

DP\100020

Securing South Georgia's native habitats following invasive species control

Newton, Rosemary | Royal Botanic Gardens, Kew

Funding sought
Project start/end

£256,544.00
1 Apr 2018 - 31 Mar 2021

1. Contact Details

Q1. Lead applicant contact details

Please enter the contact details for the lead application. The lead applicant is the same as the Flexi-Grant account holder. Please note that the Flexi-Grant account holder will be the only contact point for the application. Additionally, please add contact details for the Project Leader if this is different from the lead applicant.

Dr Rosemary Newton

Royal Botanic Gardens, Kew

Primary Applicant

Royal Botanic Gardens, Kew, Wakehurst
Place, Ardingly, West Sussex, RH17 6TN,
United Kingdom

Q2. Lead organisation contact details

Please enter the applicant organisation details

Royal Botanic Gardens, Kew

General

www.kew.org (Work)

Royal Botanic Gardens, Kew, Kew, Richmond,
Surrey, TW9 3DS, United Kingdom (Work)

Q3. Lead organisation type

Please select one of the below options.

Other (e.g. Academic)

Please add any 'Committee Feedback' to the field below:

Please add any 'Specific Ineligibility' feedback to the field below:

Please add any 'Conditions' to the field below:

Please add any 'Positive Feedback to the field below:

2. Title, Dates & Budget Summary

Q4. Project title

Securing South Georgia's native habitats following invasive species control

Q5. Project dates

Start date: 01/04/2018	End date: 31/03/2021	Duration (e.g. 2 years, 3 months): 3 years
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Q6. UKOT(s)

(See Guidance Notes)

Which UK Overseas Territory(ies) will your project be working in? You may select more than one UKOT from the options below.

South Georgia and The South Sandwich Islands (SGSSI)

* if you have indicated a territory group with an asterisk, please give detail on which territories you are working on here:

In addition to the UKOTs you have indicated above, will your project directly benefit any other country(ies)? If so, list here.

Falkland Islands

Q7. Budget summary

Year:	2018/19	2019/20	2020/21	Total request
Amount:	£101,666.00	£89,123.00	£65,755.00	£256,544.00

Q7b. Proposed (confirmed and unconfirmed) co-financing as % of total project cost

20%

3. Lead Organisation Summary

Q8. Lead organisation summary

Please provide the following information on the lead organisation

What year was your organisation established/ incorporated/ registered?	1983
What is the legal status of your organisation?	<input checked="" type="radio"/> Other (if selected, please explain below)
Other explained	Non-Departmental Public Body with Exempt Charitable Status
How is your organisation currently funded?	Kew is funded through a variety of funding sources. Approximately 40% of Kew's operating costs come from the UK government as grant-in-aid (administered through Defra). The balance is derived from membership and philanthropic donations, other commercial events and fundraising, as well as through competitive sources of research funding such as research councils and the Leverhulme Trust.
Have you provided the requested signed audited/independently examined accounts? If you select "yes" you will be able to upload these. Note that this is not required from Government Agencies.	<input checked="" type="radio"/> Yes

Please attach the requested signed audited/independently examined accounts. The limit for any single file uploaded as supporting materials with your application is 6MB. Please ensure documents are saved in PDF form where possible in order to minimise size.

Q9. Has your organisation been awarded Darwin Initiative funding before (for the purposes of this question, being a partner does not count)?

Yes

If yes, please provide details of the most recent awards (up to 6 examples)

Reference no.	Project leader	Title
DPLUS037	Thomas Heller	Conserving the genetic diversity of St Helena's threatened endemic flora
DPLUS030	Martin Hamilton	Building systems and capacity to monitor and conserve BVI's flora
23-034	Dr Ruth Bone	Edible wild orchid trade: sustaining livelihoods and biodiversity in Zambia
22-012	Prof. Philip Stevenson	Harnessing agricultural ecosystem biodiversity for bean production and food security

22-006	Dr Aaron Paul Davis	Mainstreaming biodiversity conservation and climate resilience at Yayu Biosphere Reserve
22-005	Dr Paul Wilkin	Conserving Madagascar's yams through cultivation for livelihoods and food security

4. Project Partners

Q10. Project partners

Please list all the partners involved (including the Lead Organisation) and explain their roles and responsibilities in the project. Describe the extent of their involvement at all stages, including project development. This section should illustrate the capacity of partners to be involved in the project, and how local institutions, local communities, and technical specialists are involved as appropriate.

Please provide written evidence of partnerships. Please add fields for more partnerships, if required. Details on roles and responsibilities in this project must be given for the Lead Organisation and all project partners.

Lead Organisation name:	Royal Botanic Gardens, Kew (Kew)
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Details (including roles and responsibilities and capacity to engage with the project):

Experience: Kew has a successful history of delivering Darwin Plus projects on time and within budget and actively supporting conservation initiatives and botanical research in the UKOTs for over 20 years. Rosemary Newton is an experienced seed scientist and was part of the team responsible for delivering the multi-million Euro EU funded NASSTEC project FP7-PEOPLE-2013-ITN (<https://nasstec.eu/home>).

Roles and responsibility: Rosemary Newton will lead the project and be responsible for project co-ordination, management and reporting. The named Kew team will contribute botanical expertise and student training and Kew Finance will provide financial oversight. Through the Millennium Seed Bank (MSB), the Kew team will provide ex-situ conservation of seed collections, producing seed viability and germination data.

Involvement: Kew was a partner on DPLUS015 which led to the successful delivery of the South Georgia Non-Native Plant Management Strategy 2016-2020 and the production of the Field Guide to the Introduced Flora of South Georgia. In support of and to continue this success, Kew has developed this proposal and identified suitable partners for its delivery.

Capacity: Kew regularly manages large, global multidisciplinary projects. The MSB is the largest wild plant species seed bank in the world with fully equipped laboratories for seed research.

Do you have partners involved in the Project?

Yes

The limit for any single file uploaded as supporting materials with your application is 6MB. Please ensure documents are saved in PDF form where possible in order to minimise size.

1. Partner Name:

Indigena Biosecurity International

Website address:	http://www.indigena.co.nz/
Details (including roles and responsibilities and capacity to engage with the project):	<p>Experience: Although formed in 2015, Indigena staff, including Bradley Myer (Director), Kelvin Floyd, Ken Passfield and Sally Poncet, have been working on South Georgia for many years. Sally was awarded the Polar Medal in 2015.</p> <p>Roles and responsibility: Indigena are currently contracted to the Government of South Georgia & the South Sandwich Islands for the implementation of the Non Native Plant Management Strategy 2016 -2020. The contract has a 5 year term. For the Darwin Plus project, the team will be responsible for the fieldwork component. This will involve collection of soil samples, setting and monitoring seed dispersal traps and collecting seed and spores while on South Georgia. The team will also monitor existing vegetation plots and control programme plots in invaded sites using best practise methodology and the latest mobile technology to enable systematic delivery, proper statistical analysis of results and publishing.</p> <p>Involvement: Indigena have been involved in all stages of the development of this project proposal via face-to-face and Skype meetings and emails over the past year.</p> <p>Capacity: The Indigena team are on South Georgia for a minimum of 188 person days each season and can accommodate the proposed project activities by adding to their existing work programme.</p>
Would you like to include a letter of support from this organisation?	<input checked="" type="radio"/> Yes

Letter of Support:	<p>The limit for any single file uploaded as supporting materials with your application is 6MB. Please ensure documents are saved in PDF form where possible in order to minimise size.</p> <div data-bbox="564 282 1390 443" style="border: 1px solid black; padding: 5px;"><hr/><hr/></div>
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Do you have more than one partner involved in the Project?

Yes

2. Partner Name:	The University of Durham
Website address:	https://www.dur.ac.uk/

<p>Details (including roles and responsibilities and capacity to engage with the project):</p>	<p>Experience: The University of Durham is one of the top universities in the UK, with strengths in quantitative and conservation ecology within the Biosciences Department. Wayne Dawson has particularly strong expertise in statistical analysis and invasion ecology.</p> <p>Roles and responsibility: Wayne Dawson will lead the statistical analysis of the data, which will include i) data on field observations of vegetation and alien/native plant species presence in experimental alien plant removal plots on South Georgia, ii) data from seed viability and germination trials from seed traps located on and soil samples collected from South Georgia.</p> <p>Involvement: The University of Durham has been involved in all stages of project development including face-to-face and Skype meetings and emails over the past year.</p> <p>Capacity: Durham has excellent computer facilities and I.T. support to allow the storage and analysis of data sets. Expertise in working with large data sets and statistical modelling are readily available.</p>
<p>Would you like to include a letter of support from this organisation?</p>	<p><input checked="" type="radio"/> Yes</p>
<p>Letter of Support:</p>	<div style="border: 1px solid black; height: 60px; width: 100%;"></div>

<p>3. Partner Name:</p>	
<p>Website address:</p>	
<p>Details (including roles and responsibilities and capacity to engage with the project):</p>	

Would you like to include a letter of support from this organisation?	<input checked="" type="radio"/> Yes
Letter of Support:	<div style="border: 1px solid black; height: 60px; width: 100%;"></div>

4. Partner Name:	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>
Website address:	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>
Details (including roles and responsibilities and capacity to engage with the project):	<div style="border: 1px solid black; height: 60px; width: 100%;"></div>
Would you like to include a letter of support from this organisation?	<input checked="" type="radio"/> Yes
Letter of Support:	<div style="border: 1px solid black; height: 60px; width: 100%;"></div>

5. Partner Name:	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>
Website address:	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>
Details (including roles and responsibilities and capacity to engage with the project):	<div style="border: 1px solid black; height: 60px; width: 100%;"></div>
Would you like to include a letter of support from this organisation?	<input checked="" type="radio"/> Yes
Letter of Support:	<div style="border: 1px solid black; height: 60px; width: 100%;"></div>

6. Partner Name:	
Website address:	
Details (including roles and responsibilities and capacity to engage with the project):	
Would you like to include a letter of support from this organisation?	<input type="radio"/> Yes <input type="radio"/> No

If you require more space to enter details regarding Partners involved in the Project, please use the text field below.

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5. Project Staff

Q11. Project staff

Please identify the core staff on this project, their role and what % of their time they will be working on the project.

These should match the names and roles in the budget spreadsheet.

Please provide 1 page CVs for these staff.

Name (First name, Surname)	Role	% time on project	CV attached below?
Rosemary Newton	Project leader; invasive species and seed ecologist	25	<input checked="" type="checkbox"/>
Bradley Myer	Managing director and logistic support	7.5	<input checked="" type="checkbox"/>
Kelvin Floyd + Zachary Milner	Field work and data capture	5+ 5	<input checked="" type="checkbox"/>
Sally Poncet + Ken Passfield	Field work and data capture	5+ 5	<input checked="" type="checkbox"/>

Do you require more fields?

Yes

Name (First name, Surname)	Role	% time on project	CV attached below?
Wayne Dawson	Statistical expert in plant invasion ecology	10	<input checked="" type="checkbox"/>
Colin Clubbe	Steering group chair and advisor	5	<input checked="" type="checkbox"/>

Marcella Corcoran	Seed germination and horticulturalist	25	<input checked="" type="checkbox"/>
			<input type="checkbox"/>

Please provide 1 page CVs (or job description if yet to be recruited) for the Project staff listed above. Ensure the file is named clearly, consistent with the named individual and role above.

The limit for any single file uploaded as supporting materials with your application is 6MB. Please ensure documents are saved in PDF form where possible in order to minimise size.

Have you attached all Project staff CVs?

Yes

6. Background & Methodology

Q12. Summary of Project

Please provide a brief summary of your project, its aims, and the key activities you to undertake. Please note that if you are successful, this wording may be used by Defra in communications e.g. as a short description of the project on GOV.UK. Please bear this in mind, and write this summary for a non-technical audience.

This project will safeguard South Georgia's native habitats by monitoring and assessing vegetation changes following invasive non-native species control; estimating from soil seed bank and seed viability studies the risk of non-native plant species persisting past 2020 to inform future management strategy; quantifying the potential for non-native plant species to disperse into new areas following glacial retreat due to climate change; and, securing seed and fern spore collections of native plant species for conservation at Kew's Millennium Seed Bank.

Q13. Background

What is the current situation and the problem that the project will address? How will it address this problem? What key OT Government priorities and themes will it address?

Invasive non-native species are one of the most important drivers of biodiversity loss, and this impact is particularly severe on islands. South Georgia is a wildlife haven which has, until recently, been significantly impacted by introduced reindeer and rodents. Reindeer have been successfully eradicated and the island is expected to be declared rodent free in 2018 (DPLUS048). In response to the predicted grazing pressure release following mammal eradication, a non-native plant management strategy was developed (DPLUS015) and is now being implemented. This programme aims to manage to zero density 33 of the 41 non-native species on the island and to control the more widespread invasive species. Eradication of non-native plant species is exceedingly difficult because of the formation of a soil seed bank from which plants regenerate, often for many years. In support of the South Georgia Non-Native Plant Management Strategy, this project will: assess the effectiveness of non-native plant eradication efforts, estimate the risk of non-native plant species persisting past 2020 to inform future management activities, quantify the potential for non-native plant species to spread into new areas exposed by retreating glaciers, and ensure native plant species of South Georgia are secured in ex-situ conservation.

Q14. Methodology

Describe the methods and approach you will use to achieve your intended outcomes and impact. Provide information on how you will undertake the work (materials and methods) and how you will manage the work (roles and

responsibilities, project management tools etc). Give details of any innovative techniques or methods.

Field work: Indigena staff with extensive experience of working in South Georgia will complete surveillance and control operations on South Georgia between early January and mid-March during the short growing season. During this period, in addition to their South Georgia Non-Native Plant Management Strategy activities, the team will gather specific data from existing monitoring plots and invaded areas following non-native plant control (Output 1), collect soil samples (Output 2), set seed traps and collect these at the end of the field season (Output 3), collect seeds for experiments (Output 4) and collect native seeds and fern spores for conservation at the Millennium Seed Bank (MSB) (Output 5).

Laboratory work: Seeds from dispersal traps and soil samples will be photographed and plant species identified from seed morphology. Prototype seed dispersal traps will be designed, made and tested prior to the first field season to ensure they are robust enough for the extreme conditions on South Georgia. Seed quality will be assessed by x-radiography and seed dormancy and seed viability determined by germination and tetrazolium testing at the MSB using standard procedures. Where needed, germinated seeds will be grown on at Kew to confirm species identification (Output 2 and 3). Thermal gradient plate germination tests on seeds of three closely-related species pairs (same genus) from South Georgia, where one species is native and the other is non-native, will be used to determine the thermal germination niche of each species, enabling the potential impact of a warming climate on these species to be determined (Output 4).

Data analysis: The University of Durham, with support from Kew, will undertake data analyses. Given the logistical challenges, the number of samples listed in the Logical Framework (Q25) are conservative, but sufficient to deliver our main outputs. The sample sizes listed are minima, and the field teams will endeavour to collect more samples should conditions allow it. For Outputs 1, 2 and 3, data will be analysed using a combination of descriptive statistics, multivariate methods and simple mixed models. For Output 4, relative germination success of three closely related pairs of native and non-native plant species from South Georgia will be compared, under a range of vernal temperature conditions, including current temperatures on South Georgia, and predicted temperatures under climate change in 2050. Output 4 data will be analysed using generalized linear mixed models.

Ex-situ conservation: Seed collected for conservation will be stored at the MSB under international gene bank standards to ensure long-term viability. Germination protocols will be produced using an established germination testing framework developed by the MSB (Output 5).

Data dissemination: Kew will be responsible for reporting and will lead on data dissemination, ensuring results are freely available and are communicated to the public through popular articles, blogs, institutional websites, Research Gate, and Twitter. All project partners will be included in the publication of at least two peer-reviewed open-access papers in international journals.

If necessary, please provide supporting documentation e.g. maps, diagrams etc., using the File Upload below. The limit for any single file uploaded as supporting materials with your application is 6MB. Please ensure documents are saved in PDF form where possible in order to minimise size.

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7. Objectives, Stakeholders & Sustainability

Q15. Project Objectives

How does this project:

- Deliver against the priority issues identified in the assessment criteria
- Demonstrate technical excellence in its delivery
- Demonstrate a clear pathway to impact in the OT(s)

Deliver against the priority issues identified in the assessment criteria: The project clearly delivers against three of the Darwin Plus priority areas, primarily in dealing with invasive species, as well as developing approaches to deal with the effects of climate change and developing data systems on biodiversity.

Demonstrate technical excellence in its delivery: The project brings together a particularly strong team with a long and proven experience of working on invasive species and in the UKOTs, including significant experience working in the challenging conditions of South Georgia. The Indigena team are extremely well-placed to obtain the data and samples required by the project, in order to rigorously assess the effects of the current non-native plant species control and eradication methods, and to assess the threat posed by non-native plants to South Georgia under ongoing climate change. The technical excellence in seed science at Kew is unrivalled, ensuring that data obtained from seeds retrieved from seed trap and soil samples will be of very high quality, thus providing reliable information on the potential risk of non-native plant species persistence, resurgence and spread in the environment beyond 2020. The experimental and analytical expertise at Durham University will ensure that meaningful recommendations for managing non-native plant species risks can be inferred from these collected data.

Demonstrate a clear pathway to impact in the OT(s): The results of data collection, germination experiments and analyses will directly inform future recommendations for the development of the next phase of the South Georgia non-native plant management programme beyond 2020. This will include an assessment of the risks on re-invasion from the seed bank by eradicated plants, and the risk of spread of non-native over native plant species in areas of glacial retreat. In addition, analyses of non-native species presence will enable targeting of future management efforts in areas of South Georgia deemed to be at high risk of invasion or reinvasion. Furthermore, we will explore how our findings can be applied to other subantarctic islands and to the Falkland Islands, which share a very similar flora. In particular, we would be able to make recommendations as to i) which non-native plant species are likely to persist in soil seed banks, ii) which non-native species are most likely to benefit from future climate change, and iii) how circumpolar native species are likely to respond to climate change. All of the project outputs will feed directly into the policy priorities of the Government of South Georgia & the South Sandwich Islands who are intimately involved with the project.

Q16. Project Stakeholders

Who are the stakeholders for this project and how have they been consulted (include local or host government support/engagement where relevant)? Briefly describe what support they will provide and how the project will engage with them.

The main stakeholder is the Government of South Georgia & the South Sandwich Islands (GSGSSI). One of their key environmental objectives is to effectively manage invasive alien species, and in particular better understand the distribution and abundance of non-native plants to control their spread. This project directly supports the long-term objectives of GSGSSI of controlling and eradicating invasive alien species and restoring native biodiversity and habitats (Target 9, Biodiversity Action Plan for South Georgia & the South Sandwich Islands 2016-2020). Results from this project will directly inform the development of a post-2020 invasive control strategy. GSGSSI has been closely involved throughout the development of this project and fully supports our approach.

Tour operators and tourists are stakeholders, as maintenance of South Georgia as a natural wilderness area, which includes eradication and control of non-native species, is essential to ensure continued attraction of visitors. During 2016/17, 23 cruise ships made 68 separate visits involving 8,946 tourists (2016-2017 GSGSSI Annual Tourist Report). Tourists will partake in biosecurity monitoring through reporting weed sightings to GSGSSI by using the recently published Field Guide to the Introduced Flora of South Georgia, which will be distributed free of charge. This will raise awareness of invasive plant issues, particularly on islands.

Falklands Conservation (FC) and the British Antarctic Survey (BAS) support and will benefit from the project outputs as well as the overall project approach. We have discussed this project with Andy Stanworth (FC) and Peter Convey (BAS) who are both supportive of this work.

Q17. Institutional Capacity

Describe the lead organisation's capacity (and that of partner organisations where relevant) to deliver the project.

Kew's mission is to be the global resource for plant and fungal knowledge, building an understanding of the world's plants and fungi upon which all our lives depend. Kew's UK Overseas Territories (UKOTs) Conservation Science Team has well-established links having collaborated with all UKOTs on plant conservation projects, providing technical support in a wide range of activities including plant identification, seed conservation, habitat surveying, GIS, horticultural techniques and management plans for more than 20 years. Kew's Millennium Seed Bank (MSB) at Wakehurst is the world leader in wild plant species seed conservation, partnering with organisations in more than 95 countries to conserve 25% of the world's plant species by 2020. There are over 84,000 seed collections held within the MSB partnership, representing 38,079 different species from more than 330 families. Welcome Trust Millennium Building

laboratories are fully equipped to support germination and viability testing of seeds from all plant species.

Indigena Biosecurity International is a leader in the field of invasive species management. Indigena is a fully owned subsidiary of Kaitiaki o Ngahere Ltd, a limited liability company based in New Zealand. Indigena is committed to the conservation and restoration of the world's natural areas through the provision of innovative specialist consulting and operational services. Indigena is a specialist in the field of ecological management with a particular focus on the management of environmental pest plants. Indigena's strategic planning, mission statement and values are all specifically designed to deliver cutting edge technology and performance in this highly specialised field of work. They have a history of working with the Overseas Territories team at Kew and also with the Government of South Georgia & the South Sandwich Islands. Indigena staff are all science graduates who are experienced in working in extreme conditions and situations and have a well-developed sense of team work. The current team are the most experienced people working in control of invasive species on South Georgia, with more than 50 seasons of field work between team members. Sally Poncet, who has been working on South Georgia since the 1970s, has published extensively on the biology of South Georgia.

The University of Durham is one of the top 100 universities worldwide, and is consistently ranked within the top 10 universities in the UK (Times Higher Education Table of Tables 2017). Plant sciences and ecology are major strengths within the Department of Biosciences, which has a valuable combination of plant growth and molecular biology facilities, and bioinformatics and quantitative ecological expertise. The University has excellent computing facilities which can provide the IT infrastructure needed for the data analyses proposed. Wayne Dawson has more than 12 years' research experience working on the ecology of plant invasions and has strong analytical skills using data from field observations, experiments and databases, and a wide range of statistical methods.

Q18. Sustainability

How will the project ensure benefits are sustained after the project has come to a close? If the project requires ongoing maintenance or monitoring, who will do this and how will it be funded?

GSGSSI's Non-Native Plant Management Strategy states that the control objective of 33 of the 41 non-native plant species is eradication. Our findings on which seeds of non-native species are present in the soil seed bank and their viability will be key to predicting the likely status of these non-native species post-2020. GSGSSI is committed to maintaining the control of invasive species after 2020 and the results of this project will be critical to informing the development of a post-2020 strategy.

The Millennium Seed Bank (MSB) has a commitment to global seed banking of wild plant species for long-term conservation and much of the MSB infrastructure has been designed for hundreds of years' use. Supporting ex-situ plant conservation in this way

in the UKOTs is an integral part of Kew's statutory remit to Defra. Multiple collections of South Georgia seeds will be held at the MSB to ensure conservation of the genetic diversity of South Georgia plant species in both time and space. Germination protocols for all seeds and fern spores of conservation collections of the native plant species of South Georgia at the MSB will be developed and be available to support restoration work in South Georgia as required.

8. Funding and Budget

Q19. Budget

Please complete the appropriate Excel spreadsheet linked below, which provides the Budget for this application. Some of the questions earlier and below refer to the information in this spreadsheet. Note that there are different templates for projects requesting over and under £100,000 Darwin Plus budget.

R6 D+ Budget form for projects under £100,000

R6 D+ Budget form for projects over £100,000

Please refer to the Finance Guidance for more information.

N.B.: Please state all costs by financial year (1 April to 31 March) and in GBP.

Budgets submitted in other currencies will not be accepted. Use current prices – and include anticipated inflation, as appropriate, up to 3% per annum. The Darwin Initiative cannot agree any increase in grants once awarded.

Please upload your completed Darwin Plus Budget Form Excel spreadsheet using the field below.

Q20. Co-financing

Are you proposing co-financing?

Yes

Secured

Provide details of all funding successfully levered (and identified in the Budget) towards the costs of the project, including any income from other public bodies, private sponsorship, donations, trusts, fees or trading activity, as well as any your own organisation(s) will be committing.

(See “Finance for Darwin & IWT” and the "Guidance for Applicants" documents)

Co-financing is obtained by synergising with the South Georgia Non-Native Plant Management Strategy programme, funding for which is secured from GSGSSI to the value of £12,000. These include travel costs (flights and boat expenses) to and from South Georgia and transport to sites while on South Georgia for the field teams. Funding for accommodation and subsistence for the field teams for one week per field season has been included in the Darwin Plus budget specifically to cover the additional days needed on the island to accomplish the project work described in this application. The remaining accommodation and subsistence costs for the field teams

fall under the Non-Native Plant Management Strategy programme and will be covered by GSGSSI.

Open access publication costs to the value of £5,000 will be covered by RBG Kew.

Overheads to the value of £42,097 are included as in kind contribution for RBG Kew.

Unsecured

Provide details of any co-financing where an application has been submitted, or that you intend applying for during the course of the project. This could include co-financing from the private sector, charitable organisations or other public sector schemes.

Date applied for	Donor Organisation	Amount	Currency code	Comments

Please give brief details including when you expect to hear the result. Please ensure you include the figures requested in the Budget Spreadsheet as Unconfirmed funding.

Cruise ship operators will be approached for funding the publication of a Guide to Seeds and Seedlings of the Plants of South Georgia to the value of £6,000. We have received verbal indication from the International Association of Antarctica Tour Operators (IAATO) that this is something they would seriously consider funding. We would approach them on confirmation of the Darwin Plus funding and expect to receive a verbal commitment within the first year of the project.

Do you require more fields?

No

9. Financial Controls, Value for Money & Open Access

Q21. Financial Controls

Please demonstrate your capacity to manage the level of funds you are requesting. Who is responsible for managing the funds? What experience do they have? What arrangements are in place for auditing expenditure?

The Royal Botanic Gardens, Kew, had a total income of £77.9 million in the year ending March 2017 and has a fully resourced Finance Department for administering and controlling these funds. Overall governance procedures lies with the Board of Trustees who are advised by the Finance Committee. The Kew Finance Department has a team dedicated to supporting financial management of all projects and assisting grant-holders with monthly reviews and with reporting to funders. Rosemary Newton at Kew will be responsible for day to day management of the funds for this project. Institutional and project accounts are audited each year by external accountants.

See: <https://www.gov.uk/government/publications/royal-botanic-gardens-kew-annual-report-and-accounts-2016-to-2017>

Q22. Financial Management Risks

Explain how you have considered the risks and threats that may be relevant to the success of this project, including the risks of fraud or bribery.

Risk of fraud/bribery will be mitigated through partners' fiscal control mechanisms, aligned with financial reporting standards required and strictly implemented by Kew. Given the relative simplicity of the budget, established reputations of partners and that Indigena is already working in South Georgia, we consider this risk to be very low.

There is no currency exchange risk as all prices are quoted in GBP.

Regarding project outcome, there is risk due to severe weather conditions hampering boat accessibility or restricting field work. This risk is reduced by the Indigena team being on South Georgia for the whole of the summer period. Furthermore, the team have the flexibility to prioritise fair weather tasks ahead of other tasks less dependent on good weather.

Health and safety risks of working in extreme environmental conditions will be minimised by working with competent and experienced professionals familiar with conditions on South Georgia. Staff will have survival equipment with them at all times when in the field in case they are unable to return to the boat.

Q23. Value for money

Please explain how you worked out your budget and how you will provide value for money through managing a cost effective and efficient project. You should also discuss any significant assumptions you have made when working out your budget.

The budget was developed through a consultative process with partners and is based on experience of similar project work using competitive rates. Utilising existing skills within the team and partnership organisations has eliminated the need for consultancy costs.

There is no charge for the cost of seed banking (storage) as this is part of a long-term conservation initiative and is covered from other funding including Defra's grant-in-aid to Kew. In addition, Kew contributes to overheads to support this project and includes advisory services such as policy, ethics and biodiversity conventions.

By synergising with the current management plan of the South Georgia Non-Native Plant Management Strategy, substantial costs of international air travel, boat travel, accommodation and subsistence for extra field trips to South Georgia have been avoided. This has significantly reduced the costs related to obtaining samples and seed for this work.

Communication will be mainly via Skype and other internet-based systems, with a modest travel budget requested.

Open access publication will be covered by Kew; production costs for the Guide to Seeds and Seedlings of Plants of South Georgia by cruise ship operators.

Q24. Outputs of the project and Open Access

All outputs from Darwin Plus projects should be made available on-line and free to users whenever possible. Please outline how you will achieve this and detail any specific costs you are seeking from Darwin Plus to fund this.

Throughout the project, progress and individual outputs will be communicated via a range of social media channels and online updates on the Kew and GSGSSI websites. A blog detailing seeds banked at end of year 3 will be published on GSGSSI and Kew websites. Reports will also be made available at the annual South Georgia Stakeholders meeting hosted by GSGSSI at the Foreign and Commonwealth Office in London.

Summary reports will be published annually on GSGSSI and Kew websites and Research Gate. At least two scientific papers will be submitted to open access journals for publication at the end of year 3. Matched funding from Kew will be available to ensure these publications are open access.

All datasets will be well described, with metadata comprising detailed information on methods included. Copies of datasets will be provided to the metadata catalogue of the South Atlantic Environmental Research Institute (SAERI) Information Management

System. Databases listed in the logical framework will be made available online on the Global Biodiversity Information Facility (GBIF): <https://www.gbif.org/>

Germination protocols will be made publicly available on Kew's open access Seed Information Database (SID) on acceptance of scientific papers: <http://data.kew.org/sid/>

The Guide to Seeds and Seedlings of the Plants of South Georgia booklet will be distributed to interested parties including practitioners and cruise ship operators and enthusiastic visitors to South Georgia free of charge.

10. Logical Framework

Q25. Logical Framework

Darwin Plus projects will be required to report against their progress towards their expected outputs and outcome if funded. This section sets out the expected outputs and outcome of your project, how you expect to measure progress against these and how we can verify this.

Annex D and Annex E in the Guidance Notes provides helpful guidance on completing a logical framework, including definitions of the key terms used below.

Impact:

South Georgia's native habitats and plant species diversity are protected through the eradication of non-native species, conservation of native species, rehabilitation and maintenance of native habitats and improved biosecurity

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
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Outcome:

South Georgia's native habitats protected by identifying non-native species most likely to persist, determining potential climate change effects on native and non-native species survival and banking seeds of native species

0.1 The number of non-native species predicted to persist post-2020 determined

0.2 Native and non-native species likely to colonise new habitats identified

0.3 Spores of at least three fern species and all native seed plants of South Georgia securely banked at the Millennium Seed Bank

0.1 Summary report published on GSGSSI and Kew websites and Research Gate

0.2 Seed Bank Database (SBD) for seed collected and excel database of results

0.1 Weather conditions allow boats to access South Georgia and field work to be completed

0.2 All target species produce sufficient seeds or spores during the lifetime of the project to allow safe collection for storage and not impact the future of native populations

Output 1:

Vegetation changes following reindeer removal from established vegetation monitoring plots quantified and success of the control programme of non-native plants on South Georgia evaluated

1.1 Data from 2 established vegetation monitoring plots analysed in year 1 and year 2 and across the monitoring period to demonstrate change in numbers and frequency of native and non-native plant species

1.2 Data from at least 2 invaded sites (4 plots per site) analysed in year 1 and year 2 and across the monitoring period to demonstrate change in numbers and frequency of native and non-native plant species

1.1 Excel database and report on vegetation changes in established monitoring plots and in non-native species distribution in invaded sites where control is taking place

1.2 Summary report published on GSGSSI and Kew websites and Research Gate

1.3 Scientific paper on vegetation changes following non-native species control submitted to open access journal for publication end of year 3

1.1 Team able to visit all sites every year to collect data unhampered by weather conditions

1.2 GSGSSI boat operational and able to transport team from the Falkland Islands to South Georgia and to field sites

1.3 No new non-native species introduced to South Georgia

<p>Output 2:</p> <p>The risk of non-native plant species persisting past 2020 estimated</p>	<p>2.1 Viability of seeds from at least 20 invaded sites with a minimum of 5 soil samples of 200 cm³ per site determined</p>	<p>2.1 Excel database on seeds found in soil seed bank</p> <p>2.2 Summary report on potential for non-native species to spread into new areas published on GSGSSI and Kew websites and Research Gate</p>	<p>2.1 Soil samples contain sufficient seeds</p> <p>2.2 Reliable identification of species is possible from seeds or young plants</p>
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Output 3:

The potential for non-native species to spread quantified

3.1 The number of species and number of seeds per species dispersed into at least 5 traps per site each placed in a minimum of 2 invaded sites, 2 native sites and 2 sites recently exposed by retreating glaciers identified

3.2 Likelihood of new areas recently exposed by retreating glaciers being colonised by non-native species, over native species, quantified

3.1 Excel database on seeds caught in dispersal traps

3.2 Summary report on potential for non-native species to spread into new areas published on GSGSSI and Kew websites and Research Gate

3.1 Dispersal traps are robust enough to survive the field season and are not disturbed

3.2 Dispersal traps collect sufficient seeds

3.3 Reliable identification of species is possible from seeds or young plants

Output 4:

Impact of climate change on selected native and non-native plant species in South Georgia estimated

4.1 Germination characteristics of 3 native and 3 non-native plant species at current and warmer temperatures of seeds determined (as a proxy of establishment success)

4.2 Likelihood of non-native success over native species under climate change quantified

4.1 Scientific paper on the thermal germination niche of three closely related pairs of native and non-native species and associated predictions of a changing climate on seed germination behaviour submitted to open access journal for publication by the end of year 3

4.1 Adequate seed can be sourced for germination experiments

4.2 Seeds germinate under tested conditions

<p>Output 5:</p> <p>Seeds and fern spores of native plant species of South Georgia collected and stored at the Millennium Seed Bank for ex-situ conservation and seed germination protocols determined</p>	<p>5.1 Spores of at least three fern species and all native seed plants of South Georgia securely banked and at least two thirds (i.e. 17 species) with multiple collections for genetic diversity at the Millennium Seed Bank</p> <p>5.2 Seed dispersal and dormancy syndromes identified and seed germination protocols determined for all native species</p> <p>5.3 Seedling images captured for all native plant species</p>	<p>5.1 Kew's internal Seed Bank Database at the Millennium Seed Bank</p> <p>5.2 Blog detailing seeds banked at end of year 3 on GSGSSI and Kew websites</p> <p>5.3 Germination protocols on Kew's open access Seed Information Database: http://data.kew.org/sid/</p> <p>5.4 Seedling images for native plant species to South Georgia available online</p> <p>5.5 Publish a Guide to Seeds and Seedlings of the Plants of South Georgia</p>	<p>5.1 Populations of target native plant species produce seeds which are mature and in sufficient quantities for collection (no more than 20% of available seed to be collected to ensure native populations are not harmed) at the time the sites are visited</p>
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Do you require more Output fields?

It is advised to have less than 6 Outputs since this level of detail can be provided at the Activity level.

No

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. Each new activity should start on a new line.

- 1.1 Agree a Memorandum of Collaboration with GSGSSI, Indigena, University of Durham and Kew
- 1.2 Review and finalise current methodology, including sites and plots for sampling, in light of planned South Georgia activities and data analyses
- 1.3 Project launch and workshop in the Falkland Islands
- 1.4 Discuss and finalise field data protocols at Falkland Islands workshop
- 1.5 Collect data on non-native species distribution at field sites visited in year 1 and year 2
- 1.6 Analyse data to quantify the success of control methods in year 1 and year 2
- 1.7 Update excel database and produce a summary report on non-native species distribution
- 1.8 Upload summary report onto GSGSSI and Kew websites and Research Gate
- 1.9 Prepare scientific paper for open access publication in an international peer-reviewed journal

- 2.1 Develop soil sampling protocols
- 2.2 Discuss and finalise field data protocols at Falkland Islands workshop
- 2.3 Collect soil samples from field sites in South Georgia
- 2.4 Transport samples to the MSB for analysis
- 2.5 Process samples in the laboratory by sieving soil and removing seeds
- 2.6 Identify species where possible from seeds
- 2.7 Seed germination and tetrazolium tests to quantify seed viability
- 2.8 Grow on seedlings in a glasshouse at Kew for plant species identification
- 2.9 Analyse data to estimate the proportion of viable non-native seeds in soil samples
- 2.10 Update excel database and produce a summary report on soil sample analysis and the risk of non-native plant species persisting past 2020
- 2.11 Upload summary report onto GSGSSI and Kew websites and Research Gate

- 3.1 Develop and test seed trap design
- 3.2 Agree seed trap sites and set-up protocols at Falkland Islands workshop
- 3.3 Set seed traps at the beginning of the field season to catch dispersed seeds
- 3.4 Collect seed from seed traps before the end of the field season
- 3.5 Transport samples to the Millennium Seed Bank (MSB) for analysis
- 3.6 Identify species where possible from seeds
- 3.7 Seed germination and tetrazolium tests to quantify seed viability
- 3.8 Grow on seedlings in a glasshouse at Kew for plant species identification
- 3.9 Analyse data to quantify potential native and non-native species spread
- 3.10 Update excel database and produce a summary report on the potential for non-native species to spread
- 3.11 Upload summary report onto GSGSSI and Kew websites and Research Gate

- 4.1 Identify non-native and closely-related native species to research the impact of climate change on seed germination and subsequent recruitment in South Georgia
- 4.2 Determine germination requirements for paired native and non-native plant species

from SBD or the literature

4.3 Collect target non-native seed from populations in South Georgia or the Falklands if not available from MSB collections

4.4 Seed germination tests on a thermal gradient plate at the MSB on three closely related species pairs, where one species is native and the other is non-native

4.5 Analyse data to determine germination characteristics (e.g. temperature thresholds)

4.6 Prepare scientific paper for open access publication in an international peer-reviewed journal

5.1 Identify suitable populations for seed and fern spore collection

5.2 Collect seeds and fern spores of native plant species of South Georgia for ex-situ conservation at the MSB

5.3 Transport collections to the MSB for processing and banking

5.4 Produce blog on South Georgia collecting trip for GSGSSI and Kew websites

5.5 Process seed and fern spore collections and produce germination protocols

5.6 Identify seed dispersal and dormancy syndromes

5.7 Photograph seedlings from germination tests and make images available online

5.8 Upload germination protocols onto the Seed Information Database (SID)

5.9 Publish a Guide to Seeds and Seedlings of the Plants of South Georgia

11. Implementation Timetable

Q26. Provide a project implementation timetable that shows the key milestones in project activities

Please complete the Excel spreadsheet linked below to describe the intended workplan for your project.

[Darwin Plus Implementation Timetable XLS](#)

Please add columns to reflect the length of your project.

For each activity (add/remove rows as appropriate) indicate the number of months it will last, and fill/shade only the quarters in which an activity will be carried out.

12. Monitoring and Evaluation

Q27. Monitoring and evaluation (M&E) plan

Describe, referring to the Indicators above, how the progress of the project will be monitored and evaluated, making reference to who is responsible for the project's M&E.

Darwin Initiative projects are expected to be adaptive and you should detail how the monitoring and evaluation will feed into the delivery of the project including its management. M&E is expected to be built into the project and not an 'add' on. It is as important to measure for negative impacts as it is for positive impact.

Within the first month of the project starting, the Project Co-ordinator will develop and produce a Monitoring and Evaluation Plan to inform the project's progress. The project will be delivered as a partnership between Kew, Indigena and the University of Durham. Each partner organisation will be a member of the Steering Group which will be chaired by Colin Clubbe who has extensive experience of project management, evaluation and monitoring. We will invite key stakeholders, including the Government of South Georgia & South Sandwich Islands (GSGSSI), Falkland Conservation and British Antarctic Survey (BAS) to be members. The Steering Group will meet quarterly and receive reports from the project co-ordinator, Rosemary Newton, review progress and ensure that reports for Darwin are prepared in good time. Quarterly updates will be used to evaluate progress against listed activities and to identify any obstacles to the successful delivery of the five outputs and the project overall. Regular communication by email and Skype between partners will be maintained between quarterly meetings. The quarterly Steering group meetings will be minuted by the project co-ordinator and provide a means of verification for the monitoring and evaluation plan.

A Memorandum of Collaboration (MoC) between all of the project partners will be established and signed at the start of the project and will articulate the roles and responsibilities of each partner in the delivery of the project.

Regular reporting will enable the project co-ordinator to make informed decisions to maximise the impact of the project and ensure value for money. Kew will manage the project adaptively, working with partners to respond to circumstances in a strategic manner so that the overall objective is achieved. The logical framework, implementation timetable and activities will be used by the project co-ordinator and steering group to regularly evaluate progress against project indicators and targets. Any changes needed based on progress and due to unanticipated events or conditions will be implemented.

At the end of the project a final report will be published evaluating the impact of the project and its successes and failures as a case study for other projects. This will be submitted to Darwin and disseminated through Kew and GSGSSI websites. Appropriate results will be published in academic journals. Success in publishing the key scientific results in a peer-reviewed journal will be a means of external validation of the quality of the science undertaken.

Number of days planned for M&E	80
Total project budget for M&E (this may include Staff and Travel and Subsistence Costs)	£33,750.00
Percentage of total project budget set aside for M&E (%)	10.5

13. Certification

Q28. Certification

On behalf of the

trustees

of

the Royal Botanic Gardens, Kew

I apply for a grant of

£256,544.00

in respect of all expenditure to be incurred during the lifetime of this project based on the activities and dates specified in the above application.

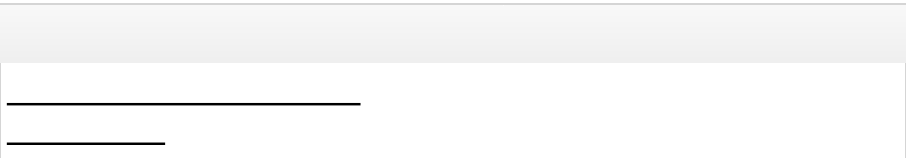
I certify that, to the best of our knowledge and belief, the statements made by us in this application are true and the information provided is correct. I am aware that this application form will form the basis of the project schedule should this application be successful.

(This form should be signed by an individual authorised by the applicant institution to submit applications and sign contracts on their behalf.)

- I have uploaded CVs for project principals and letters of support.
- I have uploaded our most recent signed audited/independently verified accounts and annual report (if appropriate).



Name	Professor Katherine Willis
Position in the organisation	Director of Science, RBG Kew

Signature (please upload e-signature)	
Date	

If this section is incomplete the entire application will be rejected.

14. Submission Checklist

Checklist for submission

	Check
Have you read the Guidance documents, including the ' <u>Guidance Notes for Applicants</u> ' and ' <u>Finance Guidance</u> '?	<input checked="" type="checkbox"/>
Have you read, and can you meet, the current <u>Terms and Conditions</u> for this fund?	<input checked="" type="checkbox"/>
Have you provided actual start and end dates for your project?	<input checked="" type="checkbox"/>
Have you provided your budget based on UK government financial years i.e. 1 April – 31 March and in GBP?	<input checked="" type="checkbox"/>
Have you checked that your budget is complete, correctly adds up and that you have included the correct final total at Q7?	<input checked="" type="checkbox"/>
Has your application been signed by a suitably authorised individual?	<input checked="" type="checkbox"/>
Have you uploaded a 1 page CV for all the Project Staff (listed at Q11) on this project, including the Project Leader?	<input checked="" type="checkbox"/>
Have you included a letter of support from the applicant organisation, <u>main</u> partner(s) organisations and the relevant OT Government?	<input checked="" type="checkbox"/>
Have you uploaded a signed copy of the last 2 years annual report and accounts for the lead organisation, or provided an explanation if not?	<input checked="" type="checkbox"/>
Have you checked the <u>Darwin Plus website</u> to ensure there are no late updates?	<input checked="" type="checkbox"/>