

# Technical, Cost Effectiveness and Sustainability Audit

March 2016

## EXECUTIVE SUMMARY



National Community Driven Development Project  
(NCDDP)





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(NCDDP)**

**Technical, Cost Effectiveness and  
Sustainability Audit**

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**EXECUTIVE SUMMARY**

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# EXECUTIVE SUMMARY

1. **The National Community Driven Development Project (NCDDP) was initially established in 2013 by the Government of Myanmar with support from the World Bank.** In 2015, the project was scaled up, with additional financing support from the Government of Myanmar, the World Bank as well as the Government of Italy. The NCDDP is implemented by the Department of Rural Development under the Ministry of Agriculture, Livestock, and Irrigation. The project provides grants to village tracts to finance the construction of rural, community-level civil infrastructure. At the time of the conduct of this technical audit, the project had completed two cycles and financed over 2,000 sub-projects in 9 townships across the country<sup>1</sup>.
2. **This technical evaluation and audit was undertaken to independently assess the technical quality, project facilitation, cost effectiveness, compliance with environmental and social safeguards, and the operation and maintenance/sustainability of a random representative sample of infrastructures that have been completed.** A summary of best practices and 'lessons learned' was also sought from these inspections and interviews with village stakeholders. The random sampling was based on sub-projects from Year 1 and Year 2; from all nine Townships served by NCDDP; from a mix of remote and not remote villages; and from a representative number of each sub-project type. A total of 210 NCDDP sub-projects or roughly 10% of sub-projects were evaluated during this exercise.
3. **The cost effectiveness of NCDDP investments was determined by including visits and evaluations of comparable pieces of infrastructures financed by other entities.**
4. **The technical evaluation was conducted by an independent technical consultant, Neil Neate, P.Eng.** Neil was assisted by two Myanmar consulting civil engineers and eight civil/mechanical engineers who are employed by DRD but not working on the NCDDP.
5. **The selection of 210 NCDDP sub-projects was performed using a stratified random sampling method, employing the following criteria:**
  - There was proportional representation of SPs within each Township;
  - There was proportional representation of SPs by infrastructure type;
  - Greater than 50% of the selected sites were considered remote; and
  - Thirty of the SPs evaluated were constructed in Year 1, enabling the operation and maintenance of infrastructures to be evaluated.

**Table 1:  
Sampling  
Framework**

SP Main Type	Number of SP Evaluated – Year 1	Number of SP Evaluated – Year 2	Total Number of SP Evaluated
Building	9	55	64
Bridge	2	13	15
Water Supply	4	32	36
Road	11	61	72
Electricity	4	19	23
<b>Total</b>	<b>30</b>	<b>180</b>	<b>210</b>

<sup>1</sup> The nine Townships are: Kanpetlet, Pinlebu, Kyunsu, Sidoktaya, Ann, Htantabin, Namhsan, Laymyetnar and Tatkon.

6. **Five types of sub-projects were evaluated: Building, represented by schools, health centers and village halls; Bridge; Water Supply; Road; Electricity.** Each SP type was evaluated using a set of Field Tools that were similar in scope and style but differed from one another in the type of information gathered. The Building Technical Rating Field Tool, for example, collected data in regards to concrete practices, wall, column and roof information, etc.; while the Water Supply Tool examined piping, reservoirs and public tapstands. There were five Field Tools for each SP type: Field Tool 1 – Technical Quality Evaluation; 2 – Cost Effectiveness; 3 – Environmental and Social Safeguards; 4 – Operation/Maintenance and Sustainability; and 5 – Key Issues.

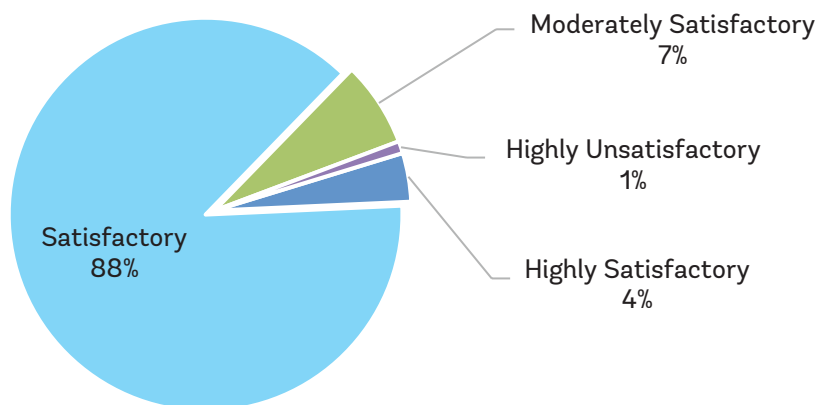
## Technical Design Quality

7. The entire sub-project ‘packages’ (preparation, design, implementation and follow-up) were evaluated using the WB six-point quality rating system (Highly Satisfactory, Moderately Satisfactory, Satisfactory, Moderately Unsatisfactory, Unsatisfactory, and Highly Unsatisfactory). It was found that 4% of the SPs are Highly Satisfactory with a further 88% rated Satisfactory. The evaluation teams found 7% to be Moderately Satisfactory, and only 1% (2 SP) were considered Highly Unsatisfactory.

8. Considering the aggregated total of all sub-projects evaluated, it was found that 78% of the technical components of the structures have been constructed in accordance with the plans and specifications as set out in the sub-project proposals and considered to *Meet Specification* with a further 19% rated *Slightly Below Spec* in terms of meeting the intent of the sub-project proposal. Only 3% of technical ratings were Below Specification.

9. There were differences found in the technical quality amongst sub-project type. Bridge sub-projects’ components were found to *Meet Spec* 91% of the time. Water supply and building SPs were both rated as 79% *Meet Spec*, with a further 18% and 19%, respectively, rated Slightly Below Spec for these two sub-project types. Road SPs were rated at 75% *Meet Spec*, while more problems were observed at electrical schemes: 57% *Meet Spec* and 42% *Slightly Below Spec*.

**Rating of Subproject Packages**  
(preparation, design, implementation and follow up)

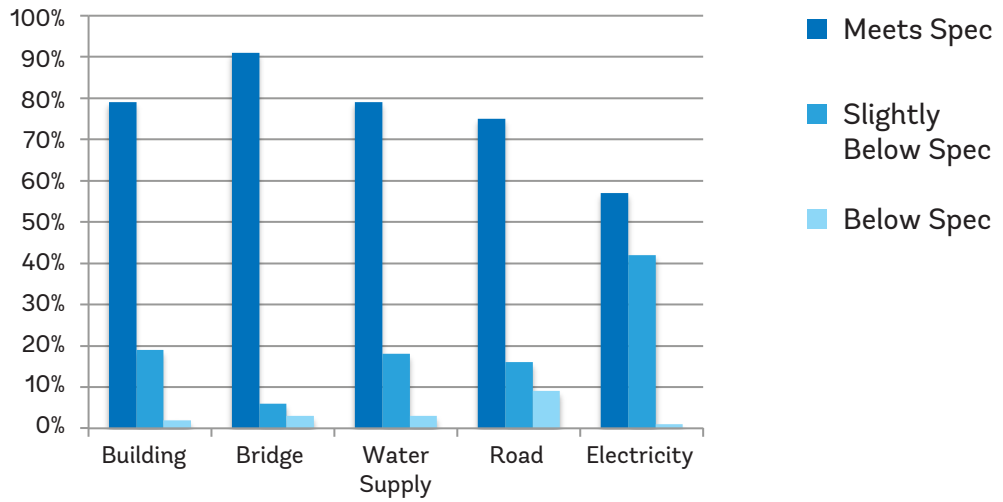


**Figure 1:**  
Rating of  
Subproject  
Packages



**Figure 2:**  
Technical Quality Ratings by Subproject Type

**Technical Quality Ratings by SP Type**  
Aggregate of All Components/Aspects



10. Since these technical ratings have been assigned to specific components or aspects of each of these infrastructures, the identification of problem areas is possible and recommendations are provided to improve the technical quality of these items.

11. The data was also sorted to determine if there are any apparent trends in technical quality based upon when the SP was constructed.

12. The table shows that the overall technical quality of SPs has increased from 70% to 79% of components meeting specification. This may be an indication of an increasingly knowledgeable staff that is gaining experience.

**Table 2:**  
Aggregate Ratings of Subprojects by Construction Year

	Meets Spec	Slightly Below	Below Spec
Year 1 (30 SPs)	70%	29%	1%
Year 2 (180)	79%	18%	3%



**Bridge Subproject** | Kanyin Tai Village, Lemyethna Township, Ayeyarwady Region

## Technical Facilitation

13. The frequency of technical facilitator visits to SP sites was noted down during the technical evaluation visits and was found to be an average of five construction facilitation visits for each SP. The technical quality of SPs was also compared with the degree of remoteness of each village and found to be roughly equal across the nation.

14. It can be seen that very little fluctuation of the aggregated sum of ratings is evident when comparing SPs' degree of remoteness. This indicates that NCDDP technical facilitation efforts produce roughly equal results regardless of the SP villages' remoteness.

	Meets Spec	Slightly Below	Below Spec
Not Remote (55 SP)	78%	21%	1%
Remote (87 SP)	78%	18%	5%
Very Remote (59 SP)	79%	19%	2%
Extremely Remote (9 SP)	75%	25%	0%

**Table 3:**  
Aggregate Ratings of Subprojects by Remoteness

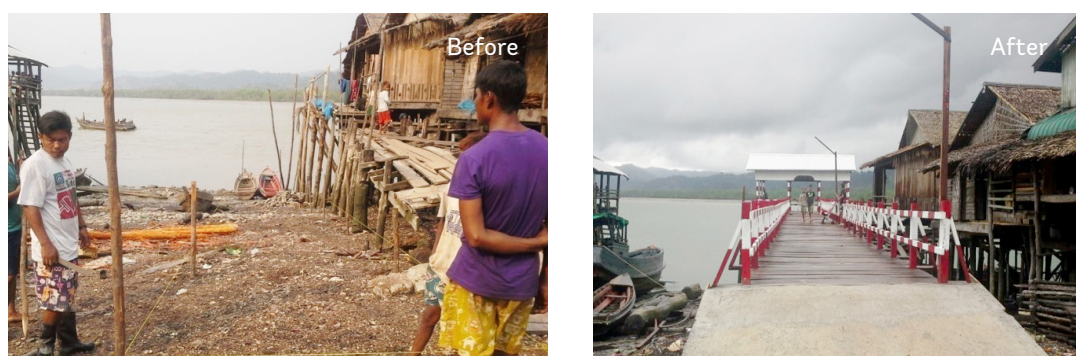


## Cost Effectiveness

15. NCDDP's buildings, concrete road works and solar panel electrification schemes were found to be equally cost effective as compared to similar constructions by other agencies. NCDDP unit costs for these types of infrastructure are in line with those of other projects.
16. NCDDP roads constructed of earth and gravel were found to be more cost effective than similar constructions by other entities.
17. The audit's sampling of bridges, both NCDDP and comparable works by others, was small and featured a variety of construction methodologies and materials. Nevertheless, an analysis of the information indicates that NCDDP bridge construction costs are in line with those of DRD and therefore are cost effective.
18. No comparable infrastructure by others was found to contrast with NCDDP's gravity-fed water supply program nor macadam road works, so conclusions cannot be drawn for these aspects of the Project's works. NCDDP's borehole program, however, was found to be cost effective when compared with a similar groundwater well scheme by DRD.
19. A comparison of the Community Force Account (CFA) versus Contractor construction implementation modalities indicates that CFA will be more cost competitive for bridge and solar panel SPs but less so for roads and electrical grid extensions. The two modalities are roughly equal when considering buildings and mini-hydro SPs, and no firm conclusions can be drawn for water systems.
20. As would be expected, community contributions, in many cases labour and locally sourced materials, were found to enhance the cost effectiveness of all NCDDP sub-projects, particularly concrete road schemes.







Jetty Subproject | Kawka Hnin Village, Kyunsu Township, Tanintharyi Region

## Compliance with Environmental and Social Safeguards

21. The data collected at the NCDDP SP villages indicates that the Environmental Codes of Practice, the Operation Manual standards for verification and monitoring, and the social screening checklists are being used and followed in a majority of SP village files – 96% of sub-project files contained appropriately completed ECoP documentation, with a greater majority making use of the social screening checklist (99%).
22. Technical inspections of the sub-project sites during the evaluation showed that 96% of environmental considerations had been appropriately handled on the ground, during and after construction.
23. Voluntary land donations have taken place for 17% of the SPs evaluated. Proper documentation was found in village files in all cases.

## Operation and Maintenance / Sustainability

24. O&M Committees have been formed and are functioning in 76% of the Year 1 sub-projects evaluated (with electrical sub-projects being the extreme outlier at only 50% of SP sites). The scale of activities undertaken by these committees, both routine maintenance items and major repairs, differs between sub-project types. **Roads and water supply sub-projects reported greater numbers of deferred major repairs**, perhaps due to expense and capacity problems.
25. The prevalence of certain routine maintenance activities was measured for each sub-project type. The results of this survey and analysis will inform future O&M training sessions. **A great majority of O&M Committees indicate that ongoing capacity development activities have been undertaken.** Village sub-project O&M Committees will benefit from an increased awareness of proper O&M techniques.
26. Only 18% of village committees have instituted a user fee while 23% of villages hold O&M funds in a bank account. Village committees report that all ongoing O&M activities are wholly supported by the villagers, with no inputs from line Ministries or government agencies.
27. Sub-projects that were undertaken using a CFA implementation modality were found to be more inclined to institute user fees for community infrastructure and are more likely to hold funds in village accounts for future use in operation and maintenance activities.





## Major Recommendations

28. This report provides analysis and a summary of the major problems and challenges associated with the NCDDP construction program. Recommendations of corrective measures and proper construction methodologies are presented throughout the report for specific items. Following are the major recommendations from this study:

- NCDDP should convene a technical sharing session where Township and Union engineering representatives meet to exchange ideas on how SP designs and file documentation can be improved, presenting examples.
- NCDDP engineers and technical staff must check that properly executed as-built drawings are created for all completed SPs. Design changes should be reviewed with senior personnel so that standard template drawings can be altered if warranted.

- A Disaster Risk Management training course should be held to emphasize the responsibility of designers to more fully consider the forces of nature when planning rural infrastructures.
- All NCDDP environmental and social safeguard checklists and forms must be completed for each SP site. Environmental monitoring activities should be ongoing during the SP construction, with notes to file as appropriate. Refresher training courses should emphasize the importance of this documentation.
- NCDDP Engineering Department should provide refresher training sessions to O&M Committees on the 1-year anniversary of the completion of a SP, performing a rigorous inspection of the works and then offering pointers as to how regular periodic maintenance can increase the usefulness and functionality of the infrastructure. Engineering inspections of the systems should take place prior to these sessions so that the course material can be adjusted to suit each individual site.
- The NCDDP should consider revising O&M Committee documentation to stipulate activities that must be undertaken according to a routine schedule, with realistic funds allocated for labour and materials.
- The NCDDP should consider revising O&M Committee documentation to insert specific capital repair estimates. Estimates should be provided appropriate to SP type, for example, roof replacement for buildings, with options described to committees for the funding of such major repair capital works.
- NCDDP should develop a comprehensive set of standard template drawings, designs, details and specifications for all SP types; and train its technical personnel in the use and modification of these standard drawings.

The findings and recommendations from this report will provide direction for the continued success of NCDDP. Following is a table listing the main findings for each section of this technical evaluation.



**School Renovation Subproject** | Par Kon Village, Kanpetlet Township, Chin State



Topic	Main Findings	Remarks
<b>1 Technical Design Quality</b>		
Entire Sub-Project 'Package'	4% of the SPs are Highly Satisfactory with a further 88% rated Satisfactory.	
Individual SP components	Total of all sub-project components evaluated, 78% of the technical components of the structures were rated Meets Specification with a further 19% rated Slightly Below Specification.	
Technical Quality from Year 1 to Year 2	Overall technical quality of SPs has increased from 70% to 79% of components Meeting Specification.	
Technical Facilitation	Average of five construction facilitation visits for each SP.	
<b>2 Cost Effectiveness</b>		
Comparisons with infrastructure by other agencies	NCDDP's buildings, concrete road works, bridge, borehole well and solar panel electrification schemes were found to be equally cost effective. Roads constructed of earth and gravel were found to be more cost effective.	No comparable infrastructure by other agencies was found to contrast with NCDDP's gravity-fed water supply program nor macadam road works.
Comparison of Community Force Account (CFA) vs. Contractor implementation methods	CFA are more cost competitive for bridge and solar panel SPs but less so for roads and electrical grid extensions. The two modalities are roughly equal for building and mini-hydro SPs.	Not enough data was gathered to make any judgment on water supply systems.
Community contributions	Voluntary community contributions, in many cases labour and locally sourced materials, were found to enhance the cost effectiveness of all NCDDP sub-projects.	
<b>3 Environmental and Social Safeguards</b>		
Environment Code of Practice	96% of sub-project files contained appropriately completed ECoP documentation, with a greater majority making use of the social screening checklist (99%).	
Environmental inspection	96% of environmental considerations had been appropriately handled on the ground, during and after construction.	
Land donations	Voluntary land donations have taken place for 17% of the SPs evaluated. Proper documentation was found in village files in all cases.	
<b>4 Operation and Maintenance/Sustainability</b>		
O&M Committees	O&M Committees have been formed and are functioning in 76% of the Year 1 sub-projects evaluated	Only 50% of electrical SPs have a functioning O&M Committee.
Major repairs	Roads and water supply sub-project O&M committees reported greater numbers of deferred major repairs.	
User Fees for O&M use	18% of village committees have instituted a user fee while 23% of villages hold O&M funds in a bank account.	
Comparison of CFA vs. Contractor implementation methods	CFA SPs were found more inclined to institute user fees for community infrastructure and more likely to hold funds in village accounts.	





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