



Project Information Document/ Integrated Safeguards Data Sheet (PID/ISDS)

Concept Stage | Date Prepared/Updated: 20-Nov-2018 | Report No: PIDISDSC21625

**BASIC INFORMATION****A. Basic Project Data**

| | | | |
|--|--|--|---|
| Country India | Project ID P162679 | Parent Project ID (if any) | Project Name West Bengal Major Irrigation and Flood Management Project (P162679) |
| Region SOUTH ASIA | Estimated Appraisal Date Dec 10, 2018 | Estimated Board Date Jul 31, 2019 | Practice Area (Lead) Water |
| Financing Instrument Investment Project Financing | Borrower(s) Republic of India | Implementing Agency Irrigation and Waterways Department | |

Proposed Development Objective(s)

The Project Development Objectives are to improve irrigation service delivery, strengthen flood risk management and improve climate change resilience in the Project area.

Improving irrigation services includes management reforms as pursued under Component A, and infrastructure modernization to reinforce the management improvements under Component B. Strengthening flood risk management is addressed under Component C. These improvements will help improve the resilience of the Project area to climate change.

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

| | |
|---------------------------|--------|
| Total Project Cost | 413.00 |
| Total Financing | 413.00 |
| of which IBRD/IDA | 290.00 |
| Financing Gap | 0.00 |

DETAILS**World Bank Group Financing**

| | |
|--|--------|
| International Bank for Reconstruction and Development (IBRD) | 290.00 |
|--|--------|

Non-World Bank Group Financing



| | |
|---------------------|--------|
| Counterpart Funding | 123.00 |
| Borrower | 123.00 |

Environmental Assessment Category

B - Partial Assessment

Concept Review Decision

Track II-The review did authorize the preparation to continue

B. Introduction and Context

Country Context

- 1. India continues to be the world’s fastest growing major economy.** The economy has recovered from the disruptions caused by demonetization and the introduction of the Goods and Services Tax (GST) in 2017. While growth dipped to 6.7 percent in FY17/18, it has accelerated in the last two quarters to reach 8.2 percent in Q1 FY18/2019. This was supported by a revival in industrial activity, strong private consumption, and a rise in exports of goods and services. At the same time, the external situation has become less favorable.
- 2. Since the 2000s, India has made remarkable progress in reducing absolute poverty.** Between FY2011/12 and 2015, poverty declined from 21.6 to an estimated 13.4 percent at the international poverty line (2011 PPP US\$ 1.90 per person per day), continuing the earlier trend of robust reduction in poverty. Aided by robust economic growth, more than 90 million people escaped extreme poverty and improved their living standards during this period. Despite this success, poverty remains widespread in India. In 2015, with the latest estimates, 176 million Indians were living in extreme poverty while 659 million, or half the population, were below the higher poverty line commonly used for lower middle-income countries (2011 PPP US\$ 3.20 per person per day). Recent trends in the construction sector and rural wages, a major source of employment for the poorer households, suggest that the pace of poverty eradication may have moderated.
- 3. Despite the impressive achievements in terms of poverty reduction, India’s agriculture has been on an unsustainable resource-intensive path.** With an annual per capita water availability of close to 1,000 m³, India is one of the most water stressed countries in the world. According to the recently prepared Systematic Country Diagnostic (SCD)¹, India’s land would need to generate 4 times more GDP to achieve China’s GDP, and India’s irrigation water would need to produce 5 times more agricultural GDP to achieve China’s level of water productivity.² Inefficient resource use also causes negative environmental impacts such as loss of arable land and biodiversity, declining groundwater tables and pollution of water resources. India is also among the countries most vulnerable to the impacts of climate change, which are amplified by its dependence on climate-sensitive sectors for their livelihoods³. It is estimated that, in the absence of adaptation or policy changes, farm incomes will decline by 12 percent in the

¹ World Bank Group (2018) India: Systematic Country Diagnostic: Realizing the promise of prosperity (Report No. 126284-IN)

² Irrigation uses 688 bm³ in India and agricultural GDP is 17 percent of an approximate \$2 trillion economy while in China irrigation uses 355 bm³ and agricultural GDP is about 9.7 percent of an approximate \$10 trillion economy

³ World Bank (2012).



coming years⁴.

4. **India will need to adopt a growth path that uses water more efficiently** and that increases productivity and generates jobs in rural areas. Incomes in rural areas need to be boosted through higher agriculture growth and generation of more jobs through rural enterprise.

Sectoral and Institutional Context

West Bengal

5. **West Bengal has the sixth largest economy in India**, and produces over six percent of the country's GDP. In the period 2007-2012, the average gross state domestic product (GSDP) growth rate was 6.2 percent⁵, one of the lower rates in India. Almost 70 percent of the population is living in rural areas, and 22.5 and 14.7 percent of the rural and urban population live below the poverty threshold⁶. Agriculture contributes an estimated 20 percent to the GSDP and employs over 55 percent of the workforce. West Bengal is one of the most important food producing states in India, producing nearly 20 percent of the rice and 33 percent of the potato production. Economic growth, poverty reduction and employment creation depend to a large extent on agricultural growth.

6. **Average paddy yields in West Bengal are consistent with and higher than the national average** in Rabi (3.4 tons/ha) and Kharif season (2.7 tons/ha)⁷, respectively. At over 185 percent, West Bengal has one of the highest cropping intensities of the country, but much of this high intensive agriculture comes at the expense of inefficient and unproductive resource use, as irrigated paddy dominates the cropping pattern.

7. **West Bengal is relatively rich in water resources** and accounts for 7.5 percent of the country's water resources. The annual average rainfall is around 1,760mm, of which 76 percent is received in the monsoon months and the rest in the non-monsoon period. The net annual water resource generated from rainfall in West Bengal amounts to 51.0 billion cubic meter (BCM)⁸. The groundwater resources are 34.2 BCM.

8. **Despite abundance, use of water is low**. Over 20 percent of the rain infiltrates through the soil, and as much as 49 percent is returned to the atmosphere through evapo-transpiration⁹. The state has created little storage to carry abundant monsoon rainfall into the water-scarce post-monsoon season, and the potential to create major storage is limited. The state currently uses about 42 percent of the total annual net replenishment of groundwater.

9. **West Bengal has 37,660 km² flood prone area** spread over 111 blocks, out of a total geographical area of 88,752 km². An analysis of the statistics of floods that occurred during last 41 years shows that only in 5 years the state has not faced a severe flood. The total devastated area exceeded 20,000 km² in 4 different years and the flood of medium magnitude (i.e. between 2,000 to 10,000 km²) occurred on 10 occasions. In view of its geographical location at the tail end of the Ganga Basin and several other Himalayan rivers, the problem of flood management and drainage in the State is acute.

⁴ Climate, Climate Change, and Agriculture – Economic survey 2017-18. <http://mofapp.nic.in:8080/economicsurvey/pdf/>

⁵ <http://www.esopb.gov.in/Static/PDF/GSDP/Statewise-Data/StateWiseData.pdf>

⁶ Indiatat

⁷ Indiatat

⁸ West Bengal Pollution Control Board (WBPCB), 2009

⁹ West Bengal State Action Plan on Climate Change <http://www.moef.nic.in/downloads/public-information/West-Bengal-SAPCC.pdf>



Damodar Valley Command Area

10. The Damodar Valley Command Area (DVCA) irrigation scheme is located downstream of Durgapur on the Damodar river in the districts of East and West Burdwan, Howrah, Bankura and Hoogly. The scheme covers 393,964 ha and provides an important source of livelihoods for 2.68 million people. The canals are fed via headworks at Durgapur Barrage. Flow in the Damodar River to Durgapur is regulated by five upstream dams located in Jharkhand. Irrigation water is supplied from these dams during three seasons: Kharif (June to October), Rabi (November to February) and Boro (January to May).

11. The DVCA is 60 years old, and in need of modernization. Key challenges include degradation of infrastructure and inadequate irrigation management, including poor quality of service delivery, inefficient irrigation and absence of a monitoring system. As a result of the degradation of the system, surface water no longer reaches the middle and tail reaches of the canal network. Out of the 41 blocks covered by the DVCA irrigation network, no irrigation water is received by 23 blocks in Rabi season, 19 blocks in the Boro season and 3 blocks even in the Kharif season. While the design discharge at the head of the LBMC and RBMC are 260 m³/s and 64 m³/s respectively, the maximum discharges recorded in 2017 were only 212 m³/s and 57 m³/s. Of the 1,700 canal regulatory structures, almost half are severely or moderately damaged. Tail end farmers are compelled to abstract groundwater, which increases the costs of cultivation and undermines the sustainability of the scheme.

12. Groundwater has traditionally been drawn from shallow aquifers (to about 20 m deep) with centrifugal pumps, but overuse of this source has obliged farmers to increase the number of deeper wells with submersible pumps. Between 2005 and 2017, the number of semi-critical blocks increased from five to 19 (out of a total of 41 blocks)¹⁰. Out of 40 monitoring wells (in 40 different blocks) in the DVCA, 23 wells showed depletion of more than 3m from 2001 to 2016. A recent World Bank study concluded that the buffering impact of groundwater on production volatility is declining.

13. As the system continues to degrade and the effects of climate change increasingly affect system performance, surface water is progressively being confined to the top-end of the system, groundwater use in the tail end continues to increase, groundwater levels continue to decline, and the sustainability of the scheme continues to erode.

14. The Lower Damodar basin area is historically flood-prone. Some 33.5 thousand hectares of the cropped area and 461,000 people are affected annually on average. The major causes of floods, waterlogging and drainage congestion in the Project area include inadequate utilization of flood storage potential in the five reservoirs in Jharkhand, river bed siltation, unauthorized construction of bunds across channels and rivers to augment the water availability during Boro ('Boro bunds') and the tidal effect at the outfall of the channels and rivers.

15. Financial viability in the DVCA is realized as challenges. The Government of West Bengal (GOWB) recognizes that the Project beneficiaries in the DVCA are generally part of the bottom 40 percent in terms of income, and sees irrigation as one of its key public investments to reduce poverty. The GOWB realizes that recovery of Operation and Maintenance (O&M) costs from farmers is important to promote an efficient use of natural and public resources, but prefers to cover irrigation investment and O&M costs by the public budget.

16. While the allocation of public funds for O&M has been relatively predictable over the past years, allocation

¹⁰ A semi-critical block is a block where the ground water table has on average been declining by over 0.20m per year over a five-year period.



and expenditures cannot be tracked on a scheme basis and don't allow for comparison and benchmarking across the State. Budgets continue to be allocated based on standard per hectare norms and previous years' allocations, and not on an assessment of maintenance needs and systematic asset management.

17. Climate change is expected to amplify the challenges that the system is facing. In response to increasing rainfall unpredictability that is associated with climate change, farmers will even more rely on groundwater in future, especially during the Kharif season. Rising temperatures will increase crop water requirements, will increase the premium on reliable supplies and the quality of service delivery, and will reduce the area that can be irrigated through surface water. Higher climate variability and higher temperatures will increase the demand for groundwater and further jeopardize the sustainability of the system. More extreme weather events will increase flooding, but sea level rise will impede the timely drainage of these floods and will affect the large population that live in the DVCA, and intrusion of saline water will force farmers to increase water withdrawal to flush out the salinity, while making groundwater less suitable for irrigation. In the longer run, more extreme events and the resulting higher rates of upstream erosion and downstream sedimentation will also have an impact on the storage capacity of the upstream dams and will reduce their capacity to buffer these extreme events.

18. The Durgapur barrage and the DVCA are managed by the Irrigation and Waterways Department (IWD) of the GOWB. The operation, maintenance and management of water distribution are managed by engineers from block level to sub divisional and district levels (see fig. x). IWD supplies water up to the level of field outlets ("chaks"). After the field outlet, distribution, management and maintenance are done by the beneficiaries that are organized in Chak Committees. Distribution infrastructure is generally absent within chaks and water flows from plot-to-plot.

19. An institutional analysis of IWD was conducted during Project preparation. The analysis revealed the following institutional weaknesses in the management of the scheme:

- Water data monitoring is virtually absent. Those data that are being collected are based on hand-written records and visual inspection of gauges. No remote control or automation of hydraulic infrastructure is taking place.
- Gaps exist in the monitoring and management of groundwater. Specifically, while groundwater levels are being monitored by CGWB, no monitoring of the magnitude of groundwater withdrawal is undertaken. No licenses are issued for installation of groundwater wells.
- Severe shortages in staffing are a regular feature in the DVCA. IWD is recruiting on a seasonal basis contractual staff to cover the shortfall.
- A Public Expenditure Review that was conducted during Project preparation concluded that O&M is severely underfunded. No systematic process is in place for the planning and prioritization of maintenance works, nor for the management of hydraulic assets.
- Weak arrangements are in place for gauging user satisfaction with the quality of irrigation service delivery and for grievances redress.
- Lack of transparency in the management of the system, in the allocation of water and in the implementation of maintenance works. IWD does not prepare an annual Citizen Report Card and does not have irrigation service delivery standards.
- Little stakeholder participation in the management of the system and the allocation of water. Water allocation is decidedly top-down and there is little opportunity for demand-based water delivery.

Theory of Change

20. The Project will address the following challenges:



- **Inadequate irrigation service delivery.** IWD is responsible for the management of large-scale irrigation systems in West Bengal. In the absence of data monitoring, it is difficult to evaluate the performance of IWD against benchmarks and service standards, or to get a sense of the efficiency and effectiveness of the use of its resources, including the reliability, accuracy and equity of water delivery, quality of services, compliance with agreed delivery schedules, etc. The project will establish a modern MIS and provide incentives for improved management, including outsourcing of O&M to Operators on a performance basis.
- **Degraded and outmoded infrastructure.** The physical infrastructure is in poor condition due to deferred maintenance and needs modernization. Mere rehabilitation to the state in which the scheme was when it was conceived is inadequate as the situation has changed dramatically: groundwater now irrigates a cumulative area of over 400,000 hectares (over 40 percent) during Kharif, Rabi and Boro seasons and the system has de facto been converted into a conjunctive use system. In addition, cropping intensities are among the highest in India. During Project preparation, an assessment has been conducted to identify the location and type of hydraulic infrastructure that will best support the Project's objective to improve the quality and transparency of service delivery. The project will modernize irrigation infrastructure at all levels, and will pilot pressurized water supply in selected chaks.
- **More efficient use of public resources for O&M.** Performance management on the basis of evidence, including expenditure data, will help identify and resolve the causes of inefficiency. The project will also introduce modern asset management that will allow for the systematic monitoring and rational assessment of maintenance needs and allocation of resources that is based on these needs.
- **Strengthen flood risk management:** The project will invest in measures to reduce flooding, including selected dredging and repairs of embankment.
- **Climate change resilience:** The Project will help farmers continue using groundwater and strengthen their capacity to respond to water variability.

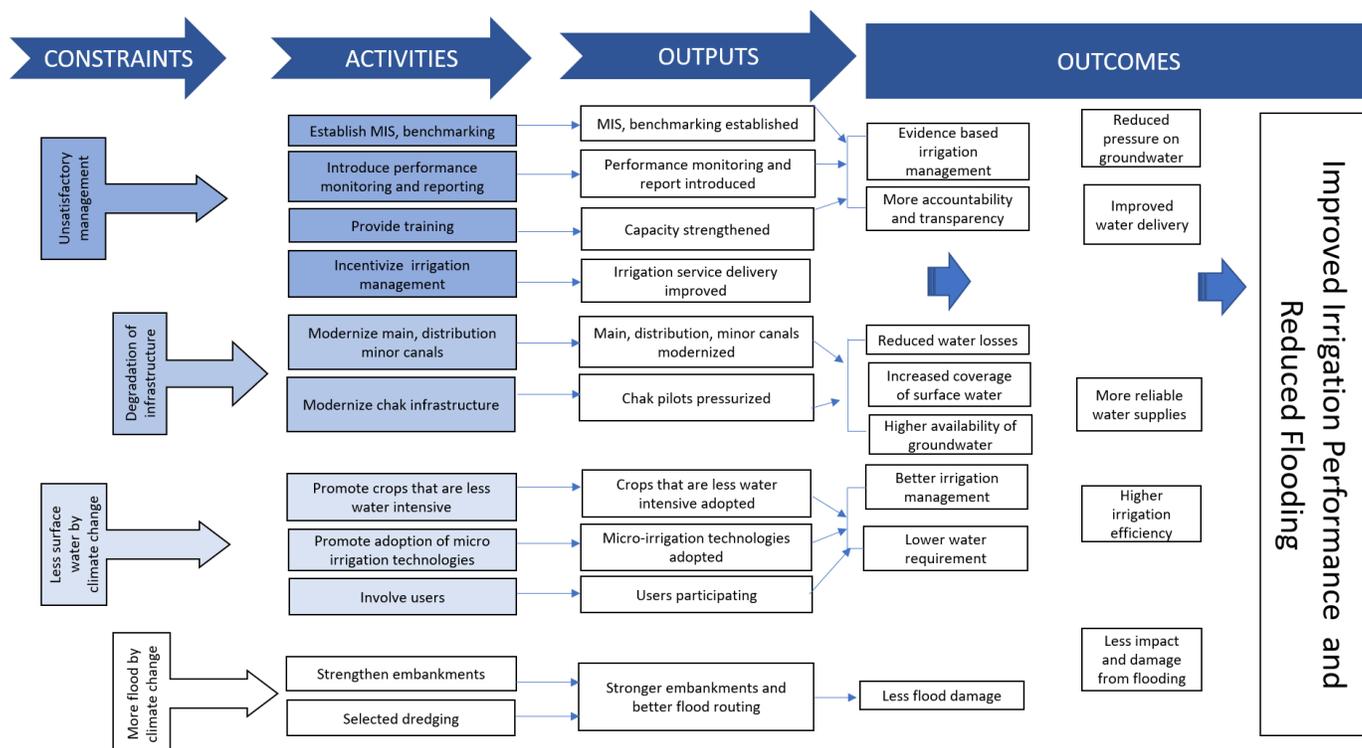


Fig 1: Theory of Change

Relationship to CPF

21. The proposed Project contributes to India’s recently approved Country Partnership Framework (CPF, 2018-22), including support for a more resource-efficient, inclusive and diversified growth in the rural sector. The Project aims to do so by promoting performance-based irrigation service delivery through private irrigation Operators. A more client-oriented irrigation service delivery aims to strengthen the inclusiveness of irrigation. The Project will also work closely with the West Bengal Accelerated Agriculture Transformation Project (P168999) that is currently under preparation to promote agricultural diversification.

22. The proposed Project will also contribute to the following “How’s” that the CPF identifies:

- (i) strengthening public sector institutions: the Project will strengthen public sector capacities and introduce and benchmark service delivery standards, client feedback, grievances redress and citizen report cards, and rational asset management.
- (ii) leveraging private finance: the Project will enable in the medium-term private finance by outsourcing O&M to private irrigation Operators. Involving the private sector in public service delivery is expected to make irrigation a more attractive proposition for capital investments from the private sector.
- (iii) lighthouse India: identifying cost-effective measures to improve irrigation performance and close the gap between irrigation potential created (IPC) and irrigation potential utilized (IPU) is of core interest to all Indian States. The proposed Project will reach out to the central Government and other Indian States to disseminate the results of the Project.
- (iv) Cross-cutting: the Project aims to improve the sustainability of groundwater use and help the DVCA become more climate resilient and more responsive to floods and droughts.



C. Proposed Development Objective(s)

23. **The Project Development Objective** is to improve irrigation service delivery, strengthen flood risk management and improve climate change resilience in the Project area. Improving irrigation services includes management reforms as pursued under Component A, and infrastructure modernization to reinforce the management improvements under Component B. Strengthening flood risk management is addressed under Component C. These improvements will help improve the resilience of the Project area to climate change.

Key Results (From PCN)

24. **The core outcomes of the Project** will be measured through the following indicators:

To improve irrigation service delivery

- #1 – Farmers reached with agricultural assets and services (number, male and female) [Corporate Results Indicator]
- #2 – Compliance with agreed water delivery schedule of the Operator’s contract
- #3 – Compliance with bulk water supply from Main Canal to Distributary Canal

To strengthen flood risk management

- #4 – Number of days of flooding more than 1 meter (days)

To improve climate change resilience

- #5 – Improved irrigation efficiency, as measured by the performance of the irrigation Operators.

D. Concept Description

25. **The Project aims to achieve the PDO through the following Components:** (i) *improved management of irrigation* to improve service delivery and M&E, and strengthen and reform institutions and improve M&E, (ii) strategic investments in the *modernization of irrigation infrastructure* to upgrade hydraulic assets at main, branch, distributary and minor level, and (iii) *strengthen flood risk management* that will invest in flood reduction in the downstream parts of the command area. Improving climate change resilience is integrated within each of these components. The Component Project Management will finance Project implementation in accordance with the Project Implementation Manual.

Component A: Irrigation Management (US\$30.0 million, of which US\$20.0 million IBRD, US\$10.0 million AIIB and US\$0.0 million GOWB)

26. This component will improve the management of the DVC irrigation scheme. The component includes the following subcomponents: (i) establishment of MIS and performance monitoring, (ii) improving the quality of service delivery, and (iii) capacity strengthening. Intermediate indicators include the establishment of an MIS, the percentage compliance of water supply with the agreed water allocation schedule, and the groundwater study completed.



Sub-Component A.1: Establishment of MIS and Performance Monitoring

27. The Project will establish a robust MIS and a network/system for data capture, transmission and management and will invest in all associated data capture, management and transmission infrastructure. The design of the MIS will not only support the monitoring needs specific to this project, but also all the departmental (IWD) schemes and projects. The MIS will have the following modules.

- **Administrative Functions**, including procurement, design approvals, project management and physical progress, finance and expenditure benchmarking, and HR;
- **Irrigation Operations and Decision Support System**, including a water balance module for conjunctive water management; a disaster management module including irrigation infrastructure operational thresholds, flood warning and alerts; and an asset health and management module, including asset maintenance records, current status of assets, and date of next service. These modules will be tied together with a high-level dashboard for decision makers/water managers. The Project will pilot use of satellite services for irrigation scheduling;
- **Performance Monitoring and Irrigation Efficiency Evaluation**, including service delivery performance module measured as a factor of quantity and timeliness of delivery with subsequent benchmarking at outlets, personnel performance, beneficiary registration and engagement, service delivery verification and citizen's feedback, grievance redressal, diagnostics tracking and high-level performance review dashboard.

Sub-Component A.2: Improving Service Delivery

28. The Project will improve the quality of service delivery through (i) introduction of performance-based operation of irrigation canals at distributary canal and below, (ii) support for individual irrigation service providers, and (iii) introduction of accountability and transparency.

29. IWD will outsource the operation of distributary-and-below canals (serving on average 10,000 hectares) to private Operators.

30. Operators will be paid by IWD on a per hectare basis¹¹. The M&E consultant will be responsible for monitoring the performance of the Operators against the agreed performance indicator. The Project will provide extensive training of Operators after contract signing.

31. The Project will also promote *individual service providers* to offer irrigation services to farmers and farmer groups. Numerous such providers are active in- and outside the Project area, including mobile pump services, pump repair services, micro-irrigation suppliers, small-scale on-farm water storage developers, weather information services, and others¹². The project will support these service providers and encourage them to scale up their services within the Project area through capacity strengthening, and assistance in the preparation of business plans and credit requests to banks. Preferably, the Project will take advantage of the incentives provided to the irrigation Operators in promoting these services.

¹¹ The GOWB has indicated that irrigation investment and O&M costs should be covered by the public budget, and that recovery of costs for surface water delivery from farmers is not a short-term priority.

¹² See <https://youtu.be/oJflugfH2c8> for an example



32. The Project will finance introduction of rational asset management, including establishment of a geo-tagged asset database, budget planning, development of maintenance standards, and reporting on these.

33. The Project will strengthen *accountability and transparency* by:

- introducing a benchmarking system of irrigation performance, including identification of key performance indicators, development of irrigation service delivery standards, regular measurement and reporting of performance;
- introducing client feedback, including regular user surveys and disclosure of the results, establishment of user and third-party complaint mechanisms, promotion of citizen participation and disclosure of performance, e.g., through cell phone apps;
- preparing an annual Citizen Report Card¹³ to report on IWD's key performance indicators;
- staff management: job descriptions, annual performance evaluation, job requirements, in-house training, career management, etc;
- introducing Service Level Standards (SLSs) for irrigation services;
- launching (under Component D) of a communication campaign to inform stakeholders about the details of the project, including the performance nature of service delivery through private Operators, the importance of efficient water use, and the benefits of pressurized micro-irrigation for groundwater.

Sub-Component A.3: Aquifer Management

34. **The Project will establish a groundwater monitoring system** that will be managed by the Water Resources Investigation and Development Department (WRIDD). The monitoring system would measure actual groundwater withdrawal. Through the MIS (sub-Component A.1), the Project will collect baseline data on groundwater use, levels and quality. WRIDD will operate a service that will issue alerts when groundwater levels drop below 20 and 30 meters, and will disclose geo-tagged groundwater level information through a mobile phone app that will be developed under sub-Component A.1. Under sub-Component A.4, the Project will strengthen capacities of Chak Committees to monitor groundwater levels.

35. **The Project will also invest in the groundwater knowledge base** by conducting a study into the groundwater situation in the project area. The study would aim to establish a more accurate water balance (including in particular sub-surface in- and outflow), identify opportunities for groundwater recharge, and define levels for sustainable groundwater withdrawal.

Sub-Component A.4: Capacity Strengthening

36. The Project will strengthen capacities of IWD staff, Operators, Chak Committees and farmers to improve the quality of service delivery. A capacity strengthening needs assessment will be conducted during the first year of the project, and will be updated annually, based on feedback from beneficiaries. IWD staff will be trained in effective contract design and contract management and monitoring.

37. The Project will support the GOWB's program to transform the River Research Institute (RRI) into a center of

¹³ A "Citizen Report Card" is an annual communication to customers on how the agency has progressed in the current year on a number of results indicators, including items such as: time to resolve a complaint; performance of the operators, area irrigated, water use per ha; etc. Report Card results are typically published in the local media and posted on the IWD's website.



excellence affiliated with the Jadavpur University. RRI will award MSc and PhD degrees in River Engineering, and Hydrology and Hydro-informatics, Finance and Project management. Investments in upgrading RRI's infrastructure have been identified. RRI will also serve as the agency responsible for M&E, with support from an external consultant recruited by the Project.

Component B: Modernization of Irrigation Infrastructure (US\$189.1 million, of which US\$57.5 million IBRD, US\$72 million AIIB and US\$59.6 million GOWB)

38. This component will invest in the modernization of irrigation infrastructure at main, branch, distributary and minor level. The component includes the following subcomponents: (i) Main and Branch Canal Modernization, and (ii) Distributary and Minor Canal Infrastructure Modernization. Intermediate indicators include the length of main, distribution and (sub-)minor canals rehabilitated, and the number of pressurized pilots that have been successfully established.

Sub-Component B.1: Main and Branch Canal Modernization

39. The Project will invest in the modernization and upgrading of the Right and Left Bank Main Canals (RBMC and LBMC) and Branch Canals of the DVCA. There are 10 Branch Canals in the command area with an average service area of 39,000 hectares. The design philosophy is based on an irrigation assessment that was conducted during Project preparation to optimize the type and location of the hydraulic infrastructure to facilitate service delivery. "Full supply" water levels will be maintained throughout the system. Long-crested ("duckbill") weirs will be installed to help better manage water levels. Selected sections of canals will be lined to reduce the risk of bank erosion.

Sub-Component B.2: Distributary and Minor Canal Infrastructure Modernization

40. There are 39 Distributary Canals in the command area, with an average service area of 10,000 hectares. The 220 Minor and sub-Minor Canals in the project area each serve on average a command area of 2,000 ha. The project will upgrade these canals through investments in rehabilitation of cross-regulators, modern closable and lockable outlet structures and selected canal lining to reduce bank erosion.

41. In two of the sub-minor canals, the project will pilot installation of pressurized supply. To that end, the minor canal will be converted into a reservoir, and solar panels and pump stations will be installed on top of the canal to avoid resettlement, reduce evaporation and enhance the operational efficiency of the panels. Within the associated chaks, the Project will install sub-surface pressurized pipe systems that will deliver water to faucets on each plot. Farmers who so wish can connect these to a micro-irrigation system, with support from the Operators. Others who wish to practice flood irrigation can continue doing so.

42. In support of these pilots, and to help farmers use groundwater more efficiently, the Project will promote adoption of micro irrigation technologies by farmers. This will be done through (i) awareness raising and capacity strengthening, (ii) support for the preparation of loan requests to (a) bridge the time between purchase and receipt of the central GOI subsidy, and (b) cover the beneficiary's contribution.

Component C: Flood Management (US\$182.8 million, of which US\$57.5 million IBRD, US\$73 million AIIB and US\$52.3 million GOWB)

43. This Component will invest in structural measures to reduce flooding in the Project area. Non-structural



measures are covered under NHP, including monitoring, preparation of an Emergency Preparedness Plan, establishment of an Early Flood Warning System, hydrological studies and capacity strengthening.

44. During Project preparation, a hydrological modelling study was conducted to assess the impacts on flooding of several investment packages. On the basis of these studies, the Project will promote a pragmatic flood management approach to moderate the frequency and extent of flooding, as floods in the Lower Damodar cannot be fully avoided. Structural measures will include investments to ensure that flood flow discharge is more evenly shared between the Mundeswari and Amta Channels. Overall, the objective is to provide protection of at least a 1 in 25-year flood return period for the left bank of the Amta Channel. For the right bank, the objective would be to prevent annual recurring floods to the extent possible, and to also manage Amta right bank overflows to pass to channels and areas where resultant damage can be minimized. If possible, the right bank area would be largely protected from substantive damage up to a 1 in 10-year event.

Component D: Project Management (US\$10.7 million, of which US\$0.0 million IBRD, US\$0.0 million AIB and US\$10.7 million GOWB)

45. This component will strengthen IWD and the State Project Management Unit (SPMU)'s capacity for Project management, monitoring and evaluation (M&E) (including, inter alia, the areas procurement and financial management) through the provision of goods, consultant services, training, and financing incremental operating costs. Intermediate results indicators include the number of Project monitoring reports submitted on time annually.

46. Staffing of the SPMU will be strengthened, prior to Project effectiveness, to include a number of technical, financial management, M&E and safeguards (social and environmental) experts. RRI will be responsible for M&E, data collection and reporting, and setting up the MIS. It will be supported by an external consultant. A Project Management Consultant (PMC) will be recruited to assist the SPMU in managing and coordinating Project activities. The PMC will also conduct construction supervision of civil works.

47. This component will also launch a communications campaign to inform stakeholders about the details of the project, including the performance nature of service delivery through private Operators, the importance of efficient water use, and the benefits of pressurized micro-irrigation for groundwater.

2. Overall Risk and Explanation

48. The **overall risk rating for the proposed Project is considered Substantial**. The planned mitigation measures to the main risks are as follows:

49. For the Sector Strategies and Policies risk, the Project will continue the dialogue with the GOWB on this broader sector narrative during project implementation, including global experience to improve irrigation performance, strengthen the financial viability and sustainability.

50. For the Technical Design risk, closer discussion with IWD will be carried out to finalize the project design which is an innovation and based on incentivizing behavior change to adopt more efficient irrigation.

51. For the Institutional Capacity for Implementation and Sustainability risk, capacities of the SPMU will be strengthened, and the SPMU will be adequately staffed with competitively recruited specialists, supported by specialized consultant services.



52. For the Fiduciary risks, appropriate procurement staffing and capacity building measures have been taken. The SPMU has prepared a Project Procurement Strategy for Development (PPSD) as well as a Procurement Plan.

53. For the Stakeholder risk, the project will launch a communication campaign to inform stakeholders about the details of the project, including the performance nature of the services, and the fact that the Operators report to IWD.

54. For the Environmental and Social Risk, the SPMU will recruit a high-quality safeguards specialist. In addition, strengthening of safeguards capacities of SPMU staff will be conducted systematically during Project preparation and implementation.

SAFEGUARDS

A. Project location and salient physical characteristics relevant to the safeguard analysis (if known)

The proposed project is located in the Damodar Valley Command Area and the Lower Damodar Sub-basin, and includes areas located in Burdwan, Bankura, Hooghly and Howrah Districts of West Bengal. Burdwan District has a population density of 1,100 inhabitants per km². Of the total population, 7 % are scheduled tribes. The population density of Bankura district is 520 per km². Bankura is one of the country's 250 most backward districts (out of a total of 640). It is one of the nineteen districts in West Bengal currently receiving funds from the Backward Regions Grant Fund Program (BRGF). Bankura district has a literacy rate of 70.26% and has highest tribal population (11%) among all four project districts. Hooghly district has a population density of 1,753 inhabitants per km². Around 4% of the total population in the district is scheduled tribe. The population density of Howrah district is 3,300 per km². Tribal population in the district is less than one percent of total population.

The project area consists of the Damodar Valley Project (DVP) and an area located in the Lower Damodar Sub-basin downstream of the DVP that is prone to seasonal flooding. The DVP currently irrigates around 332,000 ha in the kharif season (out of a design area of 393,800 hectares), 20,000 ha in the rabi season on the basis of an earmarked allocation, and an average of 28,000 ha in the summer (boro) season, depending on the amount of water remaining in the upstream reservoir and after meeting the priority needs. The total area irrigated (including all sources of water) is approximately 100,000 hectares in rabi and boro season each. The main sources of water of those parts that are not covered by canal water are ground water and household and village ponds.

The Lower Damodar Sub-basin area is historically flood prone. On average, about 33,500 hectare of cropped area and 460,000 people are affected every year. The major reasons of floods, waterlogging and drainage congestion in the project area include inadequate utilization of flood storage in reservoirs, progressive rising of bed of the Mundeswari River due to siltation resulting in reduction of carrying capacity, tidal effect at the outfall of the channels and rivers, and inadequate capacities of drainage channels and outfall structures.

B. Borrower's Institutional Capacity for Safeguard Policies

The overall management of the project including preparation and implementation of safeguard measures lies with Irrigation and Waterways Department (IWD). IWD is first time client and has not implemented investment projects supported by the World Bank or any other multilateral development bank. During project preparation, strengthening of safeguard capacities of the implementing agencies will be carried out through recruitment of qualified and experienced



Safeguard Specialists. A close and intensive engagement with stakeholders during the preparation will help in identifying the gaps on different aspects and accordingly prepare a suitable capacity building and action plan to address those gaps.

C. Environmental and Social Safeguards Specialists on the Team

Parthapriya Ghosh, Social Specialist
Charu Jain, Environmental Specialist

D. Policies that might apply

| Safeguard Policies | Triggered? | Explanation (Optional) |
|--|------------|---|
| Environmental Assessment OP/BP 4.01 | Yes | The physical investments that are planned under the project include modernization and upgrading of irrigation, conjunctive use of surface and ground water for irrigation, recharging of ground water and tail end ponds, and crop diversification. Limited desilting and rehabilitation of embankments along flooding hotspots of the river Mundeswari will also be considered. These investments could result in adverse impacts. The Environmental and Social Impact Assessment (ESIA) will be undertaken to consider the potential impacts of these interventions, and thereafter propose alternatives or mitigation measures for the identified impacts. An Environmental and Social Management Framework (ESMF) will be prepared since the precise locations for interventions will be known following the Feasibility Study, which will define the area of influence and scope of the project. |
| Performance Standards for Private Sector Activities OP/BP 4.03 | No | |
| Natural Habitats OP/BP 4.04 | Yes | Project activities involving significant conversion or degradation of critical natural habitats will not be financed under the project. Impact on natural habitats, including forest, wetlands, protected areas, etc., in the project area shall be assessed during the ESIA and an Environmental Management Plan (EMP) will be prepared to mitigate these identified impacts. The ESIA and FS shall consider environmental flows. The potential impacts of rehabilitation of canals and limited desilting of certain reaches of the Mundeswari river on their natural ecosystems shall be assessed. Any changes to operational policies of the upstream dams (to be assessed under OP 4.37 Dam Safety) to provide adequate discharge for the project command area and reduce flooding might impact protected |



| | | |
|--|-----|--|
| | | areas located in the command areas of the dams upstream of the project area. |
| Forests OP/BP 4.36 | No | As per the initial client assessment, forest management practices in the project command area are not reported. The ESIA and FS will confirm the same, as well as the presence of any RAMSAR sites in project area. |
| Pest Management OP 4.09 | Yes | No pesticides and fertilizers are expected to be financed directly by the project. However, there may be induced impacts of increased fertilizer and pesticide use due to improved agricultural intensification and diversification. An Integrated Pest Management (IPM) Plan will be prepared. |
| Physical Cultural Resources OP/BP 4.11 | TBD | The ESIA and FS will identify any potential religious and other physical cultural property sites associated with the proposed investments, especially with construction of channels within chaks. "Chance find" provisions will be included in the civil works contracts. |
| Indigenous Peoples OP/BP 4.10 | TBD | All four project districts have a presence of tribes. Bankura has the highest percentage of tribal population (11% of the total population) followed by Budwan (7%) and Hooghly (4%). The tribal population in Howrah is less than one percent of the total population. The policy will be triggered in the event that the ESIA determines that the project has a negative impact on Indigenous Peoples. In that case, a Social Assessment will be carried out to prepare an Indigenous Peoples Development Plan (IPDP). |
| Involuntary Resettlement OP/BP 4.12 | Yes | The project will acquire some private land leading to loss of livelihood and sources of livelihood. There could be temporary relocation of squatters during the rehabilitation of canals. Based on Social Impact Assessment (SIA) results, the project will prepare a site specific Resettlement Action Plans (RAPs). |
| Safety of Dams OP/BP 4.37 | Yes | The project area is fed by waters from 5 large dams located in the State of Jharkhand (Tehyghat, Tilayia, Konar, Panchet and Maithon). An independent assessment of the dams shall be undertaken to assess the safety of dams and adequacy of O&M plans and emergency systems for the project area. |
| Projects on International Waterways OP/BP 7.50 | Yes | The Damodar River drains into the river Hooghly, which is a tributary of the river Ganga before flowing into the Bay of Bengal. The Ganga and the Hooghly and their tributaries are considered 'international waterways' for the purpose of the policy. Considering that the focus of the proposed project is to modernize |



and upgrade management systems for improved irrigation and flood management, that the Damodar River flows entirely within India, and that India is the lowest downstream riparian of the Hooghly before it drains into the Bay of Bengal, an exception under paragraph 7(c) of the policy has been approved.

Projects in Disputed Areas OP/BP 7.60

No

The project is not located in a disputed area.

E. Safeguard Preparation Plan

Tentative target date for preparing the Appraisal Stage PID/ISDS

Aug 01, 2018

Time frame for launching and completing the safeguard-related studies that may be needed. The specific studies and their timing should be specified in the Appraisal Stage PID/ISDS

An environmental and social impact assessment has been initiated to assess the impacts of the project and to propose measures to mitigate negative impacts. The feasibility consultant is responsible for collecting baseline information on social and environmental aspects. This information shall be further used by the consultant undertaking the ESIA. Site specific RAPs will be prepared on the basis of the Feasibility Study.

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APPROVAL

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|---------------------------|------------------------|-------------|
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