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# Summary Report

## Financial and Economic Viability of Kalpasar Project

**Submitted by:**

**Grant Thornton Bharat LLP**

**&**

**G Tech Infrastructure Pvt. Ltd.**

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# Financial and Economic Viability Analysis

## 1. Kalpasar Project: Background and Introduction

The State Government of Gujarat (GoG) plans to construct an earthen dyke (~ 30 Km) and flood regulator across the Gulf of Khambhat, connecting the east and west banks of the gulf. The project (hereafter, "The Kalpasar Project," or 'The Project," "Gulf of Khambhat Development Project (GKDP)" is expected to lead to the creation of the largest man-made freshwater coastal reservoir of about 10,000 Million cubic meters for irrigation, drinking, and industrial purposes, as well as a 2 km concrete spillway, to flush out salt water or flood water.

This multi-purpose development project covers dyke, water supply for domestic, industrial, and irrigation applications, new transportation linkages, renewable energy, and tourism, thus named as GKDP.

The project is expected to (a) cater to the agricultural water requirements of Saurashtra and Central Gujarat regions for about 10.54-lakh hectares of land in 37 talukas of nine districts (~ 6500 mcm), (b) is also expected to lead to groundwater improvement in the periphery of the reservoir (7.0 lakh ha), and (c) rejuvenation of rivers in the region. More than 60 existing dykes will get permanent filling from this project. In addition, a 16-lane road and 4-lane semi-high speed rail network are planned to be built over the dyke, reducing the travel distance between Bhavnagar to Surat/Mumbai by 136 Km and between South Gujarat and Saurashtra by 110 Km (~ 2 hours of travel time).

The road project involves building ~30 km section of road over the dyke, and ~70 Km as access roads approaching to dyke. The 4-lane semi-high speed rail project involves the construction of 97.5 Km of railway. Due to the creation of the freshwater reservoir, the saline groundwater of the coastal area of Saurashtra & Central Gujarat will get converted into freshwater with reduced soil salinity.

The project is also expected to engender considerable improvement in groundwater quality as well as soil salinity of coastal area of Saurashtra & Central Gujarat. It is expected that about 1.2 lakh hectares land along the periphery of the reservoir will be reclaimed and employed for development towards value-based residential, commercial, and industrial development.

The reclaimed land around Bhavnagar/Saurashtra region would get substantial benefits from industrial estates like Dahej and Dholera. The renewable energy project

includes a wind farm (capacity 1500 MW, ~ 450 wind turbines) and a solar power plant (capacity 1000 MW, ~2 Mn solar PV modules) over an area of 4500 hectares (3000 ha for solar and 1500 ha for wind).

The estimated CUFs for wind and solar plants are 25-28% and 17-18%, respectively, as per the NIWE study. The renewable energy generated from these installations will be used to lift the fresh water from the reservoir for further applications. Overall, the project also involves flood protection in the upstream area, freshwater supply to the Saurashtra region, and renewable energy for the lift irrigation system. The project will also help in reviving the Bhavnagar port with speedy development of the region.

## 2. Objective and Scope of Work

Against this backdrop, the Ministry of Earth Sciences (MoES) has taken up the task of preparing a Detailed Project Report (DPR) for the aforesaid project. Moreover, Grant Thornton Bharat LLP (Lead Partner undertaking the Assignment in association with G Tech Infrastructure Pvt. Ltd.), hereinafter referred to as 'GT or the Consultant,' has undertaken to prepare the Financial and Economic Viability Analysis (FEVA) of the project.

The Financial and Economic Viability Analysis (FEVA) report intends to conduct the following analysis that will help the authorities in efficient decision-making pertaining to the execution of the project (including transaction structuring). (1) Collect various data points from the studies conducted by reputed bodies (facilitated by NCCR) and from in-house consultants (with GT and G-Tech Infra), and finally from secondary reputable sources (e.g., ADB, World Bank, among others).

The analysis and report are predominantly based on the information and reports provided by the Kalpasar department. External secondary data points are utilized only where utmost necessary, which is mentioned in the assumptions beside the relevant section.

Primary data collection is outside the purview of the FEVA report. (2) The FEVA analysis will employ this data in building the financial and economic model to assess the financial and economic feasibility of the project. To this end, a number of parameters will be analyzed. A more detailed description of these parameters is provided in the following relevant sections.

Given the scale and scope of the project, a number of direct and indirect benefits are expected to accrue to all the stakeholders of the project (Government, financiers, and local population, among others). In particular, the lower strata of society (e.g., daily wage earners, agricultural economy) are expected to particularly benefit from various aspects of this project. Some of these positive externalities are quantified and discussed in the economic analysis section, while some are difficult to quantify and will be part of non-quantifiable externalities.

FEVA employs revenue, project cost phasing, and opex estimates provided by NCCR, as obtained from various reputable institutions through different studies (traffic survey by L&T and Gujarat Engineering Research Institute, renewable energy report by NIWE, concept structure plan report by CEPT, Geotechnical and Structural design report from IIT Madras, freshwater reservoir related study by CWPRS, among others).

The financial analysis as part of the FEVA report comprises identifying various sources of direct revenues from different project components (water, transport, renewable, land monetization, among others) and matching them with appropriate capital and operating expenditure year-on-year to prepare cash flow, profit & loss, and balance sheet statements, for each of the project individually. This results in the assessment of project financial feasibility facilitated by measures such as internal rate of return (IRR), net present value (NPV), debt and interest service coverage ratios (DSCR and ISCR). This analysis will also help in identifying critical parameters affecting the financial feasibility of individual projects.

The analysis also entails consolidating the direct financial cost and benefits to estimate the overall profitability and financial feasibility (IRR and NPV measures) for the PPP partner and the authority (on behalf of the Govt. of Gujarat). For calculating financial feasibility, we employ a cash flow discounting procedure as explained in detail in the methodology section.

For economic analysis, net economic benefits are identified by netting the economic benefits from economic costs. First, a set of direct benefits such as savings in vehicle operating

costs and time, savings due to the reduction in environmental pollution, and employment generation are quantified using the information provided by NCCR.

Next, various capital and operating expenditures are converted into economic costs (using the Shadow cost factor approach followed by the World Bank and ADB). Moreover, the analysis considers state GST taxes as an indirect benefit from the project and as inflows to the project that can be directly ascribed to the Kalpasar project.

All of these economic costs and benefits are matched to the corresponding revenues to compute economic IRR and NPV values as part of economic feasibility analysis. Lastly, a set of non-quantifiable externalities are identified and discussed (e.g., impact on flora and fauna, socio-cultural-economic impact on the local population, impact on water bodies, local wildlife, and phenology, coastal shipping, reduction in silting, tourism and recreation among others).

A very critical part of this report is identifying the most efficient (a) cost-wise and (b) implementation-wise transaction structure that not only provides flexibility in low-cost fundraising but also provides efficiency gains in project implementation.

The study compares four transaction structures that are a mix of various PPP combinations, including EPC and DBFOT structures, and a state government SPV-based implementation.

In addition to the financial and economic modeling of these projects, the report also provides qualitative discussion pertaining to the risk metrics of these transaction structures. Each transaction structure has certain advantages and disadvantages; given the nature of project execution, the report identifies the best set of transaction structures across all four structures and provides the quantitative and qualitative analysis to determine the appropriate structure.

# 3. Financial Analysis

Financial benefits directly ascribed to the project include toll charges from road, farebox and non-fare revenues from railways, savings in electricity charges from grid power supply on account of the generation of renewable energy (wind and solar) for lifting fresh water, revenues from the freshwater supply for domestic, industrial, and agricultural (irrigation) applications, development and monetization of reclaimed land in the vicinity of the project, and development of fisheries.

The dyke project, along with the flood regulator and irrigation canal - though comprises a major share (~ 75%) of the aggregate project cost- has very limited revenue visibility ascribed to it (e.g., freshwater availability). Thus, the dyke project and auxiliary infra (flood regulator and irrigation canal) are not financially viable on a standalone basis strictly on parameters such as Financial IRR and NPV.

For example, in the Kalpasar project, a considerable investment is made in dyke construction and the development of infrastructure such as the irrigation network, flood regulator, and Narmada diversion canal. Thus, with no VGF, the equity and project IRRs to private developers are expected to be low. Therefore, to implement such projects of significant economic value, it is customary to provide VGF support (approx. 10%-20%) in addition to cash inflows from the other project components.[1] The VGF further mitigates the funding risk of these projects during the construction stage to a significant extent. The project cost phasing and profitability of different project components are discussed below.

## (A) Project cost phasing details

The total project cost is estimated at approximately Rs. 1,90,298 crores, of which the Dyke Project is likely to cost Rs. 54,117 crores, Flood Regulator Rs. 20,678 crores, Transportation Projects Rs. 16,472 crores, Irrigation and Narmada Diversion Canal Rs. 57,843 crores and Renewable Energy Rs. 14,500 crores respectively. Other Costs include costs of Decantation, Instrumentation, Desalination, Flood Protection and also include contingency charges, cost of quality control, and other statutory costs (including GST). The project Cost Estimate is as per the Detailed Project Report prepared by NCCR, updated as of 11th August 2023. Capex is phased over eight years (1-8), 2.57%, 6.59%, 10.10%, 15.34%, 15.73%, 18.64%, 22.66%, and 8.38%, respectively (as provided by the Kalpasar department).

The major project component is the dyke project and auxiliary infrastructure. The total project cost of Rs. 1,77,407 crores has been assumed for the Dyke project. It also includes the interest during the construction of Rs 25,897 crores. For computation purposes, a debt-to-equity ratio of 70:30 is assumed, which is similar to other large public infrastructure projects being executed in the country (details as provided by the authorities). The construction period of the project is estimated to be 8 years. The capex is phased out over the 8 years in the following manner (details as provided by the authorities).

**Table: Capex Phasing of Dyke Project**

| Year | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 |
|---|---|---|---|---|---|---|---|---|
| %Phasing | 2.62% | 7.38% | 11.91% | 18.49% | 16.10% | 16.21% | 20.70% | 6.59% |
| Cost in crores | 4,645 | 13,095 | 21,127 | 32,809 | 28,566 | 28,753 | 36,721 | 11,691 |

[1] https://pppinindia.gov.in/vgfguidelines

The O&M expenses are considered as 4.15% of the project cost, escalated at a rate of 5% per annum. With reference to reports provided by authorities, the operation and maintenance costs are estimated to be about Rs. 7,731 crores (Year 2035). This results in the following annual O&M expense profile.

**Table: O&M Expense Profile**

| Year | 2035 | 2045 | 2055 | 2065 | 2076 |
|---|---|---|---|---|---|
| Cost in crores | 7,731 | 12,592 | 20,511 | 33,411 | 57,144 |

The following direct benefits are expected to accrue on account of the Kalpasar Project.

## 1. Fresh Water Availability for Various Applications

Kalpasar Project aims to create a freshwater coastal reservoir in the Gulf of Khambhat by the construction of about 30 km dyke connecting the east and west banks of the Gulf. It will be the world's largest freshwater reserve of about 10,000 million cubic meters to be perused for irrigation, drinking, and industrial water application purposes. Given the irrigation, drinking, and industrial application usage and rates (discussed in detail in the relevant sections), the following cash inflows are derived on account of freshwater availability (the figures are provided for the base case scenario, and various sensitivities are provided in the relevant sections).

**Table: Cash Inflow Profile From Fresh Water Availability**

| Year (Rs Crore) | 2035 | 2045 | 2055 | 2065 | 2076 |
|---|---|---|---|---|---|
| Seasonal irrigation | 402.17 | 514.81 | 659.00 | 843.58 | 1106.85 |
| Perennial irrigation | 7.32 | 9.38 | 12.00 | 15.36 | 20.16 |
| Drinking water | 866.01 | 2246.21 | 5826.08 | 15111.35 | 43114.46 |
| Industrial use | 4029.20 | 10450.70 | 27106.42 | 70307.07 | 200594.29 |
| **Total** | ***5304.70*** | ***13221.09*** | ***33603.51*** | ***86277.37*** | ***244835.75*** |

## 2. Land Reclamation and Development

Consequent to the construction of the dyke across the Gulf and the creation of the freshwater reservoir, the presently tidal-affected land between EL + 5.0 m MSL and EL + 8.0 m MSL in the periphery of the proposed reservoir will open for reclamation and development (~1.2 lakh hectare). The proposed land will be developed as a mix of residential, commercial, and industrial areas.

The assumptions pertaining to land price escalation due to development based on pre- and post-development Jantri rates are provided by authorities. Using these rates and land areas, we compute the land valuations. The phasing of land monetization is done based on an expected return of 12% (over land value and market rates), considering the current market rates of land for 30 years. 100% of land will be monetized by the year 2064 based on a 12% return on investment criterion.

The following cash inflow schedule is obtained based on the proposed land monetization phasing schedule.

**Table: Land Monetization Phasing and Cash Inflows**

| Year | 2035 | 2045 | 2055 | 2065 | 2076 |
|---|---|---|---|---|---|
| Cumulative Phasing (IRR based) | 3.3% | 36.7% | 70.0% | 100% | 100% |
| Cash Inflow (Rs crore) | 16663 | 16663 | 16663 | 0 | 0 |
| Cumulative Inflows (Rs crore) | 16663 | 183294 | 349926 | 499894 | 499894 |

## 3. Assumptions Related to Fisheries

Based on the conceptual structure plan prepared by CEPT University, the information related to the potential of fisheries and pricing (Rs/tonnes), the following fish yield (Rs crores) has been computed.

**Table: Reservoir Fish Yield**

| Year | 2035 | 2045 | 2055 | 2065 | 2076 |
|---|---|---|---|---|---|
| Phasing of Fishery Development | 15% | 0% | 0% | 0% | 0% |
| Cumulative Development | 15% | 100% | 100% | 100% | 100% |
| Yield | 22.50 | 201.59 | 270.92 | 364.09 | 503.98 |

These cash flows related to water supply charges, land monetization, and reservoir fish yield are directly assigned to the cash inflows on account of the dyke project.

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## (B) Road Project

A total project cost of Rs. 11,959.34 crore has been estimated to construct the roadways over the dyke. It also includes the interest during construction of Rs. 2330.25 crores. For computation purposes, a debt-to-equity ratio of 70:30 is assumed, which is similar to other roadway projects.

The construction period of the project is considered to be equal to the moratorium period, i.e., 8 years. It is assumed that capex is phased out as 3.78%, 6.28%, 5.82%, 5.82%, 12.11%, 23.57%, 28.28%, and 14.32% over the construction period, i.e., eight years. To compute the projected revenues from toll, traffic forecast and toll rates over the period 2035-76 (conducted by L&T based on willingness to pay survey) for different vehicles has been employed. In addition to toll revenues, non-fare revenue is assumed to be generated from two sources, i.e., revenue from marketing and other commercial charges.

Revenue from marketing & other commercial charges is considered to be 10% of revenue from passenger trains with a yearly escalation of 3% per annum. Operation and maintenance cost is assumed as 1% of the total project cost each year with an annual escalation of 3%.

In contrast, periodical maintenance cost is assumed to be 5% of the total project cost every five years, with an escalation rate of 3%. The operation and maintenance cost rate is estimated as per the inputs provided by Kalpasar authorities.

The following project financial feasibility metrics are obtained under the base case scenario (other sensitivities are provided in the relevant annexures).

**Table: Road Project Profitability Metrics**

| | Years | 30 | 40 | 50 |
|---|---|---|---|---|
| **Project IRR** | | 20.40% | 21.02% | 21.16% |
| **Equity IRR** | | 31.76% | 31.95% | 31.97% |
| **NPV @ Cost of capital** | | | | |
| **NPV @ 12%** | | 8231.07 | 11493.13 | 13310.22 |
| **NPV @ 10%** | | 13272.22 | 19417.48 | 23506.92 |
| **NPV @ 8%** | | 20983.69 | 32727.74 | 42094.38 |
| **NPV @ 6%** | | 32943.31 | 55724.96 | 77575.04 |

| **Coverage ratios** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **2035** | **2036** | **2037** | **2038** | **2039** | **2040** | **2041** | **2042** |
| **DSCR (Debt Coverage)** | 2.50 | 2.85 | 3.25 | 3.70 | 3.53 | 4.78 | 5.44 | 6.19 |
| **ICR (Interest Coverage)** | 3.66 | 4.24 | 4.91 | 5.69 | 5.55 | 7.68 | 8.95 | 10.45 |
| **Average DSCR** | 2.50 | 2.67 | 2.86 | 3.06 | 3.15 | 3.40 | 3.66 | 3.93 |
| **Average ICR** | 3.66 | 3.95 | 4.25 | 4.59 | 4.76 | 5.18 | 5.63 | 6.12 |

*IRRs are computed over 30, 40, and 50 years of operations. NPV is computed at discount rates of 6%, 8%, 10%, and 12%.

The above results show a comfortable debt servicing profile over the period of study with DSCRs of more than 2.5 in all the years. Project and Equity IRRs remain above 20% and 31% for 30-, 40-, and 50-year periods of analysis. The project NPV remains in the comfortable range of Rs. 8,231 crores (cost of 12%) to Rs. 77,575 crores (cost of 6%).

## (C) Railway Project

A total project cost of Rs. 13,612.15crore has been assumed for the construction of the railway track between Bhavnagar and Dahej-Bharuch. It also includes the interest during construction of Rs. 2,612.41 crore at a debt-to-equity ratio of 70:30. The overall projected revenue is the sum of revenues from passenger trains, revenues from freight trains, and non-fare revenues. The total distance has been considered as 97.5 km. The fare per passenger is considered to be Rs 2.75 as per the year 2019 rates data, with an escalation of 6% per annum (which is similar to other semi-high-speed rail projects such as the Silverline project).

The phasing of passenger trains over the study period is done as per the study conducted by L&T and GEERI (provided by NCCR). The number of passenger trains per day is estimated to be 63 for 2035, which gradually increases to 159 in 2076. Referring to similar semi-high-speed rail projects (e.g., Vande Bharat), the number of daily passengers per train per day is considered as 1300.

To compute the revenue from passenger trains, the capacity utilization rate for passenger trains has been considered as 50% for 2035 and gradually increased to 97% in the year 2076 (similar to Silverline and Bangalore suburban semi-high-speed rail projects). Separate assumptions have been made to further compute the projected revenues from freight trains, for freight trains without RORO services and freight trains with RORO services. The number of freight trains without RORO and with RORO is considered to be in equal ratio. The number of freight trains per day is considered to be 10 in 2035 and gradually increases to 79 in 2076.

To compute the revenue from freight trains with RORO services, the total number of wagons per train has been assumed to be 60, whereas rates per wagon are considered as Rs 8100 with an escalation of 3% per annum.

Further, to compute the revenue from freight trains without RORO services, the number of wagons per train remains the same, i.e., 60. Tonne capacity per wagon is 50, and the rate per wagon per tonne is considered to be Rs. 180, which is referred from the tariff rate circular from the Ministry of Railways. Capacity utilization rates computed for freight trains were kept similar to passenger trains. Non-fare revenue is assumed to be generated from two sources, i.e., Revenue from Marketing and other expenses and Revenue from registration fees and stamp duty.

Revenue from marketing & other expenses is expected to be 10% of revenue from passenger trains with no yearly escalation. Whereas revenue from registration fees & stamp duty is expected to be 15% of revenue from passenger trains with no yearly escalation. In addition, the periodic replacement costs are considered as Rs 9,715 crores, Rs 23,643 crores, and Rs 9,715 crores for the years 2044, 2054, and 2064 respectively.

It may be noted that the modalities for railway operations vis-à-vis Indian Railways has not yet been finalised. It is expected that the Railways shall undertake such activities as ticketing, signaling, scheduling etc. for which they will incur some cost which will effectively be paid out of the fairbox revenue collection. At this stage, it has been found that Revenue Share of up to 5% of the fairbox revenue does not affect the profitability of the Railways project. Further detailed discussions with the Railway Authorities shall reveal the financial feasibility at their end at this revenue share.

The following project financial feasibility metrics are obtained under the base case scenario (other sensitivities are provided in the relevant annexures).

**Table: Railway Project Profitability Metrics**

| | Year | 30 | 40 | 50 |
|---|---|---|---|---|
| **Project IRR** | | 13.90% | 15.68% | 16.24% |
| **Equity IRR** | | 18.90% | 20.45% | 20.81% |
| **NPV @ Cost of capital** | | | | |
| **NPV @ 12%** | | 1,865.30 | 5,329.77 | 7,634.47 |
| **NPV @ 10%** | | 4,969.34 | 11,498.06 | 16,700.60 |
| **NPV @ 8%** | | 9,937.03 | 22,418.39 | 34,371.82 |
| **NPV @ 6%** | | 17,922.58 | 42,144.10 | 70,118.52 |

| **Coverage ratios** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **2035** | **2036** | **2037** | **2038** | **2039** | **2040** | **2041** | **2042** |
| **DSCR (Debt Coverage)** | 0.66 | 0.91 | 1.20 | 1.54 | 1.98 | 2.49 | 3.11 | 3.79 |
| **ICR (Interest Coverage)** | 0.97 | 1.35 | 1.81 | 2.38 | 3.11 | 4.00 | 5.11 | 6.41 |
| **Average DSCR** | 0.66 | 0.78 | 0.92 | 1.07 | 1.24 | 1.43 | 1.64 | 1.88 |
| **Average ICR** | 0.97 | 1.16 | 1.36 | 1.60 | 1.87 | 2.18 | 2.53 | 2.92 |

*IRRs are computed over 30, 40, and 50 years of operations. NPV is computed at discount rates of 6%, 8%, 10%, and 12%.

The above results show a comfortable debt servicing profile from 2037 onwards, with DSCRs of more than 1.20 in most of the years. Though, the first two years (2035-36) of debt servicing may require financing support. Project and Equity IRRs remain above 13% and 18% for the 30-, 40-, and 50-year period of analysis. The project NPV remains in the comfortable range of RS. 1,865 crores (cost of 12%) to RS. 70,118 (cost of 6%).

## (D) Wind

Total project cost of Rs. 15,387.00 crore has been assumed to create wind farms at four different sites (Vadgam, Motibaru, Proposed P1 region and Proposed P2 region). It also includes the interest during the construction of 2,237.63 crores.

For computation purposes, a debt-to-equity ratio of 70:30 (as per the CERC order 2021-22) is assumed, which is similar to other wind power plant projects. As per the CERC order, this cost is expected to be in the range of Rs 6.23-7.68 crore per MW (> 150MW; NIWE report considers Rs 7.00 crore per MW); cost at Rs 7.00 per MW crore for wind projects have been considered.

The construction period of the project is estimated to be 8 years. CAPEX is phased out as 0.9%, 0.6%, 0.1%, 0.1%, 16.3%, 32.8%, 32.7% and 16.5% over the period of 8 years. A tariff rate of Rs. 9.03 kWH (2038) and a CUF of 35% have been assumed for estimating the revenue from energy generation. [As per the latest CERC tariff order available, the current total, i.e., fix+variable tariff rates, are provided in the range of Rs 6-7.5 kWH (2022), along with an escalation rate of 3.84%. We consider an average tariff of Rs 6.68 kWH (2022)].

With reference to reports provided by the Kalpasar authorities, Operation and maintenance cost is considered at Rs 17.45 lakhs per MW with an escalation of 3.84% per year. It costs Rs. 262.99 crores per year (~2% of the project cost). CERC (2022) observes that O&M expenses range from Rs 6-15 Lakh per MW. However, for projects > 150 MW, the costs are closer to Rs 7-8 Lakh per MW. As per the NIWE report, the O&M cost for a wind project is considered as Rs 1.5 Lakhs per MW.

The following project financial feasibility metrics are obtained under the base case scenario (other sensitivities are provided in the relevant annexures).

**Table: Wind Project Profitability Metrics**

| | Year | 20 | 25 | 30 |
|---|---|---|---|---|
| **Project IRR** | | 13.56% | 15.19% | 15.78% |
| **Equity IRR** | | 26.37% | 27.25% | 27.49% |
| **NPV @ Cost of capital** | | | | |
| **NPV @ 12%** | | 725.84 | 1,795.78 | 2,362.18 |
| **NPV @ 10%** | | 2,021.68 | 3,634.22 | 4,568.31 |
| **NPV @ 8%** | | 3,876.75 | 6,327.00 | 7,882.70 |
| **NPV @ 6%** | | 6,520.30 | 10,275.29 | 12,892.85 |

| **Coverage ratios** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **2035** | **2036** | **2037** | **2038** | **2039** | **2040** | **2041** | **2042** |
| **DSCR (Debt Coverage)** | 2.48 | 2.55 | 2.63 | 2.71 | 2.79 | 2.89 | 2.99 | 3.09 |
| **ICR (Interest Coverage)** | 3.63 | 3.79 | 3.97 | 4.17 | 4.39 | 4.64 | 4.91 | 5.23 |
| **Average DSCR** | 2.48 | 2.51 | 2.55 | 2.59 | 2.62 | 2.66 | 2.71 | 2.75 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Average ICR** | 3.63 | 3.71 | 3.79 | 3.88 | 3.97 | 4.07 | 4.17 | 4.28 |

*IRRs are computed over 30, 40, and 50 years of operations. NPV is computed at discount rates of 6%, 8%, 10%, and 12%.

The above results show a comfortable debt servicing profile over the period of study with DSCRs of more than 2.48 in all the years. Project and Equity IRRs remain above 13% and 26% for the 30-, 40-, and 50-year period of analysis. The project NPV remains in the comfortable range of Rs. 726 crores (cost of 12%) to Rs. 12,893 (cost of 6%).

## (E) Solar

Total project cost of Rs. 5,861.71 crore has been assumed to construct the solar power plant. It also includes the interest during construction of Rs. 852.43 crore. For computation purposes, a debt-to-equity ratio of 70:30 (as per the CERC order 2021-22) is assumed, which is similar to other solar power plant projects. As per the CERC order, this cost is expected to be in the range of Rs 3.75-6.43 crore per MW (> 150MW; NIWE report considers Rs 4.00 crore per MW). A cost of Rs 7.00 per MW crore has been considered for Solar projects.

The construction period of the project is estimated to be 8 years. CAPEX is phased out as 0.9%, 0.6%, 0.1%, 0.1%, 16.3%, 32.8%, 32.7% and 16.5% over the period of 8 years. A tariff rate of Rs. 9.03 kWH (2028) and a CUF of 35% have been assumed to estimate the revenue from energy generation. [As per the latest CERC tariff order available, the current total, i.e., fixed+variable tariff rates, are provided in the range of Rs 6-7.5 kWH (2022), along with an escalation rate of 3.84%.

An average tariff of Rs 6.68 kWH (2022)] has been considered. Also, as per the CERC report, CUF has been provided in the range of 30%-45%. With reference to reports provided by the Kalpasar authorities, Operation and maintenance cost is considered at Rs 10 lakhs per MW with an escalation of 3.8% per year. It works out to Rs. 100 crores (at 2022 rates) at about 1.5% of the project cost. CERC (2022) observes that O&M expenses range from Rs 3-8.5 Lakh per MW. However, for projects > 150 MW, the costs are closer to Rs 3 Lakh per MW. As per the NIWE report, the O&M cost for a solar project is considered as Rs 8 Lakhs per MW.

The following project financial feasibility metrics are obtained under the base case scenario (other sensitivities are provided in the relevant annexures).

**Table: Solar Project Profitability Metrics**

| | Year | 20 | 25 | 30 |
|---|---|---|---|---|
| **Project IRR** | | 23.47% | 24.43% | 24.70% |
| **Equity IRR** | | 45.28% | 45.54% | 45.58% |
| **NPV @ Cost of capital** | | | | |
| **NPV @ 12%** | | 2,484.34 | 3,221.72 | 3,624.62 |
| **NPV @ 10%** | | 3,575.29 | 4,686.86 | 5,351.46 |
| **NPV @ 8%** | | 5,069.94 | 6,759.34 | 7,866.48 |
| **NPV @ 6%** | | 7,125.95 | 9,715.53 | 11,578.84 |

| **Coverage ratios** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **2035** | **2036** | **2037** | **2038** | **2039** | **2040** | **2041** | **2042** |
| **DSCR (Debt Coverage)** | 4.48 | 4.62 | 4.77 | 4.93 | 5.09 | 5.27 | 5.47 | 5.68 |
| **ICR (Interest Coverage)** | 6.57 | 6.88 | 7.21 | 7.59 | 8.00 | 8.47 | 8.99 | 9.59 |
| **Average DSCR** | 4.48 | 4.55 | 4.62 | 4.69 | 4.77 | 4.85 | 4.92 | 5.01 |
| **Average ICR** | 6.57 | 6.72 | 6.88 | 7.04 | 7.21 | 7.40 | 7.59 | 7.79 |

*IRRs are computed over 30, 40, and 50 years of operations. NPV is computed at discount rates of 6%, 8%, 10%, and 12%.

The above results show a comfortable debt servicing profile over the period of study with DSCRs of more than 4.48 in all the years. Project and Equity IRRs remain above 23% and 45% for 30-, 40-, and 50-year periods of analysis. The project NPV remains in the comfortable range of Rs. 2,484 crores (cost of 12%) to RS. 11,579 (cost of 6%).

The envisaged solar and wind power projects are expected to be spread over an area of 4500 ha, out of which 3000 ha will be allocated to solar power plant. It is expected that wind and solar energy generation will be employed to meet the dyke's power demand. As a result, the irrigation process and overall rural development will be facilitated, and environmental imbalance will be mitigated, which, in turn, will help India meet its target of 500 GW of renewable energy by 2030.

## (F) Consolidated Project Profitability

The Kalpasar project involves various sub-projects, including the construction of rail and roadways, solar & wind projects, development of freshwater reservoir and fisheries harvesting, tourism, land reclamation, and availability of fresh water for drinking, agriculture, industrial and commercial purposes. The financial model accounts for the incremental cash flows associated with these sub-projects along with the main dyke project.

Financial analysis here involves the analysis of cash flows from all the sub-projects on a nominal cost basis as per the current prices (Year 2023). For each sub-project (e.g., rail, road, wind, solar, etc.), project and equity IRR and NPV measures are computed. In addition, debt servicing coverage indicators (DSCR, ICR, etc.) are also projected.

The analysis has been conducted for 30, 40, and 50 years. For cash flow discounting, discount rates of 6%, 8%, 10%, and 12% have been employed. The analysis considers 20% VGF support (resulting in an inflated equity IRR for private developers) to make the project viable in the initial stages of construction.

Moreover, to account for any upside, a provision of 20% revenue sharing from the profits of developers to authorities is made. The following project financial feasibility metrics are obtained under the base case scenario (other sensitivities are provided in the relevant annexures).

**Table: Consolidated Project Profitability Metrics**

| | **Year** | **30** | **40** | **50** |
|---|---|---|---|---|
| **Project IRR** | | 9.13% | 10.84% | 11.61% |
| **Equity IRR** | | 26.95% | 27.38% | 27.45% |
| **NPV @ Cost of capital** | | | | |
| **NPV @ 12%** | | -34,572.88 | -18,237.35 | -7,331.02 |
| **NPV @ 10%** | | -13,141.09 | 17,628.70 | 42,333.45 |
| **NPV @ 8%** | | 21,878.22 | 80,671.00 | 137,633.89 |
| **NPV @ 6%** | | 78,575.04 | 192,597.66 | 326,387.53 |

| **Coverage ratios** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **2035** | **2040** | **2045** | **2050** | **2055** | **2060** | **2065** | **2070** |
| **DSCR (Debt Coverage)** | 1.39 | 1.92 | 2.91 | 4.73 | 8.65 | 0.00 | 0.00 | 0.00 |
| **ICR (Interest Coverage)** | 2.34 | 3.63 | 6.60 | 15.39 | 93.00 | 0.00 | 0.00 | 0.00 |
| **Average DSCR** | 1.39 | 1.62 | 1.90 | 2.39 | 3.02 | 4.47 | 6.56 | 9.47 |
| **Average ICR** | 2.90 | 3.03 | 3.75 | 5.10 | 7.18 | 10.90 | 16.09 | 23.35 |

*IRRs are computed over 30, 40, and 50 years of operations. NPV is computed at discount rates of 6%, 8%, 10%, and 12%. This analysis assumes 20% VGF and 20% Revenue sharing.

The above results show a comfortable debt servicing profile over the period of study with DSCRs of more than 1.62 till year 2055. Project and Equity IRRs remain above 9% and

26% for 30-, 40-, and 50-year periods of analysis respectively. The inflated equity IRRs reflect the VGF float during the initial years.

The project NPV remains comfortable for 8% and 6% cost of capital in the range of Rs. 21,878.22 crores (cost of 12%) to Rs. 326,387.53 (cost of 6%). For a higher cost of capital at 10%, two NPV values are positive for 40 and 50 years at Rs. 17,628.70 crore and 42,333.45 crores . It reflects the fact that dyke and auxiliary infra on its own is purely an investment with very limited cash inflow streams that can be ascribed to this project (land monetization, water supply, and fisheries).

Most of the benefits accruing to the project are indirect economic benefits (as quantified in the economic analysis section). Such projects are undertaken for their positive externalities and intangible benefits on account of socio-economic development in the region and the positive impact these projects have on social infrastructure (E.g., water, education, healthcare, etc.). These benefits are not reflected in financial profitability measures. In fact, while some of these benefits can be quantified in the economic benefits, many are not quantifiable.

# 4. Economic Analysis

Large infrastructure projects like the Kalpasar Project comprise several economic benefits that may not be captured in the financial analysis of the nature discussed in the previous section. These are often referred to as project externalities. While there are various such externalities that can be quantified, many of them cannot be quantified. The quantifiable benefits are those where the benefits can be identified and quantified in terms of market value estimates, or close economic approximations can be computed. Such benefits, net of investments, are employed for conducting economic analyses, such as economic IRR (EIRR) and economic NPV (ENPV).

The Indian government has prescribed an EIRR of 14% from a policy perspective. 2 One widely employed approach to estimate such economic benefits and carry out the analysis is called Shadow Cost Factor Estimation (SCFE approach). Detailed discussion about the methodology is provided in the respective section. In brief, the approach entails the following steps. (1) Conversion of Financial Project Cost Estimates into economic costs; (2) Conversion of Opex estimates into economic costs; (3) Identification of tangible (or direct) economic benefits accruing due to the project; (4) Quantification of the tangible (or direct) economic benefits based on sound economic principles; and finally (5) Conducting an economic analysis of the Present Value of Economic Benefits and Economic Return from the project.

In order to convert the capital and O&M costs into economic costs, shadow factors are considered, as prescribed by the Ministry of Housing & Urban Affairs (Indian government), in appraising such large-scale infrastructure projects.3 These guidelines suggest a shadow cost factor of 0.83 and 0.87 for capital and O&M costs, respectively.

In addition, the following economic benefits (based on the inputs provided by Kalpasar authorities and other consultants) are considered. These include savings in vehicle operating time (VOT), vehicle operating costs (VOC), and savings in environment in the form of carbon credits. Overall, the quantification and phasing of these benefits is provided below. The resulting economic benefits on account of VOC, VOT, and Carbon credits are quantified below.

**Table: Economic benefits from VOC, VOT, and Carbon credits (Rs crore)**

| Year | 2036 | 2046 | 2056 | 2066 | 2076 |
|---|---|---|---|---|---|
| **Economic benefits from road** | | | | | |
| *VOT Savings* | 5056.00 | 8595.80 | 12932.20 | 17621.50 | 20156.70 |
| *VOC Savings* | 1796.5 | 2656.6 | 3729.3 | 4817.3 | 5374.8 |
| **Economic benefits from Rail** | | | | | |
| *VOT Savings* | 7406.69 | 10127.97 | 11752.67 | 12954.92 | 13460.22 |
| *VOC Savings* | 1402.2 | 2149.1 | 2676.1 | 3017.2 | 3147 |
| **Carbon Credits** | 45.7 | 67.3 | 93.4 | 120.3 | 134.2 |
| ***Total Benefits*** | **15707.09** | **23596.77** | **31183.67** | **38531.22** | **42272.92** |

[2] https://www.mohua.gov.in/upload/whatsnew/59a3f7f130eecMetro_Rail_Policy_2017.pdf
[3] https://mohua.gov.in/upload/uploadfiles/files/Appraisal%20Guidelines%20for%20Metro%20Rail.pdf

Another set of economic benefits are on account of employment generation from agricultural, industrial, tourism, special investment region, and urban development. The data related to employment generation potential has been taken from the concept structure plan report by CEPT University. The detailed assumptions employed in the projection of employment benefits are provided in the economic analysis section in a detailed manner. The resulting cash inflows are shown below.

**Table: Total Value Added from Employment Generation due to the Project**

| **Year** (Rs crore) | **2035** | **2045** | **2055** | **2065** | **2076** |
|---|---|---|---|---|---|
| **Base Case** | 1,067 | 21,216 | 26,039 | 28,763 | 32,090 |

While considering the economic benefits, we considered corporate taxes (25.17%) and GST (18%). Only the state's share of GST (9%) is considered on capital expenditure items and revenues. For revenues, GST is taken as applicable. For example, no GST is considered on road toll and water supply (drinking and agriculture). For railways, 5% GST is considered. It has resulted in additional cash flows, as provided below.

**Table: Cash inflows from taxes**

| **Year (Rs crore)** | **2027** | **2028** | **2029** | **2030** | **2031** | **2032** | **2033** | **2034** |
|---|---|---|---|---|---|---|---|---|
| **GST-Capex** | 441 | 1,126 | 1,722 | 2,613 | 2,686 | 3,194 | 3,882 | 1,439 |
| **Year (Rs crore)** | **2041** | **2046** | **2051** | **2056** | **2061** | **2066** | **2071** | **2076** |
| **Corporate Tax** | 2055 | 4,479 | 11411 | 17657 | 25778 | 33450 | 51697 | 79028 |
| **GST-Revenues** | 3833 | 4002 | 4246 | 4612 | 5091 | 2,743 | 3,643 | 4,769 |

Based on the economic value of project cost and benefits, the project Economic IRR and NPV indicators for the Base-case scenario are computed (different cases pertaining to the sensitivities are provided in the economic analysis section in a detailed manner).

**Table:** Economic IRR (%) and NPV (Rs crores):

| **Economic IRR** | **%** | | |
|---|---|---|---|
| **30-Years** | 16.8% | | |
| **40-Years** | 17.3% | | |
| **50-Years** | 17.4% | | |
| **Economic NPV** | **30-Years** | **40-Years** | **50-Years** |
| **NPV@12%** | 55365.82 | 72028.23 | 78787.55 |
| **NPV@10%** | 99460.97 | 130657.27 | 145851.01 |
| **NPV@8%** | 165767.50 | 225004.34 | 259761.99 |
| **NPV@6%** | 266599.81 | 380747.81 | 461727.78 |

IRRs are computed over 30, 40, and 50 years of operations. NPV is computed at discount rates of 6%, 8%, 10%, and 12%.

The above results show a significant economic profitability level. The economic IRR remains above 16% for 30-, 40-, and 50-year periods of analysis. The economic NPV remains

comfortable in the range of Rs. 55366 crores (cost of 12%) to Rs. 461728 crores (cost of 6%). The higher levels of EIRR and ENPV reflect the long-term economic benefits associated with the project that are not captured by the FIRR measure, which only considers the direct benefits/cash inflows, as discussed previously. These economic profitability metrics also justify the investment in dyke project, which fares low on strictly FIRR and other financial parameters.

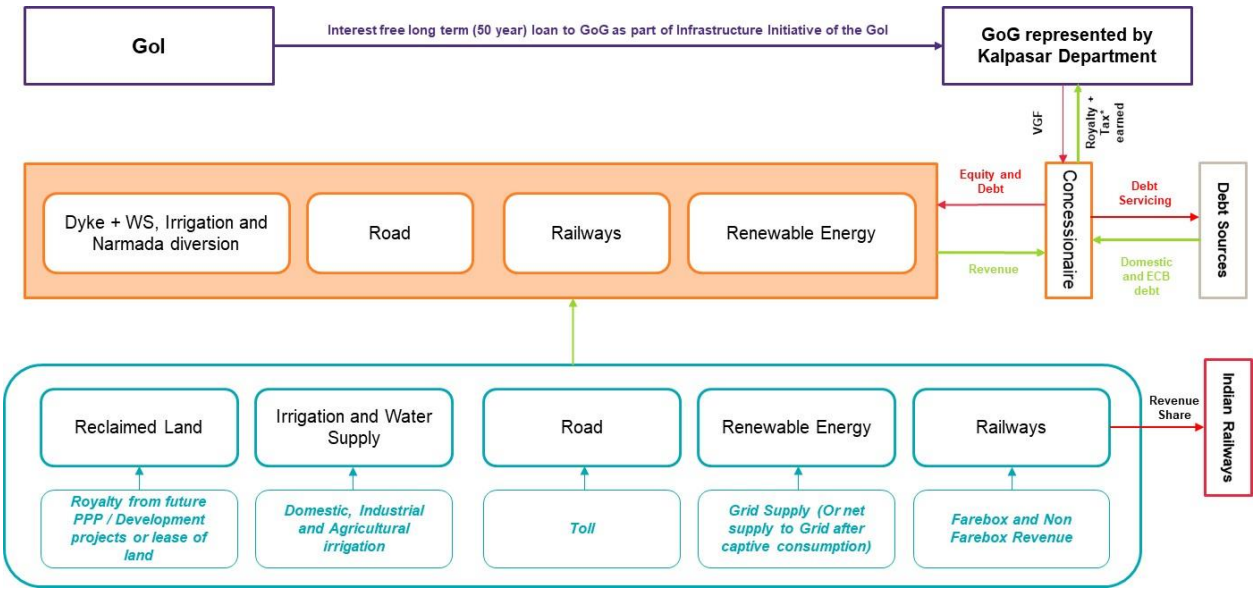
## 5. Transaction Structures

After reviewing different scenarios, the following four structures are proposed for the consideration of Kalpasar Authorities (details in the relevant section on transaction structures).

### (A) Transaction Structure 1- Single-Bundle PPP

In this scenario, we consider the project as a bundle of four sub-projects (a) Dyke, (b) Road, (c) Railways, (d) Wind and Solar (RE Project). All these projects are stipulated to be offered on a PPP basis (Design, Build, Finance, Operate Transfer: DBFOT; VGF+Revenue Share). The approach stipulates all the projects as a consolidated offering for implementation on the Design, Build, Finance, Operate, and Transfer (DBFOT) model of PPP with (a) an additional Viability Gap Funding (VGF) support (approx. 20%) to make it viable for the private developer and also (b) a revenue sharing (20%) mechanism to ensure distribution of profits, in case of any upside.

**Figure: Complete Project Bundle DBFOT-PPP**




The salient features of the proposed structure one (TS1) are as follows

- All the projects [Dyke (and water supply network), Transport (rail and road), and Renewable energy (wind and solar)] to be executed in a single project bundle with DBFOT mode of procurement;
- The private consortium (SPV) is expected to raise funds through a combination of loans from ECB/Domestic debt(RTL)/multilateral funding institutions (ADB, World Bank, JBIC/JICA, etc.), and equity from the sponsors;
- In addition, GoG is expected to provide viability gap funding (VGF ~ 20%) to support the dyke project and make it financially viable ;

- The proposed land reclaimed as part of the dyke project will be developed by the concessionaire, and the same may be considered as a de facto lease during the concession period;

- On account of this de facto land lease and any other upside to transport and renewable energy projects, the concessionaire will provide royalty/revenue share (10%-20%) to the concession authority;

- The private SPV will have the rights to sub-contract different project bundles and will be responsible for the overall quality of project execution ;

- The cash inflows to the government on account of project execution include state GST (to GoG), corporate taxes (to GoI), and royalty/revenue share from the DBFOT-PPP; also, part of the revenues will be shared with Indian Railways for its support in railway operations (ticketing, signaling, etc.,);

- Cash outflows of GoG (through the Kalpasar department) primarily include the VGF spending to make the Dyke project viable

**Summary of Financial Analysis**

The key results from the analysis are provided below (detailed workings are discussed in the relevant sections).

**Table: Project and Equity IRR**

| Year | Project IRR | Equity IRR |
|---|---|---|
| 30-Years | 9.1% | 27.0% |
| 40-Years | 10.8% | 27.4% |
| 50-Years | 11.6% | 27.4% |

**Table: Value to Govt. (VGF=20% and RS=20%)**

| Discount rate | VGF (V) | Revenue Share (RS) | Taxes (T) | Total Value= T+RS-V |
|---|---|---|---|---|
| 6% | 33,240 | 1,48,625 | 73,074 | 1,88,458 |
| 8% | 30,271 | 87,668 | 45,153 | 1,02,549 |
| 10% | 27,647 | 54,930 | 30,269 | 57,552 |
| 12% | 25,322 | 36,298 | 21,826 | 32,803 |

## (B) Transaction Structure 2- Two project Bundle EPC+DBFOT-PPP

In this scenario, we consider the project as a combo of two sub-bundle projects (a) Dyke (along with auxiliary water reservoir and irrigation network) and (b) Transport and Renewable energy bundle. **Part (a)**, that is, Dyke (and auxiliary water reservoir and irrigation network), is to be given on an EPC basis with complete government ownership. A brief discussion on the rationale for keeping the dyke (and auxiliary, offering on an EPC basis) is provided as follows. Given the significant costs involved with the dyke project (and auxiliary infrastructure ~ Rs 1,67,000 crores), it is difficult to be executed by a single consortium. Even more so due to the fact that there are not many revenue streams that are directly linked to this project, resulting in low tangible financial IRR to the private developer.

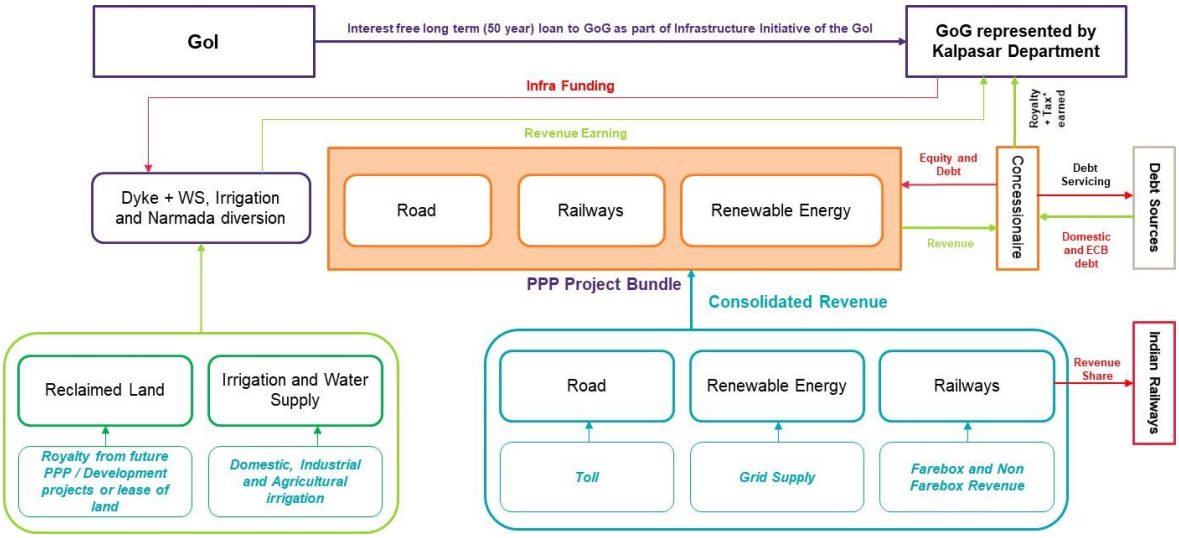
For example, in the Kalpasar project, a considerable investment is made in dyke construction and the development of infrastructure such as irrigation networks, flood regulators, and the Narmada diversion canal. Thus, with no support from authorities, the equity and project IRRs to the private developers are very low. Most of the revenue potential and economic benefits to the dyke project are of indirect nature (e.g., employment opportunities, tourism potential, fisheries, irrigation infrastructure, availability of fresh water, socio-economic development, education, healthcare, saving in travel distance time and fuel, etc.).

Most of these are indirect socio-economic benefits, expected to accrue to society over the long term. Such benefits are not visible in the financial parameters such as financial IRR, and hence, as such, do not invite much private investment and may even contaminate the balance sheet of other financially feasible projects (transportation and renewable energy). Nonetheless, such projects are of critical importance to the socio-economic development of lower strata in society. In the long-term, these projects also support the allied infrastructure (such as education, healthcare, etc.) as the lower strata of society witness growth on other economic parameters (per capita income, consumption, etc.).

**Part (b)** comprising transport and renewable energy bundle to be offered on DBFOT-PPP basis (Design, Build, Finance, Operate Transfer: DBFOT; Revenue Share) to the private developer. The approach stipulates all the projects in Part (b) as a consolidated offering for implementation on the Design, Build, Finance, Operate, and Transfer (DBFOT) model of PPP with a revenue-sharing mechanism to ensure distribution of profits in case of any upside. Since, unlike the dyke projects, these projects are profitable on a standalone basis, provision for VGF is not required. Large infrastructure projects of this nature contribute heavily to socio-economic development through the creation of social and commercial infrastructure and energy security in a sustainable manner (e.g., construction of roads, railways, renewable energy).

Moreover, the in-house captive consumption of electricity from the proposed renewable energy plants is expected to make the energy costs cheaper. Revenue-sharing is stipulated to compensate the authorities for any potential future upside from the project bundle (such as large growth in traffic volumes on toll roads and rail).

**Figure: Dyke and Auxiliary (EPC)+ Transport and Renewable (DBFOT+PPP)**




The salient features of the proposed structure two (TS2) are as follows

- All the projects to be executed in two project bundles with (a) Dyke (and water supply network) project under EPC by GoG (through Kalpasar) and (b) the transport and renewable energy bundle under DBFOT-PPP mode of procurement;
- The EPC project will be funded by GoG (through Kalpasar dept.) with requisite support from GoI under infrastructure funding schemes;
- The revenues from the Kalpasar project (land monetization, water supply, etc.) will accrue to the Kalpasar dept.;
- The DBFOT-PPP project bundle will be partly funded through a mix of debt-equity by the private developer (or concessionaire) ;
- The concessionaire will pay a royalty/revenue share (10%-20%) to the concession authority and payment from farebox revenues to Indian Railways on account of services provided (ticketing, signaling, etc.);
- The cash inflows to the government on account of DBFOT-PPP project execution include state GST (to GoG), corporate taxes (to GoI), royalty/revenue share from the DBFOT-PPP; the revenues to GoG (through Kalpasar dept) from Dyke project include revenues from land monetization and water supply (domestic, industrial, and agriculture);
- Cash outflows of GoG (through the Kalpasar department) primarily include the Capex and Opex pertaining to the Dyke project under EPC.

## Financial Analysis Summary

In the financial analysis section, we discuss the key measures of project performance evaluation (detailed workings are discussed in the relevant sections).

## 1. Value to Private Developer: Transportation and Renewable Energy Bundle: DBFOT PPP

### Table: Project and Equity IRR/NPV Analysis

| Project Level Analysis (NPV in Rs crore) | | | | | Equity Analysis (NPV in Rs crore) | | | |
|---|---|---|---|---|---|---|---|---|
| **Project IRR** | **%** | | | | **Equity IRR** | **%** | | |
| **30-Years** | 17.61% | | | | **30-Years** | 20.89% | | |
| **40-Years** | 18.39% | | | | **40-Years** | 21.70% | | |
| **50-Years** | 18.60% | | | | **50-Years** | 21.87% | | |
| **Project NPV** | **30-Years** | **40-Years** | **50-Years** | | **Equity NPV** | **30-Years** | **40-Years** | **50-Years** |
| **NPV@12%** | 16,083 | 23,612 | 27,964 | | **NPV@12%** | 10,215 | 15,577 | 18,701 |
| **NPV@10%** | 28,161 | 42,332 | 52,138 | | **NPV@10%** | 16,484 | 26,574 | 33,612 |
| **NPV@8%** | 46,670 | 73,725 | 96,212 | | **NPV@8%** | 26,162 | 45,422 | 61,562 |
| **NPV@6%** | 75,338 | 1,27,771 | 1,80,293 | | **NPV@6%** | 41,295 | 78,612 | 1,16,312 |

## 2. Value to Govt.: Dyke Project (EPC), Revenue Share, and Taxes

### Table: Value addition to the Govt.

| Value addition to Govt. | | | |
|---|---|---|---|
| **Govt. IRR** | **%** | | |
| **30-Years** | 10.9% | | |
| **40-Years** | 12.3% | | |
| **50-Years** | 12.9% | | |
| **Project NPV** | **30-Years** | **40-Years** | **50-Years** |
| **NPV@12%** | -10,774 | 3,502 | 13,040 |
| **NPV@10%** | 10,243 | 37,130 | 58,751 |
| **NPV@8%** | 43,600 | 94,964 | 1,44,857 |
| **NPV@6%** | 96,551 | 1,96,147 | 3,13,422 |

## (C) Transaction Structure 3 - Three project Bundles EPC+HAM+DBFOT-PPP

In this scenario, the overall project is considered as a combo of three sub-bundle projects (a) Dyke (and auxiliary water reservoir, and irrigation network) to be given on EPC basis with complete government ownership, (b) Road project as Hybrid Annuity Model (HAM) to a private developer, and (c) Rail and Renewable energy bundle to be offered on DBFOT-PPP basis.

**Part (a)** A brief discussion on the rationale for keeping the dyke (and auxiliary, offering on an EPC basis) is provided as follows. Given the significant costs involved with the dyke (and auxiliary) project (Approx Rs 1,67,000 crores), it is difficult to be executed by a single consortium. Even more so due to the fact that there are not many revenue streams that are directly linked to this project, resulting in low tangible financial IRR to the private developer.

For example, in the Kalpasar project, a considerable investment is made in dyke construction and development of infrastructure such as irrigation networks, flood regulators, and the Narmada diversion canal. Thus, with no support from authorities, the equity and project IRRs are very low. Most of the revenue potential and economic benefits to the dyke project are of indirect nature (e.g., employment opportunities, tourism potential, fisheries, irrigation infrastructure, availability of fresh water, socio-economic development in the region, etc.).

Most of these are indirect socio-economic benefits expected to accrue to society over the long term. Such benefits are not visible in the financial parameters such as financial IRR, and hence, as such, do not invite much private investment and may even contaminate the balance sheet of other financially feasible projects (transportation and renewable energy). Nonetheless, such projects are of critical importance to the socio-economic development of lower strata in society. In the long term, these projects also support the allied infrastructure (such as education and healthcare, etc.) as the lower strata of society witness growth on other economic parameters (per capita income, consumption, etc.).

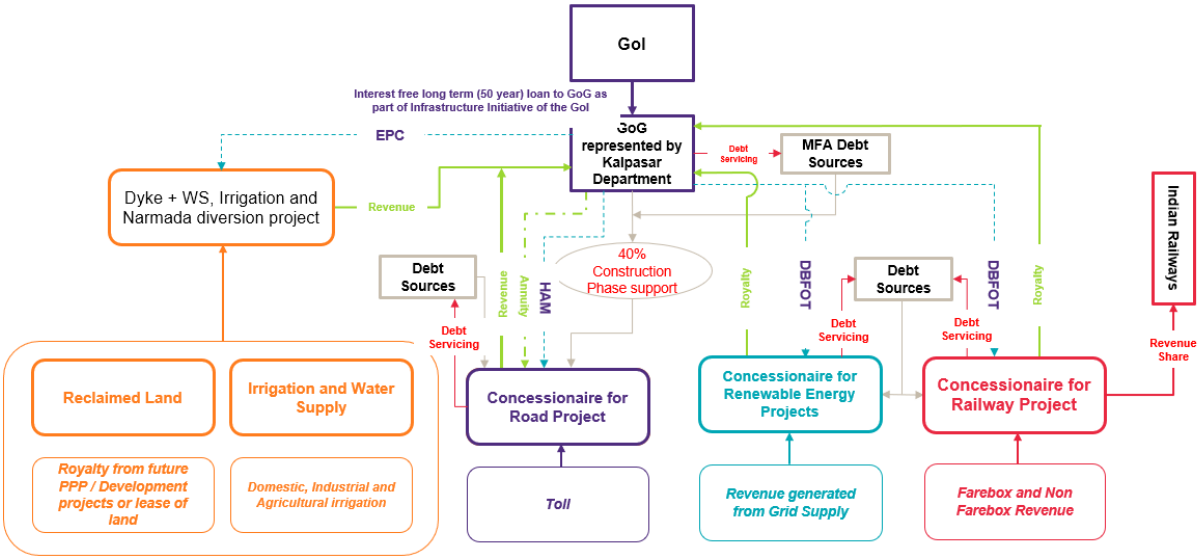
**Part (b)** includes the road project under the Hybrid Annuity Model (HAM) approach. The following are some of the salient features of the HAM model. The HAM model of PPP execution is novel and offers considerable flexibility and benefits over the conventional DBFOT/BOT structures. In this structure, the private developer will quote the NPV of the respective project bundle along with the O&M costs for the entire operation period as a bid parameter. During the construction period, 40% of the cost shall be payable to the concessionaire by the authority in five equal payments linked to the physical progress of the project. The balance of 60% will be borne by the concessionaire through a combination of equity and debt. This cost will be reimbursed in the form of inflation-indexed (weighted average of WPI and CPI) annuities post-completion of the project.

In addition to the cost, the concessionaire will also get interest on capital investment that is MCLR+1.25% to account for the opportunity cost of the concessionaire. Moreover, the concessionaire will also get inflation-indexed pass-through O&M payments, along with the annuity, till the end of the concession period (15 years). Collection of taxes, tolls, fareboxes, and other charges will be done by the authority. These revenues can be securitized to back the financing from multilateral funding institutions (MFIs). Moreover, the revenues can also support the payments of annuities (project cost and O&M), which are the obligations of Kalpasar authorities (on behalf of the state government). To fund its part, GoG can explore the issuance of special purpose tax-free bonds/multilateral funding in the form of soft loans.

**Part (c)** comprising railways and renewable energy bundle to be offered on DBFOT-PPP basis (Design, Build, Finance, Operate Transfer: DBFOT; VGF+Revenue Share) to the private developer. The approach stipulates all the projects in Part (c) as a consolidated offering for implementation on the Design, Build, Finance, Operate, and Transfer (DBFOT) model of PPP with a revenue-sharing mechanism to ensure the distribution of profits in case of any upside. Additional revenue-sharing is stipulated to compensate the authorities for any potential future upside from the project bundle (such as large growth in traffic volumes on toll roads and rail).

Moreover, these projects have proven viability and future upside. Thus, inviting private participation brings gains in efficiency and technology from the private sector. Moreover, the provision of a revenue-sharing mechanism further helps the government to take a share in case of any upside potential.

**Figure: Dyke and Auxiliary (EPC)+ Road (HAM)+ Rail and Renewable (DBFOT+PPP)**




The salient features of the proposed structure three (TS3) are as follows

- All the projects to be executed in three project bundles with (a) Dyke (and water supply network) project under EPC by GoG (through Kalpasar department), (b) Road under HAM mode, and (c) the transport and renewable energy bundle under DBFOT-PPP mode of procurement;
- The EPC project will be funded by GoG (through Kalpasar dept.) with requisite support from the GoI under infrastructure funding schemes;
- The revenues from the Kalpasar project (land monetization, water supply, etc.) will accrue to the Kalpasar department;
- The DBFOT-PPP project bundle will be partly funded through a mix of debt-equity by the private developer (or concessionaire) ;

- The concessionaire will pay a royalty/revenue share (10%-20%) to the concessioning authority and payment from farebox revenues to Indian Railways on account of services provided (ticketing, signaling, etc.);

- The road project will be executed under the HAM-PPP model wherein 40% construction support will be provided by GoG (through the Kalpasar department) linked to the physical progress of the project; the same is proposed to be funded through Area Improvement Bonds and Multilateral Funding;

- The balance 60% of the HAM construction cost will be funded through a mix of debt-equity raised by private concessionaire (~ 70:30 D:E), which will be recovered during the operational phase in the form of annuities;

- Under the HAM model, GoG will make payments to the private concessionaire for O&M, interest on capital, and recovery of construction cost to mitigate the revenue risk and funding risk ;

- The cash inflows to the government on account of DBFOT-PPP project execution include state GST (to GoG), corporate taxes (to GoI), royalty/revenue share from the DBFOT-PPP; the revenues to GoG (through Kalpasar department) from Dyke project include revenues from land monetization and water supply (domestic, industrial, and agriculture); and toll revenues and non-fare revenues from the HAM project;

- Cash outflows of GoG (through Kalpasar department) primarily include the Capex and Opex pertaining to the Dyke project under EPC; outflows on account of the HAM project include funding support in the form of annuity, interest on capital, and O&M recovery

### Summary of Financial Analysis

The key results from the analysis are provided below (detailed workings are discussed in the relevant sections).

### 1. Value to Private Developer and Govt: Road (HAM)

**Table: Project, Equity, and Govt. IRR/NPV Analysis**

| | **Project** | **Equity** | **Govt.** |
|---|---|---|---|
| **IRR (8+15 Years)** | 13.0% | 24.6% | 31.4% |
| **NPV** | **(Rs crore)** | **(Rs crore)** | **(Rs crore)** |
| **NPV@12%** | 263 | 1,284 | 8,135 |
| **NPV@10%** | 945 | 1,803 | 11,464 |
| **NPV@8%** | 1,914 | 2,505 | 16,203 |
| **NPV@6%** | 3,290 | 3,464 | 23,009 |

### 2. Value to Private Developer: Rail and Renewable Energy Bundle: DBFOT PPP

**Table: Project and Equity IRR/NPV Analysis**

| **Project Level Analysis (NPV in Rs crores)** | | **Equity Analysis (NPV in Rs crores)** |
|---|---|---|

| Project IRR | % | | | | Equity IRR | % | | |
|---|---|---|---|---|---|---|---|---|
| 30-Years | 16.2% | | | | 30-Years | 18.0% | | |
| 40-Years | 17.1% | | | | 40-Years | 19.1% | | |
| 50-Years | 17.3% | | | | 50-Years | 19.4% | | |
| Project NPV | 30-Years | 40-Years | 50-Years | | Equity NPV | 30-Years | 40-Years | 50-Years |
| NPV@12% | 7,852 | 12,119 | 14,654 | | NPV@12% | 4,258 | 7,252 | 9,054 |
| NPV@10% | 14,889 | 22,914 | 28,631 | | NPV@10% | 7,422 | 13,050 | 17,114 |
| NPV@8% | 25,686 | 40,997 | 54,118 | | NPV@8% | 12,330 | 23,064 | 32,391 |
| NPV@6% | 42,394 | 72,046 | 1,02,718 | | NPV@6% | 20,024 | 40,802 | 62,608 |

***Equity IRR is lower than project IRR due to additional revenue sharing with the government.**

### 3. Overall Value to Government: Dyke Project (EPC), Revenue Share, and Taxes

**Table: Value Addition to the Government**

| Value addition to Govt. [IRR (%) and NPV in Rs crores] | | | |
|---|---|---|---|
| Govt. IRR | % | | |
| 30-Years | 11.5% | | |
| 40-Years | 12.9% | | |
| 50-Years | 13.4% | | |
| Project NPV | 30-Years | 40-Years | 50-Years |
| NPV@12% | (5,224) | 10,894 | 21,495 |
| NPV@10% | 18,264 | 48,621 | 72,638 |
| NPV@8% | 55,384 | 1,13,384 | 1,68,767 |
| NPV@6% | 1,14,178 | 2,26,653 | 3,56,744 |

## (D) Transaction Structure 4 - Kalpasar SPV for the three project bundles (EPC+HAM+DBFOT-PPP)

In this scenario, similar to TS3, we consider the project as a combo of three sub-bundle projects (a) Dyke (and auxiliary water reservoir, and irrigation network) to be given on EPC basis with complete government ownership (b) Road project as Hybrid Annuity Model (HAM) to a private developer, and (c) Rail and Renewable energy bundle to be offered on DBFOT-PPP basis. However, now the projects will be executed under an SPV entity separate from the Government of Gujarat (GoG).

This SPV will be a separate standalone entity, that is liable for taxes, raising financing, and implementing projects on various PPP models. Thus, this SPV will be conferred with the relevant set of rights and obligations from GoG (through Kalpasar Dept.). The discussion here focuses on SPV operations, as separate project bundles (EPC, HAM, and DBFOT-PPP) are already discussed in detail in TS3 (in the previous section).

The SPV entity acts as the nodal agency for the complete project execution. Thus, it would require the relevant set of rights to act as concessioning authority to execute the (a) Dyke project through EPC-based execution (award of contract, monetization of land, development of tourism, fisheries, etc.); (b) Road project under HAM (acquisition of land, collection of toll, payment of annuity, etc.), and (c) Rail and renewable under DBFOT-PPP (acquisition of land and various permits, necessary approval to laydown railway tracks, sale/purchase of power, etc.).

This proposed ownership structure of this SPV is as follows: GoG (50%), and other organisations such as NHAI, Indian Railways etc. owning the balance 50%, the proposed paid up capital being Rs 200 crore.

This SPV will raise funding in the form of soft loans from multilateral funding agencies to part fund (1) Dyke project under EPC and (2) payment of obligations under the road HAM project (annuity, interest on capital, O&M recovery, etc.). This may require sovereign support from GoG and GoI, in the form of letter of comfort, and assignment of project receivables (toll, water & irrigation network, etc.).

In addition, the investment by the SPV is stipulated to be sourced in the form of interest free sub-ordinated loans (for long duration door-to-door tenors of 40 years) from GoG. SPV will pay dividends (after accounting for taxes) and repayment on interest free loans back to its shareholders (GoG).

Further, loans are proposed to be raised in the form of auxiliary special purpose tax free bonds (e.g., Area Improvement Bonds) and loans from multilateral funding institutions. The repayment of these loans will be done with the dividends received from the SPV and state GST inflows (engendered on account of Kalpasar project).

It is proposed that all the applicable rules of GoG (as authority awarding project contracts on PPP basis) will be applicable to the Kalpasar SPV entity, thereby making it a quasi state body.

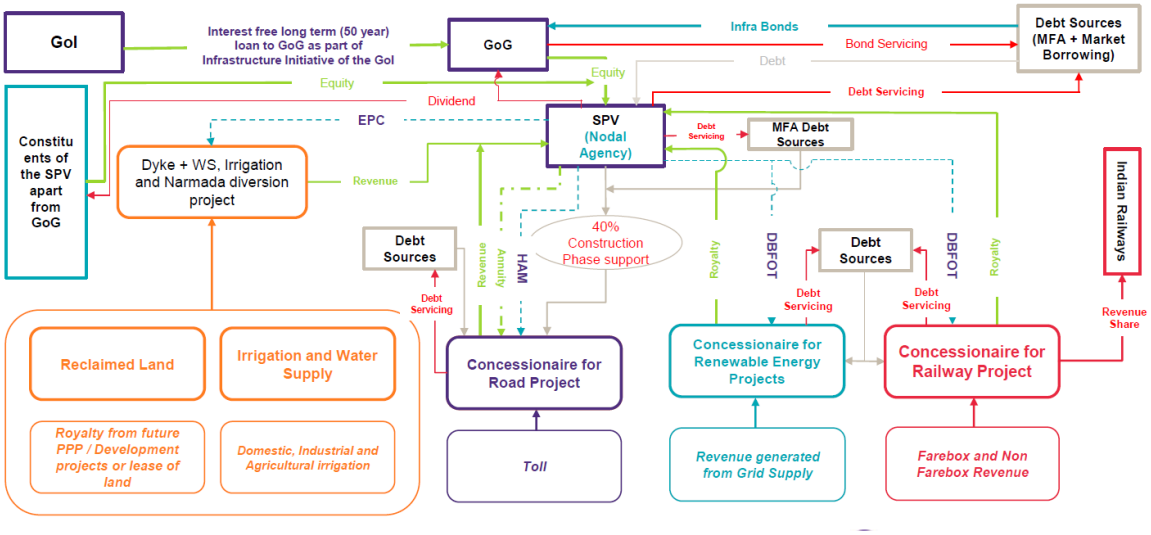
Moreover, the borrowings of Kalpasar SPV, will have financing support from GoG in the form of interest-free subordinated loans. Since the implementation of this project will result in significant benefits to GoG in the form of state GST, the same may be employed to fund the investment (interest free subordinated loans to SPV with back-ended repayments).

Unlike conventional project finance based SPV funding, this SPV does not hold asset per se, and therefore, borrowing from multi-laterals would require considerable support

(tangible and intangible from state bodies). Thus, SPV should appear like a quasi state body in its rights and obligations. The illustrative diagram for the transaction structure is provided below. The salient points of this Kalpasar SPV-based execution are as follows.

- Project to be executed by a SPV formed with equity contribution from beneficiary state government and other nodal organisations (NHAI, Indian Railways, etc.);
- The combination of project bundle includes (a) Dyke and Water network under EPC; (b) road under HAM; (c) Railway and Renewable Energy in DBFOT-PPP;
- The EPC project (a) is proposed to be part funded through funds borrowed from the;
- market, Multilateral Funding Agencies (MFA), market borrowing and equity contribution (funded partially by GoI and partially by GoG through issue of interest-bearing Infra Bonds);
- Revenues from land and water supply (domestic, industrial and agriculture), road toll, and revenue sharing from DBFOT-PPP accrues to SPV;
- Projects under DBFOT-PPP model are funded by private concessionaire through debt-equity mix;
- Revenue from DBFOT-PPP accrues to the Concessionaire and Royalty/Revenue share (~20%) is shared with the SPV; railways paid a revenue share out of earnings from Farebox Revenue;
- Projects under EPC and DBFOT can be either through project bundles or single packages executed by specific agencies (for EPC) or Concessionaire (for DBFOT);
- MFA debt, market borrowing, equity inflow from GoG with contribution from GoI, and issue of Area Improvement Bonds (Infra Bonds);
- The SPV is responsible for Construction and O&M of the EPC project;
- The SPV will also payout obligations (annuity, O&M, interest on capital) to HAM concessionaire;
- SPV will also pay dividends from profits (after providing for taxes) and repayment of interest-free loans

**Figure: Kalpasar SPV for the three project bundles (EPC+HAM+DBFOT-PPP)**




## Summary of Financial Analysis

The key results from the analysis are provided below (detailed workings are discussed in the relevant sections).

### 1. Value to Private Developer and Govt: Road (HAM) (same as TS3)

**Table: Project, Equity, and Govt. IRR/NPV Analysis**

| | Project | Equity | Govt. |
|---|---|---|---|
| **IRR (8+15 Years)** | 13.0% | 24.6% | 31.4% |
| **NPV** | **(Rs crore)** | **(Rs crore)** | **(Rs crore)** |
| **NPV@12%** | 263 | 1,284 | 8,135 |
| **NPV@10%** | 945 | 1,803 | 11,464 |
| **NPV@8%** | 1,914 | 2,505 | 16,203 |
| **NPV@6%** | 3,290 | 3,464 | 23,009 |

### 2. Value to Private Developer: Rail and Renewable Energy Bundle: DBFOT PPP

**Table: Project and Equity IRR/NPV Analysis**

| **Project Level Analysis (NPV in Rs crores)** | | | | | **Equity Analysis (NPV in Rs crores)** | | | |
|---|---|---|---|---|---|---|---|---|
| **Project IRR** | **%** | | | | **Equity IRR** | **%** | | |
| **30-Years** | 16.2% | | | | **30-Years** | 15.62% | | |
| **40-Years** | 17.1% | | | | **40-Years** | 17.16% | | |
| **50-Years** | 17.3% | | | | **50-Years** | 17.58% | | |

| Project NPV | 30-Years | 40-Years | 50-Years | | Equity NPV | 30-Years | 40-Years | 50-Years |
|---|---|---|---|---|---|---|---|---|
| **NPV@12%** | 7,852 | 12,119 | 14,654 | | **NPV@12%** | 2,431 | 5,107 | 6,725 |
| **NPV@10%** | 14,889 | 22,914 | 28,631 | | **NPV@10%** | 4,916 | 9,945 | 13,596 |
| **NPV@8%** | 25,686 | 40,997 | 54,118 | | **NPV@8%** | 8,830 | 18,419 | 26,798 |
| **NPV@6%** | 42,394 | 72,046 | 1,02,718 | | **NPV@6%** | 15,033 | 33,592 | 53,182 |

***Equity IRR is lower than project IRR due to additional revenue sharing (25%) with the government.**

## 3. Overall Value to SPV: Dyke Project (EPC), HAM and DBFOT Revenue Share Table: Project and Equity IRR/NPV Analysis

| Project Level Analysis (NPV in Rs crores) | | | | | Equity Analysis (NPV in Rs crores) | | | |
|---|---|---|---|---|---|---|---|---|
| **Project IRR** | **%** | | | | **Equity IRR** | **%** | | |
| **30-Years** | 9.3% | | | | **30-Years** | 14.0% | | |
| **40-Years** | 10.8% | | | | **40-Years** | 15.4% | | |
| **50-Years** | 11.5% | | | | **50-Years** | 15.9% | | |
| **Project NPV** | **30-Years** | **40-Years** | **50-Years** | | **Equity NPV** | **30-Years** | **40-Years** | **50-Years** |
| **NPV@12%** | (26,445) | (14,975) | (7,611) | | **NPV@12%** | 8,161 | 19,299 | 26,663 |
| **NPV@10%** | (8,909) | 12,682 | 29,370 | | **NPV@10%** | 21,009 | 41,981 | 58,669 |
| **NPV@8%** | 19,375 | 60,605 | 99,097 | | **NPV@8%** | 41,161 | 81,218 | 1,19,710 |
| **NPV@6%** | 64,700 | 1,44,608 | 2,35,050 | | **NPV@6%** | 73,014 | 1,50,667 | 2,41,109 |

## 4. Overall Value to SPV: Dyke Project (EPC), HAM and DBFOT Revenue Share Table: PV to SPV (Project/Equity)/Govt/Total (Rs crore)

| Discount rate | SPV-Project | SPV-Equity | Govt. | Total |
|---|---|---|---|---|
| **12%** | -7,611 | 26,663 | 27,623 | 20,012 |
| **10%** | 29,370 | 58,669 | 42,671 | 72,041 |
| **8%** | 99,097 | 1,19,710 | 70,369 | 1,69,465 |
| **6%** | 2,35,050 | 2,41,109 | 1,24,018 | 3,59,068 |

## (E) Comparison of different structures and recommendation

In this section, a comparative analysis of different transaction structures is discussed, using the empirical analysis carried out in the previous sections. In addition to the much relevant quantitative parameters such as IRR and NPV, and Value-for-Money (VFM), qualitative parameters are also discussed in detail.

### 1. Quantitative Analysis: Overall value and Value-for-Money

The discounted net present value of these projects is computed at different opportunity costs (6%, 8%, 10%, 12%). Though 10% and 12% are more acceptable industry benchmarks, the values are also shown for 6% and 8%. For TS4, the present value includes the value to Kalpasar SPV and to GoG as well. For the computation of VFM, we take TS1 as the benchmark structure and compute the incremental value added by different PPP structures. Overall, the analysis suggests that TS3 and TS4 fare much better than TS1 and TS2. Through it may seem that quantitatively TS1 is better than TS2; however, given the execution risks involved in TS1, it would be the least desirable structure. This is so because, it has huge concentration of project risk. Finding one consortium that can execute the complete project bundle is a difficult task, with risks related to funding, execution, among others. Thus it is desirable to have projects in separate bundles, such as those in TS3 and TS4 that leads to diversification of risk. Each project is executed separately by a private developer in an appropriate mode (HAM and DBFOT) that suits the nature of the project, which further mitigates the risks associated with the project.

**Table: Overall value to the Govt. (Rs crore)**

| Discount rate | TS1 | TS2 | TS3 | TS4 |
|---|---|---|---|---|
| 6% | 31,630 | 13,040 | 21,571 | 20,012 |
| 8% | 55,942 | 58,751 | 72,728 | 72,041 |
| 10% | 1,00,270 | 1,44,857 | 1,68,873 | 1,69,465 |
| 12% | 1,85,102 | 3,13,422 | 3,56,870 | 3,59,068 |

**Table: Value-for-Money (VFM: Rs crores)**

| Discount rate | TS2 | TS3 | TS4 |
|---|---|---|---|
| 12% | -18,590 | -10,059 | -11,619 |
| 10% | 2,809 | 16,786 | 16,098 |
| 8% | 44,587 | 68,604 | 69,195 |
| 6% | 1,28,320 | 1,71,768 | 1,73,966 |

## 2. Qualitative Analysis: Risk Comparison between different structures

The four TSs have been evaluated on seven parameters:

1. Ease of procurement
2. Design challenge
3. Ease of taking approvals
4. Financial closure
5. Execution risk
6. Time-cost overrun possibility

Overall, TS3 and TS4 employ the most suitable method of procurement for the respective projects. TS3 uses EPC for the Dyke project, HAM for the road project, and DBFOT for the rail and renewable energy projects. TS4 uses a Kalpasar SPV to execute all four projects.

The hybrid nature of TS4 (Kalpasar SPV) makes it more suitable than TS3. This is because the SPV is more independent in terms of financing and decision making related to various aspects of procurement.

In terms of design challenge, TS4 is also found to be superior to TS3. This is because the project bundles are diversified in TS4, which mitigates the risk and allows for more targeted assignment to private PPP partners with demonstrated track records in the given set of industry businesses.

In terms of ease of taking approvals, TS4 is again found to be superior to TS3. This is because the Kalpasar SPV is a quasi-state entity, which has the credibility of a public unit and at the same time the agility to turnaround things in a swift manner.

On the financial closure dimension, TS4 appears to have an advantageous position. This is because it is a quasi-state entity, which may find it easier to raise debt from MFIs and interest free loans from the Government of Gujarat (GoG). Moreover, it is independent from GoG and can identify new sources of funds engendered on account of the Kalpasar project. These new sources can be assigned/securitised to mitigate the funding requirements of the project.

In terms of project execution risk, time-cost overrun and overall distribution risk also, TS4, and to an extent TS3 appear to be more efficient. This is primarily ascribed to (a) the diversified nature of project bundles which employs different procurement methods according to the risk and visibility of cash flows in the project (b) the unique hybrid positioning of Kalpasar SPV as quasi state entity, that may have the credibility and incentives to execute a large social-infrastructure project such as Kalpasar, and at the same time the agility and efficiency gain of the nature assigned to PPP/Private nature of execution.

Overall, TS4 appears to be the most suitable transaction structure for the Kalpasar project. It addresses the key challenges of procurement, design, approvals, financial closure, execution risk, time-cost overruns, and overall risk in a comprehensive and efficient manner.

## 7. Recommendation

Examining all the transaction structures on qualitative and quantitative parameters TS3 and TS4 turn out to be the efficient ways of executing the project. However, TS4 appears to be marginally more efficient as it is hybrid structure that has several benefits compared to TS3.

The standalone independent SPV mode provides more flexibility and freedom to implement large projects of this nature, which may be prone to time and cost overrun, if implemented pure under public ownership. The proposed Kalpasar SPV is stipulated to independently tie-up the financing, and identify and allocate sources and uses of funds to avoid cash flow fungibility, which often afflicts the fund management in public work procurements.

Given the quasi-state owned nature of Kalpasar SPV, it can avail low cost financing from MFIs as well as interest free subordinate debts from GoG. Moreover, execution of large Dyke project on a separate balance sheet of SPV will not vitiate the GoG fiscal position. For example, funds given to SPV will be in the form of interest free debt. The repayment of these borrowings will provide the cushion of GoG debt servicing.

Moreover, the funds given to the SPV and revenue sources generated from the Kalpasar can be more efficiently identified and employed for the development of the project. Thus, on an overall basis, TS4 appear to be the best mode of project execution.

In recommending TS4, the following other recommendations are also being proposed:

1. Project through be executed through a SPV in which the State Government shall hold 50% equity stake; balance equity stake to be held by organisations such as NHAI, Indian Railways etc.

2. The SPV to act as a quasi-state (Government) organisation with the executive powers as bestowed upon the respective departments e.g., land, revenue etc.

3. SPV to independently tie-up the financing and identify and allocate sources and uses of funds to avoid cash flow fungibility. Government of Gujarat to provide State Guarantee as comfort for market borrowings of the SPV.

4. Unlike in other places, the land available in the project is reclaimed land for which a substantial amount of infrastructure expenses needs to be incurred by the Project Authorities. Owing to this, the Project Authorities (through the Project Development Agencies as decided appropriately) should look to monetise the land in a manner which is both economically feasible as well as financially profitable to the overall sustainability of the project.

5. SGST accruing from the project should be earmarked in the State Budget as budgetary support exclusive for the purpose of the project.

6. Government of Gujarat to issue Area Improvement Bonds with coupon rates of 6% as Senior Debt (as compared to Interest Free long-term loan from the Government of India), to be serviced through dividends received from the SPV and through the budgetary support as mentioned at Sl. No. 3 above.

7. At least 10% of the loan from the Government of Gujarat to the SPV to be sourced from Government of India (GoI) through the Interest Free Long-Term Loan for a 50-year period. Higher quantum of loans is recommended from GoI to reduce

dependency on dividend to be received from the SPV which effectively would be utilised for bond repayment. That would allow the SPV to either retain a part of the profit for future exigencies, or alternately, that would allow the SPV to pass on social sector benefits in the form of lower charges on supply of water for irrigation purposes.

8. SPV to enter into negotiations with Indian Railways regarding the modalities of passenger and freight train operations. Depending on the modalities finalised, Revenue Sharing mechanism with the Railways to be finalised. At this stage, it has been found that Revenue Share of up to 5% of the fairbox revenue does not affect the profitability of the Railways project. Further detailed discussions with the Railway Authorities shall reveal the financial feasibility at their end at this revenue share.

9. Minimum Royalty from the DBFOT projects, Railways and Renewable Energy, to be fixed at 25%

10. The road and railways project are of considerable length, more than 60 Kms. To effectively execute the project, Concessionaires for the respective projects may be allowed to sub-contract these are EPC packages of smaller lengths. Similar arrangement may also be allowed under the Concession Agreement for the Renewable Energy package.

11. Procurement and Contract Management for a project of this extent needs to be suitably executed and monitored. It is recommended that a separate PMU dedicated towards Procurement and Contract Management may be set up.

12. For effective project execution, it is proposed that separate PMUs be set up for the different packages and a Master PMU to oversee the separate packages. This would also ensure that the SPV has minimum manpower requirement, with the stated manpower solely dedicated towards decision making responsibilities.

13. There is massive potential to harness the agricultural output through sustained irrigation and multi-cropping. The Government of Gujarat or the SPV should take concentrated efforts through reputed Agriculture Institutes of excellence to identify the cropping and multi-cropping.