



Verification Report for

Project : Rainwater Harvesting Recharge Kadusonnapanahalli,
Karnataka, India.

UCR Project ID : **155**

| | |
|------------------------|------------------------------------|
| Name of Verifier | SQAC Certification Pvt. Ltd. |
| Date of Issue | May 20, 2022 |
| Project Proponent | Oasis International School |
| UCR Project Aggregator | Progressive Management Consultants |
| Work carried by | Mr. Santosh Nair |
| Work reviewed by | Mr. Suuhas Tendulkar |
| | |

Summary:

SQAC Certification Pvt. Ltd. has performed verification of the “Rainwater Harvesting Recharge Kadusonnapanahalli, Karnataka, India.,” for Rainwater Harvesting Recharge systems (RWHs), on the basis of UCR criteria. The project activity is the harvesting of rainfall during the monsoon season, which involves the conservation and storage of unutilized water for future and current potable water requirements, agricultural purposes and also recharge of the groundwater aquifer. Along with the increase in per household water consumption, the project activity helps replenish the ground water table. The overall goal of this project is to promote sustainable water development in the village of Kadusonnapanahalli and prevent over exploitation of groundwater resources.

Verification for the period : **01/01/2015 to 31/12/2021**

In our opinion, the total RoU’s over the crediting / verification period stated in the Project Concept Note (PCN) submitted to SQAC are found to be correct and in line with the UCR guidelines.

The RoU’s were calculated on the basis of UCR Protocols which draws reference from, UCR Protocol Standard Baseline, UCR Rainwater verification standard Final ver 2. Owing to the Covid pandemic, the verification was done remotely by way of video calls / verification, phone calls and submission of documents for verification through emails.



SQAC is able to certify that the RoU's from the Rainwater Harvesting Recharge Kadusonnapanahalli, Karnataka, India (UCR ID – 155) for the period **01/01/2015 to 31/12/2021** amounts to **52,575 RoUs**

Detailed Verification Report:

UCR - RoU Scope 2 (Measures for conservation and storage of unutilized water for future requirements.)

Purpose:

The project activity is the harvesting of rainfall during the monsoon season, which involves the conservation and storage of unutilized water for future and current potable water requirements, agricultural purposes and also recharge of the groundwater aquifer. Along with the increase in per household water consumption, the project activity helps replenish the ground water table. The overall goal of this project is to promote sustainable water development in the village of Kadusonnapanahalli and prevent over exploitation of groundwater resources.

The objectives of this verification are, by way of suitable evidences, to establish that:

1. The project has been commissioned as per the documented & video evidence
2. The details provided in the PCNMR are correct
3. The RoUs claimed from the project are correct and in accordance with the requirements of the UCR Standard.

Scope:

The scope covers verification of RoUs from the project - Rainwater Harvesting Recharge Kadusonnapanahalli, Karnataka, India (UCR ID – 155)

Criteria:

Verification criteria is as per the requirements of UCR Rainwater (RoU) Standard Version 2.0

Description of project:

The project activity Rainwater Harvesting Recharge Kadusonnapanahalli, Karnataka, India involves three (3) distinct RWHs as below:

1. A pond type catchment system with associated recharge/soak pits to capture rainfall runoff during the monsoons, constructed in 2015, by increasing the depth of a naturally occurring depression with high terrain on all four sides to collect rainwater (Catchment Area 1). The project activity in Catchment Area 1 hence creates potable drinking water from previously untapped water resources.
2. A circular manmade catchment area with stones and concrete (Catchment Area 2) with associated recharge wells and borewells constructed in 2015. The project activity in Catchment Area 2 creates potable drinking water from previously untapped water resources.

3. The irregular Catchment Area 3 is an abandoned quarry that has been cleaned by the PP and harvested for rainwater since 2016. The water collected and reused (from Catchment Area 3) is not fit for drinking purposes, hence the water is pumped and used by the local villagers for agricultural purposes only. In doing so, the PP has saved the groundwater from being over exploited.

In addition to the above, the PP has developed and constructed soak pits along the storm water drains to ensure that the catchment areas receives clean storm water run-off. The project activity is the harvesting of rainfall during the monsoon season, which involves the conservation and storage of unutilized water for future and current potable water requirements, agricultural purposes and also recharge of the groundwater aquifer. Along with the increase in per household water consumption, the project activity helps replenish the ground water table. The overall goal of this project is to promote sustainable water development in the village of Kadusonnapanahalli and prevent over exploitation of groundwater resources. Hence the project activity ensures the water security of India and attains SDGs 6, 11, 12 and 13.

PROJECT NAME : Rainwater Harvesting Recharge Kadusonnapanahalli, Karnataka, India

UCR Scope : RoU Scope 2 Measures for conservation and storage of unutilized water for future requirements.

PCNMR Prepared on : 10/05/2022

Catchment Area 1 : 6081.19 m² (Latitude. & Longitude = 13° 5' 58.0884" N 77° 39' 58.8341" E)

Catchment Area 2 : 48.39 m² (Latitude. & Longitude = 13° 5' 53.286" N 77° 39' 58.2437" E)

Catchment Area 3 : 8588.53 m² (Latitude. & Longitude = 13° 5' 58.0376" N 77° 40' 4.084" E)

Total Catchment Area : 14718.11 m²

Number of RWHs and associated structures : 3

Year of Construction : 2015 (Catchment 1 &2)

: 2016 (Catchment 3)

Device Used for Lifting / Storing Groundwater : Centrifugal Pump, Soak Pits, Recharge wells

Features Associated with the RWHs and Bore Wells

Rainfall

The monsoon season in Karnataka is from June, July, August and September. Daily rainfall data from 1989 to 2018 is considered for the analysis of rainfall trend, variability and mean rainfall patterns (source: Observed Rainfall Variability and Changes Over Karnataka State, 2020, Met Monograph No.: ESSO/IMD/HS/Rainfall Variability/13(2020)/37 by Climate Research Division/ Climate Application & User Interface Group/ Hydrometeorology).

The mean rainfall (mm) and coefficient (%) of variation for the state of Karnataka for monsoon months, southwest (SW) monsoon season and annual for the period 1989- 2018 is reported in the table below:

| | June | July | August | September | JJAS | Annual |
|-------------|-------|-------|--------|-----------|-------|--------|
| Mean | 205.5 | 269.6 | 221.2 | 150.5 | 846.8 | 1146.9 |
| CV | 22.0 | 27.7 | 23.1 | 35.3 | 14.5 | 12.7 |

Mean rainfall (mm) and coefficient of variation of the state for the monsoon months, southwest monsoon season and annual

Contribution of July month to SW monsoon seasonal total rainfall is highest (32%) followed by August (26%), June (24%) and September (18%). On an average 74 % of the annual rainfall is received in SW monsoon season. The variability for monsoon and annual rainfall is 14.5 % and 12.7 % respectively

| DISTRICT | JUNE | | JULY | | AUGUST | | SEPTEMBER | | MONSOON | | ANNUAL | |
|-----------------|------|----|------|----|--------|----|-----------|----|---------|----|--------|----|
| | MEAN | CV | MEAN | CV | MEAN | CV | MEAN | CV | MEAN | CV | MEAN | CV |
| BAGALKOTE | 83.5 | 57 | 55.9 | 45 | 71.6 | 56 | 118.7 | 62 | 329.6 | 36 | 542.8 | 25 |
| BENGALURU RURAL | 71.7 | 63 | 89.9 | 57 | 116.4 | 51 | 151.7 | 54 | 429.6 | 28 | 796.5 | 27 |
| BENGALURU URBAN | 72.7 | 60 | 81.8 | 54 | 124.0 | 58 | 162.7 | 51 | 441.3 | 29 | 825.9 | 26 |

Rainfall statistics (mm) for the districts of Karnataka for the four monsoon months, southwest monsoon season and annual

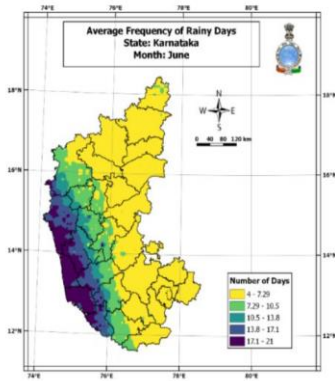
As Karnataka receives maximum amount of rainfall during SW monsoon season, coastal and adjacent districts (Uttar Kannada, Shivamogga, Udupi, Dakshin Kannada and Kodagu) of the Karnataka state receive highest amount of rainfall ranging from 269- 1124 mm in June, 583- 1378 mm in July, 442-1000 mm in August, 155-412 mm in September respectively. The average rainfall received for these districts during SW monsoon season and annual is in the range of 1739- 3914 mm and 2108-4474 mm respectively. Inland districts receive less amount of rainfall compared to coastal districts.

The mean rainfall received for inland districts of Karnataka during SW monsoon is in the range of 55-269 mm in June, 54-319 mm in July, 71-257 mm in August 90-155 in September 289-1014 in SW monsoon and 530-1319 for the annual respectively.

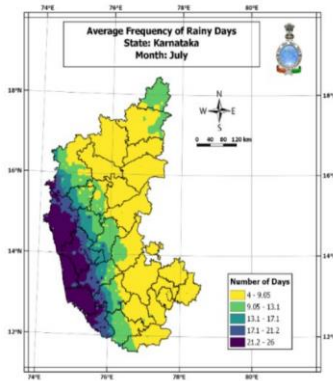
Average frequency of rainy days for the districts of the Karnataka state has been identified (see figures below). The East-West pattern in average frequency of rainy days has been observed. The coastal and

adjacent western districts indicate the higher number of rainy days while interior eastern districts record comparatively lesser number of rainy days.

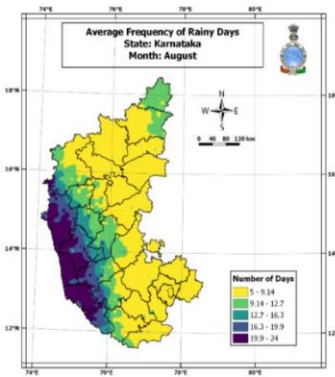
Karnataka state receives maximum rainfall in the month of July (32 % of SW monsoon rainfall) followed by August (26%), June (24%) and September (18%) and contribution of the SW monsoon rainfall to annual total is 74 %. The variability for monsoon and annual rainfall is 14.5 % and 12.7 % respectively.



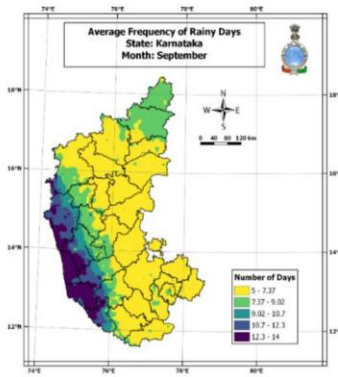
Average frequency of rainy days: June



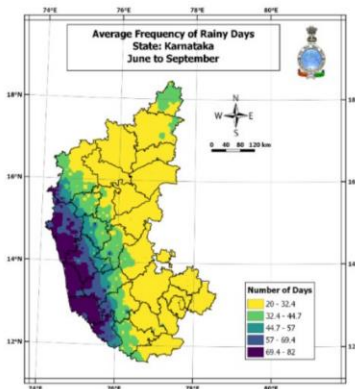
Average frequency of rainy days: July



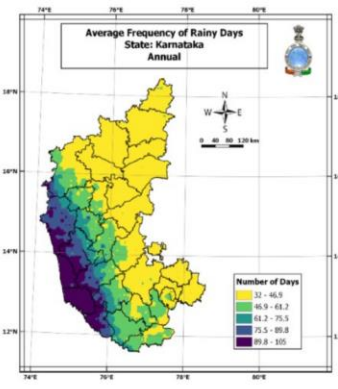
Average frequency of rainy days: August



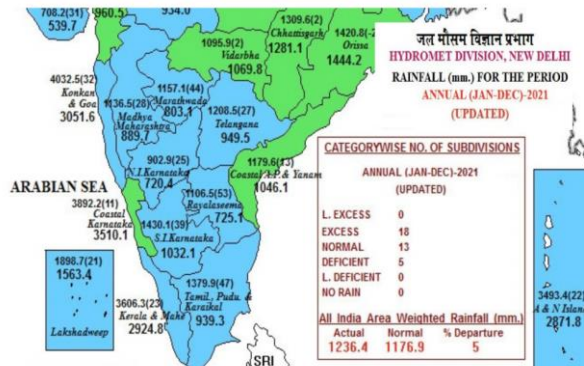
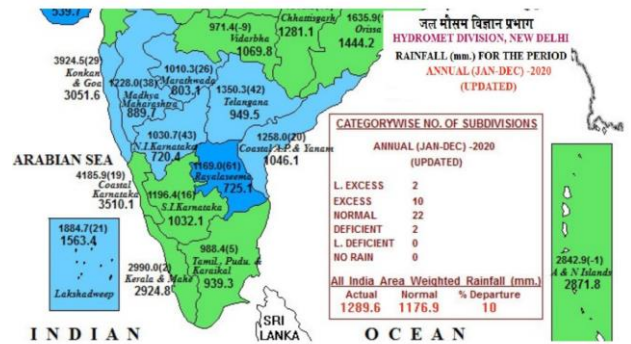
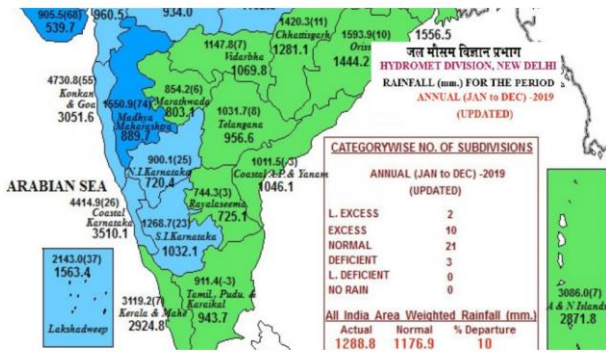
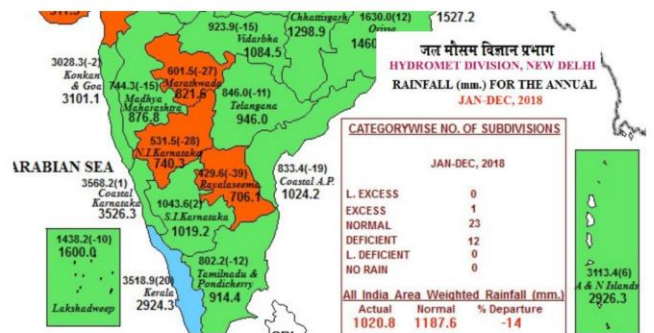
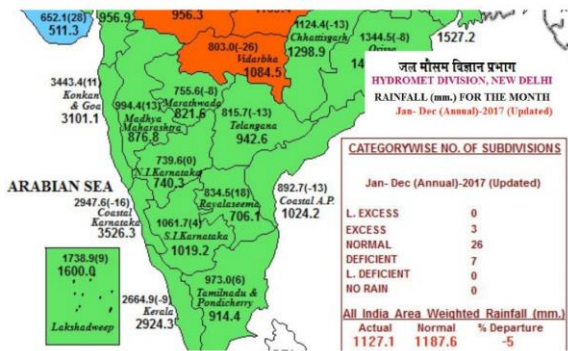
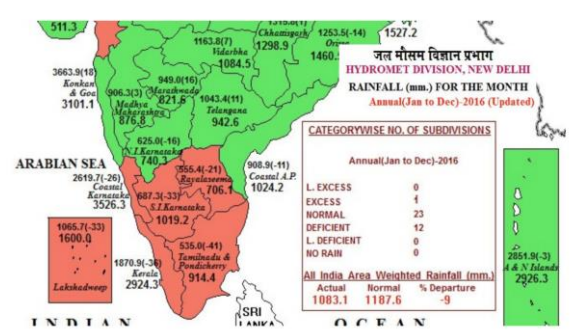
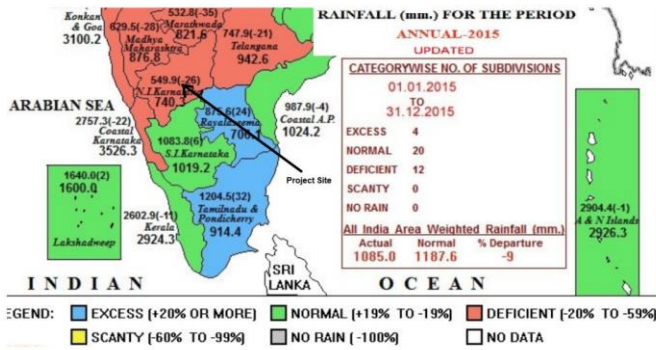
Average frequency of rainy days: September



Average frequency of rainy days: JJAS



Average frequency of rainy days: Annual





Customized Rainfall Information System (CRIS)

Hydromet Division
India Meteorological Department
Ministry Of Earth Sciences
New Delhi-110 003

Choose the States/UTs Select District.

District : BENGALURU URBAN

Note : (1) The District Rainfall in millimeters (R/F) shown below are the arithmetic averages of Rainfall of Stations under the District.
(2) % Dep. are the Departures of rainfall from the long period averages of rainfall for the District.
(3) Blank Spaces show non-availability of Data

| YEAR | JAN | | FEB | | MAR | | APR | | MAY | | JUN | | JUL | | AUG | | SEPT | | OCT | | NOV | | DEC | |
|------|-----|------|------|------|------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|------|------|------|------|
| | R/F | %DEP | R/F | %DEP | R/F | %DEP | R/F | %DEP | R/F | %DEP | R/F | %DEP | R/F | %DEP | R/F | %DEP | R/F | %DEP | R/F | %DEP | R/F | %DEP | R/F | %DEP |
| 2016 | 4.9 | 115 | 0.0 | -100 | 18.2 | 122 | 6.2 | -84 | 132.3 | 24 | 164.0 | 122 | 187.9 | 105 | 45.1 | -65 | 48.1 | -73 | 31.7 | -80 | 2.9 | -95 | 73.3 | 307 |
| 2017 | 0.5 | -78 | 0.0 | -100 | 27.4 | 234 | 26.0 | -34 | 204.6 | 93 | 32.0 | -57 | 41.1 | -55 | 231.7 | 80 | 394.5 | 118 | 259.7 | 63 | 15.1 | -72 | 11.5 | -36 |
| 2018 | 0.0 | -100 | 3.5 | -47 | 47.4 | 478 | 24.0 | -39 | 196.9 | 85 | 71.1 | -4 | 66.7 | -27 | 95.0 | -26 | 158.5 | -13 | 86.3 | -46 | 16.4 | -70 | 5.9 | -67 |
| 2019 | 0.6 | -63 | 31.8 | 500 | 0.0 | -100 | 27.4 | -32 | 142.4 | 47 | 62.7 | -13 | 59.6 | -37 | 143.5 | 14 | 187.7 | 2 | 254.1 | 71 | 35.4 | -32 | 11.0 | -14 |
| 2020 | 0.1 | -96 | 0.0 | -100 | 9.8 | -12 | 106.3 | 163 | 90.7 | -6 | 131.5 | 83 | 155.3 | 64 | 61.9 | -51 | 235.2 | 28 | 184.8 | 24 | 64.7 | 24 | 11.6 | -9 |

Source for district rainfall figures:

[https://hydro.imd.gov.in/hydrometweb/\(S\(3jgcjrzb35zqt22p0bmpa4bm\)\)/DistrictRaifall.aspx](https://hydro.imd.gov.in/hydrometweb/(S(3jgcjrzb35zqt22p0bmpa4bm))/DistrictRaifall.aspx)

Note: The most conservative data has been selected as per operation data map above vs district rainfall figures.

| Year | As per https://hydro.imd.gov.in/ | As per Hydromet division, New Delhi | Conservative figures (Lowest of A & B) |
|------|---|--|--|
| | A | B | |
| 2015 | n/a | 1083.8 | 1083.8 |
| 2016 | 713.7 | 687.3 | 687.3 |
| 2017 | 1244.1 | 1061.7 | 1061.7 |
| 2018 | 771.7 | 1043.6 | 771.7 |
| 2019 | 956.2 | 1268.7 | 956.2 |
| 2020 | 1051.9 | 1196.4 | 1051.9 |
| 2021 | n/a | 1430.1 | 1430.1 |

Baseline scenario

The baseline scenario is the situation where, in the absence of the project activity, unutilized rainwater flows uncollected into drains or is not conserved and harvested within the project boundary and hence remains unutilized. Baseline scenario, if not directly measurable, is calculated by using option 1 as per UCR Standard: -

$$\text{Harvested water or Volume of water utilized (m}^3\text{)} = \text{Area of Catchment/Roof/Collection Zone (m}^2\text{)} \times \text{Amount of rainfall (mm)} \times \text{Runoff coefficient} \times \text{Uncertainty Factor } 0.68 \text{ (1-0.32)}$$

Area applicable : 2015 onwards (Catchment 1 &2)
 : 2016 onwards (Catchment 3)

Total Catchments Area (1, 2 & 3) : 14718.11 m²

As per UCR RoU Standard: Runoff Coefficient (K) for Clayey soil (Catchment 1& 3) = 0.82 and for Gravel (Catchment 2) = 0.7

The calculations of RoUs for rainwater harvesting systems year wise are rounded down as below:

| Year | Amount of rainfall (mm) | Catchment Area | | | Runoff Coefficient | | | Uncertainty factor | RoU |
|------------------|-------------------------|----------------|-------|---------|--------------------|-----|------|--------------------|---------------|
| | | C1 | C2 | C3 | C1 | C2 | C3 | | |
| 2015 | 1083.8 | 6081.19 | 48.39 | n/a | 0.82 | 0.7 | 0.82 | 0.68 | 3699 |
| 2016 | 687.3 | 6081.19 | 48.39 | 8588.53 | 0.82 | 0.7 | 0.82 | 0.68 | 5637 |
| 2017 | 1061.7 | 6081.19 | 48.39 | 8588.53 | 0.82 | 0.7 | 0.82 | 0.68 | 8708 |
| 2018 | 771.7 | 6081.19 | 48.39 | 8588.53 | 0.82 | 0.7 | 0.82 | 0.68 | 6330 |
| 2019 | 956.2 | 6081.19 | 48.39 | 8588.53 | 0.82 | 0.7 | 0.82 | 0.68 | 7843 |
| 2020 | 1051.9 | 6081.19 | 48.39 | 8588.53 | 0.82 | 0.7 | 0.82 | 0.68 | 8628 |
| 2021 | 1430.1 | 6081.19 | 48.39 | 8588.53 | 0.82 | 0.7 | 0.82 | 0.68 | 11730 |
| Total RoU | | | | | | | | | 52,575 |

The total RoUs achieved in this monitoring period is as follows:

| Summary of the Project Activity and RoUs Generated for the Monitoring Period | |
|---|---------------|
| Start date of this Monitoring Period | 01/01/2015 |
| Water credits claimed up to | 31/12/2021 |
| Total RoUs generated | 52,575 |

Level of Assurance:

The verification report is based on the information collected through interviews conducted over video calls / phone calls, supporting documents provided during the verification, Project Concept Note / Monitoring Report (PCNMR) submitted to SQAC. The verification opinion is assured provided the credibility of all the above.

Verification Methodology:

Review of the following documentation was done by SQAC Verifier, Mr. Santosh Nair, who is experienced in such projects.

- Project Concept Note / Monitoring Report (PCNMR)
- Commissioning Report by way of written certificate from Sarpanch of the village
- Photographs and videos as evidence of the existence of the project
- Data provided upon request of all the documents of the related projects

Sampling:

Since there are only 3 Catchment Areas in question, the sampling can be considered as 100%.

Persons interviewed:

1. Ms. Shital Mahadik : Project Proponent
2. Ms. Sandhya Lakshman : Authorised representative – Oasis International School
3. Mr. Chirag : Project Team Leader
4. Mr. Rajendra Babu : Sarpanch of the village
5. Mr. Madhusudhan S : Villager

During the interview with Mr. Madhusudhan S, resident of Balegara, Kadusonnapanahalli, Karnataka, it was understood that their entire water requirements were getting fulfilled through the project comfortably and also the quality of the water was very good. They are using it for all their domestic uses which includes drinking, bathing, washing, cleaning, agriculture, etc.

According to the UCR RoU Standard principles, the project activity accomplishes the following as detailed in the PCN submitted which is reproduced below:

- (a) Increases the sustainable water yield in areas where over development has depleted the aquifer

According to the data released by the Central Groundwater Board in 2021, the total amount of groundwater that can be utilised in India in a year is 398 billion cubic meters (BCM), of which, approximately 245 BCM is currently being utilised, which is about 62 per cent of the total. But the level of exploitation of groundwater is very high in States like Punjab, Rajasthan, Haryana, Delhi and Tamil Nadu. This project activity was commissioned in April 2015, prior to the monsoon season. In 2015 the village groundwater table was very low and the village authorities were able to supply

only 40 litres of water per household with the rainwater harvest project the villagers are now able to get 250 litres of water per household. In 2019, the PP has also set up a RO (Reverse Osmosis) water filtration system to provide clean drinking water to the residents at a nominal cost. Revenue from the sale of UCR RoUs will enable scaling up of such project activities.

- (b) Collect unutilized water or rainwater and preserve it for future use

In India, at the district level, in 24 states/UTs, as many as 267 districts had stages of groundwater extraction more than 63 per cent, ranging from 64 per cent to 385 per cent (source: https://www.business-standard.com/article/current-affairs/from-58-to-63-india-pumped-more-groundwater-between-2004-and-2017-121122101377_1.html). This project activity serves as an example to recharge unutilized water and provides potable water for drinking purposes and also agricultural purposes thereby preventing over exploitation of the groundwater aquifer. The project activity also helps in groundwater recharge efforts and water security of the country.

- (c) Conserve and store excess water for future use

RWH is responsible for lessening the load on primary water sources, adding fresh and potable water availability for the masses. In the urban areas, it is shown to be beneficial by increasing the efficiency of wastewater treatment plants since the need for clean water is compensated by the harvested rainwater, to a great extent. The project activity decreases the dependence on groundwater, thereby preventing excessive depletion.

Documentation Verified:

- Project Concept Note / Monitoring Report (PCNMR)
- Commissioning Certificates
- District rainfall figures
- Operation data map

Corrective Action Requests (CARs)

Not applicable as no non-conformities has been evidenced.

Applied methodologies:

UCR Rainwater (RoU) Standard Version 2.0

Applicability of double counting emission reductions

Currently not applicable for water credits.

Issuance Period: 07 years – 01/01/2015 to 31/12/2021

RoU = Area of Catchment/Roof/Collection Zone (m²) x Amount of rainfall (mm) x Runoff coefficient x Uncertainty Factor / 1000

The calculations of RoUs for rainwater harvesting systems year wise are rounded down as below:

| Year | Amount of rainfall (mm) | Catchment Area | | | Runoff Coefficient | | | Uncertainty factor | RoU |
|------------------|-------------------------|----------------|-------|---------|--------------------|-----|------|--------------------|---------------|
| | | C1 | C2 | C3 | C1 | C2 | C3 | | |
| 2015 | 1083.8 | 6081.19 | 48.39 | n/a | 0.82 | 0.7 | 0.82 | 0.68 | 3699 |
| 2016 | 687.3 | 6081.19 | 48.39 | 8588.53 | 0.82 | 0.7 | 0.82 | 0.68 | 5637 |
| 2017 | 1061.7 | 6081.19 | 48.39 | 8588.53 | 0.82 | 0.7 | 0.82 | 0.68 | 8708 |
| 2018 | 771.7 | 6081.19 | 48.39 | 8588.53 | 0.82 | 0.7 | 0.82 | 0.68 | 6330 |
| 2019 | 956.2 | 6081.19 | 48.39 | 8588.53 | 0.82 | 0.7 | 0.82 | 0.68 | 7843 |
| 2020 | 1051.9 | 6081.19 | 48.39 | 8588.53 | 0.82 | 0.7 | 0.82 | 0.68 | 8628 |
| 2021 | 1430.1 | 6081.19 | 48.39 | 8588.53 | 0.82 | 0.7 | 0.82 | 0.68 | 11730 |
| Total RoU | | | | | | | | | 52,575 |

The total RoUs achieved in this monitoring period is as follows:

| Summary of the Project Activity and RoUs Generated for the Monitoring Period | |
|---|-----------------------------------|
| Start date of this Monitoring Period | 01/01/2015 |
| Water credits claimed up to | 31/12/2021 |
| Total RoUs generated | 52,575 (round down figure) |

Annual RoU calculation:

| Year | RoU |
|------------------|---------------|
| 2015 | 3699 |
| 2016 | 5637 |
| 2017 | 8708 |
| 2018 | 6330 |
| 2019 | 7843 |
| 2020 | 8628 |
| 2021 | 11730 |
| Total RoU | 52,575 |

Conclusions:

Based on the audit conducted on the basis of UCR Protocol, which draws reference from UCR Rainwater (RoU) Standard Version 2.0, the documents submitted during the verification including the data, Project Concept Note (PCNMR), SQAC is able to certify that the Water Credits from the project - RWH for Rainwater Harvesting Recharge Kadusonnapanahalli, Karnataka, India. (UCR ID – 155) for the period 01/01/2015 to 31/12/2021 amounts to **52,575 RoUs**