

Darwin Plus: Overseas Territories Environment and Climate Fund Annual Report

Important note *To be completed with reference to the Reporting Guidance Notes for Project Leaders:
it is expected that this report will be about 10 pages in length, excluding annexes*

Submission Deadline: 30th April 2018

Darwin Plus Project Information

Project reference	DPLUS051
Project title	Water Security and Sustainable Cloud Forest Restoration on St Helena
Territory(ies)	Saint Helena
Contract holder institution	Saint Helena Government
Partner institutions	Connect Saint Helena, Arctium, Centre for Ecology and Hydrology
Grant value	£123,356
Start/end date of project	April 2016 to June 2018
Reporting period (e.g., Apr 2017-Mar 2018) and number (e.g., AR 1,2)	April 2017 to March 2018
Project leader name	Derek Henry
Project website/blog/Twitter	www.arctium.co.uk/dplus051-water-security/
Report author(s) and date	Ben Sansom, Derek Henry, Mike Jervois, Leon DeWet, Alan Gray – April 2018

1. Project overview

St Helena has experienced unpredictable weather in recent years, which has led to two droughts in the past three years. The island has a very high dependency on rainfall to replenish water supplies. With the planned increase in eco-tourism, water demand is expected to rise, whilst climate change is likely to further impact on weather patterns.

The 20-Year Water Resource Masterplan outlines development and management of island water resources to provide security of supply and enable resilience to climate change. The preferred development approach is through rainwater harvesting.

Improving mist capture in the Peaks through restoring endemic cloud forest would increase available water resources and provide more cloud forest habitat for at-risk endemic plants and invertebrates.

This project will provide sub-catchment scale water balances to confirm the relationship between cloud forest, mist capture and impact of invasive species on water supply. Outcomes will support development of a cloud forest restoration plan.

Two sub-catchments in the Peaks cloud forest, located within the centre of the island, were identified for their current habitat distribution and significance to island water supply; Grapevine Gut (exclusively invasive species) and Wells Gut (partially endemic species). A third sub-

catchment on the south-east side of the Peaks was also identified for climate monitoring to compare micro-climates on opposite sides of the Peaks.

The project has been designed to benefit the population of St Helena and endemic plants and animals. The outcomes of the project will be used to support the development of a more secure and sustainable water supply through cloud forest management and restoration, which in turn will increase habitat for endangered species.

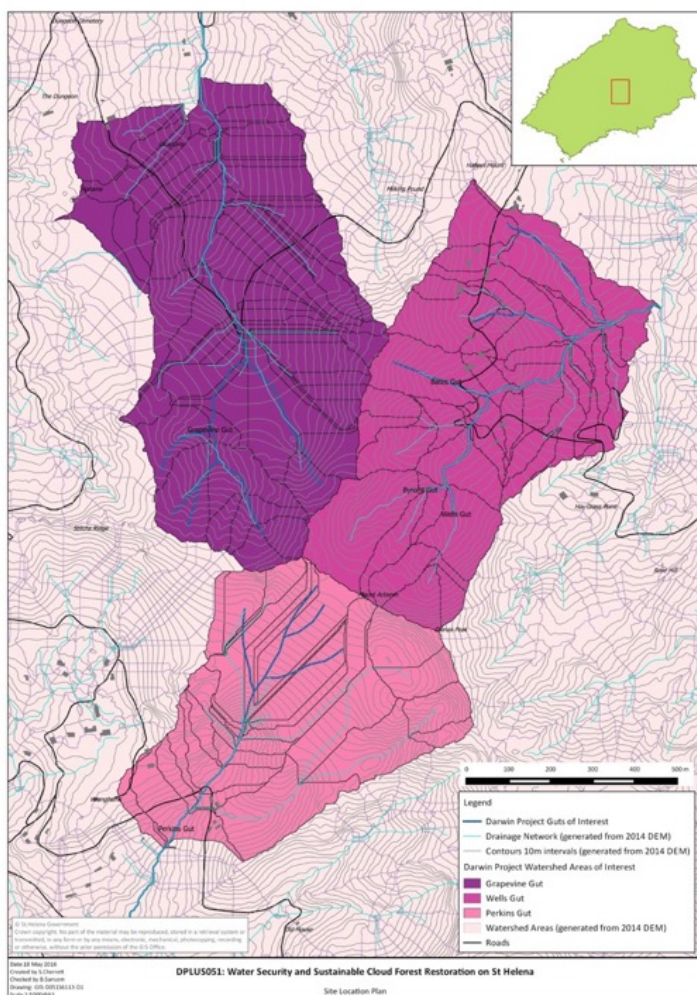
A site location plan is presented in Figure 1.

2. Project stakeholders/partners

All stakeholders were involved in the project planning process, as the project is borne out of Connect Saint Helena's (Connect) 20-Year water resource masterplan and Saint Helena Governments (SHG) responsibility for leading environmental management and protection on the island. The Centre for Ecology and Hydrology (CEH) provided technical knowledge supporting the selection and location of monitoring locations and ongoing interpretation of data. Arctium provided project management support and co-ordinated, installation of monitoring equipment, training and field survey support amongst project tasks.

During the project year Connect needed to limit staff involvement in the project due to the need to focus attention on post drought operations. As a consequence, the majority of project communication has been between the remainder of the project partners. The reduction in Connects manpower resulted in some data collection periods being missed due to other support staff being on annual leave, delaying the download of data from the study. Monitoring is planned to continue until May 2018.

Figure 1.1: DPLUS051 Site Location Plan



Project stakeholders have been in regular contact throughout the year via email and Skype year to discuss staff resources, data collection progress, troubleshooting field equipment issues and project budgets.

Mike Jervois, project Monitoring Network Officer, moved to the Saint Helena National Trust (SHNT) during the year and continued monitoring duties. Mike finished his role in early April 2018 and is in the process of handing over to Mr Paul Cherrett who will continue in the role until the end of June 2018. Paul is familiar with the monitoring network due to his early project involvement through Connect.

During October and November 2017 SHG, Connect and Arctium held two project progress meetings on island bringing together all the island-based staff working on the project. Meetings were held on 27th October 2017 before the start of field survey and data collection and on 24th November to present progress after equipment maintenance and data collection activities had finished.

The project team also reported progress to the Environment and Natural Resource Committee of St Helena Government on 16th November 2017.

PowerPoint presentations from these meetings are provided as evidence.

The project team from Arctium, Environment Management Division (EMD) of Saint Helena Government, and the SHNT also took part in 2 days of drone flying tutorials (17th and 20th November 2017) and class-based activities (10th November 2017), focussing on the process for obtaining a permit to fly from Air Safety Support International and safe drone operations (see Plates 2.1 and 2.2).

An additional outcome and deliverable from the project will be to assist SHNT and the SHG Conservation team in the drafting of an Operations Manual and supporting documentation to support a Permission to Fly application with Air Safety Support International.

A draft Operation Manual is provided as evidence.

Plate 2.1: Drone Flying in the Peaks



Plate 2.2: Drone Flying on Rosemary Plain



In addition to the meetings and training, all of the Darwin Plus funded project teams that were on the island during November 2017 met for a social event to swap stories, ideas and network. A picture of the project teams from DPLUS029, DPLUS050, DPLUS051, DPLUS052, DPLUS059 and DPLUS070 is presented in Plate 2.3.

Plate 2.3: Darwin Plus Project Teams on St Helena



3. Project Progress

3.1 Progress in carrying out project Activities

During the second year the following activities were completed:

Output 1: Desk Study

The desk study has been completed in draft form and is awaiting supplemental data from DPLUS052 (soil data and maps) when it becomes available (end of May 2018).

Evidence: Desk study chapters

Output 2: Baseline Field Assessments

Baseline field assessments are complete. The ecology survey was completed in the first quarter of 2018. Final drafts are being made to the ecology text for completion in early May 2018. Maps for the report will be completed in May, using GIS layers created during the survey.

Additional aerial surveys were completed during November 2017 with the support of Air Safety Support International and St Helena Airport. The data has been used to plan the baseline ecology survey and provide additional mapping data for the project.

Evidence: Orthomosaics and 3D models of the sub-catchments, ASSI permission to work certificate, ecology survey GIS layers.

Output 3: Environmental Monitoring

The team have collected data on several occasions in the past 12 months, with the most recent data collection completed in February 2018. Data sets in Excel format are provided as evidence of data collection.

The project has encountered several problems with equipment due to the aggressive nature of the Peaks climate (in particular humidity and salt corrosion). During the project year the following items failed to operate correctly:

1. All automatic weather stations (Wells Gut, Perkins Gut and Grapevine Gut);
2. Hobo rain gauge data logger in Diana's Peak;
3. Barometric data logger in Grapevine Gut;
4. Surface water logger in Grapevine Gut and Wells Gut; and
5. Soil moisture loggers in Grapevine Gut and on Diana's Peak.

This task should have been completed by April 2018, however due to continued problems with the weather stations, the project team wish to continue collecting data until May 2018 in order to have a more meaningful data set to interpret.

The team wish to extend the reporting deadline by 3 months to 30th September. The additional time is needed to interpret and report on an extended data collection period. This will allow for a more complete data set to be interpreted and used to calculate the project water balance (6 months additional data).

At present the task is 75% complete. Table 3.1 summarises data collection and equipment issues encountered during the year.

Table 3.1: Project Data Collection and Equipment Log 2017 to 2018

Date	Staff	Comments
May 2017	EMD staff.	<p>Vegetation clearance around monitoring locations.</p> <p>WS01WG and WS01GVG working well. WS01PG battery is dead. Internal battery required replacing.</p> <p>SM02GVG and SM01DP logger batteries are dead. Batteries replaced, however new batteries were draining too fast for loggers to be used in the field.</p> <p>Unable to download data from the mist capture logger MC01DP. Possible battery replacement or faulty data logger.</p>
June 2017	EMD	<p>Removal of MC01DP from site as the data logger was not working. The Hobo data logger battery was replaced, but the problem persisted. Possible faulty data logger hardware.</p>
July 2017	Connect	<p>Data collected from a limited number of locations.</p>
October and November 2017	Arctium and EMD	<p>Downloaded data from all loggers.</p> <p>Weather stations WS01PG, WS01WG and WS01GVG not working. All internal batteries replaced, rechargeable batteries recharged and installed. No signal from sensors to the weather station Datataker data logger. A check of connecting cables showed heavy corrosion within 9 pin plugs (see Plate 3.1). Replacement cables needed to repair the weather stations. New cables ordered to arrive on island late January 2018.</p> <p>MC01DP data logger inspected. All data lost between March 2017 and October 2017 due to malfunction of data logger. Logger battery replaced again in November 2017 and logger re-started. The logger has been moved to the site of MC02PG as there are still concerns about its reliability. The location of MC02PG is less critical to the project should problems with the logger persist.</p> <p>MC01PG Hobo rain gauge data logger was removed from site and used to replace the damaged mist capture data logger at MC01DP.</p> <p>MC02PG Hobo rain gauge data logger removed from site and installed at Grapevine Gut weather station location.</p>

Date	Staff	Comments
		<p>MC02WG Hobo rain gauge data logger removed from site and installed at Wells Gut weather station location.</p> <p>SM01DP data logger replacement USB cable used to download data. The same communications problem persists with the logger. Possible hardware problem.</p> <p>BP01GVG logger was found to have been removed from site as the logger memory was full. The logger was downloaded and installed back in the field in November 2017 recording at 1h intervals. Data from BP01WG can be used as the logger is close to Grapevine Gut.</p> <p>Logger SW02GVG was also found out of the water in Grapevine Gut in November 2017. The reason for this was unknown, but the site is located within a secure compound. The logger was re-started and installed in November 2017.</p> <p>BP01WG logger stopped recording in June 2017. Logger memory cleared and re-started in November 2017 recording at 1h intervals.</p>
February 2018	EMD/SHNT	<p>Data download. Problems downloading data from SW03WG at the V-notch weir. Logger is working as was re-started in November 2017. Will attempt to download during the next site visit at the end of April.</p> <p>Continuing problems with soil moisture loggers at Diana's Peak and in Grapevine Gut.</p> <p>Weather station cables were not replaced due to additional wiring needed. Postponed until end of April 2018. New rain gauges in Wells Gut and Grapevine Gut weather station locations are providing key data as an alternative.</p>

The data record length for monitoring equipment is presented in Table 3.2.

Table 3.2: Project Field Monitoring Data Record Length

Catchment	Monitoring Location	Data Record Length
Perkins Gut	MC01PG	12 months continuous data. October 2016 to October 2017.
	MC02PG	10 months data. 7 continuous months. October 2016 to October 2017.
	WS01PG	4 months continuous data.
	iB01PG	15 months continuous data. October 2016 to February 2018.
	iB02PG	15 months continuous data. October 2016 to February 2018.
Diana's Peak	MC01DP	9 months data, 5 continuous months. October 2016 to March 2017 and November 2017 to February 2018.
	SM01DP*	No data due to logger failure. Repairs completed in November 2017.

Catchment	Monitoring Location	Data Record Length
Grapevine Gut	iB01DP	15 months continuous data. October 2016 to February 2018.
	WS01GVG	7 months continuous data. 2 months unreliable data before sensors failed. October 2016 to June 2017.
	iB01GVG	15 months continuous data. October 2016 to February 2018.
	iB02GVG	15 months continuous data. October 2016 to February 2018.
	iB03GVG	15 months continuous data. October 2016 to February 2018.
	iB04GVG	15 months continuous data. October 2016 to February 2018.
	iB05GVG	15 months continuous data. October 2016 to February 2018.
	RF01GVG	4 months continuous data. Hobo rain gauge (was previously used as MC01PG). November 2017 to February 2018.
	SW01GVG*	12 months continuous data. October 2016 to October 2017.
	SW02GVG	13 months data. 9 months continuous data. October 2016 to June 2016 and November 2017 to February 2018.
	FL01GVG	New Blue Siren flow logger. 4 months continuous data, November 2017 to February 2018.
	BP01GVG*	10 months continuous data. October 2016 to July 2017.
	SM01GVG*	12 months continuous data. October 2016 to October 2017.
	SM02GVG	No data. Sensor is irreparable – near end of life equipment donated by CEH (not included in original project design).
Wells Gut	WS01WG	4 months continuous data.
	MC01WG	15 months data (11 months continuous). October 2016 to September 2017 and November 2017 to February 2018.
	MC02WG	12 months continuous data. October 2016 to October 2017. Removed from site and used as rain gauge at location of Wells Gut weather station.
	SM01WG*	12 months continuous data. October 2016 to October 2017.
	iB01WG	15 months continuous data. October 2016 to February 2018.
	iB02WG*	12 months continuous data. October 2016 to November 2017.
	iB03WG	15 months continuous data. October 2016 to February 2018.
	iB04WG	15 months continuous data. October 2016 to February 2018.
	SW01WG*	12 months continuous data. October 2016 to October 2017.
	SW02WG*	12 months continuous data. October 2016 to October 2017.
	SW03WG*	12 months continuous data. October 2016 to October 2017.
RF01WG	4 months continuous data. Hobo rain gauge (was previously used as MC02PG). November 2017 to February 2018.	
Byrons Gut	iB01BG	15 months continuous data. October 2016 to February 2018.
	iB02BG	15 months continuous data. October 2016 to February 2018.
	SW01BG*	8 months continuous data. October 2016 to October 2017.

*Note: The February 2018 monitoring data collection was not able to download data from these locations. The May 2018 data collection site visit will download the data between November 2017 to April 2018 (additional 6 months data). The remainder of the sites will have an additional 2 months data (March and April 2018).

Despite the remoteness of the monitoring locations and relatively small number of people who access the study area, some of the data loggers in Grapevine Gut and Wells Gut were removed from their monitoring locations. An investigation by the DPLUS051 monitoring team concluded that data loggers at SW02WG and SW02GVG were removed without consent, which has resulted in additional gaps within the monitoring data. It is regrettable that this occurred and has had an impact on some of the data sets (3 months data for SW02GVG and a few days for SW02WG). All monitoring locations had been selected to ensure there was limited opportunity for tampering of equipment and signs were posted at each monitoring location explaining the purpose of the equipment and providing project team contact details. The team have endeavoured to ensure that the equipment is as secure as possible within the study area.

There have been continual technical issues with the automatic weather stations in Wells Gut, Grapevine Gut and Perkins Gut. The November 2017 field monitoring trip assessed and serviced all the weather stations in order to solve the power and data collection issues. During these

inspections it was discovered that the data cables had become badly corroded (see Plate 3.1), causing a failure in the equipment.

Plate 3.1: Corroded Weather Station Data Cables



The equipment suppliers had not seen this level of corrosion before and concluded that the high humidity in the Peaks and salty air had contributed to the rapid decline in the cables. New data cables and power cables were ordered by Arctium and shipped to island at the end of January 2018 by Dr Alan Gray, who was speaking at the inaugural St Helena Environment Conference.

Whilst waiting for a solution for the weather stations, it was decided by the Project Manager that the Hobo rain gauges MC02WG and MC01PG would be moved from the monitoring network and used as rain gauges in Wells Gut and Grapevine Gut (Plate 3.2) where the weather stations are located. This would enable the collection of mist and rainfall at both locations for a minimum of 6 months. The Hobo rain gauge at MC02PG was swapped with the faulty Hobo rain gauge logger on Diana's Peak so that a more reliable mist data record could be collected at the highest point on the island.

The project had collected up to 12 months of mist data in a transect across the Peaks. The re-deployment of the Hobo rain gauges in Perkins Gut and Wells Gut were seen as a critical action necessary to ensure that rainfall data could be collected in the principal catchments being studied (Wells Gut and Grapevine Gut). Rainfall and mist data collected from November 2017 will be essential for the calculation of a water balance for Wells Gut and Grapevine Gut. Despite these serious issues, the data collected is still of value, unique to the island and provides a new insight into the proportion of rainfall and mist captured by the islands montane cloud forest.

Plate 3.2: Rain gauge at Grapevine Gut



The Blue Siren surface flow data logger was successfully installed in the stream in Grapevine Gut during November 2017 (Plate 3.3).

Plate 3.3: Blue Siren Flow Logger Installation at Grapevine Gut



Output 4: Interpretation of Data

The calculation of water balances from collated water level, flow, meteorological and botanical survey data has been delayed as additional data sets are collected on site. However, processing of monitoring data and some interpretation has continued, as and when data sets are collected in readiness for the water balance calculation. At present this task is 60% complete against the log frame.

Evaluation of historic climate data has been ongoing identify any trends, anomalies or discrepancies in the data sets.

Data sets in Excel format are provided as evidence of data collection.

Output 5. Reporting

Reporting tasks have been delayed due to the issues with monitoring equipment. At present the report is 50% complete against the log frame.

The main review and interpretation of data will start in mid-May 2018 when the latest data download has been completed on site. Sections of the report such as the restoration plan cannot be drafted until the data interpretation and water balance are complete.

3.2 Progress towards project Outputs

Output 1: Desk Study

All desk study data has been collected and is now being evaluated and reported. Evidence provided as per Section 3.1. The indicator is still valid for the output.

Output 2: Baseline Field Assessments

The delay in completing the botanical surveys will not affect the project delivery. The ecology surveys have been completed, with reporting being finished in early May 2018 by EMD. The outputs of the survey will be incorporated into the interpretation of the climate data and water balance which will start in mid-May 2018. The indicator is still valid for the output.

The remote sensing / aerial survey indicators are still valid. This task was completed as per the revised programme.

The water features survey was completed in October 2016. This task was completed as per the revised programme. The water features survey report comprises a section of the main project report which is currently being drafted.

The indicator is still valid for the output. Evidence has been presented in Section 3.1.

Output 3: Environmental Monitoring

All monitoring equipment was installed between October and November 2016 in conjunction with the baseline assessment and aerial surveys. This task was completed as per the revised programme. Additional monitoring equipment (Blue Siren flow logger), was installed in November 2017.

Data collection is ongoing and is being completed as per the revised programme.

The indicators for this output are still valid. Evidence has been presented in Section 3.1.

Output 4: Interpretation of Data

The interpretation of data and calculation of water balances from collated water level, flow, meteorological and botanical survey data will start in mid-May 2018 when the additional data have been collected for all key monitoring locations. The indicators for this output are still valid. This task is 60% complete. Evidence has been presented in Section 3.1.

Output 5. Reporting

The collation of field data is an ongoing task and will be completed when a minimum of 12 months monitoring data has been collected for all key monitoring locations. The main review and interpretation of data will start in mid-May 2018. The indicators for this output are still valid. This task is 60% complete, but some sections need collating and including in the main project report. Evidence has been presented in Section 3.1.

3.3 Progress towards the project Outcome

Sections 3.1 and 3.2 have provided an update on project progress against the indicators with evidence of progress. The climate data collection has had some issues with equipment reliability, however the project team believe that the inclusion of new project data up until May 2018 will be sufficient to indicate the variations in micro-climate within the study area and to calculate a water balance. This information will be sufficient to assess the proportion of mist and rain captured by endemics and invasive plants in the study area. The results will then be used to evaluate the potential for cloud forest restoration to increase potable water supply on St Helena.

3.4 Monitoring of assumptions

The assumptions made regarding the project objectives have not changed and some of them were realised during the second year.

Equipment parts and repairs. Replacement data cables for the weather stations could not be shipped to reach the island until the end of January 2018, once the cause of the weather station malfunction had been identified in November 2017. The installation of the new data cables has also taken far longer than anticipated due to the need to use a qualified electrical engineer to re-wire the parts. This additional technical work was not anticipated when the equipment was procured. However, the project team will leave functional equipment for ANRD to use after the project has finished (see Section 7 exit strategy).

Equipment reliability and length of data record. The automatic weather stations have not worked as anticipated, with the most recent problems identified as corrosion of the data cables at all weather stations. Two soil moisture loggers have also been a problem in Grapevine Gut and on Diana's Peak (although this data is not critical to the project outcomes), plus a Hobo data logger on Diana's Peak.

The project team have identified solutions and are working through them. There is sufficient redundancy in the monitoring network that the failure of some sensors will not cause a problem to the overall project progress and outcome. However, some of the data records are discontinuous with other records requiring a longer period of monitoring in order to gain a more coherent understanding of each sub-catchments water balance.

Reporting Deadline. The team would like to extend the reporting period until the 30th September 2018 so that data collected up until May 2018 can be collated, interpreted and reported. A separate change management request has been submitted.

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

The project has installed a cloud forest micro-climate monitoring network in the Peaks National Conservation Area. For the first time, a record of micro-climate is being collected to support the understanding of the islands water resources. The monitoring network was installed in October 2016. The data collected will be used to support the implementation of the islands 20-year Water Management Plan and the selection of options to increase rainfall harvesting on the island.

The securing of endemic habitat in the cloud forest is a goal of the project, using data collected to support the option for habitat restoration to increase water harvesting for potable water supply.

Since the project inception, 7 local staff from Connect and the Environmental Management Division of SHG attended project training and have supported the baseline data collection and monitoring in the study area.

During the baseline data collection in 2016 and 2017, the project team met with Environment and Natural Resource Committee councillors to introduce the project and explain the project programme and outcomes. The team also provided an outline of the project to the general public through local radio and newspapers.

The project has yet to improve capacity in other UKOTs. See Section 6 & 8 for additional details.

4. Monitoring and evaluation

This has been covered in earlier sections.

5. Lessons learnt

The overall objectives of the project are being delivered but the team would like to extend the reporting deadline by 3 months so that a more complete data set can be interpreted. The time taken to ship replacement parts and install the parts has delayed data collection at the weather stations. The selection of alternative automated weather stations may have provided a more reliable data set due to equipment reliability, however the supplier selected has a long track record providing equipment for scientific research projects. The project team have consulted the weather station supplier who provide equipment for UK university research projects and the MET Office and they have not seen the level of corrosion observed on St Helena. All parties have learned from the experience.

The availability of staff to complete certain activities has proved demanding for Connect, as staff involvement in the project needed to be reduced to focus attention on post drought operation. This also reduced the availability of staff to download data between June and September 2017, which resulted in longer than expected gaps between data downloads and diagnosis of issues with equipment. Adequate alternative staff cover for EMD monitoring staff on annual leave would need to be better managed to prevent a repeat of the staff shortages between June and September 2017.

6. Actions taken in response to previous reviews (if applicable)

Feedback from the 2017 Year 1 report was welcome and we have tried to address shortcomings in how the project can benefit other OT's. Working with CEH and SHG, we believe that providing a model Operations Manual for flying drones for conservation work as an output which can be shared across all OT's as ASSI cover all UK OT airspace as the regulator. It should be noted that ASSI expect all Permission to Fly applicants to have authored their own Operation Manual and not copied an off the shelf version. Review health and safety of all aerial operations is paramount. Our project report section on the aerial survey will be of benefit for those planning similar surveys.

We have also created a protocol for logging surface water and climate monitoring locations which could be used by other OT's who are designing water monitoring and climate monitoring networks (Monitoring Network Manual).

The outputs of the project will also support future climate and water monitoring projects in other OT's. CEH and Arctium plan to author research papers once the project data has been interpreted (Section 8). These papers will provide further benefit to OT's and research organisations.

7. Other comments on progress not covered elsewhere

A project exit strategy was discussed with the Project Director and the Head of the Agricultural and Natural Resource Directorate and Connect Saint Helena. The strategy will be to maintain a more limited network of climate monitoring equipment in the Peaks, which can be managed by the EMD Conservation Officer and Peaks Conservation Team. The remaining climate monitoring equipment will be taken off-site and moved to other locations across the island by ANRD and incorporated into the climate monitoring network that ANRD operate (see Figure showing weather station locations). Connect Saint Helena will be appointing a consultant environment officer during the first quarter of the 2018 to 2019 financial year. The environment officer will take over all water level and flow monitoring equipment within Wells Gut and Grapevine Gut so that a longer-term data set can be maintained.

The key risk to the project is the collection of a suitably long data set to interpret microclimate data and water data in each sub-catchment. The extension of the reporting deadline to the 30th September would enable the project team to collect sufficient data and complete all interpretation and reporting.

8. Sustainability and legacy

CEH and Arctium will be promoting the project beyond the funded period to raise the profile of the work completed between 2016 and 2018. There has been limited promotion of the project so far, as any meaningful discussion is reliant upon the outputs derived from the monitoring data which is still ongoing. CEH wish to publish scientific and conference papers with Arctium to increase the legacy of the project and promote the work completed.

A long-term legacy for Saint Helena, will be the climate and water level/flow data collected to assist with the long term planning of the islands water resources and management of the endemic cloud forest. Arctium has committed voluntary time over the next few years to assist in data interpretation of water and climate data collected beyond the end of the project.

An outcome that was not identified during the project planning stages was the need for an aerial survey Operation Manual so that drones could be operated on the island. The project team are currently developing an Operation Manual which will be used to apply for a Permission to fly a drone within the study area. Obtaining the Permission from Air Safety Support International (ASSI) will allow conservation teams on the island to monitor vegetation clearance and replanting across the cloud forest and plan future work. The manual will be available as a template for other UK Overseas Territories to apply for Permissions to operate a drone as ASSI are responsible for the regulation of all UKOT's airspace.

9. Darwin identity

The Darwin Initiative logo has prominence on the SHG website and Arctium project web pages. It has also been used in presentations that Arctium have made in the UK regarding Saint Helena's environment.

During the year, the island based project team promoted the project during 2 field trips to the Peaks with visiting conference delegates who attended the inaugural St Helena Environment Conference.

Mike Jervis also took 8 private groups into the Peaks during the year to show them the islands endemic flora and fauna and discussed the project, the Darwin Plus initiative and demonstrated monitoring equipment.

The project was also promoted at Groundsure "lunch and learn" presentation in February 2018.

The project was promoted at the Ardingly College career fair in May 2017 when the Project Manager gave a talk about careers in conservation and environment.

The project will also be promoted at the July 2018 Science Festival, being held by the Royal Botanic Gardens, Kew at Wakehurst Place (West Sussex, UK).

The project team will continue to promote the project once the report is complete through the publication of research papers and conferences. CEH will be leading this initiative with the support of SHG and Arctium.

10. Project Expenditure

Note: these are draft accounts and will be amended when the audited SHG end of year accounts are published.

Table 1: Project expenditure during the reporting period (1 April 2017 – 31 March 2018)

Project spend (indicative) in this financial year	2017/18 D+ Grant (£)	2017/18 Total actual D+ Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items				
Others (Please specify)				
TOTAL				

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2017-2018 – if appropriate

Project summary	Measurable Indicators	Progress and Achievements April 2017 - March 2018	Actions required/planned for next period
Impact Climate change and increasing population are managed effectively to enable a sustainable water supply and restoration of the fragile cloud forest habitat.			
Outcome Demonstrate that restoring the cloud forest will increase harvested rainfall and meet the islands water demand, whilst improving climate change resiliency and significantly increase habitats for endemic plants and invertebrates.	0.1 Desk study. 0.2 Collection of micro-climate data. 0.3 Botanical survey of each sub-catchment. 0.4 Water balance. 0.5 Reporting and outline cloud forest restoration plan.	<ul style="list-style-type: none"> • Desk study reporting; • Collection of micro-climate data; • Aerial surveys; • Botanical surveys; • Installation of additional monitoring network equipment (Blue Siren flow logger); • Staff training – aerial surveys. 	<ul style="list-style-type: none"> • Monthly and quarterly monitoring of climate and water levels; • Interpretation of data, water balance and reporting.
Output 1. Desk Study	1.1 Complete desk study.	Desk study reporting is complete (100%).	
Output 2. Baseline Field Assessment	2.1 Completion of botanical surveys. 2.2 Completion of remote sensing/aerial surveys.	The final reporting of the botanical survey will be completed in May 2018 (85% complete). All aerial surveys are complete (100%).	
Activity 2.1. Completion of botanical surveys.		The baseline botanical survey was completed in early 2018. The survey reporting will be completed by May 2018.	
Activity 2.2. Completion of remote sensing/aerial surveys.		All 2017 aerial surveys have been completed.	

Project summary	Measurable Indicators	Progress and Achievements April 2017 - March 2018	Actions required/planned for next period
Output 3. Environmental Monitoring	3.1 Installation of Blue Siren flow logger. 3.3 Collection of meteorology data in the sub-catchments and a control catchment. 3.4 Monthly and quarterly monitoring of surface water and groundwater levels and flows and meteorological/micro-climate data.	All remaining monitoring equipment has been installed in the field the project year. Regular monitoring of climate and water data will continue until June 2018.	
Activity 3.1. Installation of Blue Siren flow logger.		Complete (100%). The Blue Siren open channel flow logger was installed in November 2017. This equipment will supplement the monitoring equipment installed in 2016.	
Activity 3.3. Collection of meteorology data in the sub-catchments and a control catchment.		This task is 75% complete but is behind the current project programme.	
Activity 3.4. Monthly and quarterly monitoring of surface water and groundwater levels and flows and meteorological/micro-climate data.		This task is 75% complete but is behind the current project programme	
Output 4. Interpretation of Data	4.1 Calculation of water balances from collated water level, flow, meteorological and botanical survey data. 4.2 Interpretation of water balances – identify trends and/or relationships between micro-climate, vegetative cover and ground conditions.	Monitoring data is currently being collated and graphed as and when monitoring data is collected in the field. Interpretation of data has started but cannot be until 6 months of data have been collected from the rain gauges that were re-deployed from Perkins Gut. It is expected that data interpretation will now start in mid-May 2018. The means of verification are still valid. This task is only 60% complete against the project programme, due to data gaps associated with monitoring equipment technical problems.	
Activity 4.1. Calculation of water balances from collated water level, flow, meteorological and botanical survey data.		This task will start in mid-May 2018 when 6 months of additional data have been collected.	
Activity 4.2. Interpretation of water balances – identify trends and/or relationships between micro-climate, vegetative cover and ground conditions.		This task will start in mid-May 2018 when 6 months of additional data have been collected.	
Output 5. Reporting	5.1 Collation of all desk based and field data.	This task is on-going as sections of the report are already being written and field data is being collated for interpretation.	

Project summary	Measurable Indicators	Progress and Achievements April 2017 - March 2018	Actions required/planned for next period
	5.2 Interpretation of data and desk based data and reporting of an outline cloud forest restoration plan.	Interpretation of data will start in June 2018 when 12 months of data have been collected. The means of verification are still valid.	
Activity 5.1. Collation of all desk based and field data.		This task started in late November 2017 but will not be complete until May 2018 when 6 months of additional data have been collected. 60% complete.	
Activity 5.2. Interpretation of data and desk based data and reporting of an outline cloud forest restoration plan.		This task started in late November 2017 but will not be complete until September 2018 when 6 months of additional data have been collected. 60% complete.	

Revised Programme (2018 to 2019)

	Activity	No of Months	Year 1												Year 2												Year 3													
			A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S								
Output 1	Desk Study																																							
1.1	Data collation at CEH and Kew	2																																						
1.2	ANRD data collation	1																																						
1.3	Reporting	2																																						
Output 2	Monitoring Network and Baseline Data Collection																																							
2.1	Vegetation surveys in sub-catchments	3																																						
2.2	Remote sensing and aerial surveys	3																																						
2.3	Installation of surface water and groundwater monitoring equipment	2																																						
2.4	Monthly and quarterly monitoring of surface water and groundwater – minimum 12 months	16																																						
Output 3	Microclimate Assessment																																							
3.1	Installation of meteorological monitoring equipment																																							
3.2	Collection of meteorology data over a minimum 12 months	16																																						
3.3	Collection of humidity data from tiny-tags over a minimum of 12 months	16																																						
Output 4	Water Balance and Interpretation																																							

Annex 2: Project’s full current logframe as presented in the application form (unless changes have been agreed) - if appropriate

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 Darwin-Projects@ltsi.co.uk if you have any questions regarding this.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: Climate change and increasing population are managed effectively to enable a sustainable water supply and restoration of the fragile cloud forest habitat.			
Outcome: Demonstrate that restoring the cloud forest will increase harvested rainfall and meet the islands water demand, whilst improving climate change resiliency and significantly increase habitats for endemic plants and invertebrates.	0.1 Desk study. 0.2 Collection of microclimate data. 0.3 Botanical survey of each sub-catchment. 0.4 Water balance. 0.5 Reporting and outline cloud forest restoration plan.	0.1 Completion of desk study and reporting of outcomes. 0.2 Field collection and interpretation of meteorological data. 0.3 Field data collection and interpretation of botanical data. 0.4 Field data collection and interpretation of hydrology, hydrogeology, meteorological and botanical data to calculate balances. 0.5 Reporting of restoration plan in final project report.	Access is made available to literature archives and data sources. Topography is accessible. Equipment can be shipped to island in good time to allow a minimum 12 months data collection. Equipment performs reliably to collect remote datasets. Procurement process enable the timely purchase of project equipment.
Outputs: 1. Desk Study - to collate archive data.	1.2 Visit Kew and CEH in the UK to collate desk based data. 1.3 Desk based assessment of ANRD archive in the Scotland library on Saint Helena. 1.4 Desk study report.	1.1 Collated reports and data sets from Kew and CEH. 1.2 Collated reports data sets from ARND library. 1.3 Completion of desk study report.	Reports and data sets are available to assess a baseline and determine key mechanisms for cloud forest rainfall harvesting.
2. Baseline Field Assessment	2.1 Completion of botanical surveys. 2.2 Completion of remote sensing/aerial surveys. 2.3 Water features survey	2.1 Drafting of maps, GIS layers, reporting of field activities. 2.2 Drafting of maps, video and photos of aerial surveys. 2.3 Water features survey report.	Topography allows access by foot into each sub-catchment to verify aerial survey data. Drone performs well and does not suffer technical problems.

			Remote sensing data is available from SHG and other identified open source data providers (NASA, SMAP).
3. Environmental Monitoring	<p>3.1 Installation of hydrology and hydrogeology monitoring locations.</p> <p>3.2 Installation of meteorological monitoring equipment and relative humidity loggers in both sub-catchments.</p> <p>3.3 Collection of meteorology data in the sub-catchments and a control catchment.</p> <p>3.4 Monthly and quarterly monitoring of surface water and groundwater levels and flows and meteorological/micro-climate data.</p>	<p>3.1 and 3.2 Monitoring location maps and data sheets.</p> <p>3.3 and 3.4 Maps, spreadsheets and associated charts showing data collected.</p>	<p>Topography allows access to monitoring locations by foot.</p> <p>Equipment is procured and shipped to Saint Helena in time to meet 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.</p>
4. Interpretation of Data	<p>4.1 Calculation of water balances from collated water level, flow, meteorological and botanical survey data.</p> <p>4.2 Interpretation of water balances – identify trends and/or relationships between micro-climate, vegetative cover and ground conditions.</p>	<p>4.1 Reporting of sub-catchment hydrology, hydrogeology, meteorology and botanical survey data.</p> <p>4.2 Reporting of sub-catchment water balances and interpretation of the relationships/trends.</p>	<p>Sufficient data can be collected to calculate a water balance.</p> <p>Meteorological data and vegetation survey are of sufficient resolution to differentiate between sub-catchments.</p>
5. Reporting	<p>5.1 Collation of all desk based and field data.</p> <p>5.2 Interpretation of data and desk based data and reporting of an outline cloud forest restoration plan.</p>	<p>5.1 Draft final report.</p> <p>5.2 Final section of draft final report. Outline cloud forest restoration plan to support water supply and terrestrial conservation objectives.</p>	<p>All data and reporting is completed within the 24 month project programme.</p> <p>Sufficient data and identification of trends/relationships to draft an outline restoration plan.</p>

Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1)

1.1, 1.2 and 1.3 contribute to Output 1. Output 1 is required to evaluate existing information and data associated with cloud forest rainfall harvesting on Saint Helena.

2.1, 2.2 and 2.3 contribute to Output 2. Output 2 is required to confirm the coverage of endemic and invasive species in each sub-catchment, define each sub-catchment through mapping and the digital terrain model and complete a survey of the sub-catchments hydrological and hydrogeological features.

3.1, 3.2, 3.3 and 3.4 contribute to Output 3. Output 3 is required for the collection of micro-climate and water resource data sets.

4.1 and 4.2 contribute to Output 4. Output 4 is required to quantify each water balance and determine differences between each sub-catchment quantify any differences in micro-climate between the sub-catchments and interpret the trends/relationships.

5.1 and 5.2 contributes to Output 5. Output 5 is the main project report and provides an outline restoration plan for the cloud forest to support water supply and terrestrial conservation objectives.

Annex 3 Onwards – supplementary material (optional but encouraged as evidence of project achievement)

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	Y
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	Y
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Y
Do you have hard copies of material you want 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.	N
Have you involved your partners in preparation of the report and named the main contributors	Y
Have you completed the Project Expenditure table fully?	Y
Do not include claim forms or other communications with this report.	