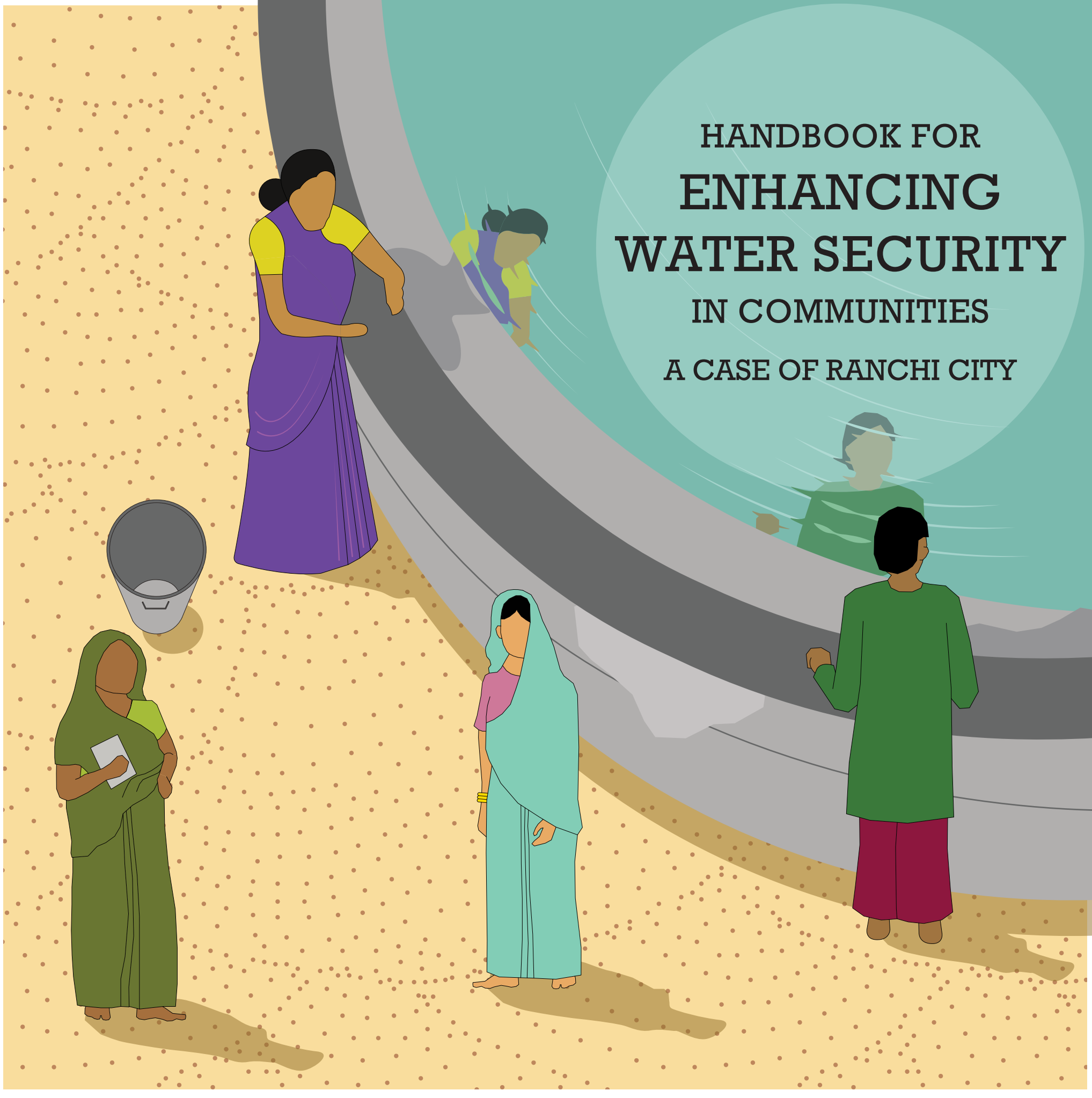
HANDBOOK FOR ENHANCING WATER SECURITY IN COMMUNITIES

A CASE OF RANCHI CITY



This handbook was compiled by Integrated Design (INDE) for Mahila Housing Trust (MHT). Integrated Design has been working with MHT since July 2018 as the technical partner to enhance the water security in the informal settlements of Ranchi City. The steps and processes outlined in this handbook have been implemented as part of a pilot project in the settlement of Bara Ghagra. The pilot project sought to recharge and improve the quality of water in the selected open wells of the settlement.

More details on the authors is available at

Mahila Housing Trust (MHT)- https://www.mahilahousingtrust.org/

Integrated Design (INDE)- https://www.integrateddesign.org/

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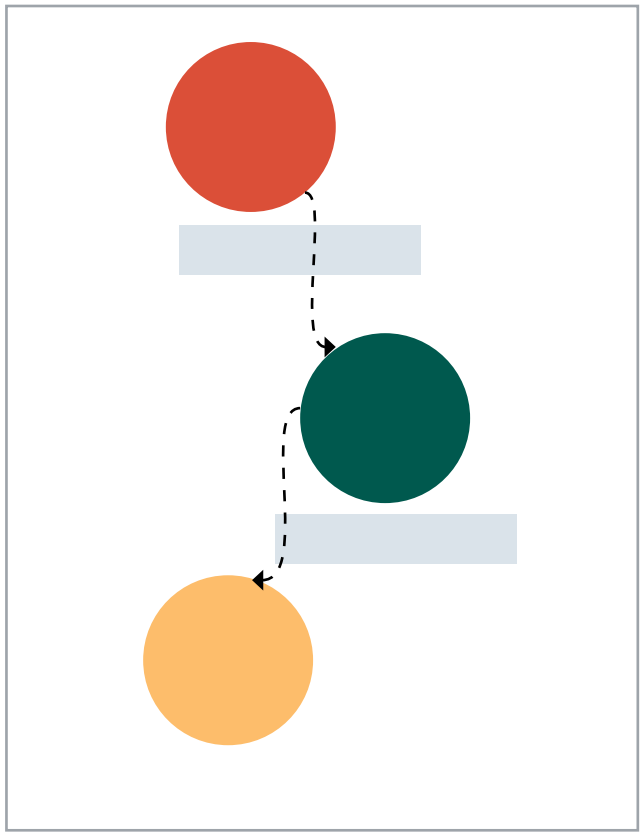

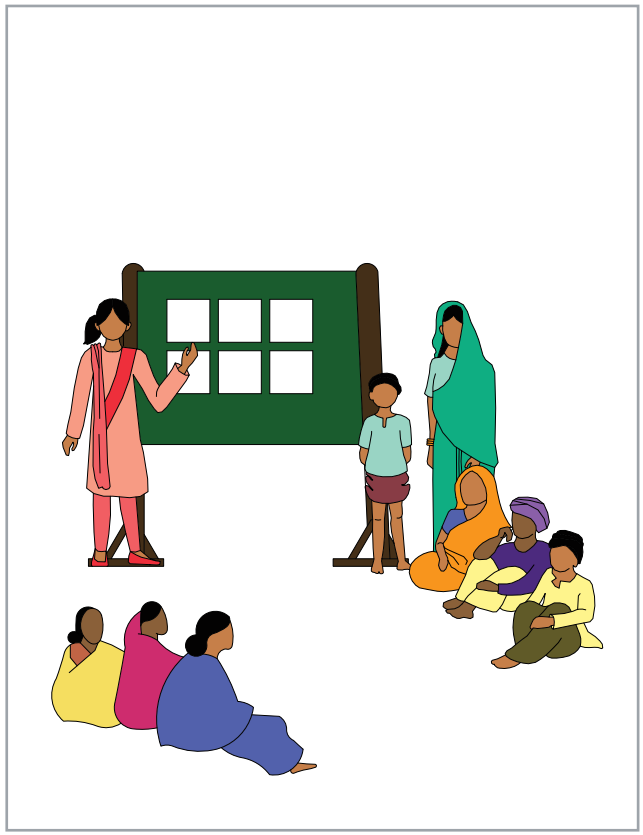

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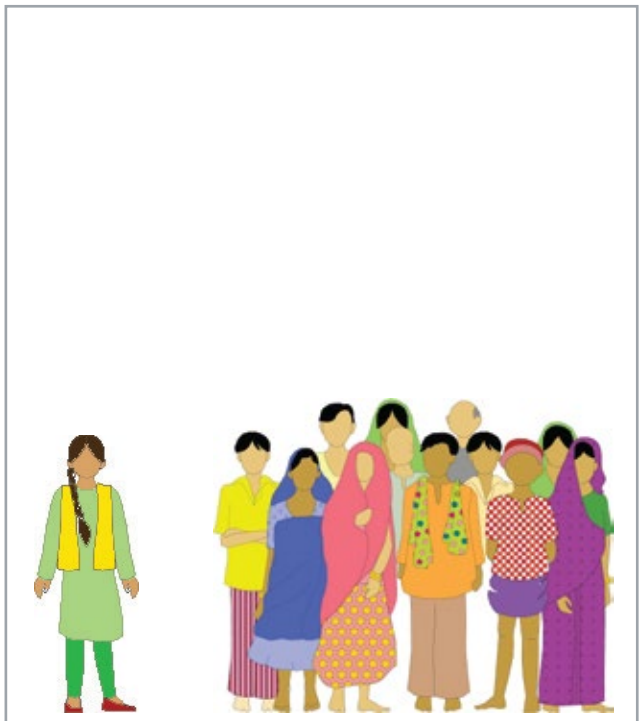

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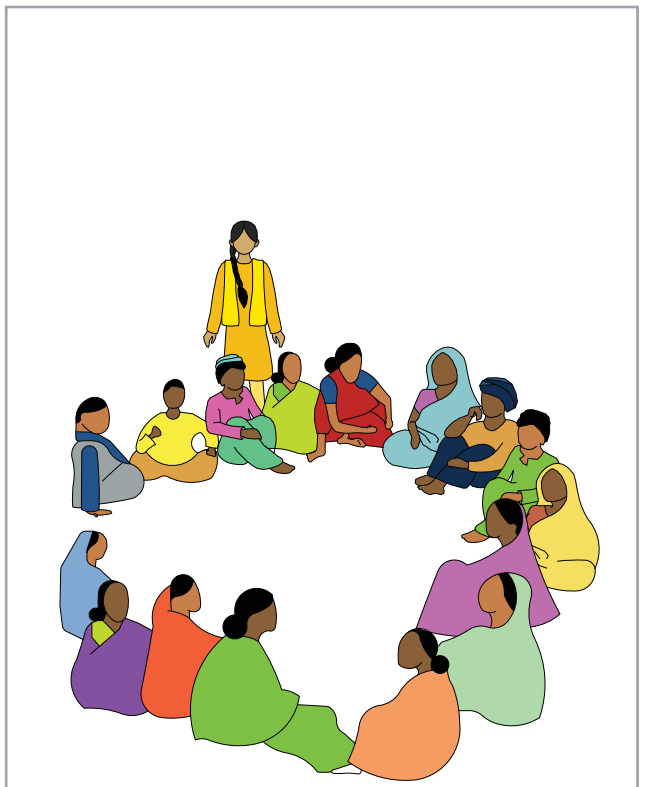


1

Preface

Most informal settlements in Ranchi were former villages, with pre-existing relationships with natural systems. Over time, the construction of roads and buildings, the release of pollutants into rivers and poorly managed sanitation have compromised on the quality and quantity of water from traditional water sources. This has led to over-reliance on groundwater from borewells. In order to reverse the trends caused by unorganised city growth, INDE has come alongside MHT to frame interventions to be made at settlement level for the better management of surface water, recharge of groundwater as well as proper location and management of sanitation within the settlement. This can lead to a revival of traditional water sources as well as increase the resilience of the community to water stress.

This handbook presents the details of the demonstration of these interventions in a pilot settlement: Bara Ghaghra.
The basis for the settlement-level specific actions in Bara Ghaghra is the fact that the only sustainable source of freshwater is rain. The localised management of rainwater (as stormwater) in terms of its surface movement through common areas of the settlement can ensure a freshwater source for the settlement, in addition to controlling flooding and preventing the stagnation of water in low-lying areas.

It is hoped that the demonstrations in the handbook will serve as an implementation guide for the MHT team, the CAG, the Ward Councilor, the Vikasini and the communities in the other settlements that MHT is engaging with.

The handbook illustrates the stages, steps, processes and facilitation of these interventions. The process is divided into four main phases- the background and context phase, the preparation and mobilization phase, the implementation phase and the support and monitoring phase. The stages and the steps involved are demonstrated and discussed along two dimensions: the technical details of the interventions, and the community processes required to facilitate and support the technical interventions.

The steps laid out in the handbook are supported with simple to understand graphics and imagery that make it easy for the community to use as a step-by-step guide.

Glossary of Terms

Black Water - Water from toilets, having fecal content from excreta.

Bore Well - Deep, narrow well drilled into an underground aquifer to extract water for various purposes

Dadi - Ponds of 4-5 feet depth dug in floodplains for irrigation purposes.

Dispersion Bed/ Trench - An infiltration bed with layers of stone, aggregate, carbon and planting that ensures maximum percolation of incident rainfall and surface runoff into the ground and upper aquifer.

Grease Trap - A trap that collects and reduces the amount of fats, oils and greases that enter the dispersion trench.

Grey Water - Waste water that is discharged from a house, that is mixed soap water, detergents, food scraps, cooking oil, urine and hair, and excluding black water (toilet water). This includes water from bathing areas, kitchens and cloth washing.

Ground Water - Water found underground in the cracks and spaces in soil, sand and rock. It is stored in and moves slowly through geologic formations of soil, sand and rocks called aquifers.

Hand pump - A manually operated pump used to draw water from wells.

Leach Pit (Soak Pit) - A pit having porous walls, which retains solids but permits liquid contents to seep into the surrounding soil.

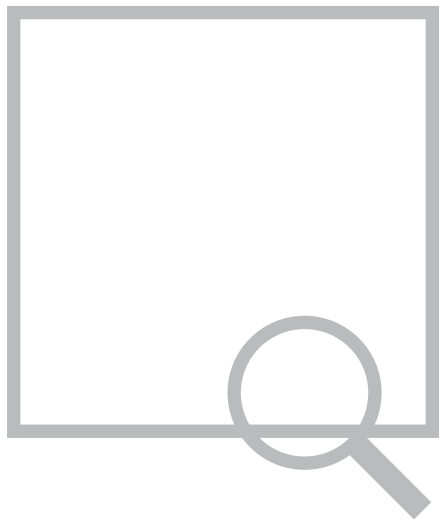
Silt Trap - A trap within which any silt, soil or sediment is contained.

Storm water - Rain water that runs off surfaces where water cannot penetrate such as roofs and roads.

STP (Sewage Treatment Plant) - A facility in which contaminants from waste water and sewage water are removed through physical, chemical and biological processes.

Waste water - Any water that has been contaminated by human domestic or industrial activity.

Weep Hole - A small opening in a wall or structure that allows water to drain out.

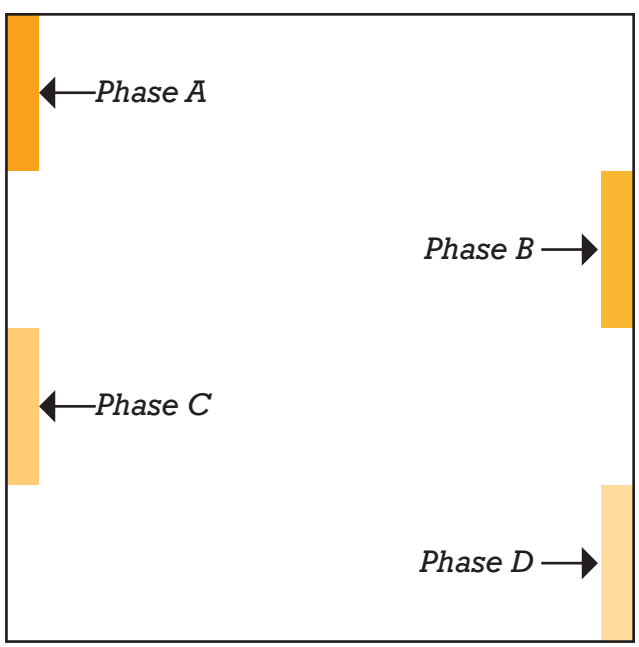


How to Use The Handbook

The handbook is divided into four main chapters or phases: (A) Background Phase, (B) Prepearation Phase, (C) Implementation Phase and (D) Support Phase. The chapters have been colour-coded accordingly for ease of use and understanding.

Stakeholder meetings and the framing of a Memorandum of Understanding (MoU) take place regularly throughout the intervention process. These discussions have been highlighted in the handbook.

During the site identification and implementation stages, the team faced a few setbacks and constraints, which have been inserted as stories in the handbook.



Meetings between stakeholders

Actual stories from site

A Background Phase

B Preparation Phase

C Implementation Phase

D Support Phase

Theory of Change

HYPOTHESIS:

1. A decentralised participatory approach (at settlement / hamlet level) premised on reviving traditional water sources will, in reducing water dependency on centralized piped water systems, ameliorate water insecurity at the neighbourhood level
2. An active involvement of, and ownership by the community while enhancing water security will eventually make the communities resilient along livelihoods and health dimensions.

BACKGROUND PHASE

STEPS

1. Set the Context - The relationship of the city/ settlements with traditional water sources

2. Lay out the larger problem statement and the imperative to address the problem.

3. Identify the neighborhoods for intervention

OUTPUTS

- Understand and classify the settlements based on relationships with the city and natural system.

- Prioritise settlements for interventions

- Identify quick wins for the community to enhance water resilience: community owned or public wells that can be revived and restored
- Assess the nature of intervention.

OUTCOMES

- Conceptualize the problem at the region, city and neighbourhood scale.

- Understand the city-caused externalities and settlement-level issues generating water stresses at the city and neighbourhood scales.

PRE-REQUISITES

- The city faces acute water stress
- The settlements have relationships with traditional water systems which while disrupted by rapid urbanization, can be revived

- The marginalized community are the last on the radar of the formal planning and governance instruments thereby necessitating participatory interventions on identified quick-wins towards enhancing water (and livelihoods) resilience.

PREPARATION PHASE

STEPS

1. Identify and define critical stakeholder roles
2. Frame the problem
   - Reduced water quantity and quality in open wells
   - Lack of grey water management
3. Identify intervention sites
4. Identify impacted communities and HHs.
5. HH water needs, use and source survey : Understand water requirements of the listed HHs
6. Discuss solutions
   a. Restoring and reviving open wells
   b.Surface runoff water management
7. Technical partner to frame the guidelines for proposed solutions.
8. Discuss the need for and purpose of MoUs
9. Frame the MoU
10. Open bank account
11. Identify skills and labour requirement
12. Mobilise labour and source material
13. Baseline assessment : Quantity and quality mapping of water in the wells

OUTPUTS

1. List of HHs that are impacted

2. Comprehensive water needs and usage figures and sources

3. Secured ownership and partnerships, agree on roles and responsibilities

4. A Signed MoU

5. Solutions and technical guidelines that are have been agreed upon.

PRE-REQUISITES

- Problems of water stress and sanitation issues are framed and understood.
- Possible interventions are discussed with the community
- Settlements for interventions are prioritised

IMPLEMENTATION PHASE

OUTCOMES

1. Agree on roles and responsibilities of various stakeholders

2. An understanding of, and agreement on
   - Emerging challenges that require immediate interventions
   - HHs impacted and participating in the intervention
   - An understanding of amelioration measures
   - Scale of interventions and actions involved

3. A mobilized community assuming ownership of implementation and maintenance

STEPS

- Site Preparation
- Actions as per the technical guidelines
- Well recharge pit construction
- Superstructure and cleaning of the well
- Grey water treatment pit construction and planting
- Post Intervention measures in maintenance & cleaning

OUTPUTS

- Sites are prepared, work is initiated and completed.

OUTCOMES

- Community takes ownership of the implementation and ongoing maintenance
- Community understands the Dos and Don'ts involved in operating and maintaining the wells.
- Community agrees that the open well water is for public use and is not under private ownership

PRE-REQUISITES

- The community can mobilise the means to implement the steps
- MoUs are signed
- Stakeholders roles are agreed upon
- Technical guidelines on the proposals are framed

SUPPORT PHASE

PRE-REQUISITES

- The baseline assessment & implementation phase has been conducted accurately
  - community needs and usage
  - water quantity and quality
- The data collected is accurate
- Surveys are unbiased and comprehensive
- Community has the means to monitor and operate the mapping of water

STEPS

- Awareness Campaigns
- Pre intervention - Water quantity and quality is monitored
- Post intervention - Water quantity and quality is monitored after one year

OUTPUTS

- Baseline water quantity and quality data is collected
- Post intervention water quantity and quality data is collected

OUTCOMES

- Community takesownership of the wells and aware of the need for well recharge and surface runoff management.
- The impact can be effectively assessed for intervention sites & for surrounding sites

IMPACT:

- Decentralized access to potable and non-potable water through restored community wells
- Reduced dependency on centralised piped water systems
- Reduced reliance on deep bores
- Grey water management and reduced pollution on agricultural fields
- Improved livelihoods and enhanced public health parameters
- A demonstratable pilot to be scaled and implemented to other sites
- Strong and mobilised community

A Background Phase

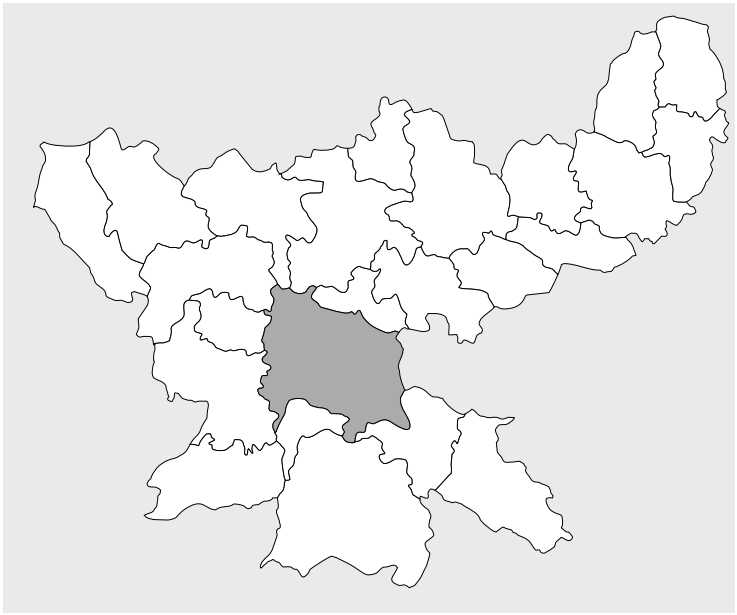
1 The Context

The Subarnarekha is the major river valley of the Ranchi region. The rain-fed Subarnarekha river and tributaries Harmu, Potpoto, Hinoo, and Jumar form the major sources of water for Ranchi. Piped water supply for the city is via three dams, the Kanke, Hatia and Rukka (also known as Getalsud) across the Subarnarekha and its tributaries.

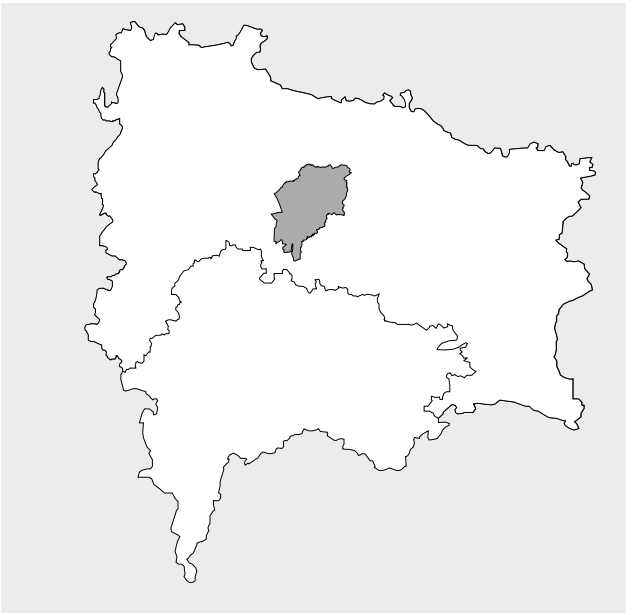
Informal settlements in Ranchi were originally tribal settlements with an agrarian way of life that have been engulfed by the city over the years. However, other than livelihood dependence, they are isolated from the larger city in which they find themselves.

Informal settlements in Ranchi were traditionally reliant on community-managed resources such as open wells, tanks and ponds, which are closely linked to surface water sources and rivers. The Subarnarekha has been the lifeline of tribal communities inhabiting the Chhota Nagpur region. Water pollution of the river basin over the last few decades has affected their day-to-day service needs and livelihood.

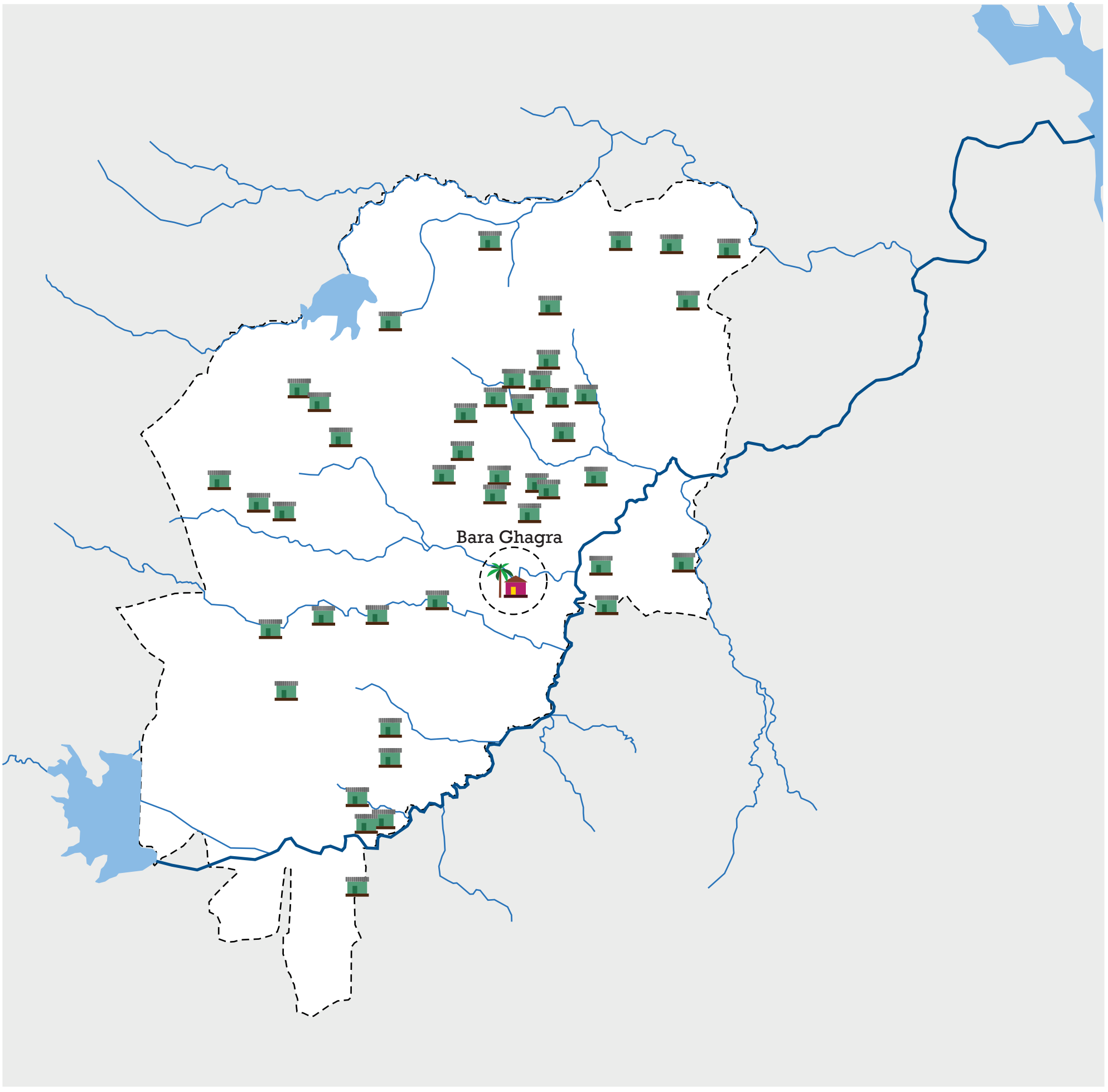
Jharkhand



Ranchi district



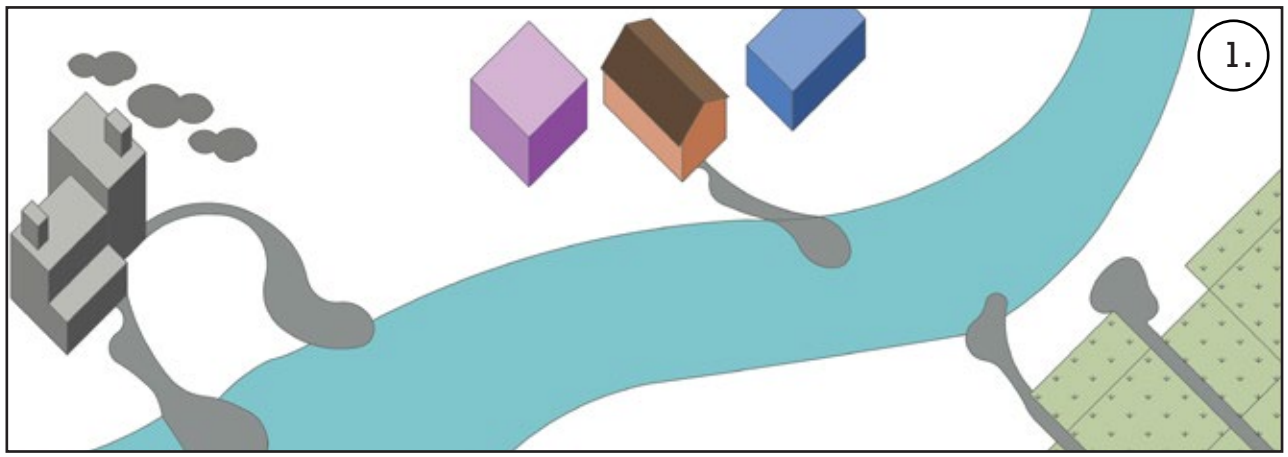
Ranchi city



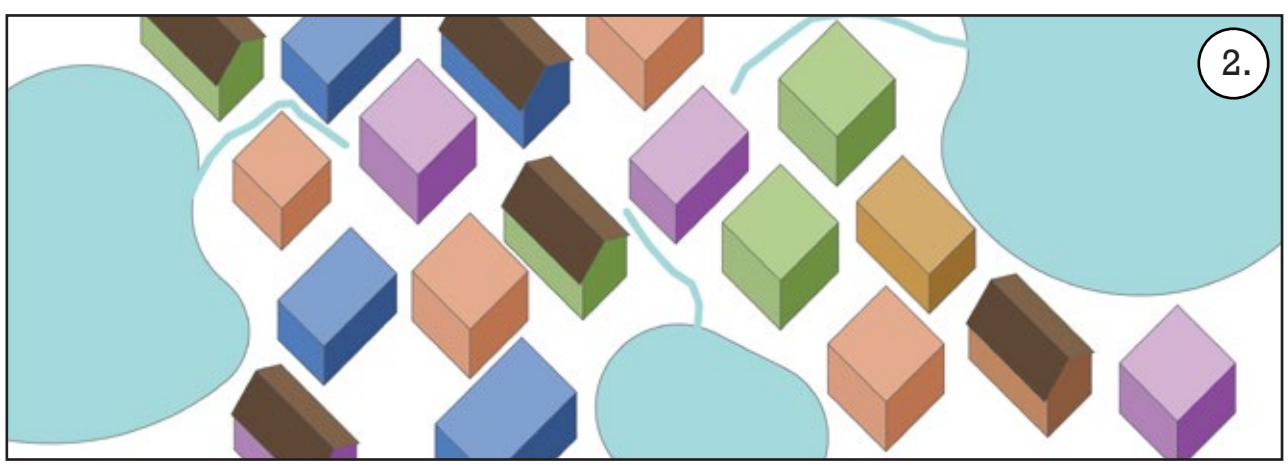
The informal settlements in Ranchi

City-caused externalities:

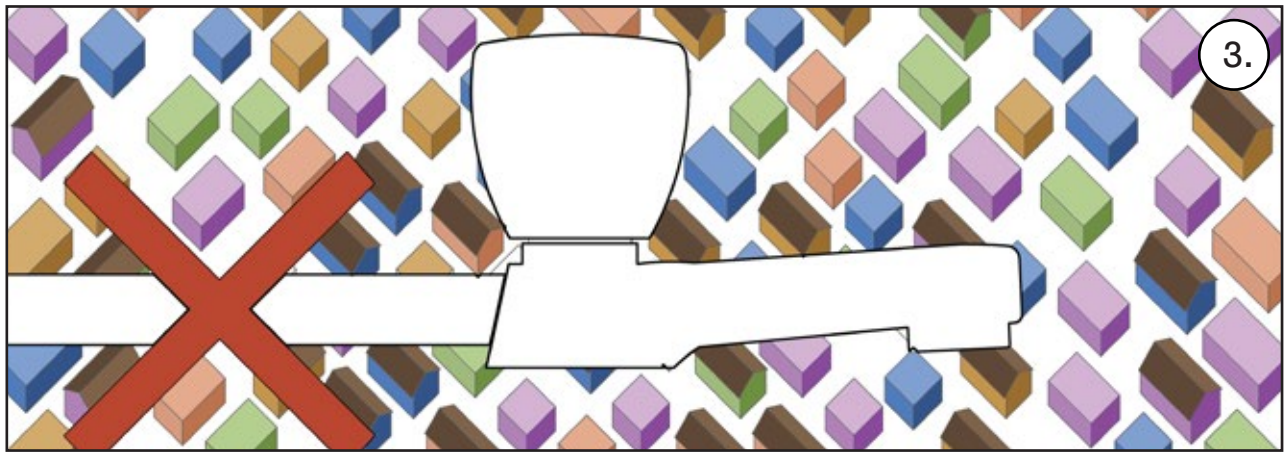
1. Pollution of the Subarnarekha Valley rivers with industrial effluents, agricultural waste water and domestic sewage.



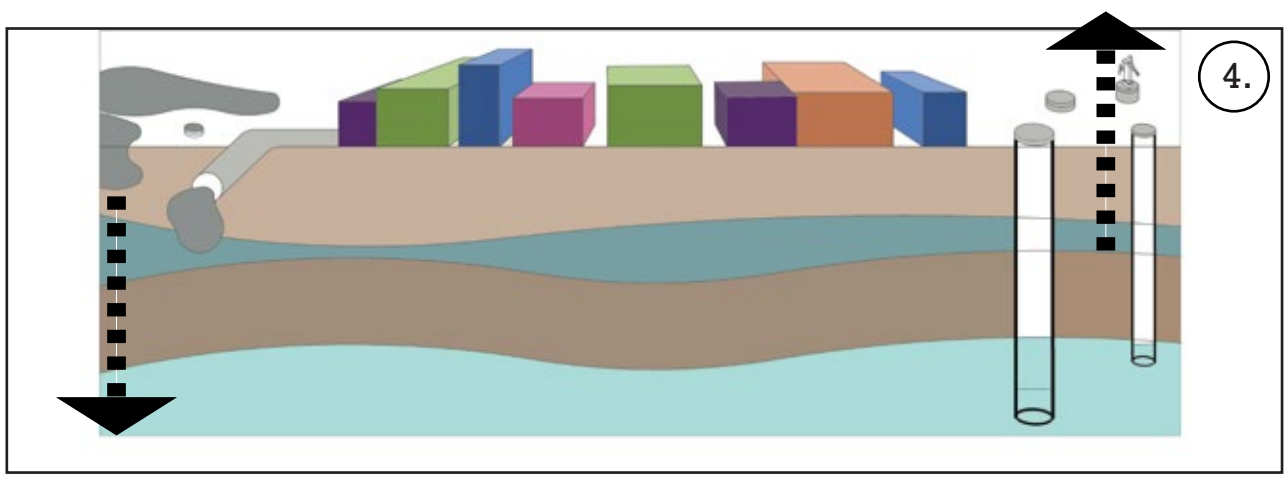
2. Severed links with surface water channels have caused tanks and ponds within settlements and throughout the city to run dry.



3. Most settlements do not receive piped water supply, or have limited access. For the city administration, many of these 'informal low income' settlements are the last priority when it comes to service provision.

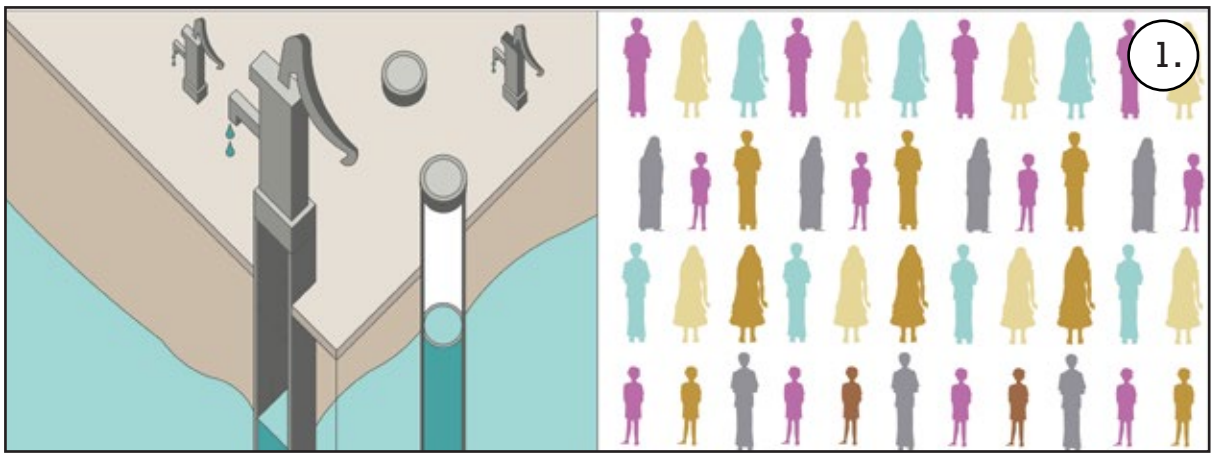


4. Ranchi city at large faces over-exploitation of groundwater as well as pollution of groundwater sources.

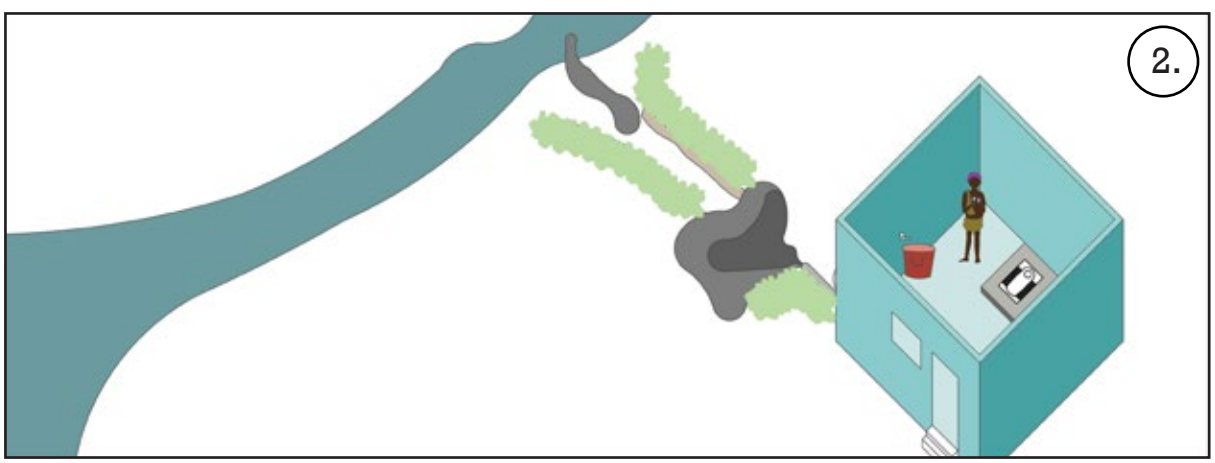


Settlement-level issues:

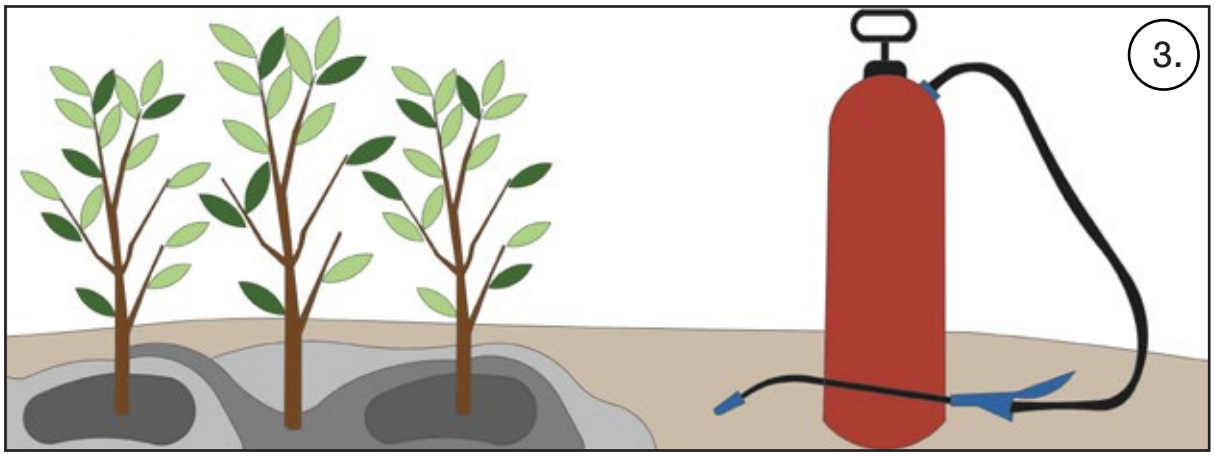
1. Heavy dependency on groundwater drawn via handpumps or borewells has led to decreased groundwater quality and levels.



2. In most settlements, toilet soak pits are located near open wells and hand pumps, and the un-built (kachha) open drains carry grey and black water downstream, contaminating surface and sub-surface water sources, the agricultural fields and finally the river or the water channel.



3. The use of chemical fertilisers and pesticides by settlements that practice cultivation affects the soil and contaminates groundwater.



2 Settlement Classification

All the settlements that MHT works with report water stress, but the reason for this stress varies based on context. To understand the nature of water insecurity faced by these informal settlements, they have been broadly classified into three categories based on their spatial relationship to urban fabric and to natural resource areas. Settlements closer to a natural resource have a greater potential for revival.

Type A

Settlements close to a natural resource

Bara Ghaghra
Namkum Basti
Mahaua toli
Namkum
Pahan Toli Namkum
Chiroundi
Khijur Tola
Bhagat Kocha
Madhukam
Pahan Toli Badgai
Hatma
Lem basti
Jagnnathpur
Pugru Basti
Tupudana

Type B

Settlements disconnected from a nearby natural resource due to urban growth

Chunna Bhatta
Akhra Kocha
Chapu Toli
Piper Toli
Mani Tola
JoJo Basa Hatia
Tiril Basti
Upper Booti Basti
Hinoo Basti

Type C

Settlements in very dense built surroundings with no connection to any natural resource

Bhabha Nagar
Latma Road Singh
Dela Toli
Tiril Sarna Toli
Kokar
Lohra Kocha
Naya Toli

Typical settlement close to a natural resource as in Type A

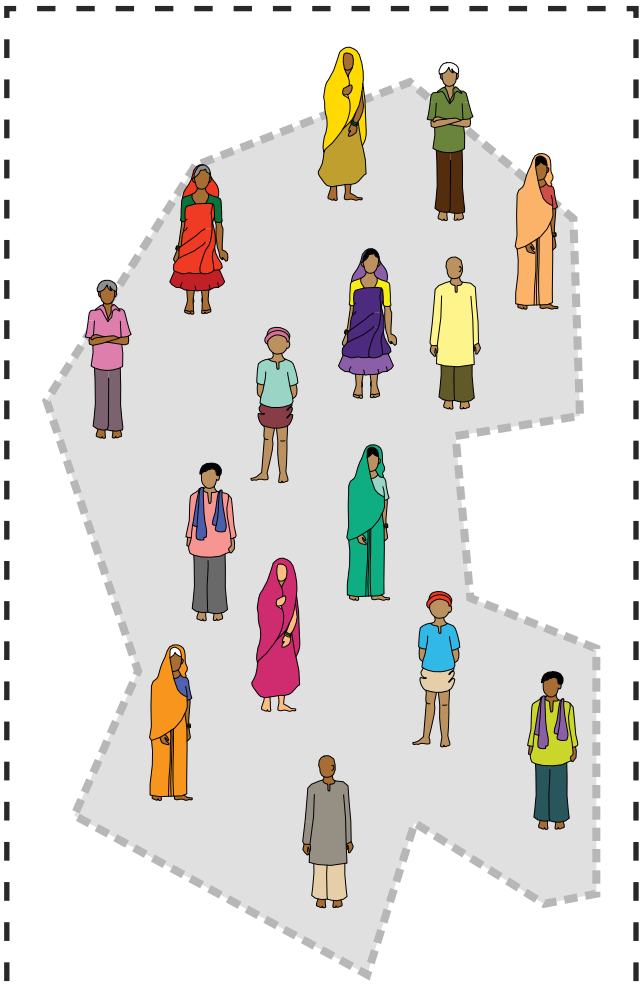
Typical settlement disconnected from a natural resource by urban growth as in Type B

Typical settlement surrounded by urban growth as in Type C

3 Why Bara Ghagra ?

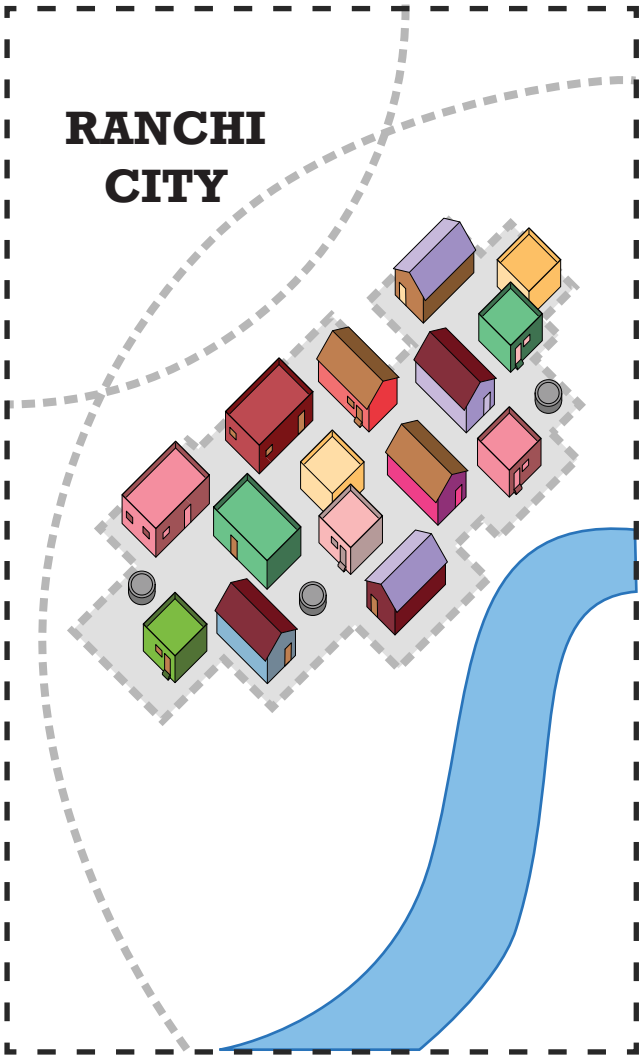
The informal settlement Bara Ghaghra was originally a village but has been within Ranchi Municipal Corporation (RMC) limit since 1987. The settlement has up to 2000 households in all and is at least 60 years old. Bara Ghaghra is chosen as the pilot settlement in which settlement-level specific actions could be demonstrated. The settlement is selected because of the following reasons:

A Settlement size



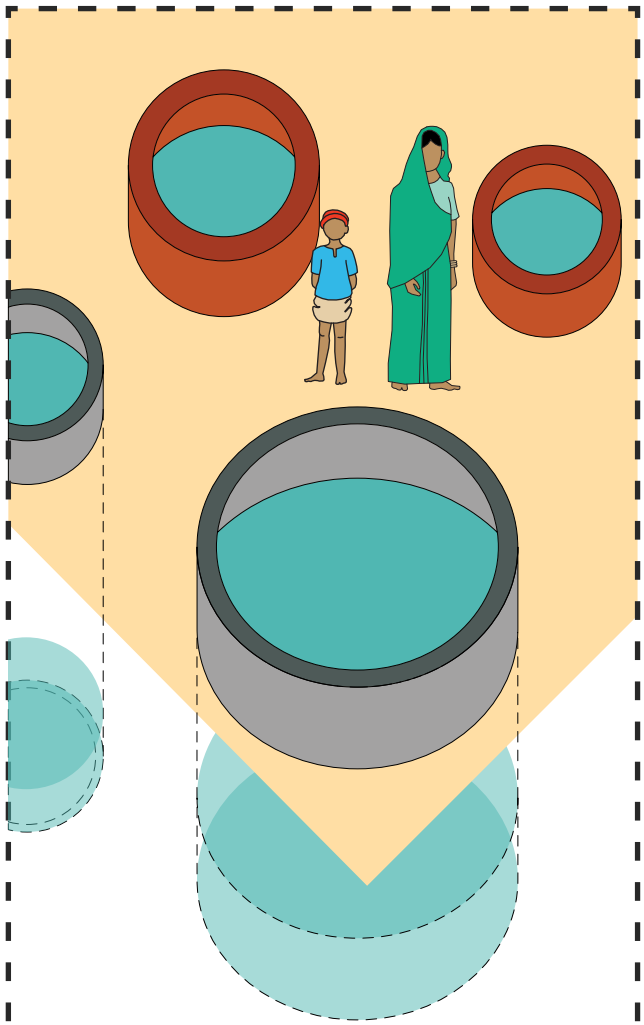
The size and density of the settlement is ideal for demonstration purposes.

B Settlement location



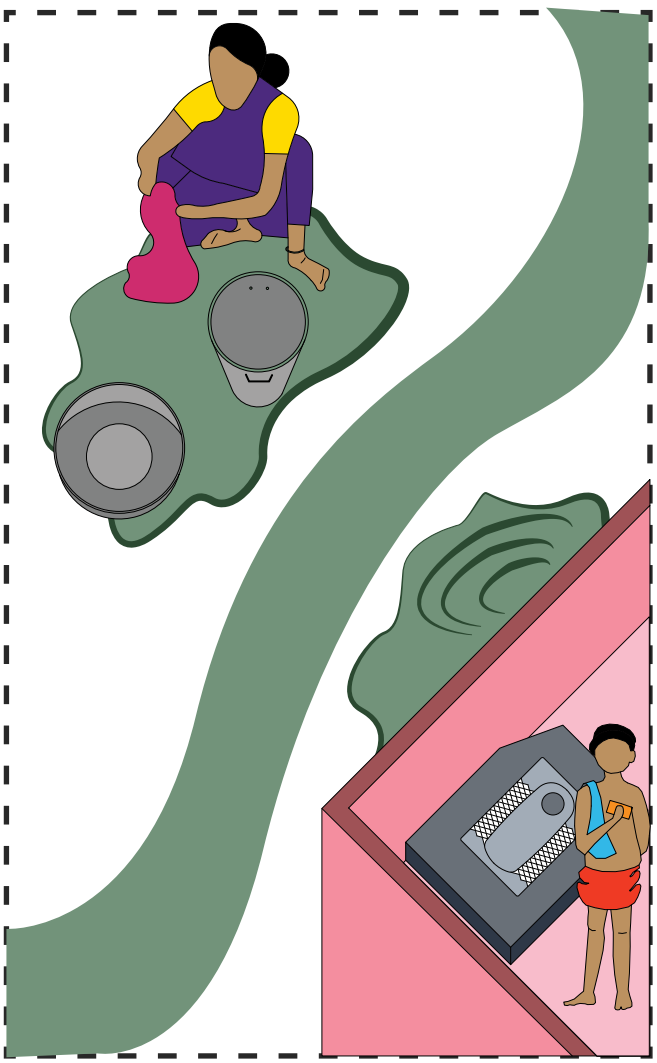
The proximity to the city, as well as to the Chutia, Sargi and Subarnekha Rivers make the settlement suitable for demonstration.

C Number of wells



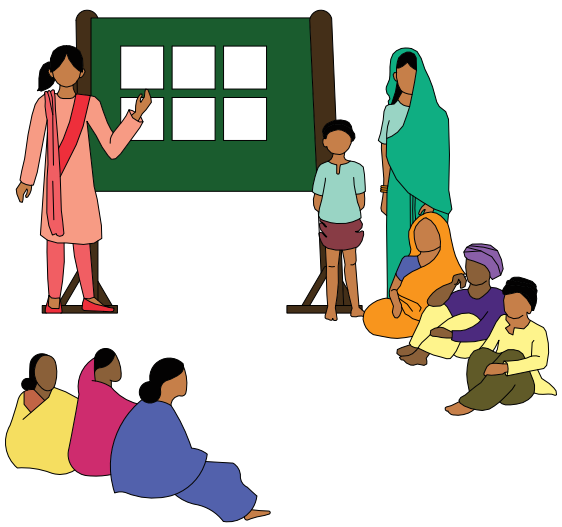
The settlement has wells of various sizes that have potential for revival. Initial visits showed that many wells had water, although communities mentioned water from the well is no longer potable.

D Grey water and black water management



The settlement generates a large amount of untreated grey and black water and has no treatment systems in place.

E Existing social capital

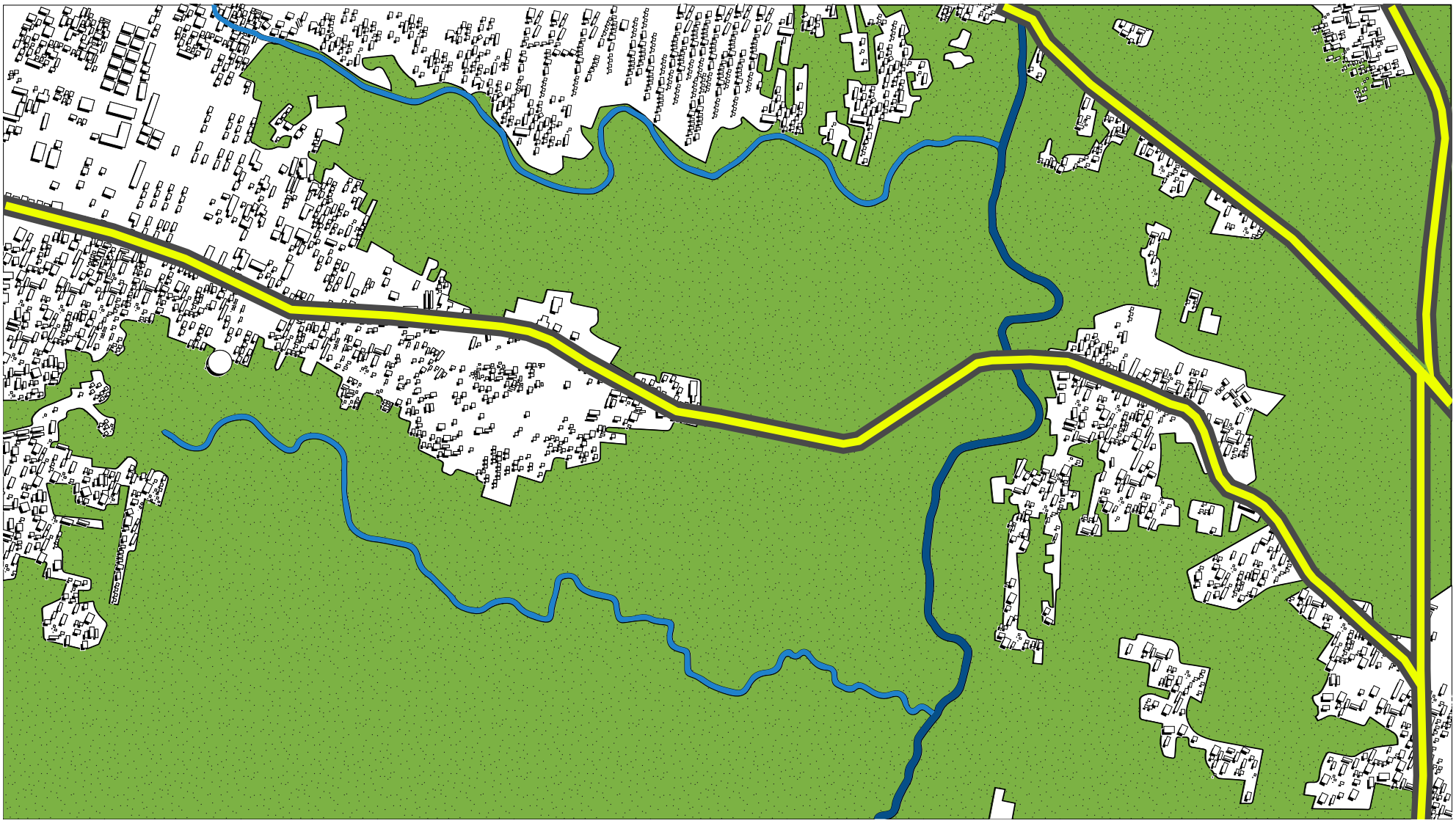


Members of the community have been engaged with MHT as professionals, which helps ensure that demonstrations can be built and operationalised quickly.

F Community engagement

The community of Bara Ghaghra is close-knit and proactive.

4 The Neighbourhood



LEGEND

- STREAMS
- SUBARNAREKHA
- MAIN ROADS
- AGRICULTURAL LANDS
- BUILT AREAS

Community

Bara Ghaghra is at least 60 years old and is inhabited by 2000 households solely of the Oraon tribe.

Livelihoods

Inhabitants of the settlement cultivate crops, keep livestock, work in industries or as labourers and maids in the city.

Relationship with city fabric

Bara Ghaghra was originally a village before it was engulfed by the city about 20 years ago. The settlement is now divided in two by a road running through it.

Community spaces in Bara Ghaghra

Dadi dug in Bara Ghagra

Constructed ponds in Bara Ghagra

Relationship with natural water systems

Streams: Bara Ghaghra is surrounded on 3 sides by the Chutia River, the Sargi River and the Subarnarekha. Untreated sewage from industries at Doranda is released into the rivers, making the river water unusable.

Wells: The several open wells in the settlement run dry in the summer, and the water is salty and hard and is not used for drinking.

Ponds: *Dadi* are ponds of 4-5 feet depth dug near the river and the water is used for irrigation.

Tanks: There are no tanks for water storage.

Amenities

The primary source of drinking water is groundwater drawn via handpumps or machine pumps, which prove insufficient in the summer.

Toilets in Bara Ghaghra are connected to soak pits or STPs.

Subarnarekha river passing
through Bara Ghagra

B Preparation Phase

The preparation phase consists of the following steps:

1. Specific stakeholders are identified and their roles are defined.

2. Specific challenges of water access and security are understood, discussed and framed along with the community. Following this, possible solutions are discussed and agreed upon.

3. Multiple stakeholder meetings are held throughout the preparation phase. The need for an MoU is discussed with the various stakeholders.

4. The sites and impacted households are identified and finalised.

5. The solutions are further refined based on site assessments and community engagement.

6. The MoU is framed based on the finalised sites, solutions and activities discussed.

7. The MoU is agreed upon and signed by the stakeholders.

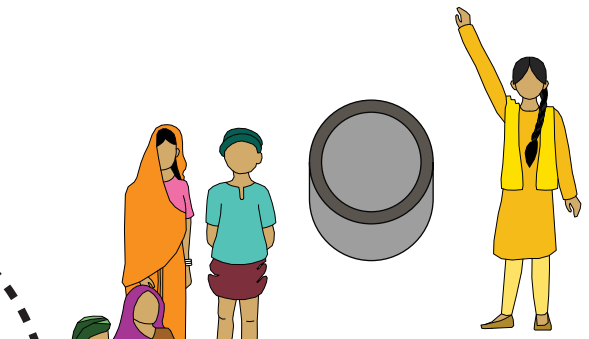
8. A bank account is opened by the community for the ongoing maintenance of the wells.

9. Finally, resources for finances, labour, material and land are identified and mobilized.

1
Define the Stakeholders

2
Site Study and
Framing the problem

3
Stakeholders Meeting
What is the MoU?

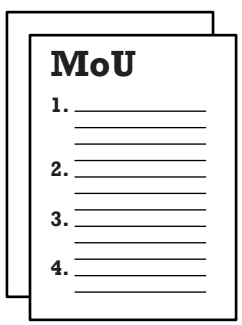


3A Identification of intervention sites

3B Discussing Solutions

Stakeholder Meeting
Framing the MOU

Stakeholder Meeting
Signing the MOU

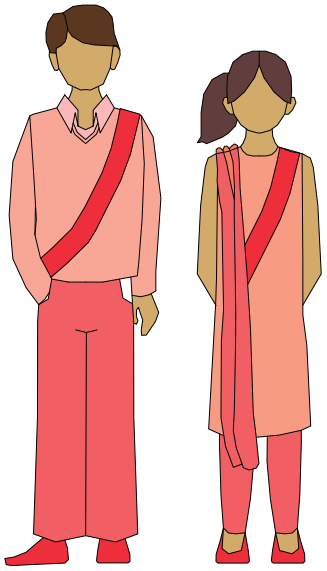


5
Shortlisted wells and
Mobilising the Labour

4 Opening Bank Account

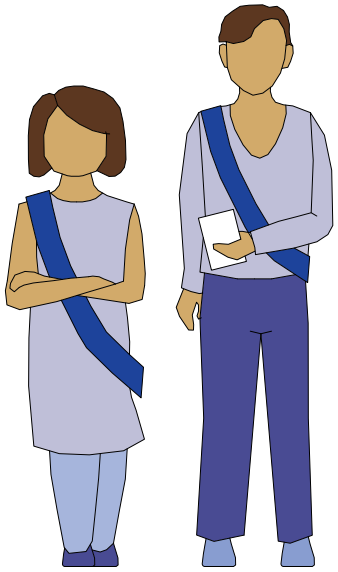
1 Define the Stakeholders

Stakeholder meetings are conducted regularly throughout the intervention process. In stakeholder meetings, the issues are presented and the concerns of the communities are discussed. Solutions are developed to address the issues and concerns that are raised, and the roles of each stakeholder are defined and agreed upon in tandem.



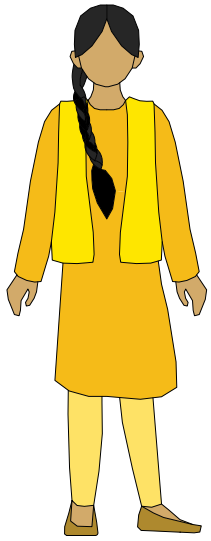
NGO Partner (MHT)

- They will hold responsibility for initial surveys, site identification, identification of community members, documentation of pre-intervention and post-intervention conditions.
- They will work along side the technical partner and the community for the construction and documentation of the interventions.



Technical Partner

- They will guide the implementation process and support the community in the execution of the interventions.
- They will support the NGO partner in its responsibilities and provide parameters for the documentation processes.



Ward Councillor

- An elected representative of the community who will directly engage with the community
- They will ensure execution and monitoring of local level interventions.

Vikasini

- A nominated representative of the CAG who will bring their issues and concerns to the technical partner.
- They will serve as a link between the community, the NGO partner, the technical partner and the councillor.

CAG

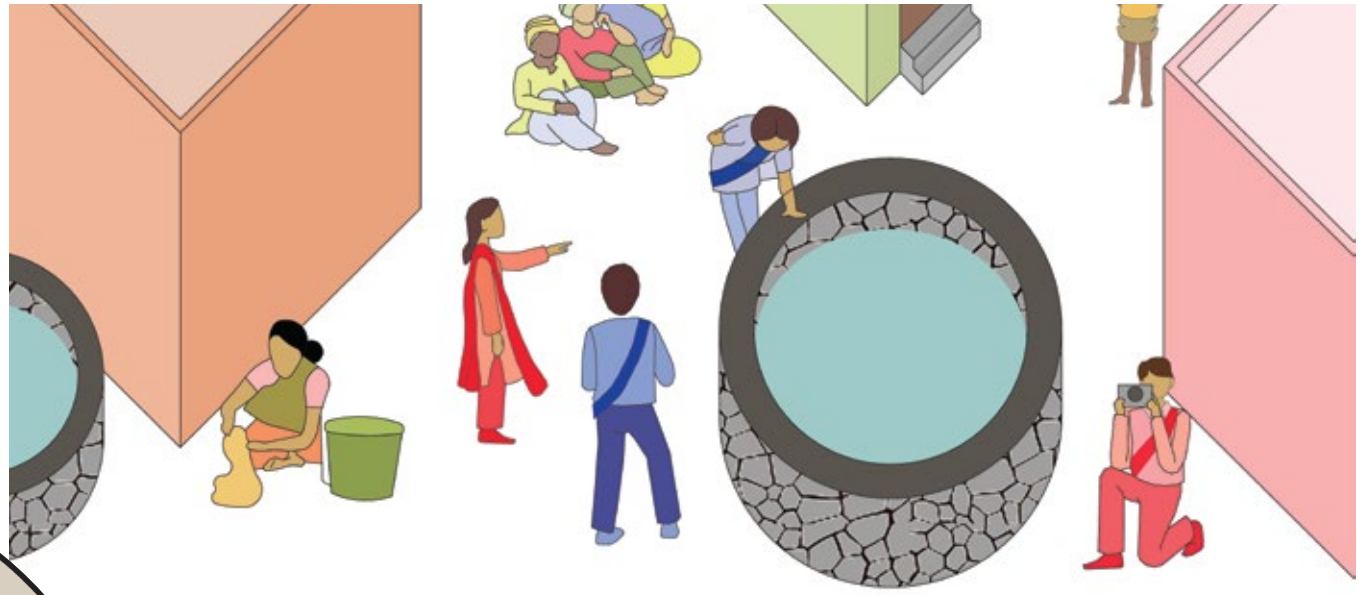
- They are volunteers from the community who will ensure execution, funding and ongoing cleaning and maintenance work at the identified sites.

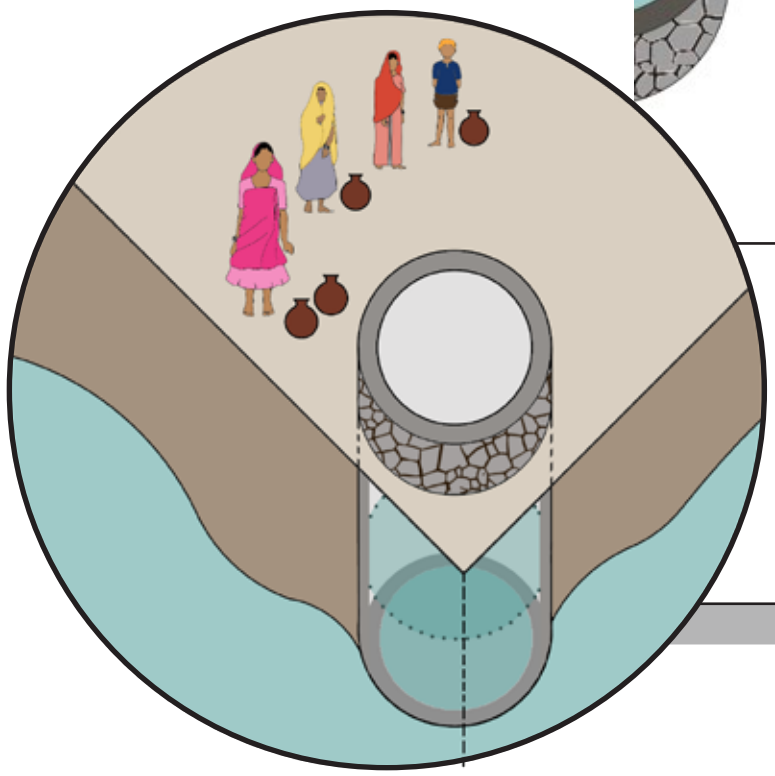
Community

- The community is the owner and the user of the wells and grey water treatment plants.
- They will hold the responsibility of execution, cleaning, and ongoing maintenance.

2 Site study and framing the problem

The technical partners visit the site and conduct a complete assessment of the site along with the NGO Partners. This study is then used to understand and frame the specific problems within the site.



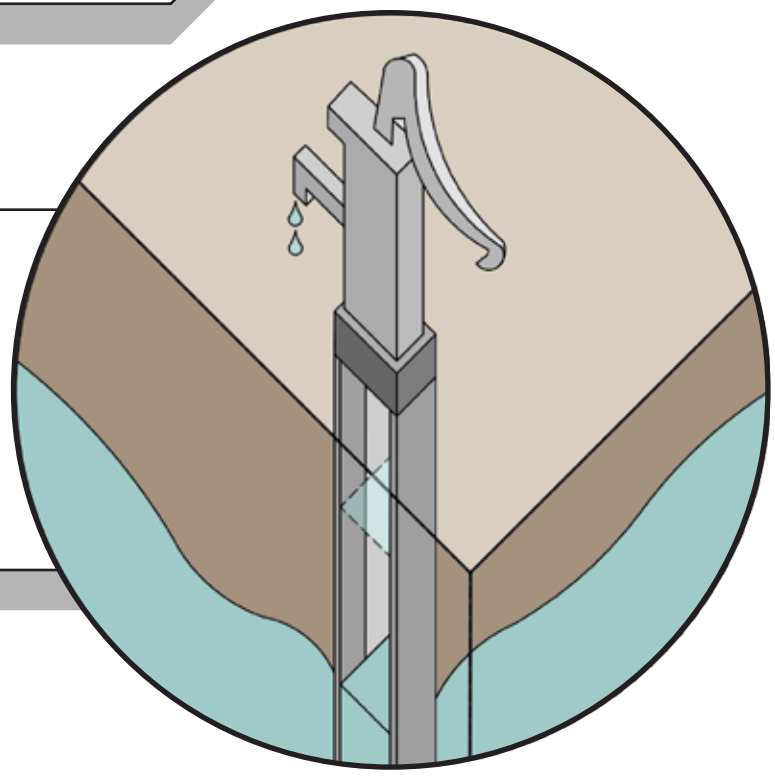


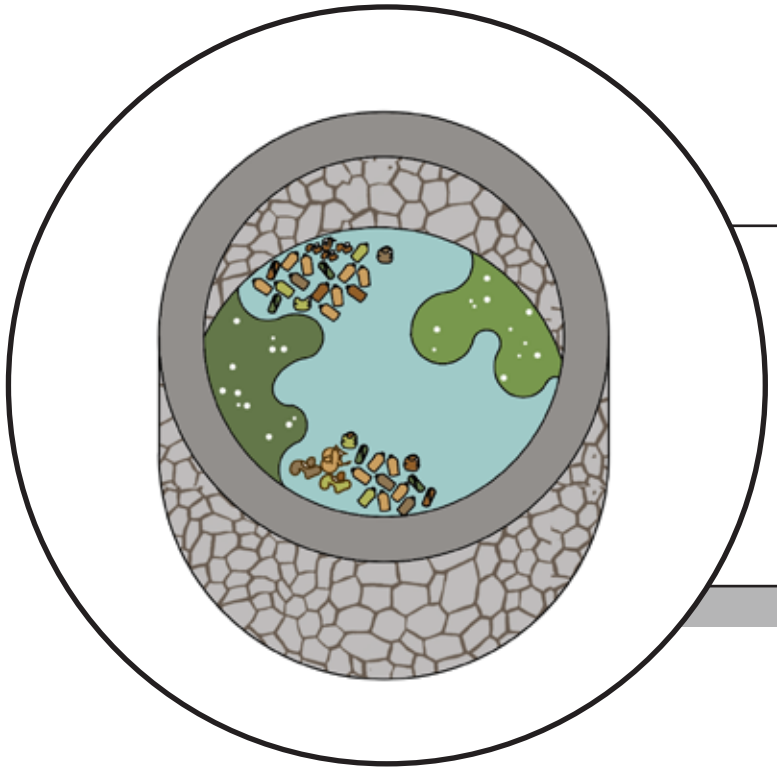
1. Depleted Water Levels

The quantity and quality of water in many wells has reduced over time, with many running dry in the summer.

2. Low Yeild from Handpumps

Over-use of handpumps has reduced their yield and they prove insufficient in the summer.



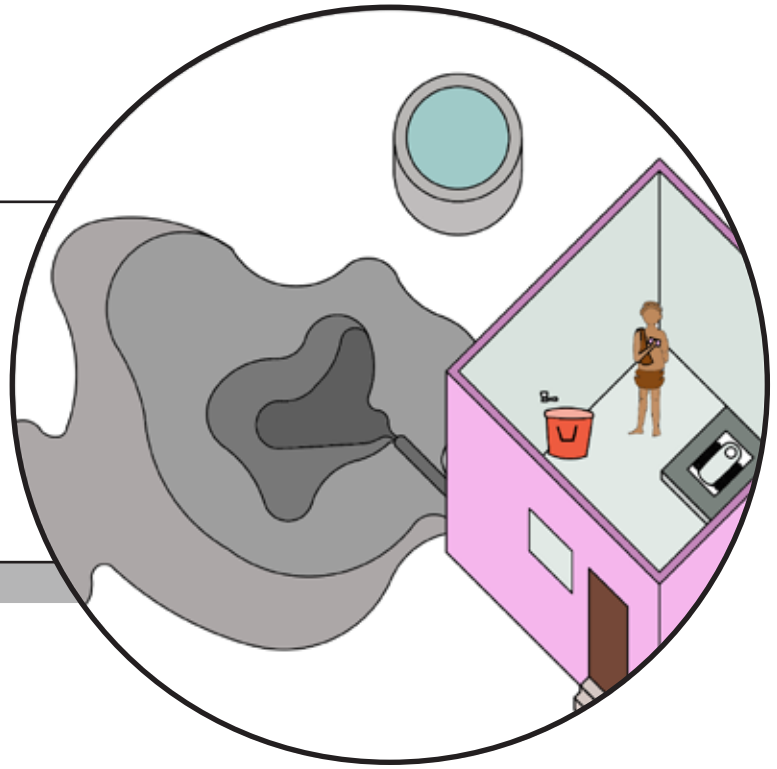


3. Contamination of open wells

Disposal of waste into open wells has led to contamination of the water in these wells.

4. Lack of wastewater management

Unbuilt open drains carry untreated grey and black water downstream, contaminating both surface and sub-surface water sources.



5. Inadequate waste management infrastructure

Insufficient capacity of Sewage Treatment Plants (STPs), inappropriate waste disposal and location of soak pits or STPs near open wells and handpumps has led to contamination of these water sources.

3 Stakeholder Meeting: What is an MOU?

In parallel with the identification of intervention sites and the discussion of solutions to address the issues and concerns of the community, signing of a non-financial Memorandum of Understanding (MOU) is important from various dimensions. The MOU is a legal document that enlists the objectives of the intervention, the duration, key activities and roles undertaken by each of the stakeholders, and the phases of implementation.

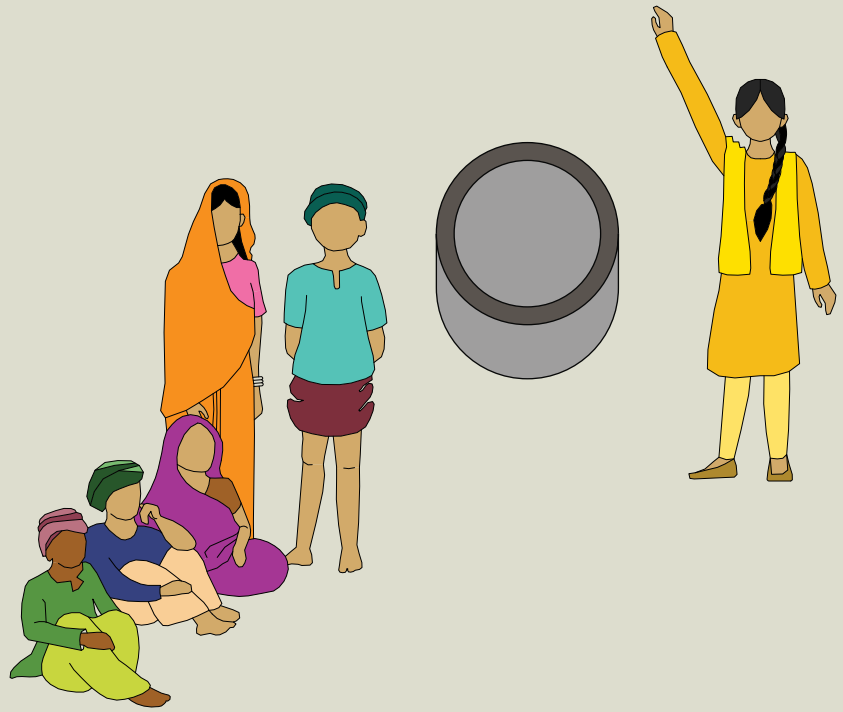
It is recommended that a tri-partite MoU is signed by:

1. The Community as represented by the CAG and the Vikasini
2. The NGO partner: MHT
3. Ward Councillor

This is a necessary first step to formalize the intervention and the relationships between the stakeholders, as well as to fix accountabilities through defined roles and responsibilities. In achieving this, the MoU serves the additional purpose of bringing in a sense of ownership (of the intervention process and the well) among the community.

Stakeholder meetings in the community

3A Identification of Intervention Sites



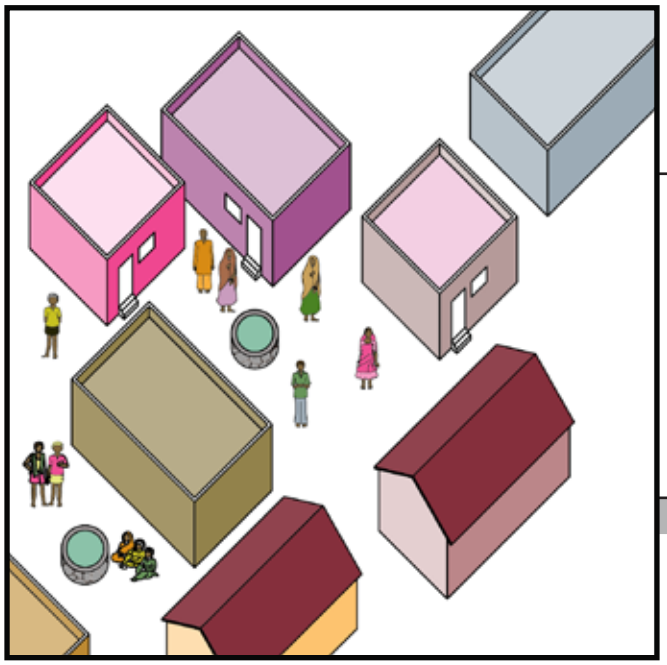
Step 1 Identification of intervention sites

Step 2 Identification of wells

Step 3 Identification of grey water treatment site

3A Step 1: Site and Community Identification Criteria

The specific sites for intervention were chosen keeping in mind certain parameters. These parameters help narrow down the area of intervention to the most suitable locations within the settement.

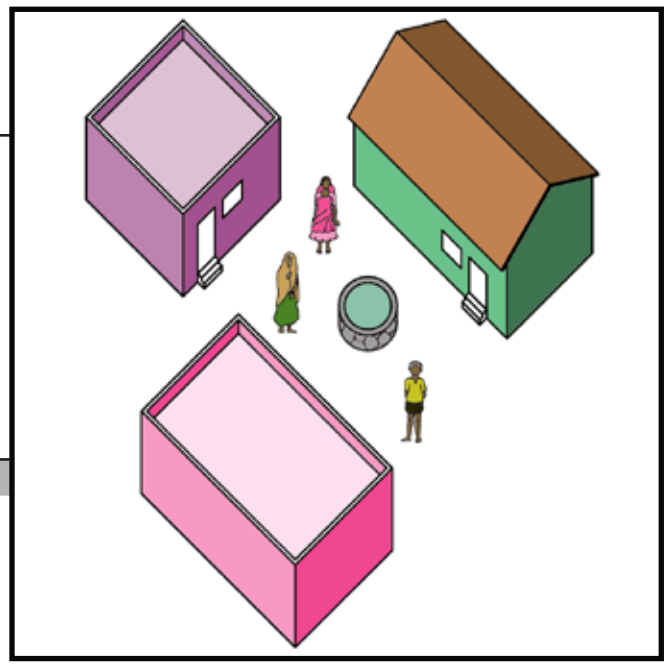


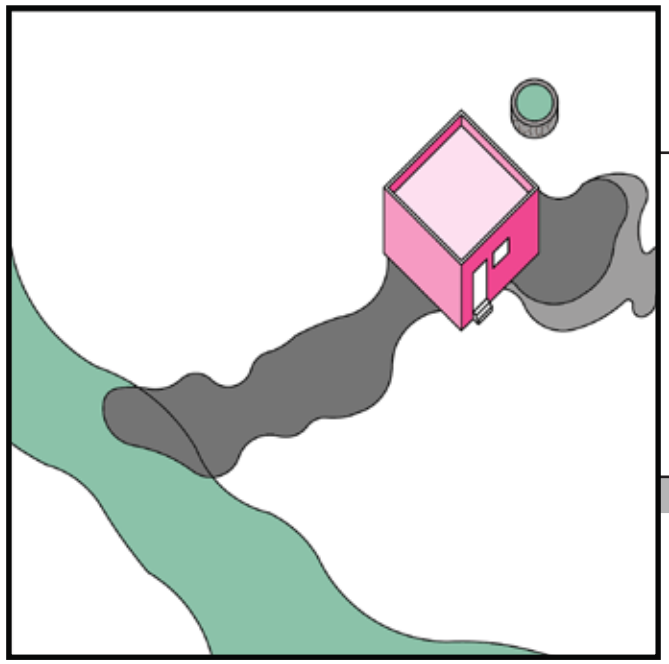
1. Accessibility

The site is easily accessible to the community for use.

2. Usage

At least 3 households use the well, and there is high to medium dependency on the open well water within its vicinity.



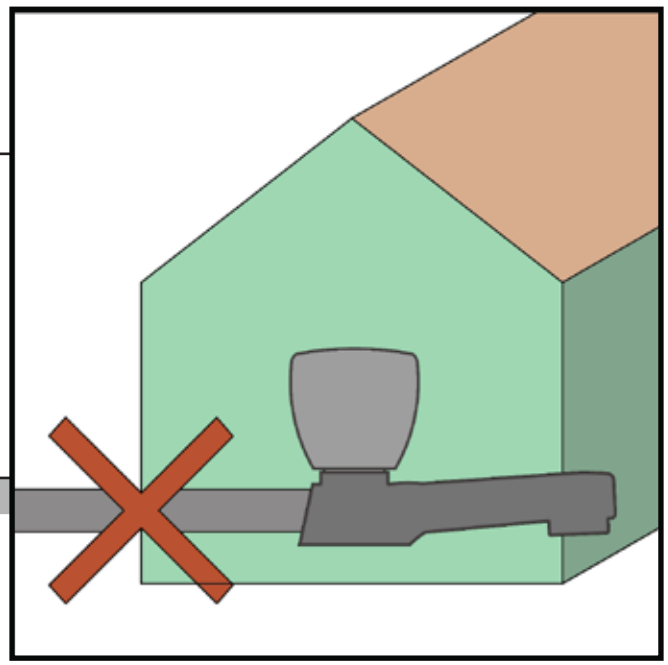


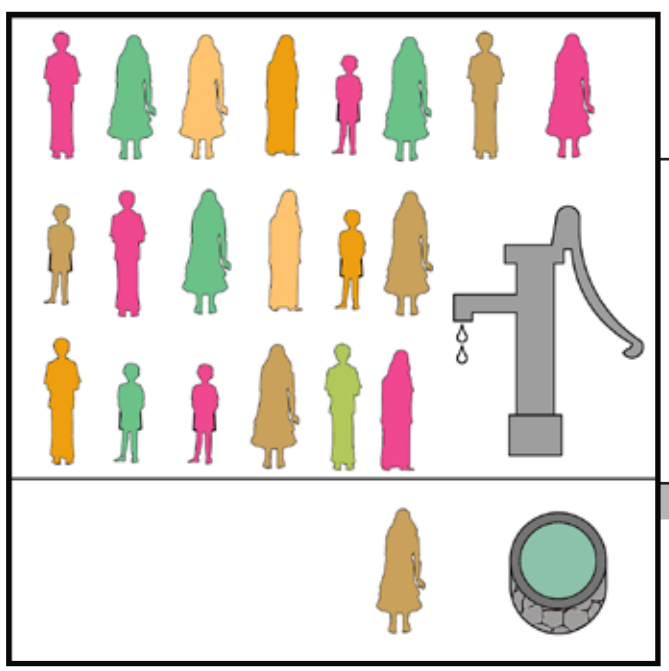
3. Lack of wastewater treatment facilities

The settlement faces high levels of ground water contamination.

4. Lack of municipal water supply

The sites do not receive piped water connection.



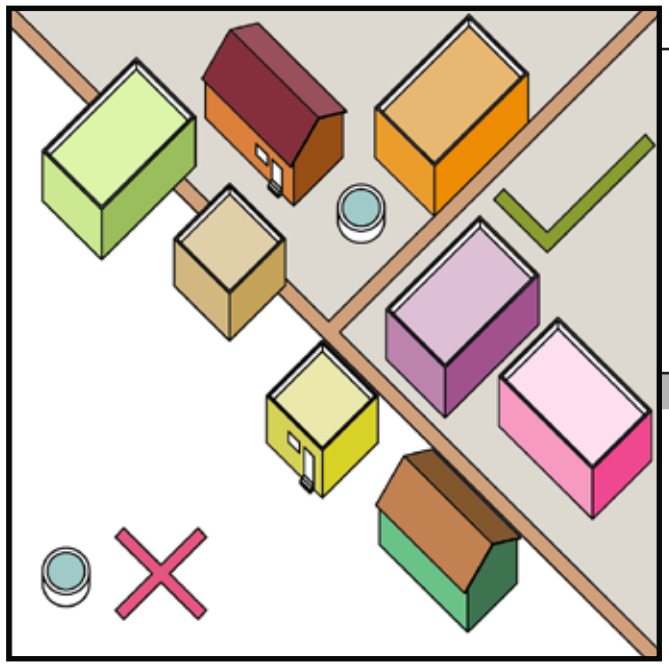


5. Reliability on handpumps

The sites are highly dependent on handpumps for their water requirements, but the handpumps have low yield.

3A Step 2: Well Identification Criteria

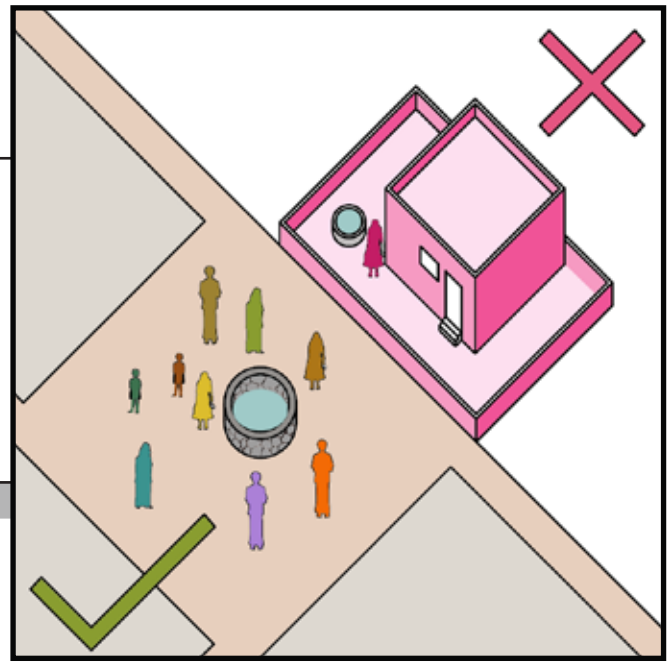
The wells to be restored were selected based on certain parameters. These parameters help shortlist the wells that are most suitable for intervention within the settement.



Accessibility

The identified well is easily accessible to the community for use.

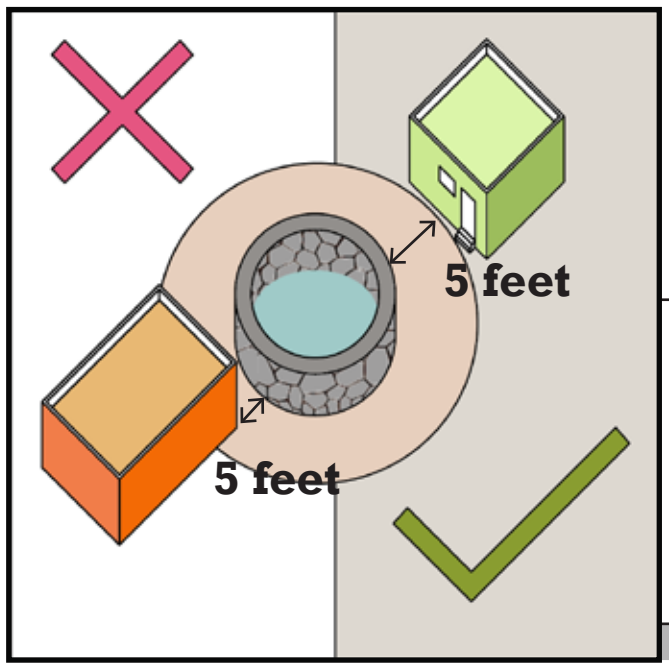
1.



Usage

The well is on village common land/ Govt. land and not within private property. If within private property, the owner of the well should agree to let other families use the well. This can be inserted as a clause in the MoU.

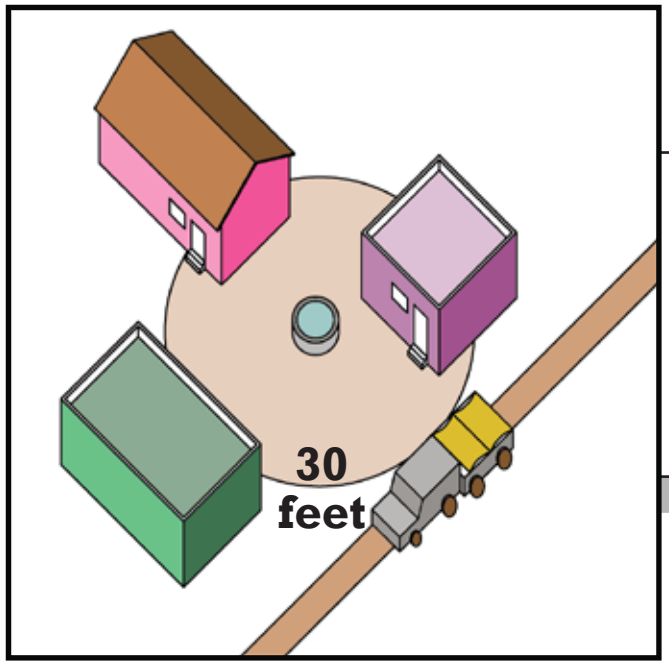
2.



Clearance

No house sits within 5 feet from the edge of the open well.

3.



Vehicular Access

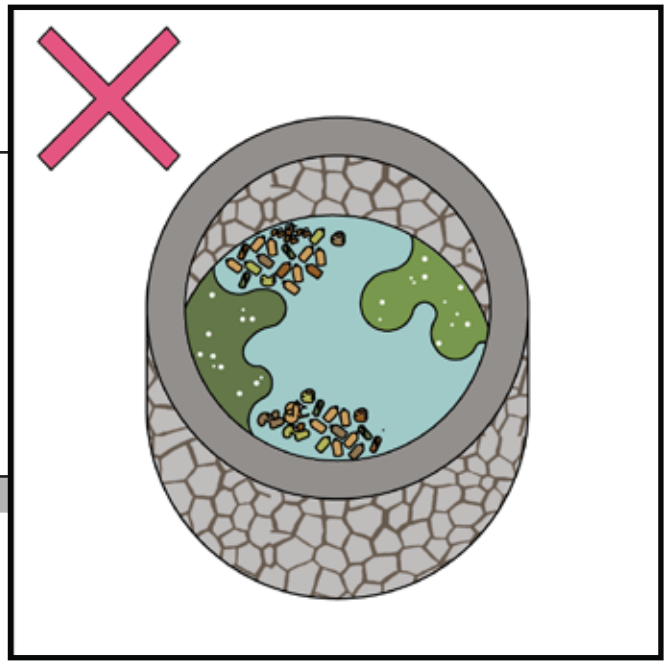
A tractor or tempo can have access up to at least 30 feet from the well, for construction or maintenance purposes.

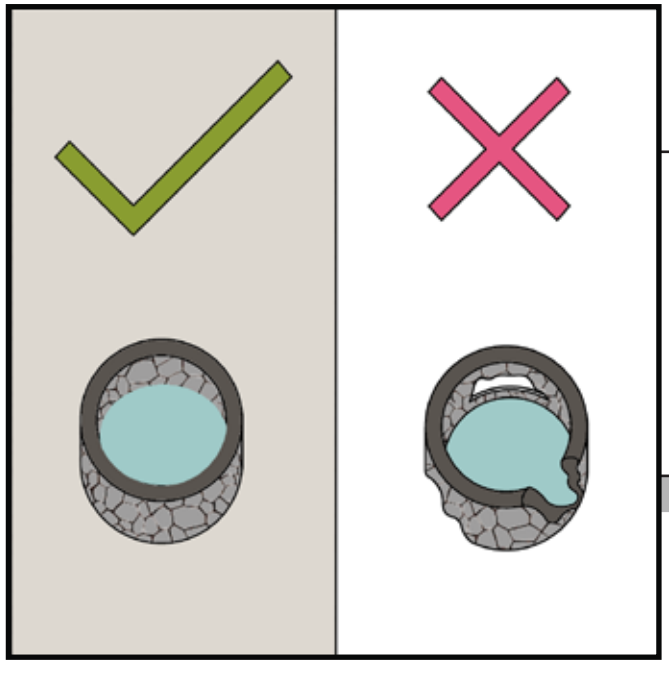
4.

5.

Contamination

The well is not polluted by black water and large amounts of garbage.





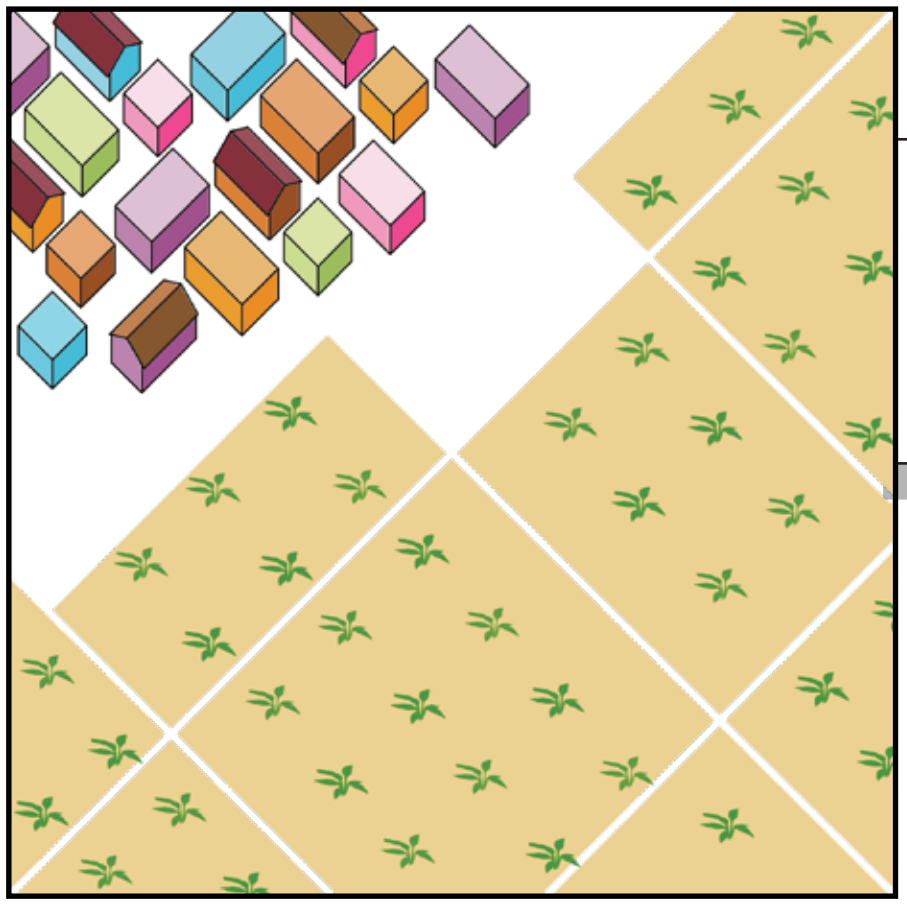
Physical condition

The walls of the well have not collapsed, or the well is in a repairable condition.

6.

3A Step 3: Grey Water Treatment Site Identification Criteria

The site for grey water management was selected based on certain parameters. These parameters help identify the most suitable location for the system within the settement.

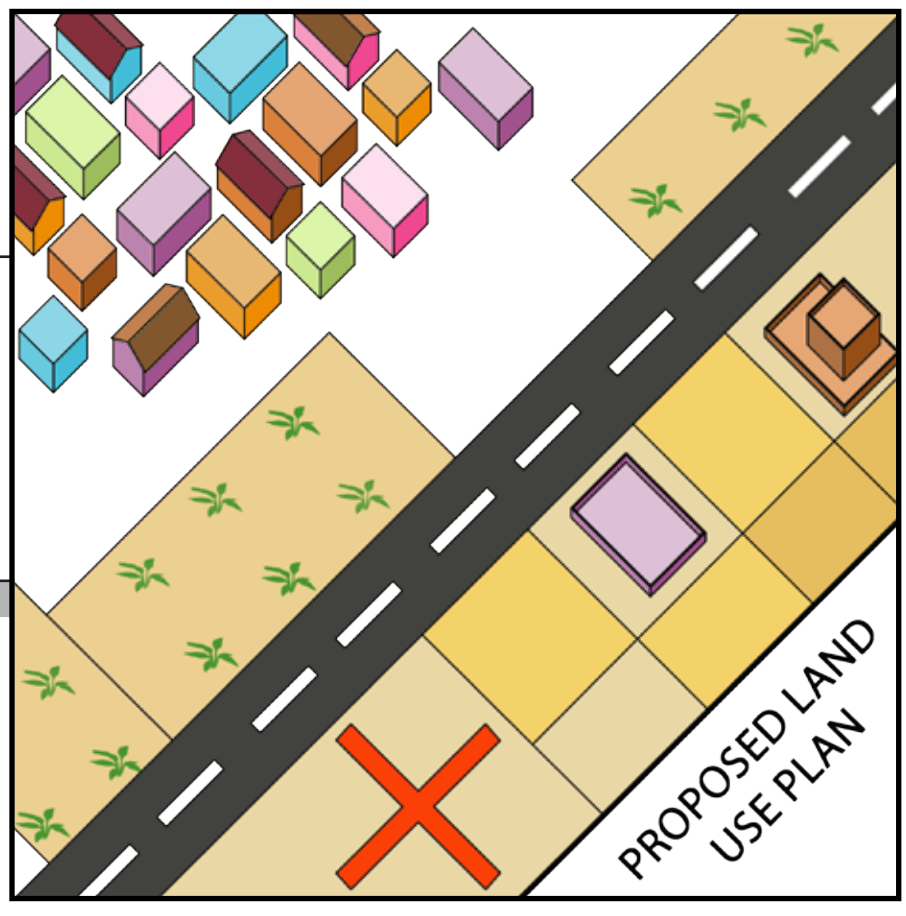


1. Location

The site is located along the outskirts of the settlement, away from areas with frequent movement and use.

2. Land use

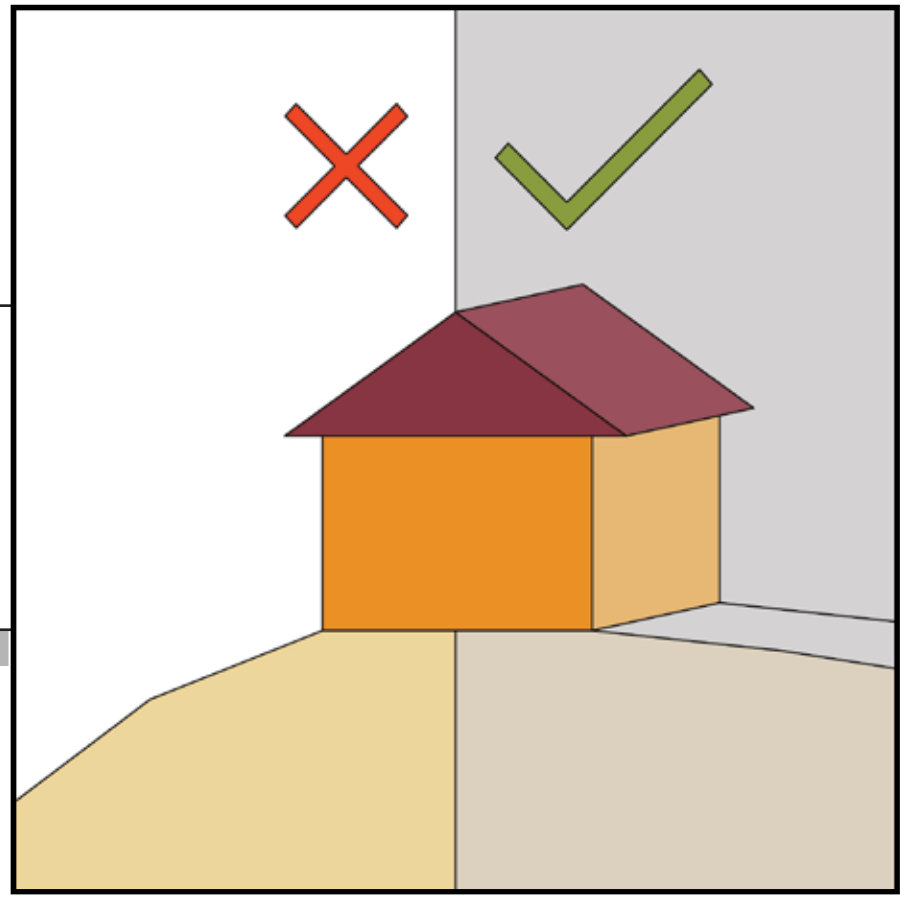
There are no future developments, including roadworks, proposed for the identified site.

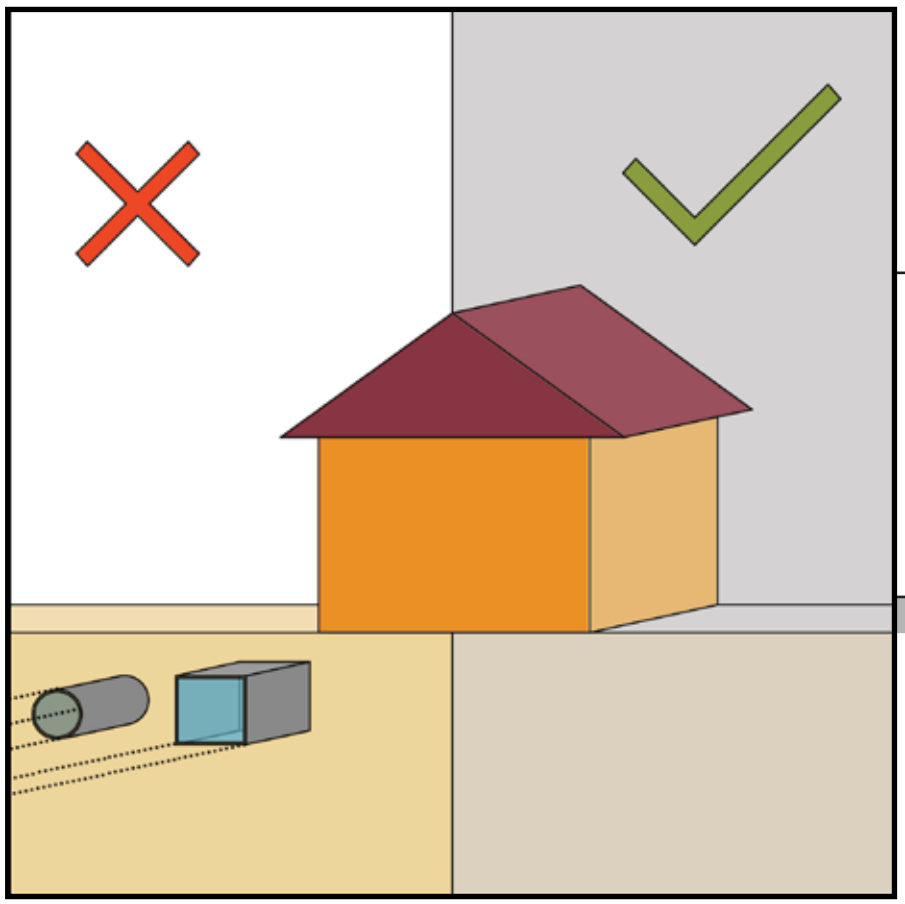


3.

Topography

The site is not steeply sloped, as it becomes difficult to regulate the flow of water.





Existing infrastructure

There is no existing infrastructure within the site that will come in the way of any excavation work.

4.

3 Stakeholder Meeting: Framing the MOU

The framing of the MoU is based on mutual agreement among all the stakeholders involved, and involves the steps listed below:

Stakeholder meetings in the community

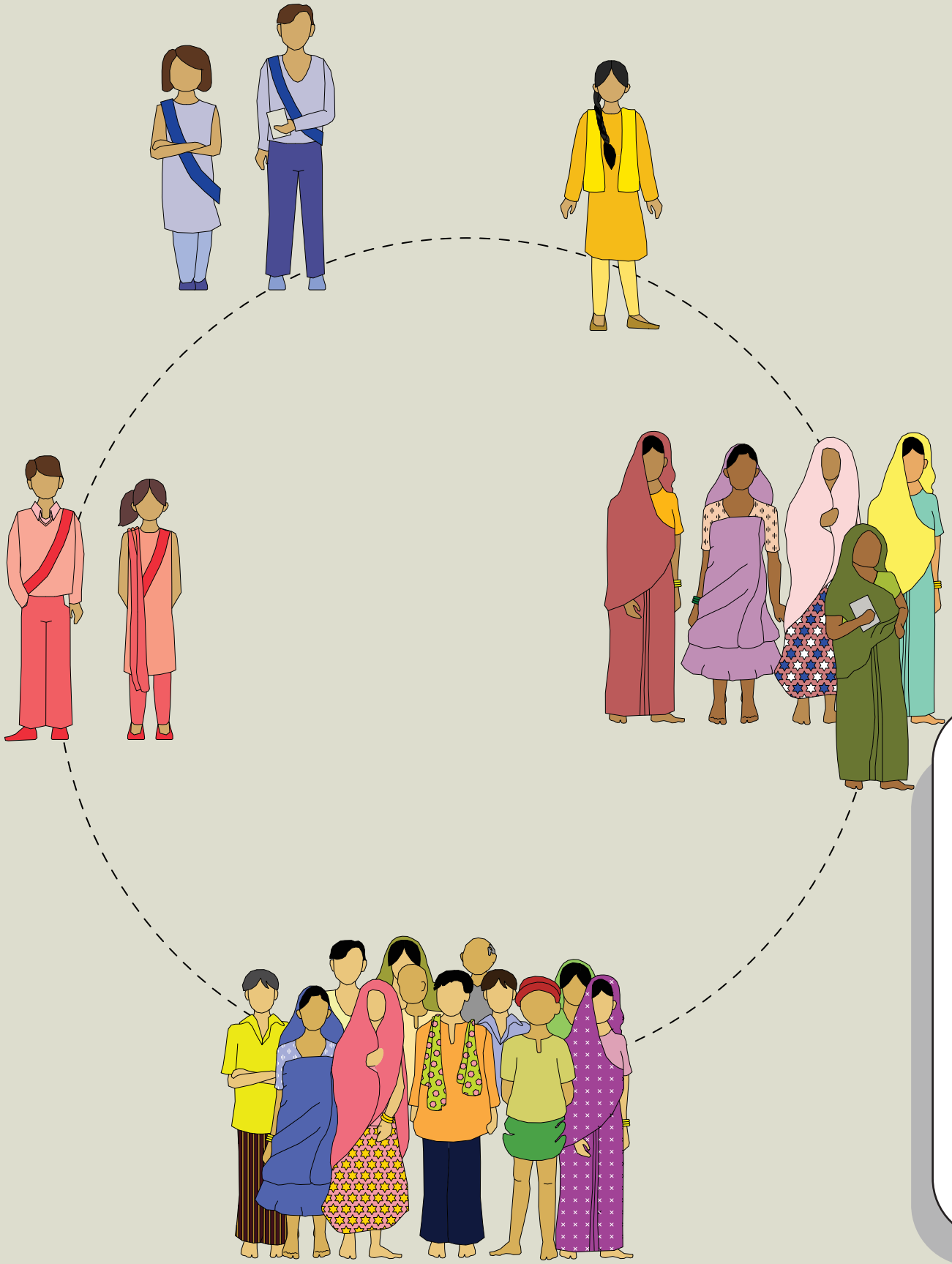
Step 1 – Defining the communities and households impacted

The MoU will define the active stakeholders (well owners & consumers) to engage in awareness and training, partnerships and mobilization and to ensure efficient implementation and operation of the proposed interventions.

Step 2 – Discuss the purpose of MoU with stakeholders

The MoU will discuss the details of the preparation and implementation process, as well as the operation and maintenance work post-intervention.

3B Discussing Solutions



Restoring and reviving open wells

The community open dug wells are the best means to ensure freshwater supply. If all the rainwater and local water flow within a settlement is allowed to percolate into the soil and be stored, the wells will have water. The proposed system also filters garbage, debris and other pollutants from the rainwater and surface water before it enters the soil and the well.

Surface runoff water management – storm water & grey water

The nature of surface runoff (either storm water or grey water) within a settlement may fall into two broad categories: in an un-built kachha (open) drain along a linear street, and surface drainage from a cluster of houses. A gravity-based cascading system is proposed to allow greater percolation of water while avoiding contamination.

Step 3 – Secure ownerships and partnerships and agree upon roles and responsibilities

The MoU will point out the roles and responsibilities of the community, CAG, NGO Partner and councilor in the implementation and support phases. At this stage, it becomes important to emphasize that it may take up to a year to see the impact of the proposed solutions, and to discuss the risks and challenges that may be encountered during the process.

3 Stakeholder Meeting: Signing the MOU

Once all stakeholders have read and agreed upon the contents of the MoU, it is signed by all stakeholders. After the signing, it becomes important to mobilize the community to read the MoU together to understand its contents and purpose.

Sample MoU between Bara Ghaghra (Jagran Toli CAG) and MHT

A. Signatories of the MoU: Jagran Toli CAG and MHT

Approximately 90 families reside in the Jagran Toli of Bara Ghaghra. These families are largely dependant on community wells for domestic uses. Bara Ghaghra has 2 Community Action Groups (CAG) in which women from the Jagran Toli are also members. The water quality in the area was tested and the women were informed about the poor quality of water and associated health hazards.

B. Context

Jagran Toli has two community wells which provide water for approximately 30 to 40 households in the vicinity. In addition, there are several handpumps (deep bores) in the settlement which supplement the water requirements in the area. While the former have water, although non-potable in recent times, the handpumps are either non-functional or dry. Consequently, the water stress in the area and its communities is high. There is a proposal to recharge, repair and clean the two wells and the immediate vicinity before the onset of monsoon. It is proposed to do this in partnership with the households that are dependent on the wells and the CAG representatives. In addition, a decentralised grey water management intervention is designed for a section of an open drain channel in Jagran Toli.

C. Objectives

1. Recharge, repair and manage the two community wells in Jagran Toli (Location shown in Annexure 1). The work is divided into two phases: a) preparation and construction, and b) operation and maintenance
2. Manage the grey water in Jagran Toli (Location shown in Annexure 1)
3. Increase the water table in the area
4. Equip the households to understand the process involved and their roles and responsibilities in keeping the wells clean and managing the grey water channels in the area

D. Duration of the MoU:

February 2020 to July 2023

E. Key activities: Phase 1: Preparation and Construction

MHT, INDE and CAG / communities

1. Identifying the wells and location
2. Number of households serviced and purposes for which water is used from the wells
3. Quality / potability of water
4. Designing interventions to recharge and repair the wells
5. Demonstration of the work in the Pilot settlement

Key Activities: Phase 2: Operation and Maintenance

CAG and Communities with handholding by MHT

1. Before the monsoon, the wells are to be cleaned by the CAG and the community under the observation of MHT.
2. Before the monsoon, the CAG women volunteers and the community will determine the quality of water and the level of water in the wells under the observation of MHT.
3. The CAG women volunteers will collect Rs.10 per month from all those who use the well and deposit the collected amount in a bank account operated at the behest of the community. This amount will be used for the maintenance of the wells.

4. MHT and INDE will create and provide a poster / sign boards with instructions explaining how the wells are to be used.
5. The individuals in the community will use and draw water from the wells as per the requirements of the larger community.
6. The responsibility of cleaning and maintenance of these wells will lie with the members of the settlement and the women who use it every day.

F. Role of MHT / Technical Partner

1. INDE shall guide the settlement-level implementation, including initial surveys, identification of suitable sites for interventions, and guiding the community in the construction of the interventions.
2. INDE shall provide the parameters for the process of documentation of pre-intervention site conditions and post-intervention conditions.
3. MHT shall allocate a dedicated team to be responsible for the entire process of initial surveys, identification of suitable sites for interventions, working with INDE for the construction of the interventions, as well as documentation.
4. MHT shall identify community members from Bara Ghaghra who will work with INDE to build the settlement-level interventions.
5. MHT shall be responsible for the process of documentation of pre-intervention and post-intervention site conditions.

G. Role of CAG and communities

1. The CAG and community shall conduct initial surveys to assess the quality and potability of water in the intervention sites, under the guidance of MHT.
2. The CAG and community shall identify and mobilize members to build the settlement-level interventions.
3. The CAG and community shall be responsible for the operationalisation of a bank account and shall ensure regular cleaning and repair of the wells is conducted.

H. Risks and Challenges Involved

1. Resistance from the community to any intervention due to misinformation or high dependence on borewell water supply and lack of trust in alternate systems.
2. Land encumbrances and disputes faced during the intervention process.
3. Constraints faced in coordination, labour mobilisation, procurement of material and in availing funds for the implementation process.
4. Risk of contamination of sites from known or unknown sources.
5. Risk of closure of the system, or damage to the systems installed.

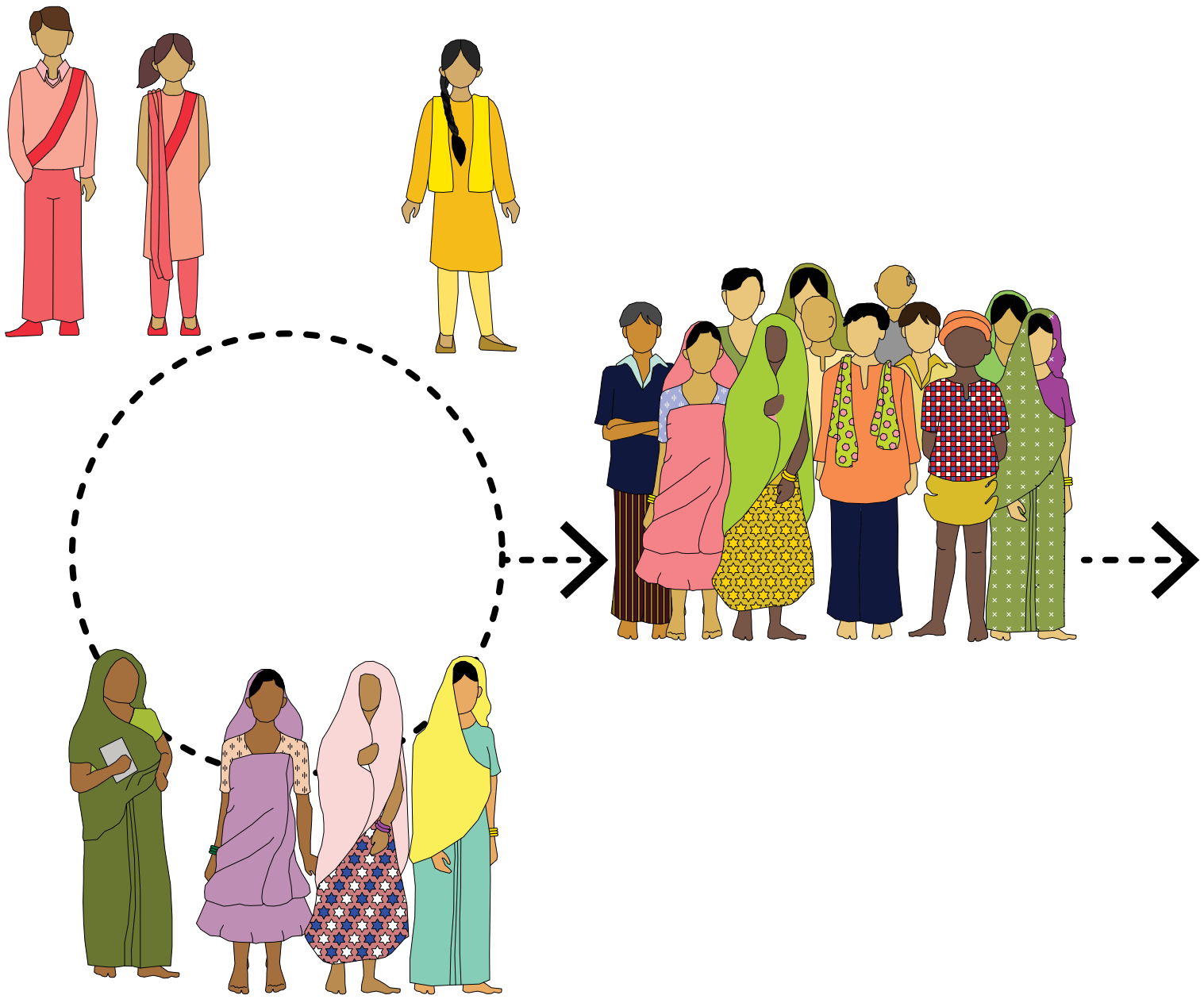
Signatures:

1. Councillor
2. Community Representatives (2 persons)
3. MHT Representative

Stakeholder meetings in the community

4 Opening the bank account

The CAG volunteers will regularly collect funds from the households that use the well. The collected amount will be deposited in a bank account operated at the behest of the community. This amount will be used for cleaning and maintenance of the wells.



5 Shortlisted Wells

Based on the well identification criteria, the following wells were selected for restoration.

A. Dangdang Well

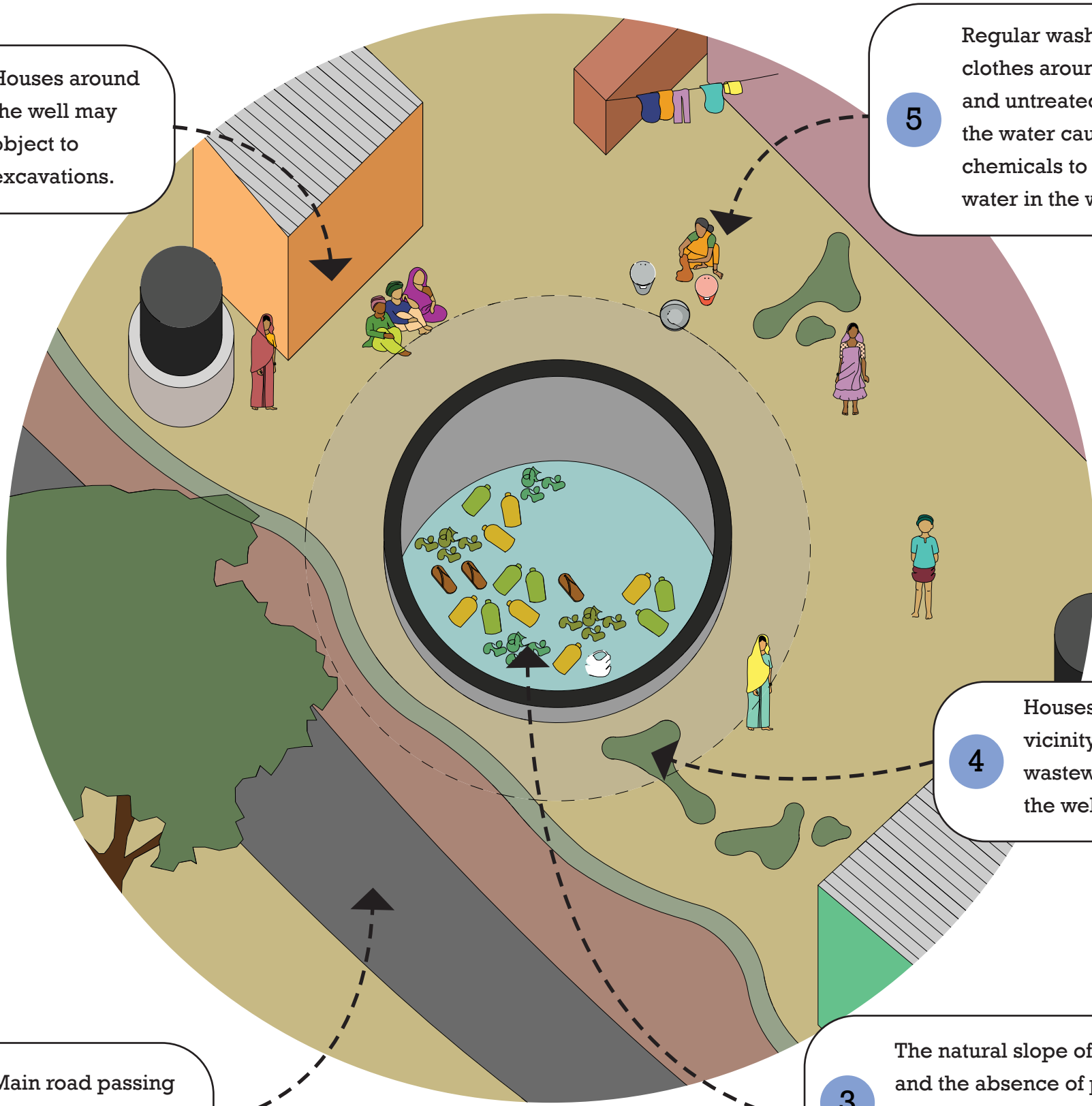
B. Mahto Well

C. Government Well

D. Gopal Well

5 A. Dangdang Well

Concerns



1 Houses around the well may object to excavations.

2 Main road passing very close to the well.

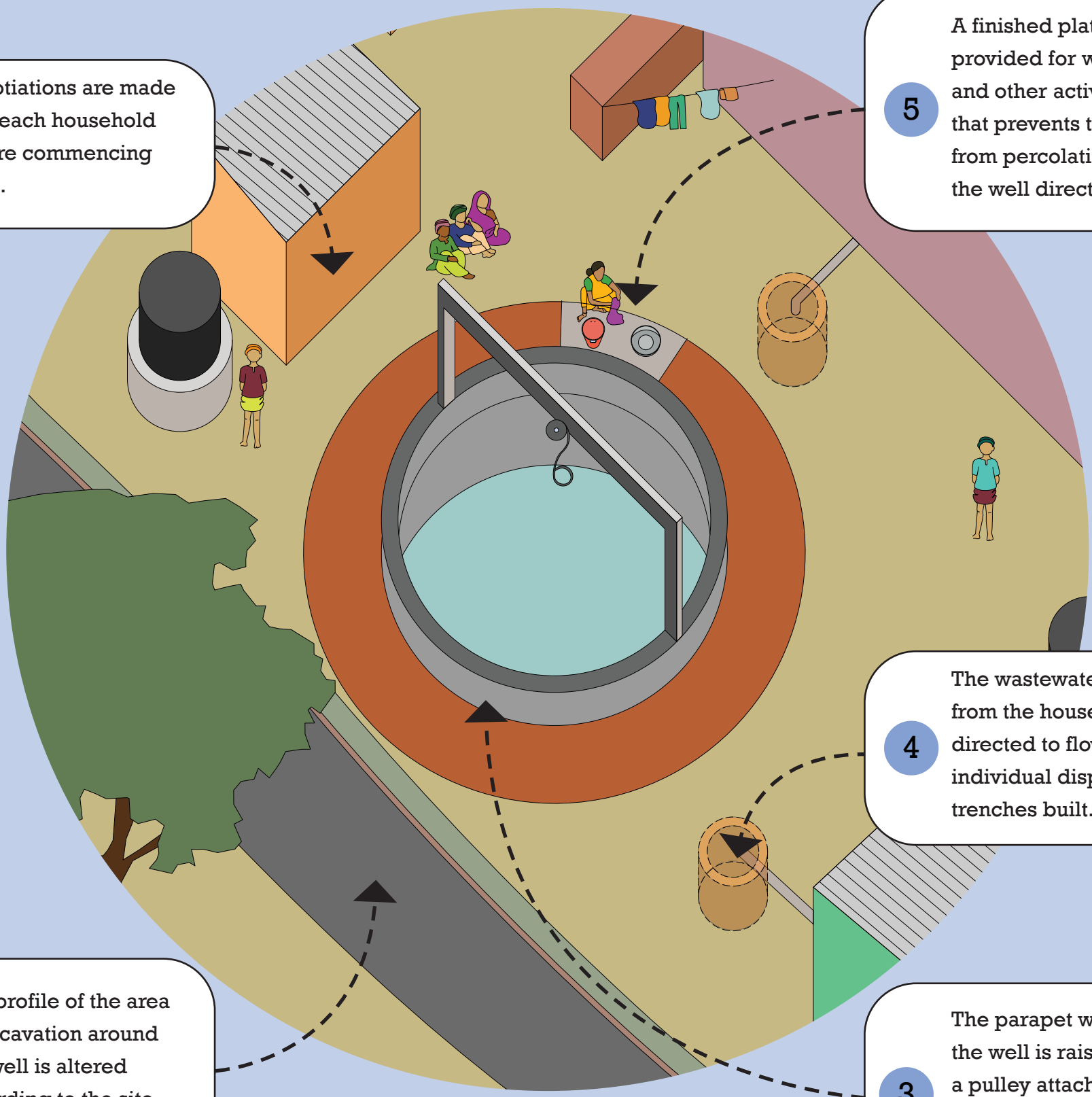
3 The natural slope of the land and the absence of proper drainage channel brings a lot of garbage with flowing water.

4 Houses in the vicinity drain their wastewater into the well untreated.

5 Regular washing of clothes around the well and untreated disposal of the water causes harmful chemicals to pollute the water in the well.

Solutions

1 Negotiations are made with each household before commencing work.



2 The profile of the area of excavation around the well is altered according to the site availability.

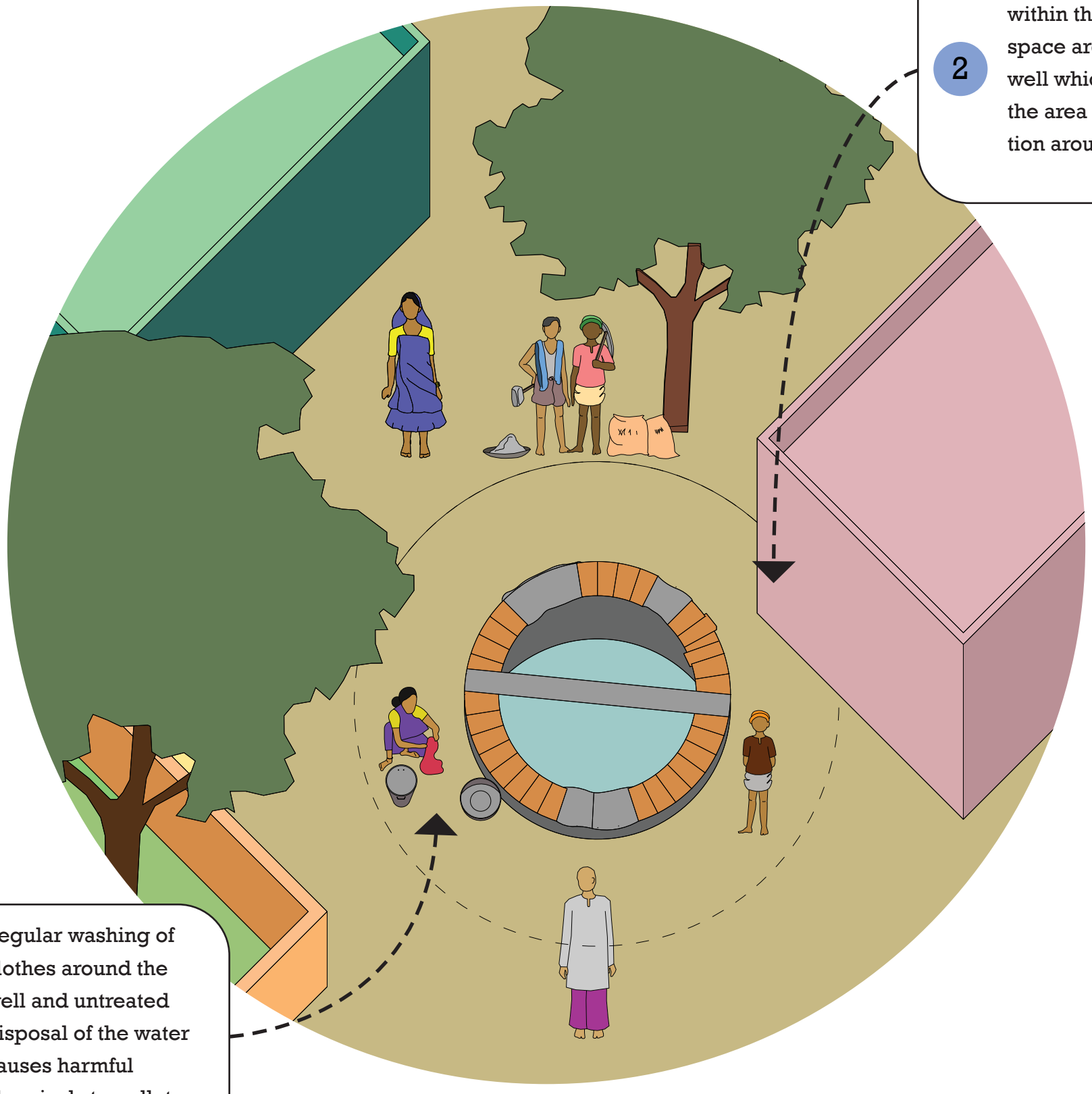
3 The parapet wall of the well is raised and a pulley attached to allow water to be removed safely.

4 The wastewater outlets from the houses are directed to flow into individual dispersion trenches built.

5 A finished platform is provided for washing and other activities that prevents the water from percolating into the well directly.

5 B. Mahto Well

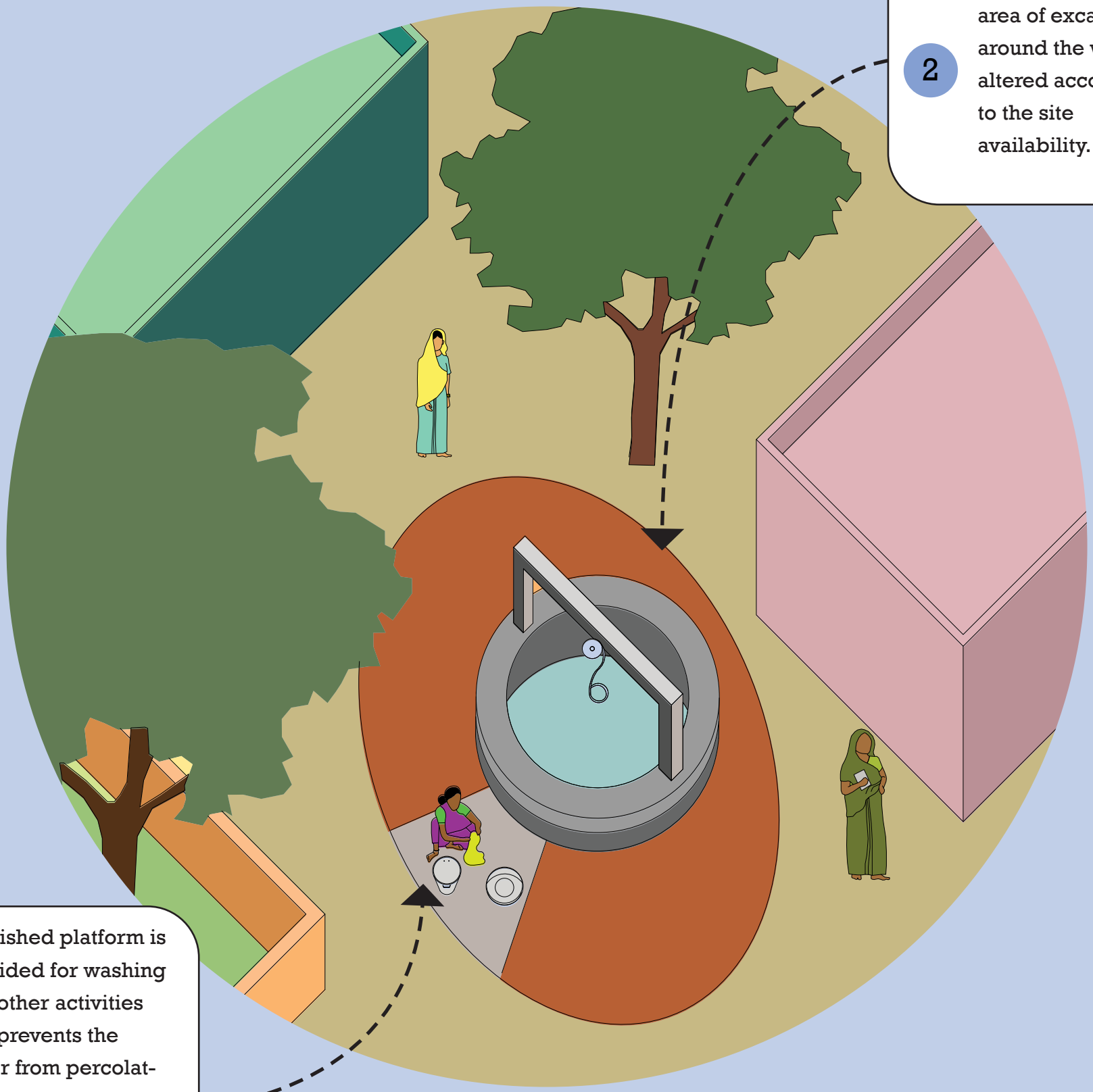
Concerns



2 A house is located within the 5 feet space around the well which affects the area of excavation around the well.

1 Regular washing of clothes around the well and untreated disposal of the water causes harmful chemicals to pollute the water in the well.

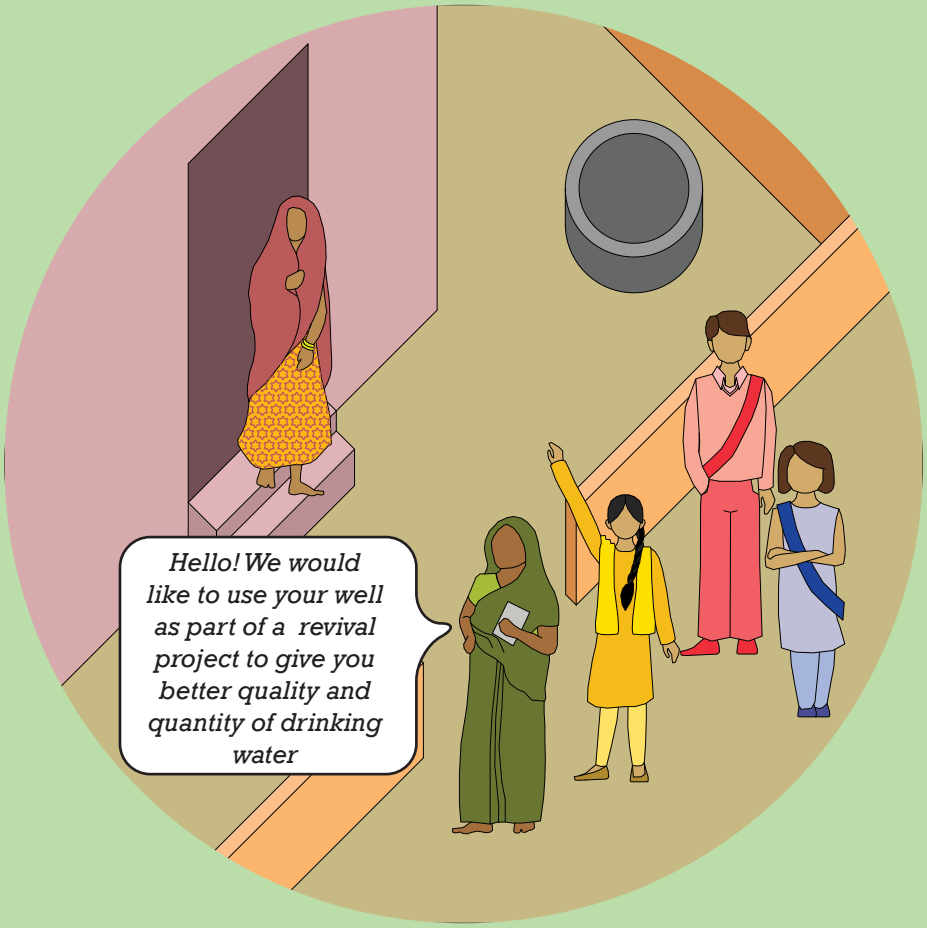
Solutions



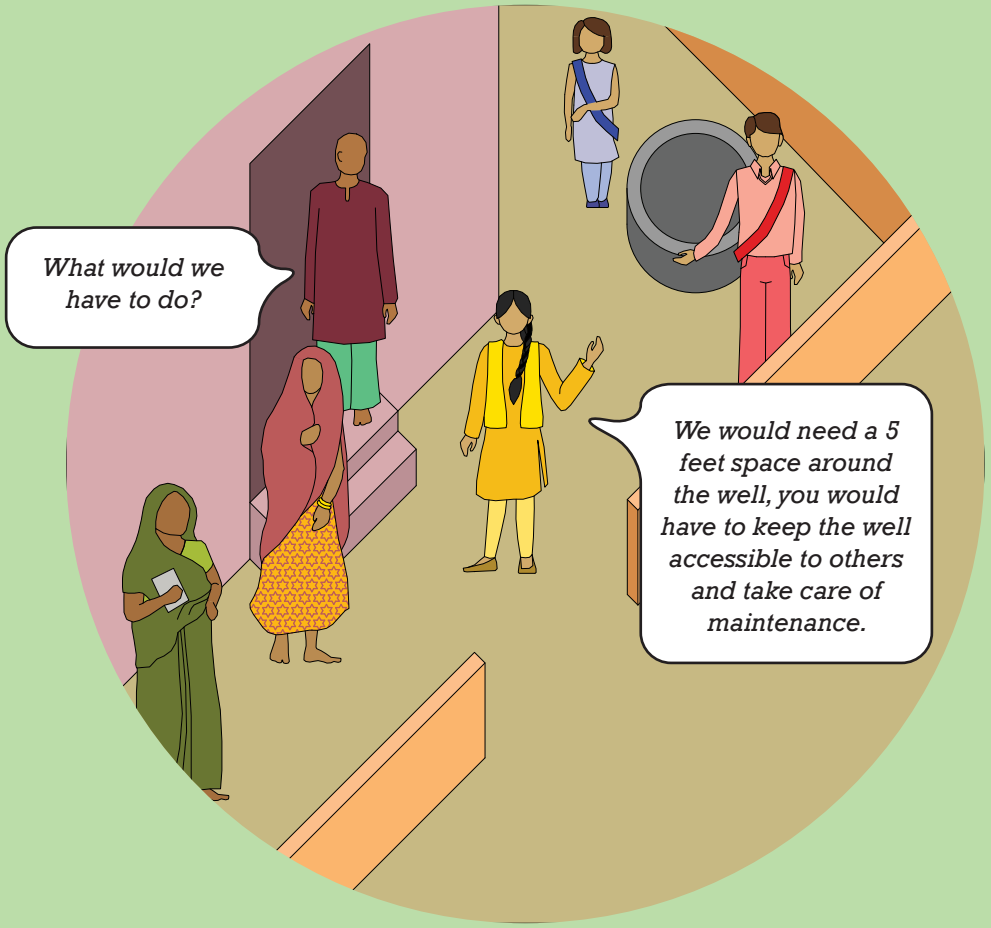
2 The profile of the area of excavation around the well is altered according to the site availability.

1 A finished platform is provided for washing and other activities that prevents the water from percolating into the well directly.

Negotiations during well selection

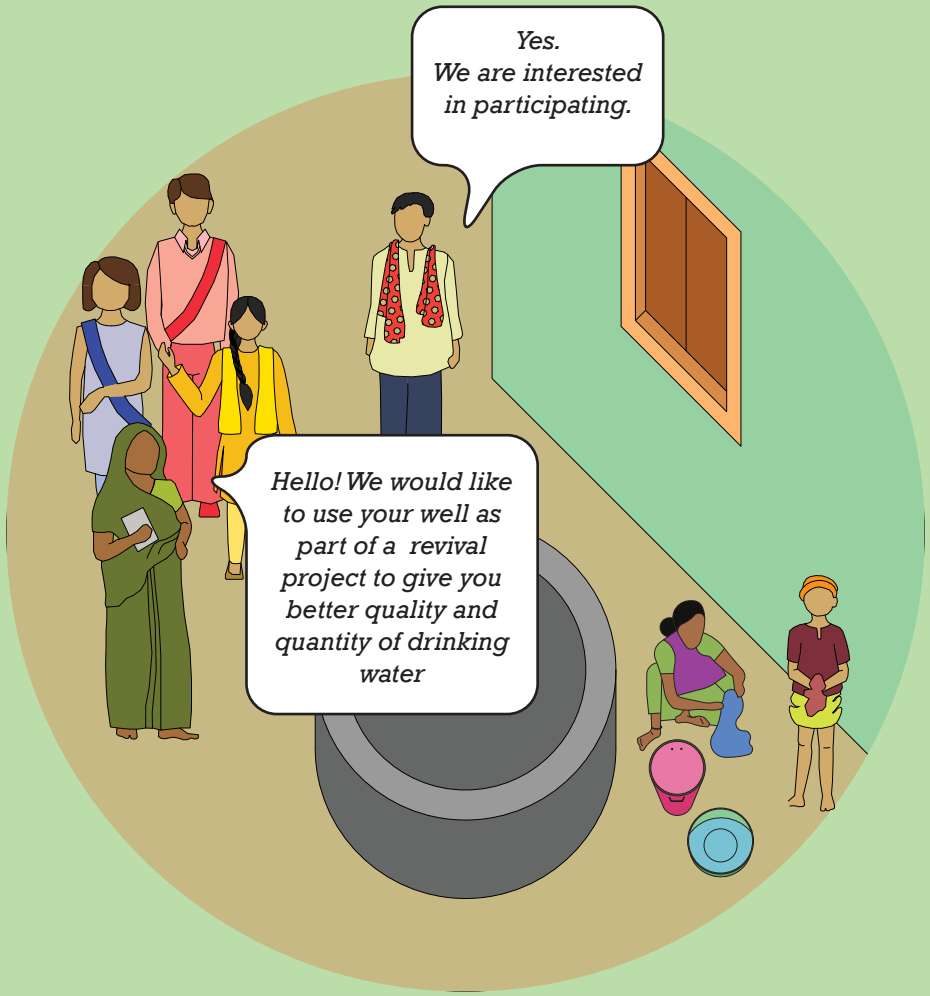


The NGO Partner along with the technical partner and community representatives approached all the households with suitable wells for intervention.



They discussed the procedure and the rules for maintenance that had to be followed post intervention.

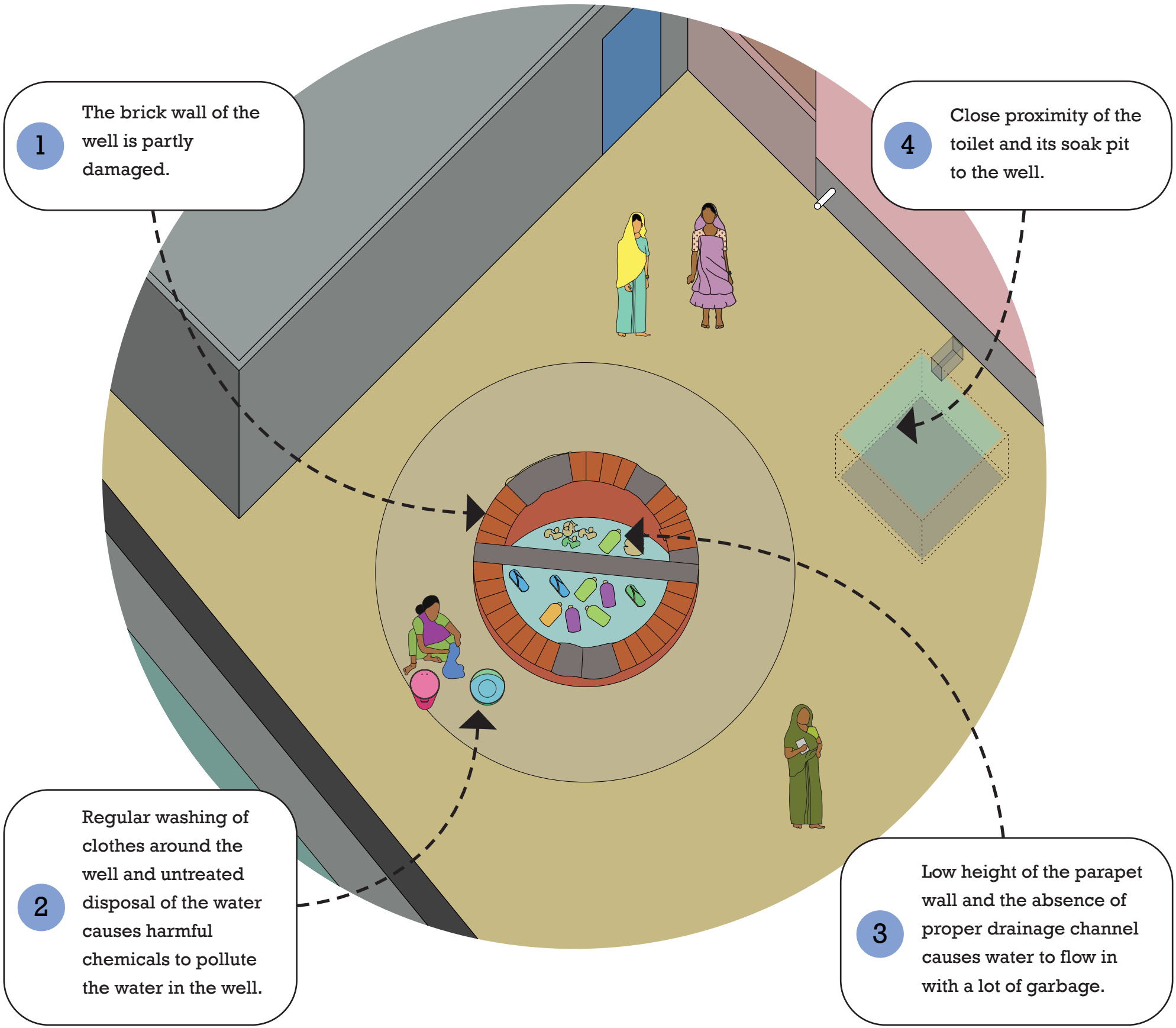
The owners of some wells denied permission and refused to be a part of the pilot project for their own personal reasons.



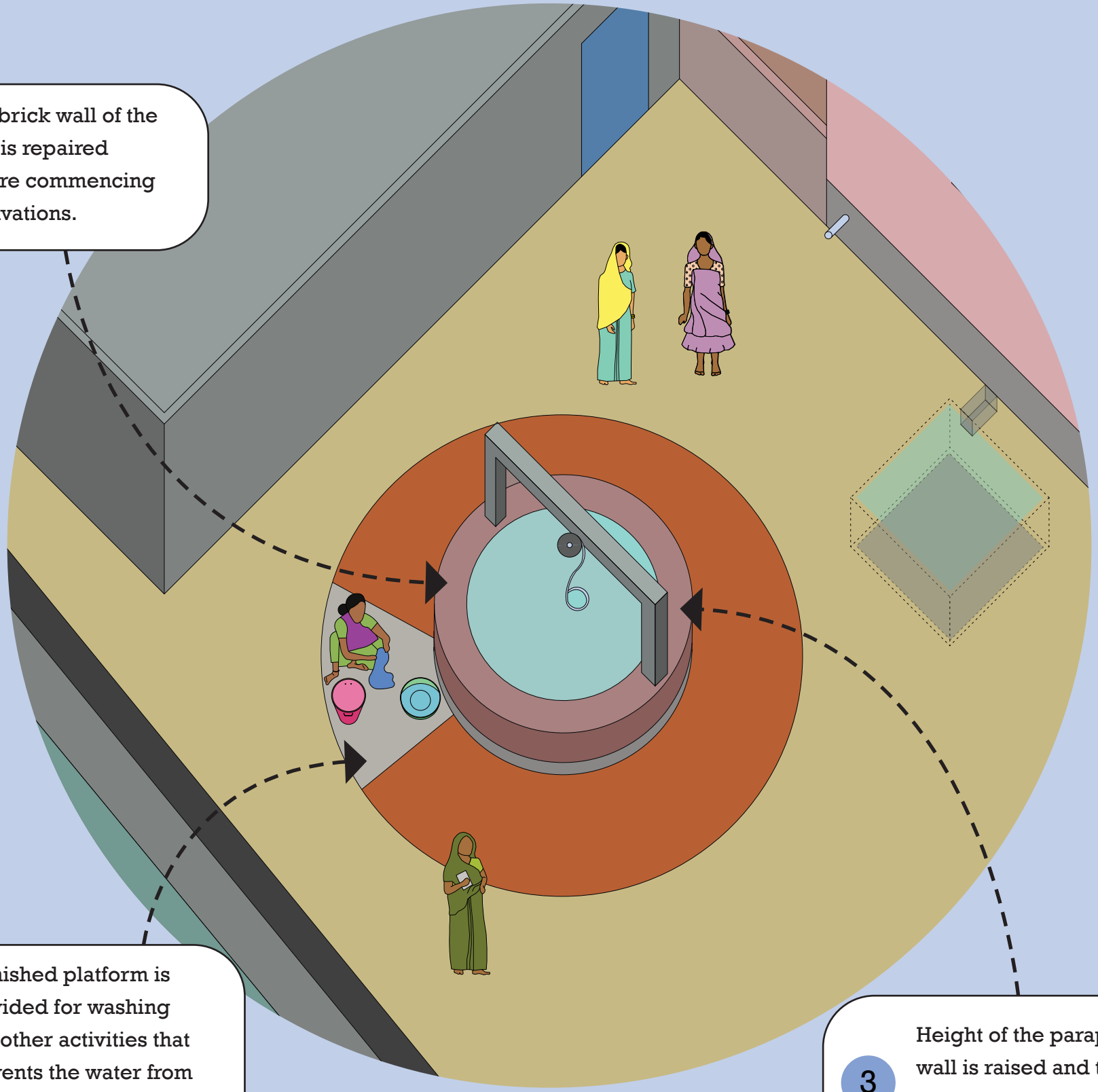
The NGO partner, technical partner and community representatives then found other wells and negotiated with the members of the community who would consent to the procedure.

5 C. Government Well

Concerns



Solutions



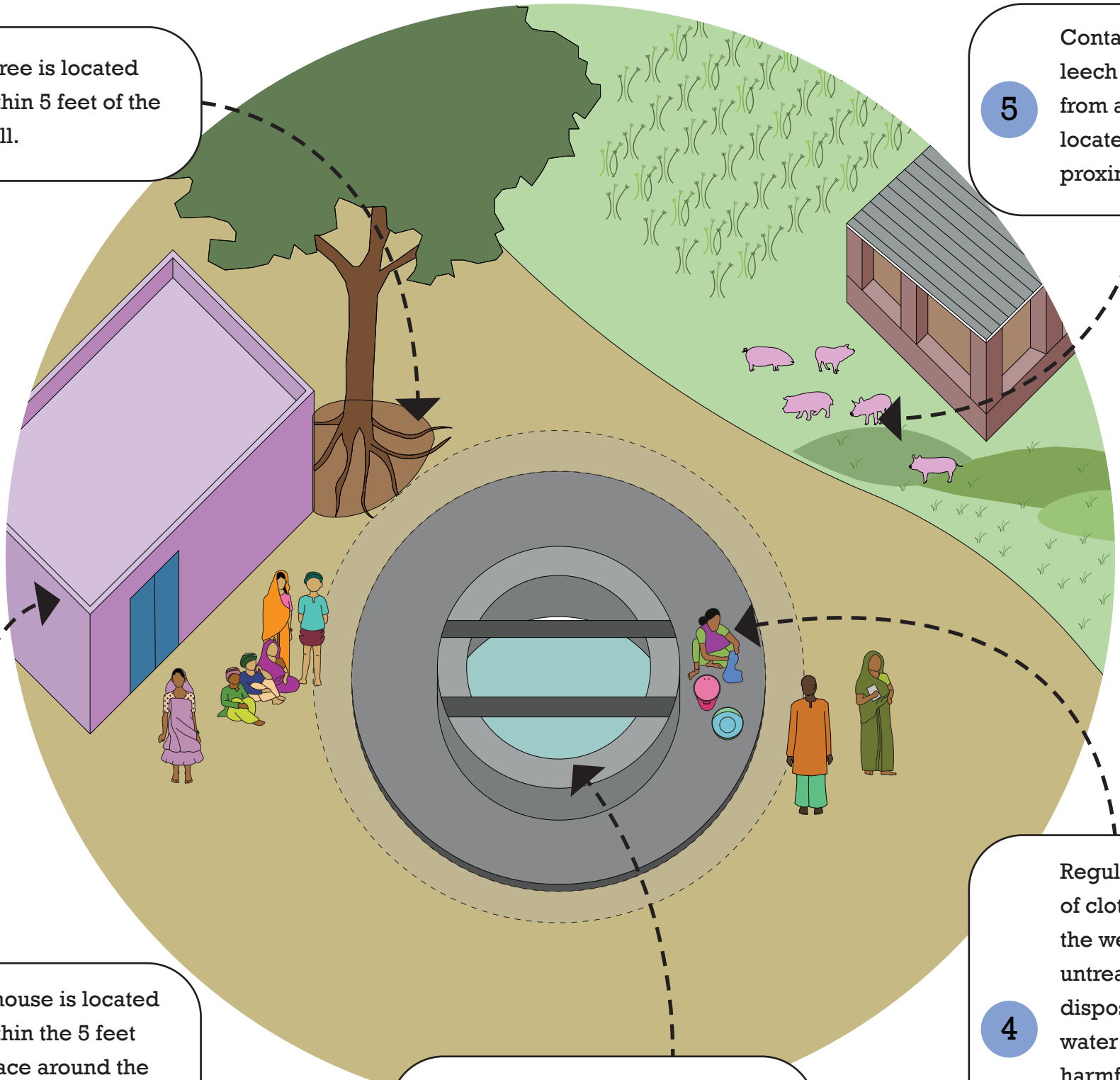
1 The brick wall of the well is repaired before commencing excavations.

2 A finished platform is provided for washing and other activities that prevents the water from percolating into the well directly.

3 Height of the parapet wall is raised and the grey water channels are diverted around the well.

5 D. Gopal Well

Concerns



1. A tree is located within 5 feet of the well.
2. A house is located within the 5 feet space around the well which affects the area of excavation around the well.
3. The well is made of stone masonry and may cave in during excavations.
4. Regular washing of clothes around the well and untreated disposal of the water causes harmful chemicals to pollute the water in the well.
5. Contaminants leech into the well from a pig sty is located in close proximity.

Solutions

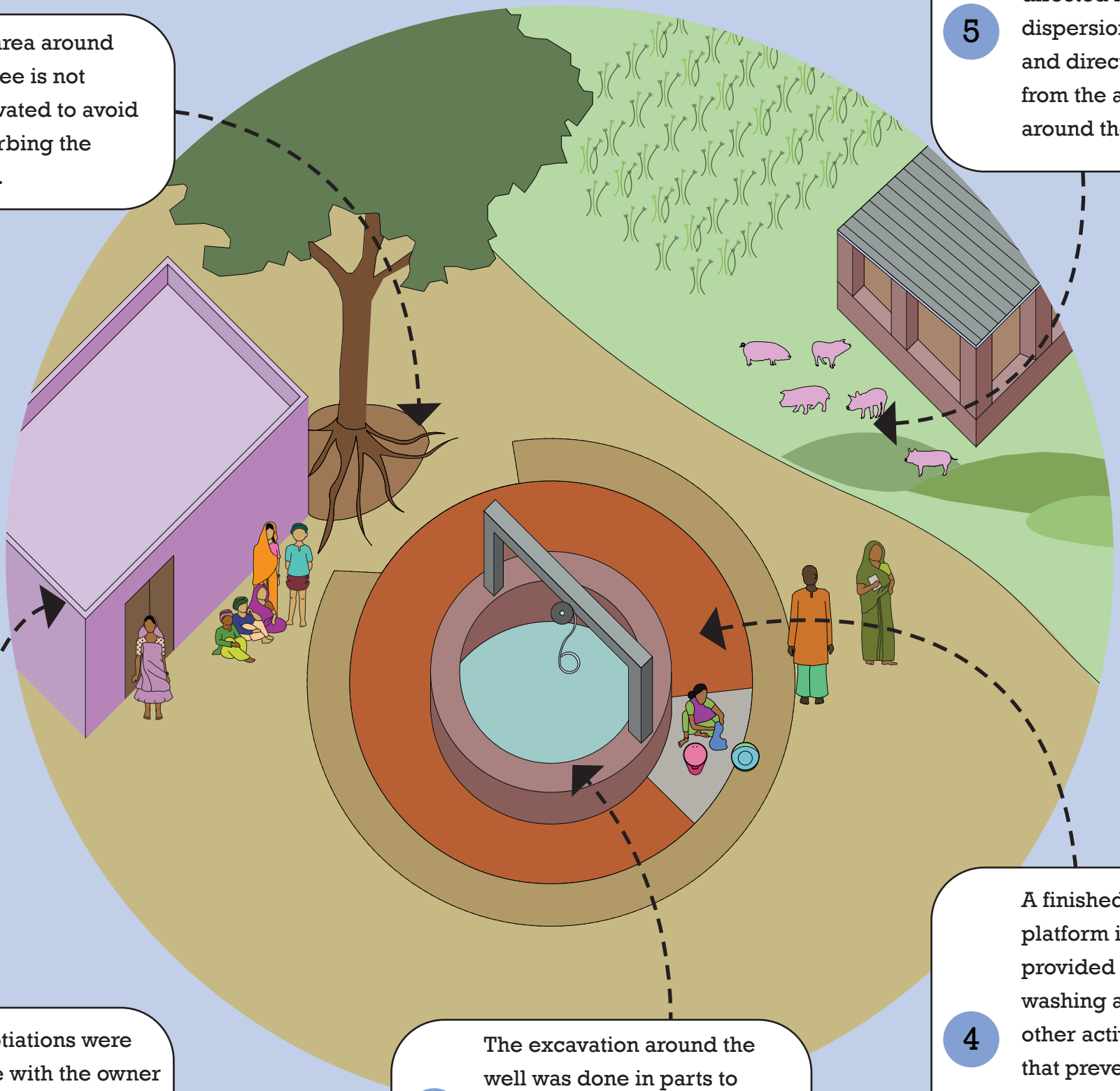
1. The area around the tree is not excavated to avoid disturbing the roots.

2. Negotiations were made with the owner of the house to not expand further out towards the well.

3. The excavation around the well was done in parts to provide support and prevent the walls from caving in.

4. A finished platform is provided for washing and other activities that prevents the water from percolating into the well directly.

5. Wastewater from the pigsty is directed into a dispersion trench and directed away from the area around the well.



5 Mobilization of Labour, Material and Land

Mobilizing skill & labour
Mobilizing labour from within the community to execute the interventions. This will involve engaging with the active stakeholders (well owners & consumers) to create awareness about the programme, and to expain the objectives and the process to be undertaken.

Sourcing material
All material required for implementation as listed by the technical partner, to be sourced and placed near the work area. The construction material is to be sourced from within 5km of the intervention site.

Clearing land encumbrances
Determining land requirements, if any, as well as land ownership for the intervention. This will require negotiation with land-owners for intervention on their land, and a mutual agreement on the regular public use of the well by the community.

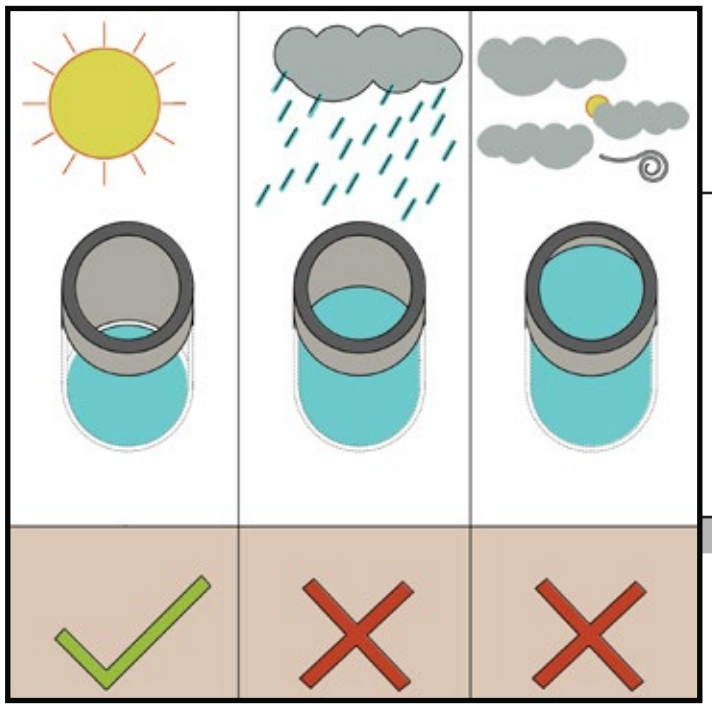
C Implementation Phase

This chapter outlines the general precautions and guidelines to be followed before starting the any repair work, during the construction phase, and post-intervention. It also lays out detailed step-by-step processes that are involved in repairing or restoring an existing open well, and in laying a grey water treatment system.


1
General Guidelines
2A
Well Recharge Pit Procedure
2B
Well Superstructure Procedure
2C
Cleaning and Repair
3
Grey Water Treatment Chambers and Trench
3B
Planting over the Dispersion Trench
3C
Alternative measures

1 General Guidelines

Before any repair work is started, the sites are to be prepared, material is to be sourced, and all site-level constraints are to be addressed.

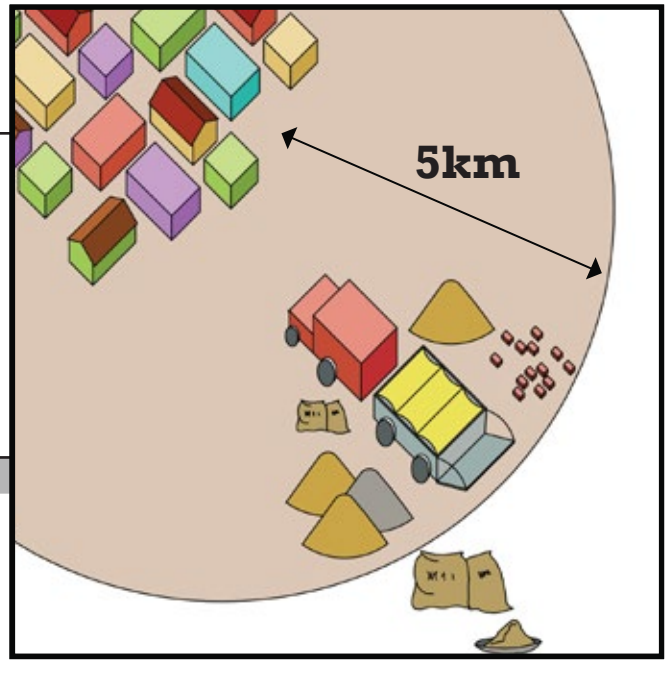


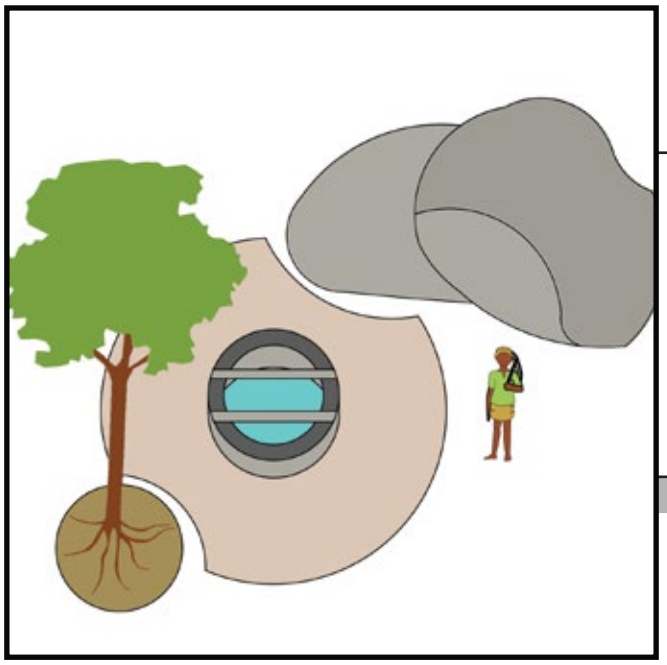
1. Completion before monsoon

All construction work on the wells and grey water must be completed in the summer months before the onset of the monsoon season.

2. Sourcing material

The material to be used for construction must be obtained from nearby locations. They can also be good quality materials recycled from other construction sites.

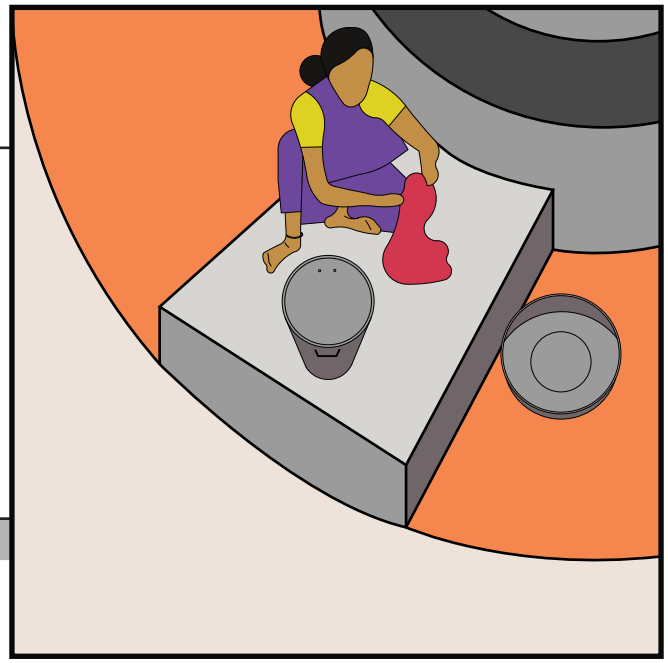




Integrating natural features

Existing natural features (eg. trees and boulders) that may be found in the vicinity are to be retained. No excavation is to be done near the root zone of the tree.

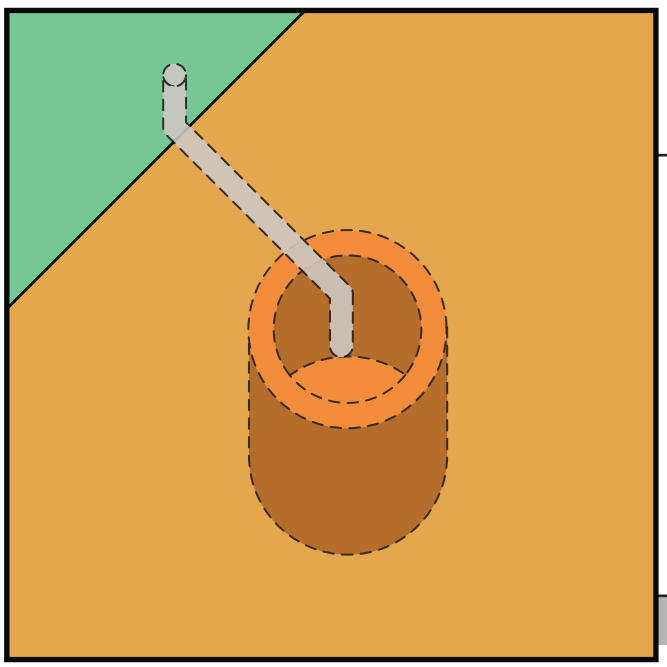
3.



Community use

To ensure that water from the well can be drawn easily and safely, parapet walls and pulley wheels are to be introduced. Platforms for washing of clothes can be provided near the wells.

4.



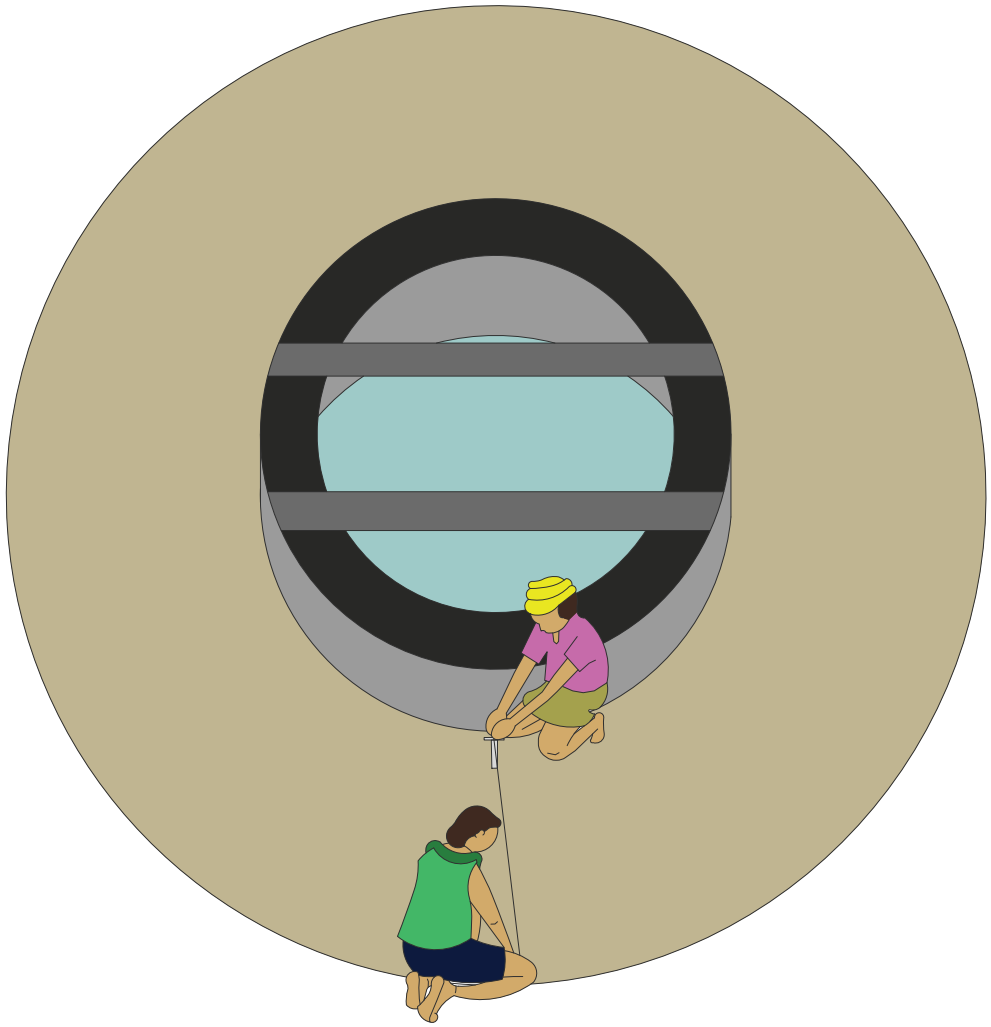
Sources of pollution

Any source of contamination (Septic tank, stagnant water, garbage dump, open defecation, livestock shed, industrial effluent outlet, open nala) to the surface and ground water within a 30 feet radius of the well shall be kerbed, diverted or managed on site.

5.

2A Well Recharge Pit Procedure

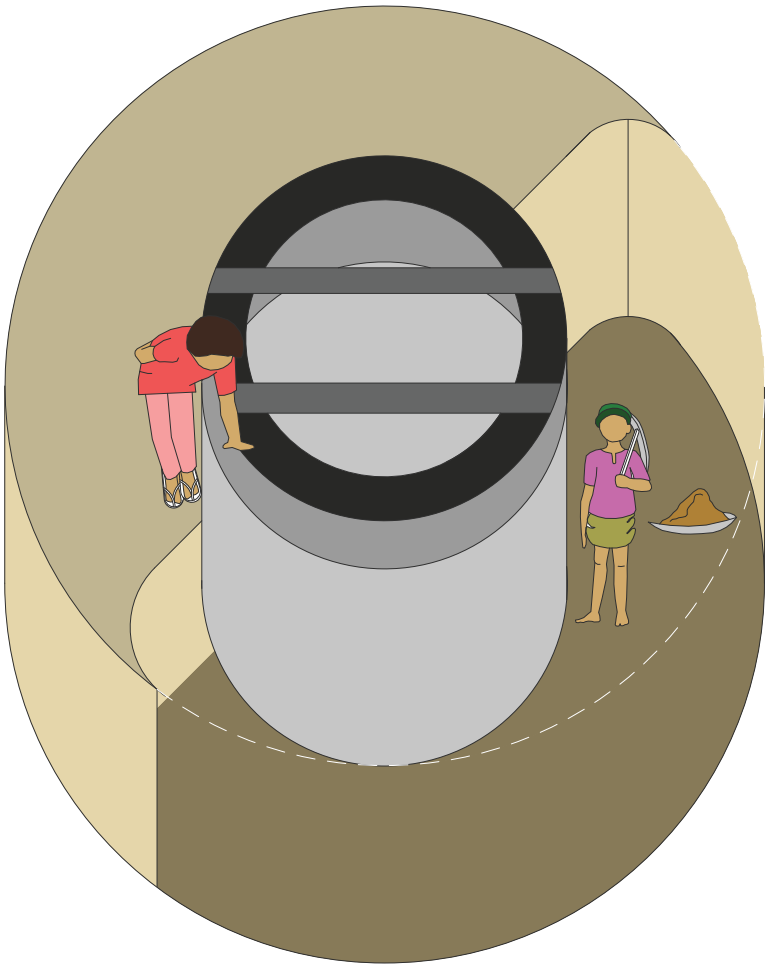
The first stage involves the formation of a recharge pit around the well. This is done in two parts or halves, to allow easy access to the well, as well as to ensure that the stability of the well is not compromised. The next steps involve constructing the superstructure, and the repair and cleaning of the insides of the wells.



Step 1

Mark area of excavation

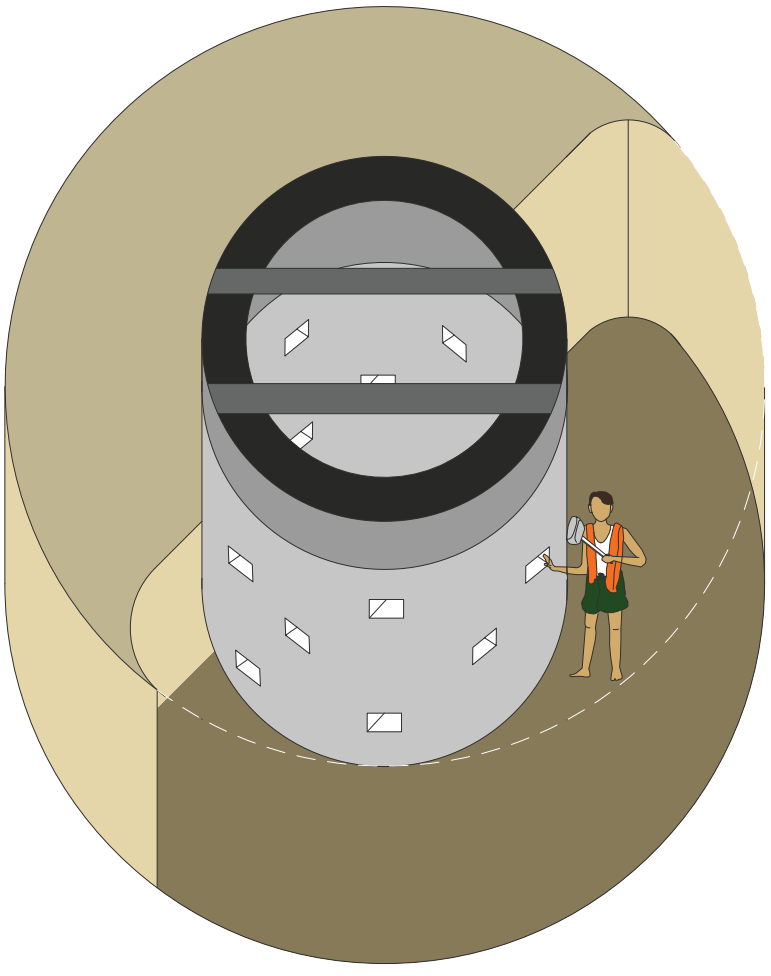
Mark a 5 - 6 foot circle around the open well.



Step 2

Manually excavate

Dig upto 5 feet depth around the well. For safety and accessibilty, dig only half the perimeter at a time.

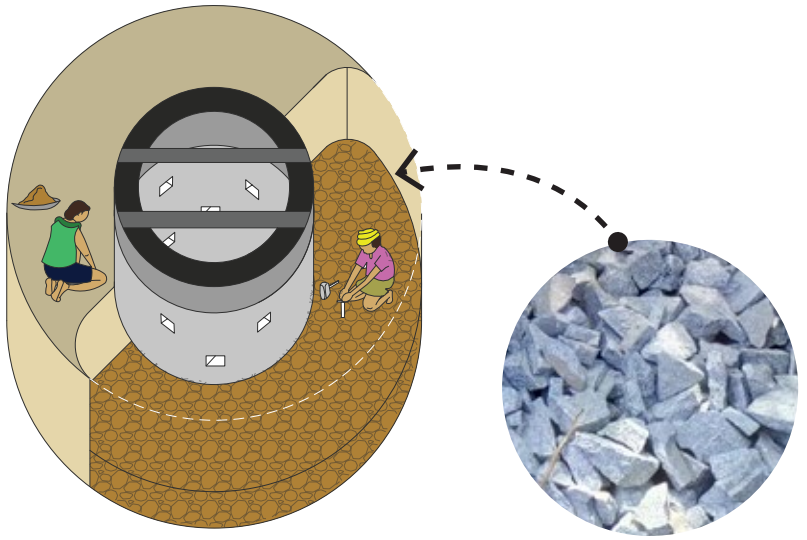


Step 3

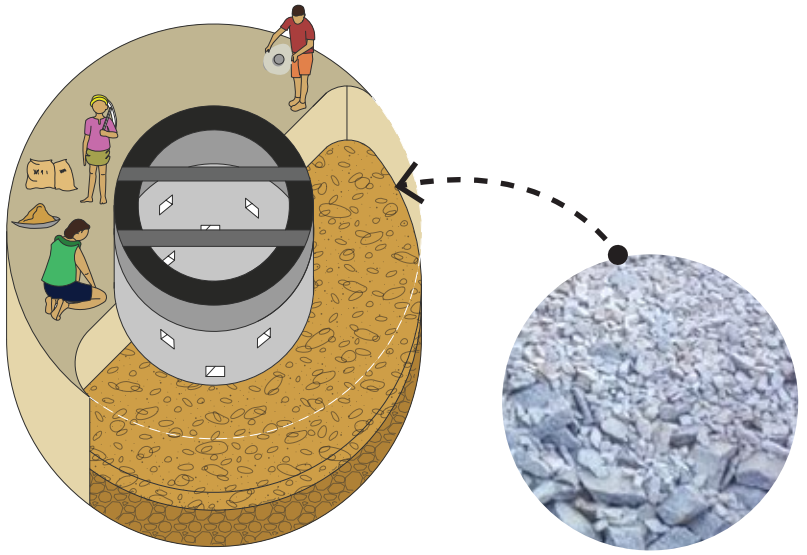
Make Weep Holes

Make weep holes at 2 - 6 feet centre to centre in a zig-zag pattern on the wall of the well at a depth of 2 - 4 feet .

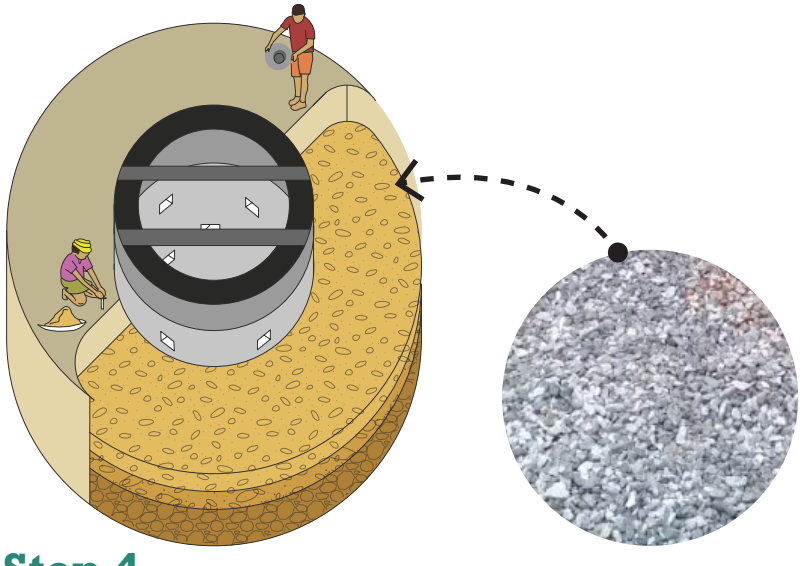
i.



ii.



iii.



Step 4

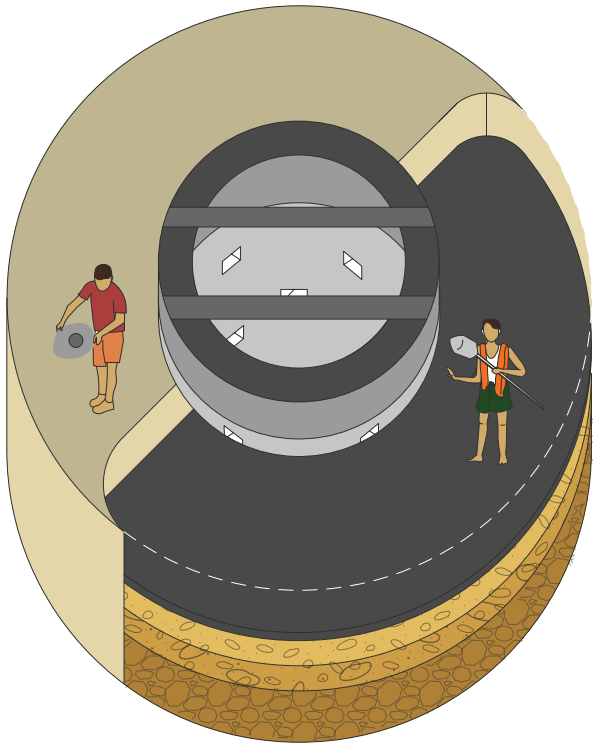
Fill layers of aggregate

i) Mark a 5 - 6 foot circle around the well.

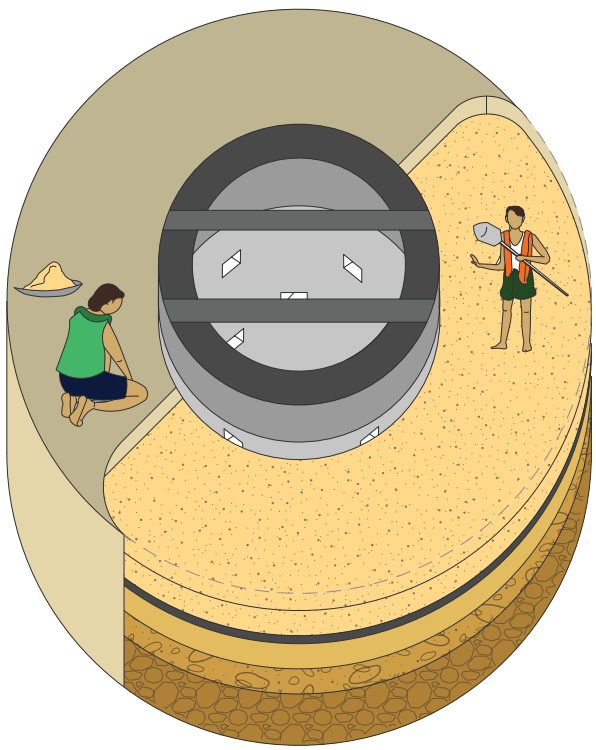
ii) Fill 1 inch of aggregate (2.5 inches in down size)

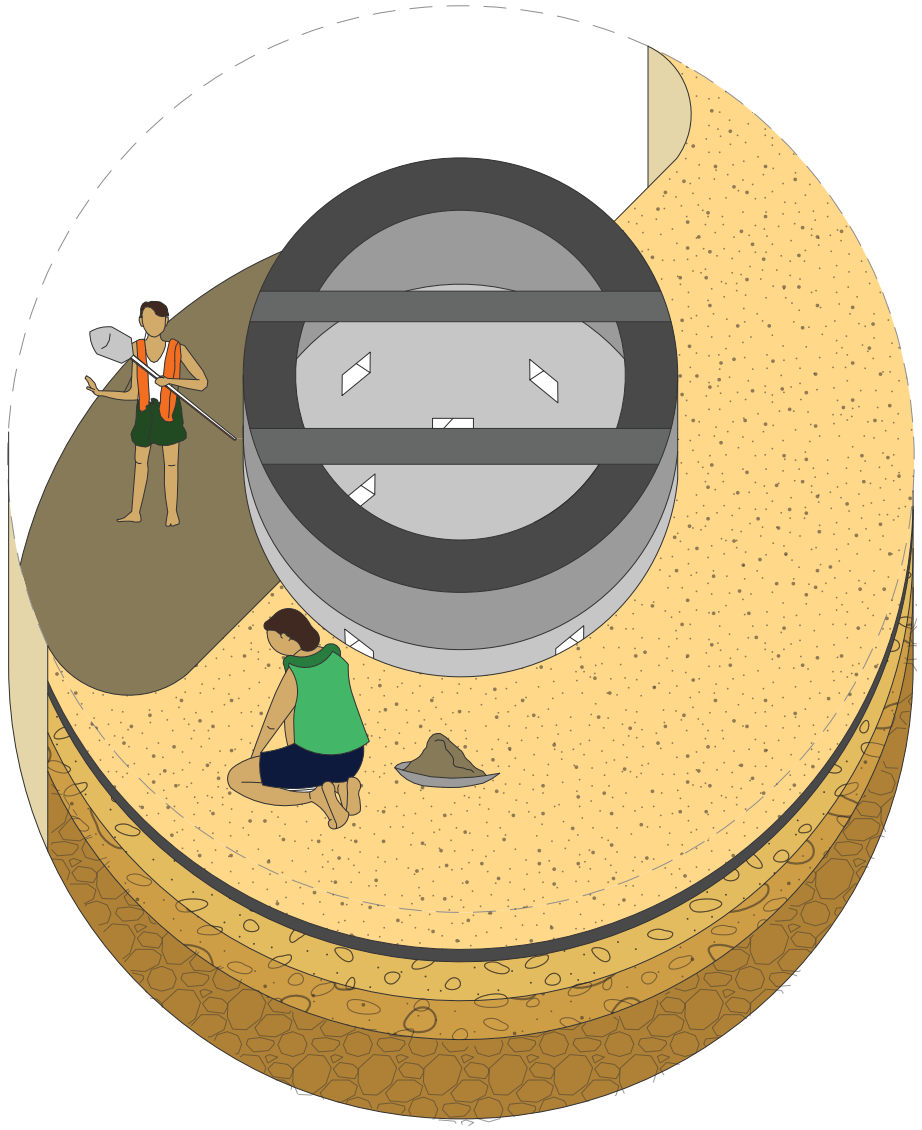
iii) Fill 1 inch of aggregate (1.5 inches in down size)

i.



ii.





Step 5

Fill charcoal and final layer

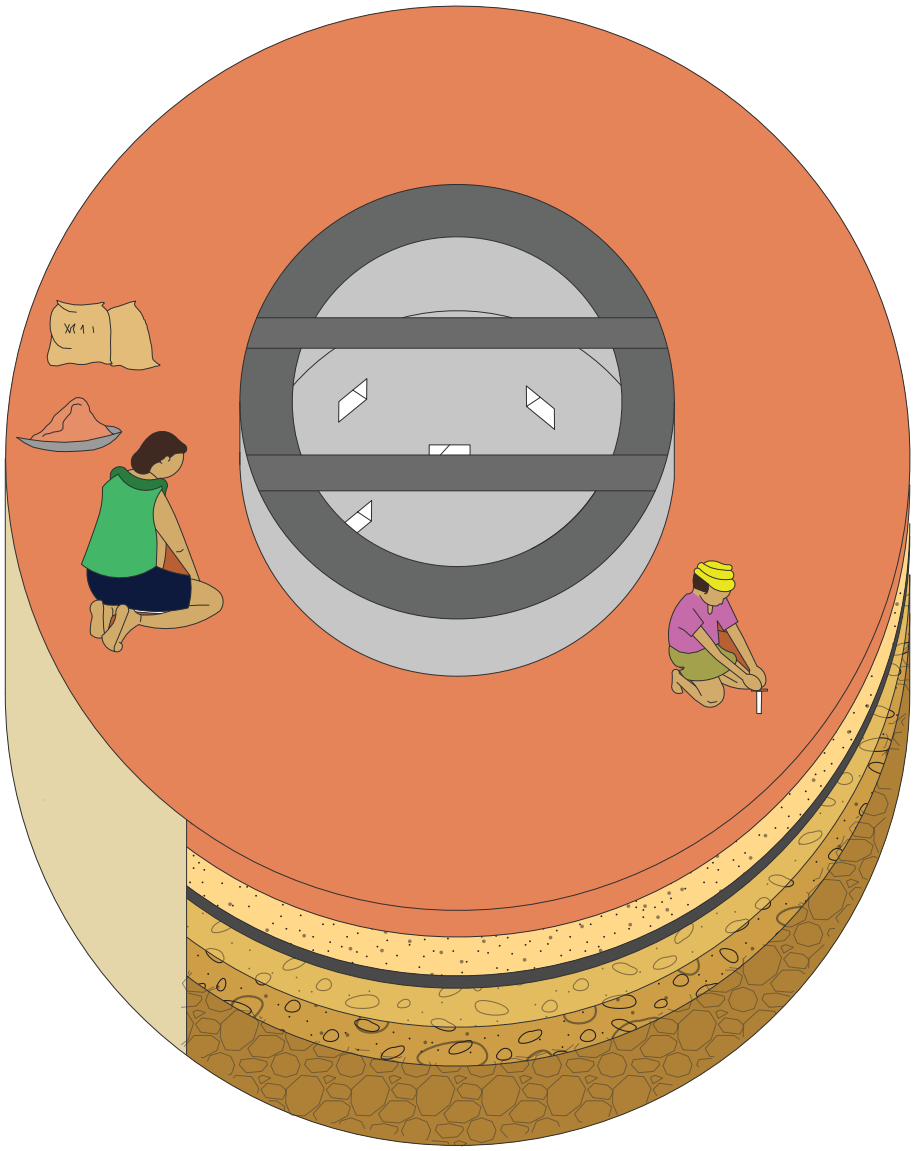
i) Fill 2 - 3 inches of charcoal (2 inches in down size).

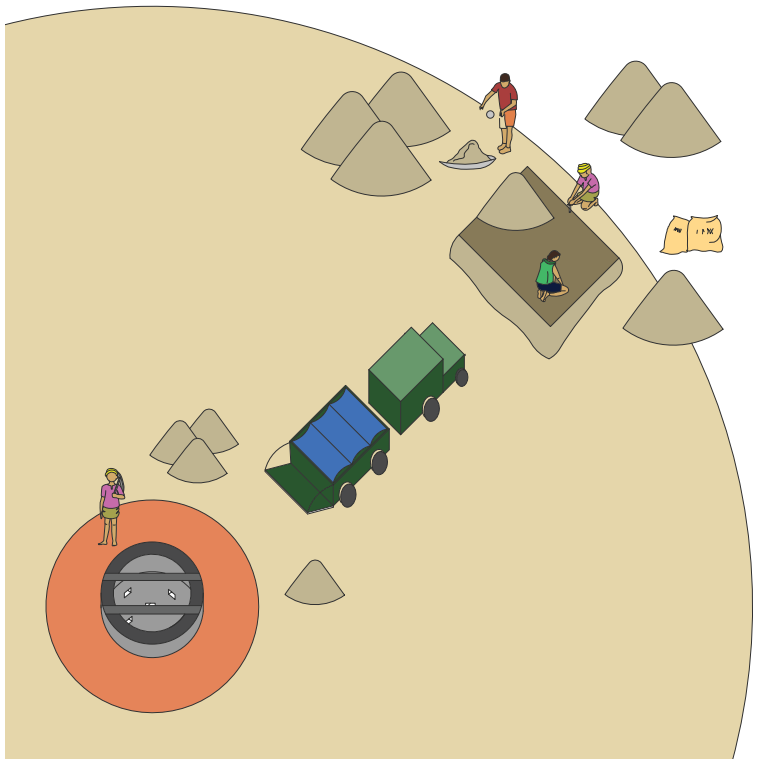
ii) Fill 1 inch of aggregate (2.5 inches in down size).

Step 6

Repeat on other side

Excavate the other side of the well that was left intact for access, repeating steps 1 to 5.





Step 7

Cover with stone or brick

Cover the area with stone or brick paving, leaving gaps to ensure percolation. Stone is preferred as it is durable.

Step 8

Recycle excavated earth

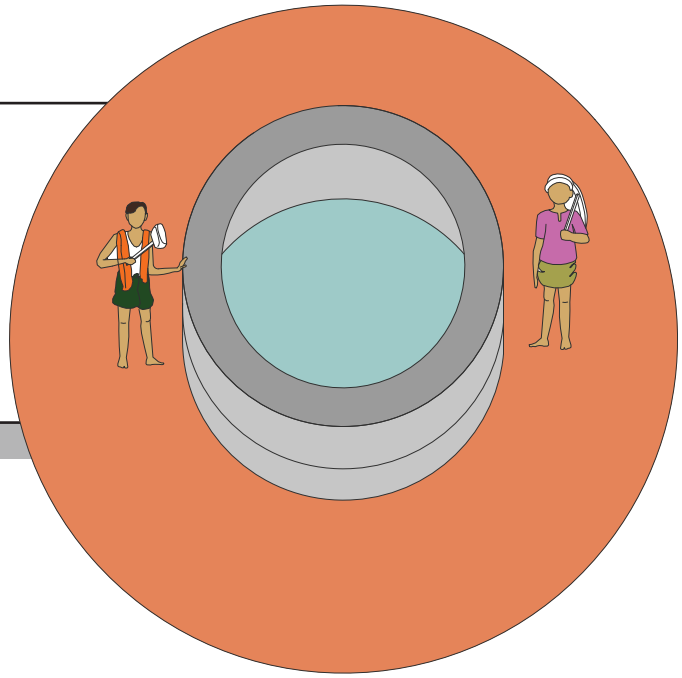
Reuse the excavated earth in other sites within 350 feet of the well.

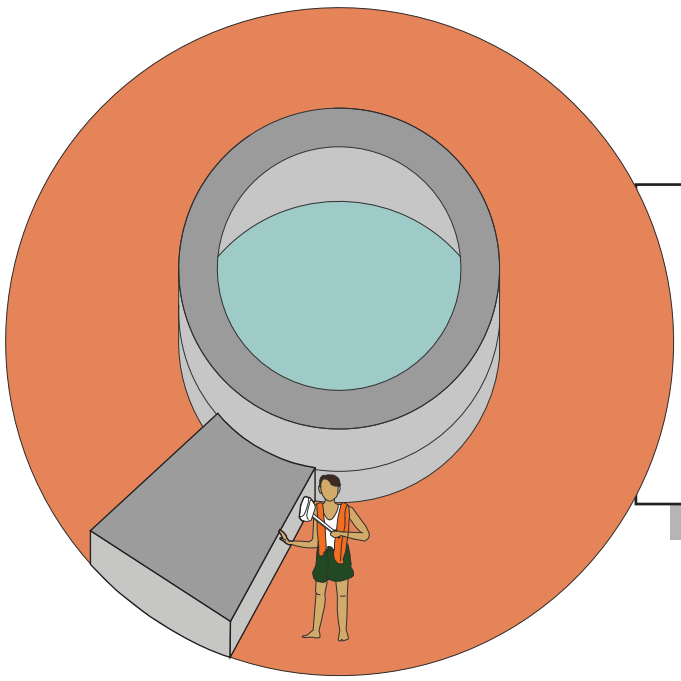
2B Superstructure Construction Procedure

Step 1

Construct Parapet Wall

Construct a wall in brick, block or stone masonry upto 2 - 3 feet above ground level.

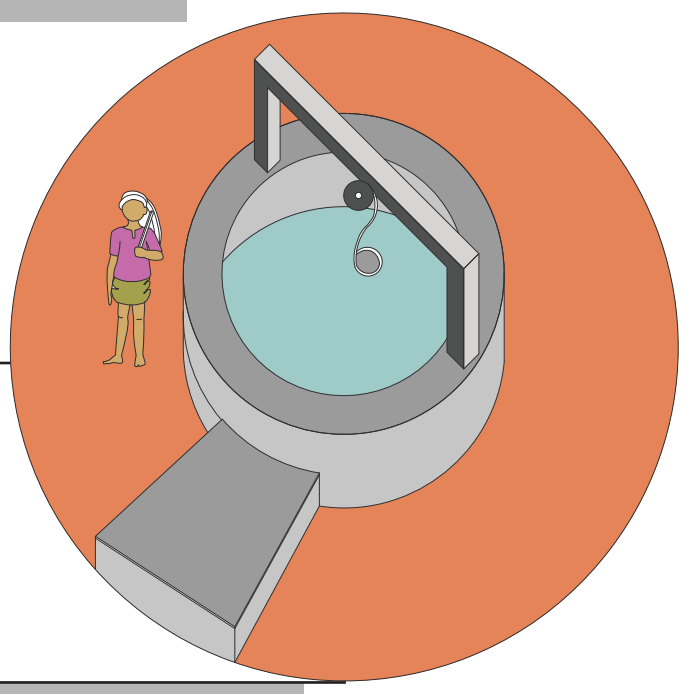




Step 2

Install Platform for washing

Make a brick or PCC platform for cloth washing to prevent contaminated water from entering the well.

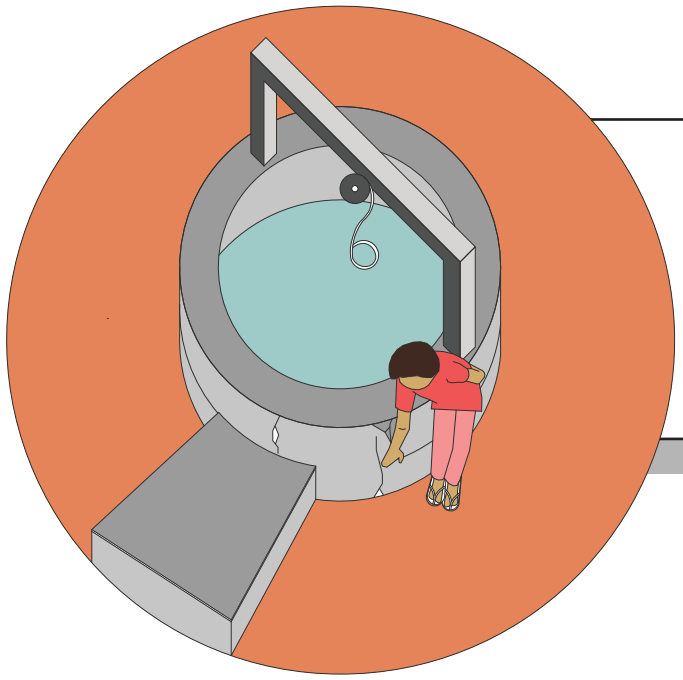


Step 3

Install Pulley Wheel

Fit a pulley wheel on an M.S or G.I frame to draw water easily & safely from the well.

2C Cleaning and Repair Procedure



Step 1

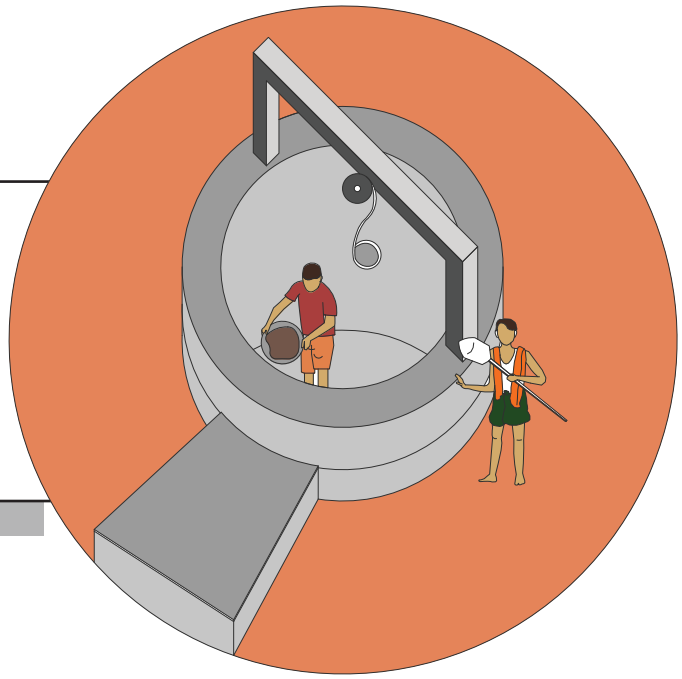
Identify repair work

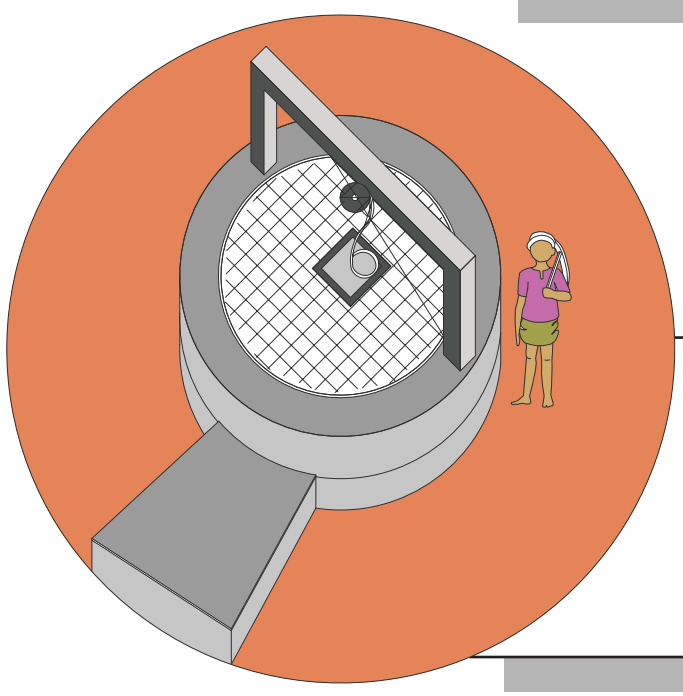
Inspect the wall lining within the well for signs of damage (structural cracks, wall collapse, replacing brick or stone blocks)

Step 2

Remove debris and clean inner wall

Manually removing the silt and debris from the bottom of the well and remove the silt and algae from the inner wall of the well.





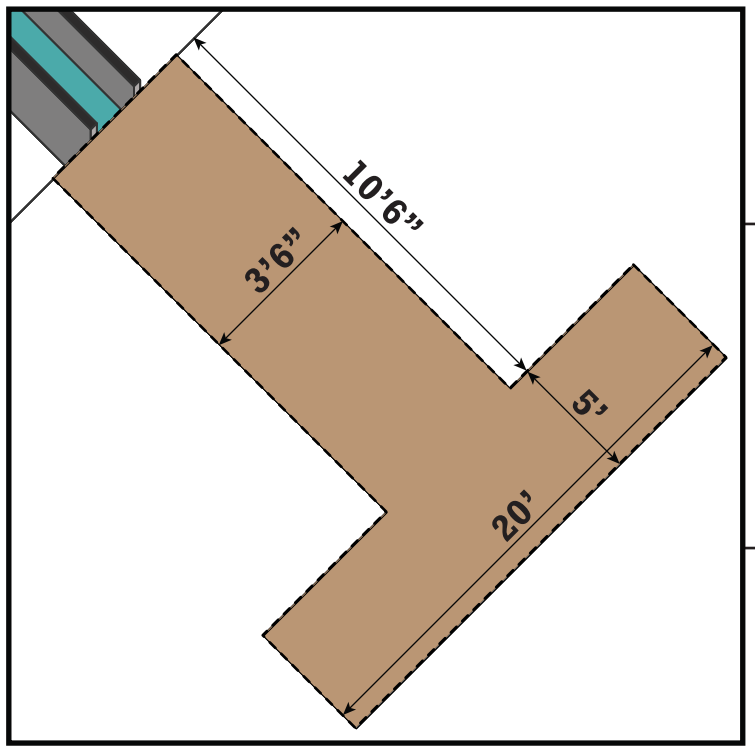
Step 3

Install Covering

Fabricate a G.I frame with weld mesh and fix it on top of the parapet wall of the well.

3 Grey Water Recharge Pit Procedure

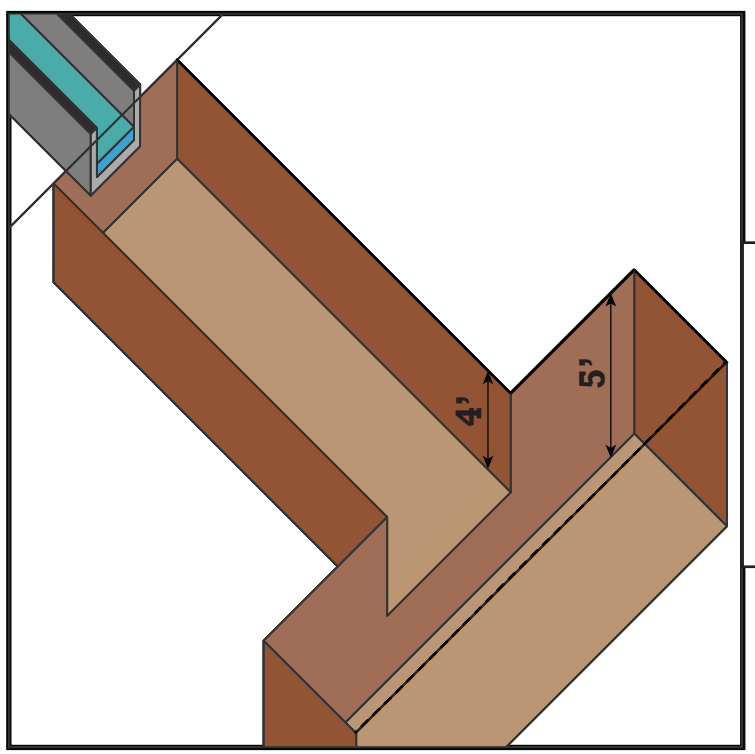
The specific sites for intervention were chosen keeping in mind certain parameters. These parameters help narrow down the area of intervention to the most suitable locations within the settement.



Step 1

Mark area of excavation

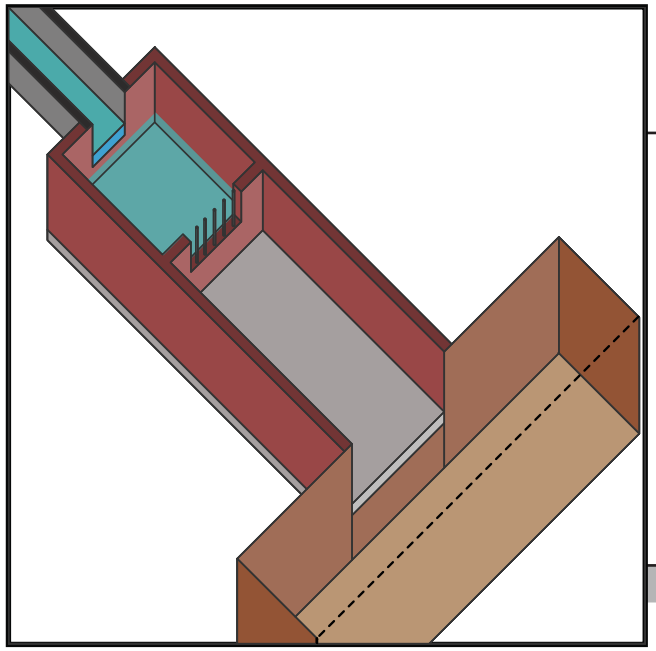
Mark the area for the three chambers (3 feet 6 inches X 10 feet 6 inches) and the dispersion bed (5 feet X 20 feet) downstream. Clear the site of encumberances.



Step 2

Manual excavation

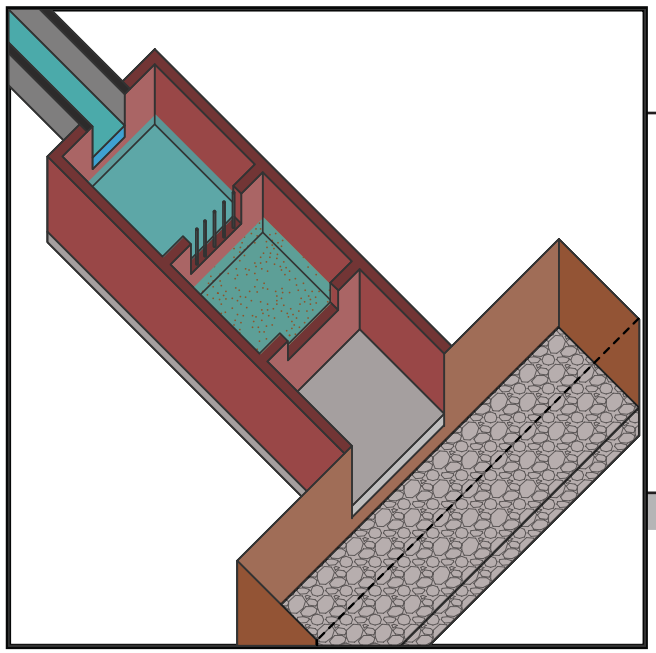
Dig a trench 4 feet deep into the ground for the chambers and a trench 5 feet deep for the dispersion bed.



Step 3

Trash Separator Chamber

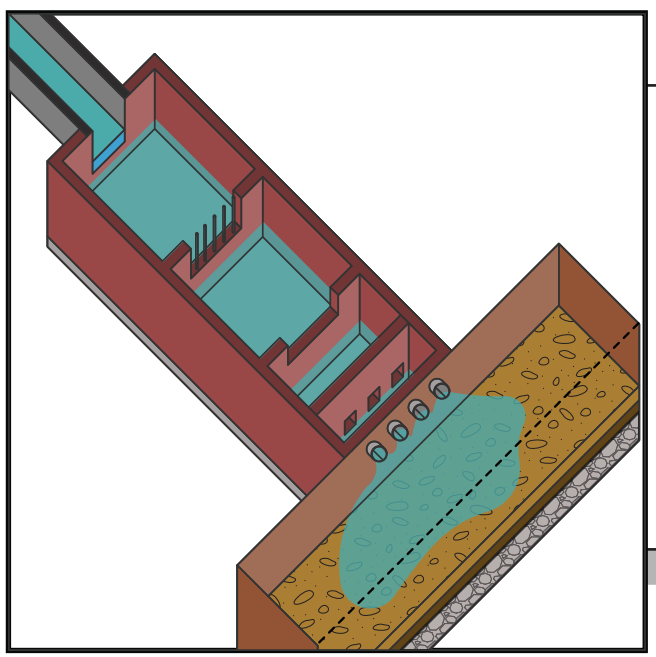
1. Construct a 75mm thk PCC bed and 4 inch thick masonry work for the chambers.
2. Build a chamber 3 feet 6 inch X 3 feet 6 inch X 3 feet 6 inch in size at the outlet of the open drain.
3. Fix a trash screen made of 12mm rods or G.I weld mesh at the outlet of the chamber, .



Step 4

Silt Trap Chamber

1. Build a chamber 3 feet 6 inch X 3 feet 6 inch X 3 feet 6 inch in size at the end of the first chamber.
2. Fill the first layer of gravel in the dispersion trench.

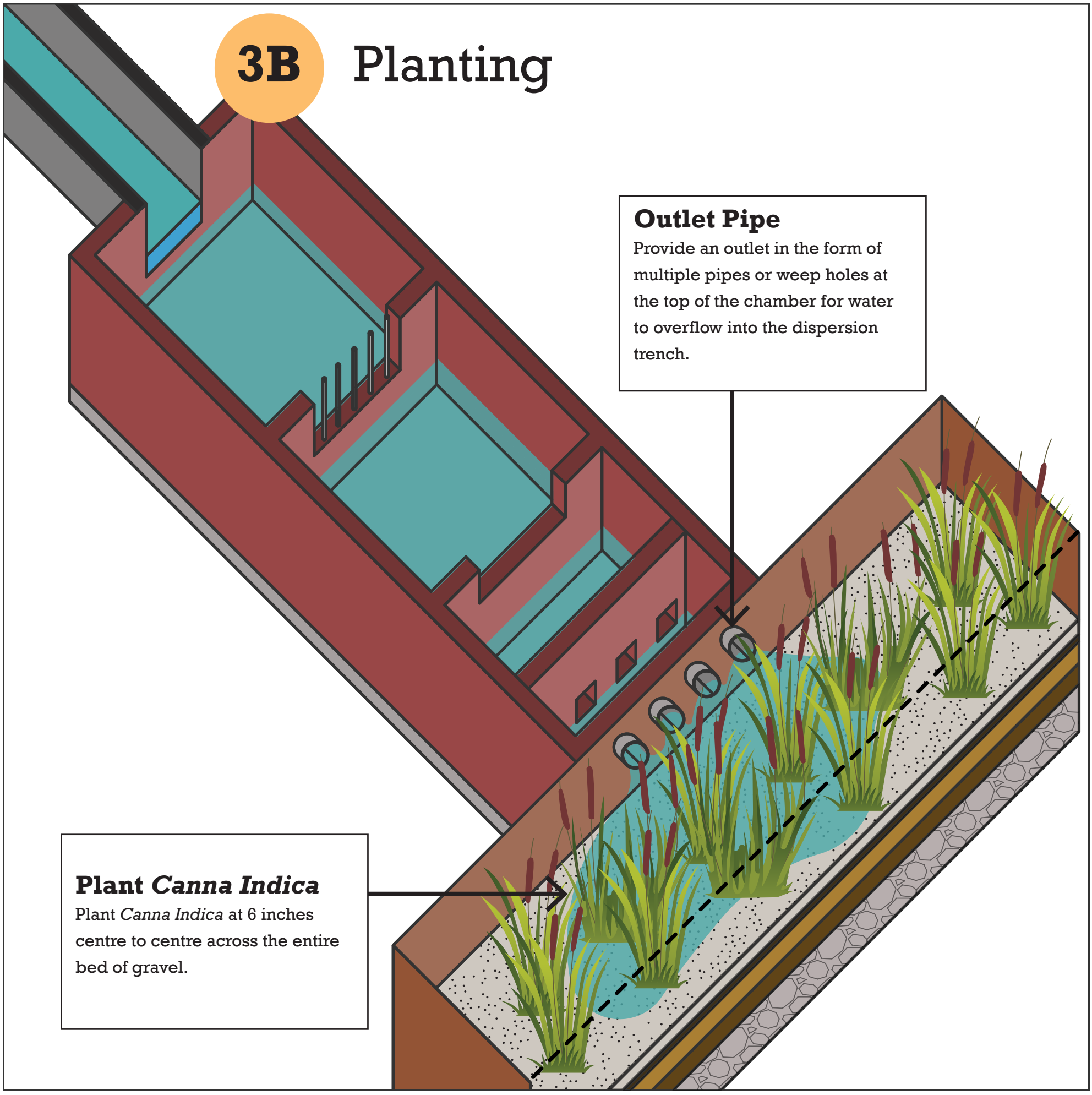


Step 5

Grease Trap Chamber

1. Build a chamber 3 feet 6 inch X 3 feet 6 inch X 3 feet 6 inch in size at the end of the second chamber.
2. Build a 4 inch thick brick partition wall in the middle of the chamber with multiple openings at the bottom to allow the oil-free water to enter the other half of the chamber.
3. Fill the remaining layer of aggregate in the dispersion trench.

3B Planting



Outlet Pipe

Provide an outlet in the form of multiple pipes or weep holes at the top of the chamber for water to overflow into the dispersion trench.

Plant *Canna Indica*

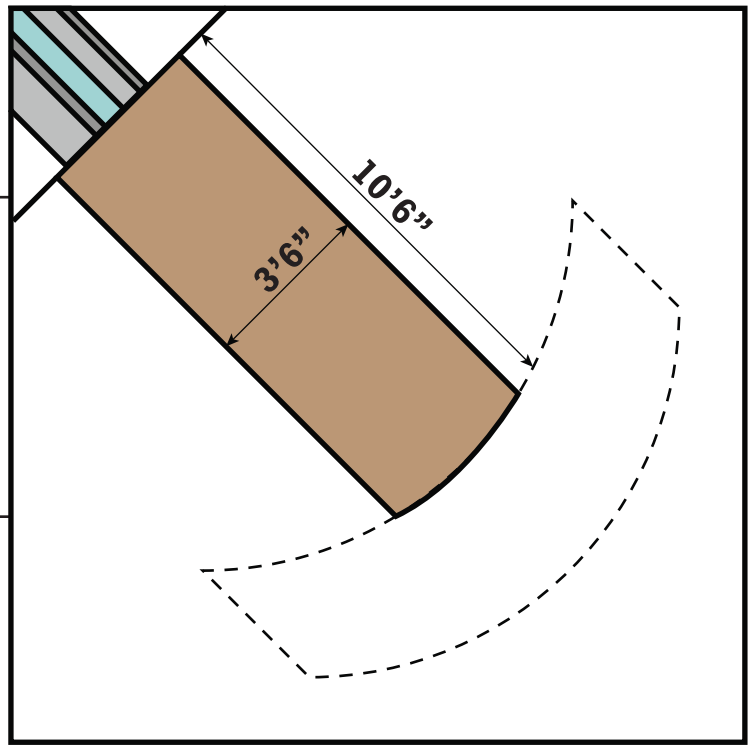
Plant *Canna Indica* at 6 inches centre to centre across the entire bed of gravel.

3C Alternative Measures

i

Profile of Dispersion Trench

The shape of the dispersion trench may vary depending on the space available on site.



Umbrella Grass

Colocasia

Canna Indica (keli)

ii

Alternate plant species

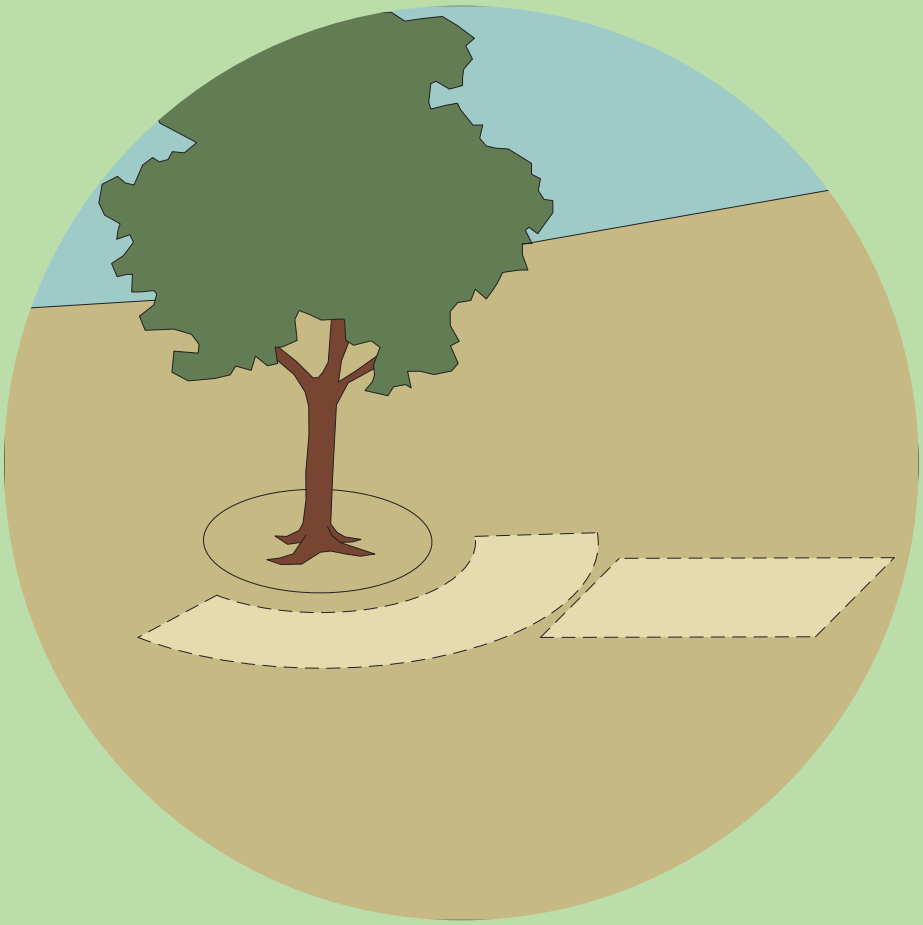
Other than *Canna Indica, Umbrella grass* or *Colocasia* may be used for the planting layer of the dispersion trench .

Selecting a site for grey water recharge pit

A spot close to a hand pump, downstream of the settlement was chosen for grey water intervention.

However the spot chosen had a future road proposed near it. This would lead to problems in the future.

A spot further downstream close to a tree was chosen to build the dispersion trench for grey water.



The profile of the dispersion trench was modified according the site conditions.

Excavation work around well being executed

Grey water recharge pit under construction.

4 Support Phase

This chapter outlines the steps to be taken before and after the interventions are made, including creating awareness among the members of the community, quality testing of the wells as well as conducting surveys among the impacted households.

1
Awareness Campaign

2
Pre-Intervention Measures

- Household Survey
- Mapping of Wells

3
Post-Intervention Measures

- Household Survey
- Mapping of Wells
- Regulations

1 Awareness Campaign

It is important to ensure that the community is made aware of the purpose of the intervention and the steps involved, and that the community is engaged throughout the process.

1. Understanding ongoing responsibilities:

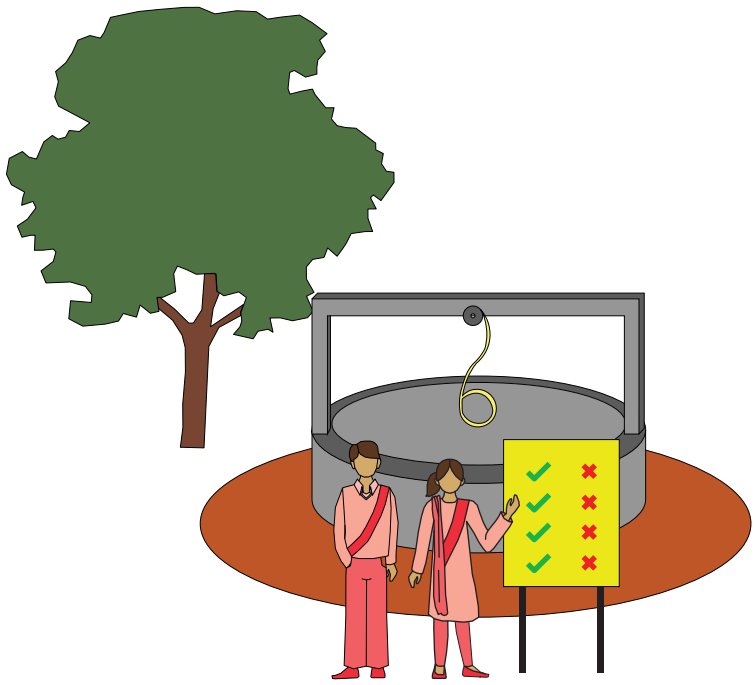
The NGO partner shall help the households understand the process involved and their roles and responsibilities in keeping the wells clean and managing the grey water channels in the area. This should be done through regular meetings and discussions with the communities right through the process as well as post the handing over of the repaired wells to the community. It is recommended that the Corporator be an active stakeholder in these conversations.

2. MoU:

The NGO partner shall mobilize the community to read the MoU together to understand its contents and purpose, and to discuss the need, roles of the various stakeholders involved, methods, timelines and benefits to the communities.

3. Information Signages near the wells:

The NGO partner shall distribute pamphlets and install information panels about the open well recharge and grey water treatment system, as well as prepare videos and conduct regular area meetings and discussions to inform the community.



4. Meeting with the Community:

Regular monthly/ bi-monthly meetings with the communities shall be conducted to re-enforce their roles, responsibilities and involvement.

5. Bank Accounts:

The CAG volunteers will collect an agreed upon suitable amount on a monthly basis from all those who use the well. The money so collected should be deposited in a bank account opened for this purpose. The bank amount is to be operated by the CAG members / Vikasini. This amount will be used for the maintenance of the wells.

2 Pre-intervention Measures

Household Survey

Initiating background work:

It is recommended that a household survey be conducted for the households or the user community to understand water requirements – potable and non-potable - and associated issues and challenges.

Questionnaire Format:

i) Name: .....

ii) Father's / husband's name:.....

iii) House number:.....

iv) Number of family members:.....

v) Contact Name and number:.....

Water uses	Quantity	Source	Distance to source	Quality of water	Remarks
Drinking					
Washing and cooking					
Animal consumption					
Washing clothes					
Others (specify)					

vi) Number of Handpumps in your vicinity:

- Private and/ or public
- Condition of the pump
- Does it give you the water and how much water is available and for what purpose?
- Where do you get the water in the summer- Tankers, RMC?

vii) Do you have a toilet?.....

viii) Where is the drainage of this toilet?.....

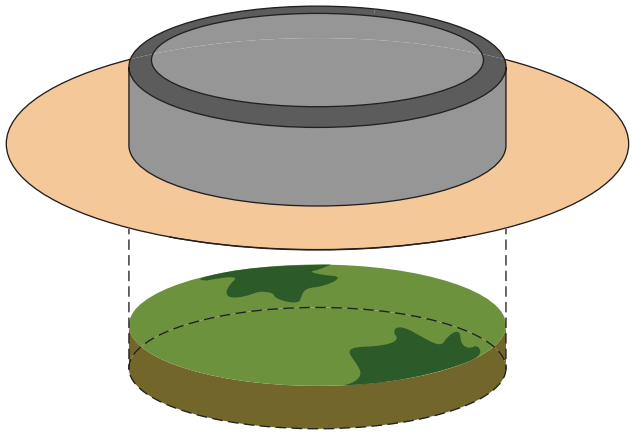
ix) Water quality testing?.....

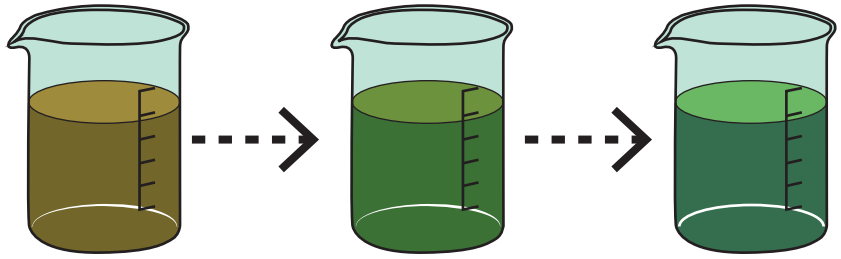
x) Other Remarks .....

Mapping of the wells

Baseline quantity and quality:

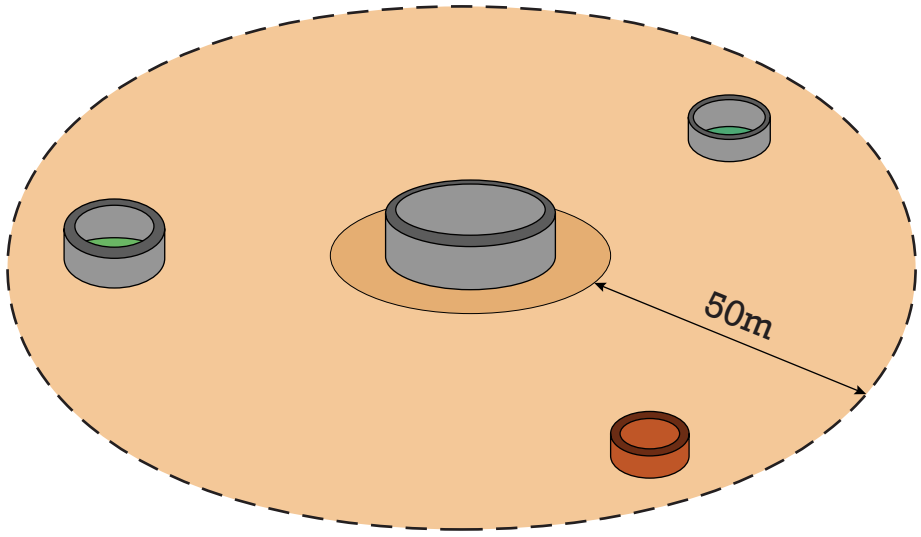
Mapping location of intervention wells and tracking water quality and quantity in all these wells before intervention.





Envisaging wider impact:

Mapping location of non-intervention wells and handpumps in the vicinity - ideally within a 50 metre radius - and tracking water quality and quantity in these wells and handpumps, to assess the extent of water pollution and stress in the vicinity.

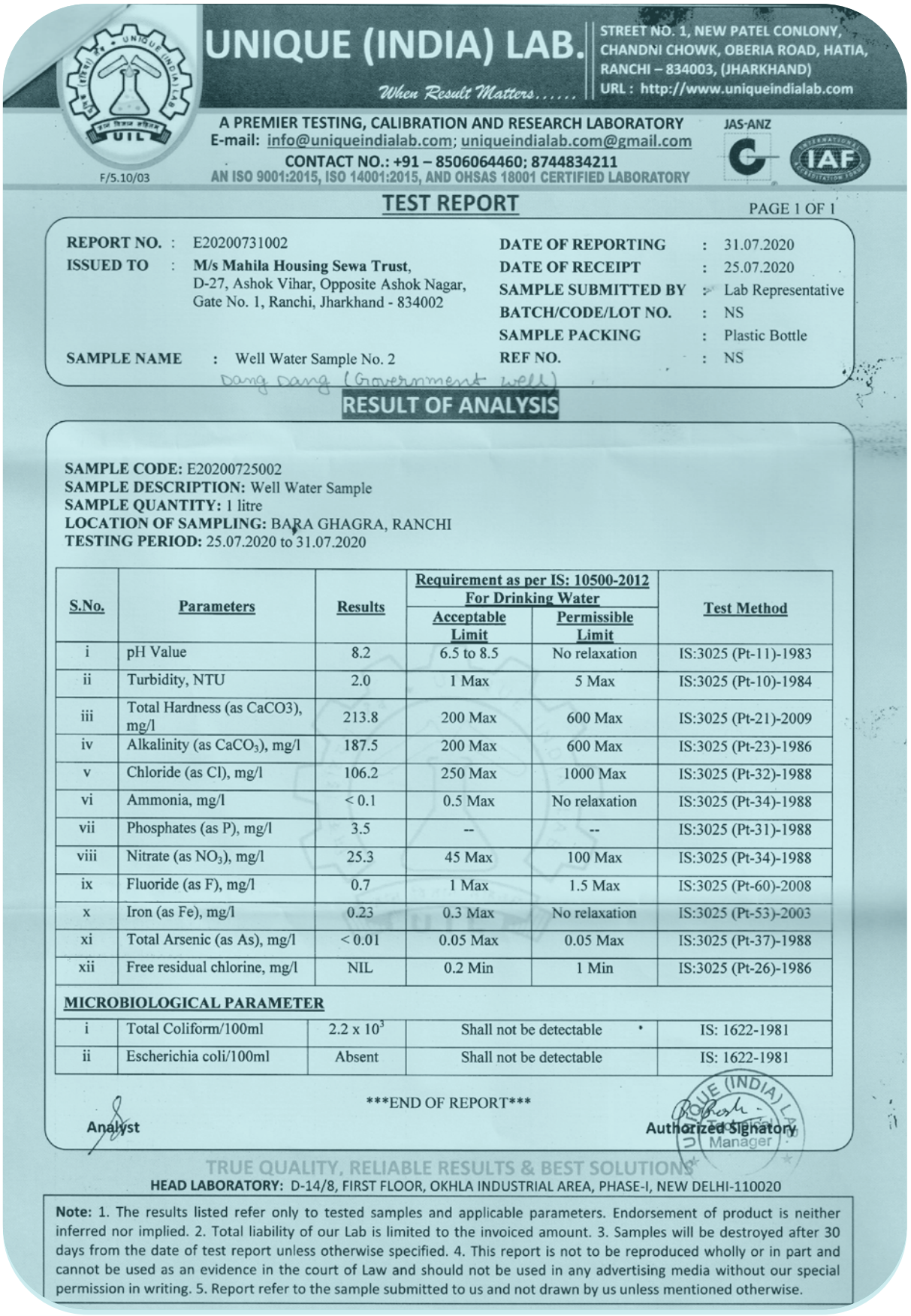


2 Pre-intervention Measures

Mapping of the wells

Sample of Quality and quantity check:

Test report conducted for Dangdang well (Well 1)



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CONTACT NO.: +91 – 8506064460; 8744834211
AN ISO 9001:2015, ISO 14001:2015, AND OHSAS 18001 CERTIFIED LABORATORY
JAS-ANZ

F/5.10/03

TEST REPORT PAGE 1 OF 1

REPORT NO. : E20200731002
ISSUED TO : M/s Mahila Housing Sewa Trust, D-27, Ashok Vihar, Opposite Ashok Nagar, Gate No. 1, Ranchi, Jharkhand - 834002
SAMPLE NAME : Well Water Sample No. 2 Dang Dang (Government well)

DATE OF REPORTING : 31.07.2020
DATE OF RECEIPT : 25.07.2020
SAMPLE SUBMITTED BY : Lab Representative
BATCH/CODE/LOT NO. : NS
SAMPLE PACKING : Plastic Bottle
REF NO. : NS

RESULT OF ANALYSIS

SAMPLE CODE: E20200725002
SAMPLE DESCRIPTION: Well Water Sample
SAMPLE QUANTITY: 1 litre
LOCATION OF SAMPLING: BARA GHAGRA, RANCHI
TESTING PERIOD: 25.07.2020 to 31.07.2020

S.No.	Parameters	Results	Requirement as per IS: 10500-2012 For Drinking Water		Test Method
			Acceptable Limit	Permissible Limit	
i	pH Value	8.2	6.5 to 8.5	No relaxation	IS:3025 (Pt-11)-1983
ii	Turbidity, NTU	2.0	1 Max	5 Max	IS:3025 (Pt-10)-1984
iii	Total Hardness (as CaCO3), mg/l	213.8	200 Max	600 Max	IS:3025 (Pt-21)-2009
iv	Alkalinity (as $CaCO_3$), mg/l	187.5	200 Max	600 Max	IS:3025 (Pt-23)-1986
v	Chloride (as Cl), mg/l	106.2	250 Max	1000 Max	IS:3025 (Pt-32)-1988
vi	Ammonia, mg/l	< 0.1	0.5 Max	No relaxation	IS:3025 (Pt-34)-1988
vii	Phosphates (as P), mg/l	3.5	--	--	IS:3025 (Pt-31)-1988
viii	Nitrate (as NO_3), mg/l	25.3	45 Max	100 Max	IS:3025 (Pt-34)-1988
ix	Fluoride (as F), mg/l	0.7	1 Max	1.5 Max	IS:3025 (Pt-60)-2008
x	Iron (as Fe), mg/l	0.23	0.3 Max	No relaxation	IS:3025 (Pt-53)-2003
xi	Total Arsenic (as As), mg/l	< 0.01	0.05 Max	0.05 Max	IS:3025 (Pt-37)-1988
xii	Free residual chlorine, mg/l	NIL	0.2 Min	1 Min	IS:3025 (Pt-26)-1986
MICROBIOLOGICAL PARAMETER					
i	Total Coliform/100ml	2.2×10^3	Shall not be detectable		IS: 1622-1981
ii	Escherichia coli/100ml	Absent	Shall not be detectable		IS: 1622-1981

END OF REPORT

Analyst

Authorized Signatory

TRUE QUALITY, RELIABLE RESULTS & BEST SOLUTIONS
HEAD LABORATORY: D-14/8, FIRST FLOOR, OKHLA INDUSTRIAL AREA, PHASE-I, NEW DELHI-110020

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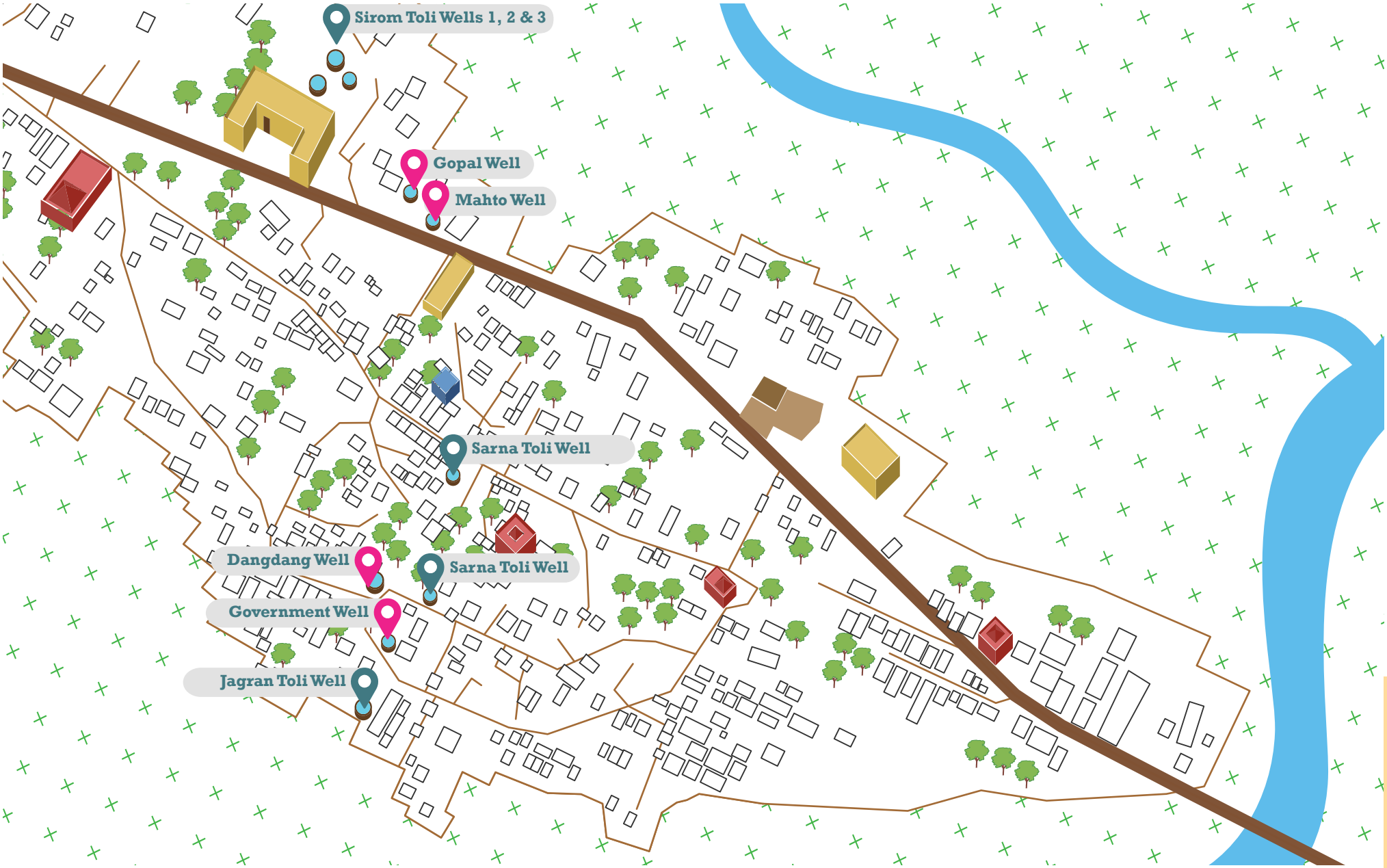
Mapping of the wells

Envisaging a wider impact



Intervention Wells in Bara Ghaghra

Wells within 50m of intervention wells

3 Post-intervention Measures

Household Survey

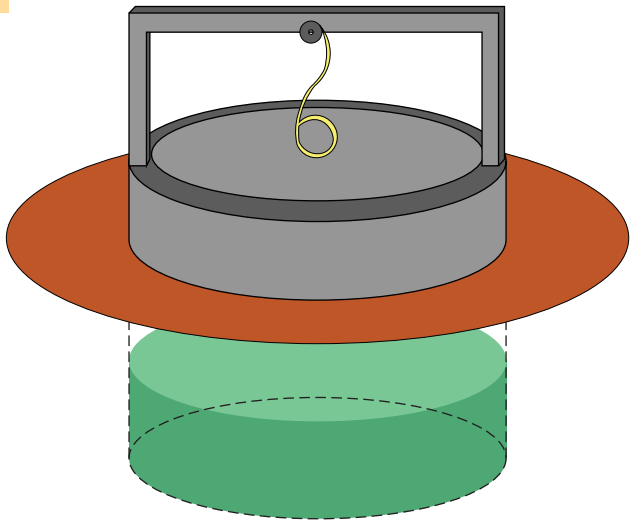
Impact Assessment:

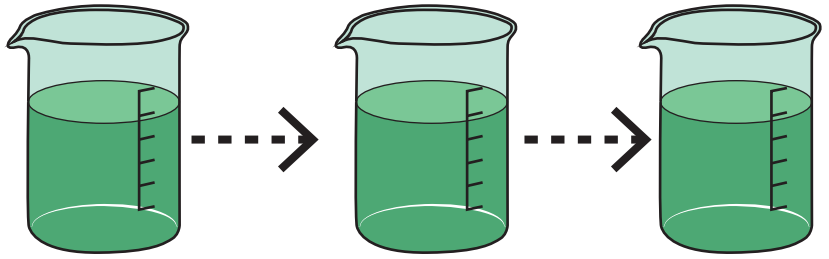
It is recommended that a household survey be conducted again for the households or the user community after the intervention has been implemented to understand the community's perception of improvement in water quality and quantity. This will also be supported with an assessment of well usage by the community, as well as mapping of the water quality and quantity in these wells.

Mapping of the wells

Impact Assessment:

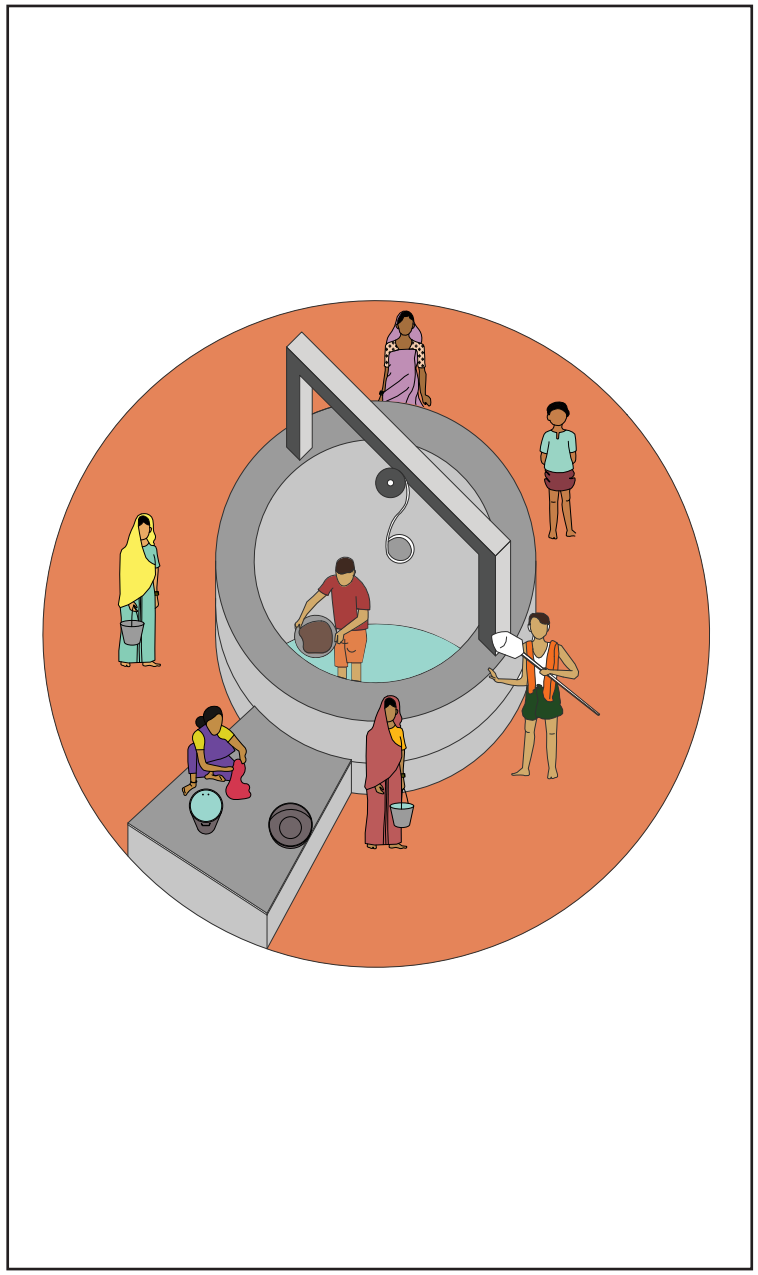
Regularly tracking water quality and quantity in intervention wells post-intervention and assessing the impact of the intervention in relation to the baseline data.



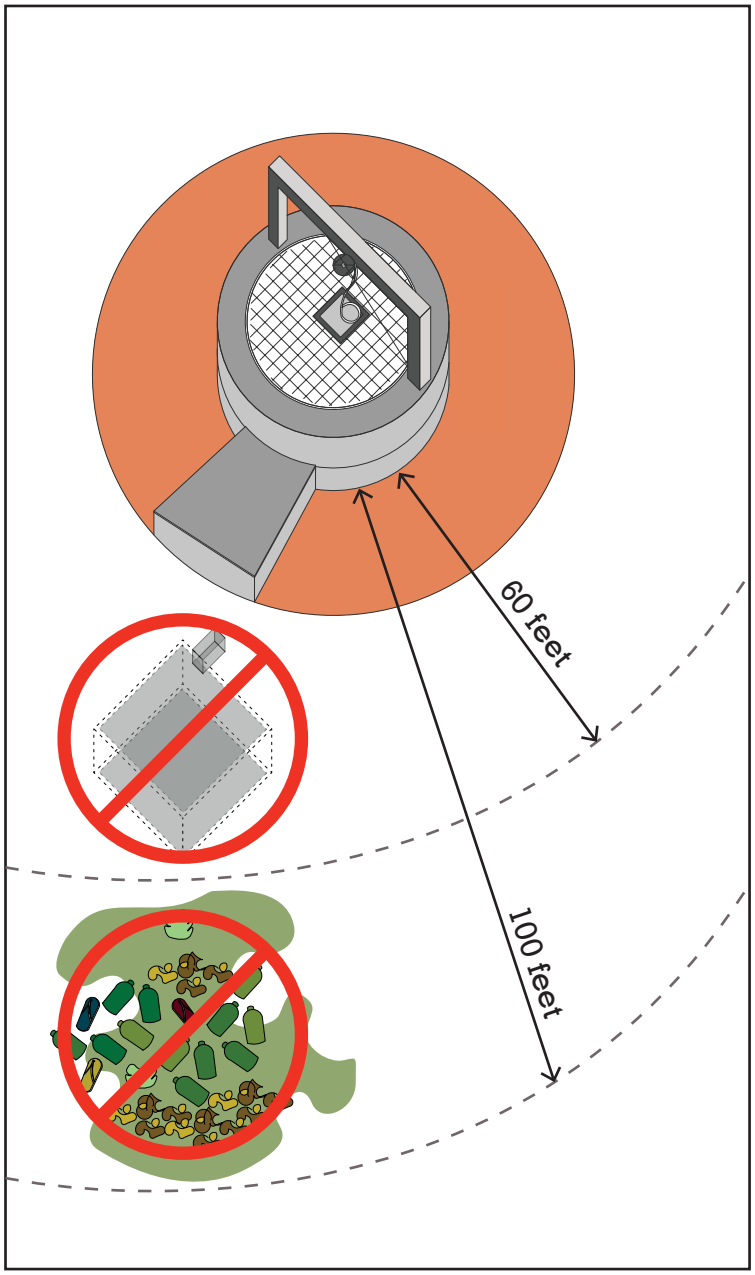


3 Post-intervention Regulations

The responsibility of keeping the wells clean and managing the grey water channels in the area will lie with the members of the settlement who use it every day.



1 Every year before monsoon, the well should be cleaned both internally and externally by the CAG and the community. The responsibility of cleaning and maintenance of these wells will lie with the members of the settlement who use it everyday.



2 The community should ensure that no garbage or stagnant water is collected within 100'of the open well, and no septic tanks and soak pits are built within 60' from the well.