



Department  
for International  
Development

## Decision making Toolkit for design of climate resilient MGNREGS structures

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### Infrastructure for Climate Resilient Growth in India (ICRG) Programme

Submitted By:



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## Background and scope for the Toolkit

The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), is the world's largest social security programme that guarantees 'right to work'. Promulgated with the objectives of "enhancing livelihoods security in the rural area by providing at least 100 days of guaranteed wage employment in a financial year, to every household whose adult members volunteer to do unskilled manual work", MGNREGA also endeavors to create durable assets and strengthen the livelihoods resource base mainly by Gram Panchayats (GPs) through works selection and implementation. Natural resource management (NRM) works that address the issues poverty and marginalization like drought, flood, deforestation, limited irrigation potential, and soil erosion are prioritized, and employment generation is maintained on a sustainable basis through yearly labour budgets of Gram Panchayats.

Since its inception, MGNREGA is now under implementation in 691 districts, covering 6918 blocks and 2,62,436 Gram Panchayats. The financial outlay for MGNREGA has been more than INR 48,000 crores and expenses on both individual and community NRM works averaged around 58% in FY 2018-19. Around 1.6 crores of permissible works are under implementation in FY 2018-19. In recent years, MGNREGA has enhanced its focus on watershed approach to harnesses its great potential for promoting inclusive and sustainable livelihoods through creating durable and productive assets. Complemented with approaches of Mission Antyodaya and Mission Water Conservation (MWC), MGNREGA has great potential for catering and up-scaling natural resource management works.

MGNREGA work implementation requires strong technical backstopping for site selection, work selection, design and estimate preparation and quality implementation. For ensuring the durability and productivity of the NRM assets, proper site selection, proper designing of structures based on localized biophysical characteristics and quality assurance during implementation are important sequential processes. The Ministry of Rural Development, Government of India has standardized technical manuals, like 'Samarthya' and 'Saksham' with details of the technical aspects of major permissible MGNREGA works. These technical training manuals orient the technical grassroots functionaries on the basics of work objective, selection criteria, principles of design parameters and maintenance schedule of different NRM works. The contents of the training manuals and other reference NRM literature provides scope to develop a Tool kit as a ready reckoner to help these technical personnel to quickly customize the design, drawing and estimates of NRM works based on collected biophysical and climatic data.

The Infrastructure for Climate Resilient Growth (ICRG) programme, a technical cooperation programme between the Ministry of Rural Development (MoRD), Government of India and Department of International Development (DFID), United Kingdom, aims to strengthen the existing capacities of the implementation agencies and demonstrate evidence-based results for climate resilient planning and implementation under MGNREGA. In order to build the capacity of the implementation agencies, technical functionaries and communities, ICRG has conducted a series of technical training programmes to demonstrate participatory planning and watershed based scientific planning for the works under MGNREGA. The training intended to develop the capacities of the implementing agencies and demonstrate climate compatible design of infrastructure under

MGNREGA. Specifically, the ICRG training programmes focus on enhancing the capacities of technical personnel on appropriate selection of NRM works, site selection, design, drawing, estimate preparation, use of GIS information for planning of works, development of project reports and quality assurance during implementation.

Learning from the ICRG training programmes, reference resource materials and based on the requests of field technical personnel, ICRG has developed a customized user-friendly excel based tool that enables quick design, drawing and estimate preparation for major permissible NRM works of MGNREGA. This module is developed as a toolkit to assist grassroot technical personnel in designing and preparing drawings and estimates of NRM works. This toolkit is also developed with a view to help the technical personnel to critically use and analyze different local biophysical factors in designing different NRM works.

## **Objective of this Toolkit**

1. To provide users with a set of technical principles and norms that act as a guide for proper design of NRM works.
2. To enable technical personnel to easily customize design, draw and prepare estimate of key NRM works undertaken in MGNREGA using localized field level information.
3. To customize a user-friendly toolkit as a connected system that links design, drawing and estimate for informed decision-making.

## **Who can use the Toolkit?**

The Toolkit can be used by the MGNREGA technical personnel like –Technical Assistant and Sub-Engineers of MGNREGA (Estimate Creator Under SECURE). The Toolkit can also be used by any technical personnel that are engaged with soil and water conservation works under watershed management or natural resource management.

## **What does the Toolkit contain?**

The Toolkit contains specific excel based sheets to assist the technical personnel in design, drawing and estimate preparation for major NRM works. The specific excel based sheets are created for (a) Loose Boulder Check, (b) Earthen Gully Plugs, (c) Earthen Dam, (d) Check Dam (with gates), (e) Stop Dam (without gates), (f) Staggered Contour Trenches, (g) Continuous Contour trenches, (h) Contour Bunds, (i) Farm Bunding, (j) Farm Pond, (k) Recharge Pits, (l) Gabion structure, (m) Underground Dykes and (n) 30-40 model. Each excel based sheet computes design, drawing and estimate based on the input field level data collected from the site. The Toolkit provides an option to use historical or projected rainfall data wherever required in the design process. Based on the climate variability, either historical or projected rainfall data may be used to customize the design, drawing and cost estimation.

## **How to use this Toolkit?**

Firstly, based on their site visit and consultation with community members, technical personnel must decide on the “choice of NRM work”. Thereafter, field staff or technical personnel must record the basic required biophysical field level data from the site. Other data like weather parameters, ground water potential, lineaments, geomorphology, etc., required for designing NRM works, can be collected

from secondary sources. Subsequently, the data is to be entered in the “work specific excel based sheet”.

Each work specific excel based sheet requires measured field level data as “input” (always marked in yellow cell in the excel Toolkit) to compute the different design parameters. The tool is designed in a way that data entry is “minimum but essential”. Based on the input data, required design factors (bill of quantities) are computed. Moreover, based on the input data, customized drawings of NRM works with specific measurement details are developed as integrated formula based connected cells in a separate excel sheet. The computed design factors are then linked with the schedule of rates of Chhattisgarh<sup>1</sup> and item wise estimates of costs can be computed in another integrated formula based linked excel sheet. The item wise estimates are separated by material and labour component costs. Based on the field conditions and permissible scope, the user can change certain input data and analyze the changes in design, drawing and cost estimates. The best suited design, drawing and cost estimate can be finalized for administrative approval.

## **Limitations of the Toolkit**

The Toolkit performs well for individual specific NRM works. However, in case, the work requires integration with other NRM works (like masonry check dam with extended earthen embankment, or loose boulder check with earthen gully plugs), separate specific design, drawing and cost estimates must be prepared. The current Toolkit cannot prepare “composite” design, drawing and cost estimation of integrated structures. Secondly, the Toolkit works effectively when design of “new” NRM works is proposed – in its current form, it cannot design “renovation” related works.

## **Scope of the Toolkit**

Going forward, the Toolkit has the following potential:

- It may be converted into a web-based training module.
- It can be developed as an android based application that will allow field technical functionaries to enter the field level data on site and compute the design, drawing and cost estimates. The subsequent outputs can be shared with the local communality and customized as required.
- This Toolkit has been designed for key NRM works permissible under MGNREGA. It may be extended to cover other permissible works.

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<sup>11</sup> For this document, the Schedule of Rates of Chhattisgarh has been used. This can be customized for any state.

## **Annexures**

- Annexure 1 Loose Boulder Check
- Annexure 2 Earthen Gully Plugs
- Annexure 3 Earthen Dam
- Annexure 4 Check Dam (With Gates)
- Annexure 5 Stop Dam (Without Gates)
- Annexure 6 Staggered Contour Trenches
- Annexure 7 Continuous Contour trenches
- Annexure 8 Contour Bunds
- Annexure 9 Farm Bunding
- Annexure 10 Farm Pond
- Annexure 11 Recharge Pits
- Annexure 12 Gabion structure
- Annexure 13 Underground Dykes
- Annexure 14 30-40 model