Government of Nepal

Ministry of Irrigation

Department of Irrigation

Irrigation and Water Resources Management Project (IWRMP)

Irrigation Infrastructures Development & Improvement (AF), Component-A

(Word Bank Project ID: P144474)

SUBPROJECT COMPLETION REPORT

Sanoshree DTW, Bardiya

CMS Engineering Consult Pvt. Ltd.

Full Bright Consultancy Pvt. Ltd. JV

June 2018 / Asar 2075

IWRMP (AF) - COMPONENT A
Sanoshree DTW Subproject Completion Report

CONTENTS

	Page No
Subproject Description	
Brief Desciption of Subproject	2
Size of Commad Area	2
Distance from Command Area to Key Local Destinations	2
IWRMP Intervention	
Irrigation Water Supply & Infrastructure Development Works under IWRMP	2
Financial Summary	10
Water Management	
How the Physical Water Distribution System Operates	10
How Farmers Share Water Among Themselves	10
Field Application Methods	10
Water Users Association	
Participation	11
WUA Registrations & WUA/DoI Agreements	11
WUA Organisation Rules, Regulations and Conflict Resolution	12
WUA Organisation of Operation and Maintenenance	12
Agriculture Extension and Training	
Participation	12
Productivity	12
Command Area Performance	13
Adoption of Improved Crop Varieties	13
Social and Environmental Management	
Implementation of SEMP Recommendation	13

Annexes		(Tick if Available & Attached)
A	Maps and Layout Plans	☑
B	Photos	☑
C	WUA Registration Document	☐
D	WUA / DoI IWRMP Subproject Agreement	☐
E	Land Donation Records	☐
F	ISF Collection Plan	☐
G	Borehole Logs and Lithology	☑
H	Pump Test Records and Analyses	☑
I	Details of Well Casing, Screen and Pump Installation	☑

IWRMP (AF) - COMPONENT A
Sanoshree DTW Subproject Completion Report

Name of Subproject	Sanoshree DTW	**Ecological Belt**	Terai
Municipality & Ward No(s)	Sanoshree-Tarataal Municipality		
District	Bardia		

SUBPROJECT DESCRIPTION

Brief Description of Subproject

Sanoshree DTW irrigation subproject consists of six deep tube wells with an irrigation command area of 240 ha. The sub-project was completed in fiscal year 2015/16. This subproject was reappraised in December 2016 for installation of a voltage stabilizer to address the issue of voltage fluctuations. The tubewells are functioning well to meet the irrigation demand of the area after installation of voltage stabilizers.

Size of Command Area	Planned	Gross	400	ha	Net	240 ha
	Achieved	Gross	400	ha	Net	240 ha

Distance from Command Area to:

nearest road accessible by jeep/tractor			0 km
nearest paved road			5 km
nearest urban centre/market	(name)	Guleriya	20 km
nearest local IDD/IDSD/GWIDD office	(name)	GWIDD, Nepalgunj	60 km
nearest local DADO office	(name)	Gulariya	20 km

IWMRP INTERVENTION

Irrigation Water Supply & Infrastructure Development Works

Borehole Reference	Depth (m)	Location	(Q) Discharge (lps) Design	Tested	Installed
SS-01	105.0	N ° ' "	40	30	
		E ° ' "			

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Constructed
Deep Tubewell (DTW), Submersible Pump (SP)	DTW-10/6 inch, SP-15 HP	1 1	1 1

Pump House (PH), Over Tank (OT), Distribution System (DS), Alfa-alfa Valve (AV)	PH-2*2*3m, OT-2*2*7m, DS-6"dia upvc pipe, AV-6"dia	PH-1, OT-1, DS-1400 Rm. AV-15 no	PH-1, OT-1, DS-1400 Rm. AV-14 no
Transformer (T), Transmission Line(TL)	T-50KVA, TL-11000V	T- 1no, TL-3150m	T- 1no, TL-2676m

Borehole Ref	Depth		Q Design	Q Tested	Q Installed
SS-02	100.0	N ° ' "	40	30	
		E ° ' "			

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed
Deep Tubewell (DTW), Submersible Pump (SP)	DTW-10/6 inch, SP-15 HP	1 1	1 1
Pump House (PH), Over Tank (OT), Distribution System (DS), Alfa-alfa Valve (AV)	PH-2*2*3m, OT-2*2*7m, DS-6"dia upvc pipe, AV-6"dia	PH-1, OT-1, DS-1400 Rm. AV-14 no	PH-1, OT-1, DS-1400 Rm. AV-14 no
Transformer (T), Transmission Line(TL)	T-50KVA, TL-11000V	T- 1no, TL-3150m	T- 1no, TL-3050m

Borehole Ref	Depth		Q Design	Q Tested	Q Installed
SS-03	85.0	N ° ' "	40	30	
		E ° ' "			

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed
Deep Tubewell (DTW), Submersible Pump (SP)	DTW-10/6 inch, SP-15 HP	1 1	1 1
Pump House (PH), Over Tank (OT), Distribution System (DS), Alfa-alfa Valve (AV)	PH-2*2*3m, OT-2*2*7m, DS-6"dia upvc pipe, AV-6"dia	PH-1, OT-1, DS-1400 Rm. AV-14 no	PH-1, OT-1, DS-1400 Rm. AV-14 no
Transformer (T), Transmission Line(TL)	T-50KVA, TL-11000V	T- 1no, TL-3150m	T- 1no, TL-3235m

Borehole Ref	Depth		Q Design	Q Tested	Q Installed
SS-04	108.0	N ° ' "	40	30	
		E ° ' "			

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed
Deep Tubewell (DTW), Submersible Pump (SP)	DTW-10/6 inch, SP-15 HP	1 1	1 1
Pump House (PH), Over Tank (OT), Distribution System (DS), Alfa-alfa Valve (AV)	PH-2*2*3m, OT-2*2*7m, DS-6"dia upvc pipe, AV-6"dia	PH-1, OT-1, DS-1400 Rm. AV-14 no	PH-1, OT-1, DS-1400 Rm. AV-14 no
Transformer (T), Transmission Line(TL)	T-50KVA, TL-11000V	T- 1no, TL-3115m	T- 1no, TL-1754m

Borehole Ref	Depth		Q Design	Q Tested	Q Installed
SS-05	105.0	N ° ' "	40	30	
		E ° ' "			

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed
Deep Tubewell (DTW), Submersible Pump (SP)	DTW-10/6 inch, SP-15 HP	1 1	1 1
Pump House (PH), Over Tank (OT), Distribution System (DS), Alfa-alfa Valve (AV)	PH-2*2*3m, OT-2*2*7m, DS-6"dia upvc pipe, AV-6"dia	PH-1, OT-1, DS-1400 Rm. AV-14 no	PH-1, OT-1, DS-1400 Rm. AV-14 no
Transformer (T), Transmission Line(TL)	T-50KVA, TL-11000V	T- 1no, TL-3115m	T- 1no, TL-3045m

Borehole Ref	Depth		Q Design	Q Tested	Q Installed
SS-06	102.0	N ° ' "	40	30	
		E ° ' "			

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed
Deep Tubewell (DTW), Submersible Pump (SP)	DTW-10/6 inch, SP-15 HP	1 1	1 1
Pump House (PH), Over Tank (OT), Distribution System (DS), Alfa-alfa Valve (AV)	PH-2*2*3m, OT-2*2*7m, DS-6"dia upvc pipe, AV-6"dia	PH-1, OT-1, DS-1400 Rm. AV-14 no	PH-1, OT-1, DS-1400 Rm. AV-14 no
Transformer (T), Transmission Line(TL)	T-50KVA, TL-11000V	T- 1no, TL-3115m	T- 1no, TL-1570m

Borehole Ref	Depth		Q Design	Q Tested	Q Installed
		N ° ' "			
		E ° ' "			

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed

Borehole Ref	Depth		Q Design	Q Tested	Q Installed
		N ° ' "			
		E ° ' "			

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed

Borehole Ref | Depth | N ° ' " | E ° ' " | Q Design | Q Tested | Q Installed

Quantity

Name and Description of Structure | Key Dimensions | Planned in DFSR | Constructed

Borehole Ref | Depth | N ° ' " | E ° ' " | Q Design | Q Tested | Q Installed

Quantity

Name and Description of Structure | Key Dimensions | Planned in DFSR | Constructed

Borehole Ref | Depth | N ° ' " | E ° ' " | Q Design | Q Tested | Q Installed

Quantity

Name and Description of Structure | Key Dimensions | Planned in DFSR | Constructed

Borehole Ref	Depth				Q Design	Q Tested	Q Installed
		N °	'	"			
		E °	'	"			

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed

Borehole Ref	Depth				Q Design	Q Tested	Q Installed
		N °	'	"			
		E °	'	"			

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed

Borehole Ref	Depth				Q Design	Q Tested	Q Installed
		N °	'	"			
		E °	'	"			

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed

Borehole Ref	Depth				Q Design	Q Tested	Q Installed
		N °	'	"			
		E °	'	"			

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed

Borehole Ref Depth N ° ' " Q Design Q Tested Q Installed
E ° ' "

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed

Borehole Ref Depth N ° ' " Q Design Q Tested Q Installed
E ° ' "

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed

Borehole Ref Depth N ° ' " Q Design Q Tested Q Installed
E ° ' "

Name and Description of Structure	Key Dimensions	Quantity Planned in DFSR	Quantity Constructed

Borehole Ref | Depth | N ° ' " | Q Design | Q Tested | Q Installed
E ° ' "

Quantity

Name and Description of Structure | Key Dimensions | Planned in DFSR | Constructed

Borehole Ref | Depth | N ° ' " | Q Design | Q Tested | Q Installed
E ° ' "

Quantity

Name and Description of Structure | Key Dimensions | Planned in DFSR | Constructed

Borehole Ref | Depth | N ° ' " | Q Design | Q Tested | Q Installed
E ° ' "

Quantity

Name and Description of Structure | Key Dimensions | Planned in DFSR | Constructed

Borehole Ref | Depth | N ° ' " | Q Design | Q Tested | Q Installed
E ° ' "

Quantity

Name and Description of Structure | Key Dimensions | Planned in DFSR | Constructed

Borehole Ref | Depth | N ° ' " E ° ' " | Q Design | Q Tested | Q Installed

Quantity

Name and Description of Structure | Key Dimensions | Planned in DFSR | Constructed

Borehole Ref | Depth | N ° ' " E ° ' " | Q Design | Q Tested | Q Installed

Quantity

Name and Description of Structure | Key Dimensions | Planned in DFSR | Constructed

Borehole Ref | Depth | N ° ' " E ° ' " | Q Design | Q Tested | Q Installed

Quantity

Name and Description of Structure | Key Dimensions | Planned in DFSR | Constructed

Financial Summary (all figures in NPR)

	Approved Estimate	Contract Value	Final Value
[A] Civil Works			
NCB Contracts (All Packages)	54,759,323	38,332,982	38,022,438
WUA Payable Contracts (All Packages)			
WUA Contribution Contracts (All Package	8,168,898	8,168,898	
Subtotal	62,928,221	46,501,881	38,022,438
[B] Coningencies (All NCB Packages)			
Physical	3,911,707		
Price Escalation	3,911,707		
Other (5%)	1,955,854	121,064	121,064
Subtotal	9,779,269	121,064	121,064
[C] Miscalleneous Items	225,808		
[D] SEMP	300,000		
Total Expenditure [A]+[B]+[C]+[D]	73,233,298	46,622,945	38,143,502
Calculation of DoI/WUA Contributions			
Total DoI Works	65,064,400	38,454,046	38,143,502
WUA Net Cash Contribution*	82,000	82,000	82,000
Net DoI Contribution	64,982,400	38,372,046	38,061,502
WUA Contribution Contracts (All)	8,168,898	8,168,898	0
Total DOI+WUA Contributions	73,233,298	46,622,945	38,143,502
Total WUA Contribution	8,250,898	8,250,898	82,000
Overall Effective WUA Contribution	11.3%	17.7%	0.2%

(* where appropriate)

WATER MANAGEMENT

Description of How the Physical Water Distribution System Operates

The well discharge is pumped to overhead tank constructed and joined to delivery two sets of pipes controlled by gate valvs for irrigation. Upon the request of individual farmer,well is operated and valve is opened or closed accordingly by pump operator.There are two or three outlets in every tubel-well that cannot deliver the required discharge because of head loss in pipes. This problem can be overcom either by raising the height of over head tank or using bigger diameter pipes for delivery.

Description of How Farmers Share the Water Among Themselves

Generally, individual farmer approach to operator for water delivery but if the land cannot consume huge discharge irrigation is practiced by sharing water in a block of 2 or more farmers. The electricity tarif is shared equally among irrigators until the smallest piece of land of user is completely covered. When the smallest piece of land is irrigated, consumed units of electricity is noted and tarif shared equally. The pump still operates and electricity tarif is paid by other irrigator completely.

Desciption of Field Application Methods Being Used

Generally, wild flooding is practiced for irrigation, furrow, border, and drip irrigation can be practiced for suitable crops here. We did not noticce drip irrigation but furrow and border irrigation is practiced in potatoes and orchards.

WATER USERS ASSOCIATION

Participation		Total	Men	Women	Janajati	Dalit	Other
Number of Households		466					
Total Population	No	3,511	1,807	1,704	1,311	257	1,943
	%		51%	49%	37%	7%	55%
WUA Executive Committee	No	7	7	0	1	0	6
	%		100%	0%	14%	0%	86%
Number of Training Events		2					
WUA Training Participation	No	35	35	0	1	20	14
	%		100%	0%	3%	57%	40%

WUA Registration

Borehole Reference	Date of WUA Registration			Date of WUA/DoI Subproject Agreement		
	day	month	year	day	month	year
SS-01	7	1	2067			
SS-02	7	1	2067			
SS-03	7	1	2067			
SS-04	7	1	2067			
SS-05	7	1	2067			
SS-06	7	1	2067			

Observations on WUA Organisation, Rules, Regulations and Conflict Resolution

No any written rules & regulations formulated till date. They manage the tubewell system reaching consensus among users of a single tubewell. If any conflict/ misunderstanding occur, they resolve it by comprehensive discussion among WUs. WUA (coordination committee) is active and performing regular monthly meeting.There is no WUA office with sign board. This system comprises 6 DTWs having separate WUA each.They arrange meeting as per their requirement. This is a reappraised GW ISP to adress the fluctuating voltage by adding establizers in each well.

Observations on WUA Organisation of Operation and Maintenance (see also Annex F)

The WUA organization is active. ISF plan is prepared but need intensive training on operation and maintenance of DTWs. Thre is one operator for each DTW and get nominal remuneration base on consumption of electricity. Chairperson of coordination committee (Mr. Bhog Bahadur Oli) and Chairpersons for individual 6 DTWs are active and are mobilizing resources properly.All the users have to pay for demand charge irrespective of use of tubewell; retain operators, pay eleectric bills and properly maintain DTW. There is good understandingand and solidarity among local communities.

AGRICULTURE EXTENSION AND TRAINING

Participation		Total	Men	Women	Janajati	Dalit	Other
Total Population	No	3,511	1,807	1,704	1,311	257	1,943
	%		51%	49%	37%	7%	55%
Number of Traing Events							
Participants in Training	No	0					0
	%		-	-	-	-	-

Productivity

	DFSR Baseline		Latest Available Data, FY: ***<enter FY of data here>***					
	Area (ha)	Productivity (t/ha)	Area (ha)	Productivity (t/ha)	Price (NRs/t)	Gr Income (NRs/ha)	Prod Cost (NRs/ha)	Net Income (NRs/ha)
Spring Paddy						0		0
Increase in Productivity				-				
Paddy	170	2.90	170	3.20	22,000	70,400	52,500	17,900
Increase in Productivity				*10%*				
Wheat	80	1.80	100	2.50	24,500	61,250	46,000	15,250
Increase in Productivity				*39%*				
Maize	60	1.60	70	2.50	19,800	49,500	36,000	13,500
Increase in Productivity				*56%*				
Potato	10	6.30	14	8.00	20,000	160,000	98,000	62,000
Increase in Productivity				*27%*				
Pulses			2	0.60	45,000	27,000	15,000	12,000
Increase in Productivity				-				
Oilseed	15	1.20	18	0.60	70,000	42,000	18,000	24,000
Increase in Productivity				*-50%*				
Vegetables			5	6.00	25,000	150,000	90,000	60,000
Increase in Productivity				-				
Other						0		0
Increase in Productivity				-				
						Total ISP Net Income (NRs)		7,137,000
						Overall Net Income per hectare of Command Area (NRs/ha)		29,738

Command Area Performance	DFSR Baseline	Target	Latest
Cropping Intensity	140%	233%	158%
% Cropped Area Planted with Improved Seed			65%
% Farmers Using Improved Techniques			35%

Adoption of Improved Crop Varieties

Spring Paddy	
Paddy	Radha-4, Sukkha-3, Sabitri, Sabhamasuli and Hybrid
Wheat	Gautam
Maize	Rampur Composite, Local (Khairapur Murali), Hybrid
Potato	Cardinal, TPS, Lalgulab
Pulses	Local
Oilseed	Local
Vegetables	Cauliflower, Cabbage, Radish, Tomato, Bean

SOCIAL AND ENVIRONMENTAL MANAGEMENT

Implementation of SEMP Recommendations

SEMP Issue	Location	Mitigation Measure	Compliance	Remarks
Acquisition of private land		Farmers / WUA areed to provide required land area permanently.	Yes	
Farm Water Management		Providing additional earthen field channel and fix Alfalfa valves in proper location	Yes	
Training awareness for Groundwater Quality, pesticide use, chemical fertilizer use, health and		Raise awareness on fertilizer / pesticide use. Water Quality shall be monitored	Yes	
Change in Land Use Pattern		Advocacy to the farmers for better use of land	Yes	
Operation and maintenance		Training about pump operation and maintenance	Yes	
Water Rights and Equity Issues		WUA will decide and manage all the beneficiaries despite their social background.	Yes	
Sustainability of Irrigation System		Institutional Development of WUA in relation to IWRMP.	Yes	
Gender Issues		Field and exposure visit will be provided to WUA / Farmers men and woman.	No	
Grievances Redress Mechanism		Grievance register to be maintained on construction site	Yes	

Total Number of Mitigation Measures (not including those no longer relevant)	9
Number of Mitigation Measures Fully Implemented	8
Overall Rate of Compliance	89%

ANNEX A

MAPS AND LAYOUT PLANS

DTW 1 to DTW 6 are DTWs under Sanoshree DTW ISP and DTW 7 to DTW 10 are DTWs under Sanoshree Tarataal DTW ISP.

ANNEX B

PHOTOGRAPHS

SS-02 after Installation of Voltage Stabilizer

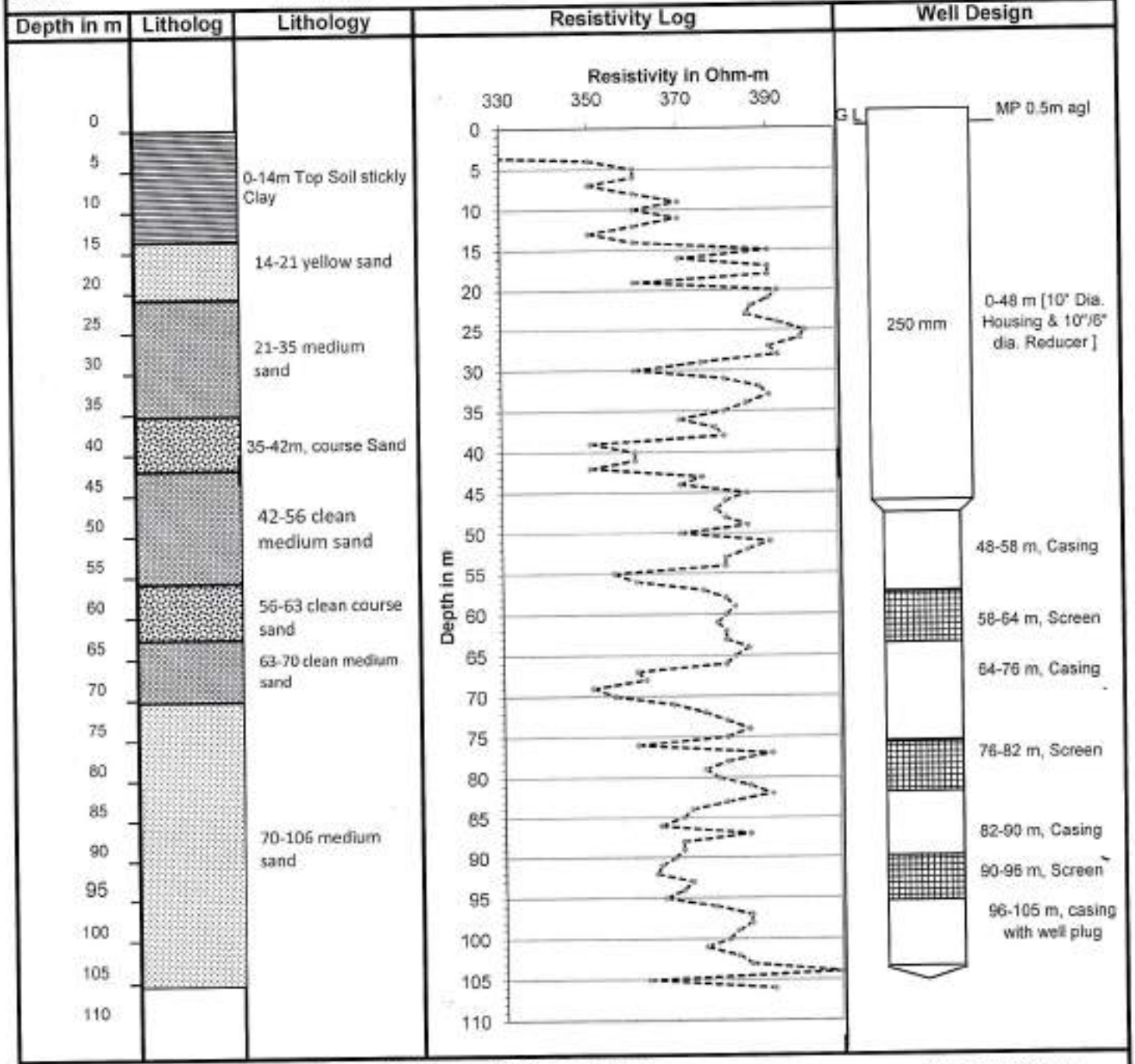
SS-03

ANNEX G

BOREHOLE LOGS AND LITHOLOGY

TECHNICAL INFORMATION OF DEEP TUBEWELL

Well No	: **SS 05/070-71/IWRMP (Production Deep Tubewell)**			
Location	: Sanoshree-3, Indrapur, Bardiya			
Drilling depth	: 106 m		Drilling Technique	: Reverse Rotary
Lowering depth	: 105 m		Drilling started date	: *2071-07-25*
Static water level	: 13.8 m		Completion date	: *2071-08-11*
Coordinates (WGS 84)	: 524750 E	Longitude	Logging Date	: *2071-08-11*
	: 3127753 N	Latitude		
	: 117 m	Altitude		
Drilled by	: Sushil Construction, Nepalganj			
Owner	: Shivanagar DTW WUA, Sanoshree-3, Bardiya & GBO Nepalganj			

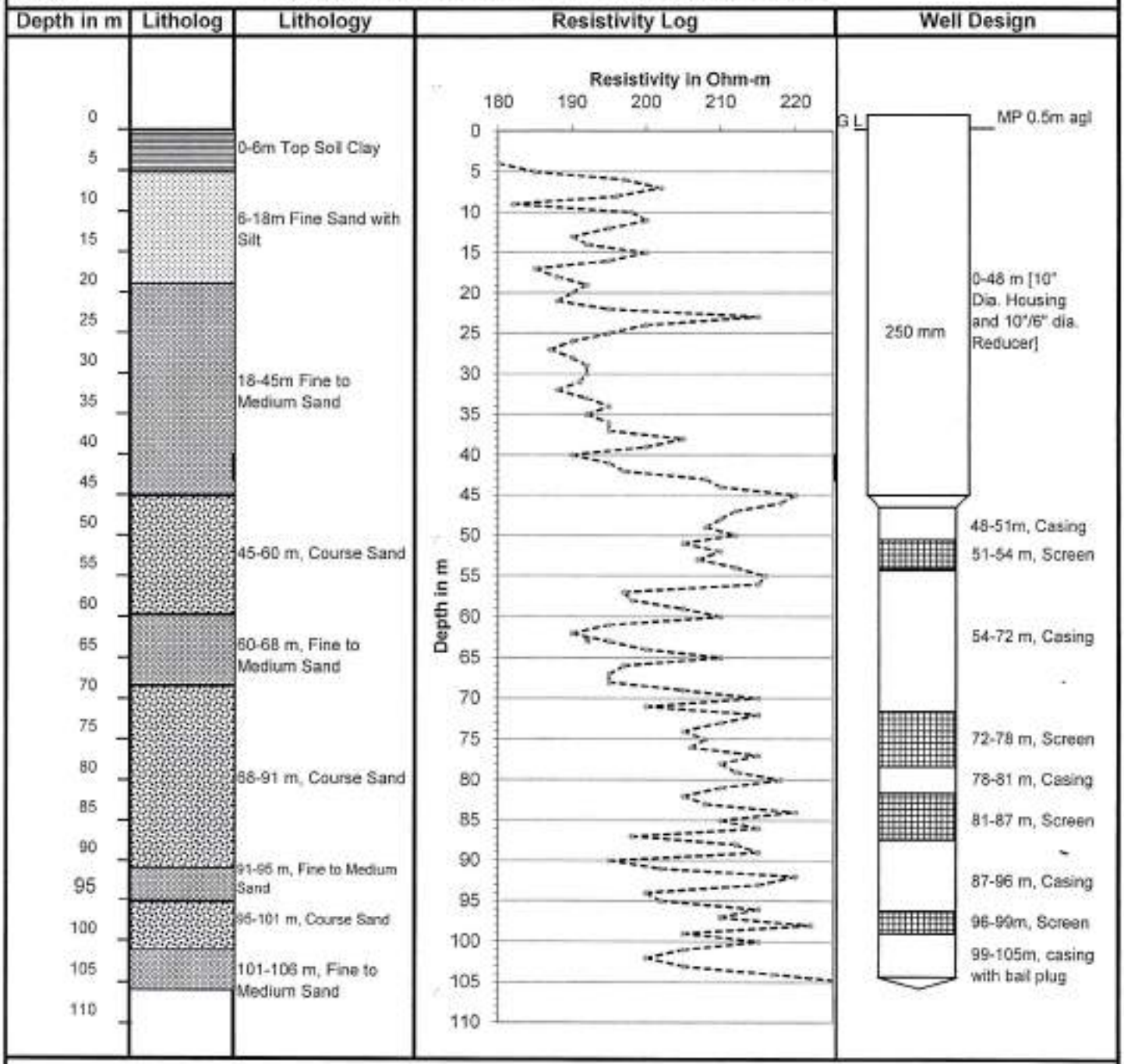


Measuring Point (MP)	: 0.5 m agl (250 mm, MS Casing Pipe)	Screen Position:
Total Housing	: 48 m bgl (250mm MS Casing Pipe)	58 - 64 = 6 m
Total Screen	: 18 m (150mm Stainless Steel V-wire Screen Pipe)	76 - 82 = 6 m
Total Casing Pipe	: 39 m (150 mm, MS Casing Pipe)	90 - 96 = 6 m

Designed by	Checked by	Recommend by	Approved by
Sushil Construction	Engineer	Hydrogeologist	GBO-Incharge

TECHNICAL INFORMATION OF DEEP TUBEWELL

Well No	: SS 01/070-71/IWRMP (Production Deep Tubewell)			
Location	: Tarataal VDC,3,4, Sukrabasti, Bardiya			
Drilling depth	: 106 m		Drilling Technique	: Reverse Rotary
Lowering depth	: 105 m		Drilling started date	: *2071-01-16*
Static water level	: 14 m		Completion date	: *2071-01-28*
Coordinates (WGS 84)	: 524468 E	Longitude	Logging Date	: *2071-01-26*
	: 3127817 N	Latitude		
	: 115 m	Altitude		
Drilled by	: Sushil Construction, Nepalganj			
Owner	: Sukra DTW WUA, Tarataal 3,4, Bardiya & GBO Nepalganj			

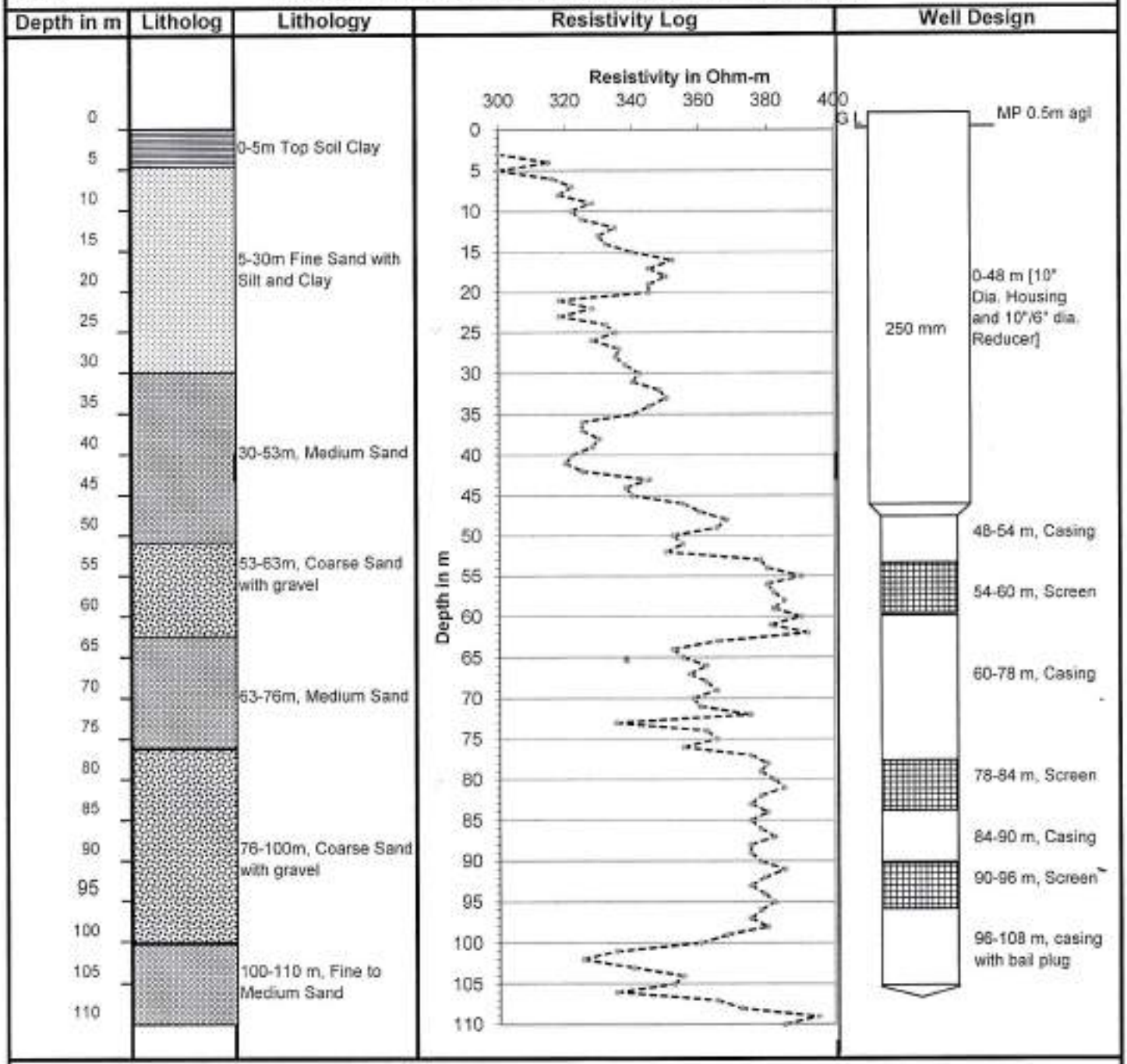


Measuring Point (MP)	: 0.5 m agl (250 mm, MS Casing Pipe)	Screen Position:
Total Housing	: 48 m bgl (250mm MS Casing Pipe)	51 - 54 = 3 m
Total Screen	: 18 m (150mm Stainless Steel V-wire Screen Pipe)	72 - 78 = 6 m
Total Casing Pipe	: 39 m (150 mm, MS Casing Pipe)	81 - 87 = 6 m
		96 - 99 = 3 m

Designed by	Checked by	Recommend by	Approved by
Sushil Construction	Engineer	Hydrogeologist	GBO-Incharge

TECHNICAL INFORMATION OF DEEP TUBEWELL

Well No	: SS 04/070-71/IWRMP (Production Deep Tubewell)			
Location	: Sanoshree-2, Indrapur, Bardiya			
Drilling depth	: 110 m		Drilling Technique	: Reverse Rotary
Lowering depth	: 108 m		Drilling started date	: *2071-03-12*
Static water level	: 16.3 m		Completion date	: *2071-03-24*
Coordinates (WGS 84)	: 524751 E	Longitude	Logging Date	: *2071-03-25*
	: 3127754 N	Latitude		
	: 119 m	Altitude		
Drilled by	: Sushil Construction, Nepalganj			
Owner	: Indrapur DTW WUA, Sanoshree-2, Bardiya & GBO Nepalganj			

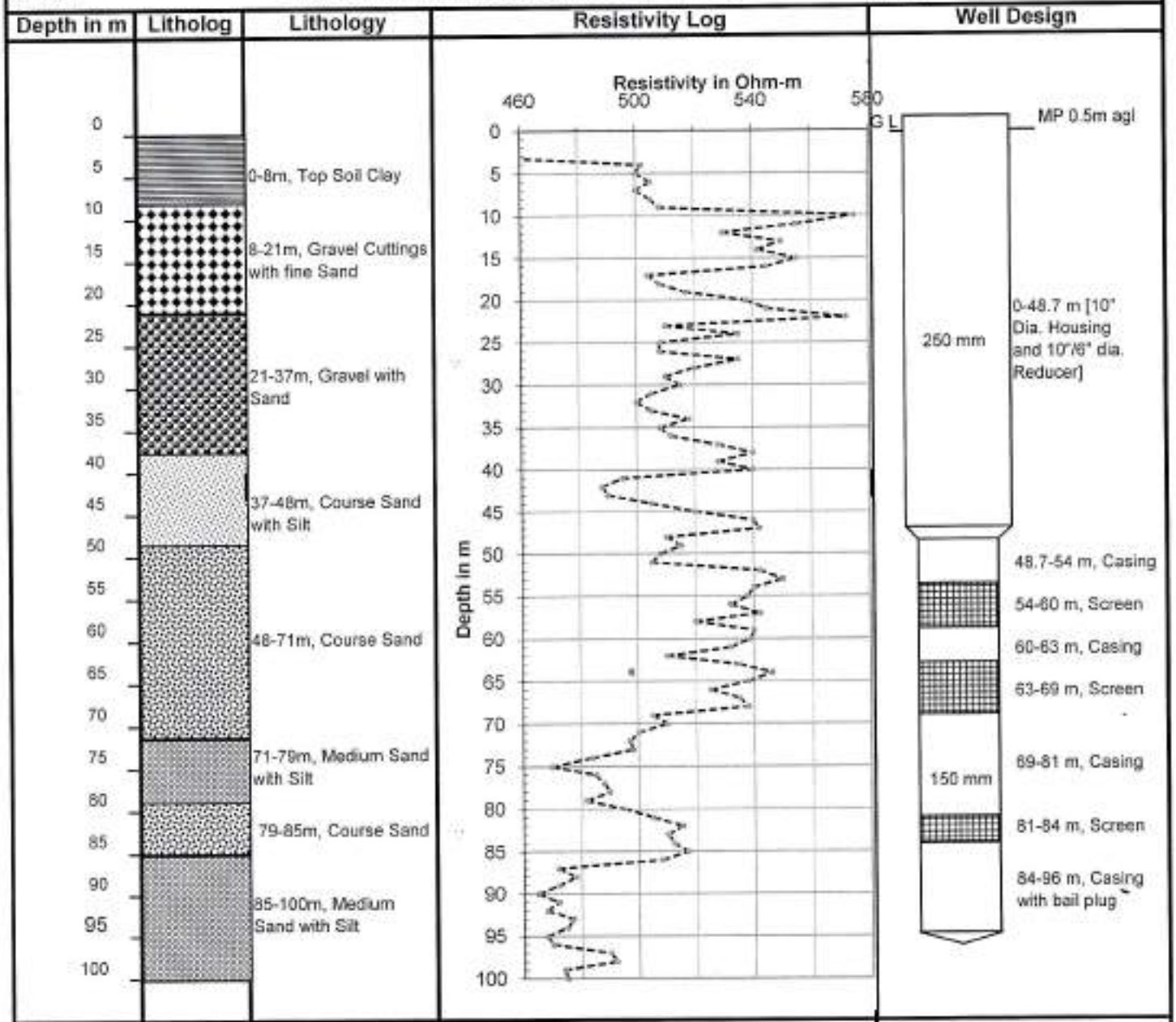


Measuring Point (MP)	: 0.5 m agl (250 mm, MS Casing Pipe)	Screen Position:
Total Housing	: 48 m bgl (250mm MS Casing Pipe)	54 - 60 = 6 m
Total Screen	: 18 m (150mm Stainless Steel V-wire Screen Pipe)	78 - 84 = 6 m
Total Casing Pipe	: 42 m (150 mm, MS Casing Pipe)	90 - 96 = 6 m

Designed by	Checked by	Recommend by	Approved by
Sushil Construction	Engineer	Hydrogeologist	GBO-Incharge

TECHNICAL INFORMATION OF DEEP TUBEWELL

Well No	: SS 02/070-71/IWRMP (Production Deep Tubewell)			
Location	: Tarataal VDC, 4, Sukrabasti, Bardiya			
Drilling depth	: 100 m		Drilling Technique	: Reverse Rotary
Lowering depth	: 96 m		Drilling started date	: *2071-01-28*
Static water level	: 13.5 m		Completion date	: *2071-02-07*
Coordinates (WGS 84)	: 505056 E	Longitude	Logging Date	: *2071-02-05*
	: 3127412 N	Latitude		
	: 96 m	Altitude		
Drilled by	: Sushil Construction, Nepalganj			
Owner	: Hariyali Krishak DTW WUA, Tarataal 4, Bardiya & GBO Nepalganj			



Measuring Point (MP)	: 0.5 m agl (250 mm, MS Casing Pipe)
Total Housing	: 48.7 m bgl (250mm MS Casing Pipe)
Total Screen	: 15 m (150mm Stainless Steel V-wire Screen Pipe)
Total Casing Pipe	: 32.3 m (150 mm, MS Casing Pipe)

Screen Position:

54 - 60 = 6 m

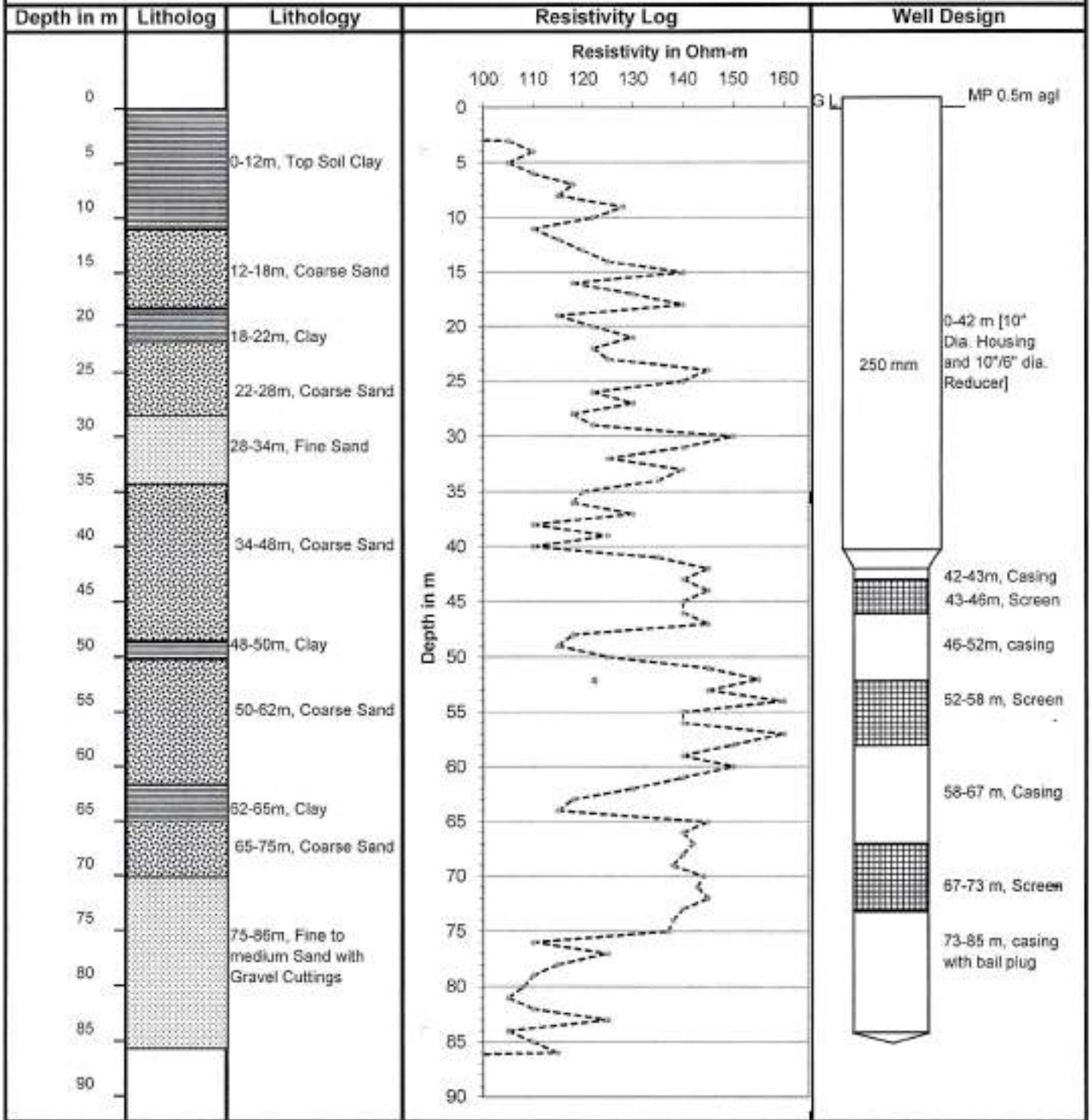
63 - 69 = 6 m

81 - 84 = 3 m

Designed by	Checked by	Recommend by	Approved by
Sushil Construction	Engineer	Hydrogeologist	GBO-Incharge

TECHNICAL INFORMATION OF DEEP TUBEWELL

Well No	: SS 03/070-71/IWRMP (Production Deep Tubewell)			
Location	: Sanoshree VDC-7, Shantipur, Bardiya			
Drilling depth	: 86 m		Drilling Technique	: Reverse Rotary
Lowering depth	: 85 m		Drilling started date	: *2071-02-11*
Static water level	: 13.9 m		Completion date	: *2071-02-19*
Coordinates (WGS 84)	: 524124 E	Longitude	Logging Date	: *2071-02-19*
	: 3131899 N	Latitude		
	: 96 m	Altitude		
Drilled by	: Sushil Construction, Nepalganj			
Owner	: Juwala DTW WUA, Sanoshree-7, Shanitpur, Bardiya & GBO Nepalganj			



Measuring Point (MP)	: 0.5 m agl (250 mm, MS Casing Pipe)	
Total Housing	: 42 m bgl (250mm MS Casing Pipe)	
Total Screen	: 15 m (150mm Stainless Steel V-wire Screen Pipe)	
Total Casing Pipe	: 28 m (150 mm, MS Casing Pipe)	

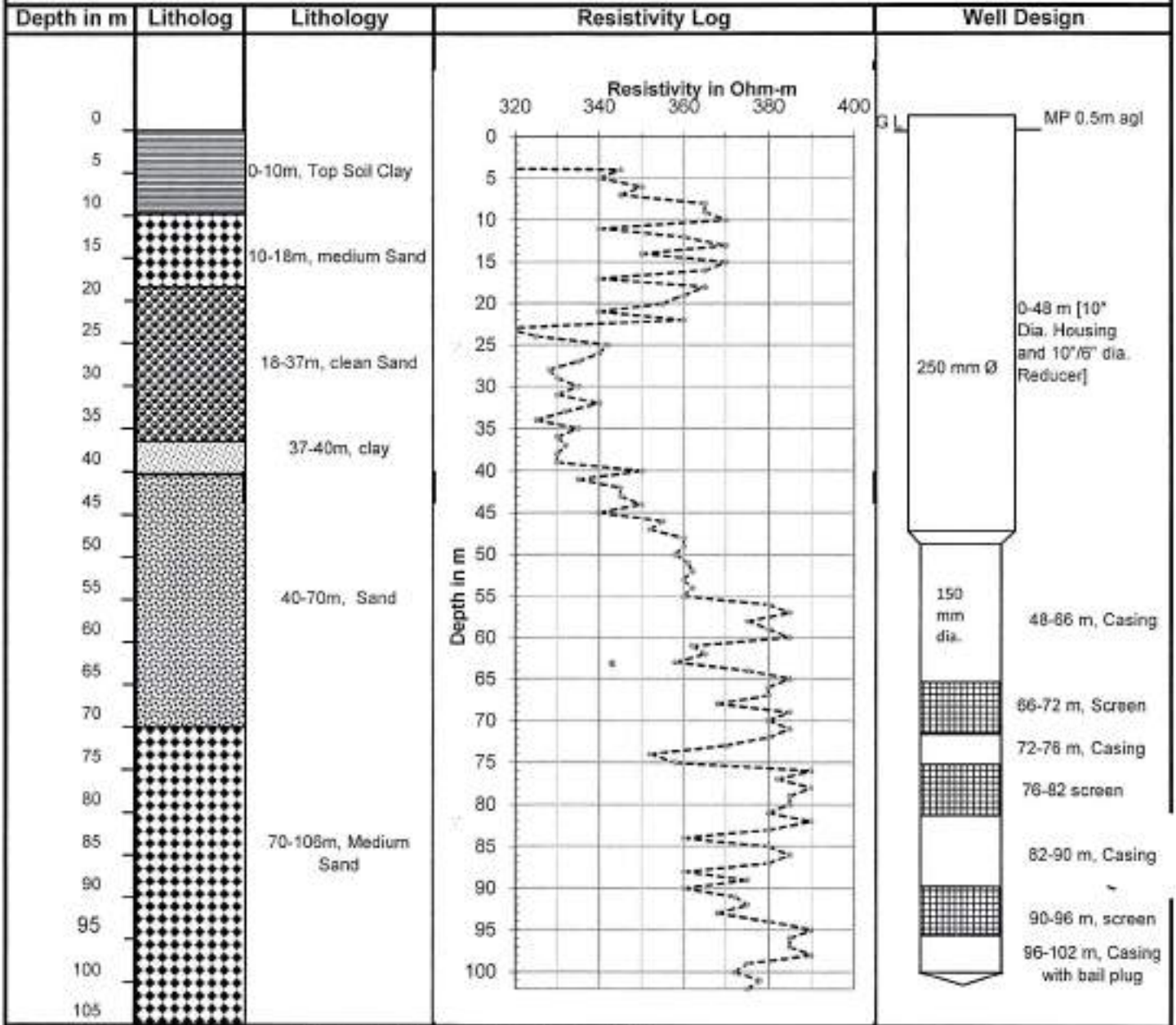
Screen Position:

43 - 46 = 3 m
52 - 58 = 6 m
67 - 73 = 6 m

Designed by	Checked by	Recommend by	Approved by
Sushil Construction	Engineer	Hydrogeologist	GBO-Incharge

TECHNICAL INFORMATION OF DEEP TUBEWELL

Well No	: **SS 06/070-71/IWRMP (Production Deep Tubewell)**			
Location	: Sanoshree VDC 3, Bardiya			
Drilling depth	: 105 m		Drilling Technique	: Reverse Rotary
Lowering depth	: 102 m		Drilling started date	: *2071-08-14*
Static water level	: 13.5 m		Completion date	: *2071-08-17*
Coordinates (WGS 84)	: 527988 E	Longitude	Logging Date	: *2071-08-18*
	: 3128430 N	Latitude		
	: 127m	Altitude		
Drilled by	: Sushil Construction, Nepalganj			
Owner	: Kusumbadevi DTW WUA, Sanoshree 3, Bardiya & GBO Nepalganj			



Measuring Point (MP)	: 0.5 m agl (250 mm, MS Casing Pipe)
Total Housing	: 48 m bgl (250mm MS Casing Pipe)
Total Screen	: 18 m (150mm Stainless Steel V-wire Screen Pipe)
Total Casing Pipe	: 36 m (150 mm, MS Casing Pipe)

Screen Position:

66 - 72 = 6 m
76 - 82 = 6 m
90 - 96 = 6 m

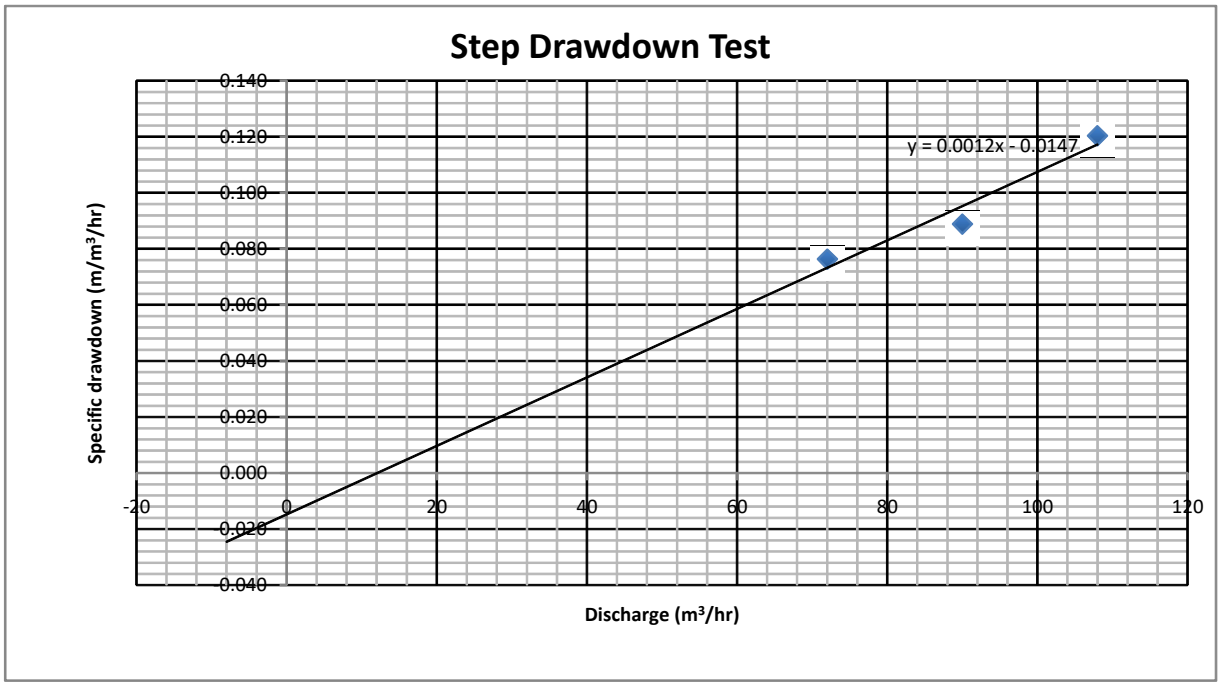
Designed by	Checked by	Recommend by	Approved by
Sushil Construction	Engineer	Hydrogeologist	GBO-Incharge

ANNEX H

PUMP TEST RECORDS AND ANALYSES

Step Drawdown Test
Sanoshree DTW: SS-01/ 070-71 IWRMP
Depth to Static water level bgl (m): 9

Discharge		Specific drawdown	Drawdown
lps	m^3/hr	$m/m^3/hr$	m
20	72	0.076	5.5
25	90	0.089	8
30	108	0.120	13



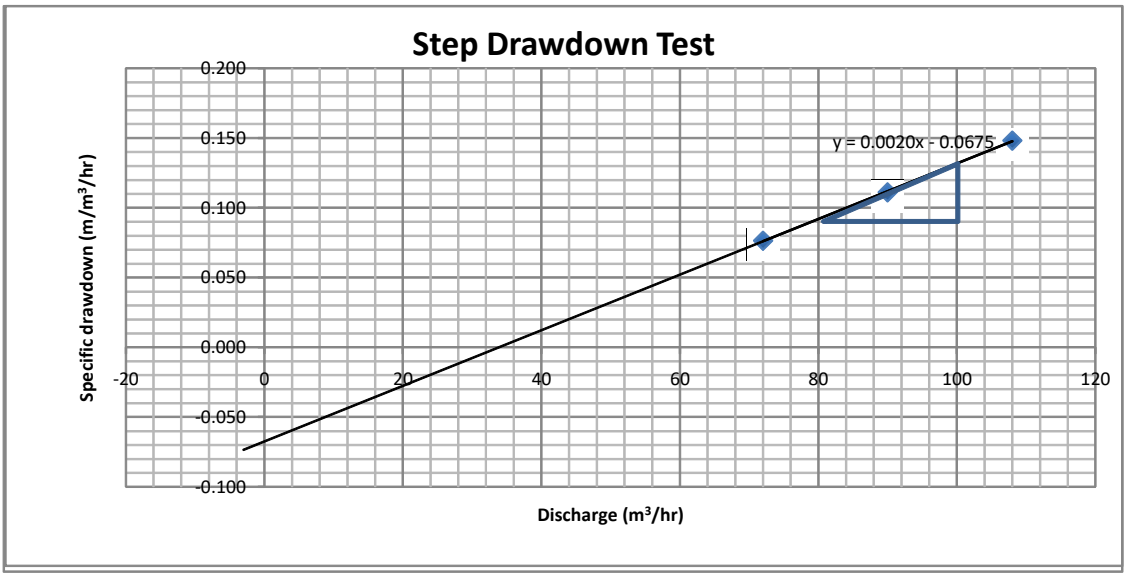
Discharge (Q)		Aquifer loss coeff.	Aquifer loss (BQ)	Well loss Coeff.	Well loss (CQ^2)	Total calculated drawdown	Well efficiency
lps	m^3/hr	B	m	C	m	m	%
20	72	-0.0147	-1.06	0.0012	6.22	5.16	
25	90	-0.0147	-1.32	0.0012	9.72	8.40	
30	108	-0.0147	-1.59	0.0012	14.00	12.41	Data not reliable to evaluate
40	144	-0.0147	-2.12	0.0012	24.88	22.77	

Comments: Negative value of Aquifer loss coeff. Indicates that there is no drawdown in the aquifer and the total drawdown measured is the well loss only. But this is not possible. The tube well cannot produce discharge of 30lps for the long duration of pumping (during pumping test) without receiving water from the aquifer. Therefore the step drawdown data are not reliable.

This test data shows the tube well is quite inefficient. The tube well needs to be redeveloped and tested again for the proper evaluation of well.

Step Drawdown Test
Sanoshree DTW: SS-02/ 070-71 IWRMP
Depth to Static water level bgl (m): 11

Discharge		Specific drawdown	Drawdown
lps	m^3/hr	$m/m^3/hr$	m
20	72	0.076	5.5
25	90	0.111	10
30	108	0.148	16



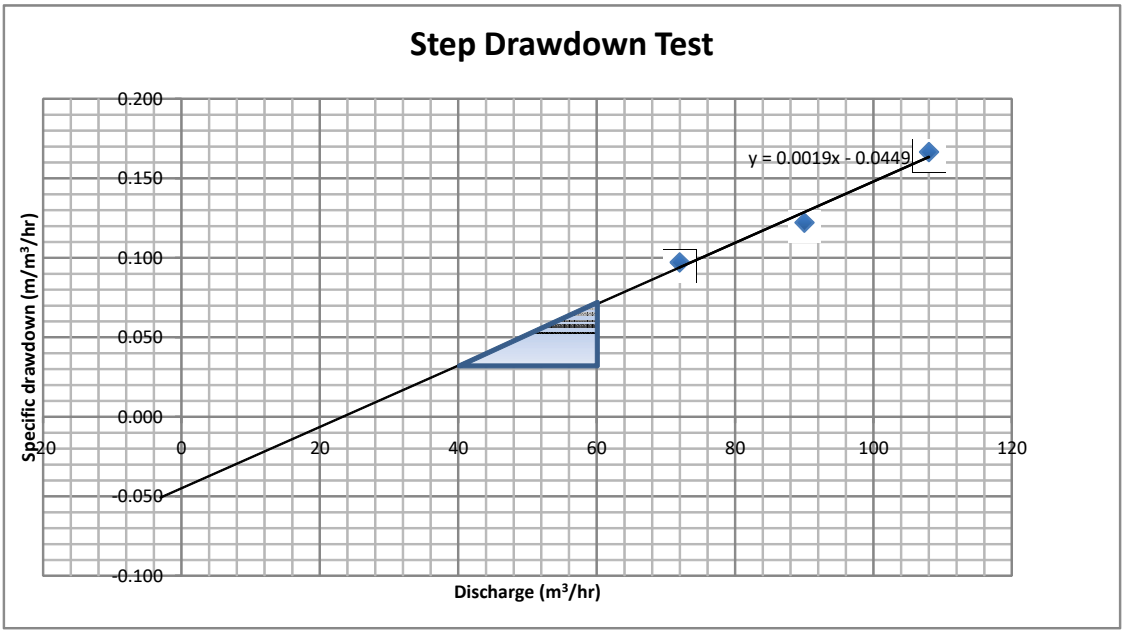
Discharge (Q)		Aquifer loss coeff.	Aquifer loss (BQ)	Well loss Coeff.	Well loss (CQ^2)	Total calculated drawdown	Well efficiency
lps	m^3/hr	B	m	C	m	m	%
20	72	-0.0675	-4.86	0.0020	10.37	5.51	Data not reliable
25	90	-0.0675	-6.08	0.0020	16.20	10.13	
30	108	-0.0675	-7.29	0.0020	23.33	16.04	
40	144	-0.0675	-9.72	0.0020	41.47	31.75	

Comments: Negative value of Aquifer loss coeff. Indicates that there is no drawdown in the aquifer and the total drawdown measured is the well loss only. But this is not possible. The tube well cannot produce discharge of 30lps for the long duration of pumping (during pumping test) without receiving water from the aquifer. Therefore the step drawdown data are not reliable.

This test data shows the tube well is quite inefficient. The tube well needs to be redeveloped and tested again for the proper evaluation of well.

Step Drawdown Test
Sanoshree DTW: SS-03/ 070-71 IWRMP
Depth to Static water level bgl (m): 12

Discharge		Specific drawdown	Drawdown
lps	m^3/hr	$m/m^3/hr$	m
20	72	0.097	7
25	90	0.122	11
30	108	0.167	18



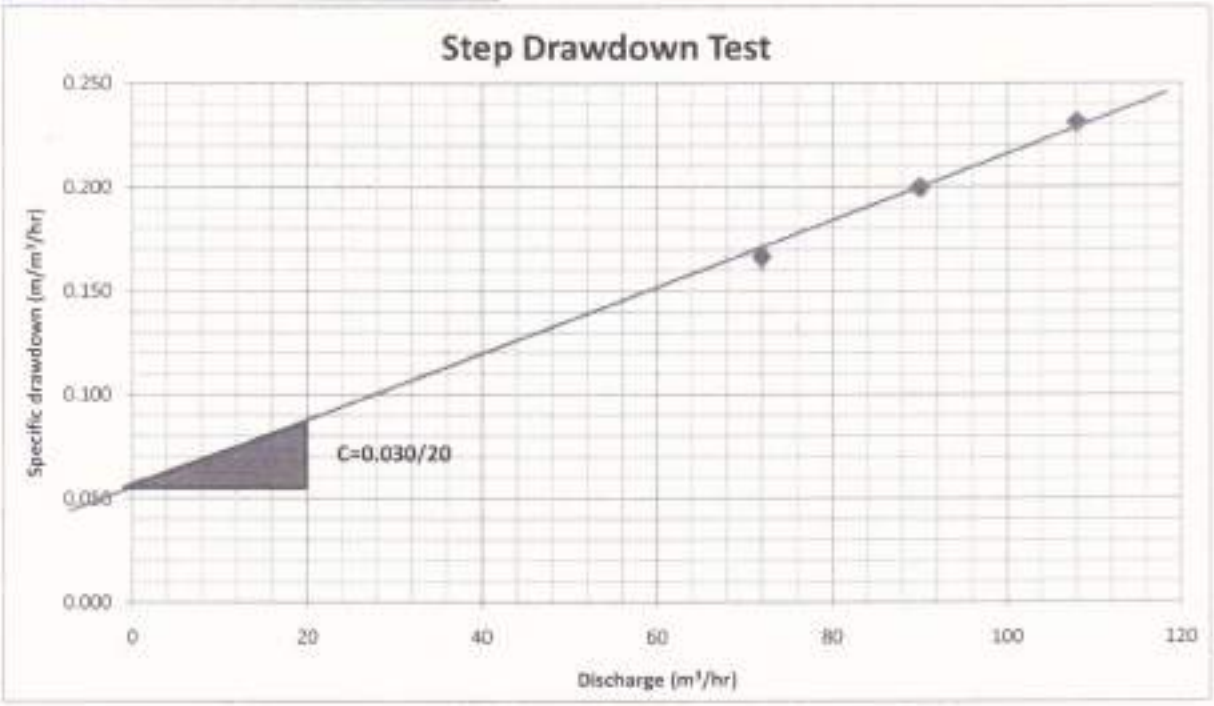
Discharge (Q)		Aquifer loss coeff.	Aquifer loss (BQ)	Well loss Coeff.	Well loss (CQ^2)	Total calculated drawdown	Well efficiency
lps	m^3/hr	B	m	C	m	m	%
20	72	-0.0449	-3.23	0.0019	9.850	6.62	data not reliable
25	90	-0.0449	-4.04	0.0019	15.39	11.35	
30	108	-0.0449	-4.85	0.0019	22.16	17.31	
40	144	-0.0449	-6.47	0.0019	39.40	32.93	

Comments: Negative value of Aquifer loss coeff. Indicates that there is no drawdown in the aquifer and the total drawdown measured is the well loss only. But this is not possible. The tube well cannot produce discharge of 30lps for the long duration of pumping (during pumping test) without receiving water from the aquifer. Therefore the step drawdown data are not reliable.

This test data shows the tube well is quite inefficient. The tube well needs to be redeveloped and tested again for the proper evaluation of well.

Step Drawdown Test
Sanoshree DTW: SS-04/070-71 IWRMP
Depth to Static water level bgl (m): 13

Discharge		Specific drawdown	Drawdown
lps	m^3/hr	$m/m^3/hr$	m
20	72	0.167	12
25	90	0.200	18
30	108	0.231	25



Discharge (Q)		Aquifer loss coeff.	Aquifer loss (BQ)	Well loss Coeff.	Well loss (CQ^2)	Total calculated drawdown	Well efficiency
lps	m^3/hr	B	m	C	m	m	%
20	72	0.055	3.96	0.0015	7.78	11.74	33.74
25	90	0.055	4.95	0.0018	14.18	19.13	25.88
30	108	0.055	5.94	0.0018	20.41	26.35	22.54
40	144	0.055	7.92	0.0018	36.29	44.21	17.92

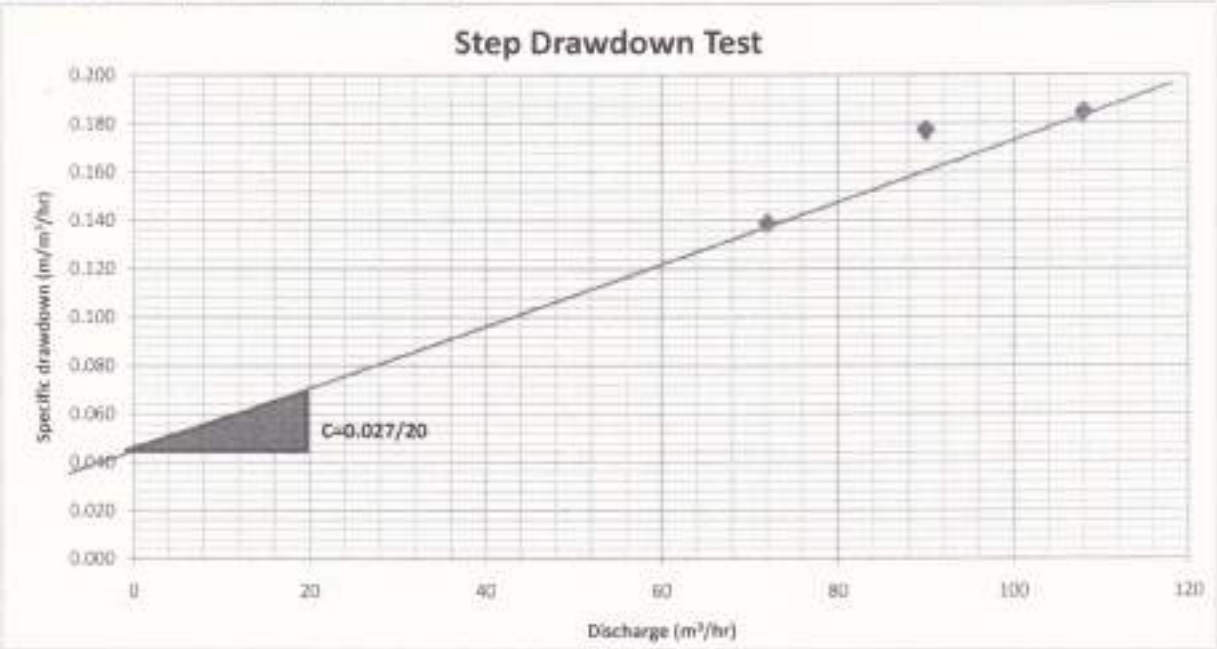
Comments. High well loss compared to aquifer loss suggests that tube well is either not properly constructed or not developed. Efficiency of tube well is remarkably low.

Also highest discharge during step drawdown test is lower than the design discharge. This tube well is not capable in providing design discharge of 40 lps.

Also step drawdown test data sheet provided by GWIDD shows lack of skills in person carrying out step drawdown test. The tube well needs further development and testing again for satisfactory evaluation of tube well.

Step Drawdown Test
Sanoshree DTW: SS-05/ 070-71 IWRMP
Depth to Static water level bgl (m): 12

Discharge		Specific drawdown	Drawdown
lps	m^3/hr	$m/m^3/hr$	m
20	72	0.139	10
25	90	0.178	16
30	108	0.185	20



Discharge (Q)		Aquifer loss coeff.	Aquifer loss (BQ)	Well loss Coeff.	Well loss (CQ^2)	Total calculated drawdown	Well efficiency
lps	m^3/hr	B	m	C	m	m	%
20	72	0.044	3.17	0.0014	7.00	10.17	31.16
25	90	0.044	3.96	0.0014	10.94	14.90	26.59
30	108	0.044	4.75	0.0014	15.75	20.50	23.18
40	144	0.044	6.34	0.0014	27.99	34.33	18.46

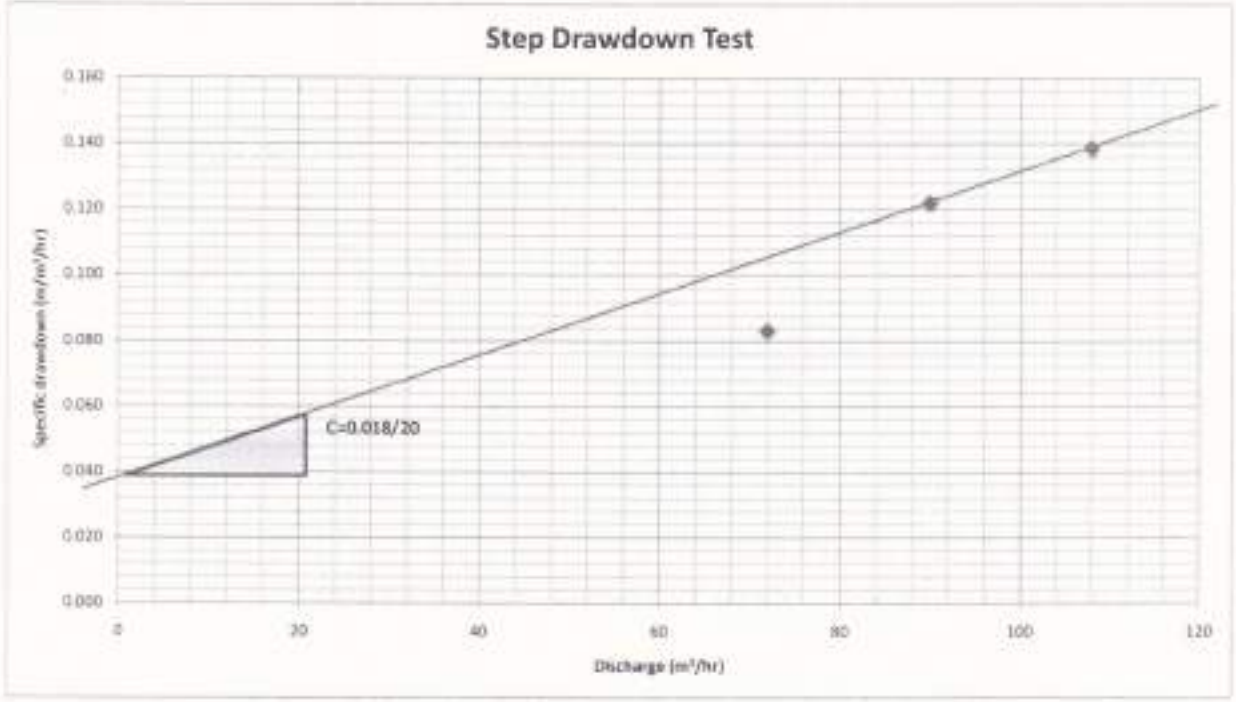
Comments: High well loss compared to aquifer loss suggests that tube well is either not properly constructed or not well developed. Efficiency of tube well is remarkably low.

Also highest discharge during step drawdown test is lower than the design discharge. This tube well is not capable in providing design discharge of 40 lps.

Also step drawdown test data sheet provided by GWIDD shows lack of skills in the person carrying out step drawdown test. The tube well needs further development and testing again for satisfactory evaluation of tube well.

Step Drawdown Test
Sanoshree DTW: SS-06/ 070-71 IWRMP
Depth to Static water level bgl (m) : 12

Discharge		Specific drawdown	Drawdown
lps	m^3/hr	$m/m^3/hr$	m
20	72	0.083	6
25	90	0.122	11
30	108	0.139	15



Discharge (Q)		Aquifer loss coeff.	Aquifer loss (BQ)	Well loss Coeff.	Well loss (CQ^2)	Total calculated drawdown	Well efficiency
lps	m^3/hr	B	m	C	m	m	%
20	72	0.040	2.88	0.001	4.67	7.55	38.17
25	90	0.040	3.60	0.001	7.29	10.89	33.06
30	108	0.040	4.32	0.001	10.50	14.82	29.15
40	144	0.040	5.76	0.001	18.66	24.42	23.58

Comments: High well loss compared to aquifer loss suggests that tube well is either not properly constructed or not well developed. Efficiency of tube well is remarkably low.

Also highest discharge during step drawdown test is lower than the design discharge

Also step drawdown test data sheet provided by GWIDD shows lack of skills in the person carrying out step drawdown test. The tube well needs further development and testing again for satisfactory evaluation of tube well.

ANNEX I

DETAILS OF WELL CASING, SCREEN AND PUMP INSTALLATION

Sanoshree ISP: Details od Well Casing, screen

Deep Tube Well No.	Location		Length of Pipes (m)					Gravel Pack (m3)
	VDC/ Municipality	Ward No	Housing line below ground level	Production Line			Total	
				Screen		Total Casing		
				Type	Length			
SS-01	Taratal	3,4	48	Stainless steel	18	39	105	10
SS-02	Taratal	4	48		18	34	100	9
SS-03	Sanoshree	7	48		18	19	85	11
SS-04	Sanoshree	2	48		18	42	108	10
SS-05	Sanoshree	3	48		18	39	105	10
SS-06	Sanoshree	3	48		18	36	102	10