Sourcing and Managing Mitigation Land

Stone curlew generally nest in open fields with dry soil, with areas of dry, bare, stony ground or low vegetation, and habitat creation has to be managed to achieve this. Factors associated with site location are those which would need to be considered when electing land for mitigation. Factors associated with habitat features are considered to be those which can be actively managed to improve habitat suitability.

Site location

- Soil type: stony free-draining soils are required on rendzinas, brown calcareous earths, brown sands, brown calcareous sands, argillic brown earths and paleoargillic brown earths
- Disturbance: the site should avoid potential sources of disturbance, including major roads and frequently used Public Rights of Way (PRoW) within Breckland SPA. The zones to be avoided are defined as - 1.5km from the A11, A14 and settlements; - 400m from frequently used ProWs and Open Access Land.

Habitat features of the site

- Nutrient levels: low phosphorus (< 15 mg/l ideally < 10 mg/l) soil nutrient levels are required, or would need to be developed, in order to achieve semi-natural grass land, characteristic of Breckland and suitable for stone curlew.
- Sward height: at nesting sites this should be no greater than 2cm, although foraging areas can have a slightly increased height up to 5cm.
- Rabbit abundance: should be encouraged as grazing from high densities of rabbits creates short sward heights; their burrows create areas of bare earth and their droppings provide food for stone curlew prey species so lead to increased density of stone curlew prey species.
- Predator abundance: foxes need to be discouraged through the provision of management of exclusion measures as they are thought to be the main predator of stone curlew eggs and chicks.

The features of the site can be managed to provide optimal habitat.
Restoration: On arable land, the availability of key soil nutrients within the main rooting zone of plants can be reduced, prior to the establishment of grassland, through a number of techniques:

- Application of chemical additives to the soil (e.g. ferrous sulphate)
- Continuous cropping using cereals to encourage uptake and removal of nutrients
- Topsoil removal to a depth where nutrient-poor subsoil is encountered
- Soil inversion (deep ploughing) to expose nutrient-poor subsoil.
- Seeded with grassland plant species, or left to regenerate naturally, without reducing the availability of key soil nutrients beforehand. The availability of key soil nutrients will subsequently decline over time.

The suitability of each technique would need to be determined for a mitigation site in light of any associated environmental impacts. However, it is anticipated that suitable and appropriate techniques could be developed for any mitigation site identified. The need for temporary cultivated plots on site should be considered to ensure mitigation is functional at the correct time.

On forested sites, the only practical way to create the nutrient-poor, mineral substrate necessary for the development of the required grass sward is to fell the trees and grind their stumps to ground level before removing the humic layer to expose the mineral soil beneath it.

The restoration and management of vegetation structure, key in encouraging and maintaining stone curlew density will guide sward management (to achieve areas less than 2cm). Natural

regeneration should be the primary approach with active weed management of undesirable plant species during the first few years, for example, bramble, broom, gorse, bracken, *Calamagrostis*. , thistles and ragwort.

Addition of seed of appropriate plant species may be necessary to create the characteristic vegetation types CG7 *Festuca ovina, Hieracium pilosella,Thymus praecox/Thymus pulegioides* grassland and U1 *Festuca ovina, Agrostis capillaris, Rumex acetosella* grassland and transitions and variations (*Rodwell, 1992*), if these species fail to appear on the site. Any seed added should be of local provenance.

The low sward height suitable for stone curlew would be achieved through a combination of management techniques. Ideally this would be achieved through intense grazing from high rabbit densities on site and controlled livestock grazing.

Rabbit numbers could be encouraged through the provision of brush piles. Rabbit proof fencing of sites will be undertaken where appropriate so that increased rabbit numbers do not adversely affect nearby arable farmland.

Mowing outside of the breeding season is also likely to be needed to reduce sward height, particularly during the early years of vegetation establishment.

Predator numbers, which may directly affect stone curlew nest success and individual mortality and indirectly impact upon rabbit density, would be managed where necessary through fencing. Consideration would also be given to the use of gamekeepers.

Annual monitoring would inform a management programme to work towards the desired vegetation structure and breeding stone curlew pair target for the site. A Habitat Creation and Management Plan would be produced, including details on monitoring requirements.