資料　4

協議議事録

資料 4. 協議議事録

4.1 協議議事録（2015 年 4 月 30 日署名）

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
ON
THE PROVISION OF EQUIPMENT FOR RURAL WATER SUPPLY PROJECT
IN THE CENTRAL DRY ZONE PHASE II
IN THE REPUBLIC OF THE UNION OF MYANMAR

Considering the urgent needs of providing safe drinking water in the Central Dry Zone, the Government of Japan decided to conduct a Preparatory Survey on the Provision of Equipment for Rural Water Supply Project in the Central Dry Zone Phase II (hereinafter referred to as "the Project") and entrusted the survey to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Myanmar the Preparatory Survey Team (hereinafter referred to as "the Team"), which is headed by Mr. Toshio Murakami, Senior Advisor, JICA, and the survey is scheduled to stay in the country from 26th April to 9th July, 2015.

The Team held discussions with the officials concerned of the Government of Myanmar and conducted a site visit at the survey area.

In the course of discussions and site visit, both parties confirmed the main items described in the attached sheets.

Nay Pyi Taw, 30 April, 2015

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ATTACHMENT

1. Objective of the Project

Objective of the Project is to provide equipment and materials for the construction of deep wells to develop stable water resources, thereby contributing to the improvement of living environment in the Central Dry Zone.

2. Project site

The Project sites requested by the Myanmar side are located at three regions (Mandalay, Magway and Sagaing) in the Central Dry Zone as in **Annex-1.**

3. Implementing Agency

3-1 The Responsible Agency is Ministry of Livestock, Fisheries and Rural Development.

3-2 The Implementing Agency is Department of Rural Development (hereinafter referred to as "DRD"). The organization chart of DRD is shown in **Annex-2.**

4. Items requested by the Myanmar side

After discussions between the Myanmar side and the Team (hereinafter referred to as "the both sides"), the items described in **Annex-3** were finally requested by the Myanmar side.

The both sides confirmed that the appropriateness of the request would be examined in accordance with the further studies and analysis, and the final components of the Project would be decided by the Japanese side.

5. Japan's Grant Aid Scheme

5-1) The Myanmar side understood the Japan's Grant Aid Scheme explained by the Team, as described in **Annex-4.**

5-2) The Myanmar side will take the necessary measures, as described in **Annex-5**, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Tentative Schedule of the Survey

6-1) The consultant members of the Team will conduct studies in Myanmar until 9th July, 2015.

6-2) JICA will prepare the draft preparatory survey report in English and dispatch a mission in order to explain its contents to the Myanmar side in the middle of October, 2015.

6-3) In case that the contents of the report are accepted in principle by the Myanmar side, JICA will finalize the report and send it to the Myanmar side by March 2016.

6-4) The Myanmar side understood that the execution of the Preparatory Survey (hereinafter referred to as "the Survey") would not necessarily imply the Japanese Government's commitment of the project implementation.

7. Background of the Request by the Myanmar side

7-1) Development Plan

The Myanmar side explained that provision of safe drinking water supply at rural area is the second top priority area of action set by the Government of Myanmar. Thus, DRD which is focal department for rural development in Myanmar is implementing the rural drinking water supply projects and activities according to the 20 year rural drinking water supply plan (2011/2012-2030/2031 fiscal year) as **Annex-6**. According to the 20 years plan, about 23,198 villages in the whole country will access to sufficient amount of safe drinking water. Procured drilling machine will be used for the implementation of the above development plan.

7-2) Selection of the targeted villages

The Myanmar side explained that the targeted villages to be surveyed are selected in consideration of scarcity of water for drinking and domestic use, level of drinking water need and geophysical constraint.

8. Scope of the Project

The Myanmar side agreed that the scope of the Project will be decided in consideration of the priority of the components and the appropriate size of the total Project cost as Grant Aid. The both sides agreed that the scope of the Project would be finally adjusted by adding/ reducing number of casing and/or screening of the production well, if all of the components could not be included in the Project based on the result of the Survey.

The Team proposed some technical issues on the diameter of the casing of the production well, proper method of pumping test, logging equipment and improvement of water supply facility to be discussed with concerned officials of DRD during the survey.

The Myanmar side requested 1 set of geophysical survey equipment to be included in the scope of the Project. DRD explained that DRD has only 1 set of geophysical survey equipment, which is not enough to conduct smooth implementation of geophysical survey. DRD also requested to include 2 sets of air compressor along with the 2 sets of drilling machines. DRD owns 7 air compressors and deployed at 2 for Northern Shan State, 4 for Central Dry Zone and 1 for Nay Pyi Taw. As most of the deep tube well drilling and construction activities are concentrated at the Central Dry Zone, DRD needs more air compressors for speedy action of drilling and well development. DRD also further requested to include 3 logging equipment in the scope of the Project due to having only one set logging equipment which is also not functioning well. The Team took note of it and agreed to continue discussion on the necessity of the equipment during the survey.

The Myanmar side requested to include spare parts for the 2 drilling rigs to be procured and also for the existing drilling rigs which may be necessary for drilling wells in the targeted villages. The Team reply that DRD should make at most effort to procure necessary spare parts with its

own fund but took note of it for continuous discussion during the Survey

9. Technical Assistant

Necessary soft component and On-the-Job Training (OJT) programs are to be considered for the Project scope. Detail components will be determined through the preparatory survey, avoiding a duplication of the activities of the any other on-going projects.

10. Water Quality

The Team mentioned the concentration of Fluoride and Nitrate-Nitrogen exceed Myanmar national proposed water quality standard in some deep tube well water in target area, and it might be the cause of negative impact to villagers' health. DRD explained that they will take appropriate countermeasures for those deep tube wells based on the result of the Survey and recommendations which will be made by the Team.

11. Measures to be taken by the Myanmar side

11-1) During the Survey

(1) The Myanmar side agreed to facilitate the Survey by following activities.

a) To provide available data, information and materials necessary for the execution of the Survey
b) To provide 2 geophysical survey team and equipment of geophysical survey (Syscal R2) with its accessories
c) To appoint full time counterpart personnel for the Team during their stay in Myanmar to take the roles of a coordinator. They are asked to make the appointments and to set up the meetings with the relevant person/ organizations whoever the Team intends to visit, and to accompany the Team in the field survey and other visiting places, if necessary.
d) To provide office space.
e) To secure permission and arrangement necessary for the geophysical exploration in the target villages for smooth execution of the work.
f) To take any measures deemed necessary to secure the safety of the members of the Team.
g) To make arrangements for the Team to bring back to Japan any necessary data, maps and other materials related to the Study for the analytical works and the preparation of reports.
h) Coordination with relevant agencies.

(2) The Myanmar side also agreed with **Annex-5** "Major Undertakings to be taken by Each Government" and to secure the necessary budget including the cost for B/A, A/P for the fiscal year 2016. More information about the necessary amount of budget will be informed by the end of August 2015, after the Survey progresses.

(3) The Myanmar side agreed that the Team will conduct selection of subcontractor of water quality test and social survey in the condition that the Team will inform the result of selection to

DRD. The Team requested DRD to attend the bid opening and assist them to obtain permission to visit the survey area.

11-2) During and after the Project

(1) Implementation structure of deep tube well construction by the Myanmar side

The both sides confirmed that the construction works of the deep tube wells in the Project shall be executed by the Myanmar side with its full responsibility:

a) DRD will assign appropriate number of staff who have experience and skill of drilling deep tube wells. The staff allocation plan is shown in **Annex-8**. The plan to drill deep tube wells by utilizing procured drilling rig(s) and existing drilling rigs are shown in **Annex-9**.
b) DRD will secure the necessary budget timely.

(2) Operation and Maintenance of Facilities, Equipment and Materials

The water supply facilities constructed by the Myanmar side shall be properly operated and maintained by the target villages with support by DRD. The equipment and materials procured through the Project shall be properly operated and maintained by DRD.

(3) Progress Monitoring Report

Progress of the deep tube well construction work shall be monitored and reported by DRD to JICA Myanmar Office. Format of the report shall be duly confirmed by both sides at the stage of signing of Grant Agreement or at the timing of the mission for Draft Final Report.

12. Other relevant issues

12-1) Inception Report

The content of Inception report, which the Team explained to the Myanmar side, was understood and accepted in principle by the Myanmar side.

12-2) Tax Exemption

The both sides confirmed that the tax exemption including Value Added Tax (VAT), custom duty, and any other taxes and fiscal levies in Myanmar which is to be arisen from the Project activities will be ensured by the Myanmar side. The Myanmar side will take any procedures necessary for tax exemption, and in case that tax exemption is not secured, the cost of tax will be covered by the Myanmar side.

12-3) Overlapping with Other Projects

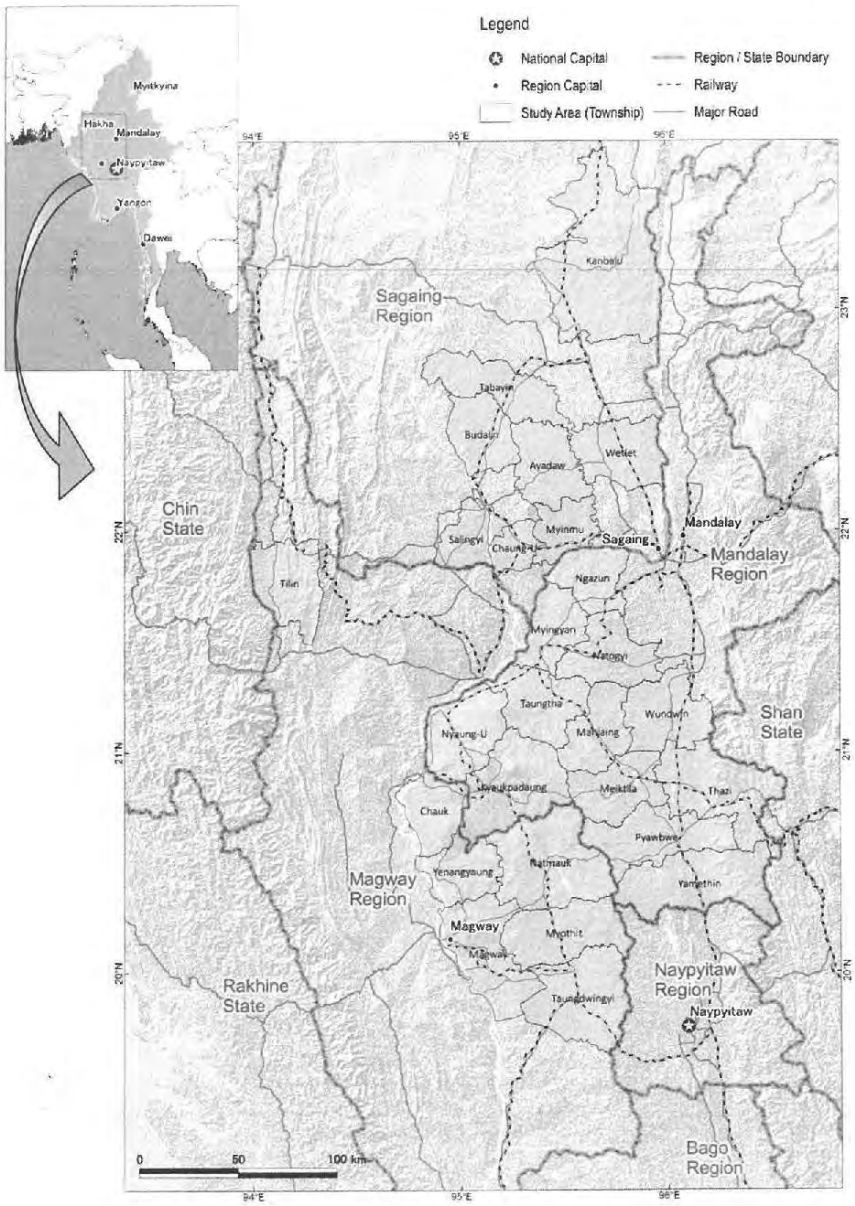
The Myanmar side explained that the Project would not be overlapped with any other projects supported by other donor agencies, NGOs, and Myanmar official organizations.

12-4) Official Request

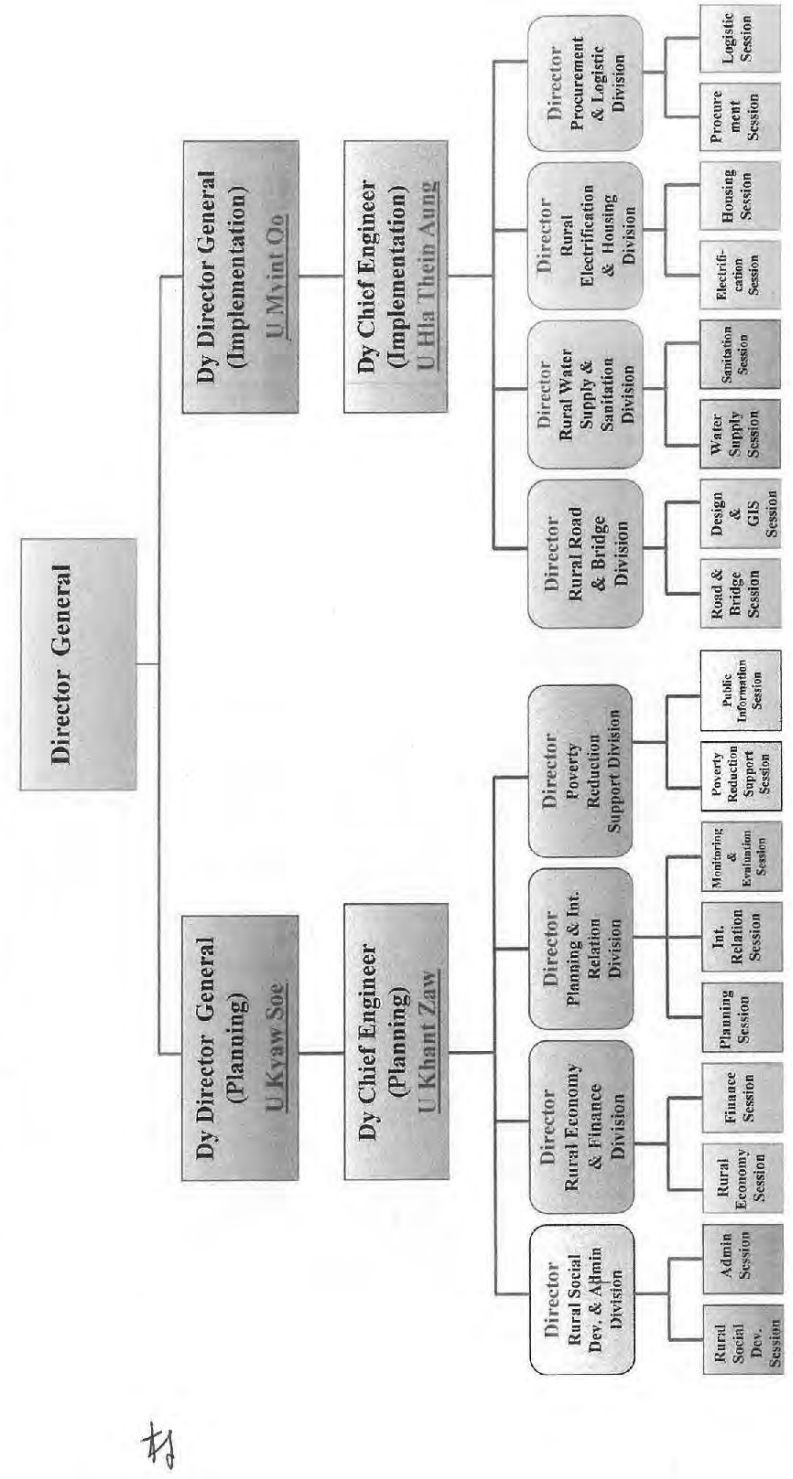
Both sides confirmed that DRD should submit the official application form for grant aid from Japan through the diplomatic channel by the end of June, 2015.

Annex-1	Project Sites Map
Annex-2	Organization Chart of DRD
Annex-3	Items Requested by the Myanmar Side
Annex-4	Japan's Grant Aid Scheme
Annex-5	Major Undertakings to be taken by Each Government
Annex-6	Development Plan to Promote Adequate Provision of Rural Water Supply in the Central Dry Zone
Annex-7	List of Target Villages
Annex-8	Allocation Plan of DRD Staffs
Annex-9	Utilization Plan of Procured Drilling Rig(s)

Annex-1: Project Site



Annex:2-Organization Chart of Department of Rural Development (HQ)



Annex-3: Items Requested by the Myanmar Side

Items	Quantity
Truck Mounted Drilling Machine (Capable of drilling more than 300m), with auxiliary tools and equipment	2 sets
Air Compressor	2 sets
Crane Truck	2 cars
Geophysical Survey equipment	1 set
Logging equipment	3 set
Consumable Material for drilling works (Bentonite, CMC)	1 lot
Submersible Pump and Generator with auxiliary materials	120 sets
Casing and Screen	120 sets

Note: Items and quantity of the Project will be determined based on the result of the survey.

Annex-4: Japan's Grant Aid Scheme

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as part of this realignment, JICA was reborn on October 1, 2008. After the reborn of JICA, following the decision of the Government of Japan (hereinafter referred to as "the GOJ"), Grant Aid for General Project is extended by JICA.

Grant Aid is non-reimbursable fund to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures (Attachment 1)

Japanese Grant Aid is conducted as follows-

- Preparatory Survey (hereinafter referred to as "the Survey")
  - The Survey conducted by JICA
- Appraisal & Approval
  -Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Determination of Implementation
  -The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
  -Agreement concluded between JICA and a recipient country
- Implementation
  -Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide a basic document necessary for the appraisal of the Project by JICA and the GOJ. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- Preparation of a outline design of the Project.
- Estimation of costs of the Project.

1

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA uses (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

The Report on the Survey is reviewed by JICA, and after the appropriateness of the Project is confirmed, JICA recommends the GOJ to appraise the implementation of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the E/N will be singed between the GOJ and the Government of the recipient country to make a plead for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

The consultant firm(s) used for the Survey Will be recommended by JICA to the recipient country to also work on the Project's implementation after the E/N and the G/A, in order to maintain technical consistency.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This

"Verification" is deemed necessary to secure accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Attachment 2

(6) Proper Use

The Government of recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

(7) Export and Re-export

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

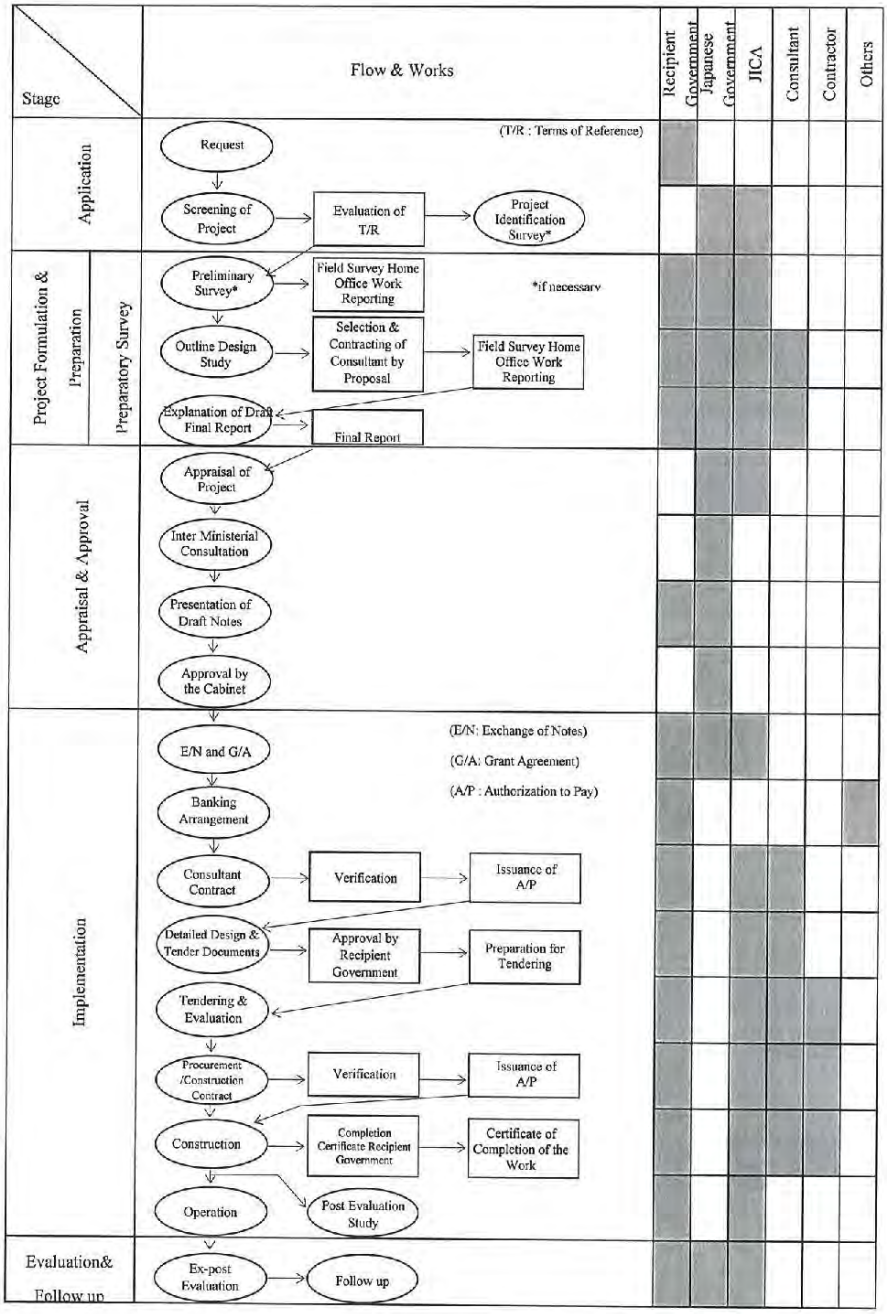
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

(10) Social and Environmental Considerations

A recipient country must ensure the social and environmental considerations for the Project and must follow the environmental regulation of the recipient country and JICA socio-environmental guideline.

Attachment 1

Flow Chart of Japan's Grant Aid Procedures



Annex-5: Major Undertakings to be taken by Each Government

No	Items	To be covered by Grant Aid	To be covered by Recipient
1	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		•
	2) Payment commission		•
2	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country and to assist internal transportation of the products		
	1) Marine (Air) transportation of the products from Japan to the recipient country	•	
	2) Tax exemption and custom clearance of the products at the port of disembarkation		•
	3) Internal transportation from the port of disembarkation to the project site	(•)	(•)
3	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		•
4	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		•
5	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		•
6	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the transportation and installation of the equipment		•
7	To give due environmental and social consideration in the implementation of the Project		•

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

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Annex-6: Department of Rural Development 20 Year plan for Rural Water Supply

Sr	State/Region	First (5) Year Plan											Second (5) Year		Third (5) year		Fourth (5) Year	
		2011-2012		2012-2013			2013-2014		2014-2015		2015-2016		from 2016-2017 to 2020-2021		from 2021-2022 to 2025-2026		from 2026-2027 to 2030-2031	
							Plan		Plan		Plan							
		Planned	Implemented	Planned	Implemented	to be implement	Budget	Aid	Budget	Aid	Budget	Aid	Budget	Aid	Budget	Aid	Budget	Aid
1	Kachin	29	29	30		30	50	10	50	15	50	8	326	47	350	55	350	64
2	Kayah	10	10	30		30	50	5	50	15	50	8	164	28		25		11
3	Kayin	41	41	30		30	50	15	50	10	50	19	250	32	420	62	420	95
4	Chin	12	12	30		30	50	20	50	15	50	5	250	42	179	56		17
5	Sagaing	95	95	34		34	50	4	50	5	50		318	78	330	66	330	37
6	Thanintharyi	78	78	30		30	50	5	50	8	50	10	200	44		29		26
7	Bago	358	358	30		30	50	25	50	27	50	23	326	55	360	83	350	98
8	Magway	122	122	43		43	50	12	50	8	50	8	416	112	570	78	662	75
9	Mandalay	205	205	33		33	50	4	50	9	50	17	250	112	250	59	150	60
10	Mon	29	29	30		30	50	10	50	5	50	10	140	44		25		23
11	Rakhine	94	94	30		30	50	10	50	10	50	8	409	37	526	80	662	91
12	Yangon	230	230	30		30	50	15	50	10	50	25	250	32	220	34		21
13	Shan	102	102	30		30	50	25	50	15	50	22	416	74	720	105	832	146
14	Ayeyarwaddy	206	206	30		30	50	10	50	13	50	7	435	54	570	89	666	75
15	PaO			30		30	50	12	50	12	50	10	250	29	255	24	328	52
16	Palaung			30		30	50	9	50	11	50	8	94	30		29		13
17	Danu			30		30	50	10	50	9	50	9	50	26		28		13
18	Kokant			30		30	50	7	50	13	50	10	112	26		22		11
19	Wa			30		30	50	10	50	10	50	8	250	28	250	25	250	40
20	Narga			30		30	50	2	50		50	5	94	28		15		12
		1,611	**1,611**	**620**		**620**	**1,000**	**220**	**1,000**	**220**	**1,000**	**220**	**5,000**	**958**	**5,000**	**989**	**5,000**	**980**

Annex-7: List of Target Villages to be Surveyed

1. Mandalay Region

No.	Township	Village Track	Village	Household	Population
1	Meiktila	Thikone	Kyatatpin	22	120
2		Khinte	Khinthar	85	320
3		Kyweltalin	Bonesukan	140	850
4	Wundwin	Taungse	Taungnyo	86	379
5	Thazi	Nghat Min Kone	Thamankyar	228	438
6		Kyweltatsone	Payarngartu(Ta)	114	750
7	Mahlaing	Yayhtwet	Htantawgyi	95	552
8		Kyatse	Asone Village	127	542
9		Yaychobutar	Khinthar (Ta)	82	577
10	Myingyan	Chay Say	Chay Say	243	1,312
11		Ku Ywar	Ku Ywar	525	2,283
12		Yone Hto	Yone Hto	147	813
13		Phat Pin I	Phat Pin I	303	1,447
14	Ngazon	Konelel	Konelel	292	1,528
15		Makyikyat	Phaungkataw	199	1,121
16		Kaungzin	Kaungzin	141	856
17		Thanbo	Ywarsite	30	139
18	Natogyi	Kyaungnan	Kyaungnan	203	1,109
19		Myinni	Kyaungkan	77	435
20		Nyaungkone	Nyaungkone	130	653
21		Zaydate	Htantaw	478	2,583
22	Taungtha	Obo	Chaungnarr	84	499
23		Zagyan	Chaungsone(La)	155	802
24		Kanmyel	Tharsi	187	931
25			Kanaye	211	930
26		Tharyarmyaing	Tharyarmyaing	372	2,026
27	Yamethin	Myinnar	Aungpinlel	38	161
28	Pyawbwe	Seitcho	Htanekan	205	806
29			Waryonesu	180	797
30	Nyaung U	Oyin	Taungyar	86	900
31		Nyaungto	Nyaungtotetite	150	720
32		Kutaw	Sinekantetite	130	600
33		Nyaungpinkan	Latpanwintetite	63	350
34		Kanma	Zaymagyi	52	341
35		Kya-O	Kanthar	67	292
36		Thapyay -I	Koneshaytetite	22	120
37	Kyaukpadaung	Tangakan	Alelywar-2	220	1,098
38		Nyaungto	Matarywarma	122	527
39			Atarsankone	224	933
40		Na Kyat Khwal	Na Kyat Khwal	958	3,813
Total of the Mandalay Region				7,273	35,453

2. Magway Region

No.	Township	Village Track	Village	Household	Population
1	Magway	Natkan	Natkan	264	1,244
2		Sharzaungkan	Sharzaungkan	330	1,611
3		Kyarkan	Nyaungpinthar	240	1,535
4		Nyaungpinthar	Konegyi	264	1,244
5		Waiwinsan	Sinekya	98	477
6		Thapyaysan	Thapyaysan(Ma)	240	1,535
7		Suupyitsan	Shwekyaw	73	388
8		Nyaungkan	Lakekan	186	770
9		Nyaungkan	Ywarthitgyi	302	1,628
10	Chauk	Thanbo	Yaykangyi	217	723
11		Myaysoon	Myaysoon Ywarthit	63	310
12		Zepwar	Zepwar	235	1,027
13		Chaungtat	Yaypyay	55	169
14		Pakhannge	Kyatesu (Ma)	164	714
15		Salintaung	Winkabar	514	2,235
16		Magyikone	Kyatkan	97	475
17		Gwaypin	Suutat	92	547
18	Yenangyaung	Intaw	Lelkyinnyoe	285	1,441
19	Myothit	Laytinesin	Laytinesin (Ta)	587	2,435
20			Gwaytaw	148	600
21		Makyikonekyi	makyikonekyi	700	3,095
22		Bolt	Bolt	587	2,435
23		Htautsharkan	Intaw (Ma)	700	3,095
24		Dantdalonpin	Htanaungkwin	302	1,574
25		Manawtkone	Manawtkone	170	791
26	Natmauk	I-Sauk	Kankyikone	56	373
27		Htonepoutchine	Htonepoutchine	367	1,018
28		Padauknghote	Padauknghote (Ywarkyi)	56	373
29		Selel	Selel	367	1,018
30		Thamhonepin	Padaukkone	119	779
31		Tegyi	Ywartharlay	75	374
32		Waryonekone	Waryonekone	148	721
33		Htonepoutchine	Nyaungkone	82	480
34	Taungdwingyi	Pantwinlay	Kukohla	195	686
35		Payatkye	Kangyigon	205	1,018
36		Wathonepyu	Daungkyankyon	205	1,080
37		Lhe pawe gyi	Lhe Pawe Gyi	100	455
38		Lhe pawe gyi	Yae Htuot Gyi	112	607
39	Ti Lin	Sin Zwe	Sin Zwe	122	936
40		Kya Oo Yin	Kya Oo Yin	70	458
Total of the Magway Region				9,192	42,474

3. Sagain Region

No.	Township	Village Track	Village	Household	Population
1	Budalin	Htanaungkone	Yonetaw	65	369
2		Ngapayin	Nyaungthar	45	217
3		Maung Htaung	Maung Htaung	842	4,318
4		Ywar Thit	Kan Thaw Thar	83	404
5		Konethar	Mhone Htoo	38	172
6		Wat Luu I	Wat Luu I	167	979
7	Chaung U	Thann Win Kan	Thann Win Kan	195	935
8		Nat Yay Kan	Nay Yay Kan	177	800
9	Ayadaw	Ngarr Taw Ma	Si Thar	84	361
10		Ma Lel Thar	Kan Yinn	392	2,809
11		Ngarr Yaung	Warr Yaung	532	4,251
12		Ye Chinn	Warr Tann Kalay	64	426
13		Nyaung Chay Htauk	Ya Thar	160	765
14		Warr Yaung	Zee Pin Lel	164	1,983
15	Salingyi	Yone Pin Yoe	Yone Pin Yoe	95	514
16			Minn Taw	205	1,071
17		Moe Kyoe Pyin	Kine	62	290
18	Myinmu	Kalarpyan	Kalarpyan	75	385
19		Nyaung Pin Kan	Hlay U Kan	129	580
20		Ma Kyee Kan	Ma Kyee Kan	244	1,143
21		Lat Pan Kyin	Wat Kya	132	744
22		Lat Pan Kyin	Tha Htay Kone (Ywar Ma)	80	410
23		Inma	Ma Kyee Taw	37	164
24	Kanbalu	Thin Taw	Thin Taw	148	817
25		Thin Taw	A Lel Khone	384	1,818
26		Koe Taung Boh	Koe Taung Boh	143	715
27		Ngapyaw Tine	Kyee Pin At	310	1,643
28		Myay Htoo	Myay Htoo	385	1,997
29		Kha Own Tar	Kha Own Tar	278	1,004
30		Kha Own Tar	Pay Kyi	170	983
31		Myay Mon	Myay Mon	550	2,527
32		Paze Kyi	Layy Twin Sin	150	714
33		Pay Kone (Ta)	Chaung Char	100	513
34	Tabayin	Thit Yar Aite	Thit Yar Aite	292	2,510
35		Min Tel Kone	Shan Taw	70	348
36		Sat Pyar Kyinn	Kyun Taw (Ta)	75	434
37	Wet Let	Shar Kwal	Palethwe (Ywar Thit)	52	298
38		Pouk Kan	Pouk Kan	250	1,159
39		Shwe Kyin	Shwe Nyaung Taw	41	210
40		Khaw Taw	Sabei Taw	96	242
Total of the Sagain Region				7,561	42,022

Annex-8 Allocation Plan of DRD Staffs

Staff Allocation Plan for Procured Drilling Rig No (1)

	Present department	Experiences of drilling deep well (more than 300m depth)	Experiences trained by JICA's technical assistance project
U Thant Sin Win	AE(H.Q)		8 years experience
U Zay Ya Win	SAE(HQ)		8 years experience
U Tun Thein	SAE		8 years experience
U Myint Aung	SAE		8 years experience
U Sein Win	Driller 1		8 years experience
U Zaw Min Latt	Driller 2		8 years experience
U Si Thu Aung	Driller 2		8 years experience
U Zaw Naing	Driller 2		8 years experience

Staff Allocation Plan for Procured Drilling Rig No (2)

Name of staff	Present department	Experiences of drilling deep well (more than 300m depth)	Experiences trained by JICA's technical assistance project
U Han Tin	AE(HQ)		8 years experience
U Mg Kyaw	SAE(Sagaing)		8 years experience
U Aung Soe	Head of Driller (HQ)		8 years experience
U Than Aung	JE(MonYwa)		8 years experience
U Soe linn	Driller 1		8 years experience
U Tun Naing	Driller 2		8 years experience
U Zin Min Htay	Driller 2		8 years experience
U Myo Thein	Driller 2		8 years experience

Annex-9 Utilization Plan of Procured Drilling Rig(s)

Sr. No	Articles	Nos.	Sagaing	Magway	Mandalay	HQ
1	Truck mounted well drilling rig, 500 m deep with 14-3/4" to 6-1/4" borehole diameter with accessories and tools	2 sets	-	1	1	-
2	Cargo truck (4 × 4 left hand drive), 6000 kg capacity with 4 ton crane	2 sets	-	1	1	-
3	Logging Equipment	1 sets	-	-	-	1
4	Geophysical Survey equipment	1 sets	-	-	-	1
5	Air compressor for air flush	2 sets	-	1	1	-
6	Submersible motor pump for pumping test completed with piping and pump accessories	2 sets	-	1	1	-
7	Consumables for drilling work (Bentonite, CMC, Form agent)	1 lot	-	-	-	1
8	Casing and screen pipes for 120 tube wells	1 lot	-	-	-	1
9	Submersible pump with generators and accessories	120 sets	40	40	40	-

4.2 テクニカルノート（2015 年 7 月 2 日署名）

TECHNICAL NOTE
ON
THE PREPARATORY SURVEY ON THE PROVISION OF EQUIPMENT
FOR RURAL WATER SUPPLY PROJECT IN THE CENTRAL DRY ZONE PHASE II
IN
THE REPUBLIC OF THE UNION OF MYANMAR

In response to the request from the Government of the Republic of THE Union of Myanmar (hereinafter referred to as "Myanmar"), the Government of Japan decided to conduct a Preparatory Survey on the Provision of Equipment for Rural Water Supply Project in the Central Dry Zone Phase II (hereinafter referred to as "the Project") and entrusted the survey to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent the Preparatory Survey Team (hereinafter referred to as "the Team"), which is headed by Mr. Toshio Murakami, Senior Advisor, JICA, to Myanmar. The Team stayed in Myanmar from April 27 to July 9, 2015.

After signing of the Minutes of Discussion between the Government of Myanmar and the Team on 30April 2015, the consultant team under the Team was scheduled to conduct the field survey until 9July 2015.

During the field survey, the consultant team had a series of discussions with Department of Rural Development (hereinafter referred to as "DRD") at the central and local level as well.

As the results of discussions and field surveys, both side confirmed the technical note described as per the attached.

2nd July 2015

Mr. MyintOo
Deputy Director General
Department of Rural Development
Ministry of Livestock, Fishery and Rural Development

Mr. Yasumasa Yamasaki
Chief Consultant
JICA Study Team
Earth System Science Co., Ltd.

1. Target Villages (Result of Village Reconnaissance Survey)

The Study Team proposed 110 villages as the target villages based on the result of the Village Reconnaissance Survey.

After having discussion, the both party agreed the target villages as shown in Table 1 (the detailed list of the target villages is shown in Appendix-1) and confirmed that no change in target village was allowed after this agreement.

Thetarget villages (110 villages) will be evaluatedbased on the results of geophysical survey and socio-economic survey.

Table 1 Result of Village Reconnaissance Survey

Region	No. of Village Requested	No. of Village Excluded	No. of Target Village of the Project
Sagaing	40	1	39
Mandalay	40	6	34
Magway	40	3	37
Total	120	10	110

2. Measure to Avoid Duplication of the Project

During the field survey, it was observed in some target villages requested by DRD that DRD had already constructed wells and water supply facilities. Therefore, it was obliged to change the target villages. In order to avoid the duplication of the Project with other project(s), DRD will share the list of the target villages with their Regional offices, the Township offices and the target villages shown in Appendix-1.

3. Confirmation and Modification of the Request for the Equipment

Request of the equipment by DRD was confirmed in the Minutes of Discussions signed on 30April 2015 between DRD and JICA.

The Study Team examined the necessity of the equipment through the Village Reconnaissance Survey and studying the existing data and information.

The Study Team explained the contents of the Equipment for the Phase 2 project based on the result of the meeting with the CDZ project office. After discussion, the both party agreed the contents of the Equipment shown in Table 2. The Study Team will continue the study for determination of more detailed specification and estimation of the procurement cost.

Table 2 Result of List of Equipment for Phase 2 Project

Equipment/Materials	Specification/Number Requested	Result of Discussion with CDZ
Drilling Rig	Drilling capacity: 400m x 2sets	Drilling capacity: 200m x 1 set, 250m x 1 set
Air Compressor	2sets (1 set + additional 1 set)	1 or 2 set If one of the compressor is repaired, the number will become 1 set.
Cargo Truck with Crane	2 vehicles	2 vehicles
Materials for well construction	1 lot	1 lot
Submersible pump, Generator, Ancillary materials	120 sets	At most 110 sets. As for generator, the number is decreased considering the possibility of public electric power supply to the target villages.
Casing and Screen	For 120 villages	For 110 villages (At most). Necessary quantity is calculated under the following condition of

1

Equipment/Materials	Specification/Number Requested	Result of Discussion with CDZ
		screen length. (1) Screen length 12 m, a half of total wells (2) Screen length 18 m, a half of total wells
Geophysical Survey Equipment	1 set (additional request)	None (Excluded from the request)
Well Logging Machine	3 sets (additional request)	1 set with 400m cable 1 set with 300m cable
Pumping Test Equipment (Proposed by the Team)	-	1 set

Regarding the public electric power supply, it was confirmed in the socio-economic survey thata total of 19 villages (8 villages in Sagaing, 7 villages in Mandalay and 4 villages in Magway) were connected to the national grid lines. Generators for the such villages will be excluded from the procurement of the equipment.

DRD expressed necessity of technical transfer of well logging and pumping test by using the submersible pump.

The Study Team understood the necessity of the technical transfer of such technique (Soft Component). Contents of the soft component are described in Item

4. Countermeasures against high contents of poisonous element such as Arsenic in the groundwater.

The Study Team asked the countermeasure of DRD if high contents of poisonous element such as Arsenic is detected in the groundwater in the well drilled in the phase 2 project.

DRD explained that any severe case has not been identified from the wells drilled by DRD. Furthermore, DRD explained that CDZ area is facing scarcity of water source therefore the water developed will be used for the purpose other than drinking. In such case, DRD will inform the community people of the deterioration of groundwater and put a sign board to instruct not use for drinking.

5. Water Quality Analysis and Monitoring

The Study Team asked the future system of water quality analysis because currently DRD is capable to analyse 10 parameters and asking remaining parameters to Ministry of Health.

DRD explained that current situation will not be changed because human resource is not sufficient and explained the necessity of technical transfer of water quality analysis.

However, the National Drinking Water Quality Standard was officially announced in 2015, therefore, DRD will formulate the water quality analysis and monitoring system after discussion with Ministry of Health and other relevant ministries.

The both parties confirmed about the water quality and monitoring on the wells drilled in the phase 2 Project as follows:

(1) DRD will analyse water quality after the completion of drilling of well. The result of water quality analysis shall be reported to JICA Myanmar Office including in the Progress Monitoring Report ((3), 11-2), 11. Measures to be taken by the Myanmar side) agreed between DRD and JICA on 30th April 2015 as the Minutes of Discussions. For this purpose, DRD will provide necessary budget before commencement of the Project.

(2) In the following cases, DRD monitors the water quality once a year.

a) water quality of a well meets the standard and/or WHO Guidelines (ver. 4) but it is very close to the standard or Guidelines

b) there is an existing deep well, of which water quality does not meet standard or Guidelines, close to the well drilled in the Phase 2 project.

c) there is any facility which may cause groundwater pollution (factories, mines, etc.) in the adjacent area of the target village.

(3) If the water quality does not satisfy the standard, such water shall be used only for purposes other than drinking. In such case DRD shall properly inform and instruct to the community people not to drink the water of such well to avoid occurrence of health hazards. If the community people use the water for drinking, DRD will take necessary measure such as refilling the well.

(4) The Study Team will propose the water quality monitoring plan at the timing of mission for Draft Final Report.

6. Well Structure to be Constructed

(1) Diameter of Casing and Screen Pipes

The Study Team proposed to install six inches of casing and screen pipes instead of 4 inches of pipes considering the security and maintenance of submersible pumps, and future expansion of water supply facilities.

DRD agreed to the proposal by the Study team.

(2) Length of Section of Screen Pipes

Thorough the discussion, the both parties agreed the length of screen section in the wells as follows:

- 50% of the total length of well: 18m (length of screen section)
- 50% of the total length of well: 12m (length of screen section)

7. Improvement of Water Supply Facility

In order to improve the rural water supply, the Study Team proposed to the design of water tank from the ground tank to the elevated tank (the base of the tank is 2.5-3m above the ground level).

DRD will consider this proposal in the future construction of water supply facilities.

8. Organization of DRD for Implementation of the Project

(1) Drilling Team

Although DRD has 11 drilling teams, if 2 sets of drilling rigs is procured in the Project, DRD will organize 2 new drilling teams as described below:

- One (1) Head driller
- Two (2) Operator 2
- Two (2) Operator 2
- Three (3) Labours

(2) Pumping test team

One (1) set of pumping test equipment with submersible pump will be newly procured in the Project. The pumping test equipment will cover all the wells to be drilled in the Phase 2 project. Therefore, DRD will organize a pumping test team before delivery of the equipment.

9. Implementation Cost of the Myanmar Side and Budgetary Arrangement

The implementation cost of the project is estimated by DRD in the second 5-years plan. The final estimated well depth to be drilled will be decided in the draft report to be submitted in the

mid October 2015. Therefore, DRD will re-estimated the implementation cost of the Phase 2 project and take necessary measure for the budgetary arrangement.

10.Delivery of the Equipment and Materials

All the equipment and materials will be delivered to the stock yard of DRD in Yangon.

11. Contents of Technical Transfer (Soft Component)

Both party agreed the necessary contents of technical transfer (soft component) from the Japanese side to DRD as follows:

(1) Well Logging

- Survey method (in class)
- Data acquisition (logging) (in the field)
- Data analysis and determination of well structure (in class)

(2) Pumping test by submersible pump

- Testing plan (in class)
- Testing method (in class)
- Data acquisition (pumping test) (in the field)
- Data analysis and evaluation of aquifer (in class)

4

Attachment:

List of Attendance

The Myanmar side (DRD):

Mr. MyintOo	Deputy Director General (Chief Engineer)
Mr. U Hla Thein Aung	Deputy Chief Engineer
Mr. KyawThau Aung	Deputy Director
Dr. Win Min Oo	Assistant Director
Mr. U Win Nyunt	Deputy Director (Magway Region & CDZ)
Mr. U SoeMaing	Deputy Director (Labutta District, Ayeyarwaddy Region)

The Study Team:

Mr. Yasumasa Yamasaki	Chief Consultant
Mr. Toru Yoritate	Hydrogeologist 1/Geophysicist 1
Dr. Yuji Maruo	Hydrogeologist 2
Mr. KengoOhashi	Geophysicist 2
Mr. Akira Sasaki	Water Quality Specialist
Mr. Tomohiro Kato	Operation and Maintenance Specialist
Mr. Yusuke Oshika	Equipment Planner/Procurement Planner
Mr. Yuki Yamashiro	Cost Estimator
Dr.Zayar Win	Coordinator/Equipment and Procurement Planner 2

Appendix 1: Result of Field Reconnaissance Survey (List of Target Villages)

(1) Sagaing Region

Region	No.	Township	Villages	ID	Estimated Drilling Depth (Pre-survey) feet	Estimated Drilling Depth (Pre-survey) m	Household	Population	Geophysical Survey Method	Result of Village Survey
Sagaing	1	Budalin	Yonedaw	SA2-01	600 ft	180 m	85	369	VES	Accepted
	2		Nyaungbinthar	SA2-02	600 ft	180 m	49	223	VES	Accepted
	3		Maunghtaung	SA2-03	500 ft	150 m	1000	5600	VES	Accepted
	4		Kantawthar	SA2-04	660 ft	200 m	80	420	VES	To be considered
	5		Mhonehtoo	SA2-05	500 ft	150 m	36	172	VES	Accepted
	6		Watluu-i	SA2-06	330 ft	100 m	165	768	VES	Accepted
	7	Chaungoo	Thanbinkan	SA2-07	660 ft	200 m	195	935	VES	To be considered
	8		Natyaygan	SA2-08	400 ft	120 m	177	809	VES	To be considered
	9	Ayadaw	Sithar	SA2-09	400 ft	120 m	80	420	VES	Accepted
	10		Oakkan	SA2-10	830 ft	250 m	142	800	VES	Accepted
	11		Warryaung	SA2-11	920 ft	280 m	920	4500	VES	Accepted
	12		Warrtannkalay	SA2-12	500 ft	150 m	100	750	VES	Accepted
	13		Yathar	SA2-13	330 ft	100 m	156	766	VES	To be considered
	14		Zeepinlei	SA2-14	500 ft	150 m	358	1897	VES	Accepted
	15	Salingyi	Yonebinyoe	SA2-15	200 ft	60 m	95	514	VES	To be considered
	16		Minntaw	SA2-16	200 ft	60 m	205	1071	VES	To be considered
	17		Kine	SA2-17	660 ft	200 m	70	305	2D	To be considered
	18	Myinmu	Kalarpyan	SA2-18	600 ft	180 m	75	385	VES	To be considered
	19		Hlayookan	SA2-19	600 ft	180 m	129	580	VES	Accepted
	20		Makyeekan	SA2-20	-	-	244	1143	-	Excluded
	21		Watkya	SA2-21	660 ft	200 m	160	748	VES	Accepted
	22		Thahtaykone(Ywarma)	SA2-22	600 ft	180 m	85	410	VES	To be considered
	23		Magyidaw	SA2-23	330 ft	100 m	44	200	VES	Accepted
	24	Kanbalu	Thindaw	SA2-24	300 ft	90 m	148	817	VES	Accepted
	25		Lwingyi	SA2-25	600 ft	180 m	102	499	VES	Accepted
	26		Koetaungboh(Kyunkone)	SA2-26	560 ft	170 m	253	1171	VES	Accepted
	27		Inngoteto	SA2-27	500 ft	150 m	278	1278	VES	To be considered
	28		Myayhloo	SA2-28	600 ft	180 m	386	1844	VES	To be considered
	29		Khaowntar	SA2-29	400 ft	120 m	278	1004	VES	Accepted
	30		Nyuangkanthar	SA2-30	500 ft	150 m	123	539	VES	To be considered
	31		Myaymon	SA2-31	500 ft	150 m	550	2527	VES	To be considered
	32		Layytwinzin	SA2-32	330 ft	100 m	150	714	VES	To be considered
	33		Chaungchar	SA2-33	500 ft	150 m	100	513	VES	Accepted
	34	Dabayin	Minyogone	SA2-34	500 ft	150 m	75	410	VES	Accepted
	35		Shandaw	SA2-35	990 ft	300 m	70	348	VES	Accepted
	36		Kyuntaw (S)	SA2-36	330 ft	100 m	75	434	VES	To be considered
	37	Wetlet	PalaeThwe (Ywarthit)	SA2-37	500 ft	150 m	52	298	VES	Accepted
	38		Poukkan	SA2-38	330 ft	100 m	250	1159	VES	Accepted
	39		Shwenyaunglaw	SA2-39	500 ft	150 m	41	210	2D	Accepted
	40		Sabeidaw	SA2-40	500 ft	150 m	100	423	VES	Accepted

(2) Mandalay Region

Region	No.	Township	Villages	ID	Estimated Drilling Depth (Pre-survey)		Household	Population	Geophysical Survey Method	Result of Village Survey
					feet	m				
Mandalay	41	Mahlaing	Htantawgyi	MA2-01	330 ft	100 m	100	550	2D	Accepted
	42		Asone	MA2-02	330 ft	100 m	150	650	VES	Accepted
	43		Khinthar(S)	MA2-03	330 ft	100 m	85	480	VES	Accepted
	44	Myingyan	Chaysay	MA2-04	400 ft	120 m	243	1412	VES	Accepted
	45		Talgyi	MA2-05	230 ft	70 m	191	830	VES	Accepted
	46		Kuywar	MA2-06	400 ft	120 m	547	2477	2D	To be considered
	47		Yonehto	MA2-07	-	-	141	850	-	Excluded
	48		Nyaungwun	MA2-08	830 ft	250 m	105	435	VES	Accepted
	49	Ngazon	Konelel	MA2-09	-	-	320	1524	-	Excluded
	50		Phaungkadaw	MA2-10	-	-	199	1121	-	Excluded
	51		Kaungzin	MA2-11	660 ft	200 m	141	864	2D	Accepted
	52		Ywarsite	MA2-12	-	-	36	231	-	Excluded
	53	Natogyi	Kyaungnan	MA2-13	-	-	203	1109	-	Excluded
	54		Kyaungkangyibin	MA2-14	400 ft	120 m	92	435	2D	To be considered
	55		Nyaunggone	MA2-15	230 ft	70 m	130	689	2D	To be considered
	56	Taungtha	Chaungnar	MA2-16	330 ft	100 m	105	450	2D	To be considered
	57		Chaungsone(La)	MA2-17	460 ft	140 m	178	800	VES	To be considered
	58		Kyaukkartaungkone	MA2-18	330 ft	100 m	65	350	2D	To be considered
	59		Tharzi	MA2-19	830 ft	250 m	170	950	VES	Accepted
	60		Kanaye	MA2-20	830 ft	250 m	180	1150	VES	Accepted
	61		Tharyarmyaing	MA2-21	500 ft	150 m	380	2200	2D	To be considered
	62	Yamethin	Oakpo	MA2-22	500 ft	150 m	-	1660	VES	Accepted
	63		Kangyi	MA2-23	990 ft	300 m	320	1520	VES	Accepted
	64	Pyawbwe	Htanekan	MA2-24	600 ft	180 m	205	807	VES	Accepted
	65		Waryonesu	MA2-25	400 ft	120 m	180	797	VES	Accepted
	66	Nyaungoo	Talkone	MA2-26	790 ft	240 m	52	320	VES	Accepted
	67		Tawbyar	MA2-27	790 ft	240 m	60	360	VES	Accepted
	68		Setsetyo	MA2-28	1320 ft	400 m	147	840	VES	Accepted
	69		Kanzauk	MA2-29	730 ft	220 m	120	565	VES	Accepted
	70		Talbindel	MA2-30	990 ft	300 m	101	523	VES	Accepted
	71		Mongywettaw	MA2-31	990 ft	300 m	85	365	VES	Accepted
	72		Phoenekan	MA2-32	660 ft	200 m	85	394	2D	Accepted
	73		Nyaungbinthar	MA2-33	690 ft	210 m	70	314	2D	Accepted
	74		Saingkan(Telide)	MA2-34	1320 ft	400 m	66	331	VES	Accepted
	75		Byugyi	MA2-35	1060 ft	320 m	334	1804	VES	Accepted
	76	Kyaukpadaung	Aleywar-2	MA2-36	920 ft	280 m	220	1098	2D	Accepted
	77		Tangakan	MA2-37	-	-	151	836	-	Excluded
	78		Leigyi(Ma)	MA2-38	1090 ft	330 m	221	1279	2D	Accepted
	79		Thayattaw	MA2-39	1150 ft	350 m	150	725	VES	Accepted
	80		Nakyatkhwal	MA2-40	990 ft	300 m	958	-	VES	Accepted

(3) Magway Region

Region	No.	Township	Villages	ID	Estimated Drilling Depth (Pre-survey)		Household	Population	Geophysical Survey Method	Result of Village Survey
					feet	m				
Magway	81	Magway	Natkan	MG2-01	600 ft	180 m	264	1244	VES	Accepted
	82		Thanbo(Ywarthit)	MG2-02	400 ft	120 m	65	280	VES	Accepted
	83		Nyaungbinthar	MG2-03	660 ft	200 m	315	1535	VES	Accepted
	84		Konegyi	MG2-04	730 ft	220 m	253	1090	VES	Accepted
	85		Sainggya	MG2-05	660 ft	200 m	460	2300	VES	Accepted
	86		Thapyaysan(N)	MG2-06	630 ft	190 m	50	250	VES	Accepted
	87		Shwekyaw	MG2-07	650 ft	195 m	95	388	VES	Accepted
	88		Leikkan	MG2-08	380 ft	115 m	226	1115	VES	Accepted
	89		Ywarthitgyi	MG2-09	600 ft	180 m	380	1805	VES	Accepted
	90	Chauk	Kanyaygyi	MG2-10	1090 ft	330 m	209	1239	VES	To be considered
	91		Myaysoon(Ywarthit)	MG2-11	870 ft	265 m	63	319	VES	To be considered
	92		Zeebwar	MG2-12	530 ft	160 m	235	1027	2D	To be considered
	93		Yenpyay	MG2-13	560 ft	170 m	40	280	VES	Accepted
	94		Kyatesu(N)	MG2-14	500 ft	150 m	140	740	VES	To be considered
	95		Winkabar	MG2-15	370 ft	110 m	610	2420	VES	Accepted
	96		Kyatkan	MG2-16	560 ft	170 m	97	478	VES	Accepted
	97		Sudat	MG2-17	1320 ft	400 m	110	560	VES	Accepted
	98		Myaynilain	MG2-18	830 ft	250 m	42	253	VES	Accepted
	99	Yenangyaung	Legyinyo	MG2-19	910 ft	275 m	273	1637	2D	Accepted
	100	Myothit	Laytinesin(S)	MG2-20	690 ft	210 m	591	3299	VES	Accepted
	101		Tharmyar	MG2-21	690 ft	210 m	650	3700	VES	Accepted
	102		Aungmyinthar	MG2-22	400 ft	120 m	210	1150	VES	Accepted
	103		Ngwelay	MG2-23	380 ft	115 m	237	1237	VES	Accepted
	104	Natmauk	Indaw(N)	MG2-24	370 ft	110 m	103	530	VES	Accepted
	105		Htanaungkwin	MG2-25	-	-	280	1574	-	Excluded
	106		Manawtgone	MG2-26	420 ft	125 m	160	930	VES	Accepted
	107		Kangyigone	MG2-27	730 ft	220 m	61	360	VES	Accepted
	108		Htonepoutchine	MG2-28	370 ft	110 m	372	2018	2D	Accepted
	109		Padaukngote(Ywargyi)	MG2-29	-	-	286	1248	-	Excluded
	110		Sellel	MG2-30	990 ft	300 m	367	1018	2D	To be considered
	111		Padaukgone	MG2-31	-	-	152	820	-	Excluded
	112		Ywarthatay	MG2-32	580 ft	175 m	75	374	VES	To be considered
	113		Wayonegone	MG2-33	330 ft	100 m	150	950	2D	To be considered
	114		Nyaunggone	MG2-34	370 ft	110 m	320	1814	2D	Accepted
	115		Kyugyaung	MG2-35	730 ft	220 m	81	550	VES	Accepted
	116	Taungdwingyi	Kokkohla	MG2-36	500 ft	150 m	229	860	2D	To be considered
	117		Kangyigone	MG2-37	630 ft	190 m	205	1099	2D	To be considered
	118		Htaukkyantgwin	MG2-38	1150 ft	350 m	270	1502	VES	Accepted
	119		Hlebwegyi	MG2-39	990 ft	300 m	182	1968	VES	Accepted
	120		Yayhtwelgyi	MG2-40	860 ft	200 m	137	662	VES	Accepted

Appendix 2: List of Villages Connected to the National Electric Grid

No.	Region	Township	ID No.	Village
1	**Sagaing**	Budalin	SA2-01	Yonedaw
2			SA2-02	Nyaungbinthar
3			SA2-03	Maunghtaung
4		Ayadaw	SA2-10	Oakkan
5		Kanbalu	SA2-24	Thindaw
6			SA2-25	Lwingyi
7			SA2-26	Koetaungboh (Kyaunkone)
8			SA2-28	Myayhtoo
9	**Mandalay**	Myingyan	MA2-05	Kuywar
10			MA2-06	Yonehto
11		Natogyi	MA2-13	Kyauknan
12		Taungtha	MA2-18	KyaukKarTaungKone
13			MA2-21	Tharyarmyaing
14		Kyaukpadaung	MA2-36	Aleywar-2
15			MA2-40	Nakyatkhwal
16	**Magway**	Magway	MG2-02	Thanbo (Ywarthit)
17		Chauk	MG2-12	Zeebwar
18			MG2-17	Sudat
19		Natmauk	MG2-27	Kangyigone

4.3 協議議事録（2015 年 10 月 20 日署名）

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
ON
THE PROVISION OF EQUIPMENT FOR RURAL WATER SUPPLY PROJECT
IN THE CENTRAL DRY ZONE (PHASE 2)
IN THE REPUBLIC OF THE UNION OF MYANMAR

Considering the urgent needs of providing safe drinking water in the Central Dry Zone, the Government of Japan decided to conduct a Preparatory Survey on the Provision of Equipment for Rural Water Supply Project in the Central Dry Zone (Phase 2) (hereinafter referred to as "the Project") and entrusted the survey to the Japan International Cooperation Agency (hereinafter referred to as "JICA"). Through discussions, field surveys, and technical examination of the study results in Japan, JICA has prepared a draft final report of the survey.

In order to explain and to consult with the Government of Myanmar (hereinafter referred to as "Myanmar") on the components of the draft final report, JICA dispatched the Draft Final Report Explanation Team (hereinafter to as "the Team") headed by Ms. Eriko Tamura, Director, Water Resources Team I, Global Environment Department, JICA, from 19th October to 22nd October, 2015.

As a result of discussions, both sides confirmed the main items described in the attached sheet.

Nay Pyi Taw, 20 October, 2015

田村 えり子

Eriko Tamura Leader Preparatory Survey Team Japan International Cooperation Agency (JICA)	Khant Zaw Director General Department of Rural Development, Ministry of Livestock, Fisheries and Rural Development The Republic of the Union of Myanmar

ATTACHMENT

1. Components of the Draft Final Report

Department of Rural Development, Ministry of Livestock, Fisheries and Rural Development. (hereinafter referred to as "DRD") agreed and accepted in principle the components of the draft final report explained by the Team. The Project sites map, list of the targeted villages and outline of the Project are respectively shown in **Annex-1**, **Annex-2** and **Annex-3**. Expected project implementation schedule is as attached in **Annex-4**.

2. Responsible and Implementing Agency

The responsible and implementing agency is Department of Rural Development, Ministry of Livestock, Fisheries and Rural Development (DRD) .

3. Japan's Grant Aid Scheme

3-1. DRD understood the Japan's Grant Aid Scheme explained by the Team, as described in **Annex-5**.

3-2. DRD will take the necessary measures, as described in the **Attachment 2 of Annex-5**, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

4. Important issue on the Project Component

4-1. Construction of deep wells and related water supply facilities

Both sides confirmed that DRD will construct deep wells and related water supply facilities for the targeted 100 villages in 5 years, for which DRD will secure necessary human resources and budget.

4-2. Water quality

The Team reminded the risk of concentration of Fluoride and Nitrate-Nitrogen exceeding water quality standard in Myanmar, and it might be the cause of negative impact to villagers' health. Both sides confirmed that DRD will conduct water quality test at the time of completion of deep well construction and take necessary measures as agreed on the Technical Note signed on 2nd July 2015 as follow.

(1) The DRD will analyze the water quality of the deep well with its own budget at the time of completion of the deep well construction and the results shall be recorded in the Progress Monitoring Report to be submitted to the JICA Myanmar office.

(2) The DRD will monitor water quality once a year in the following cases,
   a) in case water quality of a well meets National Drinking Water Quality Standards (hereinafter referred to as "the standard") and/or WHO Guidelines (ver. 4) (hereinafter referred to as "Guidelines") but it is very close to the standard or Guidelines.
   b) in case there is an existing deep well, of which water quality does not meet the standard or Guidelines, close to the well drilled in the Project.
   c) in case there is any facility which may cause groundwater pollution (factories, mines, etc.) in the adjacent area of the target villages.

(3) If the water quality does not satisfy the standard, such water shall be used only for purposes other than drinking. In such case, DRD shall properly inform and instruct the community people not to drink the water of such well to avoid occurrence of health hazards. If the community people use the water for drinking, DRD will take necessary measures such as refilling the well.

(4) Six (6) parameters, such as Total Coliforms, Fecal Coliforms, Color, Lead, Manganese, and Iron among priority parameters in NDWQS are not currently analyzed in DRD due to luck of budget and equipment. DRD also committed to secure necessary budget for reagents and chemicals for water quality tests in DRD and water quality tests by third parties such as Ministry of Health or private companies.

4-3. Operation and Maintenance of the procured equipment and constructed water supply facilities

DRD confirmed that DRD will maintain the procured equipment including air compressor, well logging machine, pumping test equipment etc with its own budget.

DRD also confirmed that DRD will provide initial instruction on the daily maintenance, tariff collection and follow up support to the village water committee, which will actually operate and maintain the constructed water supply facilities.

In addition, the Team made following recommendations to secure the sustainable water supply.

(1) Development of rural water supply strategy including expansion of water supply facilities and maintenance/rehabilitation of the existing water supply facilities.
(2) Framework to support village water committee by DRD
(3) Consideration of water supply service for low income houses

4-4. Technical assistance ("Soft Component" of the Project)

Considering the sustainable operation and maintenance of the provided facility, following technical assistance is planned to be provided under the Project. DRD confirmed that it will assign necessary number of competent and appropriate C/Ps as described in the draft final report.

- Well logging
- Pumping test

4-5. Expected outcomes and Indicators

Both sides agreed that key indicators for expected outcomes are as follows. DRD has responsibility to monitor the progress of the indicators and achieve the target in year 2022.

[Quantitative Effect]

Indicator	Original (Year 2015)	Target (5 years after the completion, planned as Year 2022)
Number of the drilled well	0	100

[Qualitative Effect]

- To save work load and time of the people in the central dry zone to fetch water
- To increase number of the people in the targeted villages with access to safe water
- Utilization of the procured equipment to drill above deep wells shall be confirmed

5. Undertakings of DRD

The Team explained to DRD its undertakings as listed in **Attachment 2 of Annex-5**, and **Annex-6**, and DRD understood and agreed to execute them.

The Team also explained necessary project cost to be covered by DRD and necessary annual operation and maintenance cost as attached in **Annex-7**. The Team also requested DRD to reimburse for some tax items including commercial tax which might not be exempted according to the recent discussion with Ministry of Finance. DRD agreed to secure necessary budget.

The Team reminded the annual progress/completion report to be submitted by DRD on it's construction of work as agreed by Record of Discussion signed on 24th September as attached in **Annex-8.** DRD confirmed on the submission of the annual progress/completion report.

6. Ex-Post Evaluation

JICA will conduct ex-post evaluation after five (5) years after the project completion with respect to five evaluation criteria (Appropriateness, Impact, Effectiveness, Efficiency, Sustainability) of the project. Result of the evaluation will be publicized. DRD is required to provide necessary support for them.

7. Coordination with other projects

Both sides confirmed that the Project shall be coordinated and demarcated with any other project supported by JICA, other development partners, NGOs, and Myanmar official organizations and departments.

8. Schedule of the Preparatory Survey

JICA will complete the final report in accordance with the confirmed items and send it to DRD in January 2016.

Annex-1	Project Sites Map
Annex-2	List of the targeted villages
Annex-3	Outline of the Project
Annex-4	Expected Project Implementation Schedule
Annex-5	Japan's Grant Aid Scheme
	Attachment 1: Flow Chart of Japan's Grant Aid Procedures
	Attachment 2: Major Undertakings to be taken by Each Government
Annex-6	Undertaking by DRD
Annex-7	Cost for Undertakings by DRD and Annual Operation & Maintenance
Annex-8	Monitoring Form (as an attachment of Record of Discussion) for Progress of the Construction Work

Annex-1: Project Sites Map

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Annex-2: List of targeted villages

Region	Township	Village Tracks	ID	Villages	Population	Priority	Coordinate (WGS 84 UTM46N)	
							X	Y
Sagaing (34 villages)	Budalin	Htanaungkone	SA2-01	Yonedaw	369	5	721184	2468685
		Ngapayin	SA2-02	Nyaungbinthar	223	3	720885	2486381
		Maunghtaung	SA2-03	Maunghtaung	5600	4	712894	2487822
		Ywarthit	SA2-04	Kantawthar	420	5	704295	2487734
		Konethar	SA2-05	Mhonehtoo	172	3	729874	2471014
		Watluu-I	SA2-06	Watluu-I	768	5	700719	2482574
	Chaungoo	Thanbinkan	SA2-07	Thanbinkan	935	3	742454	2430400
		Natyaygan	SA2-08	Natyaygan	809	3	743821	2426594
	Ayadaw	Ngarrtowma	SA2-09	Sithar	420	3	742840	2472680
		Leinhla	SA2-10	Oakkan	800	4	747838	2482552
		Warryaung	SA2-11	Warryaung	4500	2	748170	2458383
		Yechinn	SA2-12	Warrtannkalay	750	5	750823	2470044
		Warryaung	SA2-14	Zeepinlel	1897	5	751516	2457534
	Salingyi	Yonebinyoe	SA2-16	Minntaw	1071	4	712670	2428751
		Moe Kyo Pyin	SA2-17	Kine	305	6	711640	2437561
	Myinmu	Kalarpyan	SA2-18	Kalarpyan	385	2	749957	2422670
		Nyaungbinkan	SA2-19	Hlayookan	580	4	758107	2439343
			SA2-21	Watkya	748	4	745604	2447822
		Latpankyin	SA2-22	Thahtaykone(Ywarma)	410	5	747673	2446221
	Kanbalu	Thindaw	SA2-24	Thindaw	817	3	773385	2613108
			SA2-25	Lwingyi	499	3	772013	2612839
		Koetaungboh	SA2-26	Koetaungboh (Kyunkone)	1171	4	773590	2620729
		Nyaungkanthar	SA2-27	Inngoteto	1278	5	768388	2598038
		Myayhtoo	SA2-28	Myayhtoo	1184	6	745839	2565464
		Khaowntar	SA2-29	Khaowntar	1004	4	776585	2551429
		Nyuangkanthar	SA2-30	Nyuangkanthar	539	5	770771	2597741
		Myaymon	SA2-31	Myaymon	2527	3	785110	2544263
		Pazigyi	SA2-32	Layytwinzin	714	4	800148	2549708
		Paygone(S)	SA2-33	Chaungchar	513	3	762397	2587371
	Dabayin	Intimelay	SA2-34	Minyogone	410	5	731866	2513234
		Mintelgone	SA2-35	Shandaw	384	4	725913	2501505
		Satpyargyin	SA2-36	Kyuntaw (S)	434	5	728632	2505189
	Wetlet	Sharkwal	SA2-37	PalaeThwe (Ywarthit)	298	3	798805	2492481
		Poukkan	SA2-38	Poukkan	1159	6	796554	2461964
Mandalay (31 villages)	Mahlaing	Yayhtwet	MA2-01	Htantawgyi	550	5	766932	2339178
		Kyatse	MA2-02	Asone	650	4	769110	2329262
		Yaychobutar	MA2-03	Khinthar(S)	480	4	782257	2317158
	Myingyan	Chaysay	MA2-04	Chaysay	1412	3	752986	2368995
		Pinlai	MA2-05	Talgyi	830	5	758871	2404696
		Yonehto	MA2-07	Yonehto	850	3	762363	2384258
	Ngazon	Kaungzin	MA2-11	Kaungzin	864	4	765082	2403595
	Natogyi	Myinni	MA2-14	Kyaungkangyibin	435	4	757284	2368820
		Nyaunggone	MA2-15	Nyaunggone	689	5	772284	2368730
	Taungtha	Zagyan	MA2-17	Chaungsone(La)	800	3	735423	2354667
			MA2-19	Tharzi	950	4	740022	2346931
		Kanmyel	MA2-20	Kanaye	1150	4	740499	2349032
		Tharyarmyaing	MA2-21	Tharyarmyaing	2200	3	745680	2342452
	Yamethin	Myinnar	MA2-22	Oakpo	1660	4	826577	2270843
		Nabukyin	MA2-23	Kangyi	1520	3	828701	2246082
	Pyawbwe	Seitcho	MA2-24	Htanekan	807	4	804392	2275367
			MA2-25	Waryonesu	797	1	804775	2275467

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Region	Township	Village Tracks	ID	Villages	Population	Priority	Coordinate (WGS 84 UTM46N)	
							X	Y
Mandalay	Nyaungoo	Sinthamway	MA2-26	Talkone	320	2	721219	2347331
		Tawbyar	MA2-27	Tawbyar	360	3	726336	2345860
		Setsetyo	MA2-28	Setsetyo	840	1	721783	2329618
		Pyon	MA2-29	Kanzauk	565	2	709761	2328732
		Kantain	MA2-30	Talbindel	523	2	719609	2332361
		Tawpyar	MA2-31	Mongywettaw	365	2	724266	2337196
		Tuywintaung	MA2-32	Phoenekan	394	5	702946	2332978
		Nyaungbinthar	MA2-33	Nyaungbinthar	314	2	712986	2322241
		Kudaw	MA2-34	Saingkan(Tetide)	331	1	724241	2328758
		Byugyi	MA2-35	Byugyi	1804	1	724225	2325295
	Kyaukpadaung	Tangkan	MA2-36	Aleywar-2	1098	2	718698	2309611
		Lelgyi(N)	MA2-38	Lelgyi(Ma)	1279	3	734592	2325518
		Kannbyu	MA2-39	Thayattaw	725	3	729386	2325074
		Nakyatkhwal	MA2-40	Nakyatkhwal	(4790)	2	719979	2312255
Magway (35 villages)	Magway	Natkan	MG2-01	Natkan	1244	3	706558	2233838
		Sharzaungkan	MG2-02	Thanbo(Ywarthit)	280	5	716115	2216165
		Kyarkan	MG2-03	Nyaungbinthar	1535	2	737905	2244038
		Nyaungbinthar	MG2-04	Konegyi	1090	2	718609	2237658
		Paypinsan	MG2-05	Sainggya	2300	3	725131	2213520
		Thapyaysan	MG2-06	Thapyaysan(N)	250	2	712474	2227465
		Supyitsan	MG2-07	Shwekyaw	388	2	733927	2207547
		Nyaungkan	MG2-08	Leikkan	1115	3	726925	2239708
			MG2-09	Ywarthitgyi	1805	3	722085	2237683
	Chauk	Thanbo	MG2-10	Kanyaygyi	1239	3	702708	2281908
		Myaysoon	MG2-11	Myaysoon (Ywarthit)	319	2	698121	2277376
		Zeebwar	MG2-12	Zeebwar	1027	4	711611	2298972
		Chaungtat	MG2-13	Yenpyay	280	3	691309	2301533
		Pakhannge	MG2-14	Kyatesu(N)	740	3	685590	2292806
		Salintaung	MG2-15	Winkabar	2420	3	684440	2287269
		Magyikone	MG2-16	Kyatkan	478	3	685497	2292703
		Gwaypin	MG2-17	Sudat	560	1	706642	2285676
		Nyaungzin	MG2-18	Myaynilain	253	3	698822	2287055
	Yenangyaung	Indaw	MG2-19	Legyinyo	1637	2	724077	2266805
	Myothit	Laytinesin	MG2-20	Laytinesin(S)	3299	2	732775	2236056
			MG2-21	Tharmyar	3700	2	736194	2241244
			MG2-22	Aungmyinthar	1150	5	733076	2231654
		Wargyiini	MG2-23	Ngwelay	1237	4	738867	2222539
		Htauksharkan	MG2-24	Indaw(N)	530	5	742532	2229825
		Manawtkone	MG2-26	Manawtgone	930	3	732003	2222326
	Natmauk	I-Sauk	MG2-27	Kangyigone	360	2	742461	2259232
		Htonepoutchine	MG2-28	Htonepoutchine	2018	4	730959	2255653
		Wayonegone	MG2-33	Wayonegone	950	5	735749	2267902
		Htonepoutchine	MG2-34	Nyaunggone	1814	3	732682	2256118
		I-Zauk	MG2-35	Kyugyaung	550	3	744568	2259272
	Taungdwingyi	Pantwinlay	MG2-36	Kokkohla	860	6	765819	2218655
		Payatkyal	MG2-37	Kangyigone	1099	4	762556	2192933
		Warthonepyu	MG2-38	Htaukkyantgwin	1052	1	772105	2184938
		Hlebwegyi	MG2-39	Hlebwegyi	1988	2	747939	2200787
			MG2-40	Yayhtwetgyi	662	3	743110	2197239

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Annex-3: Outline of the Project

1. Title of the Project

The Provision of Equipment for Rural Water Supply Project in the Central Dry Zone (Phase 2)

2. Objective of the Project

The project aims to strengthen the capacity of DRD's rural water supply by providing the equipment necessary for construction of new deep wells, thereby contributing to improve the access of the people in the Central Dry Zone to safe and sustainable water resource.

3. Component of the Project

1) Equipment

Item	Specification	Number
Truck mounted drilling rig (drilling capacity, more than 300m) and ancillary materials	Drilling capacity: 250m	1 set
	Drilling capacity: 200m	1 set
Cargo truck with crane	Pay load: more than 10 ton Lifting load: 5 ton	2 cars
Air compressor		2 sets
Well logging machine	Measuring depth: 400m	1 set
	Measuring depth: 300m	1 set
Consumables for borehole construction (bentonite, CMC, etc.)		For 100 boreholes
Casing and screen		For 100 boreholes
Pumping test equipment		1 set

2) Supervision / Soft component

- Procurement Supervision
- Soft component on well logging and pumping test

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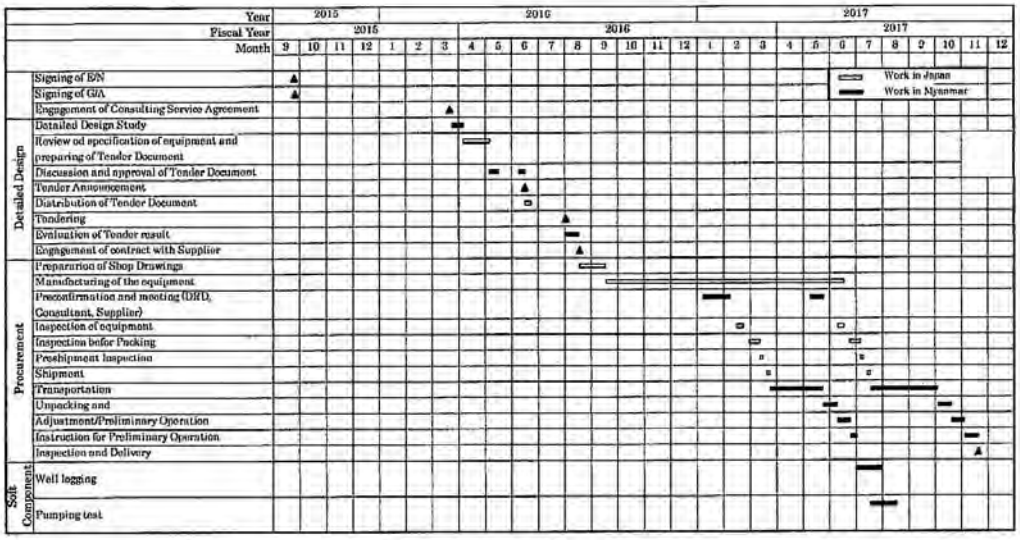
Annex-4: Expected Project Implementation Schedule



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Annex-5: Japan's Grant Aid Scheme

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as part of this realignment, JICA was reborn on October 1, 2008. After the reborn of JICA, following the decision of the Government of Japan (hereinafter referred to as "the GOJ"), Grant Aid for General Project is extended by JICA.

Grant Aid is non-reimbursable fund to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures (Attachment 1)

Japanese Grant Aid is conducted as follows-

- Preparatory Survey (hereinafter referred to as "the Survey")
  - The Survey conducted by JICA
- Appraisal & Approval
  -Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Determination of Implementation
  -The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
  -Agreement concluded between JICA and a recipient country
- Implementation
  -Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide a basic document necessary for the appraisal of the Project by JICA and the GOJ. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- Preparation of a outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA uses (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

The Report on the Survey is reviewed by JICA, and after the appropriateness of the Project is confirmed, JICA recommends the GOJ to appraise the implementation of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the E/N will be singed between the GOJ and the Government of the recipient country to make a plead for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

The consultant firm(s) used for the Survey Will be recommended by JICA to the recipient country to also work on the Project's implementation after the E/N and the G/A, in order to maintain technical consistency.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Attachment 2

(6) Proper Use

The Government of recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

(7) Export and Re-export

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

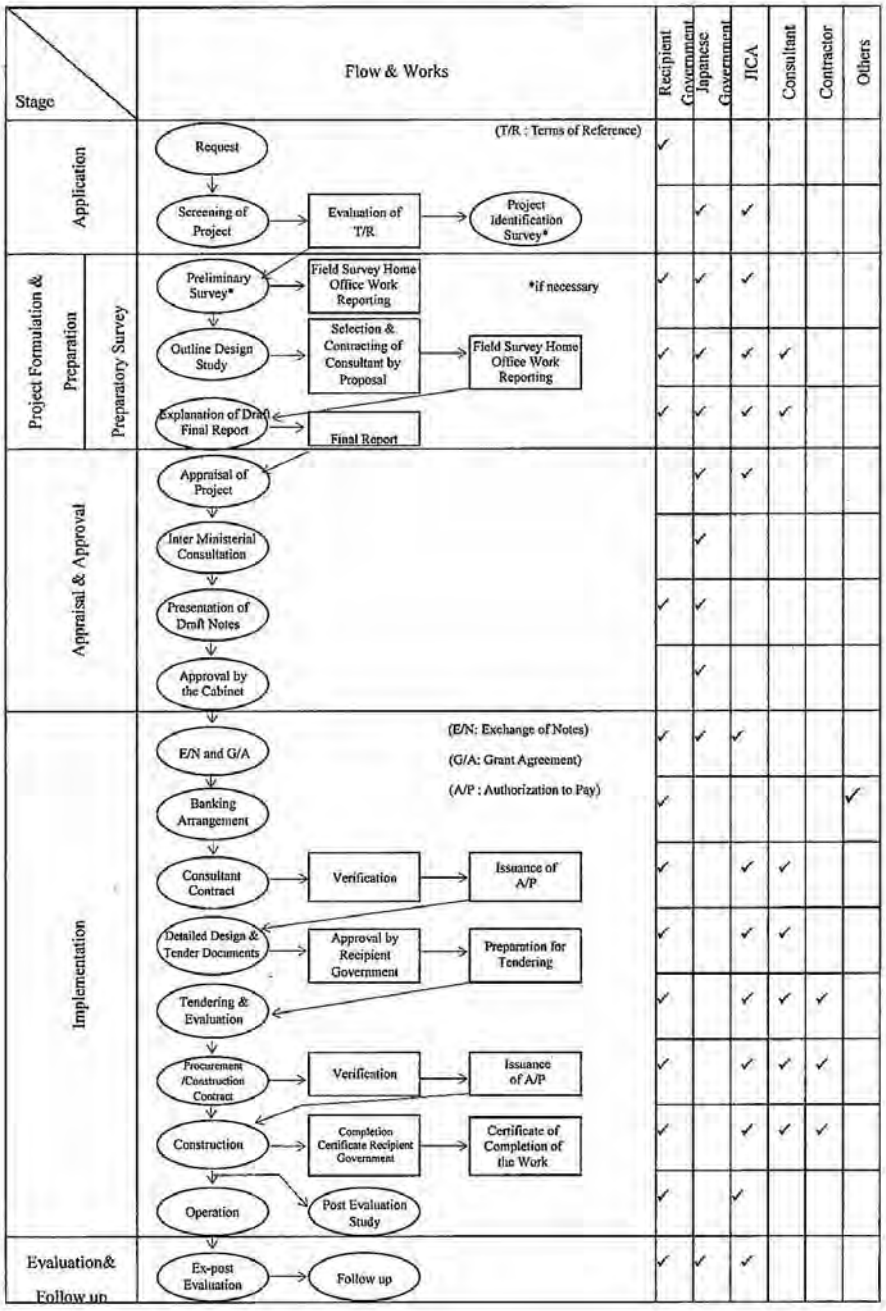
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

(10) Social and Environmental Considerations

A recipient country must ensure the social and environmental considerations for the Project and must follow the environmental regulation of the recipient country and JICA socio-environmental guideline.

Attachment 1

Flow Chart of Japan's Grant Aid Procedures



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Attachment 2

Major Undertakings to be taken by Each Government

No	Items	To be covered by Grant Aid	To be covered by Recipient
1	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		•
	2) Payment commission		•
2	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country and to assist internal transportation of the products		
	1) Marine (Air) transportation of the products from Japan to the recipient country	•	
	2) Tax exemption and custom clearance of the products at the port of disembarkation		•
	3) Internal transportation from the port of disembarkation to the project site	(•)	(•)
3	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		•
4	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		•
5	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		•
6	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the transportation and installation of the equipment		•
7	To give due environmental and social consideration in the implementation of the Project		•

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

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Annex-6 Undertaking by DRD

Following is the undertaking whish shall be conducted by DRD in addition to Attachment 2 of Annex-5

No.	Work Items	Description	Responsibility	Implementation timing (tentative)
1	Banking Arrangement Commission (B/A)	Arrangement between Myanma Foreign Trade Bank (MFTB) & The Bank of Tokyo-Mitsubishi UFJ (BTMU) to open Grant Account with BTMU. DRD needs to pay the commission fee for B/A.	DRD	After GA, Before the signing of consultant contract (By February 2016)
2	Authorization to Pay (A/P)	A/P shall be issued by MFTB to BTMU to give authorization for BTMU to pay the consultant on behalf of MFTB. DRD needs to initiate the following procedure. (1) FE (Foreign Exchange) Permission by the Budget Department under the Ministry of Finance (2) Issuing of A/P by MFTB	DRD	At the time of payment (First payment will be advance payment of consultant contract in February 2016)
3	Establishment of Project Implementing and Coordination Committee	DRD proposed to establish Project Implementing and Coordination Committee of the Project within DRD. Structure and name list of the Project Implementing and Coordination Committee shall be informed to JICA	DRD	Soon after signing of consultant contract (By February 2016)
4	Recruit of new staff at workshops	DRD will recruit 2 or 3 new staff for workshops for O&M of equipment	DRD	Before arrival of the equipment (By May 2017)
5	Assign staff for the construction of deep wells and related water supply facilities	DRD shall assign necessary staff (8 staff x 2 team) for the construction of deep wells.	DRD	Before signing of consultant contract (By February 2016)
6	Assignment of C/Ps for the soft component	DRD needs to assign necessary number of competent C/Ps for the following soft component as described in DFR. List of C/Ps shall be informed to JICA - Well logging - Pumping test	DRD	Before signing of consultant contract (By February 2016)
7	Daily allowance and traveling expenses for staff participating in soft component	-	DRD	At the time of necessity
8	Preparation of land space to store procured equipment	DRD shall secure necessary space to store procured equipment in Nyanu Workshop.	DRD	Before shipment of the equipment (By March 2017)

No.	Work Items	Description	Responsibility	Implementation timing (tentative)
9	Construction of deep wells and related water supply facilities	DRD shall construct deep wells and related water supply facilities for the targeted villages in 5 years.	DRD	5 years after the procurement of the equipment (2017-2022)
10	Water quality test	DRD shall conduct water quality test at the time of completion of deep well construction and take necessary measures as follow. Result of the water quality test shall be report to JICA Myanmar Office by Annual Progress/Completion Report. (1)The DRD will analyze the water quality at the completion of the drilling of deep wells and the results shall be included in the Progress Monitoring Report to be submitted to the JICA Myanmar office. Necessary cost for this issue is borne by the DRD. (2)In the following cases, the DRD will monitor water quality once a year. a)water quality of a well meets the standard and/or WHO Guidelines (ver. 4) but it is very close to the standard or Guidelines b)there is an existing deep well, of which water quality does not meet the standard or Guidelines, close to the well drilled in the Phase 2 project. c)there is any facility which may cause groundwater pollution (factories, mines, etc.) in the adjacent area of the target village. (3)If the water quality does not satisfy the standard, such water shall be used only for purposes other than drinking. In such case DRD shall properly inform and instruct the community people not to drink the water of such well to avoid occurrence of health hazards. If the community people use the water for drinking, DRD will take necessary measures such as refilling the well.	DRD	5 years after the procurement of the equipment (2017-2022)
11	Instruction and technical support to the targeted village to operate and maintain the constructed water supply facilities	The drilled well will be handed over to the water management committee in the targeted villages. DRD shall provide instruction and technical support to the water management committee to properly operate and maintain the constructed water supply facilities	DRD	5 years after the procurement of the equipment (2017-2022)
12	Submission of Annual Progress/Completion Report to JICA Myanmar Office	DRD shall submit Annual Progress/Completion Report on its construction work and the water quality test on the deep tube well in the targeted villages to JICA Myanmar Office.	DRD	Annually from commencement of construction work until the completion of the construction work by DRD

Annex-7 Estimated Cost for Undertakings by DRD and Annual Operation and Maintenance

The following tentative estimated cost for the Project will be reviewed periodically after commencement of the Project.

(1) Estimated Cost for Undertakings by DRD

Item	Cost (x10^3 MMK)	Yen (x10^3 Yen)
A. Cost for the First Year		
1) B/A and A/P	11,446	1,282
2) Deep Well Drilling	162,500	18,200
3) Construction of Water Supply Facility	268,800	30,106
4) Maintenance of the procurred equipment	17,225	1,929
5) Travel allowance and expense for attending the soft component	3,500	392
6) Water Quality Analysis	356	40
Total for the First Year ①	463,827	51,949
B. Cost after the First Year		0
1) Deep Well Drilling	162,500	18,200
2) Construction of Water Supply Facility	268,800	30,106
3) Maintenance of the procurred equipment	17,225	1,929
4) Water Quality Analysis	356	40
Total for each Year after the First Year ②	448,881	50,275
Total after the First Year ③=②×4	1,795,524	201,099
Grand Total for 5 Years ①+③	2,259,351	253,048

Exchange Rate: 1MMK=0.112 Japanese Yen (Jul. 2015)

(2) Estimated Cost for Annual Operation and Maintenance

Item	Number	Cost per Unit (MMK)	Annual Cost (Yen)
Drilling rig	2	1,875,000	3,750,000
Cargo truck with crane	2	5,500,000	11,000,000
Air compressor	2	625,000	1,250,000
Submersible pump	4	150,000	600,000
Generator(for submersible pump)	1	625,000	625,000
Logging machine	2	150,000	300,000
Total			**17,225,000**

Exchange Rate: 1MMK=0.112 Japanese Yen (Jul. 2015)

Annex-8 Monitoring Form (as an attachment of Record of Discussion signed on 24th September) for Progress of the Construction Work

Record of Discussions

With reference to the Grant Agreement between the Japan International Cooperation Agen (hereinafter referred to as "JICA") and the Government of the Republic of the Union Myanmar (hereinafter referred to as "Myanmar" dated September 24, 2015 concerning t Japan's grant assistance for The Provision of Equipment for Rural Water Supply Project in t Central Dry Zone (Phase 2), the representatives of JICA and of the Government of Myanm wish to record the following:

1. With regard to the Article 11 (1) (c) and (2) of the said Grant Agreement, t representative of JICA stated that:
(a) the Government of Myanmar will submit to JICA annual progress reports on t construction work utilizing the materials and/or equipment procured under the said grant, f which the Government of Myanmar is responsible, by filling in the form attached hereto un all the construction work is completed; and
(b) the Government of Myanmar, will submit to JICA a final report upon completion.

2. The representative of the Government of Myanmar stated that the Government Myanmar has no objection to the statement by the representative of JICA referred to above.

Nay Pyi Taw, September 24, 2015

Keiichiro Nakazawa
Chief Representative
JICA Myanmar Office

Khant Zaw
Director General
Department of Rural Development
Ministry of Livestock, Fisheries and Rural Development

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[Progress / Completion] Report submitted on ○○○

1. Outline of the Project
(1) Name of Country: The Republic of the Union of Myanmar
(2) Name of the Project: The Provision of Equipment for Rural Water Supply Project in the Central Dry Zone (Phase 2)
(3) Date of the Grant Agreement: <Month Date, Year>
(4) Name of the Executing Organization: Department of Rural Development, Ministry of Livestock, Fisheries and Rural Development (hereinafter referred to as "DRD"

2. General Situation (how the equipment and/or materials procured under the Japan's Grant Assistance are used in general)

3. Detailed Explanation

equipment and/or materials;	How they are being used;	In case they haven't been used as planned	
		Reason for it; (Please specify the reason such as budgetary problems and problems in employing appropriate staffs etc.)	Measures to be taken to redress the situation;

4. Progress of the Construction Work done by DRD

Project site	Current situation				In case the work is delayed		Planned completion date	Any other problems;
	Construction		Water quality test at drilled well (*2)		Reason for delay;	Measures to be taken to redress the situation;		
	Component of water supply facility(*1)	Date of construction completion	Result of water quality test	Date of water quality test				
**	Production well, tank	dd/mm/yy	satisfied	dd/mm/yy	n/a	n/a	n/a	n/a
**	Production well	dd/mm/yy	not satisfied	dd/mm/yy -	n/a	n/a	n/a	n/a

(*1) Please write the component of the water supply facility such as production well, tank, distribution pipe, house connection, etc

(*2) If the water quality of the drilled well does not satisfy the water quality standard, DRD shall take necessary measures to avoid any health hazards caused by the well.

Note: Above table could be modified subject to the mutual understanding between DRD and JICA Myanmar Office.

5. Photos (please attach photos showing the progress of the construction work or the overall view of the facilities constructed by DRD.)

資料　5

その他の資料・情報

資料 5. その他の資料・情報

5.1 村落評価一覧表

地域	村落名	ID	想定掘削深度		想定静水位	予察調査結果	Step-1 水理地質	Step-2 需要	Step-3 水質	Step-4 維持管理	Step-5 開発可能性	Step-6 優先度	想定される地層厚さ (m)			既存深井戸水源に対する問題（水へのニーズ）		
			feet	m	m								沖積層及び表層土	イラワディ層	ペグ層	水量	水質	水源距離
	Yonedaw	SA2-01	530	160	40	古期沖積低地。150m程度の井戸でEC-1500uS/cm以下の水を取れている。しかし、160mのTWでF:1.5,NO3：20とのバックテスト結果が出ており、水質確認が必要。	△	○	○	○	C	5	10 m	150 m	0 m	×	△	○
	Nyaungbinthar	SA2-02	530	160	40	イラワジ層-沖積層の境界付近。DugWell(10m程度)の水質は良くない(EC:2,470uS/cm)。82mの井戸で、1500uS/cm程度の水質。Yieldは800GPHと少ないため、もう少し深く掘れば良い水がある程度の量得られる可能性が期待できる。	○	○	-	○	A	3	10 m	150 m	0 m	–	–	–
	Maunghtaung	SA2-03	500	150	40	イラワジ層。112m掘削した深井戸では、塩分の少ない水(EC:620uS/cm)が得られているが、揚水量が800GPHと少ない。73mの井戸はEC-2,610μS/cmであるが、NO3が45mg/l以上を示しており、表層からの汚染も考えられる。	○	○	-	○	B	4	16 m	134 m	0 m	–	–	–
	Kantawthar	SA2-04	420	125	39	イラワジ層。122m、62mそれぞれの井戸でEc:1000uS/cm以下の井戸が得られている。個人所有であるが10本のT(61m平均)があり、飲料水は足りてるが生活用水・家畜の飲み水が不足。	○	○	-	○	C	5	3 m	122 m	0 m	△	○	○
	Mhonehtoo	SA2-05	330	100	30	イラワジ層とペグ層の境界付近。115m（EC:6280で硫黄臭あり）、146m(DRD)のTWがあるが、共に塩分高い。隣村のTwogyiでは115mでEC1700の井戸がある。150mまでの状況をVESで確認したい。	△	○	○	○	A	3	3 m	3 m	94 m	×	×	○
	Watluu-I	SA2-06	330	100	36	イラワジ層。なだらかな丘陵地形。70mの井戸でEC:1,000μS/cmが得れている。個人所有だが20本ほどの井戸が2013年に建設された。	○	○	-	○	C	5	6 m	94 m	0 m	×	○	○
	Thanbinkan	SA2-07	500	150	70	イラワジ層。既存の152mの井戸(MONOポンプ)だけで賄っている(2500g/h)。2年前にユニセフが作った井戸(192m)の水中ポンプが故障。水質は飲料可能レベル。ユニセフに状況報告済み。フッ素がやや高い(F：0.8)	△	○	○	○	A	3	5 m	145 m	0 m	△	△	○
	Natyaygan	SA2-08	660	200	61	イラワジ層。既存の173mの井戸(Monoポンプ)はEC=2,820と高く飲料はメインロードの反対側のため池を使っている。100m以浅のん水を狙うか、200m以上で良質な水が得られるかどうか検討が必要(フッ素がやや高い0.8)。	△	○	○	○	B	3	5 m	195 m	0 m	△	×	○
	Sithar	SA2-09	330	100	44	イラワジ層。既存の井戸は100m前後水質は掘削場所によって異なり、250m程度の距離であるがEC:650μS/mと1300μS;/mと差がある。	○	○	-	○	A	3	5 m	95 m	0 m	△	△	○
	Oakkan	SA2-10	760	230	3	イラワジ層。224mの井戸は自噴井となっている（EC:861μS/cm）。	○	○	-	○	C	4	20 m	210 m	0 m	×	○	△
	Warryaung	SA2-11	830	250	55	イラワジ層。NAGの寄付で作った井戸(244m)が公共の水源として使用(920μS/cm)されている。飲料として使用できる。民間所有の60m程度井戸はNAGの井戸より塩分濃度低い(720μS/cm)。深くても飲用可能な水質が取れる地域なので、いくつかの帯水層から取水する生産量の大きい井戸が建設できる可能性がある。	○	○	-	○	A	2	5 m	145 m	100 m	×	○	○
	Warrtannkalay	SA2-12	350	105	43	イラワジ層。97m（EC:912μS/cm)の井戸が7000g/h、MONOポンプ。	○	○	-	○	C	5	5 m	100 m	0 m	△	△	△
	Yathar	SA2-13	-	-	-	Q2。古期段丘面。深い井戸ほど水質が悪くなる傾向にある。61m: EC1250μS/㎝、182m: EC=4470μS/㎝)。200m以深に良質な地下水が存在する可能性があるかどうかを物探で確認。	△	○	-	○	D-2							
	Zeepinlel	SA2-14	430	130	50	イラワジ層丘陵地。既存深井戸は107～137m(6本)でほぼ同様の水質(EC:700μS/cm)で飲用に使用している。100m以下での地下水開発となる。	○	○	-	○	C	5	5 m	125 m	0 m	×	○	○
	Yonebinyoe	SA2-15	-	-	-	Q2。微高地の上に91mの深井戸があるが、塩分高く(EC:18,060μS/cm)僧院だけの利用になっている。近隣に50mの井戸(EC:1183μS/cm)で近隣数村落の時間給水をしている施設があり、50m程度の井戸建設が有望だが、100m以深に水質が期待できる帯水層があるかどうかを物探で確認。	△	○	-	○	D-2							
Sagaing	Minntaw	SA2-16	560	170	40	Q2。121mの深井戸があるが、非常に塩分が高く、飲料には使えない。近隣に50mの井戸(EC:1183μS/cm)で近隣数村落の時間給水をしている。150m以深に良好な水質が期待できるか確認したい。	△	○	-	○	B	4	20 m	0 m	150 m	–	–	–
	Kine	SA2-17	394	120	40	ペグ層。緩やかな丘陵地形。水源はため池だけで、村落には深井戸の経験がない。良質な地下水の分布する可能性を検討したい。	△	○	-	○	D-1	6	5 m	115 m	0 m	–	–	–
	Kalarpyan	SA2-18	660	200	36	イラワジ層。50～60mの既存井。EC:3600μS/cm、F: 1.5.　100以深の帯水層で塩分濃度の低い地下水の開発を期待する。	△	○	○	○	A	2	5 m	175 m	20 m	×	×	○
	Hlayookan	SA2-19	650	195	121	Q2。152mの深井戸(EC:1050μS/cm)があるが、水量が不足(450gph)。水位が115mと深いため、エアリフトでは多く上がらないだけかもしれない。	○	○	-	○	C	4	40 m	155 m	0 m	×	△	○
	Makyeekan	SA2-20	-	-	-	Q2。深井戸は無い、24m程度の浅井戸2本を合わせてサクションポンプで揚水。高架タンクに上げて各家庭に重力配水している。水質は良好。水は足りている。新規井戸建設は不要。	×	○	-	○	-							
	Watkya	SA2-21	660	200	36	イラワジ層とペグ層の境界付近。167mの井戸2本で給水施設を運用。EC2310とやや高い。２井で800m3/month (5800g/d)。	○	○	-	○	C	4	5 m	50 m	145 m	×	×	○
	Thahtaykone(Ywarma)	SA2-22	600	180	55	イラワジ層とペグ層の境界付近。ペグ層側と考えられる。30m以深に硬岩を挟むようになり、90m以深は硬岩となったとの情報があり、途中からペグ層に入っている可能性あり。	○	○	-	○	C	5	5 m	25 m	150 m	○	×	○
	Magyidaw	SA2-23	-	-	-	Q2。浅層地下水21mを吸引して採水するシステムが10ほどあるが農業用。飲用にはMuu Riverの水を利用。パックテストでは問題ないが、汚染なども懸念されるため、川の水質試験を実施したい。	△	○	○	○	D-2							
	Thindaw	SA2-24	270	80	50	116m(EC:34,800)、82m(EC:1053）と場所による違いが大きい。帯水層により水質の違いがある可能性あり。EC以外の項目のパックテストは問題ない。	○	○	-	○	A	3	10 m	70 m	0 m	×	△	△
	Lwingyi	SA2-25	730	220	31	地質図ではQ2だがIrが微高地を形成しイラワジ層が分布している。150m程度の飲料井戸があるが、水量が少なく需要を賄えない。	○	○	-	○	B	3	5 m	215 m	0 m	×	○	○
	Koetaungboh(Kyunkone)	SA2-26	610	185	60	Q2分布域。152mの井戸と85mの井戸があるが飲料には好まれず、ため池が利用されている。152mの井戸は僅かな硫黄臭がある。	△	○	○	○	C	4	30 m	20 m	135 m	×	×	○
	Inngoteto	SA2-27	500	150	50	イラワジ層。60mの僧院の井戸が、飲料に好まれているが、水量がわずかで、新しい井戸が必要。イラワジ層の半固結砂岩に水がある様。60m以深の水質状況の確認が必要。	△	○	○	○	C	5	5 m	145 m	0 m	–	–	–
	Myayhtoo	SA2-28	656	200	150	イラワジ層。100m程度のTWを主体とし1000uS/cm以下の水が得られている。水位が深く(>60m)、水に若干の濁りがあり、帯水層のキャパシティーが不足していると考えられる。100m以深で良質な帯水層の開発を行う。	△	○	-	○	D-1	6	5 m	195 m	0 m	–	–	–
	Khaowntar	SA2-29	710	215	30	イラワジ層。110～116mまでのTWがあり、半数は塩分強い。村の東南側が比較的水質が良く、北西側に悪い井戸が多い。	○	○	-	○	C	4	5 m	210 m	0 m	–	–	–
	Nyuangkanthar	SA2-30	580	175	50	イラワジ層。3本ある井戸はいずれも水の量が少なく合計で200ガロン/日以下。45mの井戸はEC=693uS/cm,122mの井戸はEC:1,905uS/cm。良好な帯水層の開発を180m程度までで行う。	△	○	○	○	C	5	5 m	145 m	25 m	–	–	–
	Myaymon	SA2-31	510	155	80	イラワジ層。村は北と南に分けられ、北の村に塩分の多い井戸が多く、水が足りない。100m以深まで掘削した例が無い。100m以深で塩分の少ない帯水層を開発する。	△	○	○	○	A	3	5 m	150 m	0 m	×	×	○
	Layytwinzin	SA2-32	690	210	120	表層はQ1。すぐにイラワジ層に変わる。深井戸なし。116m、146mのTest井は、それぞれ空井戸、50g/hで失敗井。山間沖積低地の浅井戸１つのみしか飲用に使えない、厳しい状況。	△	○	-	○	C	4	10 m	50 m	150 m	–	–	–
	Chaungchar	SA2-33	680	205	60	イラワジ層。50m以浅で良好な水質が得られているが、水量が少なく、50m以深(150mまで)で良質な水の水量が確保できる帯水層を開発する。	○	○	-	○	B	3	5 m	200 m	0 m	–	–	–
	Minyogone	SA2-34	370	110	3	Q2。下位にイラワジ層。ダグウェルしかない。隣村に103mのMonoポンプ井（EC:1224μS/cm)がある。水位は3.2mで自噴に近い。	○	○	-	○	C	5	50 m	60 m	0 m	–	–	–
	Shandaw	SA2-35	830	250	0	イラワジ層。灌漑水路のそこに穴を掘ってしみだし水を現在利用。近隣で自噴井が開発されている（247m、2000g/h、EC:1564μS/cm)。	○	○	-	○	C	4	5 m	245 m	0 m	–	–	–
	Kyuntaw (S)	SA2-36	330	100	68	Q2。平坦地。深度100mのTWを使用していた(1000g/h)が、1995頃にダメージで使えなくなった。同様のTWの建設で対応できる。	△	○	-	○	C	5	20 m	80 m	0 m	–	–	–
	PalaeThwe (Ywarthit)	SA2-37	430	130	55	イラワジ層丘陵地。丘陵頂部の平坦面で、かなり広い平坦地。水源は109mの井戸(2013年建設)のみ。水質は飲用できるレベル(EC=924μS/cm)。全体に凝灰質で、風化により粘土分が多くこのエリアの道路は粘土主体。	○	○	-	○	A	3	5 m	125 m	0 m	×	△	○
	Poukkan	SA2-38	492	150	30	イラワジ層分布域だが、平坦な水田地帯。深井戸は無く、Dugwellを飲料水として利用。Shallowwellが31本あり最大40mだが、飲料には使っていない。2㎞ほど北東に自噴井(38m)がありEC:1500μS/cm。180m以浅での地下水開発が検討される。	○	○	-	○	D-1	6	5 m	145 m	0 m	–	–	–
	Shwenyaungtaw	SA2-39	-	-	-	イラワジ層。丘陵の頂上。Dug wellのみが水源。水平の連続性がある地域ではないので、２Dで地下の風化深度の状況やすい2Dの実施が望ましい。	○	○	-	○	D-2							
	Sabeidaw	SA2-40	-	-	-	イラワジ層で区分されるが、地形的には平坦な水田地帯。深井戸の履歴は無く、10m程度の浅井戸にハンドポンプを使っている。水位は–1.5m程度。表層は粘性土に覆われている。2㎞ほど北に122mの自噴井が３か所あり、水質も飲料可能。本村でも可能性がある。	○	○	-	○	D-2							

各ステップでの評価の凡例)　-：実施していない。　○：問題なし。　△：検討が必要。　×：開発困難。

【Step1～4の凡例】[-] : 実施していない　[○] : 問題ない [△] : 検討が必要　[×] : 開発困難

【Step5の凡例】[A～D-2 は物理探査結果による開発難易度を示しAが最も開発しやすいことを示す

【Step6の凡例】[1] ～ [6]の評価は開発優先度を示し、[1]が最も優先度が高い

既存水源の問題の凡例

○ ：問題なし

△ ：やや問題あり

× ：問題あり

– ：深井戸の利用は無い

地域	村落名	ID	想定掘削深度		想定静水位	予察調査結果	Step-1 水理地質	Step-2 需要	Step-3 水質	Step-4 維持管理	Step-5 開発可能性	Step-6 優先度	想定される地層厚さ (m)			既存深井戸水源に対する問題（水へのニーズ）		
			feet	m	m								沖積層及び表層土	イラワディ層	ペグ層	水量	水質	水源距離
	Htantawgyi	MA2-01	500	150	60	イラワジ層。15m程度のDugWellは塩分がやや高く(EC:2300~3500μS/cm)飲用としては何がある。４Dugwellのうちの一か所を飲料に使用、イベント時にのみ180ftのTubeWellを使用している。54mのTubeWellが飲用可能ということ。60～100m間で良質の帯水層開発を目指す。	○	○	-	○	C	5	5 m	95 m	50 m	△	×	○
	Asone	MA2-02	500	150	60	ペグ層。深井戸の実績なし。浅井戸1本（村落中心から遠い）と多くの家庭で井戸を持っている。雨季は主に貯水池の水を使用。村長宅の井戸ではフッ素が高い(1.5mg/L)。供用井戸の水質は良好。周辺で一部石灰のモジュールが見られる。	○	○	-	○	B	4	5 m	145 m	0 m	–	–	–
	Khinthar(S)	MA2-03	890	270	60	ペグ層。深井戸の実績なし。浅井戸が数本（私有も含む）点在するのみ。塩化が進み、放棄した井戸が複数あり。ため池を近隣の村と共有している。	○	○	-	○	C	4	5 m	0 m	265 m	–	–	–
	Chaysay	MA2-04	530	160	50	ペグ層分布地区。50～80m付近のECが高いため（EC:2000～3000μS/cm）、120m程度での地下水帯水層の開発を実施する。	○	○	○	○	A	3	5 m	0 m	155 m	×	×	○
	Talgyi	MA2-05	560	170	50	Q2とイラワジ層の境界付近。村落内に複数井戸があり、一部は塩水化の進行により飲用不可。フッ素が高い。	○	○	-	○	C	5	5 m	65 m	100 m	–	–	–
	Kuywar	MA2-06	-	-	-	ペグとQ2の境界付近。EC=20000以上、フッ素2~4。三相電化済み。	△	○	○	○	D-2							
	Yonehto	MA2-07	541	165	60	DugWellの水質良好でポンプで村落まで送っている。水量も十分である。一方、深さ100mのTubeWellはEC=7300～8000μS/cmと塩分強く使用不可。ペグ層が浅所から分布すると考えられ深井戸の開発は困難と判断される。	×	○	-	○	A	3	5 m	160 m	0 m	×	×	○
	Nyaungwum	MA2-08	-	-	-	既存井は60～100m程度、ECが高い。250m程度の深井戸に挑戦。	○	○	-	○	D-2							
	Konelel	MA2-09	-	-	-	スクリーンの目詰まり、水質の悪化により、使用停止した井戸複数あり。浅層の水質が悪く、130mの深井戸も塩分濃度が高く使われていない。また深部ではペグ層に到達する可能性が高いことから断念。	×	○	-	○	-							
	Phaungkadaw	MA2-10	-	-	-	個人の深井戸が複数あるものの、水質面から現在は使用していない。200mの深井戸もEc:6470μS/cmと塩分濃度高く使用できない。深井戸の開発は困難と判断した。飲料水にはため池の水を使用。	×	○	-	○	-							
	Kaungzin	MA2-11	830	250	100	イラワジとペグの境界付近。10mのDugWellあり。EC=2000、Fe=0.6。近隣御村にも浅井戸有。	○	○	-	○	C	4	5 m	95 m	150 m	×	×	○
	Ywarsite	MA2-12	-	-	-	上部ペグ層の分布域。浅層（Dugwell：EC3300μS/cm)、深層(97m、213m）とも水質悪く、更に深く掘削してもペグ層であり良い水質が得られる可能性は低い。地下水開発は困難。	×	○	-	○	-							
	Kyaungnan	MA2-13	-	-	-	上部ペグ。78mの井戸から11,800μS/cmの水が出ている。水理地質的にさらに深く掘削しても良い水質は得られないと言える。18mの浅井戸4本をまとめ、サクションポンプで引いるシステムはEC:1,342で飲料可能なレベル(少し臭いがある)。	×	○	-	○	-							
Mandalay	Kyaungkangyibin	MA2-14	660	200	167	上部ペグ。127mの既存井戸がEC:2,120μS/cm。DRDが今年２月に建設した井戸は234mでEC:6,540μS/cm。	△	○	-	○	C	4	5 m	0 m	195 m	△	×	○
	Nyaunggone	MA2-15	500	150	61	上部ペグ。村の外にある農業用の61mの井戸のECが1,192μS/cm、村の中にある91m（他6本掘削しているが同様)の井戸が2800μS/㎝で、更に深いところ（200~300m)に可能性の有無は不明であるが、深井戸はより水質が悪いと想定される。	△	○	○	○	C	5	5 m	0 m	145 m	×	△	○
	Chaungnar	MA2-16	-	-	-	Q2とペグ層の境界付近。小河川脇のDugWellのみを使用しており、乾季は水位の回復に時間を要する。深井戸実績なし。孔底からの採水のためかフッ素高い(F=1.5mg/L)	△	○	○	○	D-2							
	Chaungsone(La)	MA2-17	460	140	98	イラワジ層。既存井戸は135m付近だがEC＝1483。物探の結果次第で同程度での採水を期待できるか？	△	○	-	○	A	3	5 m	135 m	0 m	△	×	○
	Kyaukkartaungkone	MA2-18	-	-	-	ペグ層。DugWellを使用しているが水位回復に時間を要する。ペグ層の分布する地域であり、物探の結果で100m以浅の帯水層を探す。	△	○	-	○	D-2							
	Tharzi	MA2-19	960	290	154	イラワジ層。既存井戸が250m程度、EC=1609。米が黄色くなる。物探の結果で掘削深度を決定する。	○	○	-	○	C	4	5 m	175 m	110 m	×	×	○
	Kanaye	MA2-20	870	265	105	イラワジ層。既存井戸が250m程度、EC=1516。米が黄色くなる。物探の結果で掘削深度を決定する。	○	○	-	○	C	4	5 m	195 m	65 m	△	×	○
	Tharyarmyaing	MA2-21	660	200	150	ペグ層とイラワジ層の境界付近。村落内に12本のTubeWellあり、120～180ft。全体的にフッ素、NO3高い。物探の結果で掘削深度を決定する。	△	○	○	○	B	3	5 m	15 m	180 m	×	×	○
	Oakpo	MA2-22	860	260	30	Q2。イラワジ層が下位に分布。村落内に深井戸2本（80m、230m）あり。深い方はエンジントラブルにて修理中。2本の合計揚水量2000ガロン/日。深井戸のカルシウムが高い可能性あり（結石等が出る人もいる）。物理探査の結果から判断。	△	○	○	○	C	4	30 m	120 m	110 m	×	○	○
	Kangyi	MA2-23	1,150	350	200	イラワジ層。村落内に浅井戸1本（50m）、深井戸2本（220m、300m）あり。300mの方は揚水にコストがかかるため、あまり使われていない。ECは2000uS/cm程度とやや高め。F=1.5。浅井戸は20世帯使用。掘削当初から水位が下がった？	△	○	○	○	C	3	20 m	110 m	220 m	×	×	○
	Htanekan	MA2-24	890	270	30	イラワジ層。浅井戸（12m）、深井戸（138m）1本ずつ。200m以上の深度の掘削実績はない。	○	○	-	○	C	4	5 m	175 m	90 m	–	–	–
	Waryonesu	MA2-25	1,010	305	11	イラワジ層。100m程度の井戸が1本のみ。乾季には水不足。	○	○	-	○	A	1	5 m	175 m	125 m	–	–	–
	Talkone	MA2-26	910	275	150	村落内に掘削しているが失敗井。2マイル先の隣村まで水汲み。3マイル東側にJICA井戸有、800ft、2008年掘削。	○	○	-	○	A	2	5 m	270 m	0 m	–	–	–
	Tawbyar	MA2-27	870	265	176	東側2マイル先にDRDが800ftの井戸を掘削。北側1.5マイル先に650ft程度の井戸有。水質良好。村落内に深井戸なし。周辺の既存井戸から深度推定。	○	○	-	○	B	3	5 m	260 m	0 m	×	○	×
	Setsetyo	MA2-28	1,290	390	269	3相電化済み。揚水量少ない。940ftにポンプ。EC=1800、Fe=1.0、F=0.8	△	○	○	○	A	1	5 m	385 m	0 m	×	○	○
	Kanzauk	MA2-29	660	200	65	本村にBAJにより200m程度の井戸掘削。2003年。6in。420ftにポンプポジション	○	○	-	○	A	2	5 m	195 m	0 m	△	△	×
	Talbindel	MA2-30	990	300	210	BAJが2003年にリハビリ、モノポンプおそらくWRUD掘削。EC=1200,砂混じり、Fe=1.0、F=0.5	○	○	-	○	A	2	5 m	295 m	0 m	×	×	△
	Mongywettaw	MA2-31	890	270	210	本村に深井戸有、対象村落内はDugWellのみ。	○	○	-	○	A	2	5 m	265 m	0 m	–	–	–
	Phoenekan	MA2-32	420	125	35	ペグ層近傍に位置、西側300mに既存VESあり。当地点で3本掘削したが、ヒ素濃度高い。ペグ露頭より東側で１５０mと２１０mの井戸があるが、これらは水質良い。西側にずらすか東側にずらすか要検討。被害側での物探結果により、掘削を検討	○	○	-	○	C	5	5 m	0 m	120 m	×	△	△
	Nyaungbinthar	MA2-33	660	200	100	ペグ層近傍。230m(750ft)の既存井戸あるが、鉄分・塩分高く使用中止。2次元の結果を見て判断。浅いほうになるかも？	○	○	-	○	A	2	5 m	195 m	0 m	–	–	–
	Saingkan(Tetide)	MA2-34	1,220	370	263	本村にJICA井戸有、3相電化済み。	○	○	-	○	A	1	5 m	365 m	0 m	–	–	–
	Byugyi	MA2-35	1,020	310	230	309.08m(JICAWELL),DWL=239,SWL=236,2003年に掘削。EC=900、他の水質項目に問題なし	○	○	-	○	A	1	5 m	305 m	0 m	△	△	○
	Aleywar-2	MA2-36	760	230	150	南側の井戸は水質悪い。北側の井戸は水質良い。これらの中間で実施する。SWL 150m。周辺の井戸で鉄分が高い。村の東側で水質が良い傾向がある。	△	○	○	○	A	2	5 m	225 m	0 m	×	×	○
	Tangakan	MA2-37	-	-	-	約１マイル南のDagagyi 村の既存井戸情報を基にしている。SWL 150m。MA2-36の近く。周辺では水質が悪い可能性が高い。また、本地域周辺は鉄分が高く1～3mg/Lと基準w大きく上回ってる。よって深井戸の開発は困難と判断した。	×	○	-	○	-							
	Lelgyi(Ma)	MA2-38	1,150	350	51.5	火山泥流分布域。300-350mで可能性有。1994年掘削、泥が混じり始めておりリハビリしたが、水質の悪化が見られる。EC=1200、Fe=5.0、F＝0.6。	△	○	○	○	C	3	5 m	0 m	345 m	△	×	×
	Thayattaw	MA2-39	1,150	350	223	イラワジ層であるが、深部で火成岩が分布する可能性高い。地点についてはどこでも良い。　既存井戸390m で600gph。2マイル先に水質が良好な井戸有。	○	○	-	○	C	3	5 m	195 m	150 m	×	△	○
	Nakyatkhwal	MA2-40	970	295	67	イラワジ層。1992年掘削、EC=790、F=0.2、若干砂混じり、電化済み	○	○	-	○	A	2	5 m	290 m	0 m	×	○	×

各ステップでの評価の凡例)　-：実施していない。　○：問題なし。　△：検討が必要。　×：開発困難。

【Step1～4の凡例】[-]：実施していない　[○]：問題ない　[△]：検討が必要　[×]：開発困難

【Step5の凡例】[A～D-2 は物理探査結果による開発難易度を示しAが最も開発しやすいことを示す

【Step6の凡例】[1] ～ [6]の評価は開発優先度を示し、[1]が最も優先度が高い

既存水源の問題の凡例

○：問題なし

△：やや問題あり

×：問題あり

–：深井戸の利用は無い

地域	村落名	ID	想定掘削深度		想定静水位	予察調査結果	Step-1 水理地質	Step-2 需要	Step-3 水質	Step-4 維持管理	Step-5 開発可能性	Step-6 優先度	想定される地層厚さ (m)			既存深井戸水源に対する問題（水へのニーズ）		
			feet	m	m								沖積層及び表層土	イラワディ層	ペグ層	水量	水質	水源距離
	Natkan	MG2-01	600	180	75	イラワジ層分布域。既存井戸の深度570 ft(173m), 静水位240 ft(73m)を基に深度を推定。Monoポンプ。1100gph。	○	○	-	○	A	3	5 m	175 m	0 m	×	△	○
	Thanbo(Ywarthit)	MG2-02	400	120	73	イラワジ層分布。120m（SWL:84m）の井戸（EC：1494μS/cm,1999年SPDCが建設)が運用中。	○	○	-	○	C	5	5 m	115 m	0 m	△	×	○
	Nyaungbinthar	MG2-03	660	200	150	イラワジ層分布域。1983年WRUD掘削の既存井戸深度656ft(200m、水位154m、1400 gph)から推定。BAJ が2014年にMono Pump修理。	○	○	-	○	A	2	5 m	195 m	0 m	×	△	△
	Konegyi	MG2-04	790	240	134	イラワジ層分布域。既存井戸の深度から推定。BAJが2014年にエンジンをオーバーホール。195m、SWL:137m。	○	○	-	○	A	2	5 m	235 m	0 m	△	△	△
	Sainggya	MG2-05	660	200	162	イラワジ層分布域。BAJ2014年にMono Pump を交換。　Yieldは1200gph。	○	○	-	○	B	3	5 m	195 m	0 m	×	×	△
	Thapyaysan(N)	MG2-06	630	190	108	イラワジ層分布域。廃棄された既存井戸（スクリーンの破損による）の深度630ft(192m)から深度を推定。水位97m。2000 gph。電化工事中。	○	○	-	○	A	2	5 m	185 m	0 m	○	×	○
	Shwekyaw	MG2-07	660	200	89	イラワジ層分布域。1986年掘削の既存井戸深度から推定（UNICEF建設）。既存井戸は稼働中。MONOポンプ。水位83m。1500 gph。	○	○	-	○	A	2	5 m	195 m	0 m	△	×	△
	Leikkan	MG2-08	400	120	100	イラワジ層分布域。1981年WRUD掘削既存井戸深度から推定。2014年BAJがMono Pump修理。175m。1300 gph。	○	○	-	○	A	3	5 m	115 m	0 m	△	×	△
	Ywarthitgyi	MG2-09	600	180	105	イラワジ層分布域。同村落内の既存井戸の深度580 ft を基に深度を推定。176m（水位103m）SPDCが建設。	○	○	-	○	A	3	5 m	175 m	0 m	△	×	△
	Kanyaygyi	MG2-10	1,090	330	212	イラワジ層分布域。2007年BAJが改修。327m（SWL:210m)。EC:1000μS/cm.	△	○	○	○	C	3	5 m	325 m	0 m	×	×	△
	Myaysoon(Ywarthit)	MG2-11	860	260	150	イラワジ層分布域。259m。Nono1971年建設が隣村にあり。1100μS/cm。	△	○	○	○	A	2	5 m	255 m	0 m	○	×	△
	Zeebwar	MG2-12	450	135	80	イラワジ層分布域。断層に隣接し、深部でペグ層が出てくる可能性あり。152m、EC:1040 μS/cm。	△	○	○	○	B	4	5 m	75 m	55 m	—	—	—
	Yenpyay	MG2-13	560	170	115	Q2。隣村の井戸を利用（EC:2100μS/cm）	○	○	-	○	A	3	40 m	130 m	0 m	△	×	×
	Kyatesu(N)	MG2-14	480	145	23	Q2。67m。個人所有。EC：3000μS/cm。	△	○	-	○	A	3	50 m	95 m	0 m	—	—	—
	Winkabar	MG2-15	370	110	30	Q2。110m、SWL:30.4m。イラワジ川の水が入っていると考えられる。水利用はイラワジ川水を利用している。	△	○	○	○	A	3	50 m	60 m	0 m	×	○	○
	Kyatkan	MG2-16	560	170	100	Q2。170m、300gph。EC:1570μS/cm。油分が混じっている。	○	○	-	○	A	3	40 m	130 m	0 m	×	×	△
	Sudat	MG2-17	1,220	370	270	イラワジ層分布域。DRDが380m掘削した（Phase 1のサイト）SWL：146m。	○	○	-	○	A	1	5 m	195 m	170 m	—	—	—
Magway	Myaynilain	MG2-18	830	250	160	イラワジ層分布域。Phase 1では除外された場所。5㎞ほど離れた地点で、244m(SWL:137 m）の実績あり。	○	○	○	○	B	3	5 m	245 m	0 m	×	△	×
	Legyinyo	MG2-19	920	280	134	イラワジ層分布域。深部でペグ層が分布。隣村にBAJが掘削した井戸は248m深度で水質が悪い（EC：2400、フッ素、鉄分高い）。278m（SWL:134m、EC:1410μS/cm,1981年建設)お既存井があるが、砂が混じる。	△	○	○	○	A	2	5 m	195 m	80 m	△	×	△
	Laytinesin(S)	MG2-20	660	200	109	イラワジ層分布域。2003年に建設したJICA井戸(200m、SWL:110m、3500gph)	○	○	-	○	A	2	5 m	195 m	0 m	△	△	△
	Tharmyar	MG2-21	660	200	120	イラワジ層。JICA井戸あり（2003年　198m、SWL:119m、54㎥/h)	○	○	-	○	A	2	5 m	195 m	0 m	△	○	△
	Aungmyinthar	MG2-22	400	120	55	イラワジ層分布域。	○	○	-	○	C	5	5 m	115 m	0 m	×	△	△
	Ngwelay	MG2-23	380	115	52	イラワジ層分布域。1980年にWPDPが建設した井戸がある。116m。水質が悪くなってきている。	○	○	-	○	B	4	5 m	110 m	0 m	△	△	△
	Indaw(N)	MG2-24	480	145	55	イラワジ層分布域。2011年DDAの建設したAierliftの井戸(110m、800gph)がある。	○	○	-	○	C	5	5 m	140 m	0 m	△	△	△
	Htanaungkwin	MG2-25	-	-	-	ペグ層の丘陵地が近傍に迫り浅層からペグ層が分布する。30以上のハンドポンプ用浅井戸が掘られたが、水が枯れてしまった。深い地下水は水資質が悪く深井戸の開発は困難と判断した。	×	○	-	○	-							
	Manawtgone	MG2-26	430	130	24	表層はQ1堆積物が覆う。全体はイラワジ層の分布域。128m既存井戸。SWL_24m、230gph。イラワジ川に近い。	△	○	○	○	A	3	10 m	120 m	0 m	—	—	—
	Kangyigone	MG2-27	730	220	141	イラワジ層分布域。深部でペグ層に変わると想定される。WRUDによる既存井戸219m、EC:3000μS/cm。	○	○	-	○	A	2	5 m	145 m	70 m	—	—	—
	Htonepoutchine	MG2-28	370	110	70	イラワジ層とペグ層の境界付近。近隣ﾃﾅｽﾄﾘｰ　105mで水質良い。150mで塩分高い。３マイル離れているJICA井戸で(thetwin(S))塩分高い。	○	○	-	○	B	4	5 m	15 m	90 m	×	○	△
	Padaukngote(Ywargyi)	MG2-29	-	-	-	DRDが掘削した150m、173mの深井戸は共に空井戸であった。WRUDが掘削した183mの井戸はEC2,950μS/cm、Feも3mg/lで鉄集がする。水理地質的にさらに深く掘削しても良質な地下水が得られる可能性は非常に低いと判断した。	×	○	-	○	-							
	Sellel	MG2-30	-	-	-	イラワジ層分布域。ペグ層深度浅い。BAJによれば260mで水があるとのこと	△	○	-	○	D-2							
	Padaukgone	MG2-31	-	-	-	浅井戸、深井戸共に塩分濃度高い。ペグ層分布域であり、深井戸は困難と判断される。また、イラワジ層中に堅牢な石灰岩のノジュール有り、現行のロータリー式では掘削が困難と判断した。	×	○	-	○	-							
	Ywartharlay	MG2-32	-	-	-	イラワジ層とペグ層の境界付近。深部にペグ層が分布すると想定される。	△	○	○	○	D-2							
	Wayonegone	MG2-33	400	120	70	ペグとイラワジ層の境界部分。丘陵部、ノジュール多く含む。215mの深井戸あるが、塩分高く破棄。100mであれば水質良し。 近隣地域（Opqoo, SWL 35m)でJICA無償フェーズ1井戸あるが、EC=5330μS/cm高い。	△	○	-	○	C	5	5 m	0 m	115 m	—	—	—
	Nyaunggone	MG2-34	370	110	70	ペグ層とイラワジ層の境界付近。地質複雑、フッ素高い	○	○	-	○	A	3	5 m	0 m	105 m	—	—	—
	Kyugyaung	MG2-35	730	220	140	イラワジ層分布域。既存深井戸なし。下位にペグ層が分布する可能性あり。	○	○	-	○	B	3	5 m	145 m	70 m	—	—	—
	Kokkohla	MG2-36	804	245	100	Q2とイラワジ層の境界付近。約1km離れた隣村の井戸情報（深度380 ft)から推定。　EC=1500以上、フッ素が非常に高い。	△	○	○	○	D-1	6	5 m	240 m	0 m	×	×	○
	Kangyigone	MG2-37	755	230	70	イラワジ層分布域。195m。EC,　フッ素非常に高い。浅い部分で帯水層を探す方向。　詳細水質分析候補地	△	○	○	○	C	4	5 m	225 m	0 m	×	×	○
	Htaukkyantgwin	MG2-38	1,060	320	100	DRD, RED CROSS が540 ft, 600 ft の井戸掘削を行うも、空井戸であった。村人情報で1000ft以上の井戸を掘削する必要あるとのこと。	○	○	-	○	A	1	5 m	315 m	0 m	—	—	—
	Hlebwegyi	MG2-39	840	255	100	イラワジ層分布域。深部でペグ層が分布する可能性あり。	○	○	-	○	A	2	5 m	145 m	105 m	—	—	—
	Yayhtwetgyi	MG2-40	600	180	40	イラワジ層分布域。深部でペグ層が分布する可能性あり。	○	○	-	○	A	3	5 m	145 m	30 m	—	—	—
		Total	66,152	20,005									883 m	14,688 m	4,434 m			
													20,005 m					

各ステップでの評価の凡例)　-：実施していない。　○：問題なし。　△：検討が必要。　×：開発困難。

【Step1～4の凡例】 [-] : 実施していない　[○] : 問題ない　[△] : 検討が必要　[×] : 開発困難

【Step5の凡例】 [A～D-2 は物理探査結果による開発難易度を示しAが最も開発しやすいことを示す

【Step6の凡例】[1] ～ [6]の評価は開発優先度を示し、[1]が最も優先度が高い

既存水源の問題の凡例

○ ：問題なし

△ ：やや問題あり

× ：問題あり

– ：深井戸の利用は無い