

Darwin Plus: Final Report

To be completed with reference to the “Project Reporting Information Note”:
(<https://darwinplus.org.uk/resources/information-notes/>).

It is expected that this report will be a **maximum of 20 pages** in length, excluding annexes.

Submission Deadline: no later than 3 months after agreed end date.

Submit to: BCF-Reports@niras.com including your project ref in the subject line.

Darwin Plus Project Information

Project reference	DPLUS103
Project title	Saint Helena Climate Change and Drought Warning Network
Territory(ies)	St Helena
Lead Partner	St Helena Government (Environment Natural Resources and Planning Portfolio)
Project partner(s)	Connect Saint Helena, Saint Helena Research Institute, Arctium, UK Centre for Ecology & Hydrology, UK Met Office
Darwin Plus Grant value	£298,335
Start/end date of project	April 2020 – March 2023
Project Leader name	Darren Duncan
Project website/Twitter/blog etc.	https://www.arctium.co.uk/dplus103-climate-change-and-drought-warning-network/
Report author(s) and date	Darren Duncan, Murray Henry, Ben Sansom, Robert George

1 Project Summary

Project Location

The project is based on St Helena, a British Overseas Territory located in the South Atlantic Ocean. The island is formed from an extinct volcanic sea mount, has a sub-tropical climate and lies 4,000km east of Brazil and 1,950m west of Namibia. The nearest land is Ascension Island, which is located 702m north west of St Helena. The island covers an area of 122km² (47sq miles) and is similar in size to the islands of Jersey and Bute. Due to its volcanic origins, the island rises steeply from sea level to a central ridge of peaks that form a rugged and highly eroded volcanic terrain. Habitat zones include semi desert at sea level through to cloud forest at a maximum height of 823m above sea level. A location plan is presented in Figure 1 overleaf.

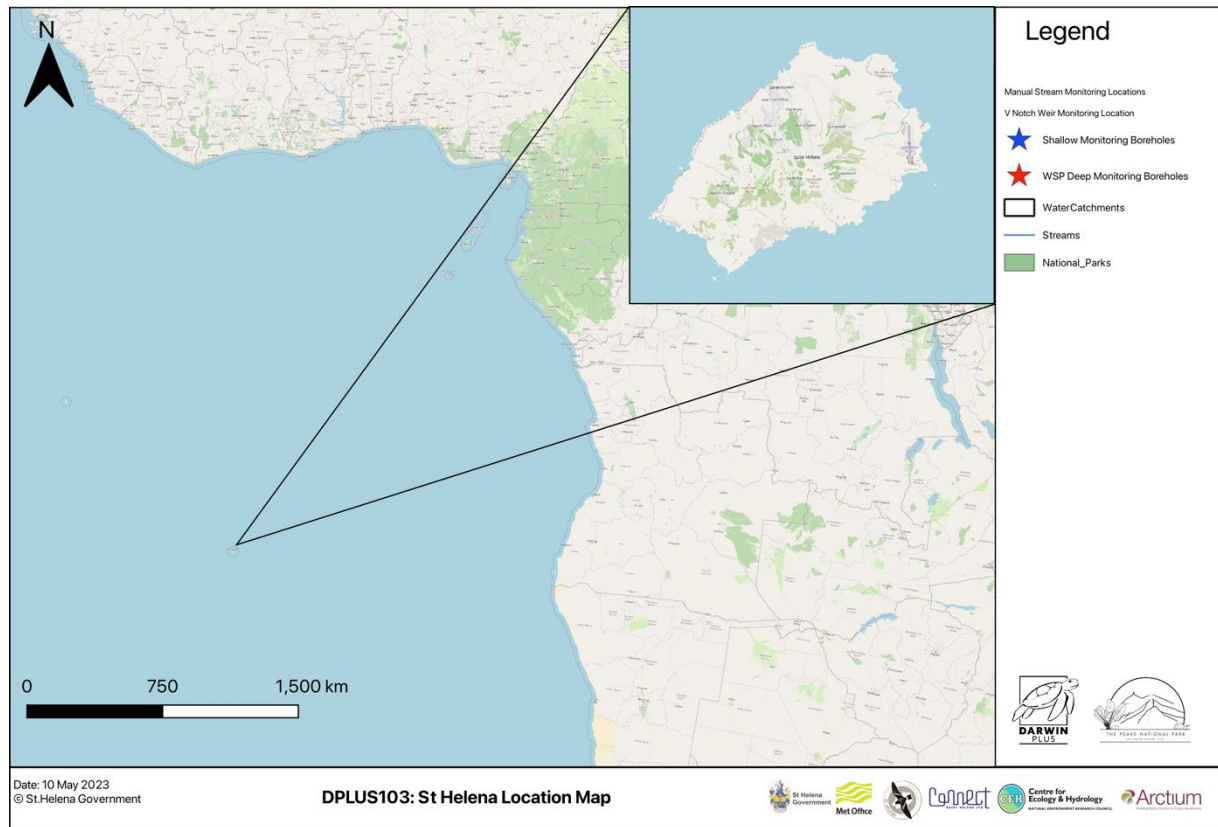
The Problem, Identification and Relevance

The provision of water on St Helena is intimately linked to the distribution of habitats and in particular the cloud forest area above 650m. Previous work (DPLUS051, CEH 1990’s work) has demonstrated that native habitats function more effectively as hydrological units than introduced systems. These native habitats are the last refuges of St Helena’s rich endemic flora and fauna but they are threatened by multiple drivers of extinction, e.g. plant pathogens, invasive species habitat loss, genetic erosion and climate change.

Previous water resource studies have been limited in scope and duration leaving significant knowledge gaps concerning the island’s geology, aquifers, springs and streams. The measurement of annual stream discharge across the island has never been achieved and an

island water balance has only been attempted on two occasions using limited data sets (Mathieson, 1988 and Halcrow, 1969). Groundwater recharge was last estimated in 1982.

Figure 1: St Helena Location Map



In 2018, the outputs from DPLUS051 and a workshop held by Saint Helena Government were used to develop The Peaks National Park Management Plan SHG (2019)¹. The management plan comprises three “pillars” of which water is the second – Water Security and Climate Change Resilience Objectives. This Darwin project (DPLUS103) was developed to complete water and climate research gaps identified in Section 3b1 of the Peaks Management Plan.

Environment and Climate Change Challenges Being Assessed

A robust baseline data set is needed to assess the islands current water resources (using data from the monitoring networks established by DPLUS103) and provide new information linking the islands geology, hydrogeology and hydrology monitoring network. A more comprehensive long-term climate dataset is also needed across the island to assess the variability in climate and provide more realistic predictions of change.

This more accurate and comprehensive climate data set coupled with a detailed island water balance will be used to support water infrastructure planning, habitat management (to effectively manage habitat for near extinct species such as the St Helena false gumwood), agricultural development, demand forecasting, drought planning, climate change resilience mitigation and water efficiency/water demand reduction measures.

How Did the Project Address These Challenges?

The impact the project has made is to provide a more robust climate and water resource data set that will enable evidence based decision-making concerning the impacts of drought and climate change.

¹ Saint Helena Government (2019). St Helena The Peaks National Park Conservation Management Plan 2019 to 2024

This has been achieved through delivering the project outcome: Develop and operate a climate and water resource data collection network on St Helena with data management and reporting protocols. The project has written 2 technical reports which are provided in Annex 2 and Annex 3 of project reporting evidence, with data from the monitoring networks provided in Annex 4. The reports are titled:

- Annex 2. DPLUS103 Climate Change and Drought Warning Network Vol 1: Climate.
- Annex 3. DPLUS103 Climate Change and Drought Warning Network Vol 2: Water Resources.
- Annex 4. Climate and water resource data sets.

Both reports describe the development of a climate monitoring network and a water resource monitoring network (groundwater and surface water) on St Helena. The first 18 months of data have been processed and presented in the reports alongside more detailed descriptions of the islands hydrogeology, geology and water chemistry. Data for 2022 has been interpreted. All of this new information is being used by Saint Helena Government and Connect Saint Helena, the islands water and electricity utility, to improve the islands responses to drought and plan to mitigate the impacts of climate change on the islands natural water supply. The islands weather forecasts have been improved as a result of all the additional weather station data being collected through DPLUS103 which is now linked to the islands UK Met Office managed weather stations at Bottom Woods and at St Helena Airport. The daily weather forecasts are published by the meteorological team at the airport. Forecasts are published as a weather widget and downloadable report on the Saint Helena Government web site (<https://www.sainthelena.gov.sh/> front page) and broadcast by the islands 2 radio stations.

Data collected from DPLUS103 is now being used for two other water resource projects on the island to enable better long-term water plans. The first is the islands Water Resource Management Plan. This document is in its early planning stages and is being developed between Connect Saint Helena, Saint Helena Government and the UK Governments Foreign Commonwealth and Development Office (FCDO).

The second stage is the FCDO funded St Helena Cloud Forest Project which runs between 2021 and 2025. The Cloud Forest Project has provided co-funding for DPLUS103 and enables the continued funding and development of DPLUS103 project outputs which have been impacted by the Covid-19 pandemic.

2 Project Partnerships

DPLUS103 is led by the Director of the Environment Natural Resources and Planning Portfolio (ENRP) in Saint Helena Government. A Project Steering Group (PSG) comprised of the key project partners has met quarterly and comprises key island and international stakeholders (Saint Helena Government, Connect Saint Helena, UK Met Office, UK Centre for Ecology and Hydrology and Saint Helena Research Institute). The PSG meeting minutes are provided in Annex 1 as evidence of project progress and decision making.

All key project partners formed the PSG and have supported the writing and preparation of the final report (and technical reports). Stakeholder and project partner roles are described below:

St Helena Based Project Partners

- **Saint Helena Government.** The SHG project team directed the project, provided project management support, managed project finances and chaired the PSG meetings. The team also delivered the climate monitoring network elements of the project which

comprised the design, installation and operation of the Automatic Weather Station monitoring network from Bottom Woods Met station on island.

- **Connect Saint Helena.** Connect Saint Helena manage and maintain the islands water resource infrastructure and are the primary responder to water shortages and drought. Connect Saint Helena have provided guidance concerning strategic water resource management planning and development of the groundwater and surface water monitoring network. Connect Saint Helena staff have supported the design of all geology, hydrology and hydrogeology surveys/investigations. In addition, Connect Saint Helena have contribute technical expertise as a member of the Project Steering Group, reviewed technical reports and provided advice and support on the procurement of water resource monitoring equipment. Connect Saint Helena have also hosted and managed the project Water Resource Monitoring Technician (WRMT).
- **Saint Helena Research Institute (SHRI).** SHRI have contributed technical expertise as a member of part of the Project Steering Group and supported project implementation through to the delivery of specified activities including staff to provide group co-ordination support for Output 4, data management and data archiving protocol support. The SHRI is a new organisation which was officially launched in November 2019. The project fits squarely within institute functions and activities, specifically to support research, to manage data and to promote and communicate research.

International Project Partners

- **UK Met Office.** UK Met Office fund the Bottom Woods Met Station on Saint Helena, and supported the design of the AWS climate monitoring network. The Met Office have provided technical support for procuring climate monitoring equipment, management of climate data collection, data set validation, distribution of audited data, reporting standards and format of more detailed island weather forecasts. In addition, UK Met Office have made a significant contribution to technical report Volume 1.
- **UK Centre for Ecology and Hydrology (UK CEH).** UK CEH has a long history of providing ecology, climate change and water resource research and technical support for environmental projects on Saint Helena. UK CEH provided a technical review of the project design and have continued to provide technical support to the water resource project team (groundwater, surface water and mist/rain data collection and data interpretation). UK CEH have provided guidance through the Project Steering Group as well as through direct contact with the water resource team. UK CEH provided feedback and support with the Volume 2 technical report.
- **Arctium.** The team at Arctium delivered the DPLUS051 project, a 2.5 year mist capture and cloud forest restoration project on Saint Helena alongside SHG, Connect Saint Helena and UK CEH. Arctium supported the design of the DPLUS103 project and have lead the water resource and geological elements of the project with the support of Connect Saint Helena and UK CEH. Deliverables included the desk study archive work, water features survey, design of a water monitoring network across the island, geophysics and geology surveys, training the Water Resource Monitoring Technician, hydrology and hydrogeology investigations and interpreting water resource and geology data. The Arctium team co-authored and edited the Volume 1 technical report and co-authored the Volume 2 technical report.

Note: See Volume 1 and Volume 2 technical reports in Annex 2 and 3 and project data in Annex 4 as evidence of work completed by the project partners.

The project partners and PSG have demonstrated their commitment as a team and success during difficult times for the following key reasons:

1. Covid-19 Global Pandemic

The first 18 months of the project were significantly impacted by the Covid-19 global pandemic. Covid-19 restrictions on international travel between the UK and Saint Helena delayed international team members from arriving on island until January 2022, resulting in all Year 1 international team member fieldwork activities being cancelled or postponed until Year 2 and Year 3. Fieldwork time was also lost due to necessary 10 day quarantine restrictions on arrival, which further reduced time in the field in Year 2. Restrictions also delayed international training activities for team members based on St Helena and local training with international team members.

The project team worked with the UK Government to re-base the project several times to reflect changes in the Year 1 and Year 2 project programme, however these delays have resulted in most of the project deliverables being undertaken within the second half of the 3 year project.

Residual impacts have been a reduced baseline data set to interpret, due to the delays setting up climate monitoring and water resource monitoring equipment.

Despite these Covid-19 setbacks, the team were in regular communication and provided on-line training for the WRMT and Connect Saint Helena staff during international travel restrictions. See all the project half-year reports and annual reports in Annex 1 as evidence. The following web link provides access to the Saint Helena Government Covid-19 press release archive:

<https://www.sainthelena.gov.sh/coronavirus-covid-19/covid-19-press-releases-archive/?highlight=covid+19>

2. New Tree Diseases on St Helena

A plant pathogen study was undertaken across the island in October 2022 (as part of DPLUS104) by a team from the Centre for Agriculture and Bioscience International (CABI). The CABI team identified a Phytophthora infection in a number of trees which were dying in the Peaks tree nursery, within the Peaks habitat areas, George Benjamin arboretum and in the Scotland tree nursery. The disease was found in Whitewoods, Dogwoods, She Cabbage, Bastard Gumwood and Redwood trees. Three other potential lethal pathogens have been detected including *Ilyonectria*. Isolation experiments are to be carried out this year to determine pathogen species identifications and which of the pathogens are causing the dieback.

Based on the findings of the study SHG formed a multi-agency Task Group to develop an action plan for controlling the plant diseases. In November 2022 the Task Group restricted access to the Peaks where several of the DPLUS103 mist and rain dataloggers, automatic weather stations and water level monitoring sites are located. The DPLUS103 project team have worked with the Task Group and their Technical Advisory Group (TAG) to arrange limited, controlled access to the Peaks so that project data can be collected.

Protocols implemented by the TAG have resulted in significantly less frequent data downloads since November 2022. The impact on DPLUS103 has been to limit the interpreted data set to data collected until the end of December 2022. Data has been collected in the first quarter of 2023 but is not available for interpretation due to time constraints. This data will be interpreted during the 2023/24 financial year when the DPLUS103 project team transfer across to Year 3 of the Cloud Forest Restoration Project.

The DPLUS103 project team are continuing to collect data in impacted parts of the island, as and when permitted, and are working with SHG and the TAG to ensure post project monitoring can continue.

<https://www.sainthelena.gov.sh/2022/press-releases/new-tree-disease-affecting-st-helenas-endemic-trees/?highlight=pathogen>

<https://www.sainthelena.gov.sh/2023/news/increasing-concern-over-plant-diseases-in-the-peaks-national-park/?highlight=pathogen>

<https://www.sainthelena.gov.sh/2023/news/access-to-peaks-national-parks-prohibited-until-december-2023/?highlight=pathogen>

Challenges and Lessons Learned

Challenges have been addressed through collaborative working, with solutions described in the technical reports provided in Annex 2 and Annex 3. The project partners have a long history of working together and understand the constraints of working on a very remote island where communications and transport links can sometimes be unreliable. The delivery of cargo can also be a challenge, with large items and equipment taking up to 3 months to reach the island.

An agreement was made during the grant application stage that the Water Resource Monitoring Technician (WRMT) role would transfer to the Environmental Management Division (EMD) of ENRP in Saint Helena Government. Funding is in place for a permanent WRMT role in EMD.

Some key challenges were around remote working and training and are described below:

1. The provision of training has been challenging due to the limited broadband connection between St Helena and the mainland. This method of delivering training was needed due to Covid-19 international travel restrictions, as team members from the UK had planned to deliver the training locally during Year 1 and complete water features surveys with the WRMT. Instead, training was limited to a number of online training sessions to provide an introduction to water resources and monitoring networks (see Year 1 Report in Annex 1 and presentations in Annex 5). Training videos and documents were sent to the WRMT to supplement regular contact on Microsoft Teams to trouble shoot issues and to deliver formal training modules.
2. Field training during Year 2 improved as the international project team were able to provide 4 weeks of on the job training, ranging from fieldwork data collection to formal office based learning. This training was very helpful for the wider project team and project partners, however the principal recipient of the training, the WRMT, resigned and left their post in February 2022. As a consequence, the wider project team had to start training a new WRMT from March 2022 from first principles as none of the wider project team were able to take on the full-time role due to their other duties.
3. A dedicated internet connection was provided for the WRMT which has allowed for more frequent communications with the international project team. A weekly Microsoft Teams meeting was started in Year 2 between the WRMT and Arctium so that project problems can be discussed and solutions identified. These meetings are also used to reinforce classroom training and field training.

Another key lesson has been to purchase more spare parts for equipment to avoid gaps in data whilst new parts are shipped, or air freighted to St Helena (airfreight has only become an option in Year 3).

Achievements and Opportunities

The project team achieved a number of novel research achievements on St Helena:

- Using geophysics for the first time on the island to look at the underlying geology in several key water catchments on St Helena, which were more successful than the project team had anticipated (See Volume 2 report in Annex 3).
- Completed the first borehole camera surveys on the island to assess the condition of deep boreholes drilled in 2017 (See Volume 2 report in Annex 3).
- Installed the first automatic weather station network which uses the mobile phone network to telemeter data to Bottom Woods Met Station in real time (See Volume 3 report in Annex 3).

3). Note: the mobile phone network was only switched on in 2016. This is the first scientific equipment to provide real-time data on the island.

- The new climate data sets are already contributing to further scientific research on the island as it is accessible to all. SHRI is co-ordinating a number of Doctoral research projects with partner Universities. This data will increasingly become important for understanding the impacts of climate change in relation to conservation and environmental management, agriculture and forestry (<https://sthelenaresearch.edu.sh/>).

During the second year of DPLUS103 a 4 year parallel project called the Cloud Forest Restoration Project started (<https://www.sainthelena.gov.sh/2021/press-releases/the-st-helena-cloud-forest-project/?highlight=cloud+forest+project>). The Cloud Forest Restoration Project (2021 to 2025) is funded by the FCDO, managed by the Royal Society for the Protection of Birds (RSPB) and supports research activities associated with Section 3b2 and 3b3 of the Peaks Management Plan water pillar (see Annex 1). The majority of the DPLUS103 project team have also been involved in the Cloud Forest Restoration project. The Cloud Forest Restoration Project water pillar activities compliment and expand upon the DPLUS103 water pillar activities and have provided additional data for the Darwin Plus project. The Cloud Forest Project has enabled the Darwin Plus team to expand the water resource and climate monitoring networks and interpreted data set through additional funding to support the purchase of the following equipment:

- Additional Davis Automatic Weather Stations (AWS) and Hobo datalogger rain gauges.
- Additional LevelScout water level dataloggers.
- A borehole camera system.
- An ABEM Terrameter LS2 geophysics resistivity instrument.
- Funding the following parallel projects and surveys:
 - A canopy drip experiment within the Peaks National Park.
 - Soil surveys and infiltration tests within the Peaks National Park.
 - A stable isotope water chemistry project.

At the time of writing the WRMT role has remained with Connect Saint Helena as it is being funded until 2025 by the Cloud Forest Project. The role will then transfer to Saint Helena Government as originally planned at the start of DPLUS103. The Cloud Forest Project also enables the DPLUS103 data sets to continue being interpreted by the international project team and allows more time for capacity building on St Helena due to time lost because of the Covid-19 restrictions. Some elements of DPLUS103 that have not been fully explored can now be interpreted in full by March 2024 (see Annex 2 and Annex 3 reports).

DPLUS103 has also been promoted through the activities of Darwin initiative project 28-022 "Restoring the Water Tower Cloud Forests of Kenya's Taita Hills" (See Annex 3 for the project water resource desk study and <https://www.darwininitiative.org.uk/project/DAR28022/>). The project is being managed by the RSPB and Nature Kenya and has a cloud forest water resource element. A representative from the DPLUS103 project team presented the DPLUS103 project to the Kenya Water Towers Authority in 2022 when discussing options for assessing the water resources and climate of the Taita Hills cloud forest. Lessons learned from DPLUS103 have been used to inform the design of the Taita Hills mist and rain monitoring pilot study. At the time of writing some of the St Helena Cloud Forest Project team who have also worked with the DPLUS103 team on St Helena are visiting the Taita Hills project as part of a knowledge exchange programme.

3 Project Achievements

Tables provided at the start of each section show where evidence demonstrating progress against the project logframe can be found in the technical reports (Annex 2 and Annex 3).

3.1 Outputs

Output 1. Climate and Water Resource Data Sets

Table 3-1: Technical report progress against the project logframe – Output 1

Logframe Outputs	Measurable Indicators	Evidence/Report Sections
1. Climate and Water Resource Data Sets	1.1 Development of a historic climate and water resource data set archive (YR1).	Volume 1 Section 2 and Volume 2 Section 2.
	1.2 Collection of new baseline climate and water resource field data completed by end of Year 3.	Volume 1 Sections 3 and 4 and Volume 2 Sections 4 and 6.
	1.3 New standards for data collection, archive and reporting established (YR1).	Volume 1 Section 5 and Appendix 2. Volume 2 Appendix 2.

The project achieved Output 1, however due to the global Covid-19 pandemic some of the measurable indicators were delivered in Year 2 rather than planned for Year 1.

Indicator 1.1. Due to Covid-19, the collation of archive reports and data sets was completed by the team on island in Year 2, with remote support provided by the international team (email and videocall). Annex 6 comprises the digitised data archive. The cornerstone of the project desk study has been the completion of an archive data collection and digitisation project which identified and digitised 35 climate and water resource reports found at various institutions across the island. Before the project started, there was no comprehensive repository of archive climate, geology and water resource data for the island. The digitised documents now form a core repository of geology, water resource and climate data which is hosted by SHRI. In several cases documents were thought to be lost as they were not located with the originating institution, however copies were found with former employees or project partners. The digitisation programme has provided the documents in several digital formats for use by future researchers.

Indicator 1.2. New baseline climate data, groundwater data and stream data has been collected from over 40 locations across the island (see Table 3-2). Regular stream flow measurements have only been taken during the 1980's, with a very limited baseline before and after that period.

Table 3-2: Monitoring Network

Equipment	Measurement Parameter	No.
LevelScout data logger (10m and 60m range)	Surface water level and groundwater level	10
BaroScout barometric data logger	Atmospheric pressure for LevelScout calibration	2
Diver data logger (10m range)	Surface water and groundwater level measurement	5
Diver barometric logger	Atmospheric pressure for Diver calibration	1
GeoPacks portable stream flow meter	Spot flow gauging and weekly manual gauging	2
Hobo rain gauge data logger (RG3M) – direct rainfall and mist measurement	Measurement of direct rainfall, canopy drip and mist interception.	12

Equipment	Measurement Parameter	No.
RBC portable flume (0.1-8.7 l/s) with Data Logger	Stream flow measurement	1
MicroSiren ultrasonic data logger	Stream flow measurement.	1
Automatic weather stations	Temperature, barometric pressure, wind speed, wind direction, dew point, sunshine hours, rainfall	7
Hobo U23-001 temperature and RH data loggers	Temperature and relative humidity measurement	17
Tiny Tag TGP-4500 temp and humidity loggers	Temperature and relative humidity measurement	21
Hannah Instruments HI991300 multiparameter meter	In-situ water chemistry (Temperature, Electrical Conductivity, PH).	1
Catchpits	Concrete catchpits for measuring water depth in streams where Connect Saint Helena have off-takes for the islands water distribution network.	3
V-notch weir	Concrete weirs for measuring water depth and flow in streams where Connect Saint Helena have off-takes for the islands water distribution network.	9
Boreholes	Groundwater level measurement	6

Monthly data collection is ongoing, however during the DPLUS103 project programme up to 27 months of continuous data have been collected at new monitoring locations and over 47 months of continuous data collected for monitoring locations that were part of the old DPLUS051 monitoring network (see Annex 2 and Annex 3 reports for evidence and data sets provided in Annex 4).

Indicator 1.3. New standards for data collection were completed in Year 2 due to Covid-19 delays. A detailed assessment of reporting standards for climate data are presented in Annex 2. Standards for groundwater and surface water data collection were established during development of the monitoring network and have informed the data collection methodology at each location (see Appendix 2 of the Water Resource report in Annex).

Output 2. Geology and Hydrogeology Conceptual Model

Table 3-3: Technical report progress against the project logframe – Output 2

Logframe Outputs	Measurable Indicators	Evidence/Report Sections
2. Geology and Hydrology Conceptual Model	2.1 New island geology data collection completed to better understand island water resources (YR2 & YR3).	Volume 2 Sections 5 and 7. Separate geophysics report.
	2.2 New hydrology and hydrogeology data collection completed to better understand island water resources (YR3).	Volume 2 Sections 4, 6, 7 and 9.
	2.3 First island water balance using long term data sets (YR3).	Volume 2 Section 10.

Output 2 has been completed, however more time is needed to interpret the large amount of geophysics and water resource data collected during Year 3.

Indicator 2.1. An assessment of new geology data for the island is presented in Sections 5 and 7 of the Volume 2 Water Resource technical report (see Annex 3). The results of Output 2 are

more detailed than previous interpretations of the geology of the island using field walking and borehole drilling techniques.

Due to the large quantities of data collected, the technical report provides an overview of the geological conceptual model. A full geophysics report has been provided as a separate supporting document in Annex 3. Due to Covid-19 related delays starting geophysics surveys until Year 3 of the project and the complex nature of the island vulcanology, more time will be needed to fully explore the data sets collected as part of DPLUS103.

A final version of the interpreted geological and geophysics data sets will be completed during Year 3 of the Cloud Forest Project where additional geophysics surveys funded by the FCDO will fill in gaps in knowledge and compliment the DPLUS103 data sets.

Indicator 2.2. The new stream flow data and groundwater data tied in with the geology and geophysics data have provided new insights into how water flows in key water catchments across the island. Additional time provided by Year 3 of the Cloud Forest Project will enable the team to interpret the lag time between rainfall/mist events and changes in stream level and flow as a longer data set will be available.

Indicator 2.3. A baseline assessment of previous island water balances and a new water balance are presented in Section 10 of Volume 2 Water Resource technical report (see Annex 3). The new water balance using project monitoring data has used a shorter project data set due to Covid-19 delays starting the project and getting equipment onto the island. A more detailed water balance will be completed during Year 3 of the Cloud Forest Project (2023 to 2024) as a continuation of the DPLUS103 work. The water balance will improve as the data set increases over time.

Output 3. Climate change and drought warning plan

Table 3-4: Technical report progress against the project logframe – Output 3

Logframe Outputs	Measurable Indicators	Evidence/Report Sections
3. Climate Change and Drought Warning Plan	3.1 Climate Change and Drought Warning Plan published (YR3).	Volume 2 Section 11.
	3.2 Publicity and promotion/outreach (public communications and minimum of 1 x public consultation events) by end of Year 2.	Volume 2 Section 3.
	3.3 Climate change and drought warning plan integrated within the island Water Resource Management Plan and adopted by SHG Environment and the Natural Resources Committee as a national plan (YR3).	Volume 2 Section 11 and Appendix 5.

This output has been partially completed due to delays in the development of a national Water Resource Management Plan by Saint Helena Government and Connect Saint Helena. The Climate Change and Drought Warning Plan review and adoption is directly linked into Water Resource Management Plan decision making.

Output 3.1. A draft climate change and drought warning plan has been developed and can be found in technical report Volume 2 in Annex 3. The plan still needs to be considered as part of a national emergency planning response. The adoption of the plan needs to be made between Connect Saint Helena and Saint Helena Government as it is a national strategic emergency plan. A review of the Climate Change and Drought Warning Plan and progress with the Water Resource Management Plan have been delayed due to the national response to Covid-19 and managing the after effects on the national economy.

Output 3.2. There has been no publicity and promotion due to the Covid-19 related delays described in Output 3.1.

Output 3.3. The draft Climate Change and Drought Warning Plan has not been integrated into the Water Resource Management Plan due to Covid-19 delays already described. The project team hope to progress this output as part of the Cloud Forest Project outputs.

Output 4. Long term change in the local climate and water resource data collection and interpretation capacity

Table 3-5: Technical report progress against the project logframe – Output 4

Logframe Outputs	Measurable Indicators	Evidence/Report Sections
4. Long Term change in local climate and water resource data collection and interpretation capacity	4.1 Network of 6 weather stations and 10 water resource monitoring collection locations by end of Year 1.	Volume 2 Section 3.
	4.2 Technical capacity. Minimum of 4 people trained to deliver range of activities: collect, manage, interpret, archive and report data by end of project (YR1-YR3).	Volume 2 Section 3.

Output 4 has been completed, however Covid-19 delays changed the year some activities were completed.

Output 4.1. The network of Automatic Weather Stations and water resource monitoring locations was completed during Year 2. See Annex 3 and Table 3-2 above.

Output 4.2. Section 3 of technical report Volume 2 (Annex 3) provides a detailed description of the training activities undertaken by the local project team during the project. Training was provided online, through fieldwork with international project partners on island and international training completed in Year 3 (after Covid-19 travel restrictions were lifted). See both technical reports as evidence of data collection, management, interpretation and reporting (Annex 2 and Annex 3 reports).

Output 5. Climate and water resource products and services

Table 3-6: Technical report progress against the project logframe – Output 5

Logframe Outputs	Measurable Indicators	Evidence/Report Sections
5. Climate and Water Resource Products and Services	5.1 Agreed methods and standards for climate data management (YR1).	Volume 1 Section 5.
	5.2 Data set included on Weather Observation Website portal or similar. Monthly data uploads from Q4 in Year 1.	Volume 1 Section 5.
	5.3 Publication of annual island climate report (YR2-YR3).	Volume 1 Appendix 3.

Output 5 has been completed.

Output 5.1. Methods for climate data standards were completed in Year 2 due to Covid-19 related delays in Year 1. See technical report Volume 1, Section 5 for details (Annex 2).

Output 5.2. Climate data can be found on the UK Met Office Weather Observation Website (<https://wow.metoffice.gov.uk/>) with the site name prefix STHL. The data sets are fully searchable and can be viewed in tabular and graphical form.

Output 5.3. The first annual climate report using 2022 data can be found in Appendix 3 of technical report Volume 1 (see Annex 2).

3.2 Outcome

Table 3-7: Technical report progress against the project logframe – Outcome

Logframe Outputs	Measurable Indicators	Report Sections
Outcome: Develop and operate a climate and water resource data collection network on St Helena with data management and reporting protocols.	0.1 Monthly data collection using established protocols by staff trained through the project.	Volume 1 Sections 3, 4 and 5 and Volume 2 Section 3 and 4.
	0.2 Project data is integrated within the island Water Resource Management Plan.	Volume 2 Sections 2.5, 4.5 and 12.
	0.3 Data contributing to more accurate local weather forecasts.	Volume 1 Section 5.

The Outcomes have been mainly achieved.

Indicator 0.1. The project has achieved its intended outcome to develop and operate a climate and water resource data collection network in the island. See evidence described in Objective 1.2, Objective 1.3 and Objective 4.2.

Indicator 0.2. Project data has not been integrated within the Water Resource Management Plan as the national project has not started yet. This indicator will be achieved at a later date as key project partners Saint Helena Government and Connect Saint Helena Saint Helena are developing the Water Resource Management Plan project with support from the FCDO.

Indicator 0.3. The project has improved the quality and accuracy of the local weather forecasts. The islands weather forecasts have been improved, as all the weather station data being collected through DPLUS103 is now linked to the islands UK Met Office run weather stations at Bottom Woods and at St Helena Airport. The daily weather forecasts are published by the meteorological team at the airport. Forecasts are published as a weather widget and downloadable report on the Saint Helena Government web site (<https://www.sainthelena.gov.sh/> front page) and broadcast by the islands 2 radio stations.

3.3 Monitoring of assumptions

Risks and assumptions were monitored on a regular basis by the Project Steering Group through quarterly meetings and twice yearly reporting to Darwin Plus. Minutes from Project Steering Group meetings and project reports to Darwin Plus are presented in Annex 1.

Changes in assumptions were communicated through amendments to the logframe after consultation with LTSI and in change requests (see Annex 1 Project Reports). The project programme and annual budget allocation had to be changed on several occasions due to the changing impacts of the Covid-19 global pandemic.

4 Contribution to Darwin Plus Programme Objectives

Note: DPLUS103 was part of Round 8 of Darwin Plus funding. As a consequence, Darwin Plus Standard Indicators were not part of the Logframe Process.

4.1 Project support to environmental and/or climate outcomes in the UKOTs

Project achievements comprise:

- The development of a climate and water resource monitoring network with protocols for the collection of long term data sets.
- The development of updated geological and hydrogeological conceptual models for key water supply catchments on the island of St Helena.
- A better understanding of deep boreholes and their function for water supply.
- The collation of a comprehensive data archive of historic water resource and climate data which is now kept at the Saint Helena Research Institute.
- A real-time web portal for climate data managed by the Bottom Woods Meteorological Station on St Helena.
- The development of draft annual climate reports and a draft Climate Change and Drought Warning Plan.

(see technical reports in Annex 2 and Annex 3 for evidence).

In addition, the project has delivered the following capacity building for staff within Connect Saint Helena Saint Helena and at the Bottom Woods Meteorological Station:

- The collection and interpretation of surface water and groundwater data (water levels, flows and water chemistry).
- The collection of climate monitoring data.
- The use of geophysics techniques to support water resource management on the island.
- The use of borehole camera systems to inspect boreholes and advise on the maintenance of boreholes.

These changes are enabling the island to make more informed decisions regarding the potential impacts of a changing climate on St Helena, support water resource management decisions with more accurate and relevant data and providing data for the national State of the Environment Report (Environmental Protection Ordinance, 2016 – Annex 1).

Outputs from the project will also be used in a future Water Resource Management Plan for the island, which Saint Helena Government and Connect Saint Helena will jointly start within the next 18 months.

4.2 Gender equality and social inclusion

Please quantify the proportion of women on the Project Board ² .	25% (2 of 8)
Please quantify the proportion of project partners that are led by women, or which have a senior leadership team consisting of at least 50% women ³ .	71% (5 of 7) (Connect Saint Helena, Saint Helena National Trust, Saint Helena Research Institute, Saint Helena Government, UK Met Office)

The project focus has been on the collection of climate and water resource monitoring data. As such, it has no social or gender outputs. The project Water Resource Monitoring Technician role was advertised in accordance with Connect Saint Helena recruitment policies and did not discriminate against applicants.

5 Monitoring and evaluation

The logframe was amended on 3 occasions (see Annex 1 Project Reports) as part of change requests related to the impacts of the Covid-19 global pandemic on the project programme. The monitoring and evaluations system was helpful for providing feedback. The project was subject to continual evaluation by project partners and the project board.

Due to DPLUS103 running in parallel to the FCDO funded Cloud Forest Restoration project, the DPLUS103 project outputs were also under regular review by the FCDO project team during Year 2 and Year 3. DPLUS103 outputs support the delivery of parts of the water pillar in the Peaks National Park Conservation Management Plan 2019 to 2024 (see Annex 1 legislation), which were in turn part of the monitoring and evaluation of the wider FCDO funded project.

6 Actions taken in response to Annual Report reviews

We have responded to all feedback from annual reports except for those related to the logframe in the Year 2 end of year report review. The DPLUS103 project team had several meetings with LTSI to make sure that the project Outputs and activities were appropriately reported in the logframe. Lots of time and effort went into this and the team were disappointed that the Year 2 report reviewer wanted the logframe activities and outputs re-numbered.

We appreciate that the project has been complex, but it would be helpful to have consistent guidance and advice on the development of a logframe, especially with regard to the level of detail needed for activities and how they are linked to an objective. In the case of this project, it would have been easier to articulate the outcomes and activities outside of the constraints of the DPLUS logframe.

7 Lessons learnt

See Section 2 for detail. Based on the experience of completing this project, we would advise against having an objective linked to the delivery of a national plan which is outside of the control of the project team.

² A Project Board has overall authority for the project, is accountable for its success or failure, and supports the senior project manager to successfully deliver the project.

³ Partners that have formal governance role in the project, and a formal relationship with the project that may involve staff costs and/or budget management responsibilities.

8 Risk Management

The risks in Year 3 had not changed from those in Years 1 and 2. They were all reflected in half-year and annual reports. See Section 5 for logframe amendments and change requests made in response to project risks being realised.

9 Sustainability and Legacy

The project has a high profile as it is integrated in the multi-million pound Cloud Forest Restoration project which will run until March 2025. The DPLUS103 project team are all contributing to the Cloud Forest Restoration project. See Section 2 achievements and opportunities.

The project outputs are permanently embedded in the annual operations of Connect Saint Helena and the WRMT role has a permanent place within Saint Helena Government through an agreed funding model. At the time of writing the role continues to be funded through the Cloud Forest Restoration project for another 2 years before funding through the annual Government budget.

10 Darwin Plus Identity

The Darwin Plus identity has been promoted in the St Helena Cloud Forest Restoration Project as a distinct contribution. The UK FCDO funded project has made several video's, two of which include members of the DPLUS103 project team delivering water resource and climate monitoring activities. The videos can be found on YouTube using the following web links:

- Water Security: <https://www.youtube.com/watch?v=tMwOD1eKn0> (517 views).
- Partners Involved: https://www.youtube.com/watch?v=C5_-lhJd6OA (668 views).

The Water Security video provides a very good summary of the DPLUS103 project work on St Helena. Both video's have been used to communicate the project to other project partners and internationally. The Water Security video was shown to the Kenya Government Water Towers Agency in 2021 as part of Darwin Initiative project 28-022, Restoring the 'water tower' cloud forests of Kenya's Taita Hills, to illustrate water security work in the St Helena cloud forest.

The project teams have also delivered public talks on island which were publicised on local radio and in the newspapers. The international project team from DPLUS103 were on island between 4th January and 16th February 2022 and 8th October to 6th November 2022, completing a variety of fieldwork activities with local project partners. This field work was being undertaken in parallel with local and international colleagues working on the St Helena Cloud Forest Project.

As part of the combined project teams island activities, a series of 3 public talks were arranged to present the two research projects and how they work together to provide a more comprehensive cloud forest project for the island with longer lasting outcomes. The 3 talks were held on 24th January, 7th February and 14th February. The DPLUS103 project team gave the first public talk which was livestreamed on YouTube for islanders to watch. The presentation was then broadcast daily on the island television channel between 25th January and 6th February 2022.

St Helena Cloud Forest Project Public Presentations

The St Helena Cloud Forest Project is an exciting, highly collaborative project working to up-scale cloud forest restoration activities for biodiversity, water security and socio-economic benefits on the Island.

Are you interested in learning more about the work being undertaken for the St Helena Cloud Forest Project? We're thrilled to announce a series of talks in collaboration with our international partners who are on-island in January and February.

Please save the dates below and join us for some interesting evening talks:

Monday 24 January

An update on the Darwin Plus funded St Helena Climate Change and Drought Warning Network (DPLUS103) led by international partners Ben Sansom, Michel Groenstaal & Steve Palmer, supported by local partners from the Met Office and Connect St Helena

Monday 7 February

An introduction to planned work to secure the St Helena False Gumwood and associated species led by international partners Dr Alan Gray and Dr Quentin Cronk, supported by local partners from EMD.

Monday 14 February

Setting up a world class micropropagation unit for endemic fern production at the EMD endemic nursery led by international partners from Royal Botanic Gardens, Kew and supported by local partners from EMD.

Venue: St Helena Community College

Time: 18.30

Further details to follow soon



The presentation was attended by 20 members of the public and project stakeholders. It was available to view on TV by the island's population (4,500). We understand that a large number of islanders watched the presentation, as the project team were asked about the project when stopped in the street by members of the general public after the broadcast. There were technical difficulties with the sound quality and some of the footage was of a reduced quality

despite being taken by the islands' broadcaster.

A public talk was also made by the DPLUS103 water resource team in November 2022 in the Jamestown Museum where the team provided an update on project progress. See Annex 5 for evidence.

In all talks the DPLUS logo was prominent. The project was also referenced in the March 2023 Darwin newsletter in the cloud forest article titled "Distant clouds - same silver lining" (see Annex 5).

In summary, where project activities were promoted the Darwin logo was used.

11 Safeguarding

Biodiversity Challenge Funds are committed to supporting projects develop and strengthen their safeguarding capabilities and capacity to prevent, listen, respond and learn. Defra will not automatically penalise projects where safeguarding concerns are identified, but will help projects respond and learn from the experience.

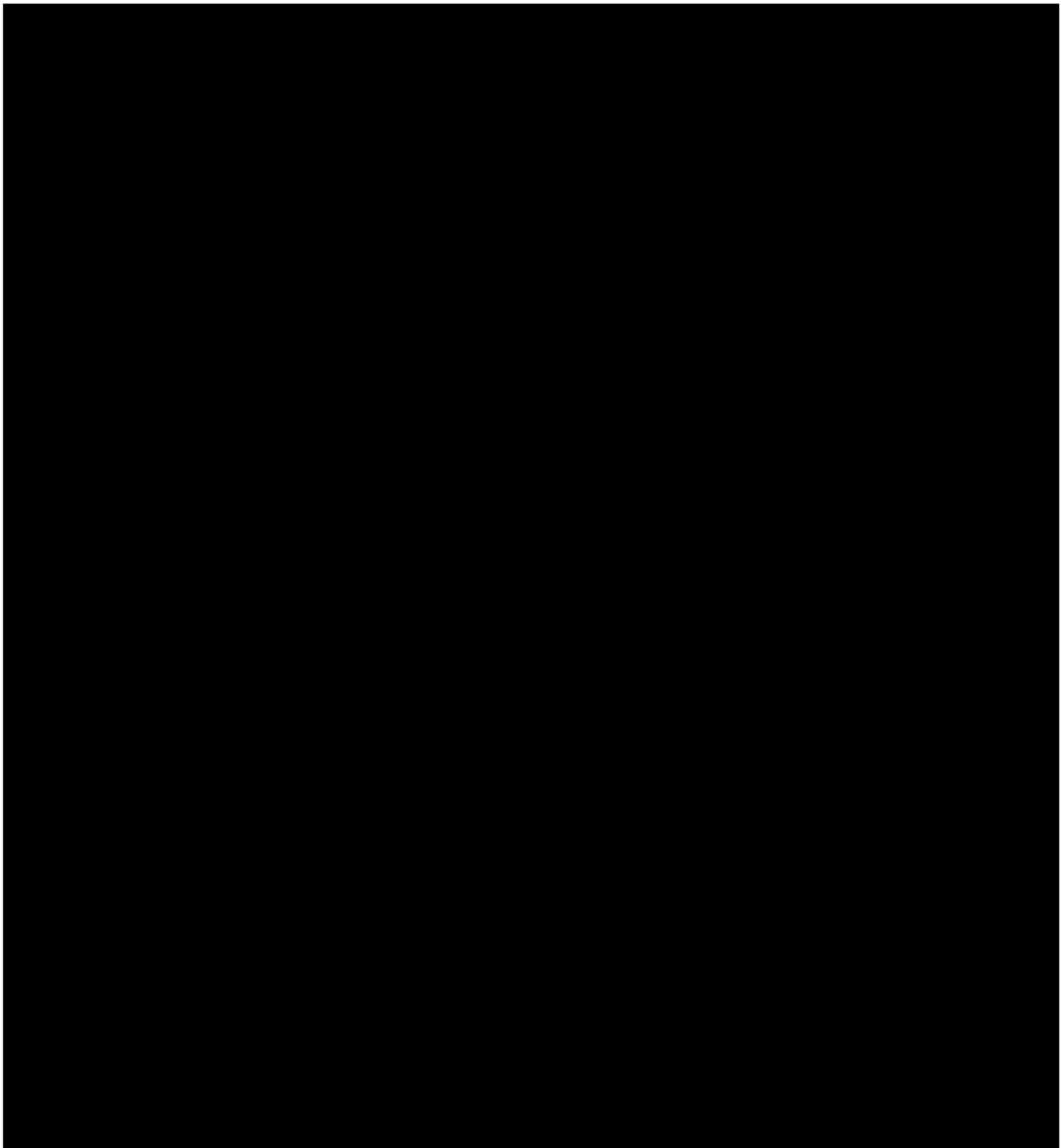
Has your Safeguarding Policy been updated in the past 12 months?	Yes
Have any concerns been investigated in the past 12 months	No
Does your project have a Safeguarding focal point?	No
Has the focal point attended any formal training in the last 12 months?	N/A
What proportion (and number) of project staff have received formal training on Safeguarding?	N/A
Has there been any lessons learnt or challenges on Safeguarding in the past 12 months? Please ensure no sensitive data is included within responses.	N/A

12 Finance and administration

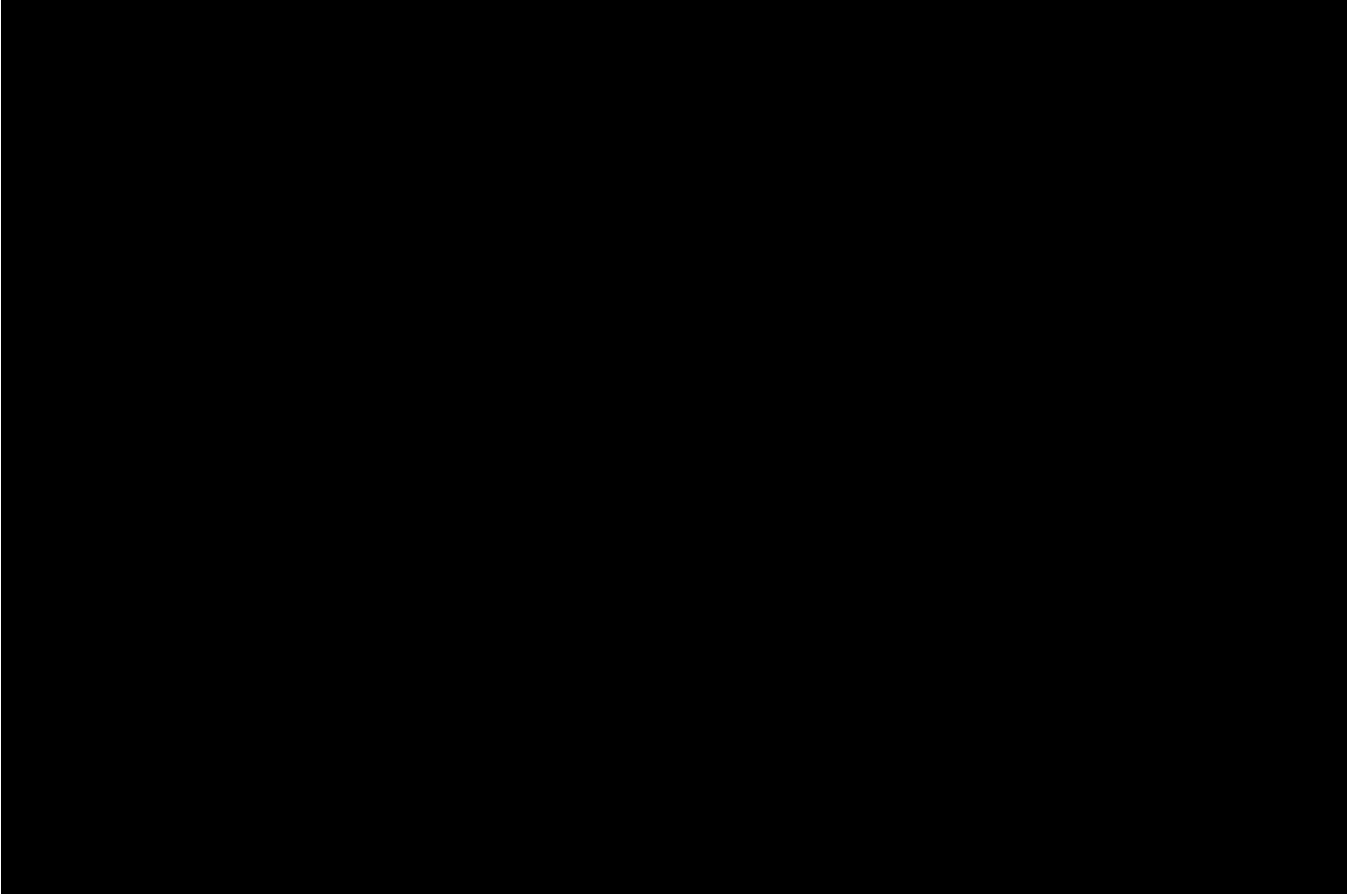
12.1 Project expenditure

Project spend (indicative) since last Annual Report	2022/23 Grant (£)	2022/23 Total actual Darwin Plus Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items				

Project spend (indicative) since last Annual Report	2022/23 Grant (£)	2022/23 Total actual Darwin Plus Costs (£)	Variance %	Comments (please explain significant variances)
Others				
Audit Costs				
TOTAL	112,835	87,906.22		



12.2 Additional funds or in-kind contributions secured



12.3 Value for Money

At the time of writing value for money cannot be evidenced, as the development of the climate and water resource monitoring network is just the start of the water management and climate benefits that will be gained by the island in the long term. The monitoring network is providing a baseline in stream flow, water level, groundwater level and climate data. Over time, the value of this data will become greater as long term trends and relationships between data sets and climate conditions become apparent. These relationships will be used to support water management decisions on the island to mitigate the impacts of climate change and enable Connect Saint Helena to deliver a more reliable water supply for the islands' population.

13 OPTIONAL: Outstanding achievements of your project (300-400 words maximum). This section may be used for publicity purposes.

I agree for the Biodiversity Challenge Funds Secretariat to publish the content of this section (please leave this line in to indicate your agreement to use any material you provide here).

File Type (Image / Video / Graphic)	File Name or File Location	Caption, country and credit	Online accounts to be tagged (leave blank if none)	Consent of subjects received (delete as necessary)
				Yes / No

				Yes / No
				Yes / No
				Yes / No
				Yes / No

Annex 1 Project’s full current logframe as presented in the application form (unless changes have been agreed)

Please insert your project’s logframe (if your project has a logframe), including indicators, means of verification and assumptions. N.B. if your application’s logframe is presented in a different format in your application, please transpose into the below template. Please feel free to contact BCF-Reports@niras.com if you have any questions regarding this.

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
<p>Impact:</p> <p>Saint Helena’s water resource decision making and policy processes will become evidence based to future proof against the risks and impacts of drought and climate change.</p>			
<p>Outcome:</p> <p>Develop and operate a climate and water resource data collection network on St Helena with data management and reporting protocols.</p>	<p>0.1 Monthly data collection using established protocols by staff trained through the project.</p> <p>0.2 Project data is integrated within the island Water Resource Management Plan</p> <p>0.3 Data contributing to more accurate local weather forecasts.</p> <p>See sections below for detail.</p>	<p>0.1 Data collection records.</p> <p>0.2 Published island Water Resource Management Plan.</p> <p>0.3 Island weather reports.</p>	<p>Covid-19 response by national governments will shape the project programme in Year 1 and Year 2. Significant elements of the project may need to be postponed, re-designed or removed from the programme.</p> <p>Covid-19 international travel restrictions are lifted. Project staff (local and overseas) are able to travel to and from St Helena in YR1.</p> <p>14 day quarantine restrictions on project team travelling to and from St Helena are lifted in YR2.</p> <p>Supply ship and flights to and from the island are not significantly delayed by fog/mist, mechanical failure or other issues, preventing timely installation of equipment.</p> <p>No change to import duties.</p>

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
			<p>SHG procurement process enables the timely and efficient purchase of project equipment.</p> <p>Equipment can be shipped to the island by air and sea in good time to allow a minimum 20 months data collection.</p> <p>Literature archives and data sources are available.</p> <p>Suitable locations are available for equipment installation.</p> <p>Climate and water monitoring equipment performs reliably to collect remote datasets.</p> <p>Land access agreements/ approvals for installation of permanent weather stations are supported and agreed.</p> <p>Geophysics rental equipment can be air freighted to and from the island.</p>
<p>Outputs:</p> <p>1. Climate and Water Resource Data Sets (YR1-YR3)</p>	<p>1.1 Development of a historic climate and water resource data set archive (YR1).</p> <p>1.2 Collection of new baseline climate and water resource field data completed by end of Year 3.</p>	<p>1.1 Desk study report of historic data sets.</p> <p>1.2 Archived historic climate and water resource data sets and database.</p> <p>1.3 New baseline climate and water resource data sets and database (data portal or similar).</p>	<p>Reports and data sets are available to assess a baseline and collate historic data.</p> <p>Gaps in data are identified to support interpretation of new data and location of new monitoring equipment.</p>

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
	1.3 New standards for data collection, archive and reporting established (YR1).	1.4 Meeting minutes and documents (development of database standards and protocols for archive and new data sets).	A data portal and database solution are identified early in the project and data standards are agreed.
2. Geology and Hydrogeology Conceptual Model (YR1-YR3)	<p>2.1 New island geology data collection completed to better understand island water resources (YR2 & YR3).</p> <p>2.2 New hydrology and hydrogeology data collection completed to better understand island water resources (YR3).</p> <p>2.3 First island water balance using long term data sets (YR3).</p>	<p>2.1a Geophysics and geology field survey project report chapter.</p> <p>2.1b Fieldwork photographs, capacity building evidence, video, media, public talk at St Helena Museum.</p> <p>2.2a Water features survey project report chapter.</p> <p>2.2b Hydrology and Hydrogeology project report chapters.</p> <p>2.3 Water balance reporting and interpretation.</p>	<p>Sufficient suitable sites available for installation and management of equipment for climate, water resource and geophysics data collection.</p> <p>Equipment is procured and shipped to Saint Helena in time to meet the project programme.</p> <p>All equipment performs well and does not suffer technical problems.</p> <p>Remote monitoring equipment does not suffer power loss (trickle charge batteries via solar PV).</p> <p>Pressure transducer calibration does not drift. Telemetry system for automated weather stations works as expected.</p> <p>A minimum of 20 months data is collected during the project for interpretation.</p> <p>Sufficient data can be collected to calculate a water balance and assess variation in climate across the island.</p>

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
			<p>Meteorological data is of sufficient resolution to allow differentiation of climate across the island.</p> <p>Geophysics data is of sufficient resolution to interpret changes in geological formation at depth.</p>
<p>3. Climate Change and Drought Warning Plan (contributes to island Water Resources Management Plan) (YR1-YR3)</p>	<p>3.1 Climate Change and Drought Warning Plan published (YR3).</p> <p>3.2 Publicity and promotion/outreach (public communications and minimum of 1 x public consultation events) by end of Year 2.</p> <p>3.3 Climate change and drought warning plan integrated within the island Water Resource Management Plan and adopted by SHG Environment and the Natural Resources Committee as a national plan (YR3).</p>	<p>3.1a Meeting agenda, emails and published plan as evidence.</p> <p>3.1b ENRC meeting minutes.</p> <p>3.2 Print, radio, photographs as evidence.</p> <p>3.3 Published island Water Resource Management Plan</p>	<p>There is sufficient evidence and identification of climate and water resource trends/relationships to identify options for water resource management on St Helena.</p> <p>Island stakeholders engage with the development of the Climate and Drought Warning Plan.</p> <p>Environment and Natural Resource Committee approve final version of the Climate Change and Drought Warning Plan.</p> <p>Saint Helena Government and Connect Saint Helena identify funding and a supplier to write a 30 year Water Resource Management Plan before the end of DPLUS103.</p>
<p>4. Long term change in local climate and water resource data collection and interpretation capacity (YR1-YR3)</p>	<p>4.1 Network of 6 weather stations and 10 water resource monitoring collection locations by end of Year 1.</p>	<p>4.1a and 4.2 Photographs, equipment, procurement evidence etc.</p> <p>4.1b Installation of permanent water resource and climate monitoring network in Year 1.</p>	<p>Water Resource Monitoring Technician has been employed within first year of project.</p>

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
	<p>4.2 Technical capacity. Minimum of 4 people trained to deliver range of activities: collect, manage, interpret, archive and report data by end of project (YR1-YR3).</p>	<p>4.2a Employment of Water Resource Monitoring Technician (letter of employment).</p> <p>4.2b Induction and field monitoring training of Water Resource Monitoring Technician and climate monitoring staff (photographs, training material, remote video training sessions, UK training and exposure visit documents, photographs, email).</p>	<p>Covid-19 response by national governments may impact on Year 1 and Year 2 indicators.</p> <p>Climate and water resource monitoring teams on the island engage with the project and attend project training events, meetings etc.</p> <p>Staff resources are available to collect all monitoring data required for project.</p> <p>Island stakeholders incorporate the project monitoring network and standards into “Business as Usual” activities beyond the life of the project.</p>
<p>5. Climate and Water Resource Products and Services (YR1-YR3)</p>	<p>5.1 Agreed methods and standards for climate data management (YR1).</p> <p>5.2 Data set included on Weather Observation Website portal or similar. Monthly data uploads from Q4 in Year 1.</p> <p>5.3 Publication of annual island climate report (YR2-YR3).</p>	<p>5.1a Procedures Manual. Development of standard climate data reports, stakeholder agreement of frequency of reporting and format for delivering reports (stakeholder events and meeting photographs, reporting).</p> <p>5.1b Statement of adoption of protocols by stakeholders. Reporting of protocols to stakeholders. 1 x report.</p>	<p>Standard climate data sets, frequency of reporting, method of reporting and access to data are agreed by island stakeholders.</p> <p>Staff resources continue at the same level to provide climate. data in agreed formats beyond the end of the project.</p>

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
		<p>5.2a Climate data reports for key stakeholders. Year 2 to Year 3 monthly data distribution in agreed format following consultation. 24 x data reports.</p> <p>5.2b Monthly Met Office verification of data upload to Weather Observation Website portal or similar.</p> <p>5.2c Weather forecasts (print, web site evidence).</p> <p>5.3 Annual island climate report.</p>	
<p>1 Desk Study - to collate archive data (YR1).</p> <p>1.1 Collate archived climate and water resource background data from SHG, Connect Saint Helena, and mainland literature to produce 2 datasets spanning at least 150 years of data (YR1).</p> <p>1.2 Desk based assessment and analysis of SHG archive water resource reports and climate data (YR1).</p> <p>1.3 Desk Study Report Section (YR1).</p> <p>2. Collection of climate and water resource data (YR1-YR3)</p> <p>2.1 Procurement of stream monitoring equipment (6 x Diver logger, 2 x Diver barometric logger, Diver comms equipment, 1 x stream flow meter, 1 x portable flume) (YR1 Q2).</p> <p>2.2 Procurement of groundwater monitoring equipment (4 x Diver logger) (YR1 Q2).</p> <p>2.3 Procurement of climate monitoring equipment (7 x Hobo Rain gauge data logger, 6 x automated weather stations, 17 x Hobo temperature/RH data loggers, weather station and logger comms equipment) (YR1 Q2).</p> <p>2.4 Recruitment of Water Resource Monitoring Technician and training of water and climate monitoring teams (YR1-YR3).</p> <p>2.5 Water features survey – identify 6 stream flow monitoring locations and 4 groundwater monitoring locations (YR2).</p> <p>2.6 Identify up to 4 geophysics survey lines (YR2).</p> <p>2.7 Installation of stream and groundwater monitoring equipment (YR1& YR2).</p>			

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
<p>2.8 Installation of permanent meteorological monitoring equipment in 6 locations across Saint Helena, upgrade select ENRP monitoring locations and install temperature/humidity data loggers (YR1).</p> <p>2.9 Collection of daily climate data using telemetry systems and data loggers (YR1 – YR3).</p> <p>2.10 Collection of monthly stream and groundwater level data logger data (YR1 – YR3).</p> <p>2.11 Collection of weekly manual stream flow gauging data (YR1 – YR3).</p> <p>2.12 Geophysics and geology surveys (YR2 & YR3).</p> <p>2.13 Interpretation of catchment geology and hydrogeology (report chapters) (YR2 – YR3).</p> <p>3. Island water balance and climate data interpretation. (YR3) Communication and events – quarterly and annually (YR1 – YR3)</p> <p>3.1 Calculation of water balances from collated water level, flow, meteorological and geophysics survey data (YR3).</p> <p>3.2 Interpretation of climate data across island (YR3).</p> <p>3.3 Interpretation of water balance – identify trends and/or relationships between climate and catchments across the island (YR3).</p> <p>3.4 Refined ecosystems services assessment for water resources (YR3).</p> <p>3.5 Water efficiency and water reduction outreach to public (YR1 – YR3).</p> <p>4. Protocols for climate data reporting, interpretation and data distribution (YR1 – YR3)</p> <p>4.1 Consultation with key stakeholders to determine key uses for climate data (YR1).</p> <p>4.2 Development of standard climate data reports, stakeholder agreement of frequency of reporting and format for delivering reports (YR1).</p> <p>4.3 Providing climate data in agreed formats (YR2 – YR3).</p> <p>4.4 Annual island climate data report (YR1 to YR3).</p> <p>4.5 World Observation Weather network data upload (YR1 – YR3).</p> <p>5. Project Report (YR1 – YR3)</p> <p>5.1 Collation of all desk based and field data, interpretation and of all data (YR1 – YR3).</p> <p>5.2 Draft Climate Change and Drought Warning plan (integrated into the island Water Resource Management Plan) for public consultation (YR2).</p> <p>5.3 Island Climate Change and Drought Warning Plan published (YR3).</p> <p>5.4 Production of project final report (YR3).</p>			

Annex 2 Report of progress and achievements against final project logframe for the life of the project (if your project has a logframe)

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
<p>Impact:</p> <p>Saint Helena’s water resource decision making and policy processes will become evidence based to future proof against the risks and impacts of drought and climate change.</p>		<p>The project water resource data has started to be used in monthly water resource planning by Connect Saint Helena. The data will be used in the national water resource management plan when the strategic project starts in 2023/2024.</p> <p>Monthly climate reports are emailed to all nature conservation partners on St Helena and international project partners. Project climate data is incorporated into the islands daily weather forecasts which are broadcast to the islands population (4,500) on radio and communicated on the government web site and in weekly newspapers.</p>
<p>Outcome</p> <p>Develop and operate a climate and water resource data collection network on St Helena with data management and reporting protocols.</p>	<p>0.1 Monthly data collection using established protocols by staff trained through the project.</p> <p>0.2 Project data is integrated within the island Water Resource Management Plan</p> <p>0.3 Data contributing to more accurate local weather forecasts.</p>	<p>This outcome has been achieved – see Section 3.2 of this report and technical reports in Annex 2 and Annex 3.</p>
<p>Output 1. Climate and Water Resource Data Sets (YR1-YR3)</p>	<p>1.1 Development of a historic climate and water resource data set archive (YR1).</p> <p>1.2 Collection of new baseline climate and water resource field data completed by end of Year 3.</p> <p>1.3 New standards for data collection, archive and reporting established (YR1).</p>	<p>See Section 3.1 for report on progress and evidence.</p>

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
Activity 1.1 Collate archived climate and water resource background data from SHG, Connect Saint Helena, and mainland literature to produce 2 datasets spanning at least 150 years of data.		Completed.
Activity 1.2. Desk based assessment and analysis of SHG archive water resource reports and climate data.		Completed.
Activity 1.3. Desk Study Report Section.		Completed.
Output 2. Geology and Hydrogeology Conceptual Model (YR1-YR3)	<p>2.1 New island geology data collection completed to better understand island water resources (YR2 & YR3).</p> <p>2.2 New hydrology and hydrogeology data collection completed to better understand island water resources (YR3).</p> <p>2.3 First island water balance using long term data sets (YR3).</p>	See Section 3.1 for report on progress and evidence.
Activity 2.1. 2.1 Procurement of stream monitoring equipment (6 x Diver logger, 2 x Diver barometric logger, Diver comms equipment, 1 x stream flow meter, 1 x portable flume)		Completed.
Activity 2.2. Procurement of groundwater monitoring equipment (4 x Diver logger)		Completed.
Activity 2.3 Procurement of climate monitoring equipment (7 x Hobo Rain gauge data logger, 6 x automated weather stations, 17 x Hobo temperature/RH data loggers, weather station and logger comms equipment)		Completed.
Activity 2.4 Recruitment of Water Resource Monitoring Technician and training of water and climate monitoring teams		Completed.

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
Activity 2.5 Water features survey – identify 6 stream flow monitoring locations and 4 groundwater monitoring locations		Completed.
Activity 2.6 Identify up to 4 geophysics survey lines		Completed. Due to the success of the geophysics technique a total of 12 geophysics s
Activity 2.7 Installation of stream and groundwater monitoring equipment		Completed.
Activity 2.8 Installation of permanent meteorological monitoring equipment in 6 locations across Saint Helena, upgrade select ENRP monitoring locations and install temperature/humidity data loggers		Completed.
Activity 2.9 Collection of daily climate data using telemetry systems and data loggers		Completed.
Activity 2.10 Collection of monthly stream and groundwater level data logger data		Completed.
Activity 2.11 Collection of weekly manual stream flow gauging data		Partially completed. A review of the monitoring locations when Covid-19 travel restrictions were lifted afforded the international team the opportunity to review the practicality of this activity. Due to the shallow water depth in most streams, it was impractical to measure stream flows using a manual flow gauge. Manual flow gauging was used at two monitoring locations to check the calibration of automatic flow gauging equipment installed in Fishers Valley and Sandy Bay when water levels permitted.
Activity 2.12 Geophysics and geology surveys		Completed.
Activity 2.13 Interpretation of catchment geology and hydrogeology		Completed.
Output 3. Climate Change and Drought Warning Plan (contributes to island Water Resources Management Plan) (YR1-YR3)	3.1 Climate Change and Drought Warning Plan published (YR3). 3.2 Publicity and promotion/outreach (public communications and minimum of 1 x public consultation events) by end of Year 2.	See Section 3.1 for report on progress and evidence.

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
	3.3 Climate change and drought warning plan integrated within the island Water Resource Management Plan and adopted by SHG Environment and the Natural Resources Committee as a national plan (YR3).	
Activity 3.1. Calculation of water balances from collated water level, flow, meteorological and geophysics survey data		Partially complete. Awaiting additional data from the Cloud Forest Project to complete this activity as there was insufficient time to collect data sets due to Covid-19 delays.
Activity 3.2. Interpretation of climate data across island		Complete
Activity 3.3 Interpretation of water balance – identify trends and/or relationships between climate and catchments across the island		Incomplete. This will be completed as part of Year 3 Cloud Forest Project activities and will be reported in March 2023.
Activity 3.4 Refined ecosystems services assessment for water resources		Incomplete. This will be completed as part of Year 3 Cloud Forest Project activities and will be reported in March 2023.
Activity 3.5 Water efficiency and water reduction outreach to public		Incomplete. The Water Resource Monitoring Technician (WRMT) role had to be re-advertised after 12 months, as the first technician left the island to work in the UK. The incumbent WRMT has spent their time dealing with the plant pathogen issues with Connect Saint Helena and project partners which has limited time for water efficiency and outreach activities at this time.
Output 4. Long term change in local climate and water resource data collection and interpretation capacity (YR1-YR3)	<p>4.1 Network of 6 weather stations and 10 water resource monitoring collection locations by end of Year 1.</p> <p>4.2 Technical capacity. Minimum of 4 people trained to deliver range of activities: collect, manage, interpret, archive and report data by end of project (YR1-YR3).</p>	See Section 3.1 for report on progress and evidence.

Project summary	Measurable Indicators	Progress and Achievements for the life of the project
Activity 4.1. Consultation with key stakeholders to determine key uses for climate data		Complete.
Activity 4.2. Development of standard climate data reports, stakeholder agreement of frequency of reporting and format for delivering reports		Complete.
Activity 4.3 Providing climate data in agreed formats		Complete.
Activity 4.4 Annual island climate data report		Complete.
Activity 4.5 World Observation Weather network data upload		Complete.
Output 5. Climate and Water Resource Products and Services (YR1-YR3)	<p>5.1 Agreed methods and standards for climate data management (YR1).</p> <p>5.2 Data set included on Weather Observation Website portal or similar. Monthly data uploads from Q4 in Year 1.</p> <p>5.3 Publication of annual island climate report (YR2-YR3).</p>	See Section 3.1 for report on progress and evidence.
Activity 5.1. Collation of all desk based and field data, interpretation and of all data		Complete. More detailed interpretation of data is being undertaken in Year 3 of the Cloud Forest Restoration Project.
Activity 5.2. Draft Climate Change and Drought Warning plan (integrated into the island Water Resource Management Plan) for public consultation		Complete. See Annex 3 report (Appendix 4 of report).
Activity 5.3 Island Climate Change and Drought Warning Plan published		Partially complete. This work has been complete, but its content will now be subsumed into the island Water Resource Management Plan, when it is completed by SHG and Connect Saint Helena in the next 24 months.
Activity 5.4 Production of project final report		Complete. See Annex 2 and Annex 3 reports.

Annex 3 Standard Indicators

Note: DPLUS103 was part of Round 8 of Darwin Plus funding. As a consequence, Darwin Plus Standard Indicators were not part of the Logframe Process.

Table 1 Project Standard Indicators

DPLUS Indicator number	Name of indicator using original wording	Name of Indicator after adjusting wording to align with DPLUS Standard Indicators	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project

Table 2 Publications

Title	Type (e.g. journals, manual, CDs)	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g. weblink or publisher if not available online)

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to BCF-Reports@niras.com putting the project number in the Subject line.	No
Is your report more than 10MB? If so, please discuss with BCF-Reports@niras.com about the best way to deliver the report, putting the project number in the Subject line.	Yes
If you are submitting photos for publicity purposes, do these meet the outlined requirements (see section 10)?	N/A
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Yes
Do you have hard copies of material you need to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	No
If you are submitting photos for publicity purposes, do these meet the outlined requirements (see section 13)?	N/A
Have you involved your partners in preparation of the report and named the main contributors	Yes
Have you completed the Project Expenditure table fully?	Yes
Do not include claim forms or other communications with this report.	