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EVALUATION

RETROSPECTIVE PERFORMANCE EVALUATION OF THE AFGHAN SUSTAINABLE WATER SUPPLY AND SANITATION PROJECT

2009-2012

August 2017

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Assignment Title: **Sustainability Assessment of the Afghan Sustainable Water Supply and Sanitation (SWSS) Project 2009-2012 (Contract #EPP-I-00-04-00019-00)**

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Cover Photo: SWSS Water Pump, Laghman Province, Karghaye District, SUPPORT-II Communications Team, 28 January 2017.

Disclaimer:

The views expressed in this report are those of the author and do not necessarily reflect the views of USAID, the Government of the Islamic Republic of Afghanistan, or any other organization or person associated with this project.

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LIST OF ACRONYMS

ALCS	Afghan Living Conditions Survey
AKF	Aga Khan Foundation
CDC	Community Development Council
CLTS	Community Led Total Sanitation
DACAAR	Danish Committee for Aid to Afghan Refugees
FGD	Focus Group Discussion
HH	Household
GEE	Generalized Estimating Equation
GPS	Global Positioning System
KI	Key Informant
MAIL	Ministry of Agriculture, Irrigation and Livestock
MoU	Memorandum of Understanding
MRRD	Ministry of Rural Rehabilitation and Development
NGO	Non-Governmental Organization
NRVA	National Risk and Vulnerability Assessment
NSP	National Solidarity Programme
O&M	Operation and maintenance
ODF	Open Defecation Free
PRT	Provincial Reconstruction Team
RuWATSIP	Rural Water Supply, Sanitation and Irrigation Programme
RWS	Rural Water Supply and Hygiene Program
SCA	Swedish Committee for Afghanistan
SWSS	Sustainable Water Supply and Sanitation Project
TAF	The Asia Foundation
TWG	Technical Working Group
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WUC	Water User Committee
WUG	Water User Group

1. EXECUTIVE SUMMARY

1.1 BACKGROUND TO STUDY

USAID/Afghanistan's $43 million investment in the Afghan Sustainable Water Supply and Sanitation (SWSS) activity is one of the Agency's largest single investments globally in sustainable rural water supply delivery. The project installed about 2,123 wells with hand pumps across Afghanistan from 2009-2012. This report presents findings from a retrospective evaluation of a random selection of wells with hand pumps installed under the SWSS project.

1.2 EVALUATION PURPOSE AND QUESTIONS

This evaluation's key purpose is to identify factors that support and hinder sustainable water service delivery in different contexts. To meet this purpose, the evaluation seeks to answer the following questions:

1. What is the overall functionality (current and historical) of water supply systems implemented by SWSS? When the water systems have broken down, to what degree have communities been able to redress failures and get the systems running again?
2. To what degree are water systems installed by SWSS meeting communities' (women and men) expectations in terms of quantity, quality, accessibility, affordability, and reliability?
3. In reference to the five sustainability factors (technical, environmental, financial, governance and social), how have these factors contributed to the sustainability or breakdown of water delivery services across these communities?
4. How did the community engagement process undertaken at time of installation appear to affect sustainability and community satisfaction?

1.3 METHODOLOGY

The main source of data for this study is a survey of 500 wells sampled from the available population of 2,123 SWSS wells, augmented by focus group discussions with women and men from beneficiary households at 13 of the well sites. Project documentation and key informant interviews with former SWSS staff and other key actors in rural water supply within Afghanistan were used to provide context and background in interpreting results.

1.4 FINDINGS

What is the overall functionality, current and historical, of water supply systems implemented by SWSS? When the water systems have broken down, to what degree have communities been able to redress failures and get the systems running again?

The survey found 73% of wells in operation (i.e. able to produce water), 9% out of operation for less than 5 months, and 16% out of operation for 5 months or more, suggesting that the

communities were unable or unwilling to repair them. The average functionality for other wells of the same age in Afghanistan is 70%.[1]

Excluding wells permanently out-of-commission (i.e. broken for a year or more), the communities were usually able to repair them within a week, requiring an average of 1.7 repairs per year.

To what degree are water systems installed by SWSS meeting communities' (women and men) expectations in terms of quantity, quality, accessibility, affordability, and reliability?

Based on the survey and focus group discussion (FGD) data, community expectations largely paralleled well performance: when wells were functional and producing water that appeared and tasted drinkable, community members were satisfied. Women and men participating in FGDs expressed similar views.

Quantity of water: Eighty-six percent of community key informants were satisfied with the availability of water through the well, while 81% felt it was sufficient to meet household needs. Just under a third of wells were reported to have some level of seasonal dryness (10% running completely dry in some seasons, and the remainder having a slow/delayed replenish rate after pumping). In FGDs, satisfaction on this measure varied according to the well performance. Households reported taking more water per day than the MRRD minimum guidelines.

Quality of water: Seventeen percent of wells were reported by community key informants to have poor water quality based on the smell, taste and color of the water, although few had been tested since the well was installed.[2] FGD participants noted in some cases that water quality issues developed some time after the well was installed, and, in some cases, had led to them abandoning the well.

Accessibility of wells: Most wells were located in places selected by community members, and those consulted were happy with accessibility. In the FGDs, exceptions were noted where the location of the well had led to conflict or one person had tried to limit well access to others. Some concerns about the accessibility of publicly located wells for non-related women were raised in more conservative communities.

Affordability of maintenance/repair: For about 84% of wells[3], well repair costs were typically manageable and households were willing to pay, or else the caretaker or another individual covered them directly. However, for non-functional wells, financial issues were often a key obstacle. Some wells had frequent repairs or more serious repairs that communities were unable to pay for. Some communities never appeared to have a strong need for the well, and so were not motivated to pay for even basic repairs.

[1] Based on comparative data from the 2014 DACAAR national well inventory, which surveyed 30,181 wells across Afghanistan.

[2] All new wells were reportedly tested for arsenic at the time of installation, as per project requirements. In addition, water from 10% of newly installed SWSS wells were given an extensive battery of tests, as reported in the SWSS Final Report (2012).

[3] This includes wells functional at the time of study and those broken down for a short period of time, with a community track record of previous repairs.

Reliability of wells: Community satisfaction with well reliability varied depending on the well performance (as reported in response to the previous question) and the degree to which community members depended on the well as a water source. Some wells had reportedly had problems from the start (in Bamyan for example – where water access is generally problematic), and community members suspected negligence on the part of the contractors.

In reference to the five sustainability factors (technical, environmental, financial, governance and social), how have these factors contributed to the sustainability or breakdown of water delivery services across these communities?

Results from multivariable regression analysis of survey data confirm that the operational performance levels (functionality, breakdown durations) of wells installed under the SWSS program are shaped by a range of technical, environmental, social, institutional and financial determinants. Factors that appear to promote a community's willingness and ability to sustain their wells include well type (drilled rather than dug), hand pump type (Indus), spare part availability, favorable groundwater conditions (available year-round and good quality), an absence of unimproved alternative water sources (which suggests communities are absolutely dependent on the well for water, hence more motivated to keep it functioning), dependence on the well for multiple purposes (likewise an indicator of need), an active committee, and users contributing money for repairs. Importantly, each of the supportive conditions identified is in place for more than half of the wells sampled, and most factors are present in 75-90% of wells.

Some of the associations – such as groundwater and well-related issues – signify root causes outside of the control of communities and beyond the abilities of local mechanics to rectify. Instead they can probably be traced to inappropriate siting, inadequate construction, difficult hydrogeology, and the lack of external support to resolve major technical issues. Other factors suggest community-level difficulties arising from local governance or financing failures, in many cases linked to other conditions that undermine the willingness of users to keep their wells running. Although groundwater availability and well-related problems can have major consequences, for SWSS wells mechanical breakdown of the hand pump is responsible for the majority of failures. Given operation and maintenance building blocks (active committees, skilled mechanics and available spare parts) appear to be in place for the majority of communities, the financing of repairs appears to pose a considerable stumbling block.

How did the community engagement process undertaken at time of installation appear to affect sustainability and community satisfaction?

The degree of community engagement during well installation varied. Communities were provided information and involved in management decisions for more than three-quarters of the sites surveyed, but 5 in 6 communities did not receive any sort of training. The most common decision that communities were consulted on was the location of the well. Consultation was usually carried out with a small number of local leaders, and women were never formally consulted. However, most FGD participants (women and men) and survey respondents expressed satisfaction with this degree of consultation.

The evidence suggests that long-term rates of well functionality are higher when community representatives are involved in decision-making related to well installation, households contribute labor towards construction, and the well installation follows CLTS mobilization. Provision of information and training – particularly in regards to operation and maintenance – is related to shorter breakdowns, and by extension, a stronger community willingness or ability to repair wells promptly.

1.5 CONCLUSIONS

The SWSS wells performed slightly better than the average for wells of comparable age, based on comparative data from the 2014 DACAAR well survey. This suggests that, despite some known weaknesses in project implementation, largely around the way communities were selected and the need to respond to an accelerated time frame, SWSS frequently managed to equip communities with wells of reasonable quality and the basic tools to keep them working. Three key lessons from this:

1. When communities need a water source[4], have a sense of buy-in/ownership, have access to spare parts and repair services, and the well is reasonably constructed, they are highly motivated to maintain it. Further, their existing systems for management, decision-making and conflict resolution are often sufficient to complete necessary well repairs. While SWSS's community engagement processes were not extensive, they were usually good enough to prepare communities. While needs assessment was a noted weak point, most Afghan communities were in need of water at that time, so this was often not an issue.

2. SWSS's quality assurance processes directed at ensuring construction companies correctly installed wells appear to have been relatively successful, and may be the main source of the modestly better-than-average performance of its wells. Another source of advantage could be its ability to hire well-qualified national staff due to its high salaries.

3. SWSS well performance was also supported by the long-term ongoing work of other actors in the field, including MRRD and DACAAR, particularly with respect to the widespread availability of spare parts and trained pump mechanics.

Comparing within the sample of SWSS wells, higher levels of engagement are positively correlated with better well functionality.

Rural Afghan communities on the whole show themselves to be impressively resourceful and resilient. If they need the water from a particular well, most can maintain the water source if it was properly constructed and they were given some basic instruction. This is fortunate, given that government outreach capacity remains limited and support efforts need to be targeted. However, there are striking regional discrepancies in access to safe drinking water, which appears to persist largely due to geological characteristics of the regions, and which is far beyond the capacity of local communities to address. Likewise, communities need some form of outside support to address major and complex well repairs.

[4] Identified by lack of alternative water sources

1.6 RECOMMENDATIONS

For implementers of current and future water supply projects:

1. Document processes and results clearly, to allow for proper follow-up and improve the sector's capacity to learn from experience.

2. Previous to constructing any wells, develop a tracking system with clear unambiguous identification codes.

3. Recognize community strengths[5] and use existing community structures and processes where possible, while being cognizant that in some communities, leaders may not represent everyone's interests or may attempt to capture project benefits for themselves and their families.

4. Needs assessment should be done routinely as part of water supply construction, learning from best practices already documented by DACAAR.

5. Community contributions to well construction, especially in the form of labor, should be a requirement.[6]

6. Take steps to assure that wells are correctly installed. For example, SWSS's approach to quality assurance included holding back a proportion of payment to construction companies for a warranty period, and dependent on the proper functioning of the well. This created an incentive for companies to adhere to proper construction standards.

7. Discontinue practices that have previously been observed to result in unintended negative consequences – for example, paying much higher than market rates for equipment and labor while installing wells can lead to distorting the market and causing problems for other actors with similar goals.

For USAID and other donors:

1. Design projects in accordance with existing national government policies and practices wherever possible, and seek to build sustainability through increasing long-term institutional capacity of the government and other Afghan institutions.

2. Support a national system and policy for monitoring groundwater quality and quantity.

3. Support development of an MIS system to highlight areas with more problematic water available and target additional support to these areas, including a comparison of existing water supply to inform strategies/best practices.

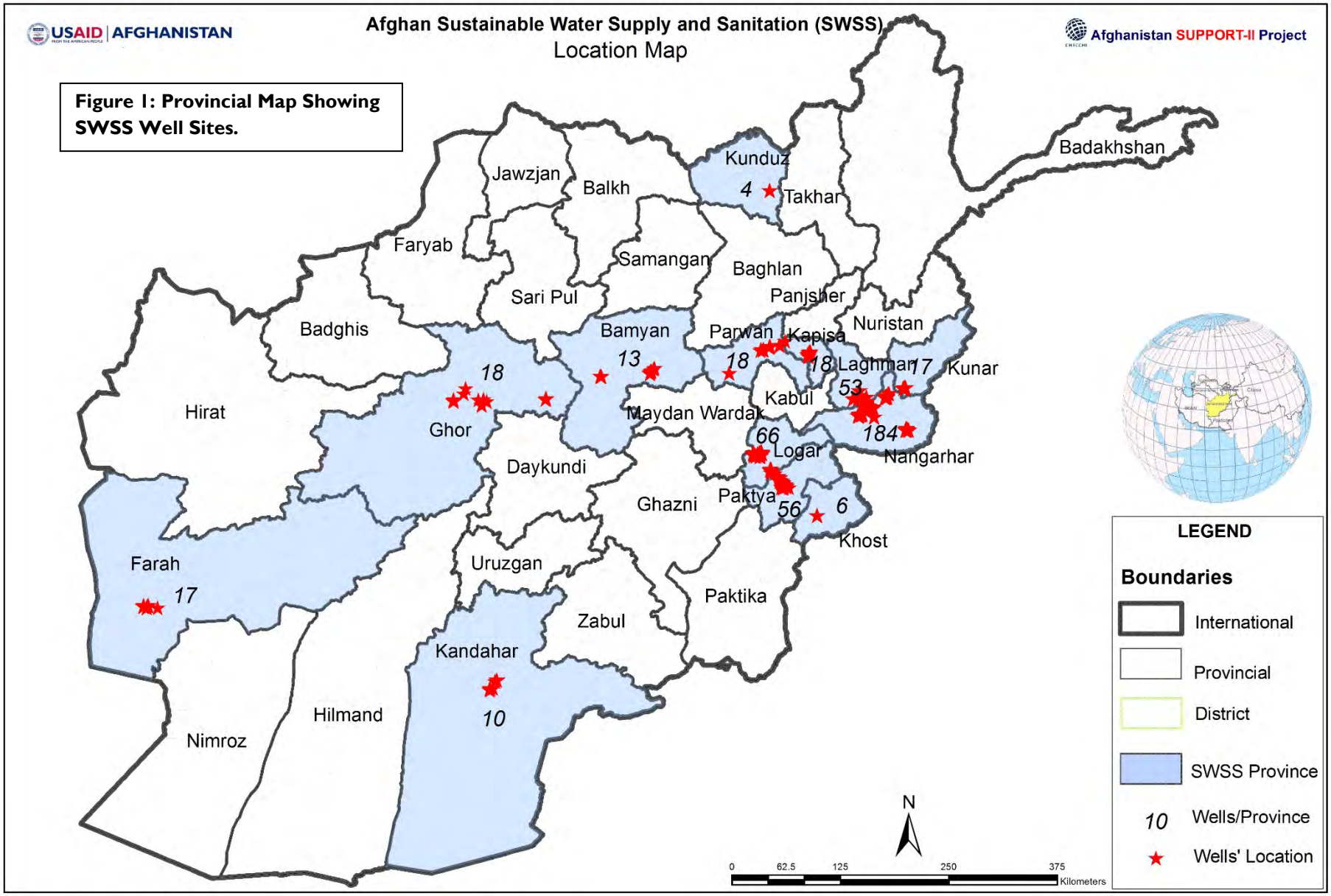
[5] For example, most communities already have conflict resolution processes that can be applied to any conflicts that arise to conflicts over well access and use.

[6] This study found labor contributions appeared more effective than cash contributions, perhaps because labor provides a more equitable form of community buy-in, regardless of wealth status.

4. Work with other partners in the sector to develop a strategy and plan for strengthening capacity to respond to large or complex well failures that community mechanics are unable to fix.

Recommendations for further research and analysis:

1. Compare advantages and drawbacks of wells with hand pumps versus other water systems.
2. Study the degree to which specific populations within a village context are at risk of lacking access to communal water sources.
3. Study new efforts to link sanitation, hygiene and water supply efforts to identify ways to sensitize and support communities in maintaining safe, healthy water supply given limited outreach capacities.
4. Analyze the existing DACAAR dataset to map out and prioritize problem communities in terms of water need.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Afghan Sustainable Water Supply and Sanitation (SWSS)
Location Map
Afghanistan SUPPORT-II Project
Figure 1: Provincial Map Showing SWSS Well Sites.
Badakhshan
Kunduz
4
Takhar
Jawzjan
Balkh
Faryab
Samangan
Baghlan
Sari Pul
Panjsher
Nuristan
Badghis
Bamyan
13
Parwan
Kapisa
18
18
18
Laghman
17
Kunar
53
Kabul
Hirat
Maydan Wardak
184
Nangarhar
Ghor
66
Logar
Daykundi
Paktya
56
6
Khost
Ghazni
Farah
17
Uruzgan
Paktika
Zabul
Kandahar
10
Hilmand
Nimroz
N
0
62.5
125
250
375
Kilometers
LEGEND
Boundaries
International
Provincial
District
SWSS Province
10
Wells/Province
Wells' Location

2. INTRODUCTION

This report presents the results of a retrospective evaluative study of wells installed in Afghanistan by the USAID-funded SWSS project from 2009-2012. By looking at how many communities have managed to maintain their wells, and the reasons for success and failure, the benefits of hindsight can be applied to ongoing efforts in rural drinking water supply, which remains a critical need for many communities in Afghanistan.

2.1 AN INTRODUCTION TO SWSS

USAID/Afghanistan's $43 million investment in the Afghan Sustainable Water Supply and Sanitation (SWSS) activity is one of the Agency's largest single investments globally in sustainable rural water supply delivery. SWSS (contracted to Tetra Tech as a Task Order under the E3 Bureau's Integrated Water and Coastal Resources Management Indefinite Quantity Contract II - WATER IQC II) supported the design and construction of approximately 3,011 wells and 37 piped water systems. In addition to water supply, another major component of SWSS focused on improving community sanitation through the community-led total sanitation (CLTS) approach, which was the first time this approach was used in Afghanistan.

The SWSS water supply component was initially to be introduced using what it called the "Provincial Approach." This approach was to be community-based and included intensive collaboration with local residents and leaders of both sexes, consistent with best sector practice. However, in response to U.S. government local strategic engagement in Afghanistan at the time, SWSS had to adapt and change almost all of its water supply implementation to what it termed the "Flexible Approach."[7] SWSS responded to Project Nomination Forms for rural water supply projects that came from the Provincial Reconstruction Teams (PRTs) often working in highly kinetic areas where it was difficult for SWSS to implement their originally planned intense community-based approach. In practice, the Flexible Approach simply meant that site selection was performed by PRTs and that SWSS would do its best to use community engagement practices, but its essential focus was on getting the wells constructed under challenging circumstances.

2.2 EVALUATION PURPOSE AND QUESTIONS

This evaluation's key purpose is to identify factors that support and hinder sustainable water service delivery in different contexts. It will achieve this through a comparative analysis of SWSS well sites based on their functionality, and with reference to the five categories of factors identified in the literature as relevant to the sustainability of water supply systems (technical, environmental, financial, governance and social).[8]

[7] Based on interviews with multiple former SWSS senior staff.

[8] Note that the original work plan stated the main point of comparison would be between flexible and provincial approaches of implementation. However, during the course of this study, the team found that almost all water supply had been carried out under the flexible condition, and there was not a large enough sample under the provincial condition to conduct a statistically valid analysis. Nonetheless, comparisons have been made to the degree possible in both the qualitative and quantitative data. See also the section on SWSS under 'Findings'.

The Office of Infrastructure hopes this evaluation will inform USAID's new investments in rural water supply with the United Nations Children's Fund (UNICEF) under the Rural Water Supply and Hygiene Program (RWS) – a $30 million USAID funded program to be implemented from March 2016 through 2020. This USAID/Afghanistan investment in RWS is the first rural water supply program since SWSS, and, like SWSS, is one of the Agency's largest rural water supply programs globally. As such, a retrospective evaluation of the sustained impact of SWSS rural water supply investments is timely, potentially invaluable to the new RWS Program, and promises to be a major USAID contribution to sector knowledge regarding rural water supply sustainability globally.

To meet the purpose stated above, this evaluation seeks to answer the following questions[9]:

1. What is the overall functionality (current and historical) of water supply systems implemented by SWSS? When the water systems have broken down, to what degree have communities been able to redress failures and get the systems running again?

2. To what degree are water systems installed by SWSS meeting communities' (women and men) expectations in terms of quantity, quality, accessibility, affordability, and reliability?

3. In reference to the five sustainability factors (technical, environmental, financial, governance and social), how have these factors contributed to the sustainability or breakdown of water delivery services across these communities?

4. How did the community engagement process undertaken at time of installation appear to affect sustainability and community satisfaction?[10]

2.3 EVALUATION FRAMEWORK

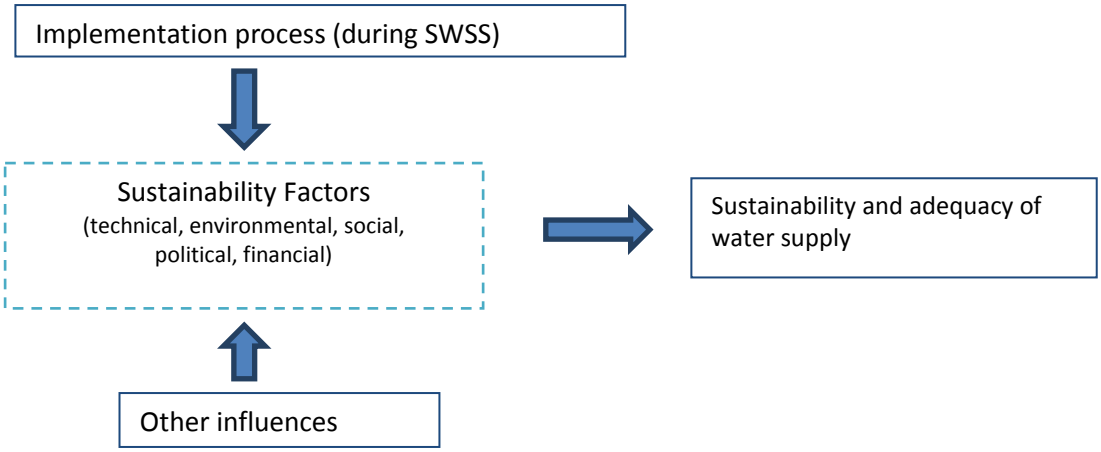
This evaluation focuses on identifying associations (that could be indications of causal relationships) amongst various factors believed to be significant to the sustainability of water supply at the village level.[11] The key focal areas are presented in Figure 1 below.

[9] Note these are the same questions stated in the work plan, but the ordering has been changed in order to improve the flow of presentation in the findings section.

[10] The initial formulation of this question included the text, "Specifically, were there observable differences between communities where the "provincial approach" was taken and communities where the "flexible approach" was taken?" However, in the course of this research it was discovered that all wells were installed under the 'flexible' approach, so this binary distinction was not a useful comparator.

[11] As the data is cross-sectional, the regression analysis conducted on survey results can only be used to identify statistical significant correlations. Correlations may be indicative of causality – we use other (largely qualitative) data to interpret these correlations and suggest potential causal relationships to the degree possible.

Figure 2: Evaluation Framework



Sustainability and adequacy of water source supply is based on direct observation of the well sites as well as community perceptions. Thus, whether a water supply is considered adequate or not, in this study, is based largely on expressed community satisfaction with it. The five sustainability factors mentioned are drawn from the literature on rural water supply, which has commonly used these categories for purposes of monitoring water supply systems.[12] Table 1 below gives a brief description of each of these factors.

Table 1: Five Factors for Water Supply Sustainability

Factor:	Description:
Technical	Includes the physical infrastructure
Environmental	Includes the water source, the placement of the water source in relation to other natural features (that may lead to erosion etc.), and properties of the water source including quantity and quality
Governance	Includes the institutions and structures involved in the management and oversight of the water source
Financial	Includes funding sources related to hardware, maintenance and oversight over the full lifecycle of the project
Social	Includes behaviors and social norms related to the water source.

[12] http://www.ircwash.org/sites/default/files/2013_wp6_sustainabilityassessmenttools.pdf

The SWSS implementation process, and especially the community engagement process, is a variable of major interest in this evaluation – in large part because it is the variable over which implementers have the most control, and so lessons about what works here should have the greatest impact in terms of informing future best practice. However, in the course of this study, it was discovered that there was considerably less variation within this variable than initially supposed, limiting the comparison between different variable conditions. Specifically, all wells were implemented under the 'flexible' approach, with generally limited community engagement and no formal link to hygiene training or CLTS, rather than the more comprehensive 'provincial' approach that was originally planned for. Nonetheless, this framework helps this study to concentrate on understanding this variable in relation to other factors of relevance to water supply performance and sustainability.

2.4 METHODOLOGY

The study collected data using the following methods:

1. Survey of 500 well sites (of which 480 were positively located) consisting of:
    a. Direct observation of the well (Guided by a well observation survey instrument as described in Annex III)
    b. Questionnaire for community key informant (usually the well caretaker or else someone with good knowledge of the well).[13] (See Annex III for the full questionnaire).
2. Focus group discussions (FGDs) with community members from 13 communities selected as a subgroup of the above survey, conducted separately for men and women (See Annex III for the FGD guide)
3. Document review (including SWSS Final Report, SWSS well completion logs, MRRD policies and guidelines on water supply – the full list is included in Annex IV)
4. Eight national level key informant interviews (with representatives from MRRD, UNICEF, DACAAR, AKF, SCA, former national SWSS staff (x2), and former international SWSS staff). (See Annex III for the interview guide, containing questions asked).

Sampling. The initial well survey sample was of 485 well sites randomly selected from a list of 2,123 well sites with GPS coordinates provided by the USAID implementing partner for SWSS. During the study, 44% of these well sites had to be replaced because the survey team could not access them due to insecurity or winter weather. They were replaced by well sites within the same province. Community members reported that insecurity almost never affected local access to wells, or their ability to maintain wells, so this should not distort the study findings. In addition, the team gained information regarding the siting of CLTS communities and, based on this, added 15 additional well sites to the sample and altered the FGD sample to include a greater balance of these

[13] 72% of the community key informants were caretakers. Some wells did not have formal caretakers, or the caretaker was unavailable during the survey. Most of the remaining respondents are water user group members, CDC members, elders, or, most commonly, someone living close to the well.

communities. This brought the total sample size to 500. Twenty of these wells could not be located, despite significant efforts by the field team (i.e. they appeared not to have been built or to have been documented incorrectly). This brings the total of wells located and surveyed to 480.

FGDs were carried out in a total of 13 communities, selectively sampled to include a range of provinces, and an equal balance of CLTS communities and non-CLTS communities (5 FGD communities were in areas where CLTS had also been conducted). In each selected community, two FGDs were conducted: one with men from beneficiary households, and one with women from beneficiary households. Each FGD was conducted with 6-8 participants, each from a different household, and with the additional criteria that participants should represent a range of ages and that the caretaker and the head of the CDC should be excluded, so that their presence would not unduly constrain free expression of a range of opinions. In several communities, where the wells had been placed into a private compound or had a very limited number of beneficiaries, these criteria had to be revised and special protocols were developed.

Data Collection. A team of field researchers were hired regionally and trained centrally in Kabul for 5 to 6 days. The training period also included field testing and revision of the survey instruments. All survey enumerators were male, while FGD groups were conducted by pairs (one facilitator and one note-taker), who were either male or female, depending on the gender of the target group.

Survey data was collected via smartphone and updated regularly. There were two tiers of data monitoring, both involving review of collected data, telephone monitoring and field visits. When irregularities or incomplete data were identified, follow up correction was taken. For this reason, the quality of the survey data appears to be high. The transcripts from the FGDs are more variable: although teams were trained and monitored extensively, the high level of discretionary understanding required to facilitate a focus group is difficult to convey. While facilitators followed the overall protocol, most did not probe or follow up, meaning the discussions are often superficial and some contributions are unclear. However, field observation notes and some follow-up interviews helped to round out the data, and the FGD notes taken as a whole were sufficient to answer the evaluation questions.

Analysis. Survey data from the 480 located well sites has been analyzed to capture overall well performance, communities' ability to maintain their wells, and various facets of the five sustainability factors (technical, environmental, governance, financial and social). While the work plan laid out an analysis based on a composite of questions related to each of the factors, the team decided that the final analysis would be more accurate and nuanced without this, and that data would only be clustered or consolidated together to the degree that it made sense. Another change in direction from the initial plan, as already noted, was to focus analysis on specific indicators of community engagement during the project intervention rather than attempting a dichotomous comparison of provincial versus flexible approach types. Annex II provides further details of the analytical methods used for assessing the factors of sustainability and effectiveness of community engagement activities.

The analysis of the FGDs was used to triangulate and aid in interpretation of the survey data, as well as to add nuance to the overall analysis. Document review and national key informant interviews were essential to the team's understanding of how SWSS was implemented, as well as broader dynamics and national factors likely bearing on water source sustainability.

2.5 STUDY LIMITATIONS AND MITIGATION

The study faced a number of risks and limitations, which were mostly anticipated at the outset:

1. **Inaccessibility due to insecurity and weather:** Insecurity proved to be the major hindrance to accessing well sites, followed by snowfall. When well sites were inaccessible due to either of these reasons, they were replaced by well sites within the same province. A total of 215 well sites (43% of the sample) had to be substituted. As insecurity appeared to have no bearing on the overall sustainability of wells, this is not expected to have much effect on the representativeness of the data.

2. **Difficulty in positively identifying well sites:** During the study pilot, the team found that positive identification of the well sites according to the GPS coordinates and/or village names provided in SWSS project records was difficult, since GPS coordinates were often not accurate (and were rarely 100% accurate), a village typically contains multiple wells, and community members were often unaware of the donor and project installing a well. A series of protocols and standard steps were implemented to ensure positive identification of the sampled wells. These included identifying the wells by village name and GPS code first, and if this resulted in ambiguity (e.g. two wells were too close to each other) or no well appeared to fit the available information, the local CDC was asked about the well and their records were consulted. If the CDC reported no well had been built corresponding to the available data, the field staff were required to get a signed statement from them to this effect, and to take a GPS-stamped photo of a local landmark to show that they had indeed been to the site where the well was recorded to be located. Finally, the well completion logs were reviewed to see whether any documentary data for the missing wells could be located (although there were challenges with this also, as not all logs included GPS data, and they did not include the Well ID codes that were later assigned). The team believes these measures were sufficient to ensure a high level of accuracy, but some level of uncertainty remains. In addition, 20 wells (4% of the sample) could not be located by the GPS or other data provided. It is not possible to draw any conclusions about why these wells were not where they were reported to be, although as local leaders did not have any records or recollection of these wells, it is likely they were either never built, or the recorded location at the time of building was entirely incorrect.

3. **Attrition of knowledge:** As the study depends in part on community members recalling the implementation process as well as the well's performance, it is subject to the fallibility of memory over time and the risk that those who were most involved are not available to the field team. Discrepancies between the recollections of FGD participants, especially regarding training and information given at the time the wells were introduced, suggest that knowledge attrition was a factor. Triangulation of sources and data saturation[14] was used to mitigate these at a broad level.

4. **Gaps in documentation:** The list of wells used to draw the sample – the most complete

[14] Data saturation is a qualitative approach for determining how much data to collect – when there is a repetition in the themes and issues provided by to the point that no or little new information is yielded by subsequent data collection, saturation is said to be reached.

available to the evaluation team - was missing one third of the wells that the SWSS project had claimed to implement. Likewise, the final SWSS report does not include much detail on the technical components of the wells, and getting full documentary details on implementation method used at specific sites was not possible. The relatively large sample size and triangulation across data sources were used to mitigate this, combined with interviews with former SWSS staff.

5. **Challenges to some of the initial study assumptions:** The initial study design was predicated on the assumption that many wells were implemented under the provincial approach, involving a high level of community engagement, and others were implemented under the flexible approach, involving a limited level of community engagement. Hence the initial plan was to compare wells under these study designs. This assumption proved incorrect (i.e. all the wells were implemented under the flexible approach), as found during the course of the study. This resulted in an adjustment to the study design, to focus more on comparing functional and non-functional wells, while still including a focus on understanding community engagement.

These limitations need to be considered in interpreting the study findings. However, the overall study design and specific mitigation strategies are robust enough that the evaluation findings can be considered largely reflective of the actual situation on the ground.

3. FINDINGS

3.1 THE NATIONAL CONTEXT

3.1.1 Current Need for and Availability of Drinking Water Supply

Drinking water supply has been, and remains, a major priority for Afghanistan. The Asian Foundation 2015 survey of the Afghan people found that 17% of respondents cited poor drinking water as one of the two biggest problems in their area (the fifth most common concern after unemployment, security issues, electricity and roads).[15] However, there has been great progress in this area over the period concurrent with and following the SWSS project. The proportion of the population with access to improved drinking water increased from 27% in 2007-8 to 65% in 2013-14.[16]

Both anecdotal and statistical evidence show that there have been a huge number of new wells drilled across the country over the same time period. For example, 23% of TAF survey respondents reported being aware of at least one new water project in their area in the preceding 12 months. While these may increase overall accessibility of water, they may also create disincentives for maintaining existing wells, depending on how carefully needs assessments are conducted: data from national interviews and the FGDs suggest that NGOs have sometimes 'competed' for well sites and implementation has often not been needs based. While piped water schemes are increasing in urban areas, and alternatives to hand pumps are considered preferable where possible, wells with hand pumps are currently the main drinking water source for Afghan families: 56.8% of TAF survey respondents in 2014 said their water came from a well.[17]

The availability and quality of drinking water sources varies regionally, depending in large part on geological characteristics of various areas. Generally, areas in the north of the country have less access to drinking water, and the water quality in these areas is poorer, whereas availability and quality of water tends to be best in the east of the country.[18]

3.1.2 Key Actors and Coordination at the National Level

Within the national government, the key body for setting policy and coordinating strategy on rural water supply (excluding irrigation) is the Rural Water Supply, Sanitation and Irrigation Programme (RuWATSIP), within the Ministry of Rural Rehabilitation and Development (MRRD). While numerous NGOs have had WASH and water supply projects, the largest and most long-running is DACAAR. DACAAR's work in water supply and WASH predates the existence of the current government. Much government policy on providing rural water supply was set with direct input from DACAAR, drawing on its considerable experiences and practice.[19] DACAAR's geo-hydrological data has been used by various other organizations and projects, including SWSS. In 2014, DACAAR carried out a major survey of over 30,000 wells across the country, including water quality testing on a subsample. This survey data has provided a useful comparator for the current study.

15 TAF Survey of the Afghan People 2015, p9 & p25

16 World Bank, Citizen's Charter Project Document, p11

17 Ibid, p76

18 See for example, the DACAAR report 2014, and the TAF survey p76 showing levels of satisfaction with water mapped per province

19 Based on key informant interview with senior DACAAR staff.

Coordination and cooperation in the sector is generally very good. Key informants within NGOs and other organizations all reported high engagement with the government and agreed with government policies on water supply, which in turn informed their own activities. High level political commitment to WASH and drinking water supply has recently been confirmed by the inclusion of drinking water supply as a priority sector under the Citizen's Charter, a presidential initiative with donor support.

However, the Afghan government has little to no outreach capacity at the district level. Beyond setting standards and policies and doing some level of oversight, they are limited in what they can do. DACAAR is the only major organization that claims to provide regular follow up field visits to its wells, on an annual basis.

3.1.3 General Practices at the Local Level – What Is Known by National Level Actors

National level policy is set based on current understanding of needs and best practices at the local level. However, large national actors, including MRRD and UNICEF, acknowledge that there is limited data on various aspects of water supply and especially on community perspectives and dynamics in relation to maintaining water supplies. On the other hand, national-level actors interviewed for this study expressed general agreement in terms of what they understand to be the case on the ground, and where they see the priorities are. Table 2 summarizes some key points of common understanding according to the five sustainability factors in the study framework. These will provide us with a useful basis of comparison when discussing the empirical findings from surveys and focus groups conducted within this study.

Table 2: Key Points of Common Understanding According to the Five Sustainability Factors

Factor:	Current Knowledge/Consensus
Community Ownership or Engagement	• Within the sector, there is a broad consensus that community ownership is a key determinant of well sustainability. Some key informants observe that communities differ in terms of their sense of dependency – if they're used to receiving 'handouts' they are less likely to take on the responsibility to maintain wells. Community contributions (usually in-kind) are seen as critical to establishing/proving ownership. Current MRRD policy is that communities must contribute at least 10% of the cost (which can be in-kind), and this is broadly supported.
Technical	• **Construction/siting:** This is seen as a critical issue and a major reason for wells failing: they were situated in unsuitable areas or were not drilled or dug deeply enough. Sometimes negligence or corruption on the part of construction companies is understood to be a key cause, so monitoring their performance and creating accountability mechanisms are key. • **Spare parts availability:** Generally agreed not to be a problem, although there is limited to no quality control on parts sold on the open market, which might be an issue. DACAAR in particular reports having made long-term efforts at developing standards and networks for supporting spare parts, which other national actors also acknowledged as being effective, along with the open market. MRRD standards on hand pump components were developed by DACAAR and

	have been widely adhered to, including by SWSS. • **Availability/capacity of mechanics:** Mixed reports, and a sense that things are generally improving there have been various models for training and payment. When mechanics are near or in communities, wells appear to be more sustainable, but high turnover and ability of mechanics to make a living are remaining questions. Most mechanics have been trained by DACAAR, as also reported by MRRD and UNICEF representatives. • **Further support (for larger or more complex repairs):** There is no government capacity to provide additional support for major repairs or well failure, or even to monitor the overall functionality of wells. MRRD is currently developing a MIS for this purpose, which might resemble SWSS's WaterTracker.
Financial	• Various financial arrangements for well repair have reportedly been attempted over the years. Up until recently, communities were supposed to pay hand pump mechanics in a set number of bags of wheat per year. Now, some national actors say the communities are free to come up with their own agreements with the pump mechanics on how to compensate them, and this is captured in a formal agreement (with one pump mechanic typically responsible for 10 wells). MRRD staff report that funds for well and hand pump repair should now come from the CDC budget.
Social	• MRRD policy is that hygiene awareness training is included as part of community engagement when wells are installed, but they are aware that USAID projects had not been following this. • Overall, communities are understood to have a poor level of awareness of safe drinking water, so put little value on maintaining safe water sources when non-safe sources (i.e. surface water) are readily available. • Well siting is seen as critical to women's accessibility, as wells in public locations (particularly in front of mosques) are often socially inappropriate for women to visit.
Governance	• Typically one well should serve 15-25 households and be able to provide 25L of water per household per day as per MRRD guidelines. • There are various reports on the roles of water user groups: some reports say that these are now replaced by CDCs, others that they are subsidiaries of CDCs, formed by one member of each household using the well. • A well caretaker is chosen from amongst the beneficiary households, and is responsible for keeping the well area clean and contacting a mechanic when repairs are needed – this is also part of the MRRD guidelines. • Typically, there is a formal handover of the well to the community when it is completed, with a tripartite agreement between community leaders, the pump mechanic, and local government.[20]
Environmental	• Limited groundwater coupled with increasing demand and lack of regulation is seen as a widespread problem, particularly in urban and urbanizing settings. • Lack of regular/systemic water quality testing is another weakness – the government's facilities are limited, and there is no response mechanism for responding to problematic water sources. • There have been discussions around the need for national ground water monitoring and related policy, but in practice this has been limited, with DACAAR

[20] This was mentioned by staff at both DACAAR and AKF.

	being the most active in terms of collecting data, and with no effective national policy or legislation on this currently in place.
Other	• Increasingly, wells with hand pumps are seen as a least-preferred option because of their tendency to break down frequently. Where population density is sufficient and it is technically feasible, other options including metered pipe schemes, gravity-fed wells and solar powered systems are being seen as preferred strategies, with anecdotal evidence that they may be more robust and sustainable options than hand pumps.

On the whole, the findings from this study support the knowledge base as expressed by representatives of the main agencies working on rural water supply. However, a noteworthy area of divergence is with regard to governance and financial arrangements for covering well repairs. These appeared to be considerably less formal and more ad hoc in communities than envisaged by government guidelines. The survey found only 16% of wells had specific user groups set up. Existing CDCs and village shuras were reportedly responsible for well management in 63% of communities, the caretaker in 9%, and 11% reported as unknown, which, based on the FGDs, likely means no one is formally responsible, or else the well has been out of commission for long enough it is a non-issue. Regular collection of fees towards a dedicated fund to cover well repairs was extremely rare (caretakers in only 3% of communities report doing so), while most FGDs participants reported that repair costs were collected from community members on an ad-hoc basis (in the KI survey, 37% of wells are repaired this way), and a few reported that the well caretaker directly covered the costs (27% of wells have repair costs covered by a single individual, according to the survey), only getting reimbursed occasionally, if at all, by well users in other households. This seems to work well for smaller repairs, where households generally find the costs manageable, and be more problematic for large, more expensive repairs, leading to longer periods of breakdown. Ten percent of wells are repaired through CDC funds.

While the study focused specifically on SWSS wells, many of these communities had wells put in from other donors as well, and their approaches to well management are likely the same across various well sites.

3.2 IMPLEMENTING THE SWSS PROJECT

3.2.1 Brief Background

While this study is exclusively focused on the sustainability of SWSS-implemented wells with hand pumps, SWSS also included another major component on sanitation, using the community-led total sanitation (CLTS) approach, which focuses primarily on eliminating open defecation in communities.[21] The initial project design called for formal links between CLTS and water supply by 'rewarding' communities that received open-defecation free status with improved water supply. However, very early in the project, the approach was changed so that water supply locations were largely determined in response to requests from Provincial Reconstruction Teams (PRTs). The different approaches in selecting communities meant that the two components operated

[21] SWSS also built a number of piped water schemes (about 32). These were excluded from this study because they were relatively few, and to keep the scope manageable.

independently, and largely in different regions of the country and different communities (section 3.1 for more detail on this). This study identified 25 wells situated in communities that had successfully participated in CLTS.[22] These were added to the otherwise random sample of SWSS wells for comparative purposes, as a number of key informants believed that the CLTS approach to community mobilization could increase community capacity and willingness to maintain communal wells.

3.2.2 Selection of Sites and Engagement of Communities for Water Supply

SWSS wells were installed based on demand from PRTs, which, in turn, were often based on requests from local leaders. Based on interviews with former SWSS staff, there was no needs assessment conducted, although overall needs were often high, and local leaders might presumably be more motivated to petition for water projects when their constituents were in need of them. Where there was a clear technical limitation to what they were asked to do (especially with respect to the larger pipe scheme project), they would raise objections, but requests for wells were almost always accommodated.

A single work order usually contained a number of wells to be commissioned. How these numbers were determined is not clear. SWSS would hire small to medium-sized Afghan construction companies to build the wells and install the hand pump. SWSS also had community outreach persons on staff who would engage the communities to discuss well siting and related issues. The specific process used per community is not documented. However, almost all communities in the survey had at least one consultation meeting (most reported between 1 to 3 meetings), and most key informants and focus group participants were satisfied with the consultation process. Women were almost never included as part of the formal consultations, although some were separately targeted through hygiene training. Only 16% of communities reportedly received any training for either men or women, although it is possible that training for women was underreported, as key informants were often unaware of whether women had been trained. Based on the recollection of former SWSS staff and community members, the most common approach was to go through the Community Development Committee (CDC) head, who would introduce SWSS to the village elders and leaders, and to meet with them to discuss where to place the wells (89% of community KIs recalled being consulted on this), how to manage the wells (70%), and how to finance well maintenance and repair (51%). Many communities made in-kind contributions during well construction, most commonly of labor. In some communities, private land was donated to the well. This was sometimes accompanied by a formal contract to show that the land was given to the well, and the well was public and all community members should have free access.[23] While former SWSS staff recall that mechanics were trained during the process, this is not documented nor captured in the well level surveys.[24] While most wells had caretakers assigned, this was often done informally by

[22] This was done based on available documentation: the list of 634 open-defecation free (ODF) certified communities that had 'graduated' through the CLTS project was compared against the full list of 2,123 SWSS wells provided from project records.

[23] Information on whether private land provided for SWSS wells was contracted in this manner was only mentioned in the FGDs, so it is not possible to comment on the degree to which this practice was followed.

[24] The only related documentation we found in this study is that many of the SWSS well completion logs included information on the name and location of the closest trained mechanic.

community members rather than as part of the consultation process, and only 13% of them report having received any training.[25]

3.2.3 Quality Assurance Issues

Although SWSS contracted small companies to construct the wells, they put considerable emphasis on transparent granting of work contracts and on quality assurance, according to former staff. For example, they held back a portion of the contract fees for a set amount of time after the well was built (somewhere between 3 to 12 months – we do not have precise details) to ensure that there were no major construction errors that would cause the well to break down soon after construction. SWSS also had their own engineers on staff, and required fairly detailed logs of well completion, including engineering diagrams, GPS coordinates, photos of completed wells and signed paperwork from local representatives.

Conversely, some other agencies noted that because SWSS had a relatively large budget and overly ambitious schedule to construct wells, it created market distortions that negatively impacted their own work, by paying far above the market rate for well construction and incentivizing many poorly qualified people to compete for contracts.

3.2.4 Linkages to MRRD and Comparison to other Water Supply Projects

SWSS had a formal Memorandum of Understanding with MRRD, and many of its staff were drawn from MRRD, and later returned to MRRD. This meant that there was a large degree of informal coordination and shared understanding. SWSS did not follow MRRD guidelines to the letter. Specifically, it did not always follow MRRD's guideline to target a well to 15-25 households, often going below this number. It also did not systematically incorporate hygiene training along with water supply. However, in many aspects, and to the degree possible given security and other operational constraints, it appears to have followed the generally understood norms and best practices at that time. As such, and as observed in the comments of MRRD, UNICEF and former SWSS staff, SWSS was in many ways fairly typical of well construction projects in the country, albeit better funded but with more political pressure to respond to specific requests and build a large number of wells in a short period of time.

3.3 Overall Functionality of SWSS Wells

Evaluation Question: What is the overall functionality (current and historical) of water supply systems implemented by SWSS? When the water systems have broken down, to what degree have communities been able to redress failures and get the systems running again?

Well functionality:

Table 3 below summarizes key findings on well functionality and use from the survey data. The survey found 73% of wells in operation (i.e. able to produce water), 9% out of operation for less than 5 months, and 16% out of operation for 5 months or more (suggesting that the communities

[25] Based on the results of the community key informant survey.

were unable or unwilling to repair them).

Comparing these findings with the extensive survey of well sites conducted by DACAAR in 2014, we find that the SWSS wells appear to be nominally above average functionality (i.e. 69.5% of wells in the DACAAR data set (N=4,714) were found to produce water, compared to 73% of SWSS wells).A sizable minority of SWSS wells (about 16%) were broken for more than five months with the community either unable or unwilling to repair them.

Table 3: Descriptive Statistics on SWSS Well Functionality

	N Total	N= TRUE	%
Basic Functionality			
Wells in sample which could not be located	500	20	4%
Wells producing water at the time of study	480	348	73%
Wells broken for less than five months	480	41	9%
Wells broken for five months or more	480	79	16%
Quantity of water			
Wells producing water at all times of year	480	414	86%
Wells which dry completely in some seasons	480	49	10%
Wells with reduced water availability in some seasons	480	149	31%
Wells with perennial issues with water quantity (i.e. producing water but slow to refill)	480	47	10%
Quality of water			
Issues with water quality noted	480	81	17%

Table 4: Wells Broken - Number of Days Well Has Been Non-Functional (N=120)

Number of Days Well Has Been Non-Functional (N=120)	Frequency	Relative Frequency	Cumulative Relative Frequency
1-2 days	2	1.7%	1.7%
3-6 days	6	5.0%	6.7%
1-4 weeks	10	8.3%	15.0%
1-4 months	21	17.5%	32.5%
5-11 months	15	12.5%	45.0%
A year or more	64	53.3%	98.3%
Don't know	2	1.7%	100.0%

Frequency of Well Repairs

The survey asked community key informants (typically caretakers), how many times in the last 12 months (since last winter), the well had been repaired.

Twenty percent of KIs (96 of 480) did not know. This number is likely to include respondents with wells that were not functioning at all (i.e. had been broken for more than a year). Of the remaining 384 wells, 261, or 20% had reportedly not been repaired. While this group might also include some wells not functioning throughout this period, most of these wells would have been functioning

without requiring repair for about the past year.

Of the wells that were either functioning or broken for less than a year, they required repairs about 1.7 times per year on average, and were typically repaired within a week or less. Of the remaining wells, it appears that most needed repairing just once or twice, with five being the maximum reported number of breakdowns in the past 12 months (reported by 6% of KIs).

Amongst those wells that were repaired, most repairs were preemptive (i.e. before the well had stopped working), or took just a few days to complete. KIs recalled 616 separate repairs carried out on 310 wells (i.e. many wells had multiple repairs, with KIs asked to recall the five most recent). Of these, 60% were repaired within two days of the well breaking down, and 83% within the week:

Table 5: Breakdown Duration Before Successful Well Repair

Breakdown Duration	Number of Repairs	Relative Frequency	Cumulative Relative Frequency
0 days (preventative repair)	148	24%	24%
1-2 days	221	36%	60%
3-6 days	143	23%	83%
1-4 weeks	69	11%	94%
1-4 months	20	3%	98%
5-11 months	15	2%	100%
Totals:	616	100%	100%

Specific factors influencing community capacity to maintain and repair wells are considered under Section 4.5 of this report.

3.4 COMMUNITY SATISFACTION WITH SWSS WELLS

Evaluation Question: To what degree are water systems installed by SWSS meeting communities' (women and men) expectations in terms of quantity, quality, accessibility, affordability, and reliability?

In answering this question, we must first consider who was using the SWSS wells. The median number of households served by SWSS wells was 15 (reported in the KI survey), with some wells serving a single household, and at the other end of the range, one well reportedly serving 150 households. Most SWSS wells were clustered at the lower end of 15 households or less.[26]

Estimates of average water consumption tend to be higher than anticipated by most standards, which typically allow for 20-25L per capita per day. Estimates from the KI survey break down as shown in Table 6, with average per capita amounts based on dividing average household consumption with average persons per household.

[26] Afghan government guidelines stipulate that a well with a hand pump should typically serve 15 to 25 households, although the SWSS project did not attempt to adhere strictly to this.

Table 6: Average Household Water Consumption

Litres Per Day Per HH	Equivalent to L/day per Capita[27]	% of HHs
0	0	5%
10-90	less than 12	5%
100-190	14-26	31%
200-290	27-40	26%
300 or more	41 or more	23%
Unknown	**Unknown**	**10%**

Men in the FGDs typically reported even higher quantities of water consumed per household (frequently up to 600L per day and above), although drawing this amount from a hand pump seems unlikely, and women's estimates of daily household water consumption were much lower. None of the FGD groups reported that communities placed any restrictions on the quantity of water each household could take, even when water shortage was reported to be an issue. In several instances, FGD participants attributed the breakdown of their wells to a 'rush' on water demand and subsequent rough use and overuse. The most common uses for well water, shown in Table 7, are as might be expected, topped by drinking and cooking. The three quarters of wells being used to water livestock could account for some of the higher water consumption estimates.

Table 7: Community Use of SWSS Wells

	N Total	Yes	%
Median number of households served by well	469	15	n/a
Well is reportedly used for:			
Drinking	480	462	96%
Cooking	480	441	92%
Washing clothes	480	428	89%
Bathing	480	428	89%
Watering livestock	480	359	75%
Irrigating crops	480	7	2%

Findings on Satisfaction from the Key Informant Survey

Table 8 shows the key informants' level of satisfaction with various aspects of the wells. This typically represents the perspective of the caretakers of the well, which cannot be taken to be equivalent to the overall community perspective, but should provide a reasonable proxy, especially on questions related to the overall reliability and functioning of the well.

[27] Based on the average household size of 7.4 as reported in the 2013-14 ALCS.

Table 8: Satisfaction with SWSS Wells (per Community Key Informant Survey)

	Very dissatisfied		Dissatisfied		Neutral		Satisfied		Very satisfied	
Degree of satisfaction with:	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Community involvement in planning and building the well	32	7%	18	4%	30	6%	82	17%	318	66%
Reliability of the well	33	7%	15	3%	26	5%	84	18%	322	67%
Availability of water	31	6%	18	4%	19	4%	90	19%	322	67%
Location of the well	21	4%	9	2%	17	3%	72	15%	362	75%
Quality of water	43	9%	18	4%	26	5%	68	14%	326	68%
Speed of repairs	69	14%	65	14%	73	15%	116	24%	157	33%
Quality of repairs	50	10%	46	10%	72	15%	124	26%	189	39%
Cost of maintaining and repairing the well	64	13%	59	12%	110	23%	160	33%	86	18%
Management of the well	23	5%	37	8%	52	11%	97	20%	271	56%
Well meeting local household water needs	43	9%	18	4%	29	6%	80	17%	311	65%

While relatively few KIs (18%) are 'highly satisfied' with the cost of well repairs, even fewer (13.4%) are 'highly dissatisfied' and most (56.2%) are satisfied or neutral, suggesting that well repair costs are reasonable for most communities under most circumstances (barring cases where a major repair is needed). However, when cost becomes an issue, it can often be insurmountable – being highly correlated with longer breakdown durations, including of a year or more (see Section 4.5). While most KIs express overall satisfaction with their wells (i.e. the combined responses on all questions related to satisfaction show an average of 76% of respondents are either satisfied or very satisfied), the areas where they express most satisfaction are the location of the well (which makes sense, as caretakers are normally selected from households close to the well), and the quality and availability of water, as well as the reliability of the well. They also express that the well is meeting local household needs. However, their greatest concern, besides the cost of repairs, is the speed and quality of repairs. The number of KIs expressing strong or partial dissatisfaction with the well's capacity to meet local household water needs is 12.6%, lower than the number of wells that have been non-functional for more than 5 months. This surprising finding suggests that either KIs were reluctant to voice criticism, or else some non-functioning wells are seen as simply irrelevant to local household needs, and hence invite neutral responses of 'neither satisfied nor dissatisfied', perhaps indicating that their communities have other viable water sources and are not in need of the SWSS wells. The data from the FGDs provides some evidence to support this latter interpretation.

On the issue of quality, 12.6% of community key informants were very or somewhat dissatisfied, whereas about 17% of wells were believed to have issues with water quality, most commonly observed through the taste, appearance or smell of the water. Some wells with water quality issues also had other issues – such as with the quantity of water, or did not appear to be needed by the

community (i.e. other sources of water were available) so it appears that community KIs expressed neutrality on the issue of water quality in these cases. Further, some water quality issues were only observed seasonally, and especially when water tables were lower (i.e. reduced quantity of water was often observed to correlate with reduced quality). Where community members were dissatisfied with water quality and believed it was not suitable for drinking, they were less likely to repair the well if it broke down, as reported in several FGDs.

Comparing satisfaction levels with data on well performance and management, results are mixed. Satisfaction with speed of repairs is strongly associated with actual breakdown durations, including more than one month ($p=0.004$) and more than one week ($p=0.020$).[28] Repair costs were not significantly associated with satisfaction with the cost of maintaining the well (though this is based on cost per repair, and so doesn't take into account the total cost when factoring in number of repairs). Satisfaction with location was not associated with whether a well was in a public location. Satisfaction with reliability was associated with functionality ($p<0.001$) but not number of breakdowns.

Findings on Community Satisfaction from the FGDs

In total, FGDs were conducted in 13 communities, and in 6 of these the wells had been broken for more than a year, while in the remaining 7 the wells were functioning.

FGD participants were asked about their overall satisfaction with the wells, as well as their satisfaction with the quantity and quality of water, accessibility, affordability, and reliability. FGD participants, not surprisingly, reported themselves to be much less satisfied when the wells were not functioning. Beyond this, it appeared that the communities' initial need at the time the well was put in, combined with the quality of the well construction, were the main determinants of whether the benefiting households were happy with their wells. Satisfaction on more specific aspects of well performance (quantity, quality, accessibility, affordability, and reliability) were hugely variable, based on the specific community situation. The results of these are summarized in Annex IX.

Community conflicts over the well water appeared to be relatively infrequent and, when they occurred, communities typically had the capacity to mediate them. The most dramatic conflict documented in this study involved a family feud over the perceived misappropriate use of a well that required two years of mediation on the part of the elders, leading the well to be temporarily closed. Within the same community, another well also sparked conflict and was closed because of it. In addition, a few FGDs reported caretakers - who were often village elders, essentially commandeering the wells and preventing access from other families. This appeared more likely an issue when the well produced limited quantities of water.

In most communities, women played a major role in collecting water. In one community, both men and women mentioned that the community men had consulted with the women about the well location, and in other communities the men had considered how to accommodate social norms on women's movement when siting the well. However, women were almost entirely excluded from formal consultations regarding water supply. Most women in the FGDs claimed to have no issue

[28] A p-value is a calculated probability that a test of statistical significance (i.e. a relationship between two variables) is false. The lower the p-value, the more likely that there is a statistically significant relationship.

with this, as they felt that their community leadership adequately represented their interests.

While almost all FGD participants said they would rather that an outside agency pay for the well repairs, the issue of affordability seemed most closely linked to the perceived need for and utility of the well. Where the initial need appeared weak, community engagement was very weak – and especially where there was no community contribution, the community expectation was that the maintenance of the well was the responsibility of the agency that installed it, and there was a greater sense of ambivalence. This was particularly apparent in the Kandahar communities.

The need for water had also reportedly fluctuated in the FGD communities, which could impact on the demand for the wells, and community motivation and ability to repair. In many communities, more wells have been put in since the SWSS wells and so the overall water availability has increased. This was the case in Kandahar, where the initial siting of the wells appears to have been problematic, community contribution to the wells was lower, and the community interest in sustaining the wells also appears very low. The failure rates for wells here was high, highlighting the importance of proper needs assessment. In contrast, the two Bamyan communities selected for FGDs were both in high need of safe drinking water. However, in both of these communities, the SWSS wells were not functioning, were reportedly never functioning well, and the communities did not have other available sources of safe drinking water.[29] They were naturally disappointed with the wells and believed that the engineers installing the wells had been negligent, perhaps failing to drill the wells deeply enough. Both men and women had similar views on this point.

In a few FGDs where community access to wells had reportedly been problematic (i.e. in one case, the caretaker of the well had blocked other community members from using it), participants complained that development projects always go through community leaders, who then capture the benefits for themselves and their relatives. This is a real risk with wells, which only serve a relatively small portion of the community, and were almost always located based on consultation with community leaders. The methodology of this study, which depended on speaking almost exclusively with well beneficiaries, cannot detect the extent to which this is an issue. However, it is worthy of further examination.

3.5 FACTORS EXPLAINING SUSTAINABILITY

Evaluation Question:

> In reference to the five sustainability factors (technical, environmental, financial, governance and social), how have these factors contributed to the sustainability or breakdown of water delivery services across these communities?

In order to ascertain key drivers of sustainability, analysis of survey data was conducted to identify associations between the operational performance of SWSS wells and the technical, environmental, social, financial and institutional characteristics of wells, user groups, and the wider operation and maintenance ecosystem. The analysis examined four outcome variables relating to operational performance: (a) functionality status, (b) whether or not the well was out-of-commission (i.e. non-

[29] In such cases, communities were typically using surface water, such as from streams.

functional for more than one year), (c) breakdown durations lasting more than 1 week, and (d) breakdown durations lasting more than one month. Both univariable and multivariable analysis was conducted by way of logistic regression Generalized Estimating Equations (GEEs).[30] Tables 7 and 8 present a partial list of variables analyzed as well as univariable (unadjusted) odds ratios for both non-functionality and breakdowns exceeding one week.[31]

Table 9: Partial List of Categorical Variables Assessed for Associations with Operational Performance (n=480)

Characteristic	Freq (%)	% Non - Functional Wells	% Breakdowns >1 Week[a]	Unadjusted Odds Ratio (95% CI)	
				Non-Functional	Breakdown >1 Week
Technical					
Hand Pump					
Indus	58.4	17.1	8.0	Ref.	Ref.
Kabul	18.6	39.1	21.0	3.00 (1.62-5.54)**	2.94 (1.30-6.68)**
Pamir	23.0	29.4	8.6	1.99 (1.10-3.61)**	1.22 (0.44-3.35)
Well type					
Drilled	92.3	25.6	10.0	Ref.	Ref.
Hand Dug	7.7	48.6	32.0	2.59 (1.30-5.19)**	4.04 (1.35-12.15)**
Spare Parts					
Not Always Available	21.9	41.3	20.1	Ref.	Ref.
Always Available	78.1	23.2	8.0	0.42 (0.27-0.64)**	0.35 (0.17-0.72)**
Mechanic					
Not Always Available	34.5	29.0	10.8	Ref.	Ref.
Always Available	65.5	23.5	11.2	0.76 (0.49-1.19)	1.17 (0.68-2.03)
Environmental					

[30] A more detailed explanation of analytical methods can be found in Annex II.

[31] Given the extensive number of variables considered, only a sub-set of factors are presented in the main body of the report, with full results located in Annex VII. Multivariable analysis was not carried out for the 'breakdown duration of more than one month' outcome variable.

Aesthetic Water Quality					
Good	83.1	27.1	10.3	Ref.	Ref.
Poor	16.9	29.6	16.9	1.16 (0.70-1.93)	1.68 (0.77-3.66)
Unimproved Back-Up Source					
No	76.6	23.1	10.7	Ref.	Ref.
Yes	24.4	41.0	12.0	2.27 (1.41-3.64)**	1.31 (0.66-2.60)
Year-Round Supply					
No	10.2	75.5	23.5	Ref.	Ref.
Yes	89.8	22.0	10.6	0.10 (0.05-0.19)**	0.51 (0.13-2.02)
Social					
Households					
≤15 Households	49.7	22.7	9.4	Ref.	Ref.
>15 households	50.3	30.5	12.5	1.45 (1.01-2.08)**	1.45 (0.85-2.47)
Used for Drinking					
No	3.7	33.3	11.0	Ref.	Ref.
Yes	96.3	27.3	14.3	0.84 (0.28-2.50)	0.56 (0.07-4.31)
Used for Cooking					
No	8.1	56.4	38.1	Ref.	Ref.
Yes	91.9	24.9	9.9	0.27 (013-0.55)**	0.19 (0.05-.69)**
Used for Livestock					
No	25.2	40.5	19.6	Ref.	Ref.
Yes	74.8	23.1	8.9	0.45 (0.28-0.71)**	0.42 (0.20-0.86)**
Well in Public Location					
No	12.1	29.3	9.3	Ref.	Ref.
Yes	87.9	27.2	11.3	0.88 (0.47-1.67)	1.46 (0.39-5.51)
Electricity					

	Yes	61.2	30.9	14.5	Ref.	Ref.
	No	38.8	22.0	6.3	0.60 (0.38-0.95)**	0.43 (0.21-0.87)**
Financial						
Use Fees						
	No	46.5	31.4	10.4	Ref.	Ref.
	Yes	53.5	22.3	11.9	0.64 (0.42-0.99)**	1.25 (0.59-2.62)
Regular Fees per Month/Year						
	No	95.8	27.0	11.2	Ref.	Ref.
	Yes	4.2	15.8	13.6	0.28 (0.17-1.67)	1.32 (0.41-4.27)
Repairs Affordable						
	No	33.3	44.2	21.5	Ref.	Ref.
	Yes	66.7	19.1	7.3	0.30 (0.20-0.46)**	0.32 (0.16-0.63)**
Institutional						
Committee						
	Inactive	9.0	40.0	11.3	Ref.	Ref.
	Active	91.0	25.1	8.3	0.49 (0.25-0.93)**	1.93 (0.17-21.77)
Caretaker Collects Fees						
	No	95.6	23.4	8.7	Ref.	Ref.
	Yes	4.4	22.2	8.3	0.95 (0.30-3.00)	0.78 (0.07-8.55)
Caretaker Repairs – Above Ground						
	No	29.7	26.4	13.6	Ref.	Ref.
	Yes	70.3	22.0	7.0	0.79 (0.48-1.30)	0.59 (0.25-1.42)
Caretaker Repairs – Below Ground						
	No	51.8	24.6	8.7	Ref.	Ref.
	Yes	48.2	21.9	8.7	0.83 (0.50-1.36)	1.01 (0.51-1.99)

Caretaker Buys Spare Parts						
	No	23.6	44.9		Ref	Ref
	Yes	76.4	19.8		0.31 (0.19-0.51)**	0.44 (0.22-0.86)**

[a] *In order to distinguish between drivers of well failure and lengthy breakdown durations, breakdown duration analysis was conducted only on those wells that were functional at the time of inspection and had experienced breakdown(s) in the previous 12 months that had been repaired. Note: ** indicates p-value<0.05. Ref. = Reference category. Totals exclude "Don't know" or "No response". Odds ratio is a measure of the relationship between an explanatory variable and an outcome variable (e.g. non-functional status, breakdown duration >1 week). It equates to the odds of an outcome occurring given a particular characteristic, relative to the odds of the same outcome occurring in the absence of that characteristic. In this table, an odds ratio >1 indicates that an explanatory variable is associated with poorer operational outcomes. The odds ratios presented are 'unadjusted', meaning they are not adjusted for other variables, and therefore may be subject to confounding. A full list of variables and results are presented in Annex III.*

Table 10: Partial List of Continuous Variables Assessed for Associations with Operational Performance

Characteristic	Mean (SD)					Unadjusted Odds Ratio (95% CI)	
	All	Functional wells	Non-functional wells	Break-downs <1 week[a]	Break-downs >1 week[a]	Non-functional	Breakdown >1 week[a]
Distance-To-Parts (Km)	14.8 (19.1)	13.6 (16.6)	17.8 (24.2)	14.2 (17.0)	15.2 (17.8)	1.01 (1.00-1.02)	1.00 (0.99-1.02)
Time-To-Mechanic (Hrs)	1.2 (1.70)	1.1 (1.7)	1.2 (1.8)	1.2 (1.5)	1.5 (2.2)	1.25 (0.73-2.15)	1.75 (0.83-3.69)
Well Depth	35.3 (14.7)	35.5 (13.9)	34.7 (16.8)	34.7 (16.8)	35.5 (13.9)	1.12 (0.84-1.48)	1.02 (0.99-1.05)
No. Households	15.9 (12.4)	15.6 (12.3)	16.7 (12.8)	17.5 (12.4)	17.6 (7.2)	1.01 (0.99-1.02)	1.01 (1.00-1.02)
Distance-To-Kabul (Km)[B]	150 (150)	142 (151)	169 (147)	132(131)	166 (161)	1.01 (1.00-1.03)	1.02 (1.00-1.03)
No. Types Of Water Use[c]	4,4 (1.2)	4.6 (0.9)	4.0 (1.6)	4.7 (0.7)	4.1 (1.5)	0.65 (0.55-0.78)**	0.54 (0.41-0.72)

[a] *To distinguish between drivers of well failure and lengthy breakdowns, breakdown duration analysis was conducted on those wells that were functional at the time of inspection but had experienced breakdown(s) in the previous 12 months and had been repaired.* [b] *In order to calculate odds ratios, units for distance were converted to tens of kilometers.* [c] *"Water use" included drinking, cooking, washing clothes, bathing, livestock watering, and irrigation. Note: ** indicates p-value<0.05. In this table the odds ratio equates to the relative change in the odds of an outcome occurring given a unit increase in the explanatory variable. In this table, an odds ratio >1 indicates that an increase in the explanatory variable is associated with poorer operational outcomes. The odds ratios presented are 'unadjusted', i.e. not adjusted for other variables, and thus subject to possible confounding. A full list of variables and results are presented in Annex III.*

Results of the univariable GEE analysis

Technical Factors. Technical factors analyzed included those relating to the well's technology (well and pump type) and the operation and maintenance ecosystem (i.e. spare parts and mechanics). The univariable analysis suggests that wells are less likely to be out-of-commission (i.e. non-functional for more than 12 months) when they are situated closer to a spare parts supplier. Likewise, if spares were always available at the closest supplier, this increased the likelihood of wells being functional and having repairs carried out within 1 month. Dug wells were more likely to be non-functional and out-of-commission than drilled wells. This may indicate dug wells are more prone to drying or collapsing. The relationship could also be linked to a dug well's large diameter, which may allow users to fetch water with a rope and bucket when the pump breaks down, thereby weakening incentives to arrange repairs. The same logic may explain why the Kabul hand pump (which generally operates at shallower depths of between 5-25m) had increased odds of non-functionality and long breakdowns compared with the Indus hand pump (depth range 25-45m). The Pamir hand pump (depth range 45-80m) also had poorer operational outcomes than the Indus, which may be a consequence of the increased stresses and costs involved in lifting water from greater depths.

Environmental Factors. Environmental factors analyzed included those relating to the quality and quantity of groundwater, and the surrounding environment. Wells were more likely to be non-functional or out-of-commission if unimproved sources were available (surface water and unprotected springs in particular), whether accessed concurrently with operational wells or only during breakdowns. The odds of a non-functional well were significantly higher when water quality was considered poor (based on taste, smell or appearance), the well did not produce water year-round, there was evidence of yield problems, or when users felt there was insufficient water to meet their needs. The link between non-functionality and tendency for a well to dry may be direct (i.e. the wells was non-functional because the well was dry) or indirect (i.e. the wells provides a seasonal supply and so communities decide not to fix the pump when it breaks down).

Institutional Factors. Institutional factors analyzed pertained to the arrangements in place to manage the wells. These associations should be treated with a degree of caution due to the possibility of reverse causation: while it is likely institutional characteristics influence operational performance, a well failure for other reasons may also instigate a deterioration of institutional arrangements. Bearing in mind this caveat, an active committee was significantly associated with well functionality, although the absolute number of committee members appeared to have a negative effect. Certain tasks performed by the caretaker were also associated with higher functionality rates, including guarding the well, purchasing spare parts, performing preventive maintenance, and conducting above ground repairs, all of which may be symptomatic of a motivated caretaker who manages the well effectively. Conversely, the likelihood of a well falling in a state of disrepair or experiencing lengthy breakdowns was higher when the caretaker monitored more than one well. There is no obvious explanation for this, though the monitoring of multiple wells may stand as a proxy measure for nearby alternative sources.

Financial Factors. Financial factors analyzed pertain to the costs of operation and maintenance, and the arrangements in place to cover those costs. As with institutional factors, cause and effect relationships between operational outcomes and financial factors may be bidirectional, and so results should be interpreted with care. The odds of a well working were significantly higher when users made financial contributions, though there was no significant association with regularity of payment

(e.g. regular monthly or annual payments vs payment upon breakdown) or the proportion of households contributing. Repair cost was related to breakdown length, with every additional 1,000 AFN per repair resulting in a 38% increase in the odds of a breakdown extending beyond a week.[32]

Social Factors. Social factors analyzed included those relating to the socio-economic and demographic attributes of the user group, and their water-related needs. The odds of non-functionality were higher when there were more than 15 households using the well. This relationship could arise because heavier use leads to more frequent breakdowns, or possibly because collective action tends to be more challenging for larger groups. A lack of electricity – a marker of a community's socio-economic situation – was a consistent predictor of good operational performance (functional status and repairs within one week), indicating that poorer communities are able to sustain their systems effectively. Conversely, wells situated further away from Kabul were more likely to be out-of-commission, which could represent spare part supply chain weaknesses, or perhaps other geographical confounders. The number of different purposes for which a well was used (e.g. drinking, cooking, washing, bathing, livestock, irrigation) was also a significant determinant of functionality and fast breakdown durations, with non-drinking purposes being particularly important.

Results of the multivariable GEE analysis:

Multivariable logistic regression GEEs were run with up to 20 explanatory variables.[33] Multivariable GEEs have the advantage of adjusting for confounding, and therefore can produce more robust results than the univariable assessment. Across the different 15 GEEs tested, 12 factors exhibited significant associations with operational outcomes (Table 11). These relationships spanned all five sustainability domains and are as follows:

- The odds of a non-functional well were significantly higher when (a) the well was hand dug rather than drilled; (b) the hand pump was a Kabul model; (c) the well failed to produce a year-round supply of water; (d) the well water was not used for a range of purposes; (e) the management committee was inactive; and (f) the caretaker was not responsible for purchasing spare parts. Among these factors, adjusted odds ratios were highest for inactive committees, though this issue affected less than 10 percent of wells.
- The odds of an out-of-commission well were significantly higher when (a) spare parts were not always available; (b) the well failed to produce a year-round supply of water; (c) aesthetic water quality was perceived as poor; (d) communities had access to an unimproved water source during breakdowns; (e) the management committee was inactive; and (f) users did not contribute money to pay for repairs. Inactive committees again exhibited the highest adjusted odds ratios, however the lack of financial contributions from users was the most widespread issue, affecting almost half of all wells in the sample.
- The odds of a breakdown lasting more than a week were significantly higher when (a) wells were hand dug rather than drilled; (b) the well failed to produce a year-round supply of

[32] On average, self-reported maintenance costs averaged 1,119 AFN (~US$ 16.7) per repair, although there was great variation (standard deviation of 1596).

[33] Detailed results for the multivariable GEEs are presented in Table 20 in Annex VII.

water; (c) water quality was perceived as poor; (d) the well water was not used for a range of purposes beyond; (e) wells were located farther from Kabul; and (f) the repair cost was comparatively high. Hand dug wells and a lack of year-round water gave rise to the highest adjusted odds ratios, though these characteristics were only found in a small minority of wells.

Table 11: Factors significantly associated with operational performance of SWSS wells in full multivariable GEEs

Factor Domain	Factors Significantly Associated with Poorer Operational Outcomes		
	Non-Functional Well	Out-of-Commission Well	Breakdown Exceeding 1 Week
Technical	• Well is hand dug • Hand pump is a Kabul model (vs Indus)	• Spare parts not always available	• Well is hand dug
Environmental	• Well is seasonal or dry	• Well is seasonal or dry • Water of poor aesthetic quality • Unimproved alternatives available	• Well is seasonal or dry • Water of poor aesthetic quality
Social	• Water not used for many purposes	• Water not used for many purposes	• Water not used for many purposes • Well located farther from Kabul
Institutional	• Committee inactive • Caretaker does not buy spare parts	• Committee inactive	
Financial		• Users do not make financial contributions for maintenance	• Repair cost is high

Note: Adjusted odds ratios, confidence intervals and p-values for the multivariable GEEs can be found in Annex VI.

Summary:

The results demonstrate that the performance of wells installed under the SWSS program is shaped by an interrelated range of technical, environmental, social, institutional and financial factors. While it is difficult to make broad conclusions about the relative importance of each domain, it is worth noting that technical and environmental factors were significant for all three outcome variables, and tended to give rise to the relatively high odds ratios. However, an inactive management committee exhibited the highest odds ratios for both non-functional and out-of-commission wells (noting that reverse causation may have played a role).

Importantly, each of the conditions identified as a hindrance to sustainable operational performance, affected only a minority of the wells sampled, and most factors were present for less than a quarter of the wells. The exception to this was lack of financial contributions – while the effect size appeared to be relatively modest, the problem was by far the most widespread, affecting almost half of the

wells surveyed.

Some of the factors – such as groundwater- and well-related issues – signify root causes outside of the control of communities and beyond the abilities of local mechanics to rectify. Instead they can probably be traced to inappropriate siting, inadequate construction, difficult hydrogeology, and the lack of external support to resolve major technical issues. Other factors represent endogenous issues arising from local governance or financing failures, in many cases linked to other conditions that undermine the willingness of users to keep their wells running. Although groundwater availability and well-related problems can have major consequences, it is important to note that for SWSS wells it is mechanical breakdown of the hand pump that is responsible for the majority of failures. Given O&M building blocks (active committees, skilled mechanics and available spare parts) appear to be in place for the majority of communities, the financing of repairs appears to pose a considerable stumbling block.

Summary of FGD Findings:

Extrapolating back from the FGD findings to the broader study, it appears that communities will only maintain their wells when they feel it is worth doing so (i.e. they have a need for water, and the well water is sufficient in terms of quantity and quality to meet this need). It appears likely that the 84% of wells surveyed that are either currently functional or repairable (i.e. including communities with wells that are functional or have been broken for less than 5 months) are largely satisfying their users' expectations.

3.6 Effects of Community Engagement Process

How did the community engagement process undertaken at time of installation appear to affect sustainability and community satisfaction?

The approach used to assess the effect of community engagement activities during implementation was similar to that undertaken to understand the factors associated with operational performance (see Annex II). GEE regression analyses were carried out to identify associations between a range of measures of community engagement and involvement during the implementation of SWSS, and the operational performance of wells. Four outcomes variables were again examined: (a) functionality status, (b) whether or not the well was out-of-commission (i.e. non-functional for more than 1 year), (c) breakdown duration of more than 1 week; and (d) breakdown duration of more than 1 month. Both univariable and multivariable analyses were conducted by way of logistic regression Generalized Estimating Equations (GEEs).[34] The community engagement indicators characterized the level of consultation, information provision, decision-making, training and community contributions for each well. Specific measures captured both the breadth of involvement (e.g. number of households involved) and the depth of involvement (i.e. extent to which these households were involved).

Tables 10 and 11 present a partial list of engagement measures analyzed, the extent to which they applied to the SWSS implementation process, and the concomitant univariable (unadjusted) odds ratios for both non-functionality and breakdowns exceeding one week. The data show that during the implementation process the majority of communities received information about their O&M

[34] Multivariable analysis was not carried out for the 'breakdown duration of more than one month' outcome variable.

responsibilities and associated costs. The level of decision-making was varied: almost all communities had a say in the well location and more than three-quarters were involved decisions about how the well would be managed, whereas a much smaller fraction felt they played a role in selecting the type of well and pump to be installed. On average, communities reported two consultation meetings, with 12 people involved in the process. Around 10% of communities contributed cash or materials, though almost half contributed labor during the well construction.

Table 12: Partial List of Community Engagement Categorical Variables Assessed for Associations with Operational Performance

Type of Involvement	Freq (%)	% Non-Functional Wells		% Breakdowns >1 Week[a]		Unadjusted OR (95% CI)	
		With Involvement	Without Involvement	With Involvement	Without Involvement	Non-Functional	Breakdown >1 Week
Information							
CLTS	4.4	14.3	18.1	0.0	11.3	0.43 (0.16-1.13)	n.a.
O&M Responsibilities	77.8	26.8	31.3	8.3	18.9	0.79 (0.47-1.32)	0.37 (0.20-0.71)**
O&M Costs	56.7	25.5	30.9	8.5	14.4	0.82 (0.52-1.28)	0.60 (0.33-1.07)
Decisions							
Well Location	97.7	26.5	30.0	10.4	4.4	0.79 (0.22-2.88)	0.19 (0.03-1.16)
Management	77.3	22.5	40.4	8.2	20.5	0.44 (0.26-0.74)**	0.38 (0.16-0.89)**
Financing Repairs	55.7	23.5	30.6	7.6	15.2	0.70 (0.46-1.08)	0.53 (0.27-1.02)
Committee	17.9	17.9	28.5	10.4	11.1	0.54 (0.31-0.97)**	1.08 (0.53-2.20)
Type of Well/Pump	21.8	30.5	25.5	11.4	11.0	1.36 (0.79-2.32)	1.22 (0.55-2.73)
Training							
Any Type	17.1	18.9	28.7	1.9	14.0	0.60 (0.35-1.01)	0.18 (0.07-0.44)**
Management	13.6	20.3	28.1	2.3	13.3	0.68 (0.37-1.23)	0.21 (0.09-0.54)**
O&M	15,7	20.6	28.2	2.0	13.7	0.67 (0.39-1.13)	0.18 (0.07-0.48)**
Hygiene	14,3	17.7	28.6	2.0	13.7	0.55 (0.31-0.97)**	0.20 (0.08-0.48)**
Committee – Any	39.1	24.0	26.0	8.8	13.4	0.92 (0.58-1.45)	0.61 (0.32-1.15)
Caretaker - Any	10.8	28.8	27.3	3.8	11.8	1.10 (0.62-1.94)	0.39 (0.11-1.39)
Contributions							
Any	52.7	27.7	27.3	12.4	9.8	1.03 (0.69-1.54)	1.24 (0.63-2.43)
Cash	11.0	22.6	28.1	5.6	11.7	0.79 (0.38-1.61)	0.52 (0.15-1.78)
Labor	43.5	26.3	28.4	13.1	9.5	0.90 (0.60-1.35)	1.36 (0.70-2.65)

Materials	10.0	29.2	27.3	12.0	11.0	1.09 (0.63-1.90)	0.88 (0.22-3.49)

[a] *In order to distinguish between drivers of well failure and lengthy breakdown durations, breakdown duration analysis was conducted only on those wells that were functional at the time of inspection and had experienced breakdown(s) in the previous 12 months that had been repaired. Note: ** indicates p-value<0.05. well. Totals exclude "Don't know" or "No response". Odds ratio >1 indicates variable is associated with poorer operational outcomes. Full results presented in Annex VII.*

Table 13: Partial List of Community Engagement Continuous Variables Assessed for Associations with Operational Performance

Type of Involvement	Mean (SD)					Unadjusted OR (95% CI)	
	All Wells	Functional Wells	Non-Funct. Wells	Repairs <1 wk[a]	Repairs >1 wk[a]	Non-Functional	Breakdown >1 Week[a]
No. Meetings	2.3 (1.5)	2.3 (1.5)	2.2 (1.6)	2.1 (1.0)	2.2 (1.0)	0.97 (0.83-1.14)	1.04 (0.75-1.43)
No. People Consulted	12.2 (11.7)	11.6 (7.6)	13.7 (19.2)	11.4 (8.3)	12.7 (7.0)	1.02 (1.00-1.03)	1.02 (0.99-1.05)
No. Decisions	3.1 (1.8)	3.2 (1.7)	2.9 (1.9)	3.2 (1.7)	2.6 (2.0)	0.91 (0.79-1.05)	0.87 (0.65-1.15)
No. Training Topics	0.4 (1.0)	0.5 (1.1)	0.3 (0.9)	0.6 (1.2)	0.1 (0.6)	0.85 (0.70-1.03)	0.56 (0.39-0.79)**
No. Trained in Mgmt.	1.1 (3.7)	1.2 (3.9)	0.9 (3.1)	1.4 (3.7)	0.1 (0.8)	0.98 (0.93-1.03)	0.80 (0.67-0.95)**
No. Trained in O&M	1.7 (5.8)	1.9 (6.4)	1.0 (3.3)	2.3 (6.7)	0.1 (0.8)	0.96 (0.93-1.00)	0.80 (0.67-0.94)**
No. Trained in Hygiene	1.4 (4.1)	1.6 (44)	0.9 (3.0)	1.9 (4.4)	0.2 (1.0)	0.95 (0.90-1.00)	0.84 (0.76-0.93)**
% HHs Contributing Cash	3.4 (15.1)	2.9 (14.1)	4.8 (17.3)	1.9 (11.3)	1.0 (6.6)	1.01 (1.00-1.02)	0.99 (0.97-1.02)
Cash Per HH	15.4 (111.7)	12.7 (89.2)	22.0 (154.6)	8.7 (63.8)	10.7 (78.8)	1.00 (1.00-1.00)	1.00 (1.00-1.00)
% HHs Contributing Labor	22.6 (37.4)	21.1 (36.3)	26.7 (40.3)	21.8 (36.1)	22.9 (36.6)	1.00 (1.00-1.01)	1.00 (0.99-1.01)
Days of Labor Per HH	1.5 (4.3)	1.7 (4.9)	1.0 (1.8)	1.4 (4.1)	1.6 (2.6)	0.94 (0.87-1.00)**	1.00 (0.94-1.06)

[a] *In order to distinguish between drivers of well failure and lengthy breakdown durations, breakdown duration analysis was conducted only on those wells that were functional at the time of inspection and had experienced breakdown(s) in the previous 12 months that had been repaired. Note: ** indicates p-value<0.05. well Odds ratio >1 indicates variable is associated with poorer operational outcomes. Full results presented in Annex VII.*

Univariable Gee Analysis

Consultation. Neither the number of consultation meetings nor the number of people consulted in general terms was significantly related to functionality status or breakdown duration, though a higher number of people consulted was associated with a greater likelihood that a well would be out-of-commission.

Information provision. Provision of information on O&M responsibilities was associated with a significantly lower likelihood of a well being out-of-commission, and breakdown durations exceeding one week or one month.

Decision-making. Respondents were asked about seven types of decision-making, and the more decisions that communities were involved in, the lower the likelihood that the well was out-of-commission and the more satisfied respondents were with the level of participation during implementation. Decisions about well management and committee membership exhibited the most consistent and significant relationships with operational performance, and both were associated with reduced odds that the well was non-functional or out-of-commission. Wells of communities deciding on management issues had a greater likelihood of breakdowns being resolved within a week. Other significant associations with operational performance included decisions about financing repairs and well location.

Training. A range of training indicators were examined, including topics covered (management, O&M, hygiene), number of people receiving the training, and the involvement of key individuals (e.g. caretaker, committee members). Provision of training was found to be associated with faster breakdown durations (i.e. within one week) regardless of the training topic. The number of households trained for each of the three topic areas was also a significant predictor of breakdown duration. Training in hygiene was the only factor associated with functionality status, though any form of training and the number of topics covered emerged as significant when excluding wells that did not provide a year-round supply of water.

Contributions to well construction. Household contributions assessed included cash and labor, taking into account both the proportion of households contributing and the magnitude of their contributions. The more days of labor a community contributed during implementation, the greater the likelihood of a functioning well. Surprisingly, a higher proportion of households contributing cash was associated with increased odds that a well was out-of-commission. Contribution of cash was also negatively associated with satisfaction with participation and involvement in the implementation process. Breakdowns tended to be shorter when a higher number of households contributed cash.

Multivariable Analysis. Based on the significance of univariable relationships, the following variables were included in 15 different multivariable GEEs: (a) information provided about O&M responsibilities, (b) decisions about well management, (c) provision of any type of training, (d) percentage of households contributing cash during implementation, and (e) average number of days of labor contributed by households during implementation. In several models, the number of days of labor contributed during well construction was significantly associated with functionality status and breakdown durations. Provision of training, information about O&M responsibilities and involvement in decisions about well management were also associated with a greater likelihood of repairs being carried out within a week.

When entering other community engagement variables one-by-one into the multivariable GEEs, additional associations were identified (Table 12). A well was more likely to be functional when CLTS was carried out and when users were involved in decisions about the well's management or financing of repairs. Involvement in decisions about well management were also associated with faster breakdown durations, as was receiving information about O&M responsibilities and the related costs, and the provision of training on O&M, management and hygiene. Receiving information about O&M and the related costs was also associated with shorter breakdowns, as was the provision of training on O&M, management, and hygiene. The latter three training variables were highly correlated, and, when analyzing all three together, it appeared that training for O&M maintained the

strongest relationship with faster repair times.

Table 14: Community Engagement and Involvement Factors Significantly Associated with Operational Performance in Multivariable GEEs

Factors Significantly Associated with Poorer Operational Outcomes		
A Non-Functional Well	**An Out-Of-Commission Well**	**A Breakdown Exceeding 1 Week**
• CLTS was not conducted • Community not involved in decisions relating to well management • Households contributed fewer days of labor	• Community not involved in decisions relating to financing repairs and well management	• Community provided no information on O&M responsibilities and costs • Community not involved in decisions relating to well management • Community received no training on O&M, management, and hygiene

Summary

Although it is not possible to prove causal relationships, the evidence suggests a number of community engagement activities carried out during the implementation of SWSS are positively associated with the sustainable performance of wells. Involvement in decision-making, the extent of labor contributions, and CLTS mobilization are all linked with higher levels of well functionality. Provision of information and training – particularly in regards to O&M – are related to a stronger willingness or ability to repair wells promptly. The degree to which households contribute labor may be a good indicator of the underlying need and willingness to sustain a water supply, or perhaps the process instills a greater sense of ownership and commitment to sustain the system. With its sanitation focus, the reason for the relationship between CLTS and well performance is less clear – perhaps it is a byproduct of the community mobilization process, or simply an artifact of CLTS selection bias. Capacity building activities (provision information and training) do not appear to affect the underlying demand or willingness of a community to keep a system working, but instead seems to aid communities with the requisite demand to carry out their O&M responsibilities more effectively. Involvement in decision-making seems to promote higher levels of water point functionality, faster repair times, and greater satisfaction with community engagement processes, though it is unclear to what extent decision-making is initiated by the implementer (and therefore a driver of the superior performance), or whether it simply reflects an inherently motivated and well-organized user group that would sustain their system irrespective of the implementation approach.

4. DISCUSSION AND CONCLUSIONS

Overall, this study found that, based on DACAAR's survey, SWSS wells performed at slightly higher than average levels when compared with other wells of similar age installed in Afghanistan. Given the noted constraints on SWSS's implementation, i.e. SWSS paid less attention to needs assessment and social engagement than they had originally planned to, this is something of a surprise. However, the functionality of SWSS wells was lower than that of wells installed by DACAAR, with the latter having an 83% success rate for wells of a comparable age. DACAAR puts emphasis on community consultation, quality assurance and long-term follow up, so we would expect to see this reflected through higher functionality rates. Nonetheless, SWSS wells slightly outperformed the average, including wells put in by CDCs through the NSP program, suggesting that despite its challenges, SWSS implementation also had some strengths.

To explain SWSS's generally respectable performance, we offer the following three-part explanation. While this is partially speculative, it appears to be the best fit to the available evidence:

1. When communities need a water source, have a sense of buy-in/ownership and the well is reasonably constructed, they are highly motivated to maintain it. Further, their existing systems for management, decision-making and conflict resolution are often sufficient to the task. While SWSS's community engagement processes were not extensive, they were usually good enough to prepare communities. While needs assessment was a noted weak point, most Afghan communities were in need of water at that time, so this was often not an issue.
2. SWSS's quality assurance processes directed at ensuring construction companies correctly installed wells appear to have been relatively successful, and may be the main source of the modestly better-than-average performance of its wells. Another source of advantage could be its ability to hire well- qualified national staff due to its high salaries.
3. SWSS well performance was also supported by the long-term ongoing work of other actors in the field, including MRRD and DACAAR. The evidence for this is strongest with respect to spare part availability, and, to a lesser extent, the availability of trained mechanics.

Firstly, we should note that, although there was relatively little variation in the degree of community engagement at the time of implementation across the SWSS wells, higher levels of engagement are indeed positively correlated with better outcomes. However, this does not necessarily need to involve a large number of community participants or many people. We note that in both the KI survey and the FGD discussions, community members expressed high levels of satisfaction with the community engagement process, even though these often did not involve a large number of people, or more than a few meetings, and even though they almost never involved women. People were satisfied because they said that the engagement was appropriate and followed local norms, and their community leaders were, in most cases, able to fairly represent their interests. This highlights a situation in which most communities already have effective local mechanisms for decision-making and conflict resolution. In most cases, the SWSS engagement process appears to have been 'good enough' for the purposes of well sustainability.

Secondly, one of SWSS's strengths appears to have been relatively strong technical and contractual oversight on well construction. Former SWSS management recalls a fairly rigorous and transparent

process for awarding construction contracts. Perhaps more importantly, they withheld part of the payment for a fixed period after the well was put in to act as a guarantee. This would help to avoid or correct any egregious misconduct on the part of well construction companies, who are commonly reported to cut corners, most frequently by drilling wells at a shallower depth than commissioned.

Third and finally, SWSS benefitted from broader ongoing efforts at creating spare parts distribution networks and training well mechanics, as most appeared to be broadly available to the caretakers of SWSS wells. As reported by former SWSS staff, SWSS also consulted DACAAR for geological surveys and data on groundwater, and was able to attract well qualified national staff due to its generous budget. The latter, however, might have had a neutral effect on the overall sector as many of these staff came from (and later returned to) MRRD.

Regarding the influence of community engagement with CLTS, although the small number of CLTS communities with wells limited the sample, it nonetheless correlated significantly and positively with well performance. However, data from the FGDs do not shed any light on why this: for example, no women in any of the FGDs recalled hygiene training (or else they failed to make the link between this training and the introduction of the well). We also know that there was no formal linkage between CLTS and the wells in SWSS implementation.

As existing statistical data already demonstrates, sanitation and hygiene is clearly a priority and weak area overall in Afghan communities. Very few of the communities with SWSS wells treat their water in any way, and communities in this study are more likely to revert to unprotected surface water rather than repair their wells when sources are available. Around 14% of communities in this study had received hygiene training, and this was significantly associated with shorter breakdowns (i.e. of less than one week). Improving community awareness on hygiene will likely motivate them to keep their wells functional and lead to reduced incidents of waterborne illness.

Beyond its direct work putting wells into communities, there appear to have been some long term beneficial spillover effects from SWSS not directly captured by this study of its wells. Firstly, SWSS introduced CLTS to Afghanistan, where it has proven to be an effective technique for improving sanitation. As a direct result of this, MRRD has adopted CLTS as part of its official policy, and UNICEF is working with the government to scale it up. This plan builds on SWSS's achievements and also intends to go beyond its limitations, by formally linking sanitation, hygiene and water supply. Limited though they are, the findings from this study generally support the move towards linking sanitation through CLTS, hygiene training and water supply together, but cannot provide much nuance about how to do this, or the degree to which it will make an impact on overall well functionality. As these new policies are introduced, it would make sense to include pilot studies, including detailed case studies, to better understand these relationships.

Another legacy of SWSS was WaterTracker – a pilot system to monitor well functionality and provide technical support in response to breakdowns. Although the system was passed over to MRRD, the government did not have the capacity to maintain it at that time. As the government's IT system has improved, RuWATSIP is planning to introduce an online national data management system, and will likely incorporate some aspects of WaterTracker's design and functionality, which included tracking the functionality of existing wells and providing a mechanism for responding to breakdowns. This study again confirms the value of such a system or an equivalent, without which

communities cannot be expected to address more severe or complex well breakdowns. Going forward, it remains important to consider the sustainability of wells not just on a case-by-case basis but also at this broader strategic level: both for well repair and, even more urgently, with relation to monitoring and regulating the quality and quantity of groundwater.[35]

One important conclusion from this study is that rural Afghan communities on the whole show themselves to be impressively resourceful and resilient. If they need the water, most can do a lot on their own when they are given decent construction and a few basic pointers to get them started. This is fortunate, given that government outreach capacity remains limited and support efforts need to be targeted. On other hand, there are striking regional discrepancies in access to safe drinking water, which appear to persist largely due to the geological characteristics of the regions, and which are far beyond the capacity of local communities to address. Likewise, communities need some form of outside support to address major and complex well repairs.[36] Effective monitoring and regulation for groundwater sources also needs to be addressed urgently at the national level, since evidence from the surveys and FGDs suggests that a situation of large proliferation of unregulated water sources coupled with high consumption demands would be susceptible to reduced quantity and quality of water, an observation reinforced by national level key informants. Community hygiene awareness remains a pressing issue in addressing the broader aim of providing safe drinking water and reducing waterborne diseases that are conducive to high childhood mortality (as per USAID's Hygiene Improvement Framework).

[35] As noted in Section 4.1, national level monitoring and regulation of these issues is a known weakness, whereas the field data from this study shows that community level regulation of water use does not exist, and demand often outstrips supply, whilst more and more private wells are being installed.

[36] See sections 4.3 on well functionality and 4.5 on sustainability factors for a discussion of related evidence. In summary, a subset of communities experience major repair needs that are beyond their capacity to pay for, or for which they cannot find the expertise, which requires a broader strategy to address.

5. RECOMMENDATIONS

For implementers of current and future water supply projects:

1. Document processes and results clearly, to allow for proper follow-up and improve the sector's capacity to learn from experience.

2. Previous to constructing any wells, develop a tracking system with clear, unambiguous identification codes. Ideally stamp these somewhere on the well (a code is less likely to be removed than the donor plaques sometimes put on wells, and is likely to be less controversial in insecure areas with AOG operating versus a donor name, and less likely to be removed).

3. Recognize community strengths[37] and use existing community structures and processes where possible, while being cognizant that in some communities, leaders may not represent everyone's interests or may attempt to capture project benefits for themselves and their families.

4. Needs assessment should be done routinely as part of water supply construction, learning from best practices already documented by DACAAR.

5. Community contributions to well construction, especially in the form of labor, should be a requirement.[38] These help to either demonstrate or generate ownership, and of confirming genuine need/commitment on the part of the community.

6. Take steps to assure that wells are correctly installed. For example, SWSS's approach to quality assurance included holding back a proportion of payment to construction companies for a warranty period, and dependent on the proper functioning of the well. This created an incentive for companies to adhere to proper construction standards.

7. Discontinue practices that have previously been observed to result in unintended negative consequences – for example, paying much higher than market rates for equipment and labor while installing wells can lead to distorting the market and causing problems for other actors with similar goals.

For USAID and other donors:

1. As a general principle, when designing programs, fit within and build on existing national government policies and practices wherever possible, and seek to build sustainability through increasing long-term institutional capacity of the government and other Afghan institutions. For example, the WaterTracker system initiated by SWSS had great potential, but

[37] For example, most communities already have conflict resolution processes that can be applied to any conflicts that arise to conflicts over well access and use.

[38] This study found labor contributions appeared more effective than cash contributions, perhaps because labor provides a more equitable form of community buy-in, regardless of wealth status.

reportedly did not include a capacity-building/transition component that would allow for the government to sustain it beyond the project duration.

2. Support a national system and policy for monitoring groundwater quality and quantity

3. Use available data and MIS system to highlight areas with more problematic water available and target additional support to these areas, including a comparison of existing water supply to inform strategies/best practices

4. Work with other partners in the sector to develop a strategy and plan for strengthening capacity to respond to bigger well repairs.[39] In other countries, the focus has been on strengthening local government capacity – this option should be considered for Afghanistan.

Recommendations for further research:

1. The advantages and drawbacks of wells with hand pumps versus other water systems should be compared in the Afghan context, to come up with clearer policy as to which options are most appropriate under which circumstances.

2. Research should be conducted specifically on identifying the degree to which specific sub-populations within a village context are at risk of lacking access to communal water sources, with the aim of developing mitigation strategies that can be incorporated into policy and implementation practice.[40]

3. As new policy directs practice linking sanitation, hygiene and water supply efforts, further studies on the synergy between these could be helpful – particularly in identifying how best to sensitize and support communities in maintaining safe, healthy water supply when outreach capacities are limited.

4. If the TWG on WASH has not already done so, they should map out and prioritize problem communities in terms of water need. The DACAAR dataset from 2014 is an immense repository of knowledge on well location and performance, which could easily be used to conduct further analysis (DACAAR's main report drawn from this data set focuses almost exclusively on water quality analysis, but the data set also contains much broader data on well performance and sources of failure for 30,181 wells across the country).

[39] As described in Section 4.5, a subset of out-of-commission wells are due to major breakdowns that communities are unable to repair due to the high cost or lack of available expertise. These require external support.

[40] This is based on qualitative evidence from the FGD communities, in which some community members reported that poorer households were at risk of exclusion, as were IDPs, and that community elites were sometimes guilty of capturing resources, including wells.

ANNEXES

ANNEX I: SCOPE OF WORK

USAID/Afghanistan Engineering and Infrastructure Office (OI)

&

Office of Program and Project Development (OPPD)

STATEMENT OF WORK

Retrospective Sustainability Evaluation

Afghan Sustainable Water Supply and Sanitation (SWSS) Project 2009-2012

I. PROGRAM INFORMATION

Program/Project Name:	Afghan Sustainable Water Supply and Sanitation (SWSS) Project
Contractor:	TetraTech ARD
Contract #:	EPP-I-00-04-00019-00
Total Estimated Cost:	$43,314,113
Life of Project:	October 1, 2009–December 30, 2012
Active Provinces:	Baghlan, Bamyan, Farah, Ghazni, Ghor, Kandahar, Kapisa, Khost, Kunar, Kunduz, Laghman, Logar, Nangarhar, Paktya, Panjshir, Parwan
Mission Development Objective (DO):	DO2
Linkage to Standard Program Structure (SPS):	Investing in People/Health/3.1.8 Water Supply and Sanitation
Required?	Non-required

II. INTRODUCTION

Globally, investments in rural water supply are known to have a very high failure rate. In Afghanistan, a 2009 review of the WASH sector commissioned by the MRRD found that over 40% of the rural

water systems were nonfunctional within three years after completion[41]. USAID's Water and Development Strategy 2014-2018[42] recognizes this challenge, and USAID is committed to investing in longer term monitoring and evaluation of its water activities in order to identify factors that support and hinder sustainable water service delivery in different contexts.

USAID/Afghanistan's $43 million investment in the Afghan Sustainable Water Supply and Sanitation (SWSS) activity from 2009-2012 is one of the Agency's largest single investments globally in sustainable rural water supply delivery. SWSS (contracted to Tetra Tech as a Task Order under the E3 Bureau's Integrated Water and Coastal Resources Management Indefinite Quantity Contract II - WATER IQC II) supported the design and construction of 3,011 wells and 37 piped water systems, using two approaches to geographic selection and implementation. In areas that were relatively more secure, SWSS's "Provincial Approach" was community-based and included intensive collaboration with local residents and leaders of both sexes, consistent with best sector practice. In a second implementation approach, their "Flexible Approach" that evolved post-award in response to U.S. government local strategic engagement in Afghanistan at the time, SWSS responded to Project Nomination Forms for rural water supply projects that came from the Provincial Reconstruction Teams (PRTs) working in highly kinetic areas where it was difficult for SWSS to implement their intense community-based approach.

SWSS's large scale and two approaches to rural water supply implementation provides an excellent opportunity to evaluate (1) the differential implications on the sustainability of rural water services from the two implementation approaches *and* (2) the relevance of a set of factors generally accepted by rural water supply experts as contributing toward sustainable rural water supply services.

The Office of Infrastructure primarily intends that the proposed evaluation will critically inform USAID's new investments in rural water supply with UNICEF under the Rural Water Supply and Hygiene Program (RWS) – a $30M USAID funded program to be implemented from March 2016 through 2020. This USAID/Afghanistan investment in RWS is the first rural water supply program since SWSS, and like SWSS, is one of the Agency's largest rural water supply programs globally. As such, a retrospective evaluation of the sustained impact of SWSS rural water supply investments is timely, potentially invaluable to the new RWS Program, and promises to be a major USAID contribution to sector knowledge regarding rural water supply sustainability globally.

III. BACKGROUND

Only 47 percent of rural-based Afghans have access to a protected source of drinking water, and 27% of the rural population has access to a private and hygienic sanitation facility[43]. This lack of access has a high price: diarrhea, which is preventable by investments in water, sanitation and

[41] Cited in SWSS final report (2013), don't have source document information. A World Bank study reporting 60% non-functionality is cited in the PAD, but also don't have full reference for the source document. Our UNICEF colleague Rolf Luyendjik will also provide a recent report.

[42] https://www.usaid.gov/sites/default/files/documents/1865/USAID_Water_Strategy_3.pdf

[43] WHO/UNICEF. 2015. Progress on sanitation and drinking water – 2015 update and MDG assessment. http://www.wssinfo.org/fileadmin/user_upload/resources/JMP-Update-report-2015_English.pdf

hygiene (WASH), accounts for 22% of child mortality in children ages 1 – 59 months in Afghanistan[44]. Improvements in WASH have also been proven to reduce acute respiratory illness, which is the number one cause of death for children in this age group in Afghanistan. Sustainability of water and sanitation infrastructure, as well as sustained adoption of improved hygiene behaviors, is a known challenge in the WASH sector globally and in Afghanistan.

Given this context, USAID/Afghanistan designed the Afghan Sustainable Water Supply and Sanitation (SWSS) activity with three interrelated objectives:

Increase access to potable water supply and sanitation in communities that demand these services

1. Improve the sustainable management of potable water in Afghanistan's rural communities
2. Decrease the prevalence of water-related diseases through community, household, and institutional hygiene interventions

The development hypothesis was that low access to water and sanitation and unhygienic behaviors contribute to poor health of the Afghan population. For the theory of change, SWSS adapted the WASH sector's Hygiene Improvement Framework (shown in Figure 1, below) to meet the challenges of the WASH sector in Afghanistan, with particular attention to the community-level processes necessary to support sustainability. The theory of change was that a combination of WASH infrastructure, improved capacity to operate and maintain the infrastructure, and support for adoption of improved hygiene behaviors would improve the health and well-being of the targeted populations. During the first year of implementation, the Project team followed, to the extent possible, an initial focus on community "software" and capacity building to improve the enabling environment that would prepare for appropriate investments for "hardware."

[44] Li Liu, Shefali Oza, Daniel Hogan, Jamie Perin, Igor Rudan, Joy E Lawn, Simon Cousens, Colin Mathers and Robert E. Black.2015. Child Health Epidemiology Reference Group Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. The Lancet, Volume 385, No. 9966, p430–440.

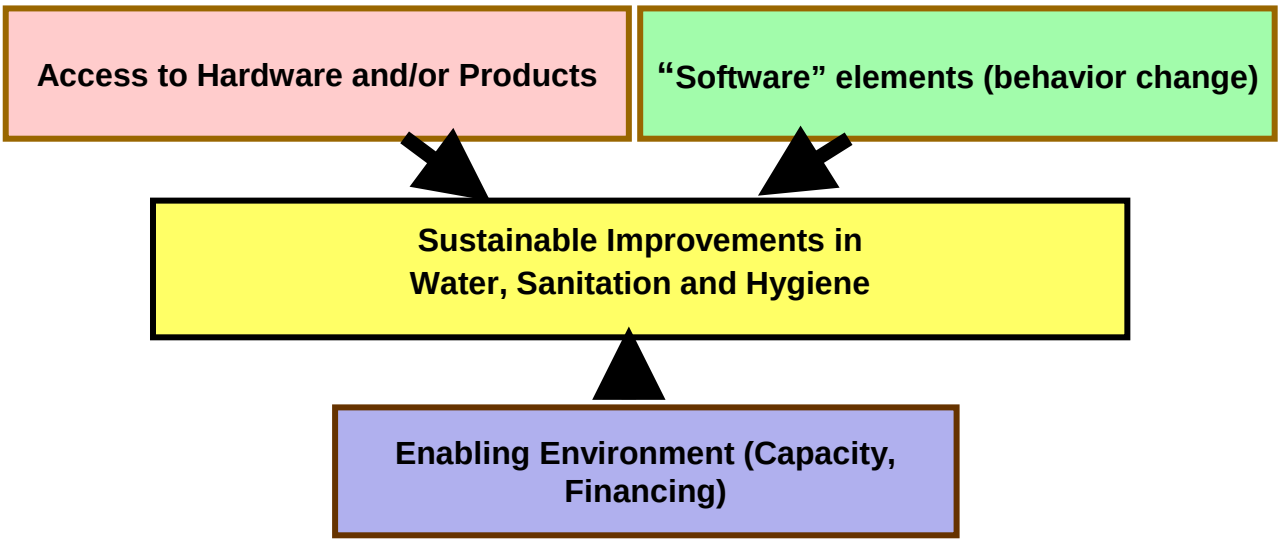


Figure 1: Hygiene Improvement Framework

SWSS designed and constructed 3,011 wells and 37 piped water systems, using two approaches to geographical selection. SWSS selected a set of sites in provinces on the basis of accessibility, relative security, and high rates of diarrheal disease in children under five years- their "Provincial Approach". In these sites, SWSS implemented a full package of community engagement of men and women, schools, and other community leaders. This engagement of communities and local authorities was achieved before any infrastructure decisions were made and implemented.

SWSS also constructed water supply infrastructure in communities in response to water supply needs identified by the Provincial Reconstruction Teams/Field Program Officers, which were typically located in less secure areas of the country. Because of security concerns and PRT pressures to complete construction quickly, SWSS was unable to implement their standard "community-based development" approach and instead used a "Flexible Approach." In these communities, SWSS typically spent less time building community ownership and creating demand prior to decisions on the design of water supply infrastructure improvements, and typically had much less involvement of women in the decision-making process. While some USAID and SWSS staff did not feel this approach was optimal, USAID directed the SWSS contractor to implement in this "flexible approach" to align with the strategic priorities of the day.

Under their standard "Provincial Approach" and in their "Flexible Approach" when possible, SWSS repeatedly engaged with communities and community-appointed infrastructure caretakers to bring about sustainable operations and maintenance of investments and improvements. Their community engagement emphasized a caretaker mechanism of collecting fees to repair hand pump wells or clean public latrines to ensure sustainability, avoid breakdowns, and ensure that public toilets were hygienic. SWSS worked through the Community Development Committee (CDC)/Shura structure to identify candidates to serve as caretakers, and trained and equipped each caretaker and assigned each to a set of geographically proximate wells.

Early research conducted by SWSS financial specialists found both traditional and non-traditional

ways in which communities were gathering funds to address water supply infrastructure needs. Traditional approaches were widely prevalent and implemented for maintenance and repair of water supplies. In these approaches, the Shura gathered funds from community residents, contacted a designated mechanic, oversaw and approved his work, made payment, and maintained records of the transaction. SWSS data from their *WaterTracker* system[45] suggested that this method of accessing skilled mechanics to meet community water infrastructure needs for a fee was effective. In addition, the research and subsequent SWSS monitoring records showed that communities also made efforts to repair their wells and hand pumps using their own materials and skills instead of those of a hired mechanic. By the end of SWSS implementation, SWSS was unable to determine whether the SWSS-trained caretakers were able to generate sufficient income from their work to motivate them to continue such work over the long-run.

Rural Water Supply Sustainability Evaluation Tools

In the rural water supply sector, there is broad agreement among experts about the importance of five factors in supporting sustainability of these water services. While the country or community context may require differential emphasis on these factors in program implementation, experts agree that each of these factors must be addressed during implementation to ensure the long-term sustainability of rural water services. These five factors, which map to the three elements of the Hygiene Improvement Framework, include:

1. **Technical (Hardware)** – What type of infrastructure is appropriate for the water supply and quality?

2. **Social/behavioral (Software)** – Engaging through multiple channels to change individual behaviors and social norms

3. **Governance (Enabling Environment)** – Organizations, institutions and people are organized, trained, motivated and accountable to keep the service running.

4. **Financial/Life cycle cost approach (Enabling Environment)** – Consider the mix of funding sources (tariffs (or user charges), taxes (the amount that government pays through its general revenues and budget) and transfers (which are typically donor support)) throughout the lifecycle of the water infrastructure and staffing, not just the cost of the initial capital investment in hardware.

5. **Environmental (Enabling Environment)** - For sustainable water supply, it is critical to understand the adequacy of the water source both in terms of quantity and quality. A low-quality source might be selected, but this will have implications in terms of treatment – which has to be factored into our thinking of whether the service can be sustained over the long term. This also includes planning for changes in precipitation that affect water supply services.

[45] WaterTracker was a storage and monitoring tool developed in partnership with SWSS, MRRD and Roshan Telecommunications. WaterTracker enabled the MRRD to track the implementation of geographically dispersed water supply infrastructure projects, and provided rural communities with the ability to report on the status of local infrastructure via mobile phone. MRRD is now developing a version that uses smartphones, which were not in widespread use during the time of SWSS project.

These factors are not independent, for example in the installation of an expensive reverse-osmosis water treatment plant (technical) in a rural area with low income (financial/life cycle costs) - it is a poor choice that will probably be unsustainable. Failure – or success – in sustainable water services is typically the result of a web of these factors and systems, and all of them need to be considered, if not addressed.

Based on these factors of sustainability, there are several tools that have been developed to assist in program monitoring of WASH interventions. An assessment of five main tools[46] found a number of common characteristics. The tools all consider financial, governance, environmental, technical and social factors of sustainability (some consider additional factors such as service delivery, management, knowledge and capacity). The tools have also adopted similar research methodologies and sampling approaches, generally presenting either an overall sustainability score or an index score for each factor assessed. The tools focus mainly at the level of service delivery, with less attention on the role, capacity, or engagement of local public and private sector systems. However, the researchers assessing the tools felt that they failed to reflect an understanding of sustainability from the perspective of water infrastructure users, rather than as interpreted from survey results based on factors of sustainability assumed to be important by external experts.

IV. PROGRAM GOALS AND OBJECTIVES

Designed in 2008, the Afghan Sustainable Water Supply and Sanitation (SWSS) activity predated the use of logical frameworks re-introduced in the 2011 ADS revisions. This activity also predates the current USAID/Afghanistan's Plan for Transition 2015-2018. SWSS was designed largely in response to language in theFY2008 appropriations bill that directed USAID to make a minimum level of investment in activities supporting the Millennium Development Goals related to basic water supply and sanitation. As such, SWSS had three interrelated objectives:

1. Increase access to potable water supply and sanitation in communities that demand these services

2. Improve the sustainable management of potable water in Afghanistan's rural communities

3. Decrease the prevalence of water-related diseases through community, household, and institutional hygiene interventions

While predating the Plan for Transition, SWSS objectives align with the Plan's Development Objective 2: Gains in Health, Education, and the Empowerment of Women Maintained and Enhanced, as does the new Rural Water Supply and Hygiene program implemented by UNICEF with MRRD, that this proposed evaluation aims to inform. The Results Framework from the Rural Water Supply and Hygiene program is shown below as Figure 2.

[46] http://www.ircwash.org/sites/default/files/2013_wp6_sustainabilityassessmenttools.pdf

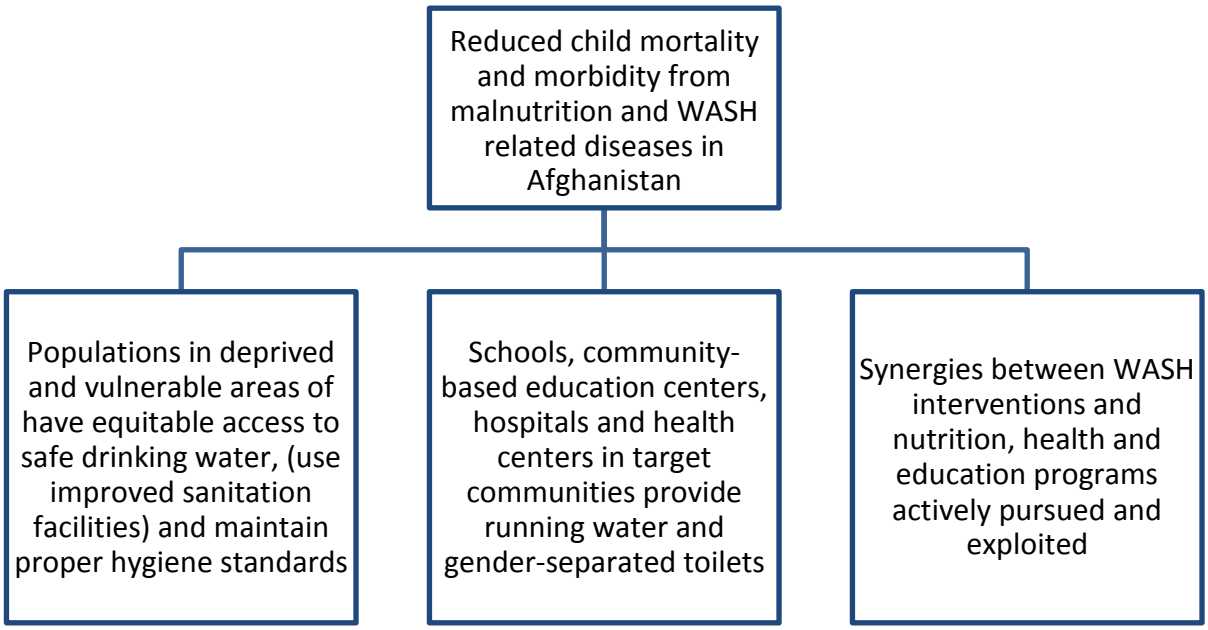


Figure 2: Rural Water Supply and Hygiene Program Results Framework

V. PURPOSE OF THE EVALUATION

The purpose of the Retrospective Sustainability Evaluation of SWSS is to attempt to identify any significant correlations between the current functionality of rural water supply infrastructure designed and constructed under SWSS and (1) the approach used by SWSS in establishing the infrastructure and (2) the five factors understood by experts to be important in ensuring sustainability of rural water supply services.

The evaluation results will be used to directly inform USAID's current investment in rural water supply, a grant of US$30 million implemented by UNICEF with MRRD from 2016-2020. The results will also form a valuable contribution to the broader Afghanistan WASH sector by providing validation of the assumed factors influencing sustainable water services within the specific local systems context.

The results will be disseminated through the Afghanistan Water Supply and Sanitation coordination group led by the Ministry of Reconstruction and Rural Development, and incorporated into other USAID WASH designs through sharing with the USAID Water and Development Strategy Implementation Working Group in Washington. Results may also be presented at regional and international fora.

VI. EVALUATION QUESTIONS

1. What is the overall functionality (current and historical) of water supply systems implemented by SWSS? When the water systems have broken down, to what degree have communities been able to redress failures and get the systems running again?

2. In reference to the five sustainability factors (technical, environmental, financial, governance and social), how have these factors contributed to the sustainability or breakdown of water delivery services across these communities?

3. To what degree are water systems installed by SWSS meeting communities' (women and men) expectations in terms of quantity, quality, accessibility, affordability, and reliability?

4. How did the community engagement process undertaken at time of installation appear to affect sustainability and community satisfaction? Specifically, were there observable differences between communities where the "provincial approach" was taken and communities where the "flexible approach" was taken?

VII. EVALUATION DESIGN & METHODOLOGY

Sample size and selection

A representative sample should be selected from the sampling frame of all water well systems constructed and installed, and with accurate GPS coordinates. The sample should ideally be constructed with the intent of identifying statistically significant outcomes between the two "approaches" used by SWSS in developing water systems. Another potentially important strata for use in sample construction is geographic region or community "type", e.g., more or less remote, major ethnic divisions, etc.

The contractor for SWSS provided a spreadsheet with GPS coordinates for over 2,000 valid data points out of the 3,011 wells and 37 piped systems constructed under SWSS. Some data cleaning is still required, and the existing data will need to be validated with the SWSS contractor to ensure that there is no systematic bias in what water systems are included and excluded from the database, before using it as the sampling frame or census for this evaluation.

This activity will only focus on wells (boreholes and hand dug) installed by SWSS and exclude piped water systems.

System assessment (Question 1)

The evaluation will require visiting each water system that was constructed under SWSS to document the status of the hardware (pipes, taps, concrete apron, pump house, etc. depending on the type of infrastructure installed), and the status of the service (whether the system is providing the quantity of water corresponding to the system design). The assessment will also include a short key informant interview/questionnaire (ideally with the caretaker of the water system). A draft is attached as Annex 1. If the SWSS-supported caretaker is available, the evaluators should ask them about training they received for the position, how they undertake their responsibilities to manage

the system, and their major challenges in keeping the system functional or in repairing it if it is currently not functional.

Assessment of sustainability context and factors (Questions 2 and 3)

Focus groups of men and women users of the water supply should be convened to address the qualitative aspects of the study, using semi-structured group interviews, and include both sites with both functional and non-functional systems (from Question 1). Depending on the community context, the evaluation team may consider organizing separate male and female focus groups.

Using open-ended and provocative questions based the theoretical factors of sustainability, the facilitators should elicit a narrative for each well, addressing the context of the community, the local government, and the private sector, and perceptions of technical, social/behavioral, governance, environmental, and financing/life cycle costs as aspects related to the functioning of the water service.

The structured focus groups should also elicit the users' perceptions of the quality of the service and their level of satisfaction with the quantity, quality, accessibility, affordability, and reliability of the water. A draft of open ended and structured questionnaire are attached in Annex 1.

Questions	***Suggested Data Sources***	***Suggested Data Collection Methods***	***Data Analysis Methods***
1. Are the systems providing water services?	Key informant (ideally with current caretaker)	Direct inspection of equipment with data entered into structured questionnaire, short key informant interview with closed and open-ended questions on survey form	By location, by gender, by SWSS implementation approach
2. Why is the system functioning or not functioning?	Users of the water systems	Focus group discussions with skilled facilitators using open-ended questions to elicit context, level of community, local government and private sector engagement (spare parts and repairs), diagnostics about history of selection as SWSS site, security issues, gaps that are difficult or beyond capacity of community to address, perceptions of their and the other gender's role in sustainable water services Structured questionnaire on survey form to complement	By location, by gender, by SWSS implementation approach

		qualitative data from discussions	
3. Perceptions of quality of the water services in your community	Users of the water systems	Using same focus groups as for question #2, open ended questions.	By location, by gender, by SWSS implementation approach, by functionality of SWSS system

VIII. EXISTING PERFORMANCE INFORMATION SOURCES

The SWSS project ended in 2012. The final report is online[47] and provides detailed information about the rationale, process, results and challenges of implementation. This evaluation is retrospective, and will focus on the functionality of the infrastructure in the field. Key personnel from the project can be contacted through Tony Kolb, POC for this evaluation.

A review of sustainability tools for WASH can be found online[48]. This document describes the generally accepted factors of sustainability in more detail than provided in this evaluation SOW.

IX. EVALUATION TEAM COMPOSITION

The intended size of the evaluation team depends on the final sample size, the logistics and the time required to complete the data collection from each site. All team members should be familiar with USAID's Evaluation Policy.

Management team

To manage the evaluation, the following team is proposed.

1. A team leader who will coordinate the work of the field team, analysis of the data, and preparation of the report
2. A specialist in qualitative research methods and analysis for the focus group sessions.
3. A research assistant to provide support during implementation.
4. Translator(s)

Infrastructure assessment team (Question 1):

[47] Afghan Sustainable Water Supply and Sanitation 2009-2012 Final Report. 2013. http://pdf.usaid.gov/pdf_docs/PA00J78X.pdf

[48] http://www.ircwash.org/sites/default/files/2013_wp6_sustainabilityassessmenttools.pdf

For Question 1, ideally the study could complete an infrastructure functionality assessment on all the wells funded under SWSS (or all that we have GPS coordinates for). For each water system, this would require a team of at least two people. The number of teams required will depend on the final sample size and logistics.

1. A locally hired engineer with experience in rural water supply, who will conduct the assessment of the infrastructure and do the key informant interviews of the caretakers

Qualitative assessment of sustainability context and factors team (Questions 2 and 3)

For the subset of water systems that have been selected for focus groups, the field data collection will require at least two evaluators. The sample size, travel time, and logistics of time spent per well focus group will determine how many teams will be required.

1. A female with focus group experience and local language fluency to convene and lead the focus group of women users of the system.
2. A male with focus group experience and local language fluency to convene and lead the focus group of men users of the water system.
3. A local representative of MRRD maybe engaged to assist with introductions and identifying focus group members.

X. EVALUATION SCHEDULE

(This will depend on the sample size and location of sites) A six-day work week is authorized for evaluation team members working in Afghanistan and a five-day work week for team members working remotely. An illustrative level of effort (LOE) in days is inserted below.

Positions for Survey, Analysis, and Report	Remote Prep & Tool Design	Travel	In-Country	Remote Report Finalization	Total LOE Days
Expat Evaluation Team Leader - Dr. Sarah Parkinson	5	4	28	24	61
Expat Water Engineer/WASH & Evaluation Specialist- Dr. Foster, working remotely	5			16	21
Afghan Specialist-1			47		47
Afghan Specialist-2			47		47
SUPPORT-II Afghan M&E Specialist					
Totals	10	4	122	40	176

Note: The above LOE is based on the Team Leader (TL) and expat WASH engineer drafting the

survey tool remotely in collaboration with OI. Once the survey tool is approved, the TL shall travel to Kabul to conduct and supervise training of the field assessors; who will be subcontracted through a local survey firm. We assume 9 days for training (2 travel days, 4 days classroom and 1-day field test and review). The TL will also participate in a pilot test in one province and review the results with OI - prior to commencing the full survey; and then the TL shall return home. We estimate that the survey will take 36-40 days. The TL and expat WASH Engineer will then both perform data analysis and report drafting remotely.

The survey shall consist of 485 well sites located in 16 provinces. The sample size was derived from http://www.surveysystem.com/sscalc.htm - and provides a confidence level of 95% with a confidence interval of 4%. The survey LOE assumes 1.5 days per well, includes travel time to and from the well site from the provincial or district center, assessment and interviews, including a select number of focus group discussions.

XI. DELIVERABLES AND REPORTING REQUIREMENTS

1. **In-briefing:** Within **48 hours** of arrival in Kabul, the Evaluation Team, will have an in-briefing with the OPPD M&E unit and the OI Team for introductions and to discuss the team's understanding of the assignment, initial assumptions, evaluation questions, methodology, and work plan, and/or to adjust the SOW, if necessary.

2. **Evaluation Work Plan:** Within **3 calendar days** following the in-brief, the Evaluation Team Leader shall provide a detailed initial work plan to OPPD's M&E unit and OI. The initial work plan will include: (a) the overall evaluation design, including the proposed methodology, data collection and analysis plan, and data collection instruments; (b) a list of the team members and their primary contact details while in-country, including the e-mail address and mobile phone number for the team leader; and (c) the team's proposed schedule for the evaluation. USAID offices and relevant stakeholders are asked to take up to **2 days** to review and consolidate comments through the SUPPORT II COR. Once the evaluation team receives the consolidated comments on the initial work plan, they are expected to return with a revised work plan within **2 days**. The revised work plan shall include the list of potential interviewees and sites to be visited.

3. **Mid-term Briefing and Interim Meetings:** The evaluation team is expected to hold a mid-term briefing with USAID on the status of the assessment including potential challenges and emerging opportunities. The team will also provide MRRD with periodic briefings and feedback on the team's findings, as agreed upon during the in-briefing. If desired or necessary, weekly briefings by phone can be arranged.

4. **PowerPoint and Final Exit Presentation:** The evaluation team is expected to hold a final exit presentation to discuss the summary of findings and recommendations to USAID. This presentation will be scheduled as agreed upon during the in-briefing. Presentation slides should not exceed 18 in total.

5. **Draft Evaluation Report**: The draft evaluation report should be consistent with the guidance provided in Section XIII: "Final Report Format." The report will address each of the issues and

questions identified in the SOW and any other factors the team considers to have a bearing on the objectives of the evaluation. Any such factors can be included in the report only after consultation with USAID. **The submission date** for the draft evaluation report will be decided upon during the mid-term or exit briefing and submitted to OPPD's M&E unit by Checchi. Once the initial draft evaluation report is submitted, the following deadlines should be followed:

a. OI will have **8 working days** in which to review and comment on the initial draft, after which point USAID/OPPD's M&E unit will have **2 working days** to review and consolidate all USAID comments (total of **10 working days**). OPPD will submit the consolidated comments to Checchi.

b. The evaluation team will then have **5 working days** to make appropriate edits and revisions to the draft and re-submit the revised final draft report to USAID.

c. OI and the M&E unit will have **10 working days** after the submission of the second revised draft to again review and send any final comments.

6. **Final Evaluation Report:** The evaluation team will be asked to take no more than **3 days** to respond/incorporate the final comments from the OI and OPPD. The Evaluation Team Leader will then submit the final report to OPPD. All project data and records will be submitted in full and should be in electronic form in easily readable format; organized and documented for use by those not fully familiar with the project or evaluation; and owned by USAID.

XII. MANAGEMENT

Checchi/SUPPORT-II will identify and hire the evaluation team, pending the COR's concurrence and CO approval, assist in facilitating the work plan, and arrange meetings with key stakeholders identified prior to the initiation of the fieldwork. The evaluation team will organize other meetings as identified during the course of the evaluation, in consultation with Checchi/SUPPORT-II and USAID/Afghanistan. Checchi/SUPPORT-II is responsible for all logistical support required for the evaluation team, including arranging accommodation, security, office space, computers, Internet access, printing, communication, and transportation.

The evaluation team will officially report to Checchi's SUPPORT-II management. Checchi/SUPPORT-II is responsible for all direct coordination with USAID/Afghanistan/OPPD, through the SUPPORT II COR, Sediq Orya. From a technical management perspective, the evaluation team will work closely with Tony Kolb. In order to maintain objectivity, OPPD's Monitoring and Evaluation Unit will make all final decisions about the evaluation.

XIII. FINAL REPORT FORMAT

The evaluation final report should be about 25 pages in length, not including annexes. It should be written in English, using Gill Sans MT 12 point font, 1.15 line spacing, and be consistent with USAID branding policy. The report should be structured as follows:

1. Title Page

2. Table of Contents
3. List of any acronyms, tables and/or figures
4. Acknowledgements or Preface (optional)
5. Executive Summary (**3-5 pages**)
6. Introduction (can pull from scope of work)
    a. Description of the project evaluated, including goal and expected results
    b. Brief statement on purpose of the evaluation, plus a list of the evaluation questions
    c. Description of the methods used in the evaluation (such as desk/document review, interviews, site visits, surveys, etc.), the rationale and location for field visits (if any), and a description of the numbers and types of respondents
    d. Limitations to the evaluation, with particular attention to the limitations associated with the evaluation methodology (selection bias, recall bias, unobservable differences between comparator groups, etc.)
7. Findings
    e. Describe findings, focusing on each of the evaluation questions and providing **gender disaggregation** where appropriate
    f. Evaluation findings should be presented as analyzed facts, evidence, and data and not based on anecdotes, hearsay, or the compilation of people's opinions
8. Conclusions
    g. Conclusions are value statements drawn from the data gathered during the evaluation process
9. Recommendations
    h. Recommendations should be actionable, practical and specific statements for existing programming and for the design and performance of future programming
    i. Each recommendation should be supported by a specific set of findings
    j. Include recommended future objectives and types of activities based on **lessons learned**
10. Annexes
    k. Evaluation Scope of Work
    l. Methodology description (include any pertinent details not captured in the report)

m. Copies of all survey instruments and questionnaires

n. List of critical and key documents reviewed

o. Schedule of Meetings and sources of information (If confidentiality is a concern, the team should discuss and agree upon an approach with USAID)

p. Notes from key interviews, focus group discussions and other meetings

q. Documentation of any changes to the SOW or evaluation process

r. Statement of differences (if applicable)

XIV. OVERALL REPORTING GUIDELINES

The evaluation report should represent a thoughtful, well-researched and well-organized effort to objectively evaluate the validity of the project's hypothesis and the effectiveness of the project. Evaluation reports shall address all evaluation questions included in the statement of work and be written in highly professional English, free of grammatical and typographical error, and with professional formatting.

Any modifications to the statement of work, whether in technical requirements, evaluation questions, evaluation team composition, methodology, or timeline need to be agreed upon in writing by the SUPPORT II COR.

ANNEX II: ANALYTICAL METHODS FOR ASSESSING FACTORS OF SUSTAINABILITY AND EFFECTIVENESS OF COMMUNITY ENGAGEMENT ACTIVITIES

Assessing determinants of non-functionality and breakdown durations

Regression analyses were carried out to identify associations between the operational performance of wells and the technical, environmental, social, financial and institutional characteristics of wells, users and the wider operation and maintenance ecosystem. This analysis employed logistic regression Generalized Estimating Equations (GEEs), which adjusted for the village-level clustering of wells that would otherwise violate the independence of observations assumption underpinning conventional regression techniques. The analysis considered four outcome variables relating to operational performance: (a) functionality status, (b) whether or not the well was out-of-commission (i.e. non-functional for more than 1 year), (c) breakdown duration of more than 1 week; and (d) breakdown duration of more than 1 month. In order to distinguish between drivers of well failure and lengthy breakdown durations, breakdown duration analysis was conducted only on those wells that were functional at the time of inspection and had experienced breakdown(s) in the previous 12 months that had been repaired.

Explanatory variables were chosen for analysis based on empirical and theoretical evidence from previous rural water sustainability studies. Both univariable and multivariable analyses were carried out. Univariable analysis allowed for the calculation of crude odds ratios for all relevant variables, though did not adjust for possible confounding. In order to adjust associations for confounding factors, multivariable logistic regression GEEs were run with a sub-set of up to 20 explanatory variables. Variables were selected based on (a) the significance of the association evident in the univariable analysis (i.e. if $p<0.05$), and (b) their level of independence from other variables included in the multivariable model. Fifteen different GEEs were run, with models differing by one or more of the following: (a) outcome variable, (b) whether or not seasonally or permanently dry wells were included (due to this variable's heavy influence on results), and (c) whether or not hand pump type was included (owing to its material impact on sample size). Due to analytical constraints, a multivariable GEE for breakdown durations of more than one month could not be conducted. In this report, we report univariable associations where $p<0.05$ and multivariable associations where $p<0.10$. Full results are presented in Annex VII.

Assessing effectiveness of community engagement activities

The approach used to assess the effect of community engagement activities during implementation was similar to that undertaken to understand the factors associated with operational performance. Regression analyses were carried out to identify associations between a range of measures of community participation and involvement during the implementation of SWSS, and the operational outcomes observed during the survey in early 2017. These community engagement indicators characterized the level of consultation, information provision, decision-making, training and community contributions for each well. Specific measures captured both the breadth of involvement (e.g. number of households involved) and the depth of involvement (i.e. extent to which these

households were involved). The operational outcomes were the same as those used in the assessment of sustainability determinants (functionality status, breakdown duration), though additional univariable analysis was also carried out to assess associations with respondents' level of satisfaction with involvement in the implementation process.

The analysis again employed logistic regression GEEs, which adjusted for the village-level clustering of wells, which is important given implementation processes may have been combined for multiple wells in the same village. Both univariable and multivariable analyses were carried out. Univariable analysis allowed for the calculation of crude odds ratios for a wide range of community engagement variables, and a sub-set of five variables were then selected for inclusion in the multivariable models. This included variables from each sub-domain (information, decisions, training, and contributions) that exhibited significant associations with operational outcomes in the univariable analysis. To ensure no other associations were missed, other variables relating to community engagement during implementation were also entered into multivariable models one by one. Again, we report univariable associations where $p<0.05$ and multivariable association where $p<0.10$.

Table 15: Adjusted odds ratios for community participation and engagement measures included in full multivariable GEEs

Outcome Measure	Model	Information about O&M	Decisions about Management	Provision of Training	% HHs Contributing Cash	Days of Labor Contributed
Non-functional	A1	1.63 (0.53-5.00)	0.90 (0.21-3.89)	0.73 (0.30-1.78)	0.99 (0.97-1.01)	0.94 (0.83-1.05)
Non-functional	A2	1.05 (0.45-2.43)	0.78 (0.27-2.22)	0.69 (0.34-1.42)	0.99 (0.98-1.01)	**0.89 (0.79-1.02)***
Non-functional	D1	1.65 (0.55-4.96)	0.96 (0.24-3.88)	0.66 (0.27-1.60)	0.99 (0.97-1.01)	0.94 (0.83-1.04)
Non-functional	D2	1.10 (0.48-2.51)	0.91 (0.34-2.44)	0.64 (0.32-1.32)	1.00 (0.98-1.01)	**0.89 (0.79-1.01)***
Non-functional	F1	1.80 (0.53-6.11)	1.24 (0.27.5.74)	0.76 (0.31-1.88)	0.99 (0.95-1.02)	0.93 (0.85-1.02)
Non-functional	F2	1.23 (0.50-2.99)	0.79 (0.26-2.35)	0.65 (0.30-1.40)	0.99 (0.97-1.02)	**0.90 (0.80-1.01)***
Out-of-commission	B1	0.79 (0.23-2.68)	0.19 (0.02-1.56)	2.30 (0.39-13.75)	1.00 (0.97-1.03)	0.95 (0.88-1.02)
Out-of-commission	B2	0.62 (0.22-1.74)	0.38 (0.10-1.48)	1.73 (0.47-6.30)	1.01 (0.99-1.03)	0.89 (0.71-1.12)
Out-of-commission	E1	0.72 (0.23-2.20)	0.28 (0.06-1.44)	1.55 (0.29-8.23)	1.01 (0.98-1.03)	0.93 (0.84-1.03)
Out-of-commission	E2	0.69 (0.26-1.82)	0.56 (0.16-1.97)	1.30 (0.42-4.04)	1.01 (1.00-1.03)	0.87 (0.69-1.09)
Out-of-commission	G1	0.69 (0.19-2.50)	0.34 (0.07-1.62)	1.27 (0.32-5.13)	1.01 (0.99-1.03)	0.86 (0.67-1.12)
Breakdowns >1 wk	C1	**0.33 (0.10-1.15)***	**0.09 (0.01-1.18)***	0.11 (0.01-2.52)	0.88 (0.66-1.18)	**0.66 (0.41-1.05)***
Breakdowns >1 wk	C2	0.50 (0.16-1.56)	0.78 (0.27-2.29)	**0.11 (0.02-0.72)****	0.93 (0.81-1.05)	0.89 (0.71-1.11)
Breakdowns >1 wk	H1	**0.30 (0.09-1.01)***	**0.10 (0.01-1.44)***	0.16 (0.01-2.12)	0.88 (0.66-1.18)	0.65 (0.37-1.12)
Breakdowns >1 wk	H2	0.44 (0.15-1.32)	1.13 (0.36-3.54)	**0.12 (0.02-0.75)****	0.93 (0.84-1.03)	0.88 (0.71-1.08)

Note: Data presents adjusted odds ratios, with 95% confidence interval in brackets. ***p<0.001,**p<0.05, *p<0.1

ANNEX III: DATA COLLECTION TOOLS

Observational Survey for SWSS Retrospective Sustainability Evaluation

a) Date:
b) Well GPS coordinates:
(If you cannot locate the well, take the GPS coordinates of the location closest to the coordinates given in the well record.)

c) Well ID number:
d) Interviewer name:
e) Province
f) District
g) Village:
h) Well successfully located?
Yes [Continue to Q1 below]

No [if No, survey ends here. Save and submit record.]

1. Take 2 photographs of the well, ensuring that the GPS and date stamps are set to "on:"
    a. A photo from one side showing the full concrete platform and pump
    b. A photo from the other side (i.e. 180 degrees) showing the full concrete platform and pump
2. What is the type of well:
    - o DUG WELL WITH HAND PUMP
    - o TUBE WELL WITH HAND PUMP
    - o OTHER_____
    - o DON'T KNOW
3. Type of hand pump:
    - o INDUS
    - o KABUL
    - o PAMIR
    - o OTHER_____
    - o DON'T KNOW
    - o NO HAND PUMP

3.1 If there is no hand pump, how is water extracted from well?
[Enter in text box, then skip to question 7]

4. Does the well produce water when operated? Pump for 30 seconds to see if water comes out. If it does not, refer to your technical guidance notes.
    - o YES
    - o NO

5. If no, what is the reason it does not currently produce water:

   HAND PUMP HAS MECHANICAL FAULT [skip to Q7]

   If yes, is the cause known? YES NO

   If yes, what is the cause:_____

   If no, is pumping the handle:

   - o EASY
   - o NORMAL
   - o DIFFICULT

   - o WELL IS PERMANENTLY DRY [skip to Q7]
   - o WELL IS SEASONALLY DRY [skip to Q7]
   - o WELL HAS COLLAPSED [skip to Q7]
   - o WELL HAS BEEN PLUGGED [skip to Q7]
   - o WELL CONSTRUCTION NEVER COMPLETED [skip to Q7]
   - o OTHER:_____ [skip to Q7]
   - o UNKNOWN REASON [skip to Q7]

6. Test the hand pump by performing a stroke test and a leak test. [skip if answered 'no hand pump' to Q3, or 'no' to Q4

   a. Stroke test: count the number of full strokes it takes to fill a 10 gallon container, based on a stroke rate of 60 strokes per minute (1 stroke per second). Only begin counting once water starts to flow. Strokes must be full strokes (operated to the maximum and minimum height), and one stroke is a complete up and down motion.

      Number of full strokes to fill container:

   b. How is the appearance of the water?

      o CLEAR

      o SOMEWHAT CLOUDY OR MUDDY

      o VERY CLOUDY OR MUDDY

   c. Leave the pump idle for 5 minutes. Now begin pumping and count the number of strokes until the water comes out (again, applying a stroke rate of 1 full 'up and down' stroke per second).

      Number of full strokes until water comes out: ____

7. Is the well sealed at the ground surface and concrete platform? (i.e, so that surface water, rain water, or contaminants cannot enter the well at the ground surface or through the concrete platform)

   - o YES
   - o NO

8. Is the concrete platform raised above ground level?

   - o YES
   - o NO

9. Is the hand pump pedestal loose at the point of attachment to the concrete platform (which could permit water to enter the casing)?

   YES NO

10. Is there any stagnant water within 2 metres of the cement floor of the well (outside of drainage channel)?

    YES

    NO

11. Is there an animal pen within 30m of the well?

    YES

    NO

    11a If yes, please estimate the distance from the well in metres:

    ___ metres

    11b. If yes, please specify whether the animal pen is on higher ground than the well:

    YES

    NO

12. Is there a latrine located within 30m of the well?

    YES

    NO

    12a. If yes, please estimate the distance from the well in metres:

    12b. If yes, please specify whether the latrine is on higher ground than the well:

        YES

        NO

13. Are there any visible maintenance problems?

    YES

    NO

    If yes, check all that apply:

        Reduced discharge

        Abnormal noise

        Pump handle shaky

        Pump head or pump stand shaky

        Cracked concrete platform

- Handle is broken or missing
- Head of hand pump is broken or missing

OTHER:_____

14. Where is the well located?

PUBLIC SPACE

BAZAAR

SCHOOL

MOSQUE

CLINIC/HOSPITAL

PRIVATE COMPOUND
OTHER:_____

15. Are there any visible obstacles to public access to the well? (e.g. located on private land, or in an out-of-the way location)

YES

NO

If yes, explain:

16. Any other observations you would like to note?

Questionnaire for Community Key Informant(s)

Select caretaker or CDC/shura where possible, or else someone else knowledgeable about the local well. This may be conducted as a single person or multiple person interview, depending on who is available and how much they know about the well.

a. Date:
b. Well GPS coordinates:
c. Well ID number:
d. Name of village:
e. Name of district:
f. Name of province:
g. Name of interviewer:

Request for permission:

Hello. I have come to your village to see how the well installed by SWSS is working, and to learn what we can do to improve access to safe drinking water in other villages across the country. I have a number of questions to ask you, and this will take about one hour. Your answers will help us to advise the UN, international donors, and the government on how to improve access to water across the country.

1. Do you agree to be interviewed for this purpose?
    - YES
    - NO

1.1 If no, is there someone else in the community we should talk to instead?

    - YES
    - NO

[If yes, save the draft survey until you find the relevant person. Then return to the beginning of this question to ask their consent to be interviewed.

If no, the interview now ends because consent has not been granted. Save and submit the draft survey.]

Interview Questions:

2. Respondent information: (fill out per respondent)
   Name: Phone Number:

Caretaker Role and Responsibilities

Role with respect to well: (caretaker of well, Water User Committee member, CDC member, community elder, lives near well, other:__)

3. Are you (or one of you) the caretaker of this well?
    - YES[skip to Q3.2]
    - NO

3.1 (If no) Why was the caretaker not available?
Caretaker is away temporarily [skip to Q8]

There is no caretaker [skip to Q8]
Other: _____ [skip to Q8]

3.2 (If yes) How many years have you been the caretaker? [Enter "999" for don't remember]

___ years

4. Are you a caretaker for any other wells?

    - YES
    - NO

5. What are your responsibilities as caretaker? [select all that apply]

    - Guard the well
    - Carry out preventive maintenance
    - Carry out 'above ground' repairs independently
    - Carry out 'below ground' repairs independently
    - Report breakdowns to area mechanic
    - Assist area mechanic with 'above ground' repairs

- Assist area mechanic with 'below ground' repairs
- Collect fees for the water services
- Report on well performance
- Keep well surroundings clean and free of potential sources of contamination
- Other duties [please describe]

6. Did you receive any training to help you with your role of caretaker?
    - o Yes
    - o No [Skip to Q6.3]

   6.1 (If yes) How many years ago did you receive this training? [range 0 to 10, or 999 for don't remember]

   6.2 (If yes) Was the training adequate in your opinion?
    - o Yes [skip to Q7]
    - o No [Skip to Q7]

   6.3 If no, do you think you need training?
    - o Yes
    - o No [skip to Q7]

   6.3.1 If yes, what do you most need training on?

7. Do you receive payment for fulfilling any of these roles?

    - o YES, I receive payment in cash
    - o YES, I receive payment in-kind
    - o NO, but I receive some other benefits or support
    - o NO, I don't receive any compensation or benefit

I. Well and Implementation Method

8. When was this well built? (Note: This refers to the well, rather than the pump, if the pump was put in later.)

    - o 1-2 years ago [skip to Q9]
    - o 3-4 years ago [skip to Q9]
    - o 5-6 years ago [skip to Q9]
    - o 7-8 years ago [skip to Q9]
    - o 9-10 years ago [skip to Q9]
    - o more than 10 years ago
    - o Don't know [skip to Q9]

   8.1[If the well is more than 10 years old] Has the well had a major repair in the last 10 years?

- o Yes
- o No [skip to q9]

8.2 How many years ago was the major repair?

[range from 0 to 10, 999 for 'don't know']

8.3 What was done to the well? [check all that apply]

- ▪ Installation of new hand pump (if well did not have one previously)
- ▪ Replacement of hand pump
- ▪ Replacement of concrete platform
- ▪ Replacement of well casing
- ▪ Replacement of the cylinder
- ▪ Desilting
- ▪ Deepening
- ▪ Other

  Describe
- ▪ Don't know

8.4 Who paid for the major repair? [select one]

- o Government
- o NGO [name]
- o Community
- o Individual
- o Aid agency [name]
- o Other
- o Don't know

8.4.1 What is the name of the NGO that paid for rehabilitation?

8.4.2. What is the name of the aid agency that paid for rehabilitation?

9. Who built the well? [enter "999" for "don't know"]

10. How deep is the well in meters? (This is the depth to the very bottom of the well, rather than to the water level.) [enter "999" for "don't know"]

11. How many community consultation meetings were carried out at the time the well was built? (An approximate guess is fine, or enter "999" for "don't know") [if the answer is 0, skip to Q16]

12. About how many community members were included in the consultations?
    - ▪ Men [Enter number, or "999" for don't know]:

- Women [Enter number, or "999" for don't know]:

13. In the planning and consultation meeting(s), were participants told about: [mark all that apply]:
    - How much it will cost to maintain and repair the well?
    - The community's responsibilities for operating and maintaining the well?
    - Other – Describe:
    - Don't know

14. In the planning and consultation meetings, which of the following decisions were made by community participants?
    - o Where the well would be placed
    - o How the well would be managed
    - o How the maintenance and repair of the well would be financed
    - o Selection of committee members
    - o Selection of caretaker
    - o Usage rules (hours of operation, etc.)
    - o Type of well and pump to install
    - o Other – Describe:

15. In your opinion, were the consultation and related activities helpful?
    - o YES
    - o NO
    - o DON'T KNOW/NO OPINION

16. During the planning and construction phase, did community members receive any training?
    - o Yes
    - o No
    - o I don't know

16.1 If yes, what topics did the training cover? [select all that apply]:

- How to manage the well (making decisions about well use, repair, and costs)
  Number of men trained to manage the well [enter "999" for "don't know"]:

  Number of women trained to manage the well [enter "999" for "don't know"]:

- How to use and maintain the well
  Number of men trained to use and maintain the well [enter "999" for "don't know"]:

  Number of women trained to use and maintain the well [enter "999" for "don't know"]:

- Hygiene education
  Number of men trained on hygiene [enter "999" for "don't know"]:

  Number of women trained on hygiene [enter "999" for "don't know"]:

- Other
  Describe other training:

I don't know

17. During the planning and construction phase, was a new committee formed to make decisions relating to the well and its management:
    - o Yes – a new Water User Committee (WUC) was formed
    - o No – pre-existing Community Development Committee (CDC) assumed these responsibilities
    - o No – pre-existing Shura assumed these responsibilities
    - o No –The caretaker assumed these responsibilities
    - o Other
      Describe:
    - o Don't know

18. Did you receive any of the following tools at the time the well was installed? (select all that apply)
    - ▪ Spanner
    - ▪ Fishing tools (tools for retrieving parts of the pump from a well)
    - ▪ Other:_____
    - ▪ No tools received
    - ▪ Don't know

19. If the well is (or was) managed by a committee/shura/CDC, how many members are on this committee:
    - ▪ Number of men [enter "999" for "don't know"]:
    - ▪ Number of women [enter "999" for "don't know"]:

20. Is this committee still active?
    - o YES
    - o NO
    - o DON'T KNOW

II. Population Served and Availability/Accessibility

21. Do people in this community use any form of electricity?
    - o Yes, we have city power all the time
    - o Yes, we have city power some of the time
    - o Yes, we have our own source of electricity (solar or generator)

- o No

22. Approximately how many households are served by this well? (estimates are fine)

    Households:

23. For what purposes do people use this well? (tick all that apply):

    - Drinking
    - Cooking
    - Washing clothes
    - Bathing
    - Watering livestock
    - Irrigating crops
    - Other productive purposes (e.g. brickmaking, masonry) [describe]

24. Is the well currently producing water?
    - o Yes [skip to question 26]
    - o No

24.1 For how long has it been non-functional?
- o 1-2 days
- o 3-6 days
- o 1-4 weeks
- o 1-4 months
- o 5-11 months
- o A year or more
- o I don't know

24.2 Have you contacted a mechanic about the problem?
- o YES [Skip to 24.4]
- o NO

24.3 Why has a mechanic not been contacted about the problem?
- o Don't know of a mechanic to contact in this area [Skip to 25]
- o Former mechanic has moved away from area [Skip to 25]
- o Don't want/need the hand pump repaired [Skip to 25]
- o Don't trust the mechanic to carry out high quality repairs [Skip to 25]
- o Mechanic charges too much to carry out repairs [Skip to 25]
- o No one in the community has taken responsibility for contacting a mechanic [Skip to 25]
- o Other:_____ [Skip to 25]

24.4 Has the mechanic inspected the problem?

- o YES [Skip to Q24.6]
- o NO
- o I don't know

24.5 Why has the mechanic not inspected the problem?

- o Mechanic is busy with other matters [skip to 25]
- o Mechanic is no longer living in the area [skip to 25]
- o Community does not have the money to pay for the transport [skip to 25]
- o Other:_____ [skip to 25]
- o I don't know

24.6 What is the main reasons the mechanic not repaired the problem?

- o Does not have the skills to repair the problem
- o Does not have the tools to repair the problem
- o Cannot find the spare parts
- o Community has not raised enough money to pay for the parts/repair work
- o Cannot agree a price with the mechanic
- o The well needs deepening
- o Other:_____
- o I don't know

25. How soon do you think the well will be repaired? [select one]

- o Within the next week
- o Within the next month
- o Within the next three months
- o After three months
- o Never
- o I don't know

26. In the last 2 weeks (14 days), for how many days has the well NOT produced water? [enter 0 if it produced water every day]:

27. In the last year (since last winter), how many times has the well been repaired? [enter 999 for don't know] [if the answer is 0, skip to Q29]

28. Please answer these questions about each repair done in the last 12 months, starting with the most recent.

	Month of repair	**Duration of breakdown before repaired**	**Who did repairs:**	**Cost of repair in Afs (incl. parts, labor, transport):**	**Main reason(s) for repair delay**
Most recent repair:	Hamal Sawr Jawza Saratan Asad Sunbula Meezan Aqrab Qaws Jadi Dalwa Hoot I don't know	0 days (preventative repair) 1-2 days 3-6 days 1-4 weeks 1-4 months 5- 11 months I don't know	Area mechanic Caretaker Other community member NGO Government Other I don't know		Collecting money Waiting for mechanic Mechanic could not fix Finding spare parts Other:_____ I don't know
2nd most recent					
3rd most recent					
4th most recent					

5th most recent

29. What sorts of problems has the community had in maintaining or repairing this well? [check all that apply]
    - Problems in the management of this well
    - Problems paying for well repairs.
    - Problems getting spare parts
    - Problems finding mechanics who know how to repair the well
    - Problems with the availability of groundwater?
    - Problems related to security
    - Any other problems

29.1 Please describe these problems:

30. Do you think the well will still be working in 5 years?
    - o YES
    - o NO [skip to question 31]

30.1 Do you think the well will still be working in 10 years?

- o YES
- o NO

III. Environmental Factors

31. Does the well currently provide enough water to meet the needs of the households using it?

- o YES
- o NO
- o I don't know

31.1 Approximately how many average size buckets (of 10 litres) per day does each household currently take from the well?

[Range 0 to 50, or 999 for don't know]

32. Does the well provide water all year round?

- o YES [Skip to 34]
- o NO
- o I don't know

32.1 If no, in which seasons does the well run dry? [check all that apply]:

- Spring
- Summer

- Autumn
- Winter

33. Which drinking water source(s) does the community use when the well is non-functional? [Check all that apply.]

    - Other protected well with hand pump
    - Protected well without hand pump
    - Public tap
    - Protected spring
    - Protected karez
    - Unprotected well
    - Unprotected spring
    - Stream/river
    - Lake/dam/pond
    - Community always use this well
    - Other:_____
    - I don't know

34. Do users ever have to queue for more than ten minutes?

    o Always
    o Usually
    o Sometimes
    o Never
    o I don't know

35. While using the well, do you ever have to pause or wait some time for water to come out?

    o No, water is always available
    o Yes, this is a problem that occurs all year round
    o Yes, but this is a problem only in certain seasons

36. Does the community also use other drinking water sources when the well is functional?

    o Yes
    o No [skip to Q37]

    36.1 If yes, why?

    - Well is in an inconvenient location for some or all community members.
    - User costs are too high
    - There are better options available for drinking water
    - Security issues
    - Other (explain)

    36.2 If yes, which other water sources does the community use? [select all that apply]

    - Other protected well with hand pump

- Protected well without hand pump
- Public tap
- Protected spring
- Protected karez
- Unprotected well
- Unprotected spring
- Stream/river
- Lake/dam/pond
- Other:_____

37. Have there been any issues with the color, smell or taste of water drawn from the well?

- YES
- NO [skip to Q38]

37.1 If yes, what were these?

38. Has anyone ever tested the water quality?

- o Yes
- o No [skip to Q39]
- o I don't know
- o

38.1 Who tested the water?

- o NGO
- o MRRD
- o Government health worker
- o UNICEF
- o Community leaders
- o Other
- o Don't know

38.2 How many years ago was the most recent test? [enter the number of years or 999 for don't know]

38.3 Did the test results show the water was safe to drink?

- o Yes [Skip to 39]
- o No
- o Don't know

38.3.1 If no, please explain:

Do you think the water is safe to drink?

- o Yes [skip to 40]
- o No
- o Don't know [skip to 40]

38.3.2 If no, why not?

39. Do members of the community do anything to the water to improve its quality or taste?

- o Yes
- o No [skip to 41]
- o Don't know

40.1 If yes, what methods of treatment are used in the community? (Choose all that apply)

- o boil
- o add bleach/chlorine
- o strain through cloth
- o water filter
- o solar disinfection
- o let it stand and settle
- o other
- o don't know

IV. Financial Factors

40. During the construction of the well, did people from the benefitting households (those using the well) participate in any of the following ways? (Tick all that apply)

- Contribute cash
  - o Average amount of cash (in Afs) contributed per household? [enter '999' for 'don't know']
  - o What percentage of user households contributed cash? [enter '999' for 'don't know']
- Contribute labor
  - o Average amount of labor (in days) contributed per household? [enter '999' for 'don't know']
  - o What percentage of user households contributed labor? [enter '999' for don't know]
- Contribute construction materials
  - o What percentage of user households contributed construction materials? [enter '999' for 'don't know']
- Other contribution [describe]

41. Do water users usually cover the cost of repairs?

- o Yes – through a general community fund held by the CDC
- o Yes – through a special fund or collection especially for well repairs
- o No – An individual in the community covers the cost of any repairs [skip to 46]
- o No – NGO covers the cost of any repairs [skip to 46]
- o No – Government covers the cost of any repairs [skip to 46]
- o Other [Describe:] [skip to 46]
- o No repairs have ever been made [skip to 46]

42.1 How often do households give money for the fund?

- o Each week
  How many Afs per week do they pay?
- o Each month
  How many Afs per month do they pay?
- o Each year
  How many Afs per year do they pay?
- o Each bucket
  How many Afs per bucket do they pay?
- o Only when the well needs repairs
- o I don't know

42.2 The last time the well was repaired, was there enough money already saved to pay for repairs?

- YES [skip to 42.3]
- NO
- Don't know

42.3 How much did each household have to pay at the time of repair?

42.4 How much money is currently saved up by the community to pay for future repairs? [If there is a single CDC fund, include the money in this, if the community has no savings, enter '0', if don't know, enter '999']

____ Afghanis

42.5 What proportion of households actually pay what has been agreed?

- o 75-100% of households
- o 50-75% of households
- o 25-50% of households
- o 0-25% of households
- o Don't know

42.6 Are there any consequences for not paying?

- o YES
  If yes, describe consequences:
- o NO
- o Don't know

43. In general, can people in the community afford to pay for repairs?

- o YES

- o NO

- o I don't know

44. Who usually buys spare parts when needed?

- o Caretaker
- o Area mechanic
- o Other community member
- o NGO provides for free
- o Local government provides for free
- o Other:_____
- o Don't know

45. How many kilometers away is the nearest location for spare parts? [enter '999' for 'don't know]

____ kms

46. Are spare parts available from this location when needed?

- o Always [skip to 49]
- o Often
- o Sometimes
- o Rarely
- o Never
- o Don't know

46.1 If you cannot get spare parts from here, where do you get spare parts?

47. Have you had any problems with the quality of the spare parts used to repair the well?

- o Yes
- o No
- o Don't know

V. Governance Factors: Institutional Capacity and Arrangements

48. Who do you think the well belongs to?

- o The community
- o Individual land owner
- o Local government
- o National government
- o USAID
- o Other:____

49. If there is a CDC or Water User Committee (or equivalent) in place: [otherwise skip to Q50]

49.1 Have committee members received any training? [select all those that apply]

- On technical matters (e.g maintenance and repairs, operation)
- On financial and administrative matters (e.g tariffs, financial management, record keeping)
- On hygiene education
- None
- Don't know

49.2 How many of the committee members are performing their duties?

- o All
- o More than half
- o Less than half
- o None
- o Don't know/not applicable

49.3 How many years ago did the last committee elections take place?

- o Within the last year
- o 1-2 years ago
- o 3-4 years ago
- o 5 or more years ago
- o Never
- o Don't know

49. 4 Does the committee have a bank account?

- o Yes
- o No
- o Don't know

50. Does a trained well mechanic live in this community?

- o Yes [skip to Q51]
- o No
- o Don't know [skip to Q51]

50.1 If no, from where does the community access a mechanic if required?

- Another community
- No known mechanic available in this area [skip to Q51]

50.2 Please estimate the time it takes for a one-way trip (by the mechanic's usual mode of transport) between this community and the location of the mechanic in hours [enter '999' for 'don't know']

51. Is a pump mechanic available when repairs are needed?

- o Always
- o Often
- o Sometimes

- Rarely
- Never
- Don't know

52. Since the completion of construction, has the community or caretaker received any external support (from the government, an NGO, or other organization) to help with the well: [select all that apply]:

- Training or advice on technical issues
- Training or advice on administrative or financial issues
- Free replacement parts
- Free repairs
- No support received
- Other (please describe)
- I don't know

Satisfaction with the well

53. How satisfied are you with the following: [Where 0 is very dissatisfied, 1 is dissatisfied, 2 is neither satisfied nor dissatisfied, 3 is satisfied, and 4 is very satisfied.]

	0	**1**	**2**	**3**	**4**
	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
a) Community involvement at the time of planning and building the well					
b) Reliability of the well					
c) Availability of water from the well					
d) Location of the well					
e) Quality of the well water					
f) Speed of repairs (i.e. how long it takes between the time the well breaks down and the time it gets fixed)					

g) Quality of well repairs

h) Cost of maintaining and repairing the well
i) The management of the well
j) The well's ability to meet local households' water needs

Focus Group Discussion Guide for SWSS Retrospective Sustainability Evaluation

Date:
Time:
Well ID number (as assigned in SWSS database):
Name of village:
Name of district:
Name of province:
Names of FGD facilitators:
GPS Coordinates (use your phone to get coordinates):
Have you recorded this FGD? Yes | No

#	Participant Name	Role in the community (relevant to well)	Age	Phone numbers (to be recorded at the end of the FGD)
1				
2				
3				

1. Introductions

Get people seated in a circle, or in a way so that everyone is facing each other, and it would be easy for people to speak (i.e. not have someone off in a corner, or behind other people). Do your best to create a positive friendly, environment where people can feel relaxed.

Before we get started, we want to introduce ourselves and why we have gathered everyone together today. [Say your names, and that you are working for ATR.]

We would like to thank you for your time and participation. We have been asked to come here by USAID, which funded one (or some) wells in your village. [Specify the exact location of the well in a way that people will understand, and ask people if they know the well you are referring to.] They

want to know how things are going with the well. We would like to learn about your experiences and ideas on the water supply in your community, and get your advice. We will share your ideas with the government, UNICEF and USAID as they install wells in other communities, to make sure that they meet people's needs. As we know, water is an important topic and we look forward to hearing what you have to say.

This discussion will take about one and a half hours. We would like to hear from everybody here, and we respect everybody's experiences and opinions. We will be taking notes.

2. Basics re. the well and the participants' knowledge/relation to it

Can we now ask each of you to introduce yourself with your name, and also if you know about the well, and if you and your household use it regularly. Please also mention if you are on any official committee or shura related to the well or to other village matters.

[screen and get permission]

3. Background on the installation process and related activities

1. Now this is a question to anyone who happens to remember. Do you remember when the well was installed?

Write number of people who say they remember:

Write when it was installed (how many years ago):

2. Who installed the well?

3. When the people came to install the well, who did they talk to about it in the village?
   Prompts: Did they talk to men and women, or to men only? Do you think they talked to enough people? Why or why not? Do you think they talked to the right people? Why or why not?

4. Did the people installing the well include community members in making decisions about the well? If so, what decisions did community members make about the well?
   Prompts: Did community members choose the location of the well? How to pay for maintaining the well? How to manage the well? Did they select water user committee members? Did they select a caretaker? Anything else?
5. At the time the well was put in, what other related activities happened?
   Prompts: For example, were there any activities related to hygiene, safe water storage, or sanitation? Can you please describe these? Were these activities useful? [prompt as possible, if one person answers, you can prompt the rest of the group to see if they agree or have anything else to add]

6. Overall, do you think that the people of the community were involved enough in the process of putting in the well so that they were ready to take care of it?

Prompts: Was it a good process? Why or why not? If not, what else should they have done, or what should they have done differently? What advice would you give to people introducing wells into another community?

4. Overall Perspectives on the Well

1. Now you have had the well for some time. Overall, how is it working? What is working well, and what isn't working well?
2. Has anything changed (negatively or positively) in your community since the well was installed?
   Prompt for details as necessary: Are there changes in people's health? Are there changes in children's health? Are children suffering from diarrhea less? Are there any changes in who collects the water? Are there any changes in agriculture practices? Are there any social changes between men and women? Any other changes?
3. Is everyone in the community able to get enough water to meet their needs from this well?

5. Technical Factors

1. How often does the well break down?
2. If the well is currently broken, why hasn't it been repaired?
3. When the well breaks down, from where do you get water? Is the alternate water safe? If not, do you treat it?

6. Governance Factors

1. Who is in charge of managing the well? [Can explain, managing the well includes making decisions and rules about things like who can use the water, how much they can take, when they can take it, what they can use it for, who should look after the well, and how to pay for repairs]
2. How were these people chosen to manage the well?
3. Are the people in charge of managing the well ever changed? If so, how often? Why were they changed?
4. Is the current system of managing the well working? Why or why not?
5. Are women involved in making any decisions about managing and using water? Please explain. Do you think they should be involved more than they are now?
6. Is there ever conflict in the community over this well? If so, what causes the conflict? How does the community resolve it?

7. Financial Factors

1. How does the community pay for the well when it needs to be repaired or maintained?
2. Does the current way of paying for the well work? Why or why not?
3. Are you happy with the way costs for the well are handled? Why or why not?

8. Social/Behavioral Factors

1. Who brings water in your household? Men? Women? Girls? Boys? Is it always the same person? Why is it these people who bring the water?

2. Do these people always bring water from the well, or do they ever use other sources? If they use other sources, where do they get their water, and why?
3. Is the well in a good location for everyone? Why or why not?

9. Environmental Factors

1. About how many average sized buckets/cans (10 litres) of water does your household take from the well each day?
   [ask this question for each person in the circle]
   Follow up question: Is this enough to meet your household's needs?
2. Do you have problems with your well drying up, or providing less water at certain times of the year? If so, what times of year?
3. Are you happy with the quality of the water from the well? [*Prompt: If needed, you can ask about the color, smell and taste of the water.*]
4. Do you think the water is safe to drink? Why or why not?

10. Final Comments

1. We've now reached the end of our questions. Thank you very much to all of you for taking the time and sharing your ideas. This has been a very interesting discussion. Are there any final comments or pieces of advice that anyone would like to add?
   [After listening to and noting any last comments, again thank the participants.]

SWSS Retrospective Sustainability Evaluation

Interview Guide: National Key Informants

Background & introduction:

We're conducting a study on what factors are most important to sustaining community wells as viable, safe water sources in rural areas of Afghanistan. We are looking particularly at wells that were implemented by the USAID-funded Sustainable Water Supply and Sanitation project (SWSS), from 2009-2012, but we hope the findings will have broader applicability. We are also interested in learning from the experiences of other agencies and projects, which is why we have come to talk to you today.

Date:

Interviewee's name:

Position:

Organization:

Telephone #:

Email:

A. General background and links to other actors

1. Can you tell us a bit about your organization's work with water supply/wells?
2. Which parts of Afghanistan do you work in?
3. Were you or any of your staff working in this area at the time of the SWSS project? If so, did you hear of the SWSS project or have any interactions with it?
4. If so, what were your impressions of the SWSS project?
5. Are you able to compare how the SWSS project approached well installation and community engagement with your own organization's approach? Any comments on the effectiveness of the SWSS approach, apparent strengths and weaknesses?
6. Overall, how well coordinated is work in this area across different agencies?
7. How much do MRRD policies guide/inform your work? In your opinion, are these policies effective?

B. Sustainability factors

Most recent data suggest that about 60% of wells in Afghanistan are in operation at any one time (not accounting for the quality of the water). We're interested in learning more about your experiences with the factors that impact why some communities are able to maintain their wells and others are not.

8. In your experience, what are the most important factors influencing whether or not a community is able to maintain a safe water supply? How do you know this?

In the literature, there are five key areas that are considered in terms of water supply sustainability and safety, so I want to ask you specifically about each of these:

Technical

9. In your experience, how widespread are problems with improper well construction or hand pump installation in Afghanistan? Are efforts to avoid these problems adequate? What best practices would you recommend?
10. In your experience, how widespread are problems with the availability and/or quality of spare parts for wells? How important are these problems to the overall sustainability of drinking water supply? Do you have any advice or insights on how to address these problems?
11. In your experience, how widespread are problems with the availability and/or capacity of pump mechanics? How important are these problems to the overall sustainability of drinking water supply? Do you have any advice or insights on how to address these problems?
12. Are there any other technical problems related to the sustainability of community wells that you feel require greater recognition? Please explain.

Environmental

13. How much does the availability of groundwater/depth of water table affect well sustainability in your opinion? What are the main strategies for managing/mitigating physical limitations on groundwater supplies? Are these adequate in your opinion?
14. How much of a challenge has sourcing and maintaining sources of potable water been? What are the main natural factors causing problems here? (e.g. salinity, Ph levels, presence of dangerous minerals in water etc.) What are the main strategies for managing/mitigating issues with source water quality? Are these adequate in your opinion?

Financial

15. In practice, how much have financial arrangements at the village level impacted well sustainability in your experience? What specific aspects of financing have been most prone to cause problems? (e.g. conflict over financial management, high costs, misappropriation of funds, etc.)
16. What financial arrangement models have worked best for repairing and maintaining wells?
    a. Are these currently reflected in national policies?
    b. How widespread are these in practice? If they are not widespread, what are the limiting factors in their uptake?

Governance

17. In practice, how much have financial arrangements at the village level impacted well sustainability in your experience? What specific aspects of financing have been most prone to cause problems? (e.g. conflict over financial management, high costs, misappropriation of funds, etc.)
18. What governance arrangement models have worked best for repairing and maintaining wells?
    c. Are these currently reflected in national policies?
    d. How widespread are these in practice? If they are not widespread, what are the limiting factors in their uptake?
19. Has the sense of community ownership been an important factor in sustaining wells in your

experience? If so, how would you assess the absence or presence of community ownership towards a well? What specific practices have you found lead to a healthy sense of community ownership?

Social

20. In your experience, what social factors at the village level are most relevant in terms of maintaining community wells?

C. Other resources

21. Do you have any evaluations, research studies or other reports related to this topic that you could share with us?
22. Is there anyone else you recommend we talk with about this?
23. Any other comments?

Thank you!

ANNEX IV: LIST OF KEY DOCUMENTS REVIEWED

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ANNEX V: LIST OF WELL SITES SURVEYED

Table 16: LIST OF WELL SITES SURVEYED

Well ID (From SWSS Mobile data)	Province	District	Village	Well located?	CLTS site?
8	Khost	Nadirshahkot	Kaprai	Yes	No
9	Khost	Nadirshahkot	Kaprai	Yes	No
10	Khost	Nadirshahkot	Kaprai	Yes	No
14	Khost	Nadirshahkot	Kaprai	Yes	No
16	Khost	Nadirshahkot	Kaprai	Yes	No
23	Khost	Nadirshahkot	Kaprai	Yes	No
25	Logar	Pulialam	Sarwan khil	Yes	No
28	Logar	Pulialam	Sarwan khil	Yes	No
30	Logar	Pulialam	Sarwan khil	Yes	No
31	Logar	Pulialam	Sarwan khil	Yes	No
35	Logar	Pulialam		Yes	No
38	Logar	Pulialam		Yes	No
39	Logar	Pulialam	Bar Noor khil	Yes	No
40	Logar	Pulialam	Bar Noor khil	Yes	No
45	Logar	Pulialam	Bar Noor khil	Yes	No
49	Laghman	Qarghaee	Koz Kharoti	Yes	No
51	Laghman	Qarghaee	Mula Saheb Kelai	Yes	No
53	Laghman	Qarghaee	Amin Abad	Yes	No
54	Laghman	Qarghaee	Bela-I-Fatehullah	Yes	No
58	Laghman	Qarghaee	Mia Banda	Yes	No
59	Laghman	Qarghaee	Bela-I-Fatehullah	Yes	No

60	Laghman	Qarghaee	Bela-I-Fatehullah	Yes	No
62	Laghman	Qarghaee	Koz Kharoti	Yes	No
64	Laghman	Qarghaee	Miraka Qala	Yes	Yes
65	Laghman	Qarghaee	Miraka Qala	Yes	No
67	Laghman	Qarghaee	Mia Qala	Yes	No
69	Laghman	Qarghaee	Kanda Ghar	Yes	No
72	Laghman	Qarghaee	Amin Abad	Yes	No
74	Laghman	Qarghaee	Bela-I-Fatehullah	Yes	No
79	Laghman	Qarghaee	Amin Abad	Yes	No
85	Laghman	Qarghaee	Miraka Qala	Yes	Yes
86	Laghman	Qarghaee	Miraka Qala	Yes	No
87	Laghman	Qarghaee	Mula Saheb Kelai	Yes	No
90	Laghman	Qarghaee	Kanda Ghar	Yes	No
92	Laghman	Qarghaee	Kanda Ghar	Yes	No
93	Laghman	Qarghaee	Kanda Ghar	Yes	No
95	Laghman	Qarghaee	Kanda Ghar	Yes	No
98	Laghman	Qarghaee	Kanda Ghar	Yes	No
99	Laghman	Qarghaee	Amin Abad	Yes	No
102	Laghman	Qarghaee	Amin Abad	Yes	No
103	Laghman	Qarghaee	Kanda Ghar	Yes	No
104	Laghman	Qarghaee	Amin Abad	Yes	No
105	Laghman	Qarghaee	Amin Abad	Yes	No
106	Laghman	Qarghaee	Kanda Ghar	Yes	No

107	Laghman	Qarghaee	Kanda Ghar	Yes	No
110	Laghman	Qarghaee	Mansoor Abad	Yes	No
111	Laghman	Qarghaee	Mansoor Abad	Yes	No
112	Laghman	Qarghaee	Mansoor Abad	Yes	No
113	Laghman	Qarghaee	Mansoor Abad	Yes	No
114	Laghman	Qarghaee	Mansoor Abad	Yes	No
115	Laghman	Qarghaee	Mansoor Abad	Yes	No
118	Laghman	Qarghaee	Surkhabe	Yes	Yes
119	Laghman	Qarghaee	Surkhabe	Yes	No
121	Laghman	Qarghaee	Surkhabe	Yes	Yes
122	Laghman	Qarghaee	Qotub khil	Yes	No
123	Laghman	Qarghaee	Qotub khil	Yes	No
127	Laghman	Qarghaee	Bar Zerani	Yes	No
128	Laghman	Qarghaee	Koz Zerani	Yes	No
135	Laghman	Qarghaee	Bar Zerani	Yes	No
136	Laghman	Qarghaee	Bar Zerani	Yes	No
137	Laghman	Qarghaee	Koz Zerani	Yes	No
139	Laghman	Qarghaee	Bar Zerani	Yes	No
141	Kunar	Nurgal	Mia Qala	Yes	No
144	Kunar	Nurgal	Pattan	Yes	No
146	Kunar	Nurgal	Pattan	Yes	No
147	Kunar	Nurgal	Pattan	Yes	No
149	Kunar	Nurgal	Pattan	Yes	No
151	Kunar	Nurgal	Pattan	Yes	No
152	Kunar	Nurgal	Pattan	Yes	No
155	Kunar	Nurgal	Pattan	Yes	No

156	Kunar	Nurgal	Pattan	Yes	No
157	Kunar	Nurgal	Pattan	Yes	No
158	Kunar	Nurgal	Pattan	Yes	No
159	Kunar	Nurgal	Pattan	Yes	No
160	Kunar	Nurgal	Mia Qala	Yes	No
161	Kunar	Nurgal	Mia Qala	Yes	No
163	Kunar	Nurgal	Mia Qala	Yes	No
164	Kunar	Nurgal	Pattan	Yes	No
166	Paktia	Gardez	Kala Payan	Yes	No
167	Paktia	Gardez	Zargar	Yes	No
172	Paktia	Gardez	Qala Bala	Yes	No
175	Paktia	Gardez	Ahmadi	Yes	No
176	Paktia	Gardez	Kala Payan	Yes	No
179	Paktia	Gardez	Baba I Ahmadi	Yes	No
181	Paktia	Gardez	Deldar	Yes	No
190	Paktia	Gardez	Kala Bala	Yes	No
194	Paktia	Gardez	Kala Ma-Byeen	Yes	No
197	Paktia	Gardez	Nazeer Din Kala	Yes	No
198	Paktia	Gardez	Nazeer Din Kala	Yes	No
199	Paktia	Gardez	Rahe-Melan	Yes	No
201	Paktia	Gardez	Rahe-Melan	Yes	No
203	Paktia	Gardez	Mamray kala bala	Yes	No
256	Nangarhar	Khewa	Yasin Kali	Yes	No
259	Nangarhar	Khewa	Yasin Kali	Yes	No

260	Nangarhar	Khewa	Yasin Kali	Yes	No
262	Nangarhar	Khewa	Emal Khil	Yes	No
263	Nangarhar	Khewa	Lamatak	Yes	No
264	Nangarhar	Khewa	Lamatak	Yes	No
265	Nangarhar	Khewa	Palwari	Yes	No
270	Nangarhar	Khewa	Palwari	Yes	No
271	Nangarhar	Khewa	Qazian	Yes	No
272	Nangarhar	Khewa	Emal Khil	Yes	No
273	Nangarhar	Khewa	Abarzi	Yes	No
275	Nangarhar	Khewa	Lamatak	Yes	No
277	Nangarhar	Khewa	Emal Khil	Yes	No
278	Nangarhar	Khewa	Abarzi	Yes	No
281	Nangarhar	Khewa	Palwari	Yes	No
282	Nangarhar	Khewa	Yasin Kali	Yes	No
283	Nangarhar	Khewa	Yasin Kali	Yes	No
284	Nangarhar	Khewa	Sayed Khil	Yes	No
285	Nangarhar	Khewa	Yasin Kali	Yes	No
287	Nangarhar	Khewa	Shikhan	Yes	No
289	Nangarhar	Khewa	Abarzi	Yes	No
290	Nangarhar	Khewa	Abarzi	Yes	No
291	Nangarhar	Khewa	Emal Khil	Yes	No
293	Nangarhar	Khewa	Abarzi	Yes	No
294	Nangarhar	Khewa	Malakan	Yes	No
295	Nangarhar	Khewa	Sayed Khil	Yes	No
296	Nangarhar	Khewa	Sayed Khil	Yes	No
297	Nangarhar	Khewa	Sayed Khil	Yes	No
298	Nangarhar	Khewa	Qazian	Yes	No

299	Nangarhar	Khewa	Palwari	Yes	No
300	Nangarhar	Khewa	Malakan	Yes	No
301	Nangarhar	Khewa	Malakan	Yes	No
302	Nangarhar	Khewa	Palwari	Yes	No
303	Nangarhar	Khewa	Sayed Khil	Yes	No
305	Nangarhar	Khewa	Sayed Khil	Yes	No
306	Nangarhar	Khewa	Abarzi	Yes	No
308	Nangarhar	Khewa	Abarzi	Yes	No
309	Nangarhar	Khewa	Palwari	Yes	No
310	Nangarhar	Khewa	Lamatak	Yes	No
311	Nangarhar	Khewa	Lamatak	Yes	No
312	Nangarhar	Khewa	Qazian	Yes	No
313	Nangarhar	Khewa	Lamatak	Yes	No
314	Nangarhar	Khewa	Abarzi	Yes	No
315	Nangarhar	Khewa	Abarzi	Yes	No
324	Nangarhar	Shinwar	Haji Askar	Yes	No
325	Nangarhar	Shinwar	Haji Askar	Yes	No
327	Nangarhar	Shinwar	Bander Kali	Yes	No
329	Nangarhar	Shinwar	Mir Kali	Yes	No
331	Nangarhar	Shinwar	Bahram Kali	Yes	No
335	Nangarhar	Shinwar	Safder Mushara	Yes	No
337	Nangarhar	Shinwar	Din mohammad	Yes	No
338	Nangarhar	Shinwar	Din Mohammad	Yes	No
384	Parwan	Surkhparsa	Alikhani	Yes	No
395	Parwan	Surkhparsa	Alikhani	Yes	No
396	Parwan	Shinwari	Tai Qala	Yes	No
398	Parwan	Shinwari	Malik kheil	Yes	No

399	Parwan	Shinwari	Tai Qala	Yes	No
401	Parwan	Shinwari	Tai Qala	Yes	No
404	Parwan	Shinwari	Tai Qala	Yes	No
407	Parwan	Shinwari	Malik kheil	Yes	No
412	Parwan	Shinwari	Olang	Yes	No
413	Parwan	Shinwari	Dahane Shiwa	Yes	No
416	Parwan	Shinwari	Khoshkak	Yes	No
417	Parwan	Shinwari	Khoshkak	Yes	No
419	Parwan	Shinwari	Kajakan Bala	Yes	No
427	Parwan	Shinwari	Kajakan Paeen	Yes	No
428	Parwan	Shinwari	Kajakan Paeen	Yes	No
433	Nangarhar	Surkhroad	Haji Sahiban	Yes	No
435	Nangarhar	Surkhroad	Haji Sahiban	Yes	No
436	Nangarhar	Surkhroad	Haji Sahiban	Yes	No
437	Nangarhar	Surkhroad	Center Fatheh Abad	Yes	No
438	Nangarhar	Surkhroad	Markaz Fateh Abad	Yes	No
440	Nangarhar	Surkhroad	Fateh Abad shikhani	Yes	No
441	Nangarhar	Surkhroad	Shikhani	Yes	No
443	Nangarhar	Surkhroad	Shikhani	Yes	No
444	Nangarhar	Surkhroad	Shikhani	Yes	No
445	Nangarhar	Surkhroad	Shikhani	Yes	No
447	Nangarhar	Surkhroad	Go Zara	Yes	No
448	Nangarhar	Surkhroad	Go Zara	Yes	No
449	Nangarhar	Surkhroad	Go Zara	Yes	No
450	Nangarhar	Surkhroad	Didwan Bayan	Yes	No
451	Nangarhar	Surkhroad	Didawan	Yes	No

452	Nangarhar	Surkhroad	Dedawani Bala	Yes	No
454	Nangarhar	Surkhroad	Dashtak	Yes	No
455	Nangarhar	Surkhroad	Dashtak	Yes	No
456	Nangarhar	Surkhroad	Tranan	Yes	No
457	Nangarhar	Surkhroad	Tranan	Yes	No
458	Nangarhar	Surkhroad	Tranan	Yes	No
459	Nangarhar	Surkhroad	Tranan	Yes	No
460	Nangarhar	Surkhroad	Tranan	Yes	No
461	Nangarhar	Surkhroad	Tranan	Yes	No
462	Nangarhar	Surkhroad	Bagh Attak	Yes	No
464	Nangarhar	Surkhroad	Bagh Attak	Yes	No
465	Nangarhar	Surkhroad	Fateh Abad Dobandi	Yes	No
466	Nangarhar	Surkhroad	Fateh Abad Dobandi	Yes	No
467	Nangarhar	Surkhroad	Go Zara	Yes	No
468	Nangarhar	Surkhroad	Go Zara	Yes	No
469	Nangarhar	Surkhroad	Sad Toba	Yes	No
470	Nangarhar	Surkhroad	Sad Toba	Yes	No
471	Nangarhar	Surkhroad	Sad Toba	Yes	No
472	Nangarhar	Surkhroad	Qrutak	Yes	No
473	Nangarhar	Surkhroad	Dashtak	Yes	No
474	Nangarhar	Surkhroad	Dashtak	Yes	No
475	Nangarhar	Surkhroad	Sad Toba	Yes	No
476	Nangarhar	Surkhroad	Haji Sahiban	Yes	No
479	Nangarhar	Surkhroad	Go Zara	Yes	No
480	Nangarhar	Surkhroad	Go Zara	Yes	No
482	Nangarhar	Surkhroad	Fatih Abad Qala	Yes	No

484	Nangarhar	Surkhroad	Go Zara	Yes	No
487	Nangarhar	Surkhroad	Char Bagh	Yes	No
488	Nangarhar	Surkhroad	Char Bagh	Yes	No
489	Nangarhar	Surkhroad	Char Bagh	Yes	No
490	Nangarhar	Surkhroad	Char Bagh	Yes	No
491	Nangarhar	Surkhroad	Char Bagh	Yes	No
492	Nangarhar	Surkhroad	Char Bagh	Yes	No
493	Nangarhar	Surkhroad	Char Bagh	Yes	No
494	Nangarhar	Surkhroad	Kuz Sultan poor	Yes	No
495	Nangarhar	Surkhroad	Kuz Sultan poor	Yes	No
496	Nangarhar	Surkhroad	Kuz Sultan poor	Yes	No
497	Nangarhar	Surkhroad	Kuz Sultan poor	Yes	No
498	Nangarhar	Surkhroad	Azim Khan Banda	Yes	No
501	Nangarhar	Surkhroad	Jamal Qala	Yes	No
502	Nangarhar	Surkhroad	Jamal Qala	Yes	No
503	Nangarhar	Surkhroad	Jamal Qala	Yes	No
504	Nangarhar	Surkhroad	Jamal Qala	Yes	No
505	Nangarhar	Surkhroad	Jamal Qala	Yes	No
506	Nangarhar	Surkhroad	Jamal Qala	Yes	No
507	Nangarhar	Surkhroad	Azim Khan Banda	Yes	No
508	Nangarhar	Surkhroad	Azim Khan Banda	Yes	No
509	Nangarhar	Surkhroad	Azim Khan Banda	Yes	No
510	Nangarhar	Surkhroad	Azim Khan Banda	Yes	No
512	Nangarhar	Surkhroad	Narinj Bagh	Yes	No
513	Nangarhar	Surkhroad	Kuz Sultan poor	Yes	No
514	Nangarhar	Surkhroad	Dand I Barakat Khan	Yes	No

518	Nangarhar	Surkhroad	Jamal Qala	Yes	No
519	Nangarhar	Surkhroad	Jamal Qala	Yes	No
520	Nangarhar	Surkhroad	Jamal Qala	Yes	No
521	Nangarhar	Surkhroad	Jamal Qala	Yes	No
522	Nangarhar	Surkhroad	Jamal Qala	Yes	No
523	Nangarhar	Surkhroad	Azim Khan Banda	Yes	No
524	Nangarhar	Surkhroad	Tatang Qalae shahi	Yes	No
525	Nangarhar	Surkhroad	Tatang Qalae shahi	Yes	No
526	Nangarhar	Surkhroad	Tatang Qalae shahi	Yes	No
527	Nangarhar	Surkhroad	Tatang Qalae shahi	Yes	No
528	Nangarhar	Surkhroad	Jamal Qala	Yes	No
529	Nangarhar	Surkhroad	Dand I Barakat Khan	Yes	No
530	Nangarhar	Surkhroad	Shamsha poor Bayazid	Yes	No
531	Nangarhar	Surkhroad	Bazid Khil	Yes	No
535	Nangarhar	Surkhroad	Adam Khil	Yes	No
544	Logar	Barkibarak	Nayeb Khail	Yes	No
546	Logar	Barkibarak	Nayeb Khail	Yes	No
549	Logar	Barkibarak	Nayeb Khail	Yes	No
552	Logar	Barkibarak	Panj Pai	Yes	No
555	Logar	Barkibarak	Panj Pai	Yes	No
556	Logar	Barkibarak	Panj Pai	Yes	No
559	Logar	Barkibarak	Padkhwab	Yes	Yes
563	Logar	Barkibarak	Padkhwab	Yes	Yes
567	Logar	Barkibarak	Padkhwab	Yes	Yes
568	Logar	Barkibarak	Babori	Yes	No

569	Logar	Barkibarak	Babori	Yes	No
570	Logar	Barkibarak	Babori	Yes	No
573	Logar	Barkibarak	Babori	Yes	No
575	Logar	Barkibarak	Kashmiry Bala	Yes	No
578	Logar	Barkibarak	Kashmiry Bala	Yes	No
579	Logar	Barkibarak	Kashmiry Bala	Yes	No
581	Logar	Barkibarak	Kashmiry Bala	Yes	No
586	Logar	Barkibarak	Mohmand Chalozi	Yes	No
588	Logar	Barkibarak	Qala I Taqi	Yes	No
593	Logar	Barkibarak	Kashmiry Payan	Yes	No
594	Logar	Barkibarak	Kashmiry Payan	Yes	No
596	Logar	Barkibarak	Qala I Noorullah	Yes	No
598	Logar	Barkibarak	Deh Mughlan	Yes	No
600	Logar	Barkibarak	Deh Mughlan	Yes	No
601	Logar	Barkibarak	Deh Mughlan	Yes	No
604	Logar	Barkibarak	Mohmand Chalozi	Yes	No
606	Logar	Barkibarak	Mohmand Chalozi	Yes	No
607	Logar	Barkibarak	Ghazi Mohammad Azam	Yes	No
609	Logar	Barkibarak	Ghazi Mohammad Azam	Yes	No
741	Logar	Barkibarak	Sahibzadah	Yes	No
743	Logar	Barkibarak	Sahibzadah	Yes	No
744	Logar	Barkibarak	Sahibzadah	Yes	No
745	Logar	Barkibarak	Sahibzadah	Yes	No
747	Logar	Barkibarak	Bawoo	Yes	No
749	Logar	Barkibarak	Masoom Shah	Yes	No
756	Logar	Barkibarak	Qala Jaber	Yes	No

761	Logar	Barkibarak	Qala I Abas	Yes	No
762	Logar	Barkibarak	Qala I Abas	Yes	No
765	Logar	Barkibarak	Qala I Abas	Yes	No
771	Logar	Barkibarak	Uzbak Khil	Yes	No
773	Logar	Barkibarak	Rustam Khail	Yes	No
775	Logar	Barkibarak	Mohmand Chalozi	Yes	No
778	Logar	Barkibarak	Ghazi Mohammad Azam	Yes	No
779	Logar	Barkibarak	Mohmand Chalozi	Yes	No
780	Logar	Barkibarak	Mohmand Chalozi	Yes	No
781	Logar	Barkibarak	Kotub Khail	Yes	No
784	Logar	Barkibarak	Kotub Khail	Yes	No
791	Logar	Barkibarak	Qala I Nakam	Yes	No
793	Logar	Barkibarak	Sar Sang Deh Mughlan	Yes	No
794	Nangarhar	Shinwar	Katli	Yes	No
797	Nangarhar	Shinwar	Kala Katli	Yes	No
801	Nangarhar	Shinwar	Lagadi	Yes	No
803	Nangarhar	Shinwar	Lokhiwal	Yes	No
809	Nangarhar	Shinwar	Aka Lamasi	Yes	No
810	Nangarhar	Shinwar	Aka Lamasi	Yes	No
814	Nangarhar	Shinwar	Katli	Yes	No
817	Nangarhar	Shinwar	Kachai	Yes	No
818	Nangarhar	Shinwar	Kachai	Yes	No
819	Nangarhar	Shinwar	Kachi	Yes	No
820	Nangarhar	Shinwar	Kachai	Yes	No
822	Nangarhar	Shinwar	Kachai	Yes	No

823	Nangarhar	Shinwar	Kachi	Yes	No
825	Nangarhar	Shinwar	Kachi	Yes	No
826	Nangarhar	Shinwar	Kachai	Yes	No
827	Nangarhar	Shinwar	Kachai	Yes	No
828	Nangarhar	Shinwar	Kachai	Yes	No
832	Nangarhar	Shinwar	Choni	Yes	No
834	Nangarhar	Shinwar	Chamni	Yes	No
835	Nangarhar	Shinwar	Malekana	Yes	No
836	Nangarhar	Shinwar	Malekana	Yes	No
837	Nangarhar	Shinwar	Malekana	Yes	No
841	Nangarhar	Shinwar	Malekana	Yes	No
842	Nangarhar	Shinwar	Malekana	Yes	No
843	Nangarhar	Shinwar	Shirgar Malikana Baghcha	Yes	No
845	Nangarhar	Shinwar	Char soo	Yes	No
846	Nangarhar	Shinwar	Charsoo	Yes	No
847	Nangarhar	Shinwar	Char soo	Yes	No
849	Nangarhar	Shinwar	Miagano kili	Yes	No
850	Nangarhar	Shinwar	Miagan	Yes	No
851	Nangarhar	Shinwar	Miagano kili	Yes	No
853	Nangarhar	Shinwar	Miagano kili	Yes	No
854	Nangarhar	Shinwar	Miagano kili	Yes	No
855	Nangarhar	Shinwar	Haje Raja	Yes	No
858	Nangarhar	Shinwar	KhaNo khil	Yes	No
859	Nangarhar	Shinwar	Khano khil	Yes	No
861	Nangarhar	Shinwar	KhaNo khil	Yes	No
862	Nangarhar	Shinwar	KhaNo khil	Yes	No

864	Nangarhar	Shinwar	Shirgar Concarjomat	Yes	No
868	Nangarhar	Shinwar	Kankar I Jomat	Yes	No
917	Nangarhar	Shinwar	Anar Bagh	Yes	No
918	Nangarhar	Shinwar	Anar Bagh	Yes	No
1053	Nangarhar	Chaparhar	Zarikhail	Yes	No
1058	Nangarhar	Chaparhar	Zarikhail	Yes	No
1059	Ghor	Lalwsarjangal	Allaw Dall	Yes	No
1061	Ghor	Lalwsarjangal	ShareNow Paien	Yes	No
1063	Ghor	Lalwsarjangal	ShareNow Tapa Bala	Yes	No
1064	Ghor	Lalwsarjangal	ShareNow Paien	Yes	No
1067	Ghor	Lalwsarjangal	Saqawa	Yes	No
1068	Ghor	Lalwsarjangal	Assad Abad	Yes	No
1076	Ghor	Chaghcharan	Rigiha	Yes	No
1083	Ghor	Chaghcharan	Jar khush ka	Yes	No
1088	Ghor	Chaghcharan	Kashi	Yes	No
1097	Ghor	Chaghcharan	khashkak safla	Yes	No
1098	Ghor	Chaghcharan	khashkak safla	Yes	No
1104	Ghor	Dawlat	Gul murad	Yes	No
1105	Ghor	Dawlat	Awlad khuja	Yes	No
1110	Ghor	Dawlat	Abdul Qaum	Yes	No
1112	Ghor	Chaghcharan	Jahrak Chapari	Yes	No
1114	Ghor	Chaghcharan	Kotal Chapari	Yes	No
1119	Ghor	Chaghcharan	Sultan Yari	Yes	No
1120	Ghor	Chaghcharan	Jahr Khoshkak	Yes	No
1125	Kapisa	Nijrab	Loqa zan	Yes	No
1126	Kapisa	Nijrab	Toghak	Yes	No
1130	Kapisa	Nijrab	Toghak	Yes	No

1132	Kapisa	Nijrab	Qalacha Bala	Yes	No
1133	Kapisa	Nijrab	Qala I Ghani	Yes	No
1138	Kapisa	Nijrab	Konj I Shikhani	Yes	No
1140	Kapisa	Nijrab	Konji Shikhani	Yes	No
1145	Kapisa	Nijrab	Ghondi Qala I khanjer	Yes	No
1153	Kapisa	Nijrab	Faqir khil	Yes	No
1154	Kapisa	Nijrab	Bikh ziyarat	Yes	No
1155	Kapisa	Nijrab	Arbab khil	Yes	No
1161	Kapisa	Nijrab	Shar I now	Yes	No
1169	Kapisa	Nijrab	Ziyarat Tangi	Yes	No
1174	Kapisa	Nijrab	Zar Shoi	Yes	No
1177	Kapisa	Nijrab	Bazar	Yes	No
1184	Kapisa	Nijrab	Tai e chinar	Yes	No
1190	Kapisa	Nijrab	Meyanadeh	Yes	No
1192	Kapisa	Nijrab	Shirwani Ulya	Yes	No
1244	Laghman	Mehtarlam	Haidar Khani	Yes	No
1245	Laghman	Mehtarlam	Haidar Khani	Yes	No
1247	Laghman	Mehtarlam	Haider Khani	Yes	No
1249	Laghman	Mehtarlam	Haider Khani	Yes	No
1250	Laghman	Mehtarlam	Haidar Khani	Yes	No
1266	Laghman	Mehtarlam	Haidar Khani	Yes	No
1271	Kunar	Nurgal	Nim Kalay	Yes	No
1273	Bamyan	Bamyan	Mamorak	Yes	No
1274	Bamyan	Bamyan	Dara Bariki	Yes	No
1277	Bamyan	Shahidan	Dare Bariki	Yes	No

1441	Bamyan	Bamyan	Khowja Hasan	Yes	No
1442	Bamyan	Bamyan	Khowja Hasan	Yes	No
1446	Bamyan	Bamyan	Tol Gul Mohammad	Yes	No
1448	Bamyan	Bamyan	Qadam Shah	Yes	No
1574	Bamyan	Bamyan	Naser Abad Paeen	Yes	No
1576	Bamyan	Bamyan	Tol Daroo	Yes	No
1590	Farah	Shibkoh	Mian Deh	Yes	No
1592	Farah	Shibkoh	Mian Deh	Yes	No
1594	Farah	Shibkoh	Mian Deh	Yes	No
1598	Farah	Shibkoh	Gharbi - Sufla	Yes	No
1599	Farah	Shibkoh	Gharbi - Sufla	Yes	No
1600	Farah	Shibkoh	Gharbi - Sufla	Yes	No
1601	Farah	Shibkoh	Suflai Markazi	Yes	No
1604	Farah	Shibkoh	Suflai Markazi	Yes	No
1609	Farah	Shibkoh	Sufla I Jonobi	Yes	No
1611	Farah	Shibkoh	Sufla I Jonobi	Yes	No
1614	Farah	Shibkoh	Ulya Bala	Yes	No
1625	Farah	Shibkoh	Bala Dah	Yes	No
1626	Farah	Shibkoh	Ulya Shar	Yes	No
1629	Farah	Shibkoh	Bala Dah	Yes	No
1633	Farah	Shibkoh	Mashraq Dah	Yes	No
1640	Farah	Shibkoh	Gharb Dah	Yes	No
1649	Farah	Shibkoh	Keen Gharb wa Sharq	Yes	No
1706	Paktia	Gardez	Sara kala	Yes	No
1715	Paktia	Gardez	Mehlan	Yes	No

1716	Paktia	Gardez	Mehlan	Yes	No
1717	Paktia	Gardez	Mehlan	Yes	No
1720	Paktia	Gardez	Barghandian	Yes	No
1721	Paktia	Gardez	Barghandian	Yes	No
1723	Paktia	Gardez		Yes	No
1725	Paktia	Gardez	Norakai	Yes	No
1728	Paktia	Gardez	Norakai	Yes	No
1732	Paktia	Gardez	Ghafor Khil	Yes	No
1733	Paktia	Gardez	Hayat khil	Yes	No
1736	Paktia	Gardez	Tandan	Yes	No
1737	Paktia	Gardez	Lewan	Yes	No
1738	Paktia	Gardez		Yes	No
1740	Paktia	Gardez	Norakai	Yes	No
1742	Paktia	Gardez	SpinaQala	Yes	No
1752	Paktia	Gardez	Lewan	Yes	No
1755	Paktia	Gardez	Mehlan	Yes	No
1759	Paktia	Gardez	Tandan	Yes	No
1768	Paktia	Gardez	Habib kala	Yes	No
1772	Paktia	Gardez	Barghandian	Yes	No
1774	Paktia	Gardez	Barghandian	Yes	No
1778	Paktia	Gardez	Habib kala	Yes	No
1782	Paktia	Gardez	Habib kala	Yes	No
1785	Paktia	Gardez	Pohonton Mena	Yes	No
1794	Paktia	Gardez	Bar Golwal	Yes	No
1796	Paktia	Gardez	Bar Golwal	Yes	No
1799	Paktia	Gardez	Bagh shah azmat qalah	Yes	No

1803	Paktia	Gardez	kuz Gulwal	Yes	No
1804	Paktia	Gardez	kuz Gulwal	Yes	No
1813	Paktia	Gardez	Jar Mushki	Yes	No
1852	Paktia	Gardez	Azmat qalah	Yes	No
1853	Paktia	Gardez	Bar Golwal	Yes	No
1860	Paktia	Gardez	Mianoor Kala	Yes	No
1872	Paktia	Gardez	Qala I Abas	Yes	No
1874	Paktia	Gardez	Afzal Khil	Yes	No
1875	Paktia	Gardez	Afzal Khil	Yes	No
1876	Paktia	Gardez	Peer dad khil	Yes	No
1877	Paktia	Gardez	Shahi Khil	Yes	No
1878	Paktia	Gardez	Aka Khil	Yes	No
1884	Paktia	Gardez	Afzal Khil	Yes	No
1887	Paktia	Gardez	Rayees khil	Yes	No
1941	Kandahar	Dand	Ghani Kalacha	Yes	No
1947	Kandahar	Dand	Ghani Kalacha	Yes	No
1961	Kandahar	Dand	Zakir Shareef	Yes	No
1963	Kandahar	Dand	Ghani Kalacha	Yes	No
1969	Kandahar	Dand	Rouh Abad	Yes	No
1976	Kandahar	Dand	Rouh Abad	Yes	No
1980	Kandahar	Dand	Deh Gholaman	Yes	No
1989	Kandahar	Dand	Khowja Ali	Yes	No
1991	Kandahar	Dand	Rouh Abad	Yes	No
1994	Kandahar	Dand	Khowja Ali	Yes	No
1996	Bamyan	Yakawlang	Kata Khana Akhond	Yes	No
1998	Bamyan	Yakawlang	Kata Khana	Yes	No

2001	Bamyan	Yakawlang	Kutakhana	Yes	No
2002	Bamyan	Yakawlang	Kutakhana Payeen	Yes	No
2019	Kunduz	Khanabad	Mir Ghausodin	Yes	No
2020	Kunduz	Khanabad	Mir Ghausodin	Yes	No
2021	Kunduz	Khanabad	Mir Ghausodin	Yes	No
2022	Kunduz	Khanabad	Mir Ghausodin	Yes	No
2026	Parwan	Charikar	Mosque #4	Yes	No
2035	Parwan	Charikar	Zir Joy, Mosque #2	Yes	No
2038	Parwan	Charikar	Nayab Sofla	Yes	No
50	Laghman	Qarghaee	Miraka Qala	No	Yes
63	Laghman	Qarghaee	Miraka Qala	No	Yes
182	Paktya	Gardiz	Deldar	No	No
267	Nangarhar	Khewa/Kuz Kunar	Chalwa	No	Yes
274	Nangarhar	Khewa/Kuz Kunar	Chalawa	No	No
304	Nangarhar	Khewa/Kuz Kunar	Emal Khil	No	No
330	Nangarhar	Shinwar	Bahram Kali	No	No
515	Nangarhar	Surkh Road	Central Shamsha poor	No	No
516	Nangarhar	Surkh Road	Central Shamsha poor	No	No
532	Nangarhar	Surkh Road	Deh Bala	No	No
612	Logar	Baraki Barak	Qala Ghairat	No	No
740	Logar	Baraki Barak	Mohmand Jaber	No	No
754	Logar	Baraki Barak	Mohmand Jaber	No	No
755	Logar	Baraki Barak	Mohmand Jaber	No	No
757	Logar	Baraki Barak	Mohmand Jaber	No	No
760	Logar	Baraki Barak	Mohmand Jaber	No	No

763	Logar	Baraki Barak	Qala I Abas	No	No
768	Logar	Baraki Barak	Shamazar	No	No
1789	Paktya	Gardiz	Phantoon Meena	No	No
1854	Paktya	Gardiz	Shaheed Kala	No	No
254	Nangarhar	Khewa	Abarzi	Yes	Yes
255	Nangarhar	Khewa	Abarzi	Yes	Yes
266	Nangarhar	Khewa	Shikhan	Yes	Yes
268	Nangarhar	Khewa	Abarzi	Yes	Yes
269	Nangarhar	Khewa	Shikhan	Yes	Yes
288	Nangarhar	Khewa	Sayed Khil	Yes	Yes
557	Logar	Barkibarak	Padkhwab	Yes	Yes
558	Logar	Barkibarak	Padkhwab	Yes	Yes
560	Logar	Barkibarak	Padkhwab	Yes	Yes
561	Logar	Barkibarak	Padkhwab	Yes	Yes
562	Logar	Barkibarak	Padkhwab	Yes	Yes
564	Logar	Barkibarak	Padkhwab	Yes	Yes
565	Logar	Barkibarak	Padkhwab	Yes	Yes
566	Logar	Barkibarak	Padkhwab	Yes	Yes

ANNEX VI: LIST OF FGD SITES

Table 15: LIST OF FGD SITES

Well ID	Province	CLTS Community	Was well working?
121	Laghman	Yes	Yes
269	Nangarhar	Yes	Yes
266	Nangarhar	Yes	No. Broken for more than a year.
62	Laghman	No, but adjacent to one (some hygiene training conducted here)	Yes
105	Laghman	No	No. Broken for more than a year.
283	Nangarhar	No	Yes
803	Nangarhar	No	Yes
854	Nangarhar	Yes	Yes
1244	Laghman	No	Yes
1448	Bamyan	No	No. Broken for more than a year.
1980	Kandahar	No	No. Broken for more than a year.
1991	Kandahar	No	No. Broken for more than a year.
2001	Bamyan	No	No. Broken for more than a year.

ANNEX VII: FULL RESULTS TABLES

Table 18: Univariable Associations between Well Functionality Status and Technical Factors

	Non-Functional		Out-of-Commission		Non-Functional (excl. dry)	
Explanatory Variables	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
Spare parts						
Distance spares	1.01 (1.00-1.02)	0.051	1.02 (1.01-1.03)	0.004	1.01 (1.00-1.02)	0.061
Spares >20km	1.26 (0.86-1.85)	0.232	1.47 (0.87-2.47)	0.147	1.09 (0.70-1.71)	0.704
Spares always available	0.42 (0.27-0.64)	<0.001	0.28 (0.16-0.48)	<0.001	0.39 (0.23-0.66)	0.001
Spare part quality	1.32 (0.86-2.02)	0.202	1.18 (0.67-2.08)	0.571	1.43 (0.89-2.29)	0.141
Mechanic						
Time to mechanic (hrs)	1.02 (0.91-1.15)	0.742	1.04 (0.90-1.21)	0.568	0.93 (0.80-1.09)	0.393
Mechanic >1 hr	1.25 (0.73-2.15)	0.417	1.54 (0.80-2.96)	0.202	1.19 (0.62-2.26)	0.606
Mechanic always available	0.76 (0.49-1.19)	0.238	0.72 (0.43-1.21)	0.213	0.83 (0.50-1.38)	0.473
Well						
Dug well	2.59 (1.30-5.19)	0.007	3.07 (1.41-6.70)	0.005	1.83 (0.81-4.12)	0.145
Age of well	1.12 (0.84-1.48)	0.443	1.30 (0.93-1.80)	0.122	1.00 (0.74-1.37)	0.983
Depth	0.99 (0.98-1.01)	0.473	0.98 (0.96-1.01)	0.146	1.01 (0.99-1.03)	0.429
Pump type						
Kabul (Ref: Indus)	3.00 (1.62-5.54)	<0.001	2.84 (1.33-6.05)	0.007	3.92 (2.03-7.58)	<0.001
Pamir (Ref: Indus)	1.99 (1.10-3.61)	0.024	3.12 (1.56-6.25)	0.001	1.95 (0.98-3.88)	0.058
Kabul (Ref: Pamir)	1.51 (0.77-2.96)	0.234	0.91 (0.44-1.90)	0.800	2.02 (0.98-4.14)	0.057

Table 19: Univariable Associations Between Well Functionality Status And Environmental Factors

	Non-Functional		Out-Of-Commission		Non-Functional (excl. dry)	
Explanatory variables	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
Drinking source during breakdown						
Other well with hand pump	0.51 (0.32-0.80)	0.004	0.38 (0.22-0.65)	<0.001	0.46 (0.27-0.78)	0.004
Other protected well	1.12 (0.70-1.79)	0.648	0.99 (0.54-1.83)	0.976	1.28 (0.76-2.15)	0.361
Public tap	0.83 (0.11-6.47)	0.858	-	-	1.09 (0.14-8.50)	0.936
Protected spring	0.78 (0.25-2.42)	0.663	0.84 (0.19-3.62)	0.811	0.84 (0.23-3.02)	0.783
Unprotected well	6.93 (0.84-57.44)	0.073	2.12 (0.20-22.40)	0.531	8.63 (1.16-64.51)	0.036
Unprotected spring	2.62 (1.11-6.18)	0.028	3.20 (1.41-7.28)	0.005	2.16 (0.72-6.54)	0.171
Stream/river	2.22 (1.36-3.61)	0.001	3.13 (1.80-5.42)	<0.001	2.23 (1.27-3.93)	0.005
Lake/pond	-	-	-	-	-	-
Any spring	1.84 (0.90-3.77)	0.097	2.22 (1.07-4.63)	0.032	1.52 (0.63-3.71)	0.353
Groundwater	0.49 (0.27-0.89)	0.019	0.40 (0.20-0.79)	0.009	0.44 (0.23-0.85)	0.015
Surface water	2.22 (1.36-3.61)	0.001	3.13 (1.80-5.42)	<0.001	2.23 (1.27-3.93)	0.005
Improved	0.39 (0.023-0.68)	0.001	0.28 (0.15-0.51)	<0.001	0.40 (0.22-0.73)	0.003
Unimproved	2.27 (1.41-3.64)	0.001	3.14 (1.83-5.37)	<0.001	2.45 (1.43-4.17)	0.001
Alternative drinking sources (when well is functional)						
Any source	1.82 (1.07-3.09)	0.027	2.10 (1.10-4.01)	0.024	1.19 (0.59-2.43)	0.630
Other well with hand pump	1.29 (0.61-2.74)	0.507	0.91 (0.35-2.39)	0.849	0.97 (0.34-2.79)	0.960
Other protected well	2.11 (0.51-8.81)	0.305	1.72 (0.32-9.37)	0.529	1.84 (0.29-11.46)	0.516
Public tap	-	-	-	-	-	-
Protected spring	-	-	-	-	-	-
Unprotected spring	3.29 (1.06-10.26)	0.040	2.48 (0.74-8.28)	0.140	-	-
Unprotected well	2.67 (0.18-39.78)	0.477	-	-	-	-
Stream/river	3.17 (1.48-6.78)	0.003	3.38 (1.53-7.45)	0.003	2.63 (0.91-7.60)	0.074
Springs - any	2.30 (0.72-7.38)	0.162	-	-	0.64 (0.06-7.41)	0.719
Groundwater	1.59 (0.89-2.85)	0.118	1.69 (0.84-3.40)	0.139	1.08 (0.47-2.45)	0.860
Surface water	3.17 (1.48-6.78)	0.003	3.38 (1.53-7.45)	0.003	2.63 (0.91-7.60)	0.074
Improved	1.24 (0.64-2.38)	0.527	1.30 (0.59-2.88)	0.520	1.01 (0.42-2.43)	0.977
Unimproved	2.73 (1.26-5.91)	0.011	3.05 (1.38-6.73)	0.006	2.13 (0.72-6.30)	0.170
Poor water quality	1.16 (0.70-1.93)	0.557	2.01 (1.08-3.76)	0.029	1.03 (0.56-1.91)	0.917
Year-round supply	0.10 (0.05-0.19)	<0.001	0.10 (0.05-0.18)	<0.001	-	-
Poor yield	2.05 (1.35-3.12)	0.001	2.12 (1.28-3.51)	0.004	1.18 (0.74-1.88)	0.477
Enough water for needs	0.02 (0.01-0.04)	<0.001	0.03 (0.02-0.08)	<0.001	0.023 (0.01-0.05)	<0.001

Table 20: Univariable Associations between Well Functionality Status and Social Factors

	Non-Functional		Out-of-Commission		Non-Functional (Excl. Dry)	
Explanatory variables	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
No. households	1.01 (0.99-1.02)	0.432	1.02 (1.00-1.04)	0.098	1.00 (0.99-1.02)	0.653
HH>15	1.45 (1.01-2.08)	0.046	1.64 (0.97-2.74)	0.063	1.54 (0.99-2.38)	0.055
No electricity	0.60 (0.38-0.95)	0.029	0.38 (0.20-0.74)	0.005	0.54 (0.32-0.93)	0.025
Purposes of water use						
No. different purposes	0.65 (0.55-0.78)	<0.001	0.59 (0.49-0.71)	<0.001	0.72 (0.58-0.88)	0.002
Drinking	0.84 (0.28-2.50)	0.751	0.30 (0.09-0.94)	0.039	1.19 (0.24-5.82)	0.835
Cooking	0.27 (013-0.55)	<0.001	0.20 (0.10-0.42)	<0.001	0.43 (0.18-0.99)	0.048
Washing clothes	0.24 (0.13-0.44)	<0.001	0.23 (0.13-0.44)	<0.001	0.29 (0.15-0.57)	<0.001
Bathing	0.20 (0.11-0.37)	<0.001	0.19 (0.10-0.34)	<0.001	0.27 (0.13-0.58)	0.001
Livestock	0.45 (0.28-0.71)	0.001	0.32 (0.19-0.55)	<0.001	0.52 (0.31-0.88)	0.014
Irrigation	1.20 (0.23-6.18)	0.827	-	-	1.56 (0.30-8.15)	0.601
Queues	0.92 (0.58-1.45)	0.711	1.48 (0.77-2.82)	0.237	0.72 (0.44-1.19)	0.203
Public location	0.88 (0.47-1.67)	0.703	0.94 (0.45-2.00)	0.881	1.46 (0.68-3.15)	0.333
Distance to Kabul (per 10km)	1.01 (1.00-1.03)	0.156	1.02 (1.00-1.04)	0.019	1.01 (0.99-1.02)	0.237

Table 21: Univariable Associations between Well Functionality Status and Financial Factors

	Non-Functional		Out-of-Commission		Non-Functional (excl. dry)	
Explanatory Variables	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
User fees	0.64 (0.42-0.99)	0.045	0.58 (0.33-1.03)	0.061	0.85 (0.54-1.33)	0.477
Users pay regularly	0.28 (0.17-1.67)	0.279	0.77 (0.20-2.95)	0.702	0.74 (0.23-2.37)	0.611
>50% of user paying	0.69 (0.33-1.45)	0.326	0.77 (0.28-2.11)	0.617	0.70 (0.31-1.58)	0.387
Costs affordable	0.30 (0.20-0.46)	<0.001	0.27 (0.16-0.46)	<0.001	0.27 (0.17-0.44)	<0.001

Table 22: Univariable Associations Between Well Functionality Status and Institutional Factors

	Non-Functional		Out-of-Commission		Non-Functional (excl. dry)	
Explanatory variables	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
Management Structure						
New WUC committee	1		1		1	
Existing CDC/shura	1.36 (0.82-2.25)	0.238	1.73 (0.74-4.09)	0.209	1.07 (0.63-1.82)	0.806
Caretaker	0.92 (0.41-2.06)	0.832	0.91 (0.24-3.47)	0.894	0.71 (0.29-1.75)	0.454
Active committee	0.49 (0.25-0.93)	0.028	0.32 (0.17-0.61)	0.001	0.51 (0.23-1.16)	0.107
No. committee members	1.03 (1.01-1.05)	0.016	1.01 (0.98-1.04)	0.507	1.03 (1.00-1.05)	0.023
Caretaker Roles						
Monitors other wells	2.23 (1.09-4.58)	0.029	2.22 (0.94-5.25)	0.070	1.31 (0.53-3.25)	0.557
Guard the well	0.80 (0.30-2.16)	0.661	0.32 (0.11-0.90)	0.031	1.18 (0.37-3.81)	0.782
Preventive maintenance	0.20 (0.10-0.40)	<0.001	0.20 (0.09-0.44)	<0.001	0.23 (0.11-0.48)	<0.001
Carry out above ground repairs	0.79 (0.48-1.30)	0.343	0.48 (0.26-0.88)	0.018	0.96 (0.53-1.73)	0.893
Carry out below ground repairs	0.83 (0.50-1.36)	0.450	0.58 (0.28-1.18)	0.131	0.97 (0.56-1.67)	0.912
Report breakdowns to mechanic	0.94 (0.57-1.55)	0.809	0.75 (0.35-1.62)	0.468	0.87 (0.48-1.58)	0.641
Assist mechanic with repairs	0.95 (0.55-1.63)	0.838	0.62 (0.27-1.42)	0.256	1.00 (0.57-1.76)	0.993
Collect fees	0.95 (0.30-3.00)	0.926	1.08 (0.24-4.94)	0.922	0.37 (0.06-2.46)	0.303
Report on well performance	1.06 (0.55-2.04)	0.871	0.66 (0.25-1.71)	0.388	1.37 (0.68-2.75)	0.380
Keep well clean	0.96 (0.55-1.66)	0.880	0.60 (0.26-1.40)	0.238	0.89 (0.49-1.60)	0.696
Caretaker buys parts	0.31 (0.19-0.51)	<0.001	0.25 (0.14-0.45)	<0.001	0.41 (0.23-0.73)	0.003

Table 23: Univariable Associations between Well Functionality Status and Variables Relating to Community Involvement in Implementation

	Non-Functional		Out-of-Commission		Non-Functional (excl. dry)	
Explanatory Variables	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
CLTS	0.43 (0.16-1.13)	0.085	0.56 (0.15-2.03)	0.375	0.17 (0.05-0.57)	0.004
Consultation						
No. of Consultation Meetings	0.97 (0.83-1.14)	0.701	0.99 (0.78-1.26)	0.921	0.92 (0.76-1.10)	0.358
No. of People Consulted	1.02 (1.00-1.03)	0.065	1.02 (1.00-1.04)	0.014	1.02 (0.99-1.05)	0.195
Provision of information						
Information Provided – Any Type	0.71 (0.31-1.64)	0.421	1.92 (0.42-8.76)	0.398	0.62 (0.26-1.47)	0.280
Info – O&M Costs	0.82 (0.52-1.28)	0.382	1.06 (0.59-1.93)	0.840	0.67 (0.40-1.11)	0.120
Info – O&M Responsibilities	0.79 (0.47-1.32)	0.370	0.50 (0.26-0.94)	0.030	0.76 (0.43-1.34)	0.343
Involvement in Decisions						
No. Decisions	0.91 (0.79-1.05)	0.189	0.79 (0.64-0.98)	0.028	0.87 (0.74-1.03)	0.107
Well Location	0.79 (0.22-2.88)	0.715	0.56 (0.12-2.71)	0.472	0.84 (0.18-3.80)	0.818
Well Management	0.44 (0.26-0.74)	0.002	0.35 (0.19-0.63)	<0.001	0.39 (0.22-0.69)	0.001
Financing Repairs	0.70 (0.46-1.08)	0.106	0.44 (0.25-0.78)	0.005	0.71 (0.43-1.16)	0.166
Committee Membership	0.54 (0.31-0.97)	0.037	0.33 (0.12-0.92)	0.034	0.67 (0.36-1.24)	0.197
Caretaker	0.74 (0.45-1.21)	0.225	0.54 (0.26-1.09)	0.084	0.70 (0.42-1.18)	0.183
Usage Rules	1.44 (0.76-2.72)	0.268	1.06 (0.45-2.48)	0.901	1.06 (0.54-2.09)	0.867
Well and Pump Type	1.36 (0.79-2.32)	0.266	1.00 (0.50-2.00)	0.994	0.95 (0.51-1.75)	0.859
Training – Community Members						
Any	0.60 (0.35-1.01)	0.052	0.66 (0.29-1.51)	0.322	0.55 (0.31-0.99)	0.045
No. Topics	0.85 (0.70-1.03)	0.087	0.82 (0.61-1.11)	0.206	0.80 (0.65-1.00)	0.047
Management	0.68 (0.37-1.23)	0.197	0.59 (0.23-1.51)	0.266	0.59 (0.29-1.19)	0.142
O&M	0.67 (0.39-1.13)	0.134	0.74 (0.32-1.69)	0.474	0.61 (0.34-1.11)	0.107
Hygiene	0.55 (0.31-0.97)	0.038	0.42 (0.15-1.20)	0.105	0.45 (0.23-0.87)	0.017
No. Trained in Mgmt.	0.98 (0.93-	0.33	0.91 (0.82-	0.097	0.98 (0.93-1.04)	0.487

	1.03)	7	1.02)			
No. Trained in O&M	0.96 (0.93-1.00)	0.052	0.93 (0.85-1.01)	0.069	0.96 (0.92-1.01)	0.085
No. Trained in Hygiene	0.95 (0.90-1.00)	0.050	0.89 (0.80-1.00)	0.058	0.95 (0.89-1.01)	0.086
Caretaker Trained	1.10 (0.62-1.94)	0.757	0.51 (0.19-1.40)	0.191	1.36 (0.75-2.48)	0.316
Training – Committee Members						
Any	0.92 (0.58-1.45)	0.710	0.95 (0.50-1.82)	0.884	0.74 (0.44-1.24)	0.250
Technical	1.09 (0.65-1.84)	0.737	1.11 (0.53-2.31)	0.783	1.01 (0.55-1.84)	0.988
Finance	0.94 (0.43-2.03)	0.866	0.63 (0.15-2.72)	0.538	0.72 (0.29-1.81)	0.484
Hygiene	0.80 (0.49-1.30)	0.365	0.66 (0.29-1.49)	0.320	0.54 (0.30-0.97)	0.041
Spanner Provided to Community	1.02 (0.52-2.02)	0.954	0.45 (0.16-1.28)	0.135	0.91 (0.46-1.78)	0.781
Contributions						
Any	1.03 (0.69-1.54)	0.902	1.57 (0.93-2.65)	0.095	0.94 (0.59-1.49)	0.777
Cash	0.79 (0.38-1.61)	0.511	1.61 (0.70-3.71)	0.267	0.64 (0.25-1.64)	0.350
% HHs	1.01 (1.00-1.02)	0.242	1.02 (1.00-1.03)	0.023	1.00 (0.99-1.02)	0.754
Avg. Contribution per HH	1.00 (1.00-1.00)	0.377	1.00 (1.00-1.00)	0.771	1.00 (1.00-1.00)	0.751
Labor	0.90 (0.60-1.35)	0.615	0.91 (0.55-1.53)	0.727	0.80 (0.50-1.28)	0.358
% HH	1.00 (1.00-1.01)	0.231	1.00 (1.00-1.01)	0.251	1.00 (1.00-1.01	0.408
Avg. days Contributed	0.94 (0.87-1.00)	0.046	0.92 (0.82-1.02)	0.122	0.95 (0.89-1.01)	0.079
Materials	1.09 (0.63-1.90)	0.753	1.16 (0.57-2.35)	0.690	1.67 (0.95-2.95)	0.078

Table 24: Univariable Associations between Breakdown Duration and Technical Factors

	Breakdown >1 week		Breakdown > 1 month	
Explanatory variables	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
Spare Parts				
Distance spares	1.00 (0.99-1.02)	0.697	0.98 (0.95-1.01)	0.249
Spares >20km	1.10 (0.59-2.04)	0.760	0.69 (0.21-2.33)	0.553
Spares always available	0.35 (0.17-0.72)	0.005	0.99 (0.20-4.87)	0.992
Spare part quality	1.11 (0.60-2.05)	0.738	0.66 (0.18-2.44)	0.529
Mechanic				
Time to mechanic (hrs)	1.19 (0.97-1.29)	0.124	1.30 (1.05-1.61)	0.017
Mechanic >1 hr	1.75 (0.83-3.69)	0.144	1.42 (0.37-5.50)	0.608
Mechanic always available	1.17 (0.68-2.03)	0.571	2.58 (0.79-8.42)	0.118
Well				
Age of well	1.09 (0.64-1.84)	0.749	0.53 (0.15-1.88)	0.321
Depth	1.02 (0.99-1.05)	0.260	1 (0.94-1.07)	1.000
Dug well	4.04 (1.35-12.15)	0.013	17.93 (4.81-66.83)	<0.001
Pump type				
Kabul (Ref: Indus)	2.94 (1.30-6.68)	0.010	2.15 (0.35-13.08)	0.408
Pamir (Ref: Indus)	1.22 (0.44-3.35)	0.703	1.06 (0.12-9.38)	0.957
Kabul (Ref: Pamir)	2.42 (0.83-7.06)	0.106	2.02 ().17-23.85)	0.576

Table 25: Univariable Associations between Breakdown Duration and Environmental Factors

	Breakdown >1 week		Breakdown > 1 month	
Explanatory Variables	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
Drinking Sources during Breakdown				
Other well with hand pump	0.53 (0.29-0.97)	0.041	1.48 (0.33-6.52)	0.607
Other protected well	0.81 (0.34-1.92)	0.630	0.89 (0.22-3.64)	0.867
Public tap	4.60 (1.93-10.97)	0.001	-	-
Protected spring	0.63 (0.07-5.77)	0.679	-	-
Unprotected spring	1.63 (0.36-7.32)	0.527	2.31 (0.29-18.57)	0.432
Stream/river	1.20 (0.60-2.42)	0.608	0.36 (0.04-3.05)	0.349
Lake/pond	5.42 (0.45-65.106)	0.183	-	-
Any spring	1.09 (0.24-4.89)	0.912	1.16 (0.15-8.82)	0.884
Groundwater	0.47 (0.22-1.03)	0.058	1.25 (0.17-9.19)	0.829
Surface water	1.20 (0.60-2.42)	0.608	0.36 (0.04-3.05)	0.349
Improved	0.50 (0.23-1.07)	0.074	0.76 (0.17-3.50)	0.729
Unimproved	1.31 (0.66-2.60)	0.446	0.62 (0.12-3.08)	0.556
Alternative Drinking Sources (when well is functional)				
Any source	1.34 (0.54-3.32)	0.528	-	-
Other well with hand pump	1.42 (0.45-4.54)	0.550	-	-
Other protected well	0.89 (0.33-2.35)	0.806	-	-
Public tap	7.55 (5.15-11.07)	<0.001	-	-

Protected spring	-	-	-	-
Unprotected well	10.47 (8.01-13.69)	<0.001	-	-
Stream/river	2.11 (0.39-11.41)	0.388	-	-
Groundwater	1.43 (0.57-3.59)	0.445	-	-
Surface water	2.11 (0.39-11.41)	0.388		
Improved	1.26 (0.46-3.48)	0.654	-	-
Unimproved	2.75 (0.76-9.99)	0.124	-	-
Poor water quality	1.68 (0.77-3.66)	0.195	0.67 (0.07-6.30)	0.725
Enough water for needs	0.91 (0.24-3.53)	0.893	-	-
Year-round supply	1.97 (0.50-7.81)	0.335	-	-
Poor yield	1.02 (0.53-1.96)	0.963	0.30 (0.06-1.42)	0.130

Table 26: Univariable Associations between Breakdown Duration and Social Factors

	Breakdown >1 week		Breakdown > 1 month	
Explanatory Variables	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
No. Households	1.01 (1.00-1.02)	0.320	0.95 (0.90-1.00)	0.055
HH>15	1.45 (0.85-2.47)	0.169	0.38 (0.11-1.37)	0.140
No electricity	0.43 (0.21-0.87)	0.018	0.69 (0.19-2.53)	0.578
Distance to Kabul (per 10km)	1.02 (1.00-1.03)	0.068	1.02 (1.00-1.04)	0.054
Purposes of Water Use				
No. different Purposes	0.54 (0.41-0.72)	<0.001	0.56 (0.32-0.96)	0.036
Drinking	0.56 (0.07-4.31)	0.576	-	-
Cooking	0.19 (0.05-.69)	0.011	0.11 (0.02-0.56)	0.008
Washing clothes	0.22 (0.09-0.53)	0.001	0.18 (0.04-0.94)	0.041
Bathing	0.11 (0.43-0.26)	<0.001	0.16 (0.03-0.84)	0.030
Livestock	0.42 (0.20-0.86)	0.018	0.48 (0.12-1.90)	0.297
Irrigation	3.45 (0.98-12.12)	0.053	-	-
Public location	1.46 (0.39-5.51)	0.575	0.54 (0.13-2.21)	0.387
Queues	0.65 (0.34-1.26)	0.202	0.25 (0.07-0.83)	0.024

Table 27: Univariable Associations between Breakdown Duration and Financial Factors

	Breakdown >1 week		Breakdown > 1 month	
Explanatory Variables	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
User fees	1.25 (0.59-2.62)	0.559	0.55 (0.16-1.88)	0.342
Fees paid in advance of breakdown	1.32 (0.41-4.27)	0.642	-	-
>50% of user paying	0.82 (0.36-1.84)	0.628	1.15 (0.13-9.83)	0.899
Costs affordable	0.32 (0.16-0.63)	0.001	0.37 (0.10-1.34)	0.130
Repair cost	1.00 (1.00-1.00)	0.017	1.00 (1.00-1.00)	0.034

Table 16: Univariable Associations between Breakdown Duration and Institutional Factors

	Breakdown >1 week		Breakdown > 1 month	
Explanatory Variables	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
Management Structure				
New WUC committee	1		1	
Existing CDC/shura	1.49 (0.70-3.18)	0.298	1.78 (0.25-12.53)	0.563
Caretaker	1.81 (0.67-4.85)	0.242	0.89 (0.19-4.24)	0.881
Active committee	1.93 (0.17-21.77)	0.595	-	-
No. committee members	1.00 (0.94-1.06)	0.943	0.98 (0.88-1.08)	0.654
Caretaker Roles				
Monitors other wells	3.30 (0.99-1.99)	0.051	19.43 (4.42-85.34)	<0.001
Guard the well	0.57 (0.12-2.71)	0.480	0.23 (0.05-1.07)	0.062
Preventive maintenance	0.58 (0.10-3.46)	0.550	-	-
Carry out above ground repairs	0.59 (0.25-1.42)	0.239	0.44 (0.12-1.60)	0.211
Carry out below ground repairs	1.01 (0.51-1.99)	0.984	0.52 (0.13-2.13)	0.360
Report breakdowns to mechanic	1.85 (0.89-3.85)	0.100	1.28 (0.31-5.29)	0.733
Assist mechanic with repairs	2.93 (1.28-6.69)	0.011	2.95 (0.78-11.26)	0.113
Collect fees	0.78 (0.07-8.55)	0.842	4.89 (0.63-38.11)	0.130
Report on well performance	1.04 (0.39-2.76)	0.944	1.68 (0.35-7.98)	0.517
Keep well clean	1.78 (0.82-3.85)	0.142	1.33 (0.33-5.41)	0.688
Caretaker buys parts	0.44 (0.22-0.86)	0.017	0.95 (0.20-4.53)	0.946

Table 29: Univariable Associations between Breakdown Duration and Variables Relating to Community Involvement in Implementation

	Breakdown >1 week		Breakdown > 1 month	
Explanatory Variables	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
CLTS	1.51 (0.20-11.30)	0.690	-	-
Consultation				
No consult meetings	0.99 (0.82-1.20)	0.941	1.21 (0.84-1.75)	0.301
No. consulted	1.02 (0.99-1.05)	0.282	0.96 (0.90-1.02)	0.214
Provision of Information				
Information provided – Any	0.38 (0.18-0.79)	0.010	0.47 (0.10-2.15)	0.330
Info – O&M costs	0.60 (0.33-1.07)	0.083	0.71 (0.22-2.33)	0.571
Info – O&M responsibilities	0.37 (0.20-0.71)	0.002	0.23 (0.07-0.79)	0.020
Involvement in Decisions				
No. decisions involved in	0.87 (0.65-1.15)	0.314	0.99 (0.66-1.48)	0.961
Well location	0.19 (0.03-1.16)	0.071	0.07 (0.01-0.53)	0.10
Well management	0.38 (0.16-0.89)	0.027	1.44 (0.30-7.02)	0.649
Financing repairs	0.53 (0.27-1.02)	0.058	0.84 (0.25-2.81)	0.778
Committee membership	1.08 (0.53-2.20)	0.838	1.44 (0.40-5.18)	0.577
Caretaker	0.86 (0.38-1.93)	0.707	1.07 (0.30-3.74)	0.922
Usage rules	0.85 (0.32-2.27)	0.742	0.59 (0.08-4.26)	0.604
Well and pump type	1.22 (0.55-2.73)	0.624	1.53 (0.38-6.21)	0.554
Training Community Members				
Any	0.18 (0.07-0.44)	<0.001	0.82 (0.18-3.81)	0.795
No. topics	0.56 (0.39-0.79)	0.001	0.98 (0.57-1.70)	0.951
Management	0.21 (0.09-0.54)	0.001	1.06 (0.23-4.84)	0.937
O&M	0.18 (0.07-0.48)	0.001	0.89 (0.19-4.21)	0.883
Hygiene	0.20 (0.08-0.48)	<0.001	0.92 (0.20-4.23)	0.916
No. trained in mgmt	0.80 (0.67-0.95)	0.011	0.94 (0.79-1.11)	0.469
No. trained in O&M	0.80 (0.67-0.94)	0.009	0.92 (0.80-1.07)	0.288
No. trained in hygiene	0.84 (0.76-0.93)	<0.001	0.96 (0.85-1.08)	0.487
Caretaker trained	0.39 (0.11-1.39)	0.145	1.78 (0.34-9.37)	0.498
Training Committee Members				
Any	0.61 (0.32-1.15)	0.128	0.89 (0.31-3.78)	0.892
Technical	0.75 (0.37-1.52)	0.423	1.14 (0.28-4.66)	0.854
Finance	-	-	-	-
Hygiene	0.27 (0.13-0.59)	0.001	0.59 (0.14-2.49)	0.471
Spanner provided	1.62 (0.61-4.30)	0.334	8.73 (2.57-29.66)	0.001
Contributions				
Any	0.77 (0.23-2.6)	0.679	-	-
Cash	0.52 (0.15-1.78)	0.297	0.78 (0.09-7.11)	0.825
% HHs	0.99 (0.97-1.02)	0.536	0.31 (0.18-0.54)	<0.001
Avg. contribution per HHs	1.00 (1.00-1.00)	0.567	-	-
Labor	1.36 (0.70-2.65)	0.369	15.00 (1.97-114.11)	0.009
% HH	1.00 (0.99-1.01)	0.640	1.01 (0.99-1.02)	0.540
Avg. days contributed per HH	1.00 (0.94-1.06)	0.943	**1.06 (1.01-1.11)**	**0.016**
Materials	0.88 (0.22-3.49)	0.859	1.92 (0.41-8.93)	0.408

Table 30: Univariable Associations between Satisfaction with Involvement in Implementation and Variables Relating to Community Engagement Activities

	Satisfaction with Involvement	
Explanatory Variables	**OR (95% CI)**	**p**
Implementation		
CLTS	1.86 (0.58-5.96)	0.296
Consultation		
No. of consultation meetings	0.87 (0.74-1.03)	0.099
No. of people consulted	1.00 (1.00-1.00)	0.975
Provision of Information		
Information provided – Any type	0.73 (0.24-2.19)	0.568
Info – O&M costs	0.78 (0.43-1.41)	0.408
Info – O&M responsibilities	1.26 (0.72-2.21)	0.425
Involvement in Decisions		
No. decisions	1.15 (1.00-1.32)	0.044
Well location	1.38 (0.30-6.29)	0.678
Well management	1.45 (0.81-2.61)	0.215
Financing repairs	1.26 (0.79-2.02)	0.327
Committee membership	1.57 (0.76-3.25)	0.219
Caretaker	1.15 (0.64-2.04)	0.647
Usage rules	1.10 (0.46-2.64)	0.832
Well and pump type	1.33 (0.63-2.81)	0.457
Training – Community Members		
Any	1.95 (0.91-4.18)	0.085
No. topics	1.27 (0.95-1.70)	0.102
Management	1.56 (0.70-3.48)	0.279
O&M	2.13 (0.93-4.89)	0.073
Hygiene	2.32 (0.98-5.51)	0.056
No. trained in mgmt.	-	
No. trained in O&M	-	
No. trained in hygiene	-	
Caretaker trained	1.08 (0.50-2.31)	0.852
Training – Committee Members		
Any	1.00 (0.60-1.68)	0.989
Technical	1.14 (0.60-2.15)	0.690
Finance	0.86 (0.33-2.26)	0.759
Hygiene	0.99 (0.57-1.72)	0.969
Spanner provided to community	0.62 (0.28-1.37)	0.238
Contributions		
Any	0.59 (0.36-0.96)	0.033
Cash	0.48 (0.26-0.90)	0.022
% HHs	0.99 (0.98-1.00)	0.197
Avg. contribution per HH	1.00 (1.00-1.00)	0.025
Labor	0.83 (0.49-1.42)	0.491
% HH	1.06 (0.97-1.16)	0.174
Avg. days contributed	1.00 (0.99-1.02)	0.537
Materials	0.72 (0.36-1.43)	0.345
% HHs	1.00 (0.99-1.02)	0.760

Table 31: Full Multivariable GEEs (Models A-C)

6.	7. Non-functional – Model A		8. Out-of-commission – Model B		9. Breakdowns >1 week – Model C	
	Model A1	**Model A2**	**Model B1**	**Model B2**	**Model C1**	**Model C2**
	Incl. pump type	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**
Goodness of fit (QICC)	249.2	330.7	161.7	198.9	195.3	233.9
Number of village	140	160	140	160	89	99
Number of cases (wells/repairs)	250	302	250	302	320	360
	AOR (95% CI)	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**
Environmental, Technical & Social						
Poor Water Quality	1.12 (0.39-3.20)	1.21 (0.52-2.82)	2.44 (0.72-8.26)	1.70 (0.63-4.59)	**3.64 (1.26-10.58)****	2.00 (0.75-5.32)
No Electricity	1.06 (0.33-3.45)	0.89 (0.42-1.92)	1.59 (0.20-12.99)	1.48 (0.41-5.29)	2.09 (0.46-9.52)	0.77 (0.20-2.95)
Dug Well	1.22 (0.31-4.90)	1.99 (0.69-5.78)	0.76 (0.13-4.41)	1.24 (0.22-7.14)	8.14 (0.32-209.88)	1.20 (0.24-6.04)
Spare Parts Distance	1.02 (1.00-1.04)	1.01 (1.00-1.03)	1.01 (0.99-1.02)	1.01(0.99-1.02)	0.98 (0.94-1.03)	0.97 (0.94-1.01)
Spares Availability	3.08 (0.67-14.27)	1.35 (0.50-3.69)	1.02 (0.21-5.05)	0.95 (0.27-3.32)	1.00 (0.07-14.60)	1.35 (0.48-3.78)
Time-To-Mechanic (Hrs)					1.05 (0.83-1.33)	0.99 (0.78-1.25)
Year-Round Supply	**0.27 (0.09-0.83)****	**0.24 (0.090.62)****	**0.12 (0.04-0.41)*****	**0.13 (0.04-0.40)*****	**0.10 (0.02-0.39)*****	**0.22 (0.05-0.95)****
Kabul Hand Pump (Indus = Ref.)	2.46 (0.65-9.33)	-	0.58 (0.08-4.35)	-	0.22 (0.02-2.48)	-
Pamir Hand Pump (Indus = Ref.)	2.37 (0.72-7.79)	-	2.27 (0.28-18.29)	-	0.25 (0.02-3.00)	-

Unimproved Drinking Water Source	1.44 (0.53-3.93)	1.44 (0.69-3.01)	2.20 (0.59-8.24)	2.29 (0.74-7.03)	0.62 (0.11-3.45)	0.65 (0.17-2.44)
Distance To Kabul (10km)	0.99 (0.97-1.02)	0.99 (0.97-1.01)	1.01 (0.97-1.04)	1.00 (0.98-1.03)	**1.07 (0.99-1.16)***	**1.05 (1.01-1.09)****
No. Water Use Purposes	**0.63 (0.45-0.90)****	0.78 (0.57-1.07)	0.74 (0.51-1.09)	0.80 (0.56-1.13)	0.68 (0.40-1.15)	**0.71 (0.48-1.06)***
> 15 Hhs Using Well	1.22 (0.58-2.59)	1.00 (0.56-1.77)	2.02 (0.55-7.40)	1.53 (0.71-3.30)	2.05 (0.62-6.76)	1.48 (0.68-3.21)
Repair Cost	-	-	-		**1.00 (1.00-1.00)***	**1.00 (1.00-1.00)***
Involvement In Implementation						
Information About O&M	1.63 (0.53-5.00)	1.05 (0.45-2.43)	0.79 (0.23-2.68)	0.62 (0.22-1.74)	**0.33 (0.10-1.15)***	0.50 (0.16-1.56)
Decisions About Management	0.90 (0.21-3.89)	0.78 (0.27-2.22)	0.19 (0.02-1.56)	0.38 (0.10-1.48)	**0.09 (0.01-1.18)***	0.78 (0.27-2.29)
Provision Of Training	0.73 (0.30-1.78)	0.69 (0.34-1.42)	2.30 (0.39-13.75)	1.73 (0.47-6.30)	0.11 (0.01-2.52)	**0.11 (0.02-0.72)****
Percent Of Hhs Contributing Cash	0.99 (0.97-1.01)	0.99 (0.98-1.01)	1.00 (0.97-1.03)	1.01 (0.99-1.03)	0.88 (0.66-1.18)	0.93 (0.81-1.05)
Days Of Labor Contributed	0.94 (0.83-1.05)	**0.89 (0.79-1.02)***	0.95 (0.88-1.02)	0.89 (0.71-1.12)	**0.66 (0.41-1.05)***	0.89 (0.71-1.11)
Institutional & Financial Factors						
Active Committee	0.29 (0.03-2.43)	0.49 (0.12-1.95)	**0.16 (0.02-1.12)***	**0.14 (0.02-0.84)****	-	-
User Fees	0.71 (0.33-1.54)	0.70 (0.37-1.34)	0.62 (0.19-2.02)	**0.41 (0.16-1.05)***	1.44 (0.33-6.28)	0.75 (0.29-1.94)
Caretaker Buys Parts	**0.23 (0.07-0.75)****	**0.43 (0.18-1.03)***	0.54 (0.12-2.48)	0.45 (0.15-1.37)	0.76 (0.17-3.48)	0.52 (0.21-1.29)

Table 32: Full Multivariable GEEs (Models D-H)

10.	Excluding year-round supply as predictor				Excluding seasonally or permanently dry wells from analysis				
	Non-functional – Model D		Out-of-commission – Model E		Non-functional – Model F		Out-of-commission – Model G	Breakdowns >1 week – Model I	
	Model D1	Model D2	Model E1	Model E2	Model F1	Model F2	Model G1	Model H1	Model H2
	Incl. pump type	Excl. pump type	Incl. pump type	Excl. pump type	Incl. pump type	Excl. pump type	Excl. pump type	Incl. pump type	Excl. pump type
Goodness of Fit (QICC)	251.4	337.8	168.5	211.1	220.4	291.5	151.8	180.2	217.8
Number of Village	140	160	140	160	121	140	140	85	94
Number of Cases (Wells/Repairs)	250	302	250	302	225	270	270	307	346
	AOR (95% CI)	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**
Environmental, Technical & Social									
Poor Water Quality	1.40 (0.50-3.92)	1.38 (0.60-3.19)	**2.93 (0.90-9.58)***	2.06 (0.77-5.49)	0.69 (0.17-2.82)	1.10 (0.41-2.95)	1.02 (0.30-3.50)	**3.96 (1.31-11.96)****	2.02 (0.75-5.42)
No Electricity	0.93 (0.29-3.04)	0.92 (0.43-1.94)	1.14 (0.15-8.84)	1.44 (0.47-4.38)	1.42 (0.35-5.74)	0.81 (0.34-1.93)	1.54 (0.29-8.16)	2.19 (0.44-10.81)	0.77 (0.19-3.14)
Dug Well	1.89 (0.54-6.67)	**2.62 (1.02-6.71)****	2.27 (0.54-9.59)	2.42 (0.73-8.04)	1.37 (0.24-7.99)	**2.70 (0.87-8.35)***	1.95 (0.32-11.74)	**15.62 (0.99-247.75)***	1.37 (0.31-6.01)
Spare Parts Distance	1.02 (1.00-1.04)	1.01 (1.00-1.03)	1.01 (1.00-1.03)	1.01 (0.99-1.02)	1.02 (1.00-1.04)	1.01 (1.00-1.03)	1.01 (0.99-1.02)	0.99 (0.95-1.03)	0.98 (0.95-1.01)

Spares Availability	2.82 (0.63-12.58)	1.26 (0.49-3.20)	0.87 (0.20-3.71)	0.97 (0.31-3.02)	1.42 (0.37-5.43)	0.77 (0.29-2.02)	**0.32 (0.12-0.82)****	0.95 (0.05-17.70)	1.26 (0.42-3.75)
Distance-To-Mechanic								1.02 (0.78-1.32)	0.95 (0.74-1.22)
Kabul Hand Pump (Indus = Ref.)	2.02 (0.51-8.02)	-	0.32 (0.04-2.67)	-	**4.20 (1.05-16.92)****	-	-	0.17 (0.01-2.20)	-
Pamir Hand Pump (Indus = Ref.)	2.06 (0.63-6.79)	-	1.60 (0.23-11.27)	-	2.87 (0.74-11.18)	-	-	0.21 (0.02-2.46)	-
Unimproved Drinking Water Source	1.62 (0.60-4.37)	1.48 (0.71-3.07)	**2.89 (0.85-9.80)***	2.30 (0.85-6.26)	1.56 (0.52-4.71)	1.51 (0.70-3.24)	**4.37 (1.53-12.50)****	0.79 (0.13-4.71)	0.71 (0.18-2.73)
Distance To Kabul	0.99 (0.96-1.02)	0.99 (0.97-1.01)	0.99 (0.96-1.02)	0.99 (0.97-1.02)	0.98 (0.95-1.02)	0.99 (0.97-1.01)	0.98 (0.96-1.01)	1.07 (0.98-1.16)	**1.05 (1.01-1.09)****
No. Water Use Purposes	**0.60 (0.43-0.84)****	**0.72 (0.54-0.97)****	0.65 (0.44-0.96)	**0.70 (0.50-0.98)****	0.72 (0.48-1.08)	0.89 (0.63-1.27)	0.97 (0.62-1.52)	0.64 (0.36-1.13)	**0.67 (0.45-1.00)***
> 15 Hhs Using Well	1.29 (0.63-2.62)	0.97 (0.56-1.67)	1.93 (0.60-6.18)	1.36 (0.66-2.81)	0.95 (0.43-2.10)	0.95 (0.50-1.81)	1.63 (0.57-4.62)	1.60 (0.55-4.66)	**1.23 (0.57-2.65)**
Repair Cost	-	-	-	-	-	-	-	**1.00 (1.00-1.00)***	**1.00 (1.00-1.00)***
Involvement In Implementation									
Information about O&M	1.65 (0.55-4.96)	1.10 (0.48-2.51)	0.72 (0.23-2.20)	0.69 (0.26-1.82)	1.80 (0.53-6.11)	1.23 (0.50-2.99)	0.69 (0.19-2.50)	**0.30 (0.09-1.01)***	0.44 (0.15-1.32)
Decisions about Management	0.96 (0.24-3.88)	0.91 (0.34-2.44)	0.28 (0.06-1.44)	0.56 (0.16-1.97)	1.24 (0.27.5.74)	0.79 (0.26-2.35)	0.34 (0.07-1.62)	**0.10 (0.01-1.44)***	1.13 (0.36-3.54)
Provision of Training	0.66 (0.27-1.60)	0.64 (0.32-1.32)	1.55 (0.29-8.23)	1.30 (0.42-4.04)	0.76 (0.31-1.88)	0.65 (0.30-1.40)	1.27 (0.32-5.13)	0.16 (0.01-2.12)	**0.12 (0.02-**

									0.75)**
Percent of HHs Contributing Cash	0.99 (0.97-1.01)	1.00 (0.98-1.01)	1.01 (0.98-1.03)	1.01 (1.00-1.03)	0.99 (0.95-1.02)	0.99 (0.97-1.02)	1.01 (0.99-1.03)	0.88 (0.66-1.18)	0.93 (0.84-1.03)
Days Of Labor Contributed	0.94 (0.83-1.04)	**0.89 (0.79-1.01)***	0.93 (0.84-1.03)	0.87 (0.69-1.09)	0.93 (0.85-1.02)	**0.90 (0.80-1.01)***	0.86 (0.67-1.12)	0.65 (0.37-1.12)	0.88 (0.71-1.08)
Institutional & Financial									
Active Committee	0.26 (0.04-1.61)	0.40 (0.14-1.20)	**0.15 (0.03-0.75)****	**0.11 (0.03-0.47)****	**0.15 (0.03-0.75)****	**0.25 (0.09-0.72)****	**0.07 (0.01-0.35)*****	-	-
User Fees	0.68 (0.32-1.46)	0.64 (0.34-1.21)	0.56 (0.19-1.66)	**0.35 (0.14-0.89)****	0.81 (0.34-1.91)	0.79 (0.39-1.58)	0.35 (0.10-1.27)	1.53 (0.33-7.02)	0.70 (0.26-1.87)
Caretaker Buys Parts	**0.24 (0.08-0.74)****	**0.39 (0.17-0.90)****	0.54 (0.13-2.22)	0.36 (0.11-1.13)	**0.30 (0.08-1.20)***	0.52 (0.17-1.56)	1.09 (0.17-6.96)	0.95 (0.19-4.68)	0.61 (0.24-1.54)

Table 33: Full Multivariable GEE – Model A, Outcome Variable: Non-functionality

11. Model A – Multivariable GEE Logistic Regression Analysis: Non-Functional Wells								
	Block 1		**Blocks 1 & 2**		**Blocks 1 & 3**		**Blocks 1,2 & 3**	
	Incl. pump type	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**
Goodness of fit (QICC)	354.6	485.2	262.4	344.0	298.0	408.7	249.2	330.7
Number of villages	175	208	145	165	164	188	140	160
Number of wells	359	464	257	314	333	411	250	302

Block 1: Environmental, Technical & Social								
Poor Water Quality	1.03 (0.46-2.30)	0.79 (0.41-1.51)	1.42 (0.53-3.82)	1.34 (0.60-2.98)	0.78 (0.31-1.96)	0.72 (0.34-1.50)	1.12 (0.39-3.20)	1.21 (0.52-2.82)
Access To Electricity	0.82 (0.42-1.61)	0.88 (0.49-1.56)	0.84 (0.29-2.41)	0.94 (0.45-1.98)	1.16 (0.51-2.65)	0.93 (0.49-1.78)	1.06 (0.33-3.45)	0.89 (0.42-1.92)
Dug Well	0.87 (0.37-2.04)	1.20 (0.56-2.55)	1.22 (0.37-4.00)	1.80 (0.69-4.74)	0.85 (0.30-2.43)	1.17 (0.50-2.73)	1.22 (0.31-4.90)	1.99 (0.69-5.78)
Spare Parts Distance	1.01 (0.99-1.03)	1.01 (0.99-1.02)	1.02 (1.00-1.04)	1.01 (0.99-1.03)	1.01 (0.99-1.03)	1.01 (1.00-1.03)	1.02 (1.00-1.04)	1.01 (1.00-1.03)
Spares Availability	2.08 (0.74-5.85)	0.92 (0.46-1.85)	2.46 (0.62-9.75)	1.18 (0.47-2.96)	2.57 (0.72-9.17)	1.10 (0.47-2.49)	3.08 (0.67-14.27)	1.35 (0.50-3.69)
Year-Round Supply	**0.25 (0.10-0.64)****	**0.12 (0.05-0.26)*****	**0.31 (0.11-0.90)****	**0.21 (0.08-0.53)*****	**0.22 (0.08-0.59)****	**0.17 (0.08-0.40)*****	**0.27 (0.09-0.83)****	**0.24 (0.090.62)****
Kabul Hand Pump (Indus = Ref.)	**2.36 (1.09-5.13)****	-	2.39 (0.76-7.53)	-	**2.52 (1.00-6.36)****	-	2.46 (0.65-9.33)	-
Pamir Hand Pump (Indus = Ref.)	1.49 (0.72-3.08)	-	1.30 (0.46-3.69)	-	**2.50 (1.11-5.63)****	-	2.37 (0.72-7.79)	-
Unimproved Water Source	1.51 (0.70-3.28)	1.54 (0.84-2.83)	1.57 (0.63-3.91)	1.54 (0.78-3.05)	1.42 (0.57-3.54)	1.31 (0.64-2.67)	1.44 (0.53-3.93)	1.44 (0.69-3.01)
Distance To Kabul	1.00 (0.98-1.02)	1.00 (0.98-1.02)	0.99 (0.97-1.02)	0.99 (0.97-1.01)	1.00 (0.98-1.03)	1.00 (0.98-1.01)	0.99 (0.97-1.02)	0.99 (0.97-1.01)
No. Water Use Purposes	**0.60 (0.46-0.79)*****	**0.75 (0.59-0.95)****	**0.59 (0.42-0.83)****	**0.72 (0.53-0.97)****	**0.66 (0.50-0.89)****	0.79 (0.60-1.05)	**0.63 (0.45-0.90)****	0.78 (0.57-1.07)
> 15 Hhs Using Well	1.38 (0.77-2.48)	1.36 (0.85-2.16)	1.46 (0.72-2.96)	1.09 (0.63-1.86)	1.10 (0.57-2.09)	1.18 (0.71-1.99)	1.22 (0.58-2.59)	1.00 (0.56-1.77)
Block 2: Involvement In Implementation								
Information About O&M			1.64 (0.59-4.55)	1.11 (0.50-2.46)			1.63 (0.53-5.00)	1.05 (0.45-2.43)

Decisions About Management			0.60 (0.17-2.09)	0.58 (0.22-1.53)			0.90 (0.21-3.89)	0.78 (0.27-2.22)
Provision Of Training			0.96 (0.42-2.21)	0.79 (0.42-1.47)			0.73 (0.30-1.78)	0.69 (0.34-1.42)
Percent Of Hhs Contributing Cash			1.00 (0.98-1.01)	1.00 (0.98-1.01)			0.99 (0.97-1.01)	0.99 (0.98-1.01)
Avg. Days Of Labor			0.94 (0.82-1.08)	**0.88 (0.76-1.02)***			0.94 (0.83-1.05)	**0.89 (0.79-1.02)***
Block 3: Institutional & Financial								
Active Committee					0.62 (0.19-2.08)	0.57 (0.24-1.38)	0.29 (0.03-2.43)	0.49 (0.12-1.95)
User Fees					0.54 (0.27-1.07)	**0.55 (0.32-0.95)****	0.71 (0.33-1.54)	0.70 (0.37-1.34)
Caretaker Buys Parts					**0.21 (0.08-0.52)*****	**0.33 (0.17-0.65)*****	**0.23 (0.07-0.75)****	**0.43 (0.18-1.03)***

***<0.001, **<0.05, *<0.10

Table 34: Full Multivariable GEE – Model B, Outcome Variable: Out-of-Commission (non-functional for >12 months)

12. Model B – Multivariable GEE logistic regression analysis: Out-of-commission wells								
	Block 1		**Blocks 1 & 2**		**Blocks 1 & 3**		**Blocks 1,2 & 3**	
	Incl. pump type	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**
Goodness of fit (QICC)	219.0	301.6	171.4	217.5	182.8	241.6	161.7	198.9
Number of villages	175	208	145	165	164	188	140	160
Number of wells	359	464	257	314	333	411	250	302

Block 1: Environmental, Technical & Social								
Poor Water Quality	2.03 (0.85-4.87)	1.36 (0.63-2.93)	**2.93 (0.97-8.86)***	1.81 (0.74-4.43)	1.29 (0.41-4.00)	1.10 (0.45-2.67)	2.44 (0.72-8.26)	1.70 (0.63-4.59)
Access To Electricity	0.60 (0.21-1.69)	0.77 (0.33-1.80)	1.37 (0.27-6.91)	1.54 (0.47-5.03)	0.81 (0.19-3.38)	1.00 (0.38-2.64)	1.59 (0.20-12.99)	1.48 (0.41-5.29)
Dug Well	0.82 (0.26-2.56)	0.97 (0.31-3.08)	0.62 (0.13-2.93)	0.78 (0.17-3.57)	0.87 (0.21-3.53)	1.03 (0.29-3.67)	0.76 (0.13-4.41)	1.24 (0.22-7.14)
Spare Parts Distance	1.01 (0.99-1.02)	1.01 (0.27-1.57)	1.01 (0.99-1.02)	1.00 (0.99-1.02)	1.01 (1.00-1.02)	1.01 (1.00-1.02)	1.01 (0.99-1.02)	1.01(0.99-1.02)
Spares Availability	0.84 (0.23-3.04)	0.65 (0.27-1.57)	1.11 (0.23-5.35)	1.09 (0.34-3.47)	0.67 ().17-2.61)	0.71 (0.25-2.06)	1.02 (0.21-5.05)	0.95 (0.27-3.32)
Year-Round Supply	**0.19 (0.08-0.50)*****	**0.12 (0.05-0.26)*****	**0.13 (0.04-0.40)*****	**0.11 (0.04-0.35)*****	**0.16 (0.05-0.48)*****	**0.14 (0.05-0.38)*****	**0.12 (0.04-0.41)*****	**0.13 (0.04-0.40)*****
Kabul Hand Pump (Indus = Ref.)	1.16 (0.44-3.05)	-	0.59 (0.11-3.08)	-	0.84 (0.23-3.00)	-	0.58 (0.08-4.35)	-
Pamir Hand Pump (Indus = Ref.)	1.51 (0.54-4.25)	-	1.40 (0.26-7.61)	-	1.97 (0.54-7.22)	-	2.27 (0.28-18.29)	-
Unimproved Water Source	1.18 (0.41-3.41)	1.29 (0.55-3.00)	1.82 (0.55-6.00)	1.92 (0.70-5.29)	1.75 (0.56-5.51)	1.63 (0.63-4.23)	2.20 (0.59-8.24)	2.29 (0.74-7.03)
Distance To Kabul	1.01 (0.99-1.03)	1.01 (0.99-1.03)	1.01 (0.98-1.04)	1.01 (0.98-1.03)	1.00 (0.97-1.03)	1.00 (0.97-1.02)	1.01 (0.97-1.04)	1.00 (0.98-1.03)
No. Water Use Purposes	**0.70 (0.51-0.97)****	**0.76 (0.56-1.02)***	**0.74 (0.52-1.05)***	**0.75 (0.54-1.03)***	**0.72 (0.50-1.04)***	**0.76 (0.55-1.05)***	0.74 (0.51-1.09)	0.80 (0.56-1.13)
> 15 Hhs Using Well	1.45 (0.60-3.50)	1.42 (0.76-2.66)	2.10 (0.67-6.58)	1.58 (0.75-3.37)	1.08 (0.37-3.14)	1.24 (0.63-2.42)	2.02 (0.55-7.40)	1.53 (0.71-3.30)
Block 2: Involvement In Implementation								
Information About O&M			0.68 (0.23-2.00)	0.59 (0.24-1.49)			0.79 (0.23-2.68)	0.62 (0.22-1.74)
Decisions About Management			**0.20 (0.036-**	**0.33 (0.10-1.17)***			0.19 (0.02-1.56)	0.38 (0.10-1.48)

			1.12)*					
Provision Of Training			2.00 (0.44-9.03)	1.53 (0.48-4.84)			2.30 (0.39-13.75)	1.73 (0.47-6.30)
Percent Of Hhs Contributing Cash			1.01 (0.99-1.03)	1.01 (0.99-1.03)			1.00 (0.97-1.03)	1.01 (0.99-1.03)
Avg. Days Of Labor			0.98 (0.91-1.05)	0.92 (0.75-1.12)			0.95 (0.88-1.02)	0.89 (0.71-1.12)
Block 3: Institutional & Financial								
Active Committee					0.33 (0.08-1.46)	**0.32 (0.10-1.01)***	**0.16 (0.02-1.12)***	**0.14 (0.02-0.84)****
User Fees					0.67 (0.25-1.78)	**0.48 (0.21-1.06)***	0.62 (0.19-2.02)	**0.41 (0.16-1.05)***
Caretaker Buys Parts					**0.31 (0.09-1.09)***	**0.35 (0.14-0.84)****	0.54 (0.12-2.48)	0.45 (0.15-1.37)

***<0.001, **<0.05, *<0.10

Table 35: Full Multivariable GEE – Model C, Outcome Variable: Breakdowns >1 week

Model C – Multivariable GEE Logistic Regression Analysis: Breakdowns >1 Week								
	Block 1		**Block 1 & 2**		**Blocks 1 &3**		**Blocks 1-3**	
	Incl. pump type	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**
Goodness Of Fit (QICC)	245.3	292.2	191.5	231.3	244.2	292.3	195.3	233.9
Number Of Subjects (Villages)	103	118	89	99	103	116	89	99

Number Of Repairs	407	468	320	361	407	459	320	360
Block 1: Environmental, Technical & Social								
Poor Water Quality	**2.86 (0.91-8.96)***	1.64 (0.47-5.69)	**3.97 (1.43-11.03)****	1.84 (0.68-4.99)	**2.92 (0.99-8.56)***	1.85 (0.55-6.23)	**3.64 (1.26-10.58)****	2.00 (0.75-5.32)
No Electricity	0.44 (0.15-1.27)	0.48 (0.16-1.46)	1.98 (0.52-7.59)	0.85 (0.23-3.16)	0.50 (0.18-1.41)	0.46 (0.15-1.44)	2.09 (0.46-9.52)	0.77 (0.20-2.95)
Dug Well	3.12 (0.77-12.69)	**2.93 (0.95-9.08)***	7.73 (0.34-177.96)	1.40 (0.27-7.27)	**3.71 (0.95-14.46)***	**2.98 (0.96-9.25)***	8.14 (0.32-209.88)	1.20 (0.24-6.04)
Spare Parts Distance	1.01 (0.97-1.04)	0.99 (0.96-1.02)	0.98 (0.94-1.03)	0.97 (0.94-1.01)	1.00 (0.97-1.04)	0.99 (0.96-1.01)	0.98 (0.94-1.03)	0.97 (0.94-1.01)
Spares Availability	0.38 (0.09-1.62)	0.57 (0.20-1.58)	1.18 (0.13-9.62)	1.16 (0.44-3.06)	0.33 (0.08-1.42)	0.78 (0.24-2.46)	1.00 (0.07-14.60)	1.35 (0.48-3.78)
Time -To-Mechanic (Hrs)	1.08 (0.81-1.44)	1.18 (0.96-1.44)	1.04 (0.81-1.34)	0.97 (0.78-1.21)	1.11 (0.86-1.44)	**1.20 (0.98-1.47)***	1.05 (0.83-1.33)	0.99 (0.78-1.25)
Year-Round Supply	**0.26 (0.07-0.98)****	0.35 (0.09-1.36)	**0.09 (0.02-3.91)*****	**0.21 (0.05-0.90)****	**0.25 (0.08-0.84)****	0.39 (0.11-1.38)	**0.10 (0.02-0.39)*****	**0.22 (0.05-0.95)****
Kabul Hand Pump (Indus = Ref.)	0.62 (0.19-1.97)	-	0.30 (0.04-2.14)	-	0.34 (0.09-1.48)	-	0.22 (0.02-2.48)	-
Pamir Hand Pump (Indus = Ref.)	**0.27 (0.08-0.98)****	-	0.27 (0.03-2.73)	-	**0.22 (0.05-0.95)****	-	0.25 (0.02-3.00)	-
Unimproved Drinking Water Source	0.50 (0.12-2.05)	0.62 (0.21-1.88)	0.69 (0.11-4.18)	0.64 (0.18-2.35)	0.40 (0.10-1.68)	0.55 (0.18-1.64)	0.62 (0.11-3.45)	0.65 (0.17-2.44)
Distance To Kabul (10km)	1.01 (0.98-1.05)	1.02 (0.99-1.04)	**1.07 (1.00-1.15)***	**1.05 (1.01-1.09)****	**1.02 (0.99-1.05)**	**1.03 (1.00-1.05)***	**1.07 (0.99-1.16)***	**1.05 (1.01-1.09)****

No. Water Use Purposes	**0.67 (0.46-0.97)****	**0.65 (0.45-0.95)****	0.69 (0.44-1.10)	**0.67 (0.46-0.97)****	**0.62 (0.41-0.94)****	**0.68 (0.45-1.01)***	0.68 (0.40-1.15)	**0.71 (0.48-1.06)***
> 15 HHs using well	**1.96 (0.89-4.31)***	1.36 (0.66-2.77)	2.30 (0.65-8.09)	1.47 (0.64-3.93)	1.79 (0.84-3.82)	1.28 (0.65-2.53)	2.05 (0.62-6.76)	1.48 (0.68-3.21)
Repair cost	**1.00 (1.00-1.00)*****	**1.00 (1.00-1.00)*****	**1.00 (1.00-1.00)***	**1.00 (1.00-1.00)***	**1.00 (1.00-1.00)*****	**1.00 (1.00-1.00)*****	**1.00 (1.00-1.00)***	**1.00 (1.00-1.00)***
Block 2: Involvement in implementation								
Information about O&M			0.34 (0.09-1.24)	0.51 (0.17-1.53)			**0.33 (0.10-1.15)***	0.50 (0.16-1.56)
Decisions about management			**0.08 (0.01-1.08)***	0.59 (0.19-1.77)			**0.09 (0.01-1.18)***	0.78 (0.27-2.29)
Provision of training			0.10 (0.00-2.28)	**0.11 (0.01-0.83)****			0.11 (0.01-2.52)	**0.11 (0.02-0.72)****
Percent of HHs contributing cash			0.89 (0.66-1.19)	0.89 (0.73-1.09)			0.88 (0.66-1.18)	0.93 (0.81-1.05)
Avg. days of labor			**0.67 (0.42-1.07)***	0.88 (0.71-1.09)			**0.66 (0.41-1.05)***	0.89 (0.71-1.11)
Block 3: Institutional & Financial factors								
Active committee					-	-	-	-
User fees					2.39 (0.59-9.81)	1.09 (0.37-3.25)	1.44 (0.33-6.28)	0.75 (0.29-1.94)
Caretaker buys parts					0.55 (0.19-1.57)	0.48 (0.20-1.16)	0.76 (0.17-3.48)	0.52 (0.21-1.29)

Table 36: Full Multivariable GEE – Model D, Outcome Variable: Non-Functionality (Only Wells with Year-Round Water)

13. Model G – Multivariable GEE Logistic Regression Analysis: Non-Functional Wells (excluding seasonally or permanently dry wells)								
	Block 1		**Block 1 & 2**		**Blocks 1 &3**		**Blocks 1-3**	
	Incl. pump type	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**
Goodness of fit (QICC)	320.4	431.6	233.7	303.1	253.8	347.5	220.4	291.5
Number of villages	154	186	126	145	140	162	121	140
Number of wells	330	420	232	281	290	349	225	270
Block 1: Environmental, Technical & Social								
Poor water quality	0.96 (0.40-2.32)	0.85 (0.42-1.71)	0.95 (0.27-3.73)	1.22 (0.47-3.15)	1.64 (0.17-15.57)	0.69 (0.29-1.64)	0.69 (0.17-2.82)	1.10 (0.41-2.95)
Access to electricity	0.91 (0.44-1.88)	0.80 (0.44-1.48)	1.12 (0.32-3.87)	0.86 (0.38-1.97)	1.75 (0.65-4.70)	0.90 (0.43-1.86)	1.42 (0.35-5.74)	0.81 (0.34-1.93)
Dug well	0.70 (0.27-1.86)	1.20 (0.54-2.64)	1.05 (0.23-4.74)	1.89 ().65-5.47)	0.98 (0.30-3.28)	1.40 (0.56-3.45)	1.37 (0.24-7.99)	**2.70 (0.87-8.35)***
Spare parts distance	1.01 (0.99-1.03)	1.01 (0.99-1.02)	1.02 (1.00-1.04)	1.01 (0.99-1.02)	1.01 (0.99-1.03)	1.01 (0.99-1.02)	1.02 (1.00-1.04)	1.01 (1.00-1.03)
Spares availability	1.37 (0.51-3.69)	0.71 (0.36-1.40)	1.27 (0.33-4.91)	0.73 (0.29-1.84)	1.28 (0.38-4.36)	0.61 (0.28-1.32)	1.42 (0.37-5.43)	0.77 (0.29-2.02)
Kabul hand pump (Indus = Ref.)	**2.61 (1.19-5.72)****	-	**3.52 (1.08-11.51)****	-	**3.57 (1.32-9.69)****	-	**4.20 (1.05-16.92)****	-
Pamir hand pump (Indus = Ref.)	1.57 (0.71-3.47)	-	1.60 (0.46-5.51)	-	**2.98 (1.08-8.23)****	-	2.87 (0.74-11.18)	-

Unimproved water source	1.57 (0.70-3.52)	1.63 (0.88-3.04)	1.63 (0.62-4.28)	1.60 (0.79-3.26)	1.59 (0.59-4.33)	1.41 (0.64-3.08)	1.56 (0.52-4.71)	1.51 (0.70-3.24)
Distance to Kabul	1.00 (0.98-1.02)	0.99 (0.98-1.01)	0.99 (0.96-1.02)	0.99 (0.96-1.01)	0.99 (0.97-1.02)	0.99 (0.97-1.01)	0.98 (0.95-1.02)	0.99 (0.97-1.01)
No. water use purposes	**0.66 (0.49-0.88)****	**0.78 (0.61-1.01)***	**0.67 (0.45-0.99)****	0.80 (0.58-1.11)	0.76 (0.55-1.06)	0.89 (0.65-1.22)	0.72 (0.48-1.08)	0.89 (0.63-1.27)
> 15 HHs using well	1.15 (0.62-2.13)	1.31 (0.78-2.20)	1.10 (0.54-2.25)	1.00 (0.55-1.84)	1.00 (0.48-2.05)	1.10 (0.61-1.99)	0.95 (0.43-2.10)	0.95 (0.50-1.81)
Block 2: Involvement in implementation								
Information about O&M			1.67 (0.53-5.26)	1.19 (0.51-2.77)			1.80 (0.53-6.11)	1.23 (0.50-2.99)
Decisions about management			0.78 (0.19-3.30)	0.59 (0.21-1.69)			1.24 (0.27.5.74)	0.79 (0.26-2.35)
Provision of training			0.86 (0.37-2.02)	0.69 (0.35-1.33)			0.76 (0.31-1.88)	0.65 (0.30-1.40)
Percent of HHs contributing cash			1.00 (0.98-1.02)	1.00 (0.98-1.02)			0.99 (0.95-1.02)	0.99 (0.97-1.02)
Avg. days of labor			0.94 (0.84-1.06)	0.90 (0.80-1.02)			0.93 (0.85-1.02)	**0.90 (0.80-1.01)***
Block 3: Institutional & Financial								
Active committee					0.42 (0.14-1.30)	**0.43 (0.16-1.14)***	**0.15 (0.03-0.75)****	**0.25 (0.09-0.72)****
User fees					0.59 (0.27-1.28)	0.64 (0.35-1.14)	0.81 (0.34-1.91)	0.79 (0.39-1.58)
Caretaker buys parts					**0.26 (0.08-0.79)****	**0.44 (0.19-1.01)***	**0.30 (0.08-1.20)***	0.52 (0.17-1.56)

***<0.001, **<0.05, *<0.10

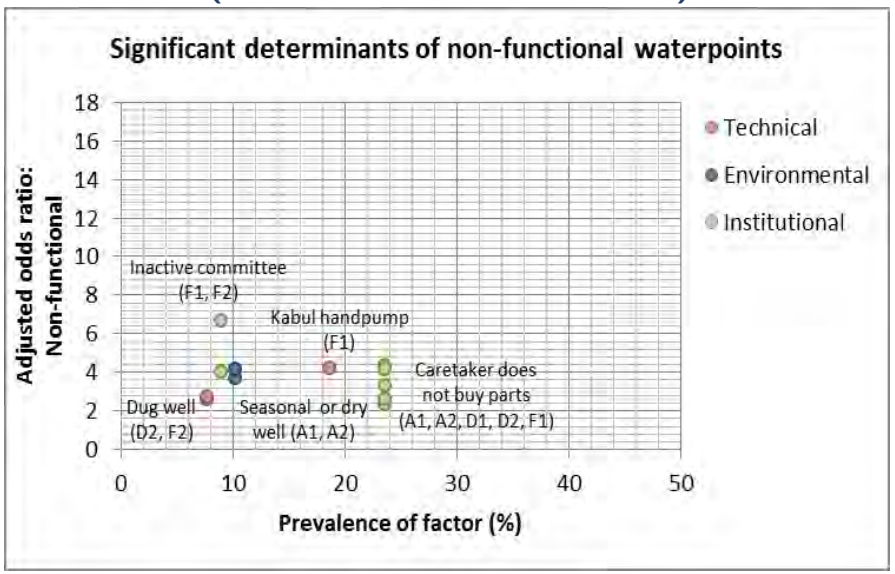
Table 37: Full Multivariable GEE – Model H, Outcome Variable: Breakdowns >1 Week (only wells with year-round water)

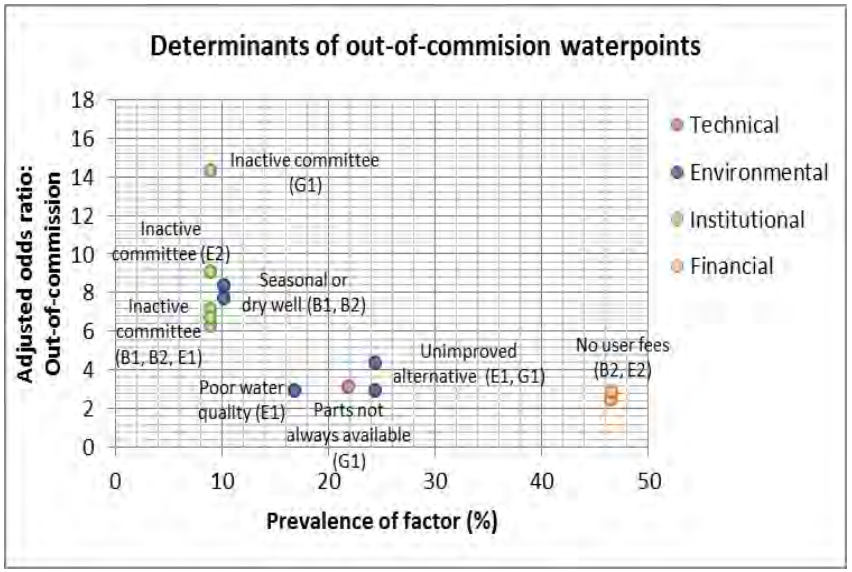
14. Model H – Multivariable GGE Logistic Regression Analysis: Breakdowns >1 Week (excluding seasonally or permanently dry wells)								
	Block 1		**Block 1 & 2**		**Blocks 1 & 3**		**Blocks 1-3**	
	Incl. pump type	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**	**Incl. pump type**	**Excl. pump type**
Goodness of fit (QICC)	227.7	275.5	176.5	215.1	228.3	275.2	180.2	217.8
Number of subjects (villages)	99	113	85	94	99	109	85	94
Number of repairs	394	454	307	347	392	441	307	346
Block 1: Environ-mental, Technical & Social								
Poor water quality	**2.90 (0.89-9.42)***	1.63 (0.45-5.84)	**4.30 (1.49-12.42)****	1.89 (0.70-5.11)	**2.96 (1.00-8.76)****	1.87 (0.54-6.49)	**3.96 (1.31-11.96)****	2.02 (0.75-5.42)
No electricity	0.52 (0.19-1.48)	0.59 (0.19-1.82)	2.012 (0.52-7.86)	0.87 (0.23-3.37)	0.59 (0.21-1.65)	0.53 (0.17-1.71)	2.19 (0.44-10.81)	0.77 (0.19-3.14)
Dug well	**4.34 (1.12-16.76)****	**3.75 (1.28-10.97)****	**13.80 (1.00-191.36)***	**1.54 (0.34-6.95)**	**4.73 (1.29-17.41)****	**3.69 (1.25-10.93)****	**15.62 (0.99-247.75)***	1.37 (0.31-6.01)
Spare parts distance	1.01 (0.97-1.04)	0.99 (0.96-1.02)	0.99 (0.95-1.03)	0.98 (0.94-1.01)	1.00 (0.97-1.04)	0.99 (0.96-1.02)	0.99 (0.95-1.03)	0.98 (0.95-1.01)
Spares availability	0.34 (0.07-1.55)	0.61 (0.20-1.85)	1.12 (0.10-12.55)	1.15 (0.42-3.17)	0.30 (0.07-1.32)	0.79 (0.24-2.61)	0.95 (0.05-17.70)	1.26 (0.42-3.75)
Distance to mechanic	1.03 (0.75-1.42)	1.14 (0.93-1.40)	1.01 (0.77-1.33)	0.94 (0.75-1.18)	1.06 (0.79-1.42)	1.16 (0.94-1.43)	1.02 (0.78-1.32)	0.95 (0.74-1.22)

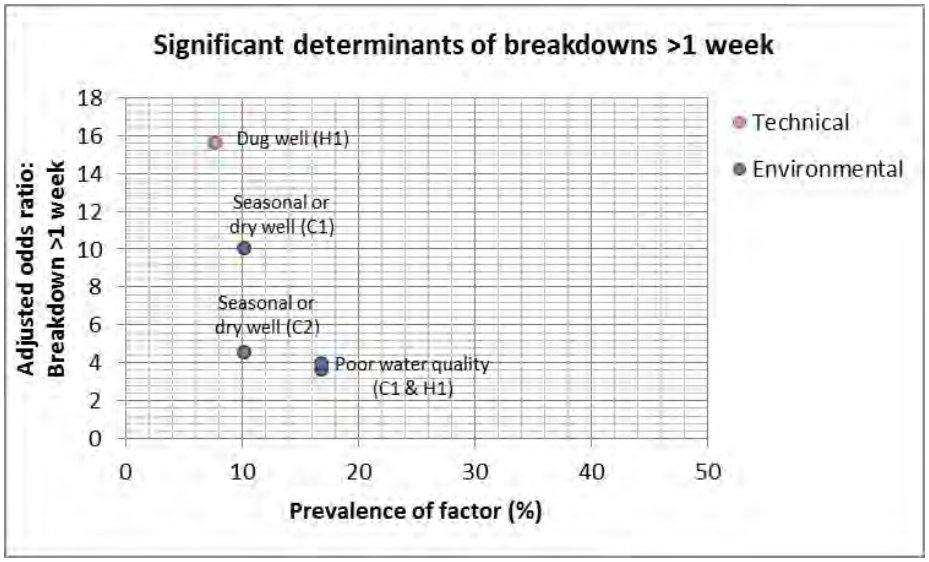
Kabul hand pump (Indus = Ref.)	0.44 (0.13-1.46)	-	0.23 (0.03-1.80)	-	**0.30 (0.08-1.22)***	-	0.17 (0.01-2.20)	
Pamir hand pump (Indus = Ref.)	**0.22 (0.07-0.73)****	-	0.25 (0.03-2.58)	-	**0.18 (0.05-0.76)****	-	0.21 (0.02-2.46)	
Unimproved water source	0.60 (0.13-2.80)	0.68 (0.22-2.09)	0.90 (0.14-5.82)	0.71 (0.19-2.64)	0.50 (0.10-2.47)	0.59 (0.19-1.85)	0.79 (0.13-4.71)	0.71 (0.18-2.73)
Distance to Kabul	1.01 (0.98-1.05)	1.02 (0.99-1.05)	1.06 (0.99-1.15)	**1.04 (1.00-1.09)****	1.02 (0.99-1.05)	**1.03 (1.00-1.05)***	1.07 (0.98-1.16)	**1.05 (1.01-1.09)****
No. water use purposes	**0.62 (0.43-0.89)****	**0.61 (0.42-0.90)****	**0.67 (0.42-1.07)***	**0.63 (0.43-0.92)****	**0.58 (0.38-0.89)****	**0.64 (0.43-0.97)****	0.64 (0.36-1.13)	**0.67 (0.45-1.00)***
> 15 HHs using well	1.46 (0.72-2.95)	1.09 (0.55-2.17)	1.77 (0.56-5.59)	1.19 (0.53-2.67)	1.41 (0.069-2.87)	1.06 (0.53-2.12)	1.60 (0.55-4.66)	**1.23 (0.57-2.65)**
Repair cost	**1.00 (1.00-1.00)*****	**1.00 (1.00-1.00)*****	1.00 (1.00-1.00)	**1.00 (1.00-1.00)***	**1.00 (1.00-1.00)*****	**1.00 (1.00-1.00)***	**1.00 (1.00-1.00)***	**1.00 (1.00-1.00)***
Block 2: Involvement in implementation								
Information about O&M			**0.30 (0.08-1.07)***	0.44 (0.15-1.30)			**0.30 (0.09-1.01)***	0.44 (0.15-1.32)
Decisions about management			0.10 (0.01-1.64)	0.92 (0.28-3.08)			**0.10 (0.01-1.44)***	1.13 (0.36-3.54)
Provision of training			0.14 (0.01-1.98)	**0.13 (0.02-0.85)****			0.16 (0.01-2.12)	**0.12 (0.02-0.75)****
Percent of HHs contributing cash			0.89 (0.66-1.19)	0.91 (0.76-1.09)			0.88 (0.66-1.18)	0.93 (0.84-1.03)
Avg. days of labor			0.65 (0.38-1.11)	0.87 (0.72-1.07)			0.65 (0.37-1.12)	0.88 (0.71-1.08)

Block 3: Institutional & Financial								
Active committee					-	-	-	-
User fees					2.12 (0.55-8.91)	0.95 (0.32-2.86)	1.53 (0.33-7.02)	0.70 (0.26-1.87)
Caretaker buys parts					0.68 (0.22-2.13)	0.56 (0.22-1.42)	0.95 (0.19-4.68)	0.61 (0.24-1.54)

Adjusted Odds Ratios and Prevalence of Categorical Explanatory Variables for Significant Determinants of Operational Performance (Model Number in Parentheses)






Significant determinants of breakdowns >1 week
Adjusted odds ratio: Breakdown >1 week
18
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
Prevalence of factor (%)
Dug well (H1)
Seasonal or dry well (C1)
Seasonal or dry well (C2)
Poor water quality (C1 & H1)
Technical
Environmental

ANNEX VIII: SELF-REPORTED REASONS WHY BREAKDOWNS ARE LENGTHY OR INDEFINITE

An instructive source of information was the self-reported explanations behind the inability or unwillingness of some communities to have their wells repaired, as well as the chief reasons behind delayed repairs. Of the non-functional wells located, 64% were broken down due to a suspected mechanical fault of the hand pump (particularly due to problems with the pipes, rods or cylinder). A further 5% of wells were dry, 5% had collapsed, 4% had never been completed, and causes of failure for the remaining 22% could not be determined. This suggests at least two-thirds of the non-functional hand pumps were amenable to repair by a local mechanic. Yet, only 37% of communities with a non-functional well had contacted a mechanic, and just 26% of non-functional wells had been inspected by a mechanic.

When asked why a mechanic had either not inspected the problem or had not been able to repair the problem, respondents provided varied explanations. Around 37% of reasons related to financial factors such as a lack of money and an inability to agree on a price with the mechanic. Forty percent of explanations were linked to technical barriers. For example, the mechanic lacked the capacity to rectify the issue (e.g. the well needed deepening or rehabilitation), or in a small number of cases the community was unable to locate the required part. For 11% of cases, the failure to carry out repairs was attributed to an institutional failure (e.g. inactive water committee or caretaker), while in another 11% of cases the users simply decided they no longer needed the well or wanted it fixed.

When respondents were asked to recall repairs that had taken place over the previous 12 months, they were also invited to explain why the duration of the breakdown was as long as it was. For those breakdowns extending beyond one week, around two thirds attributed the delay to struggles relating to payment (Figure H1). This is double the number who sited unavailability of spare parts and skilled mechanics. This is consistent with the views of respondents about the major challenges they face in sustaining their system in a general sense. Paying for repairs was by far the most commonly cited challenge, with more than half of respondents considering it as an issue (Figure H1). While groundwater availability and management failures tended to have more severe consequences (as indicated by the higher non-functionality rates associated with these issues), they were also rarer. For example, payment problems were 10 times more common than groundwater availability issues.

Annex IX: Summary of Findings from FGDS with Relation to Community Satisfaction

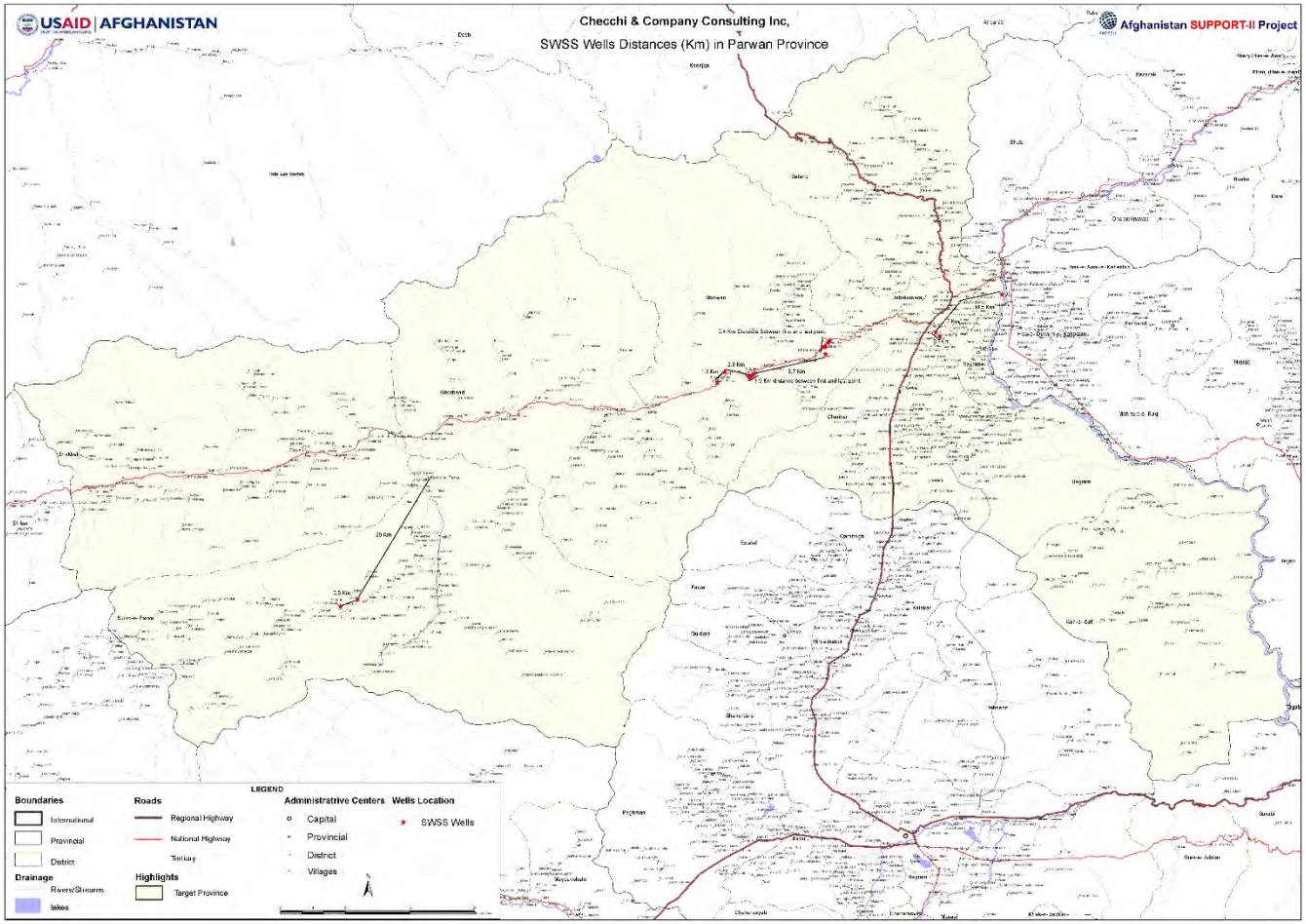
Table 38: FGDs with Relation to Community Satisfaction

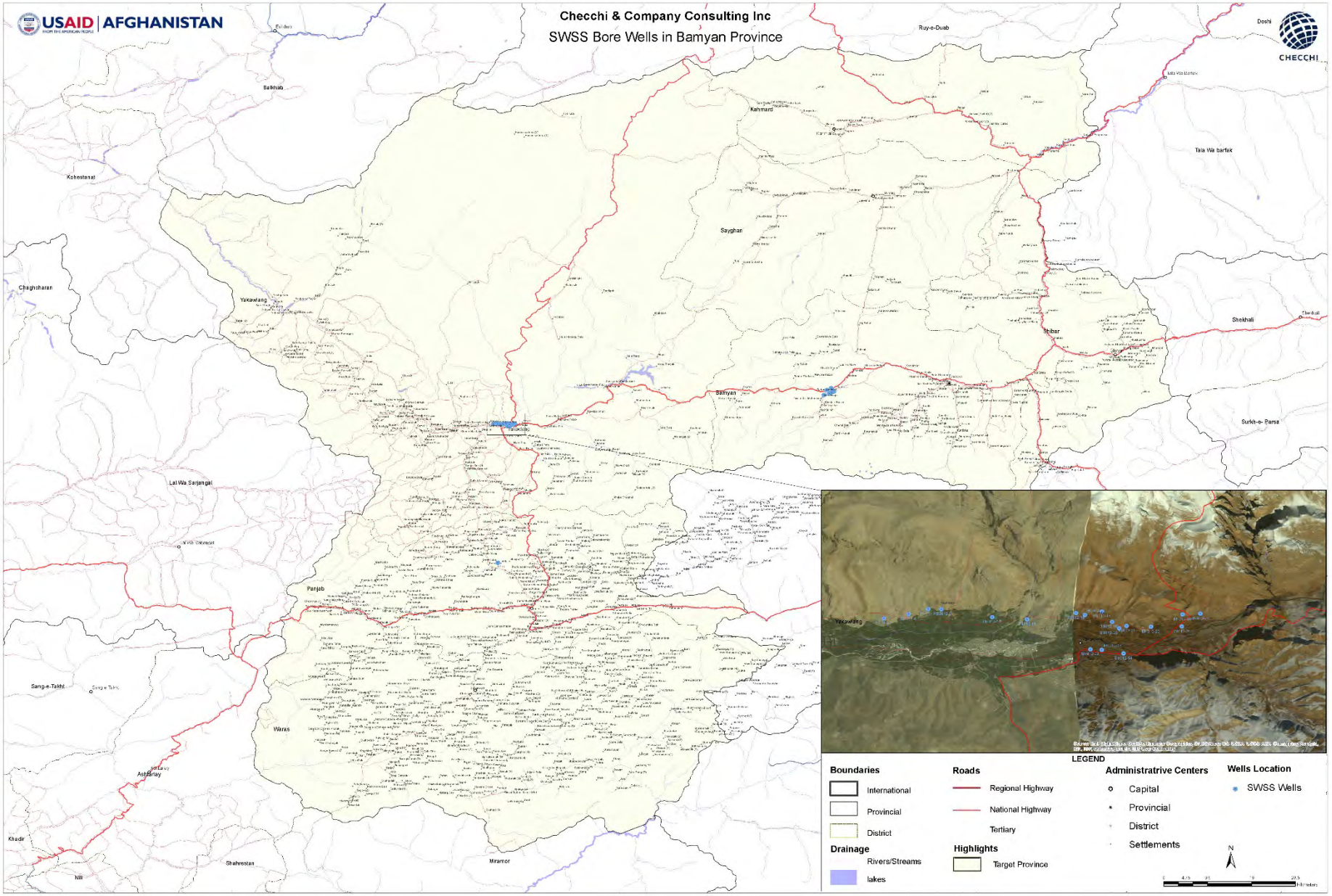
				Community Satisfaction with Respect to:					
Well ID	**Province**	**CLTS?**	**Functional well?**	**Quantity**	**Quality**	**Accessible**	**Affordable**	**Reliable**	**Notes**
121	Laghman	Yes	Yes	Y	S	Y	Y	Y	This well only served 3 households
269	Nangarhar	Yes	Yes	Y	Y	S	S	Y	There was a major conflict over this well (between 2 families) which took 3 years for community leaders to resolve. Well was closed for that period. Interview with owner of land where well was plus malik. No FGD could be conducted.
266	Nangarhar	Yes	No>1yr	N	S	Y	N	N	This well only served 3 households. Broke down a year ago after flooding, repair costs are too expensive for community. Prior to that, water was sometimes unsafe to drink, according to locals. Demographics of area have changed and more wells have been put in.
62	Laghman	Yes	Yes	Y	Y	Y	Y	Y	This well is appreciated by this community, reportedly has sufficient quantities of good quality water, and it has only required minor repairs that are easy for them to address.
105	Laghman	No	No>1yr	N	N	N	S	N	Participants in both men and women's FGDs expressed a strong need for water that this well was not able to meet. Participants in men's FGD report the well is on private land (of the community elder) and the land owner no longer lets them access it. Well reportedly breaks frequently, landowner had been paying for repairs, but now won't let anyone repair it.
283	Nangarhar	No	Yes	N	Y	Y	Y	Y	Men's FGD noted that the population in the area has increased, the well dries seasonally, and the well is no longer sufficient to meet all household needs. Women's FGD reported well was still sufficient for their own household needs.
803	Nangarhar	No	Yes	N	N	Y	N	N	The well was reportedly no providing sufficient water to meet household needs, leading some families to draw their water from a nearby stream. It reportedly has broken down frequently since it was built and the water quality is too poor for drinking.

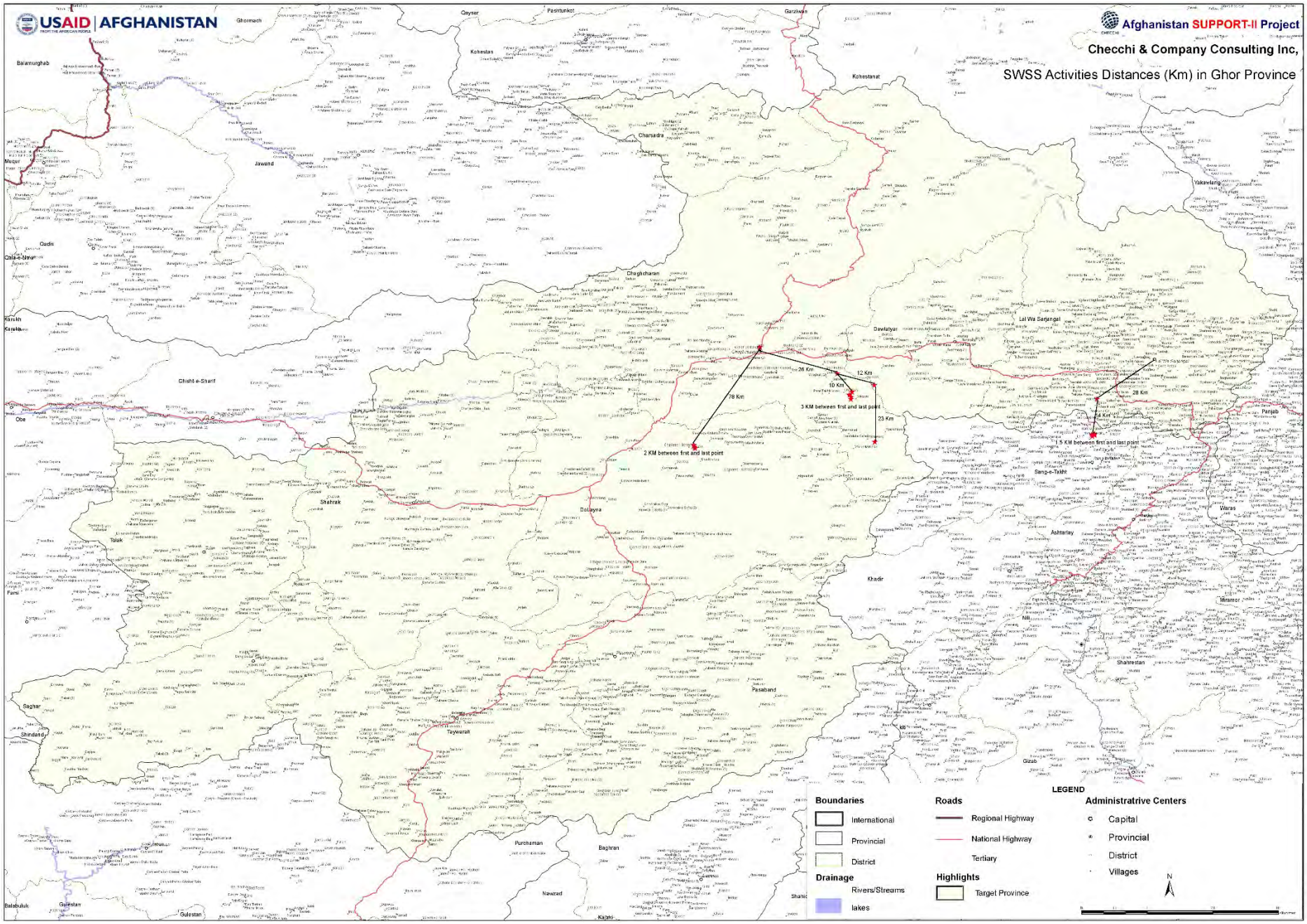
854	Nangarhar	Yes	Yes	Y	N	N	S	S	This well had been constructed on private property and was only accessed by a small number of families. The well was not really needed, according to some community members. Although many families in the area have private wells, the water quality is poor and so most access water from a well near the mosque that was put in by a different organization.
1244	Laghman	No	Yes	S	Y	Y	Y	Y	Overall, people are satisfied with the well and able to repair it when it breaks down. Sometimes there are line-ups and demand is high. People report they are using water from the well to water their crops.
1448	Bamyan	No	No>1yr	N	N	N	n/a	N	Water scarcity is a major concern here, and most people are using unclean river water. In another nearby community, people pooled their own money for a hand dug well. This well did not work from the outset. Community members believe the contractor did a shoddy job and are very dissatisfied.
1980	Kandahar	No	No>1yr	n/a	n/a	n/a	n/a	n/a	Community reportedly has 20 wells, of which only 4 are working - there is no pressing need to repair the others, and ownership of the SWSS well appears to have been low from the outset. This well did not work, but community members did not express strong dissatisfaction with this, they just have no need to fix it. In fact, despite the well having been long broken, participants from the men's FGD claimed the water it provided was sufficient in quality and quantity! (N/A in the responses here refers to a general indifference expressed by most community members).
1991	Kandahar	No	No>1yr	n/a	n/a	n/a	N	n/a	There does not appear to have been a real need for this well, nor was there any evidence of community ownership/investment. Although some of the reported breakdowns were trivial (e.g. a washer needing replacements), community members were not motivated to repair the well. They also never assigned a caretaker. The FGD participants would like outside agencies to fix their wells, but most households have their own private wells. (N/A in the responses here refers to a general indifference expressed by most community members).
2001	Bamyan	No	No>1yr	N	N	N	n/a	N	This well was working when it was put in, and people were happy as they had a strong need for water. Community members differ in their understanding of why it broke: whether the well needs deepening, or if there is a problem with the pump. The water had a salty taste and quantity varied seasonally, before it broke altogether.

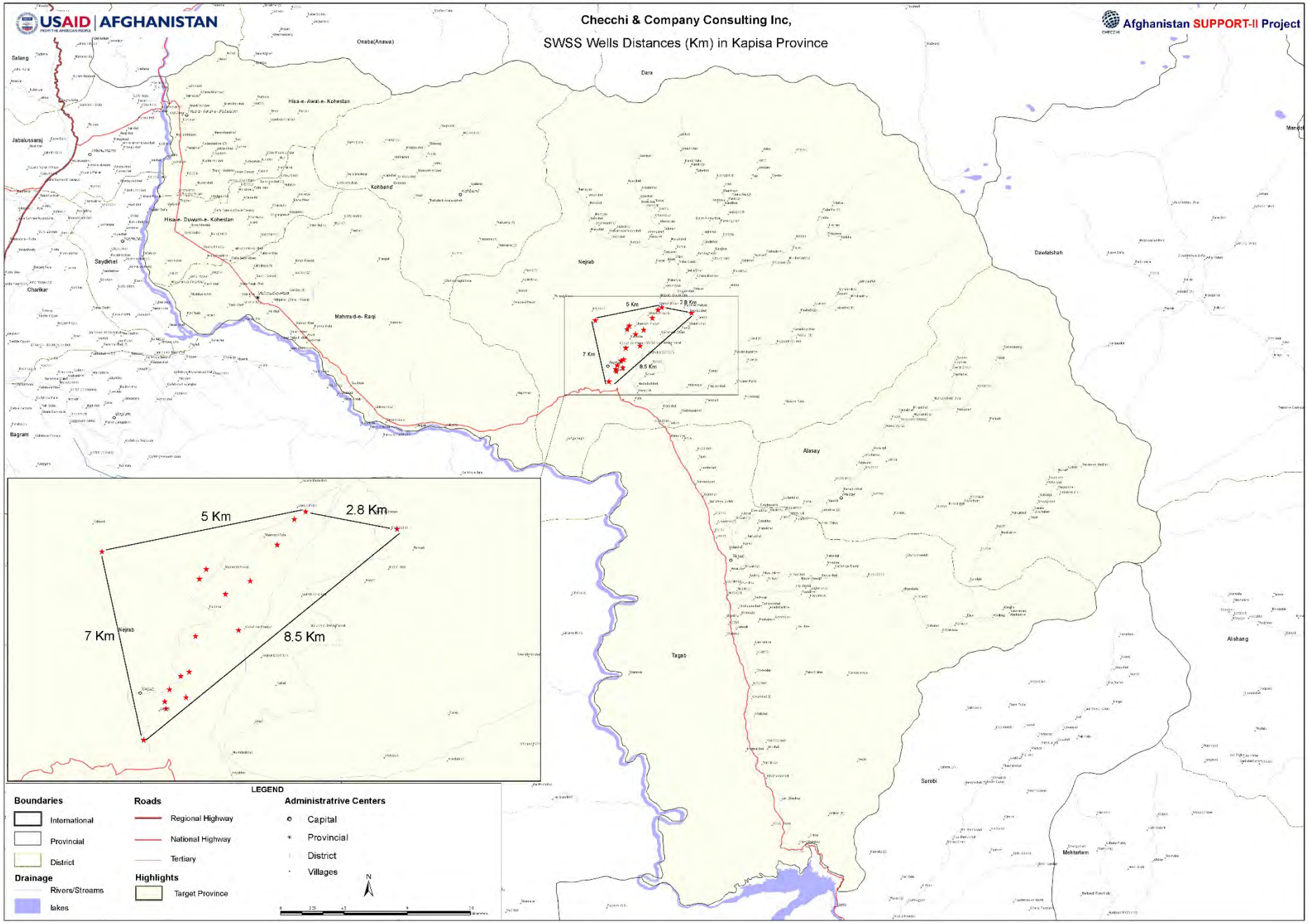
Annex X: Geolocalization

The following expandable maps show the sites of the SWSS wells in Parwan, Bamyan, Ghor, and Kapisa Provinces.




USAID | AFGHANISTAN
Checchi & Company Consulting Inc
SWSS Bore Wells in Bamyan Province
CHECCHI
Doshi
Ruy-e-Duab
Baghlan
Kahmard
Tala Wa barfek
Kohestanat
Saygban
Chaghcharan
Yakawlang
Shibar
Sheikhali
Cherdoli
Bamyan
Surkh-e- Parsa
Lal Wa Sarjangal
Panjab
Sang-e-Takht
Waras
Ashtarlay
Khadir
Shahrestan
Nili
Miramor
LEGEND
Boundaries
International
Provincial
District
Drainage
Rivers/Streams
lakes
Roads
Regional Highway
National Highway
Tertiary
Highlights
Target Province
Administratrive Centers
Capital
Provincial
District
Settlements
Wells Location
SWSS Wells
N


USAID | AFGHANISTAN
Afghanistan SUPPORT-II Project
Checchi & Company Consulting Inc,
SWSS Activities Distances (Km) in Ghor Province
26 Km
12 Km
10 Km
78 Km
3 KM between first and last point
23 Km
28 Km
2 KM between first and last point
1.5 KM between first and last point
LEGEND
Boundaries
International
Provincial
District
Drainage
Rivers/Streams
lakes
Roads
Regional Highway
National Highway
Tertiary
Highlights
Target Province
Administratrive Centers
Capital
Provincial
District
Villages
N


USAID | AFGHANISTAN
Checchi & Company Consulting Inc,
SWSS Wells Distances (Km) in Kapisa Province
Afghanistan SUPPORT-II Project
Osoba(Anawa)
Dara
Hisa-e- Awal-e- Kohestan
Jabalussaraj
Salang
Kohband
Hisa-e- Duwum-e- Kohestan
Saydkhel
Charikar
Nejrab
Dawlatshah
Mahmud-e- Raqi
Bagrami
Alasay
Tagab
Alishang
Sarobi
Mehtarlam
5 Km
2.8 Km
7 Km
8.5 Km
LEGEND
Boundaries
International
Provincial
District
Drainage
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lakes
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N

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