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 2019

Darwin Plus Project Information

Project reference	DPLUS081
Project title	Mapping for evidence-based policy, recovery and environmental resilience.
Territorries	British Virgin Islands and Turks and Caicos Islands
Lead organisation	Environment Systems Ltd.
Partner institutions	DECR, TCI; National Parks Trust of the Virgin Islands, BVI; JNCC
Grant value	£210,920.00
Start/end date of project	01/04/2018 – 31/03/2020
Reporting period and number	April 2018-April 2019, AR1
Project leader name	Johanna Breyer and Katie Medcalf
Project website/blog/Twitter	None
Report author(s) and date	Johanna Breyer, and Katie Medcalf, 26.06.2019

1.   Project overview

Ecosystem goods and services, including those derived from biodiversity, are essential drivers for the TCI and BVI economies, supporting tourism, food provision and mitigating the effects of extreme weather events. The natural environment is susceptible to damage from human activities resulting in significant loss of value to the economies of the Territories and an increased risk from natural disaster such as hurricane-generated storm surges and flooding. The recent hurricane damage to the islands highlight the importance of protecting these natural assets.

The project provides evidence to develop policy to aid post-hurricane environmental recovery and enhance future resilience to natural disasters. It uses satellite data to map and model the marine and terrestrial environment in the Turks and Caicos Islands (TCI) and the British Virgin Islands (BVI), pre- and post the 2017 hurricanes Maria and Irma.

The project further focuses on sharing experience and learning to develop both island's expertise in relevant techniques and is integrated closely with other UK Government supported projects in the BVI and TCI.

The project supports territory priorities to protect and enhance critical goods/services and biodiversity values and addresses these issues through:

- building capacity to use remote sensing technologies/methods to undertake detailed mapping of the marine and terrestrial environments for monitoring change; evaluating hurricane impacts on the natural environment; mapping opportunities for habitat restoration;

- providing firm evidence for policy development and planning.

2. Project stakeholders/partners

The project team have been working closely with project partners from the TCI Department of Environment and Coastal resources, and the BVI National Parks Trust as well as JNCC. All project partners have been involved in project planning and decision making, relevant to their role and helping to ensure that the overall project stays on track and delivers the intended outcomes for the partners within the territories. The project is on track with all deliverables.

We have further involved stakeholders from 8 other departments and organisations within the two territories into decision making and planning events so that the final project outputs and training imparted can have the maximum impact on the islands.

The project has also liaised with DPlus073 (Project lead: Louise Soames) project on BVI based on Jost van Dyke.

Help has also been given to stakeholders on BVI from the Department of Disaster Management (DDM) who wanted interpretation of geological survey results and how they can use these within their GIS systems.

3. Project Progress

Project highlights:
- Two one-week training workshops were held for key staff identified by the project partners: one on TCI and one on BVI [Evidence: Supplement_3a.docx and Supplement_3b.docx (Agenda)]
- 23 people were trained in the use of remote sensing for environmental analysis from 12 departments / organisations across the two islands, using ArcGIS and QGIS software systems respectively, according to user preferences [Evidence: Supplement_3c.odt]
- 1190 Sentinel 2 image tiles were obtained over the islands of TCI and processed to analysis ready status. [Evidence: Supplement_3d.gif]
- 224 Sentinel 2 image tiles were obtained over the islands and cays of BVI and processed to analysis ready state [Evidence: Supplement_3e.gif]
- New equipment and high-end processing laptops were delivered to each island together with equipment to collect ground truth data for monitoring of the marine environment and training given [Evidence: Supplement_3f.pdf (Invoices), Supplement_3g.jpg and Supplement_3h.jpg (Shipping lists)]
- The provided satellite imagery was used to begin to answer critical questions significant to recovery from the hurricanes for both islands, as well as resource management and protection [Maps are currently in various stage of production and will be finalised in Year 2 and, where appropriate, submitted for evidence in the final report].

3.1 Progress in carrying out project Activities

Output 1: Satellite imagery sourced and processed and supplied to BVI and TCI; mapping produced for multiple dates supported by existing and new data

Activity 1.1 Imagery planning, acquisition and preparation
Currently, the islands have access to high resolution satellite imagery from before and immediately after Hurricane's Irma and Maria the through previous CSSF funded projects (Williams et al., 2018 and 2019, Using radar based terrain mapping to model the vulnerability of 5 UK OTs and validation of the modelling).

This project therefore concentrates on sourcing and preparing a time series of Sentinel 2 images for each island group. In total by the end of Year 1, 1190 Sentinel 2 image tiles are available to TCI and 224 available to BVI. Cloud free images are rare in the Caribbean which tend to have small cumulus clouds across different parts of the image. Capturing such a dense time series enables the stakeholders to find imagery suitable for a variety of mapping needs on their islands.

A subset of 14 images was also prepared for Jost Van Dyke in the BVI and supplied to them for use in project DPlus 073 [Evidence: Supplement_3_1a.png].

Activity 1.2 Purchase of hardware to allow TCI and BVI to plan for using Sentinel data
Analysis of large data sets such as satellite imagery takes high powered processing computers and the project included funding for capital items to address this need. In the original project bid desktop computers were thought to be the best option as they generally can be built to a higher specification. However, following consultation with all the project partners, it was felt that high-spec laptops would be more suitable in the case of extreme events such as hurricanes, as they can be packed up and moved to a secure location more easily.

The collection of accurate depth data in the marine environment to a fine degree of spatial accuracy requires specialist equipment. Deeper Sonar devices were also purchased to aid in this regard.

The supplied equipment together with the training provided as part of the project, allows the territories to fully exploit the potential of satellite data for the generation of spatial evidence for policy uses, disaster management and recovery.

Activity 1.3 Collect field work data for training and modelling
Training in collection of field work data was provided on BVI and in TCI as part of the workshops. The collection of field work sample points is ongoing and will feed into the mapping and monitoring.

Activity 1.4 Produce timeseries of maps for before and after hurricane Irma and Maria showing diversity maps of terrestrial areas and key shallow water marine features
This work is on-going and currently under review with the inclusion of ground-truthing information.

Output 2: Monitoring of mapping outputs and creation of a monitoring plan for TCI and BVI for future use

Activity 2.1 Create change maps to show the effect of hurricanes Irma and Maria
In BVI change maps / models have been created for Mangrove and tropical forest showing recovery following the Hurricane based on existing habitat mapped areas [Evidence: Supplement_3_1b.pdf].

Activity 2.2 Develop and trial monitoring method
During the workshop on TCI, the techniques were discussed further with individual parameters available in the remote sensing data being explored to act as good indicators of change, these include NDVI, NDWI, Sediment in marine water. This will be further developed in year 2.

Activity 2.3 Write monitoring plan

A bespoke monitoring plan for each island will be created during year 2 and presented at the end of the project.

Activity 2.4 Create ecosystem service and opportunities maps to identify priority areas/habitats for restoration post hurricane to maximise natural protection

An initial map was created for carbon stocks in BVI.

A full list of relevant environmental ecosystem services and indicators is to be agreed following the UK workshop in year 2.

Activity 2.5 Write methodology report and workbook to allow the ecosystem service and opportunity maps to be re-created as part of future monitoring

This will be produced at the end of the project in year two to allow for stakeholder to fully exploit their new skills and data into the future.

Output 3: Workshops and training held on remote sensing, monitoring and ecosystem service mapping techniques

Activity 3.1 Workshop 1; use of remote sensing and modelling in Arc GIS and open-source

Software (QGIS) including shallow water marine, training in ground truth data collection

The first workshop aimed to build in new techniques and knowledge in GIS and remote sensing. It considered how to use ecological remote sensing to benefit BVI and TCI in understanding the risks and opportunities to help management of resources and maintain a strong and resilient environment into the future to help ensure well-being.

The course objectives were:
- Understanding the power of maps as evidence to back / create policy and land management decisions. Understanding how remote sensing data together with other information will provide a scientifically robust basis for policy and management decision making. The workshop will consider:
- Environmental risk, e.g., hurricane storm surge, propensity to bush fire
- Flooding, drought, and how you can model them
- Erosion and development

14 people were trained from 6 departments and organisations including 4 from two different departments in TCI. The BVI GIS group was instrumental in allowing colleagues to access the training.

In addition, in BVI, a session was held with the Permanent Secretary and the Minister of the Environment Department and to show how these GIS-based maps can be used for environmental valuation, vulnerability assessment and monitoring environmental change, ensuring visibility of the project at the policy level. [Evidence: see (@BVIGovernment]

Activity 3.2 Workshop 2; training in monitoring methods, design of monitoring strategies

The course in TCI built on the one held in BVI. Its objectives were:

- To build capacity on mapping with remote sensing data and Geographic Information Systems (GIS) for spatial planning and environmental management.
- To show how ecological remote sensing can be analysed in the GIS environment to monitor environmental change, and look at risk and opportunities. In particular this workshop will concentrate on recording, monitoring and evaluating environmental change due to fire and within wetlands

- To share experiences on mapping and development of mapping techniques to support ongoing work in the Turks and Caicos and the British Virgin Islands.

17 people were trained from a variety of departments and organisations including 12 from different stakeholder organisations in TCI.
In addition, presentations about the project were given to the Minister and to the Governor and to the Permanent Secretary about the project. [Evidence: see @TCI_Press and Supplement_3_1c.jpg, Supplement_3_1d.jpg, Supplement_3_1e.jpg]

In order to test understanding and confidence a quiz was set at the end of the course. Scores showed that the majority of attendees had improved their understanding of the techniques compared to the end of the December workshop on BVI. [Evidence: Supplement_3_1x.xlsx (Test scores)]

Outcomes from the workshop, including maps and evidence generated have already been utilized for the Environmental Impact Assessment guidance on the British Virgin Islands.

Activity 3.3 UK training; detailed training for two key individuals from each island to enhance their skill base in the UK at JNCC and Environment Systems offices:

This is scheduled to be held in June 2019 and we currently anticipate that we will be able to train an additional staff member from each island, so six key individuals in total.

Activity 3.4 Workshop 3: Training in modelling for opportunity mapping and ecosystem service resilience, stakeholder awareness event in policy:

This is to be held in a series of surgery webinars where the techniques are explained and assistance given to the stakeholder in the mapping they are carrying out themselves in year 2. A final workshop will be held within the territories in February/March 2020.

3.2   Progress towards project Outputs

Output 1: Satellite imagery sourced and processed and supplied to BVI and TCI; mapping produced for multiple dates supported by existing and new ground truth data

Mapping was produced for multiple dates and environmental questions supported by existing and new data. Some maps have already been used in a policy environment, e.g., in the Environmental Impact Assessment guidance on BVI. Map production is an on-going process that is increasingly owned by the project partners as the training is implemented. A full list of maps and their uses will be available by the end of year 2.

At the end of year 1 a very dense time series of imagery, both prior and following the 2017 hurricanes has been provided to each island on a hard drive for their own use [Evidence: see Section 3.0]. Discussions are underway about how to ensure a future and on-going supply of analysis ready data for staff of the islands to use for on-going mapping and monitoring of key environmental issues.

Output 2: Monitoring of mapping outputs and creation of a monitoring plan for TCI and

BVI for future use

Key baselining issues were highlighted by the impacts of hurricane Irma and Maria with key gaps in data having been identified where it was not available to baseline the spatial extent and condition of habitats and landcover pre-hurricane.

Good progress has been made through the two workshops held so far on using the pre-hurricane imagery to find extent and condition markers which can then be monitored over time. The monitoring plan will be completed for key environmental features at the end of the project and will be produced in collaboration with the project partners.

Output 3: Workshops and training held on remote sensing, monitoring and ecosystem

service mapping techniques

The first two workshops have been held and 24 people from 8 different departments have been trained in total. The final two workshops and a series of webinar surgeries are in planning for year two.

Through the range of participants from different stakeholders, awareness of the tools and the potential for the generation of spatial evidence from the data has been built across the territories, facilitating future collaboration as well as acceptance and utility of the evidence produced.

3.3   Progress towards the project Outcome

Outcome: "Planning and policy decisions in TCI and BVI routinely use marine and terrestrial maps, models and monitoring to consider spatial attributes of environmental mitigation and ecosystem services produced by nature."

Outcome indicators:
0.1 BVI and TCI have full and easy access to terrestrial and marine ready to use remote sensing data and quality control ground truth data.

➢   **Means of verification:**

Ready to use RS data collected and shared with partners [See section 3 for evidence]. Field data collated and in a form suitable for use with model.

0.2 Biodiversity maps of the terrestrial and shallow water marine areas of TCI and BVI before and after hurricanes Irma and Maria are created. Change and resilience maps created.

➢   **Means of verification:**

Maps from at least 2 time frames of terrestrial and shallow water environment [See section 3 for evidence, work on-going]. Short 5 page report documenting methods are produced. [Evidence: Supplement_3_3a.docx and Supplement_3_3b.docx]

0.3 Monitoring method to inform sustainable development policies and practices using remote sensing (RS) data are developed and implemented.

➢   **Means of verification:**

Change maps produced, map showing key areas of resilience produced, Short 5 page report documenting methods. [Year 2]

0.4 Key ecosystem services identified and mapped for each islands priority to allow sustainable use of terrestrial and marine environments. Legacy usage ensured by production of workbooks and processes.

➢   **Means of verification:**

Key ecosystem service and opportunity maps produced. Workbooks and workflows produced and those on island have run through an example to demonstrate their understanding. [Year 2]

0.5 Plans developed to integrate this new type of spatial mapping into policy decisions to help improve marine and terrestrial conservation, protection of key resources and integrated planning. Workshop run with key stakeholder to raise awareness.

➢   **Means of verification:**

Integration plan for each island developed. Maps used in at least three policy decisions.

[Year 2]

0.6 Key staff are trained and there is a plan on each island to continue integrating the RS data and techniques into the GIS working group remits. GIS working group set up on TCI.

➢   **Means of verification:**

0.6 Three workshops and one UK-based training course held, awareness of the use of the maps and monitoring tested by online questionnaire to key stakeholders and policy makers. [Two workshops held, two further planned as well as an M+E review].

During the course of Year 1 it has become apparent that the indicators need to be reviewed and updated as many are repetitive or read as activities. Early in Year 2 they will be revised and re-submitted.

The project is working well towards its stated outcome, year 1 has focused on skills, data and equipment and this is a strong foundation for implementation and practical application by the project partners during year 2.

Staff now understand how satellite remote sensing and GIS can be used to provide evidence as a key part of their decision making and are beginning to implement this by using new skills, data and equipment provided by the project independently.

Key issues of concern to the island have begun to be explored using the techniques taught during the training workshops and year 2 will strongly focus on these and the transferability of the taught techniques across different uses to ensure future application.

The next stage is to ensure the key staff in each island are confident enough in the data and techniques to work with the data long term to design and implement monitoring and to present it in such a form that policy makers can understand these issues and take them into account. This will be the ongoing work of the project in Year 2.

3.4   Monitoring of assumptions

List of assumptions in the application logframe, each is addressed in turn:

Assumption 1: Imagery purchased by JNCC for the islands as part of previous projects will be available to use.

➢ All imagery purchased by JNCC for the islands as part of previous projects is available for habitat mapping under this project.

Assumption 2: Landform data and data from the JNCC vulnerability model is available to integrate into the process.

➢ The data is available.

Assumption 3: Key stakeholders within each island continue to support and realise the value of the project.

➢ Project partners within each island have been very supportive and engaged, this is reflected in the attendance numbers of each workshop held so far.

Assumption 4: No further catastrophic events hit the islands during the project.

➢ The 2018 hurricane season passed without major impact on the territories and the recovery from Irma and Maria in 2017 continues. We hope that this will not be set back by the 2019 hurricane season.

Assumption 5: Suitable cloud-free satellite imagery can be purchased within budget. There is a low risk of the imagery being unsuitable or costly.

➢ A very large number of satellite images for both islands was procured. While clouds remain a constant problem, cloud-masking and image combination techniques have been introduced into staff training to mitigate for this.

Assumption 6: Existing data can be used for pre-hurricane reference data points.

➢ Existing data is accessible and can be used for reference.

Assumption 7: Pre-hurricane land cover maps provided for TCI by JNCC.

➢ The map is currently under review by the TCI project partners and will undergo revision and finalising in Q2 of year 2.

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

The project has made good progress in supporting the Caribbean project partners in using data driven decision making in achieving their strategic long-term environment outcomes by training a large number of relevant staff in key techniques of spatial evidence creation as well as supplying a large amount of pre- and post-hurricane(2017) imagery for both territories. Year 1 has focused on training and the supply of data, while year 2 will centre on the creation and refinement of spatial evidence and their use in decision making.

The project is developing capacity in key staff within key organisations on island for understanding the damage the hurricanes have done and reporting it through evidence-based maps and graphs, as well as addressing other challenges facing the territories that could be helped by spatial evidence.

The year 2 case study outputs demonstrating this will be available at the end of the project.

4.   Monitoring and evaluation

The project has collected a range of data for M&E, such as a baseline questionnaire of 26 stakeholders within both territories and individual workshop feedback as well as tests on knowledge retention at set intervals following training events.

While we have completed a large proportion of the project activities and project outputs (see Section 3.1) we anticipate that their impact on the project Outcome will largely become apparent in Year 2 and one of the aims of the Year 2 is to consolidate the project outputs to strengthen their contribution towards the outcome.

We recognise that the indicators of achievement and proposed means of verification within the project logframe need reviewing and refining and this will be addressed during a review of the logframe early in Year 2, the results of which will be submitted to Darwin for approval.

In Q1 of year 2, we will include an M&E review and analysis of data collected so far and an adjustment to the M&E plan, if required. Following the review, a list of data to collect in year 2 to show on-going progress and evidence it will be produced and implemented.

The M&E work is primarily carried out by Environment Systems as the project lead with support from Wavehill, our M&E contractor. A summary of the results of the M&E review will be shared with the project partners.

5.   Lessons learnt

Using upfront input and then post-event feedback from project partners to tailor training to their requirements worked very well.

If we undertook a similar project again, we would allow more time for workshop organisation logistics.

Collaboration between project partners is key to the success of the project and getting to know each other in person early-on or prior to the project is invaluable to overcome any difficulties further down the line. While we of course benefit from electronic communication, in the case of multiple partners and a wide geographical spread and different time zones, communication other then written can be difficult to maintain outside of scheduled visits and it is very helpful to have established personal relationships to mitigate for this. We have benefitted greatly from working together prior to this project and having established relationships and we would recommend to build in time for this early in the timelines of other projects.

Ideally, we would have reviewed and updated the logframe earlier in the project (i.e. Year 1).

Flexibility and adaptive management is a big feature and although several environmental issues for project focus were identified when writing the project proposal, more urgent ones have come up during Year 1, such as the need to map illegal housing on TCI and Casuarina spread to mitigate fire risk from dry scrub vegetation and it is anticipated that the future will create new challenges.

The territories want to be able to respond to these new environmental questions, so more effort is being invested into training and assistance, so they are able to map and monitor environmental issues independently and responsively and slightly less in providing one off products for the islands which are applicable only to current issues.

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

We received feedback on the application logframe upon confirmation of the project funding that, together with developments during Year 1 of the project and discussions with our project partners and M&E contractors, have led us to plan a revision of the logframe to strengthen particularly the indicators and their verification. We are aiming to submit the revised version to the Darwin Initiative by the end of Q1 of Year 2 for approval.

7.   Other comments on progress not covered elsewhere

As above, the project logframe is currently being revised and will be submitted shortly for approval to reflect both the better understanding of the process and the adaptation towards a greater emphasis on staff training, rather than delivery of one-off products to the territories during this project. We particularly mean to improve the indicators and their means of verification.

The project required a considerable amount of effort to overcome logistical problems to allow all partners to attend the scheduled workshops, e.g., the provision of sufficient accommodation and travel arrangements for a large number of participants from the different territories and islands. The cooperation of all partners to the success of these arrangements was essential.

Unfortunately, one key project partner from TCI will not be able to attend the planned Master class workshop in the UK during May 2019 as visa requirements for their travel could not be met. However, a different member of staff was able to take their place and planned "surgeries"

via Skype during 2019-2020 to support on-going mapping projects by application of the skills acquired during this project will provide an additional opportunity for training.

As identified in the initial assumptions, the territories remain at risk of infrastructure damage from hurricanes during the coming year's season and impact would have to be mitigated for in the best possible manner if this should occur. We do not currently foresee any other substantial risks.

In year 2 work will be undertaken linking the data and analysis from this project with Conflict, Stability & Security Fund (CSSF) funded work on natural capital and indicators carried out by JNCC and Woods Plc on BVI to increase efficiency and collaboration in the use of environmental data on the islands.
Positive synergies and correlations with past Darwin projects have been highlighted by the project partners (e.g., DPlus030 on BVI and DPlus016 on TCI) and the project has engaged with on-going projects (e.g., DPlus043 and DPlus073) that have related aims for mutual information and benefit.

8.   Sustainability and legacy

During both workshops held within the Territories, a wide group of stakeholders, e.g., policy makers, were invited and attended the project launch and a non-technical project launch session intended to promote the work. Both the deputy head of the National Trust of the BVI and the head of department of the DECR attended both workshops in full and consideration was given to how to present the outcomes of the work to decision makers to ensure impact further down the lines.

Attendees at all workshops were carefully selected with regards to their specific roles within the territories and to achieve a good aim between practitioners and decision makers and how they might interact.

M&E data has been collected towards this purpose from a wide group of participants of information days during the workshops and the analysis of this will form part of the M+E review in Q1 of Year 2.

Our planned exit strategy centres around a trained body of OT personnel to continue the application of the taught techniques and usage of the data supplied to create spatial evidence for disaster management/recovery, resource management and biodiversity protection as the need for this arises.

A set of skills and processes has been identified that can be combined to create mapped outputs from available data to support evidence need and the focus of year 2 is on the deepening of these skills and their transferability to separate questions.

Workbooks have been produced for the required skill sets, both for ArcGIS and QGIS, as the two territories use different software suites. A monitoring plan for the territories will be produced in year 2 in collaboration with and for future implementation by the project partners to ensure its maximum utility and sustained usage.

An on-going supply of suitable image data for the territories is crucial for sustained monitoring and the maintenance of current evidence and procurement options for this are currently explored.

9.   Darwin identity

All project documents, e.g., workshop presentations, agenda, attendance certificates referenced in Section 3 included the Darwin logo as well as those of the project partners.

A short piece about the project was published in "Sphere", the Environment Systems quarterly newsletter which is distributed to a wide range of clients and other people in the industry. [Evidence: Supplement_9_1.pdf]

During the two workshops on TCI and BVI interviews and press conferences were held with local media outlets to promote the project [Evidence: Supplement_3_1c.jpg].

All project partners used Twitter to publicise project activities. The following addresses either tweeted or were tagged in tweets related to the project: Darwin Plus (@Darwin_Defra), Environment Systems (@envsystems), JNCC (@JNCC_UK), BVI government (@BVIGovernment), TCI government (@TCI_Press).

https://www.facebook.com/NPTVI contains project-related posts.

The project has a distinct identity but is building on other projects that have been carried out in the Caribbean OTs prior to this and it forms part of a wider effort of capacity building and hopefully as a stepping stone to further strategic Darwin bids. There are other projects underway in the territories that have synergies with the current one (e.g., DPlus043 and DPlus073) and previous ones to which the learning from this project can be correlated to (e.g., DPlus030 on BVI and DPlus016 on TCI).

There is a very good understanding of the Darwin Initiative within the BVI and TCI and a number of project partners have been and are currently involved in other Darwin projects and are planning to apply for future ones. The initiative funding is appreciated as a useful funding source for specific projects with a targeted focus but also considered within strategic efforts to build capacity for environmental protection within the territories.

10.   Project Expenditure

Table 1: Project expenditure <u>during the reporting period</u> (1 April 2018 – 31 March 2019)

Project spend (indicative) in this financial year	2018/19 D+ Grant (£)	2018/19 Total actual D+ Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items				
Others (M&E data collection support during workshops on BVI and TCI)				
TOTAL				

Annex 1:   Report of progress and achievements against Logical Framework for Financial Year 2018-2019 – <u>if appropriate</u>

We have not reported progress and achievement against the Logical Framework for 2018-19 as we are currently undergoing a review of the logframe in the interest of addressing weaknesses in the application logframe with regards to the indicators and means of verification. The updated logframe will be submitted to Darwin for approval under a change control notice in Q1 of Year 2.

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

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: *Biodiversity, ecosystem services and the role they play in mitigation are further integrated and strengthened in planning and development activities in marine and terrestrial areas of BVI and TCI* .			
Outcome: Planning and policy decisions in TCI and BVI routinely use marine and terrestrial maps, models and monitoring to consider spatial attributes of environmental mitigation and ecosystem services produced by nature.	0.1 BVI and TCI have full and easy access to terrestrial and marine ready to use remote sensing data and quality control ground truth data. 0.2 Biodiversity maps of the terrestrial and shallow water marine areas of TCI and BVI before and after hurricanes Irma and Maria are created. Change and resilience maps created. 0.3 Monitoring method to inform sustainable development policies and practices using remote sensing (RS) data are developed and implemented. 0.4 Key ecosystem services identified and mapped for each islands priority to allow sustainable use of terrestrial and marine environments. Legacy usage ensured by production of workbooks and processes.	0.1 Ready to use RS data collected and shared with partners. Field data collated and in a form suitable for use with model. 0.2 Maps from at least 2 time frames of terrestrial and shallow water environment. Short 5 page report documenting methods are produced. 03 Change maps produced, map showing key areas of resilience produced, Short 5 page report documenting methods. 0.4 Key ecosystem service and opportunity maps produced. Workbooks and workflows produced and those on island have run through an example to demonstrate their understanding. 0.5 Integration plan for each island developed. Maps used in at least three policy decisions. 0.6 Three workshops and one UK-based training course held, awareness of the use of the maps and monitoring	Imagery purchased by JNCC for the islands as part of previous projects will be available to use. Landform data and data form the JNCC vulnerability model is available to integrate into the process. Key stakeholders within each island continue to support and realise the value of the project. No further catastrophic events hit the islands during the project.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
	0.5 Plans developed to integrate this new type of spatial mapping into policy decisions to help improve marine and terrestrial conservation, protection of key resources and integrated planning. Workshop run with key stakeholder to raise awareness. 0.6 Key staff are trained and there is a plan on each island to continue integrating the RS data and techniques into the GIS working group remits. GIS working group set up on TCI.	tested by online questionnaire to key stakeholders and policy makers.	
Output 1 Satellite imagery sourced and processed and supplied to BVI and TCI; mapping produced for multiple dates supported by existing and new ground truth data	1.1 Imagery sourced within budget with multi-user licence to allow islands to retain and build a library of suitable imagery. 1.2 Mechanism for the acquisition of Sentinel imagery agreed and put into place. 1.3 Field work data points and shallow water marine bathymetry points are collected. 1.4 Maps produced for each time frame, using both VHR (including Pleiades) data and Sentinel 2 data. Short report on the uses of each data type produced.	1.1 Analysis ready imagery provided to islands. 1.2 Sentinel imagery available on island for monitoring. 1.3 Collated field work data points ready for analysis and modelling with RS data. 1.4 Maps created and verified on islands by their experts – any re-running of the model completed to give finalised outputs.	Suitable cloud-free satellite imagery can be purchased within budget. There is a low risk of the imagery being unsuitable or costly. Existing data can be used for pre-hurricane reference data points. Pre-hurricane land cover maps provided for TCI by JNCC.
Output 2	2.1 Change maps created to show effects of the 2017 hurricanes.	2.1 Change maps presented to each of the islands, short 5 page report highlighting key points.	

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Monitoring of mapping outputs and creation of a monitoring plan for TCI and BVI for future use	2.2 Maps and a short 5 page report created showing resilient and sensitive areas needing restoration or further action. 2.3 Monitoring plan agreed on for both islands to use RS to update maps both systemically and after future extreme events.	2.2 Eight resilience and sensitivity maps presented to each of the islands, short 5 page report highlighting key points. 2.3 Monitoring plans written for the islands, by the islands and signed off by GIS working group stakeholders.	
Output 3 Workshops and training held on remote sensing, monitoring and ecosystem service mapping techniques	3.1 Key staff understand and can use RS data for key points. 3.2 Key staff understand and can carry out monitoring activities. 3.3 Monitoring activity plan is produced on each island and is supported by GIS group.	3.1 Staff trained via 3 workshops and 1 UK training event. Questionnaire at end of training comes back with at least 75% of attendees feeling confident they can use the data and the resultant maps. 3.2 TCI start a GIS group based on the BVI model. 3.3 Monitoring plans produced to show how the techniques will be implemented for the long term.	

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)

Output 1: Satellite imagery sourced and processed and supplied to BVI and TCI;
mapping produced for multiple dates supported by existing and new data

1.1 Imagery planning, acquisition and preparation
1.2 Purchase of hardware to allow TCI and BVI to plan for using Sentinel data
1.3 Collect field work data for training and modelling
1.4 Produce timeseries of maps for before and after hurricane Irma and Maria showing
diversity maps of terrestrial areas and key shallow water marine features

Output 2: Monitoring of mapping outputs and creation of a monitoring plan for TCI and
BVI for future use

2.1 Create change maps to show the effect of hurricanes Irma and Maria
2.2 Develop and trial monitoring method

Project summary	Measurable Indicators	Means of verification	Important Assumptions
2.3 Write monitoring plan 2.4 Create ecosystem service and opportunities maps to identify priority areas/habitats for restoration post hurricane to maximise natural protection 2.5 Write methodology report and workbook to allow the ecosystem service and opportunity maps to be re-created as part of future monitoring Output 3: Workshops and training held on remote sensing, monitoring and ecosystem service mapping techniques 3.1 Workshop 1; use of remote sensing and modelling in Arc GIS and open-sourced software including shallow water marine, training in ground truth data collection 3.2 Workshop 2; training in monitoring methods, design of monitoring strategies 3.3 UK training; detailed training for two key individuals from each island to enhance their skill base in the UK at JNCC and Environment Systems offices 3.4 Workshop 3: Training in modelling for opportunity mapping and ecosystem service resilience, stakeholder awareness event in policy.			

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.	
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.	
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.	
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. However, we would expect that most material will now be electronic.	
Have you involved your partners in preparation of the report and named the main contributors	
Have you completed the Project Expenditure table fully?	
Do not include claim forms or other communications with this report.	