

Gold standard for the global goals
Monitoring report



June 2017, version 1

Title of the project	40 MW Orange Charanka Solar Power Project in Gujarat, India
Gold Standard project id	GS5866
Version number of the monitoring report	01
Completion date of the monitoring report	21/08/2018
Date of project design certification	19/04/2018
Start date of crediting period	04/08/2017
Duration of this monitoring period	04/08/2017 to 31/07/2018
Duration of previous monitoring period	NA
Project representative(s)	Orange Charanka Solar Energy Private Limited
Host Country	India
Certification pathway (activity certification/impact certification)	Activity Certification
SDG Contributions targeted (as per approved PDD)	1 - SDG 7 Affordable and Clean Energy 2 - SDG 8 Decent Work and Economic Growth 3 - SDG 13 Climate Action
Gold Standard statement/product certification sought (GSVER/ADALYs/RECs etc.)	GS VERs
Selected methodology(ies)	ACM0002 "Grid-connected electricity generation from renewable sources" Version 17.0
Estimated amount of annual average certified SDG impact (as per approved PDD)	84,421 tCO ₂ /Year 84,421 tCO ₂ for this monitoring period
Total amount of certified SDG impact (as per approved methodology) achieved in this monitoring period	77,000 tCO ₂

SECTION A. Description of project

A.1. Purpose and general description of project

>> The project activity is a 40 MW solar power project, promoted by Orange Charanka Solar Power Private Limited (OCSPPPL). The purpose of the project activity is to generate clean electricity with utilization of solar energy. The project activity aims to harness solar energy through installation of PV with total installed capacity of 40MWac (corresponding to 53.4MWp).

The electricity generated by the project is exported to the Indian electricity grid. The project activity therefore displaces an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid and there by reduces the associated CO₂ emissions.

Placements of the Purchase Orders i.e. start date of the project activity 19th December 2016. Commissioning Date of the project activity is 4th August 2017. The project is in continuous operation since the implementation. No unforced error or breakdown details were identified for the present monitoring period.

The Emission Reductions as per the vintage break-up (2017, 2018) in the monitoring in the following format:

04/08/2017 to 31/12/2017: **24,671 tCO₂e**

01/01/2018 to 31/07/2018: **52,329 tCO₂e**

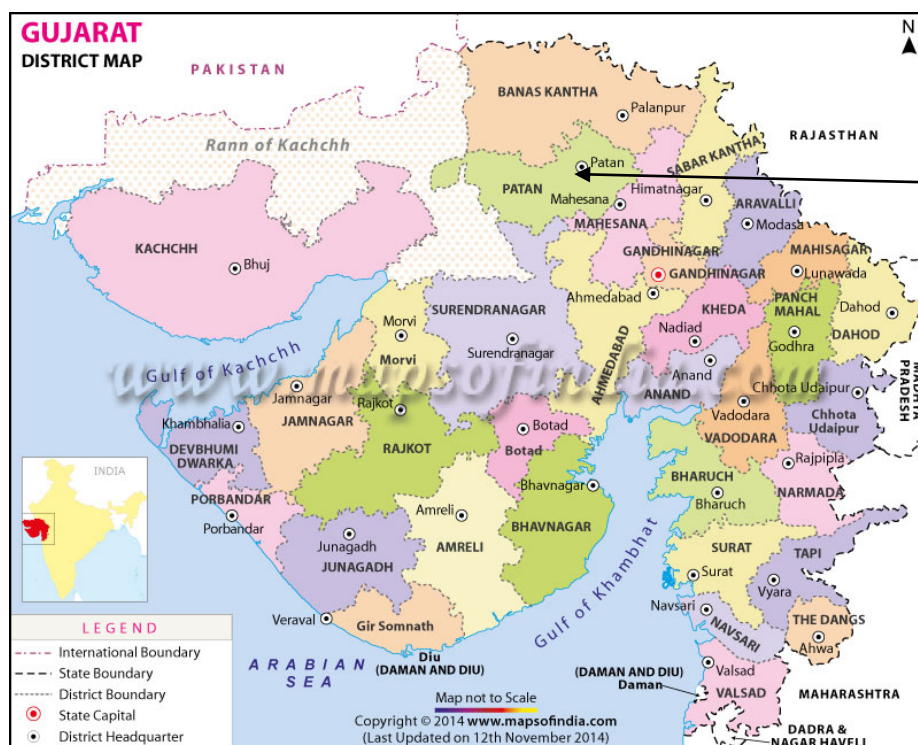
A.2. Location of project

>> OCSPPPL has installed solar PV panels at Charanka, Santalpur, District Patan in the State of Gujarat, India.

Geographical coordinates is given below:

Project Investors' Name	Latitude	Longitude	Commissioning Status
Orange Charanka Solar Energy Private Limited	23° 54' 26.45" N	71° 12' 4.79" E	4-Aug-17

The geographical location of the project site is as shown below:



Project Site

A.3. Reference of applied methodology

- >> Title: Consolidated baseline and monitoring methodology for "Grid-connected electricity generation from renewable sources"
References: Approved consolidated baseline methodology ACM0002 "Grid-connected electricity generation from renewable sources" (Version 17.0, EB 89¹)

A.4. Crediting period of project

- >> Type of Crediting Period : Renewable
 Start date of the crediting period : 04/08/2017 (Retroactive crediting start date)
 Length of the current crediting period : 7 years

SECTION B. Implementation of project

B.1. Description of implemented project

- >> The project activity aims to harness solar energy through installation of PV with total installed capacity of 40MW_{ac} (corresponding to 53.4MWp). The solar PV power plant will have solar PV modules, inverters, transformers and other protection system and supporting components as under:

Solar PV modules

Make	JA Solar	JA Solar
Technology	60-cell multi Crystalline	60-cell multi Crystalline
Model	JAP 6(K) 60 265 4BB	JAP 6(K) 60 270 4BB
Capacity	265 Wp	270 Wp

¹<http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YOHLLAR6MJ6VEU83>

No. of Modules	80784	118656
Capacity, MW (DC)	21.408 MWp	32.037 MWp
Total Capacity, MW (DC)	53.445 MWp	
Total Capacity, MW (AC)	40 MW	

Inverters

Make	ABB	Huawei
Model	PVS800-57	SUN2000-43KTL-IN-C1
Rated Capacity	1000 kVA	43 kVA
No. of Inverters	36	94
Rated Input Voltage	1000 V DC	1000 V DC

Transformers

Make	Raychem RPG	Raychem RPG	Crompton Greaves	Recons Power Equipments
Model No.	ADA1419025	ADA1419026	MT 7984	
Capacity	4000 kVA	4000 kVA	20/25 MVA	100 kVA
No. of Transformers	09	01	02	01
Voltage Ratio	4 x 380 V/ 11 kV	2 x 500 V/ 11 kV	11 / 66 kV	415 V / 11 kV

The solar PV modules have a useful life of 25 years

B.2. Post-registration changes

B.2.1. Temporary deviations from Certified Key Project Information, Project Design Document, Monitoring & Reporting Plan, applied methodology or applied standardized baseline

>> There are no deviations/delays regarding the implementation status from registered PDD, Monitoring & Reporting Plan, applied methodology or applied standardized baseline.

B.2.2. Corrections

>> Not Applicable

B.2.3. Changes to start date of crediting period

>> Not Applicable

B.2.4. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

>> Not Applicable

B.2.5. Changes to project design of approved project

>> Not Applicable

SECTION C. Description of monitoring system applied by the project

>> The export and import energy is measured continuously using Main and Check meters. Export & Import readings of Main meters is taken on monthly basis by authorized officer of Gujarat Urja Vikas Nigam Limited (GUVNL) in the presence of PP or representative of PP. Based on the readings, invoices are raised by the Project Participant. These invoices can be used for cross checking the meter readings taken for the project activity.

Months	Export (MWh)	Import (MWh)	Net Generation(MWh)
Aug-17	0	0	0
Sep-17	6060	32	6030
Oct-17	6872	36	6836
Nov-17	6276	35	6240
Dec-17	6164	34	6130
Jan-18	7552	36	7517
Feb-18	7147	31	7116
Mar-18	9015	32	8984
Apr-18	8450	30	8420
May-18	8754	30	8724
Jun-18	7388	27	7362
Jul-18	5432	31	6130
Total	79109	352	78758

Data collection and archiving

Export & Import readings from main and check meters will be collected under the supervision of the authorized representatives of PP. The net electricity supplied to grid would be calculated based on export & import readings. The period of storage of the monitored data will be 2 years after the end of crediting period or until the last issuance of CERs for the project activity whichever occurs later.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Relevant SDG Indicator	SDG13 : Climate Action
Data/parameter:	EF _{OM,y}
Unit	tCO ₂ e/MWh
Description	Operating Margin Emission Factor of INDIAN Grid
Source of data	Central Electricity Authority: "CO ₂ Emission Database
Value(s) applied)	CEA CO ₂ Baseline database Version 11" published by Central Electricity Authority (CEA), Ministry of Power, Government of India.

Choice of data or measurement methods and procedures	http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf
Purpose of data	0.9941
Additional comments	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the Simple OM approach in accordance with the procedures prescribed in the approved "Tool to calculate the emission factor for an electricity system"

Relevant SDG Indicator	SDG13 : Climate Action
Data/parameter:	EF _{BM, y}
Unit	tCO _{2e} /MWh
Description	Build Margin Emission Factor of INDIAN Grid
Source of data	Central Electricity Authority: "CO ₂ Emission Database CEA CO ₂ Baseline database Version 11" published by Central Electricity Authority (CEA), Ministry of Power, Government of India. http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf
Value(s) applied)	0.9285
Choice of data or measurement methods and procedures	Build Margin Emission Factor has been calculated by the Central Electricity Authority with the approved "Tool to calculate the emission factor for an electricity system".
Purpose of data	The data is used to calculate baseline emission reductions.
Additional comments	The Build Margin would be calculated ex ante and fixed during the crediting period. For ex ante calculation the most recent data (2014-15) available has been used.

Relevant SDG Indicator	SDG13 : Climate Action
Data/parameter:	EF _{CM, y}
Unit	tCO _{2e} /MWh
Description	Combined Margin Emission Factor of INDIAN Grid
Source of data	Central Electricity Authority: "CO ₂ Emission Database CEA CO ₂ Baseline database Version 11" published by Central Electricity Authority (CEA), Ministry of Power, Government of India. http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf
Value(s) applied)	0.9777
Choice of data or measurement methods and procedures	Combined Margin Emission Factor has been calculated with the approved "Tool to calculate the emission factor for an electricity system" as weighted average of 75% of OM (three years average) and 25% of BM for the latest year.
Purpose of data	The data is used to calculate baseline emission reductions.
Additional comments	-

D.2. Data and parameters monitored

Relevant SDG Indicator	SDG 7 : Affordable and Clean Energy																			
Data/parameter:	EG _{facility,y}																			
Unit	MWh																			
Description	Quantity of net electricity supplied to the grid during the year y.																			
Measured/calculated/default	Calculated (based on the measured values of electricity exported and imported)																			
Source of data	Share Certificate Issued by GETCL																			
Value(s) of monitored parameter	78758 MWh																			
Monitoring equipment	The electricity exported & imported are measured by Energy meter installed at substations. The reading is recorded and the difference from last month reading gives the number of units imported/exported. Two sets of energy meters (main & check) installed. The details are the meters are given below Bulk Meters of Dalot site <table border="1"> <thead> <tr> <th>Details</th><th>Main meter</th><th>Check meter</th></tr> </thead> <tbody> <tr> <td>Meter Number</td><td>GJ3845A</td><td>GJ3846A</td></tr> <tr> <td>Make</td><td>Secure</td><td>Secure</td></tr> <tr> <td>Accuracy class</td><td>0.2S</td><td>0.2S</td></tr> <tr> <td>Location</td><td>Substation</td><td>Substation</td></tr> <tr> <td>Last calibration (Before start of current monitoring period)</td><td>30/08/2017 (valid up to 29/08/2022)</td><td>06/10/2017 (valid up to 05/10/2022)</td></tr> </tbody> </table> *All the meters are of "Secure Make: with 0.2s Accuracy class.		Details	Main meter	Check meter	Meter Number	GJ3845A	GJ3846A	Make	Secure	Secure	Accuracy class	0.2S	0.2S	Location	Substation	Substation	Last calibration (Before start of current monitoring period)	30/08/2017 (valid up to 29/08/2022)	06/10/2017 (valid up to 05/10/2022)
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Meter Number	GJ3845A	GJ3846A																		
Make	Secure	Secure																		
Accuracy class	0.2S	0.2S																		
Location	Substation	Substation																		
Last calibration (Before start of current monitoring period)	30/08/2017 (valid up to 29/08/2022)	06/10/2017 (valid up to 05/10/2022)																		
Measuring/reading/recording frequency:	Measuring Frequency: Continuous Frequency of Recording: Monthly																			
Calculation method (if applicable):	Net Electricity is calculated difference between export & import which is measured by energy meter.																			
QA/QC procedures:	The net electricity is cross-checked with the invoice copies.																			
Purpose of data:	Calculation of baseline emission																			
Additional comments:	Calibration frequency: Once in 5 years as per CEA guidelines																			

Relevant SDG Indicator	SDG 13: Climate Action
Data/parameter:	Air quality
Unit	CO ₂ emission reduction and reduction in dust generation

Description	In order to reduce dust emissions during the construction phase, the following dust suppression measures stipulated and implemented: • Spraying water and covering material trucks' body to minimize dust; • Reuse of water for sprinkling of unpaved roads. • Imposition of speed controls for vehicles and unpaved site roads;
Measured/calculated/default	Calculated
Source of data	Central Electricity Authority: "CO₂ Emission Database CEA CO₂ Baseline database Version 11" published by Central Electricity Authority (CEA), Ministry of Power, Government of India. http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf
Value(s) of monitored parameter	77,000 tCO₂ emission reductions achieved during the reported monitoring period. The applied OM & BM for the project are as following: Operating Margin: 0.9941 tCO₂/MWh Build Margin: 0.9285 tCO₂/MWh The applied Combined margin for the project activity is 0.9777 tCO₂/MWh. This high emission factor signifies the fact that the electricity being fed in the Indian grid (earlier NEWNE) is highly carbon intensive. Every MWh of electricity generated by the project activity prevents further emissions. During Commissioning phase, dust generation was controlled through strict practice of control measures at site, which includes no soil piles, open trucks, controlled vehicle speed. It also includes sprinkling of water if required. The current monitoring period there has been no activity of excavation or road pavements The project makes positive impact on this parameter. It resulted in emission reductions hence is helping in climate change mitigation.
Monitoring equipment	Project logbook and the interview with the employees/local workers revealed that the project operation has minimalistic ground activities which does not result in any dust emissions.
Measuring/reading/recording frequency:	Annually
Calculation method (if applicable):	-
QA/QC procedures:	-

Purpose of data:	Baseline situation of parameter According to latest CEA official data CO₂ emissions due to electricity generation in India is 0.9777 tCO₂/GWh. (This is calculated value and sources are available in the emission reduction spreadsheet.) There was no project related activity and hence no resultant dust due to construction or project's vehicle movements. Future target for parameter Continuation of strict control measures for prevention of dust generation. Optimal operation of solar power project to generate clean energy and associated emission reductions.
Additional comments:	-

Relevant SDG Indicator	SDG 8: Decent Work and Economic Growth																	
Data/parameter:	Quality of employment																	
Unit	Number of Trainings provided to project employees																	
Description	Trainings provided to employees																	
Measured/calculated/default	Measured																	
Source of data	Training Records & Employee feedback forms																	
Value(s) of monitored parameter	4 Trainings were conducted during the monitoring period: <table><tr><th>Name of Trainings</th><th>No. of attendees</th><th>Date of Training</th></tr><tr><td>VCB Maintenance</td><td>7</td><td>16/02/2018</td></tr><tr><td>Solar I-V Test of PV modules</td><td>6</td><td>04/03/2018</td></tr><tr><td>ABB central inverter maintenance</td><td>6</td><td>24/03/2018</td></tr><tr><td>Replacement of String Inverter</td><td>8</td><td>17/07/2018</td></tr></table>			Name of Trainings	No. of attendees	Date of Training	VCB Maintenance	7	16/02/2018	Solar I-V Test of PV modules	6	04/03/2018	ABB central inverter maintenance	6	24/03/2018	Replacement of String Inverter	8	17/07/2018
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ABB central inverter maintenance	6	24/03/2018																
Replacement of String Inverter	8	17/07/2018																
Monitoring equipment	The Project personnel observes and take records in Training Records once in a year; there is no equipment to monitor it.																	
Measuring/reading/recording frequency:	Annually																	
Calculation method (if applicable):	Manually by PP representative																	
QA/QC procedures:	Transparent data collection, analysis and reporting is done to identify and record the no. of trainings provided to the employees as well as employment generated due to project activity.																	
Purpose of data :	Continuation of regular trainings/workshops for employees & O&M staffs																	
Additional comments:	The records of training & workshops have been submitted to the assessment team. The training programmes help in making the workforce efficient and skilled at their job. This not only helps the company but also adds to growth of individual employees. Thus, the project has a positive impact on the parameter.																	

Relevant SDG Indicator	SDG 8: Decent Work and Economic Growth
Data/parameter:	Quantitative employment and income generation
Unit	Number of staffs involved in the project
Description	Number of people employed directly due to the project activity
Measured/calculated/default	Measured
Source of data	Plant employment records
Value(s) of monitored parameter	Total employees : 24. Income provided to the employees for the monitoring period: : 89,35,512 INR
Monitoring equipment	The Project personnel keep the records in the employees register and records once in a year; there is no equipment to monitor it.
Measuring/reading/recording frequency:	Annually
Calculation method (if applicable):	Manually by PP representative
QA/QC procedures:	The number of persons employed would be mentioned in the plant register, which can be crossed checked with daily attendance register.
Purpose of data	To monitor the contribution to SDG 8
Additional comments:	The record of Number of employees involved in the project and the salary certificates have been submitted to the assessment team.

Relevant SDG Indicator	SDG 8: Human and Institutional Capacity
Data/parameter:	Health Camps, Knowledge and information dissemination regarding natural disasters.
Unit	Total number of beneficiaries of the initiatives undertaken by the Project Developer to enhance the human and institutional capacity of the local stakeholders.
Description	No activity related to the improvement of basic education, health, improve quality of life and basic infrastructural improvement projects to facilitate human and institutional capacity development occurred during monitoring period.
Measured/calculated/default	-
Source of data	Photographs, cheques, donation receipts, CSR reports and other supportive documentation on reporting as provided.
Value(s) of monitored parameter	0
Monitoring equipment	-
Measuring/reading/recording frequency:	-
Calculation method (if applicable):	-

QA/QC procedures:	-
Purpose of data :	To monitor the contribution to SDG 3 (Ensure healthy lives and promote well-being for all at all ages)
Additional comments:	-

D.3. Implementation of sampling plan

No sampling process is involved, hence not applicable. The details of sampling any of carried out during the course of verification will be included.

SECTION E. Calculation of SDG outcomes

E.1. Calculation of baseline value or estimation of baseline situation of each SDG outcome

In the baseline, there were no Social Development activities taking place; whereas baseline Emissions for electricity supplied by project activity, BE_y is calculated as:

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

Where,

BE_y = Baseline emissions in year y (tCO₂/yr)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr).

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO₂/MWh)

Thus the estimated baseline situation of each SDG outcome are summarised as follows:

Item	Baseline estimate
SDG 7: Affordable and Clean Energy	No Activities in the baseline
SDG 8: Decent Work and Economic Growth	No Activities in the baseline
SDG 13: Climate Action	Emission of 77,000 tCO ₂

E.2. Calculation of project value or estimation of project situation of each SDG outcome

>> The company conducts regular surveys during construction as well as O&M phases in the villages near project locations to check the requirement of facilities by the villages and the SDGs impacted in this monitoring period.

SDG 7: Ensure access to affordable, reliable, sustainable and	Method: Monitored through energy meter. Net electricity will be calculated by GETCL and PP representative on monthly basis and provided in the share certificate. Frequency: Monthly
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modern energy for all	<u>QA/QC procedures:</u> Net electricity supplied to the grid by the project activity will be cross checked with invoices submitted to EB. <u>Purpose:</u> To measure the electricity produced and supplied to the grid SDG.
SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	<u>Method:</u> Ongoing data collection <u>Frequency:</u> Annually <u>Purpose:</u> To identify and record the number of trainings provided to the employees as well as employment generated due to project activity.
SDG 13: Take urgent action to combat climate change and its impacts	<u>Method:</u> Monitored through energy meter. Net electricity will be calculated by GETCL and the PP representative on monthly basis and provided in the share certificate. Further, the emission factor is calculated using "Tool to calculate the emission factor for an electricity system", v5 and referencing data from CEA database v11. <u>Frequency:</u> Every monitoring period <u>Purpose:</u> To calculate emissions avoided due to the project activity

E.3. Calculation of net benefits as difference of baseline and project values or direct calculation for each SDG outcome

Item	Baseline estimate	Project estimate	Net benefit
SDG 7: Affordable and Clean Energy	86,347 MWh	78,758 MWh	78,758 MWh
SDG 8: Decent Work and Economic Growth	0	0	4 Training INR : 89,35,512 24 Staff
SDG 13: Climate Action	84,421 tCO₂ No impact on aesthetics	0 No impact on aesthetics	77,000 tCO₂ No impact on aesthetics

E.4. Summary of ex-post values of each SDG outcome for the current monitoring period

Item	Baseline estimate	Project estimate	Net benefit
SDG 7: Affordable and Clean Energy	86,347 MWh	78,758 MWh	78758 MWh
SDG 8: Decent Work and Economic Growth	0	-	4 Training INR : 89,35,512 24 Staff
SDG 13: Climate Action	77,000 tCO ₂ No impact on aesthetics	0 No impact on aesthetics	77,000 tCO ₂ No impact on aesthetics

E.5. Comparison of actual value of outcomes with estimates in approved PDD

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 7: Affordable and Clean Energy	86,347 MWh	78,758 MWh
SDG 8: Decent Work and Economic Growth	-	4 Training INR : 89,35,512 24 Staff
SDG 13: Climate Action	84,421 tCO ₂ No impact on aesthetics	77000 tCO ₂ No impact on aesthetics

E.6. Remarks on difference from estimated value in approved PDD

Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
SDG 7: Affordable and Clean Energy	86,347 MWh	78,758 MWh
SDG 8: Decent Work and Economic Growth	-	4 Training INR : 89,35,512 24 Staff

SDG 13: Climate Action	84,421 tCO ₂ No impact on aesthetics	77000 tCO ₂ No impact on aesthetics
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The actual achieved emission reduction for this monitoring period is 8.79% less than estimated value in the PDD as the generation depends on the solar conditions. Also it does not have a material impact on the additionality.

SECTION F. Stakeholder inputs and legal disputes

F.1. List all inputs/grievances which have been received for the project during the monitoring period together with their respective answers/actions

No grievances received for the project during the monitoring period together with their respective answers/actions.

F.2. List all inputs/grievances from previous monitoring period where follow up action is to be verified in this monitoring period

No grievances received in the previous monitoring period, thus no follow up required.

F.3. Provide details of any legal contest or dispute that has arisen with the project during the monitoring period

No legal contest or dispute that has arisen with the project during the monitoring period.