Appendix 1. Proposed Management Options and scenario outcomes.

Option	1. Discontinue management	2. Maintain current restoration programme	3. Reduce restoration input	4. Cut and leave bracken	5. Treat bracken with herbicide
Management	Discontinue the habitat restoration programme.	Cut and remove biomass as in the 2015 restoration programme.	Reduce the area and frequency of cut-remove seasonal management, as implemented in 2018.	Control Bracken vigour by seasonal cutting without frond removal.	Long-term Asulam or Glyphosate treatment of Bracken, with repeat treatments following bracken recovery and spot treatment as needed.
Vegetation	Rapid reversion to a dense bracken cover. Loss of grassland habitat. Decreased species diversity. Perhaps increase of scrub/woodland over long term in absence of rabbits.	Progressive increased semi-natural grassland species richness developing in mid and late stages of restoration.	Regression of species-rich grassland to Bracken and Tall-herb vegetation where management is reduced or discontinued.	Bracken litter accumulation, increased vigour of tall-herbs (in particular Red campion) and deterioration of access paths.	Partial frond death, reduced rhizome vigour and large macronutrient release into soil. Increased Tall-herb vigour. Toxicity to other plant other species (Glyphosate for all, and other ferns for Asulam). Reduction of grassland.
Soil	Development of deep Bracken litter horizon; Loss of dense soil surface grass root-mat. Macronutrient sequestration in Bracken rhizomes.	Low surface soil macronutrient status and dense, fibrous grass root-mat developing in mid and late-stages of restoration.	Progressive reduced surface root-mat and increased macronutrient sequestration.	Increased depth of bracken litter layer, root-mat deterioration and macronutrient release to the soil.	Soil eutrophication (nitrogen), facilitating Tall-herb biomass increase (especially Red campion). Micro-flora and fauna toxicity.
Rabbit	Loss of grass forage area, reduced population size and increased negative impact of disease events. Less burrow creation.	Progressive increased area and palatability of rabbit forage giving a greater population carrying capacity.	Reduced forage availability, leading to decreased population carrying capacity, robustness and resilience to disease.	Reduced forage productivity and palatability, population robustness.	Possible toxicity by direct contact and indirectly from forage. Reduced forage productivity and palatability, population robustness.
Shearwater	Reduced establishment of burrows. Burrow integrity reduced as Red campion and Bracken increase, and grassy root mat decreases. Increased frequency of collapse from visitors and ringers.	Improved condition of nesting habitat: burrow integrity on managed areas more robust to trampling damage by visitors and ringers	Reduced condition of habitat (fledglings more likely to be trampled by ringers) and increased cumulative risk of burrow collapse in areas removed from management.	Reduced condition of habitat (fledglings more likely to be trampled by ringers) and increased cumulative risk of burrow collapse in areas removed from management.	Possible toxicity by direct contact and from soil in nesting burrows. Reduced Burrow integrity from soil eutrophication. Reduced condition of habitat (fledglings more likely to be trampled by ringers when vegetation is taller)
Mitigation	Prevent visitor access to areas with Shearwater burrows. Limit monitoring (ringing) to essential minimum. Implement access control via adaptive management over the short and medium terms to reduce negative impacts.	Restrict access to areas with shearwater burrows in the early stages of restoration. Restriction not required on restored grassland areas, or areas with low cover of bracken or red campion.	Prioritise cutting on paths in Shearwater areas with late-stage and intermediate-stage restoration status. Make the first cut before end of May to maximise the restoration impact.	Cut Bracken before mid-June and carry out a late season Tall-herb cut. Implement access control via adaptive management over the short and medium terms to reduce negative impacts.	Trial and monitor the impact on conservation features (especially species rich grassland and desirable species) and quality and impacts of access. Restrict spraying to areas outside the CBO water-well catchment. Prevent access to treated areas. Strict operational rules to be followed to reduce 'drift'.
Uncertainty	High probability of dense Bracken development and increased negative impacts of ringing and walking over shearwater sub colony areas. Medium certainty of reduced Shearwater breeding success over the long term.	High probability of progressive restoration gains from late-stage grassland, species diversity, soil stability and Shearwater/Rabbit population resilience.	High probability of increased Bracken/Tall-herb cover, decreased area of grassland and decrease in rabbit and shearwater populations. Increased negative impacts of ringing and walking over shearwater sub colony areas	High probability of increased tall-herb cover; increased localised bracken litter, reduced grassland condition; path deterioration; slower soil condition improvement. Increased negative impacts of ringing and walking over shearwater sub colony areas	High probability of rapid herbicide toxicity and soil eutrophication. Unintended long-term ecosystem impact is uncertain. Availability of continuing approvals is uncertain for Asulam on ASSI/SPA. Uncertainty of effectiveness and number of years of treatment required. High certainty of rapid recovery and spread of bracken after ceasing treatment.
Issues	Unknown extent to which the development of dense bracken stands will influence shearwater population survival over the longer term.	Volunteer and funding availability for sustaining protected species and habitat condition will be needed.	Restoration gains would be lost and there will be negative impact on volunteer morale. CBO/ DAERA communication process needed for restoration versus reduction decisions.	Early-stage and intermediate-stage Tall-herb control would be required.	Untrialled short-term/long-term impact on species-rich grassland, Shearwater and its nesting habitat. Reputational damage of herbicide use on protected site. Early-stage and intermediate-stage tall-herb control would be required (mowing).
Resources	Financial recurrent cost-saving (ca., £1500-2000);	No change in recurrent funding, £1500-2000. More volunteers required to reverse restoration decline since 2015. Commitment to carry out restoration work from May to realise efficiencies and put mitigations in place for reducing disturbance to nesting birds. Remove financial disincentives for volunteers. Dedicated social media advertisements and website videos needed.	Minor reduction in recurrent resource commitment. Possible inefficiencies if not planned optimally, e.g. if no early work in May is carried out, this leads to extra work required later in season.	Minor reduction in recurrent resource commitment in short term, but increases over medium and long terms.	Large funding increase for initial and repeat treatments and ecological monitoring. Potential reputational damage to DAERA and CBO. Operational problems: water volumes for application; limited dry/calm weather for application to reduce 'drift'; health/safety management input.
Implications for Observatory Management	Mitigations required for access and visitor activity in context of declining accessibility and path condition (slippiness, visibility) and Health and Safety.	Management continues as before, but with a pro-active recruitment drive for volunteers to carry out restoration work.	The negative impact on access, visitor activities and expectations will be managed by CBO. Decisions on path priorities for continued management and access closure need DAERA agreement and assessment of impacts.	Managed decline of access and activities involves managing mitigations and visitor expectations and providing safety information for visitors (path condition, slippiness, and visibility deterioration). Continuing access for ringer and visits needs to be assessed by DAERA on an ongoing basis, or a protocol agreed and implemented.	Long term mitigations required to prevent access by ringers/visitors to Shearwater sites. See the other options for assessment of impacts.