

Constantine Sand Dunes

Trevoise Head & Constantine Bay SSSI



CES Works Report

Year 2 Scrub Clearance

for Trevoise Golf & Country Club



Acknowledgments

This report summarises the works undertaken by Trevoze Golf and Country Club as part of Year 2 of their Conservation Enhancement Scheme for Trevoze Head and Constantine Dunes Site of Special Scientific Interest (SSSI) funded by Natural England (NE).

The project would not have been feasible without the input and support of Nick Gammon (Managing Director) and his staff. This included hosting meetings, public liaison and facilitating delivery of works on the ground.

The Natural England Project Officer for the CES Agreement is Karen Lewis (Senior Advisor) who actively participated in discussion on the methodology and throughout the works delivery. This included public communications and coordinating discussions with colleagues in the Wildlife Licensing team at Natural England. Thanks are also extended to Chris White and Helen Fearnley of the Cornwall Reptile and Amphibian Group who assisted with field survey work for the Sand lizards *Lacerta agilis* and other reptiles and inputted to the design of the method statement.

The ecological clerk of works (ECoW) role was undertaken by Attwell Associates (Environment & Heritage) who coordinated survey, licence applications and oversaw the practical works delivery. The machine scrub clearance was delivered by P. R. Weldhen LTD and the hand clearance contract by John Hurle and Sons who also undertook Marram planting and fence replacement.

Despite the density of scrub the areas were successfully cleared to a high standard and thanks are extended to all the staff involved for their enthusiasm and attention to detail throughout the project

Cover illustration

Image of the dunes showing machine clearance above the sand bowl with Sea buckthorn awaiting disposal on the fire site
Hippophae rhamnoides

David Attwell 2018

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Abbreviations

AONB Area of Outstanding Natural Beauty

CES Works Report Year 2 Scrub Clearance – Trevoze Golf & Country Club

CES	Conservation Enhancement Scheme
CRAG	Cornwall Amphibian and Reptile Group
ECoW	Ecological Clerk of Works
EPS	European Protected Species
NE	Natural England
SSSI	Site of Special Scientific Interest
TGCC	Trevoze Golf & Country Club

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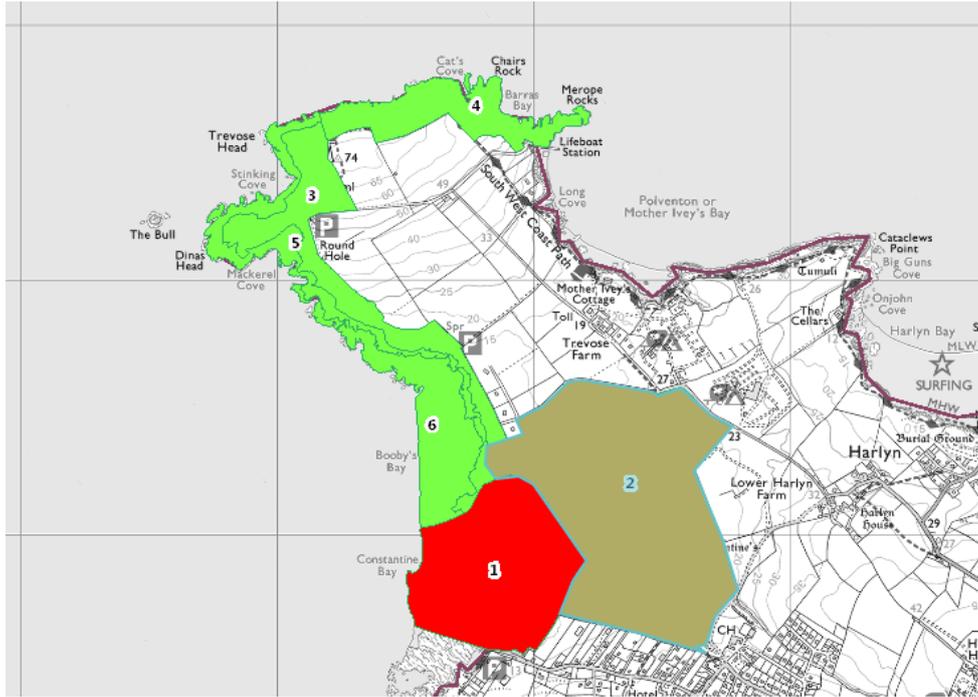


Figure 1: Location of the Trevoze Head and Constantine Dune SSSI showing the six management units
(Source Defra Magic 2017)



Figure 2: Aerial view of the dune north of the beach stream showing work areas (Source Bing Maps 2018)

Summary

In November 2017 the second year of scrub clearance works took place on Unit 1 of Trevoze Head and Constantine Dunes Site of Special Scientific Interest (SSSI) on land belonging to Trevoze Golf and Country Club (TGCC). The works were funded by Natural England as part of a Conservation Enhancement Scheme (CES) with a five year delivery period.

Due to the presence of Sand lizards *Lacerta agilis* within the dunes a comprehensive survey was undertaken from March to October 2017. This subsequently informed the design of the scrub management works and supported an application to Natural England for a Science, Education and Conservation Licence which was issued in October of the same year.

The works involved both machine and hand clearance and this was tendered as two separate contracts. The former was awarded to P. R. Weldhen (St. Columb) who had undertaken the year 1 works in February 2017 whilst the hand clearance work was awarded to John Hurlle and Sons (Probus). Works were designed, tendered and overseen by Attwell Associates (Environment & Heritage) acting as the Ecological Clerk of Works whilst publicity and communications were handled by Karen Lewis of NE and Nick Gammon of TGCC. The contractors on site also acted as the first point of contact for members of the public.

The works were timed to ensure minimum impact on the Sand lizards (and other features of interest) and commenced in mid-November 2017 with scrub clearance completed for both contracts by the week before Christmas. Marram grass planting (January) and fence replacement (March) followed on with the contracts completed by March 19th 2018.

A targeted area of scrub (approx. 0.7 HA) was cut and burnt during the project which focused on an area at the southern end of the northern dune plus a small isolated patch of *Rosa rugosa*. The objective of dealing with the invasive species was achieved alongside some significant enhancements to areas of compromised dune grassland. Mechanised clearance enabled dense areas to be effectively tackled and should have reduced the potential for regeneration from latent root stock. Lessons learnt from year 1 ensured efficiencies were achieved whilst fine tuning of equipment ensured incremental gains in both the speed and quality of outcomes. The hand clearance works was undertaken to a high standard and where feasible root stock was stump treated. It will however be necessary to target regeneration over the summer of 2018 and during the lifetime of the CES agreement. A major achievement for the landowner would be the eradication of the invasive and non-native species within 5 years and a good start has been made towards this objective.

The overall impact of this year's work is again striking and the dune is beginning to regain its structure and feel. Some Marram planting was undertaken in January to help stabilise mobile sections of dune and to provide a framework within which regeneration of the dune grassland can take place.

1. Introduction

This report summarises the scrub clearance works undertaken by Trevoise Golf and Country Club (TGCC) between November and March 2018 on part of the Trevoise Head and Constantine Dunes SSSI. The work was funded by Natural England (NE) through a Conservation Enhancement Scheme (CES) which is being delivered by the TGCC over a five year period (2016-2021).

The works followed on from an initial clearance phase in January / February 2017 which had focused on the area south of the beach stream and formed part of an ambitious programme of scrub removal with the aim of bringing Unit 1 (see Figure 1) of the SSSI into 'favourable' condition. Currently the area is classified as 'unfavourable' due to scrub encroachment and is at risk of losing its notifiable features.

The CES process was initiated by NE in May 2016 and a formal offer was made to TGCC in early winter of the same year. This document set out a comprehensive framework for delivery and included a programme of works for which funding was secured for the first year only. However in the summer of 2017 NE confirmed expenditure would be available for year 2 in line with the objectives set out in the agreement.

2. The CES Agreement – Objectives and Work Programme

The CES agreement includes a number of objectives designed to maintain or move the land forward towards 'favourable or target condition'. Whilst the agreement covers all of the SSSI owned and managed by TGCC the focus for this phase of works was unit 1 of the dune system. The agreement stated:

1. Within Units 1 & 2 of the SSSI to restore the area of sand dune habitats (mobile and fixed dune calcareous grassland) which have become dominated by scrub, to achieve favourable ecological condition
2. To carry out an extensive programme of works to eradicate non-native species (including Sea Buckthorn and Hebe) established in the sand dune habitats (both mobile and fixed dunes) and prevent further encroachment into adjacent areas
3. To carry out a programme of works to eradicate scrub within the mobile dune habitat in unit 1, by the end of the second year of the agreement
4. To carry out a programme of works to reduce the cover of scrub within the fixed dune grassland habitat in Units 1 & 2 (predominately ivy and bramble) to no more than 5 % over the period of the agreement

The agreement estimated scrub cover in Unit 1 at 42% of the area of 'coastal dune habitat' and referenced that unless 'intervention' was successful the notifiable features under the Site of Special Scientific Interest (SSI) 'may be lost'. Thresholds are included by which the agreement will be monitored including a number that are specific to clearance of the scrub. These included:

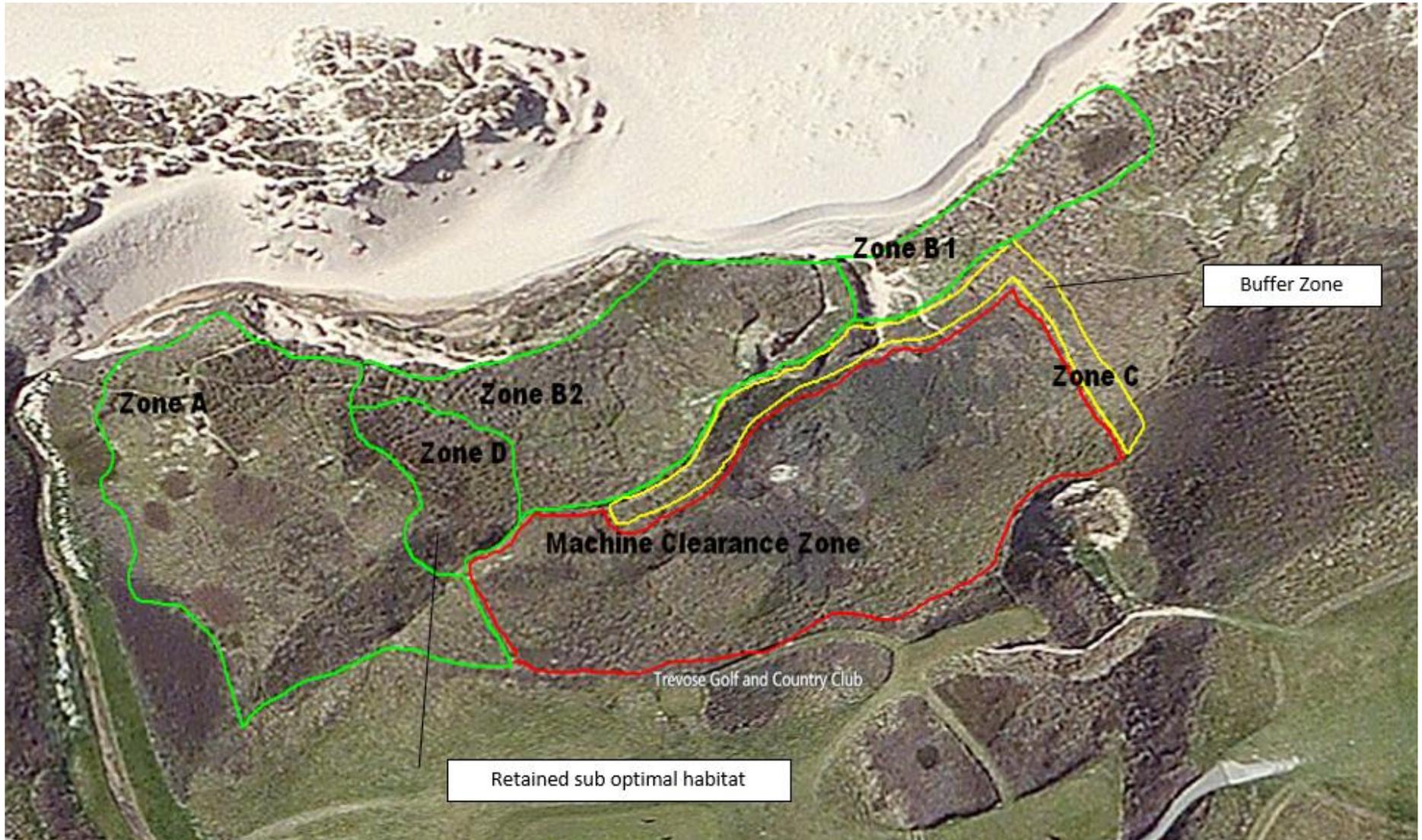
- Non-native species should be rare and Sea Buckthorn (which is considered non-native to western Britain) should be controlled and absent by the end of the five year agreement
- Scrub (native and non-native) should be absent (0%) from fore dune and mobile dune habitats
- Cover of Ivy and Bramble / scrub within the sand dune system and the dune grassland should be occasional or no more than 5% by the end of 5 years of the agreement. Scrub should be absent from the mobile dune habitat.

The agreement clarified that in all cases the objective to maintain a feature of the site implies "both **restoration** and subsequent **maintenance of that feature** if it is not in a favourable condition at the start date of the agreement period".

3. Sand lizard Survey and Licence Application

Although the dunes were notified for their indigenous flora and fauna they have also been subject to a species introduction in the 1990's for the Sand lizard *Lacerta agilis*. This reptile appears on the list of European Protected Species (EPS) and a mitigation licence is required where works might impact

Figure 3: Summary of Main Scrub Clearance Zone for Area 1



on individuals or their habitat. The Sand lizards were released on the northern section of dunes and have not been formally monitored since.

The works undertaken in year one targeted the area south of the beach stream outside of the recorded area for this species with NE approval. In light of the proposed areas for year 2 it was agreed by the Project Officer that the client could initiate a survey of the lizards over the summer to inform the development of future scrub clearance as part of their CES agreement. The survey commenced in March and then continued over the summer. A number of aims were agreed to guide the fieldwork and inform the report. These included:

- To identify the 'foci' for the Sand lizard population
- To give an indication of distribution across the dune system
- To provide guidance on the design and implementation of future CES capital works to minimise impact on the Sand lizard colony

In order to survey Sand Lizards a Schedule 5 Licence is required under the Conservation of Habitats and Species Regulations (2010 – as amended) and the Wildlife and Countryside Act 1981 (as amended). An application was made in January 2017 and this allowed for named (authorised) individuals to be included on the licence. Consent was received in mid-February (2017-28180-SCI-SCI) with a set of conditions including submission of a record of survey activity within two weeks of the end of the licenced period.

The survey was undertaken by two surveyors using standard techniques whenever environmental conditions were suitable and a comprehensive database of sightings was developed. This included records for other reptiles including the Common lizard (*Zootoca vivipara*). In addition to field survey a number of refugia were introduced late in the season. These were placed outside of the foci in areas of denser scrub to help understand how these areas were being used and which species were present.

The survey was invaluable in helping to identify how the Sand lizards were using the site from early season emergence to potential egg laying sites. In total 121 sightings were recorded of which 77 were positively attributed to Sand lizards. Records included both sexes as well as juveniles and hatchlings confirming the colony is active and successfully breeding.

The survey report included recommendations for scrub clearance works for year 2 which reflected the data gathered over the spring and summer and outlined a method statement to mitigate impacts on the Sand lizard colony and other notable species. One of the valuable outcomes of the reptile surveys was the ability to observe other species and their relationship with scrub assemblages. This informed the retention of key areas of Blackthorn scrub shown to be important for both Linnets *Linaria cannabina* and Stonechats *Saxicola rubicola*.

5. European Protected Species Licence

As a European protected species works that might impact on Sand lizards require consent from Natural England under licence. Discussions were therefore held at an early stage and it was advised that a Science, Education and Conservation Licence would be the appropriate form of application. As part of the submission a method statement, work schedule and a reasoned statement were included along with a copy of the field survey report. The application was made in August 2017 and authorisation was received on the 12th October allowing a 12 month period for works to be completed.

6. Works Programme and Timings

This works programme was designed to ensure that Sand lizards were below ground and less likely to be impacted by the works. The objective was to complete all major tasks by the end of January allowing a minimum of 1 month prior to the male lizards early season emergence.

Work Task	Year & Month								
	2017			2018					
	N	D	J	F	M	A	M	J	J
Scrub Clearance									
Marram Planting									
1 st Chemical App.									
2 nd Chemical App.									

7. Method Statement for Scrub Clearance

The method statement for the year 2 works had a number of main objectives which included:

1. Clearance of Sea buckthorn *Hippophae rhamnoides* from the north dune with the aim of eradication
2. Clearance of *Rosa rugosa* from the fore dune with the aim of eradication
3. Reduction in woody scrub cover in Zone 1 to restore Marram grassland and enhance habitat for key species i.e. Sand lizard

The works were designed to remove a variety of woody and invasive scrub from the dune with the aim of regenerating the species rich maritime grassland. Constantine is host to uncommon species such as Pyramidal Orchid *Anacamptis pyramidalis* and Sea Holly *Eryngium maritimum* along with the nationally rare Portland Spurge *Euphorbia portlandica*. Patches of calcareous grassland are dominated by Red Fescue *Festuca rubra*, with Ferngrass *Desmazeria rigida*, and Sea Ferngrass *D. marina*. Thyme *Thymus drucei*, Eyebright *Euphrasia offinalis* agg. and Hairy Birds-foot-trefoil *Lotus hispidus*, are also visible elements within the SSSI. Of particular prominence in 2017 was ¹Dodder, *Cusseta epithymum* which was widespread at the southern end of the system. Dune Fescue *Vulpia membranacea*, a national rarity is also found along path edges in the fore dune whilst the site is host to Yellow Horned Poppy *Glaucium flavum*.

Scrub communities at Constantine comprise of native and non-native species of which Sea buckthorn is the most pernicious and evident along with *Rosa rugosa*. As well as valuable pockets of woody scrub utilised by Linnets *Linaria cannabina* and Stonechats *Saxicola rubicola* there are also extensive areas of Blackthorn *Prunus avium*, Bramble *Rubus fruticosus* and Ivy *Hedera helix*. These species in combination have smothered Marram and created a dense blanket invading the fore dune at the southern end and blanketing the slopes against the golf course. Privet is also present but is less visible within the scrub assemblages.

The clearance zones and compartments focussed on the southern end of the dune and at the far northern extremity. The latter was almost a single species stand of *Rosa rugosa* with a small amount of Sea buckthorn in contrast to a more complex scrub assemblage in the southern zone. This ranged from single species Buckthorn stands to dense areas of Ivy, Bramble and Blackthorn. Access to the site was via the golf course.

Based on the summer surveys works were divided into two different approaches dependent on the sensitivities of the compartment which included:

¹ The Dodder appeared to be parasitizing Ivy which is well established in this section of the dune

I. Hand Clearance

This was specified for work within sensitive zones where either Sand lizards were recorded or there was a strong likelihood that they may have been present. The key advantages of using smaller hand held or pedestrian equipment were considered to be:

- Ability to select and target problem species within marginal zones. This enabled retention of key flora and promoted cover for lizards emerging from burrows in springtime i.e. Marram clumps
- Minimal disturbance when accessing or working on slopes or gullies
- Visual observation at close quarters when working in buffer zones. Heightened sense of awareness when clearing vegetation
- Ability to chemically treat stumps and woody plants to eradicate invasive species

II. Machine Clearance

Based on experience in Year 1 of the CES this method was found to be highly effective in certain scrub typologies. The approach was therefore specified for a single compartment in Area 1 where Sea buckthorn and Ivy / bramble was well established. The former is difficult to handle and the ability to remove rhizomes as well as top growth was considered to be the best approach to improve the effectiveness of the outcome. A buffer zone was included for hand clearance as an additional measure of confidence against areas where ²Sand lizards might be present.

Key advantages of larger machinery:

- Ability to handle prickly species at length and in volume
- Ease of Management of fire sites and disposal of arising's
- Low ground pressure on tracks
- Reduced regeneration and creation of valuable bare sand habitat

In designing the clearance zones careful thought was given to how best to manage the interface between Sand lizard occupancy and work areas. As well as selecting the appropriate methods of scrub removal the use of buffer zones and retention of some sub optimal habitat was also deployed to reduce risk to this species i.e. In addition any patches of quality habitat within work zones was pre-marked and measures taken to preserve them during the delivery of the contract.

Based on the experience of winter 2017 (Jan / Feb) it was agreed with NE that arising's could be burnt on site. Method statements to cover this were developed in 2017. A separate method statement was produced for the Marram planting which identified donor material which was sourced from the southern dune outside of the Sand lizard area.

8. Contractor & Equipment

The mechanical scrub clearance was undertaken by P. R. Weldhen of Trekkenning Farm, St. Columb. The proprietor Rundle Weldhen was involved in initial discussions but the day to day management of the site was overseen by Simon Page who was present throughout with a second machine operative.

Based on the method statement the majority of the clearance was mechanised and two Hitachi 14 ton tracked 360° excavators were used. These were fitted with a riddling bucket, land rake and grapple attachment (see discussion). A fuel bowser was brought to site to reduce movements across the golf course and once on site the machines stayed until their role was completed. Staff parked vehicles at the Golf Club depot and then walked to site each day.

² Relationship between this species and scrub is not clear but it is believed they may well use scrub margins both for shelter, foraging and to utilise root systems for burrows. The buffer zone was therefore used as an additional measure of confidence in the works delivery

The hand clearance contract was delivered by John Hurle and Sons with Dan Hurle coordinating and overseeing works on the ground. This gang varied in size from two to three people dependent on the task and other commitments. Equipment was largely focussed on the use of brushcutters with mulching blades and arising's disposed of by raking and then burning on tin sheets.

Chemical treatment was undertaken using small hand help applicators or knapsack sprayers. Staff brought vehicles to the edge of the site each day to move equipment and to provide safe working zones for chemical etc.

9. Communications & Publicity

Karen Lewis of NE coordinated pre- publicity to inform interested parties that the work would be taking place and the core objectives. This included St. Merryn Parish Council, the RNLi and Cornwall Council. In addition Nick Gammon of TGCC also spoke to local individuals and a series of site notices were erected at key access points to the beach and dunes and were present throughout the project.

A few complaints were received by the Golf Club during the works period relating specifically to fire sites and smoke and the impact on properties.

10. Winter Work Delivery Period & Weather

Work commenced on site for the hand scrub clearance on Monday the 20th November 2017 and continued until the 19th December. The normal working pattern was Monday to Friday 8AM – 4.30PM dependent on weather with a minimum of two operatives on site rising to a maximum of four. Marram grass planting followed on commencing on the 3rd January 2018 with the contract area being completed by the 9th. A further additional area (see works amendments below) was finished by the 19th January. Finally, John Hurle and Sons completed their contribution with the erection of a new boundary fence which was reinstated during the 3rd week of March 2018.

Machine clearance works commenced a day later than anticipated on Tuesday 5th of December and were completed on Monday the 18th December 2017.

The weather was variable throughout the works period with significant shifts in daily temperatures and high levels of precipitation in the form of persistent rain, hail and sleet. This resulted in a number of lost days for the hand clearance contractor due to site exposure and this continued through the scrub clearance phase to the Marram transplanting in January.

Task	2017					2018					
	Nov		December			January				Mar	
Hand Clearance											
Machine Clearance											
Marram (contract)											
Marram (extension)											
Fence Replacement											

Table 1: Summary of work period and methods applied to Scrub Clearance

11. Compliance Inspections – Ecological Clerk of Works

As part of the method statement, and funded through the CES agreement, the ECoW was employed to oversee the delivery of the scrub clearance contract. This involved monitoring performance of the contractor against the approved method statement, ensuring compliance with the Species Conservation Licence, health and safety documentation and survey of work areas on the ground.

The site was marked out on Sunday 19th November and a start-up meeting held with the hand clearance contractor on Monday 20th. This included risk assessments, site induction and species toolbox talk for staff which covered the objectives of the CES, key species ID and protocols in the event of encountering features of interest. The same talk was given to the machine clearance contractor and each new operative as they joined the project. Work zones were thoroughly checked by the

ECoW's before clearance and in total 10 specific visits were made during the scrub clearance and each one was written up as a compliance form. A further three inspection visits were made during the Marram planting period and a mid-works review meeting took place with NE on the 18th December 2017. In between two further site visits were made to meet with the contractor to discuss new works and to oversee the fence reinstatement. A full photographic record including before and after images was collated for the works.

12. Contract Amendments

During the works phase it was agreed with NE to extend the area of Marram planting to stabilise exposed areas of the dune and to consolidate work undertaken in the Year 1 zone. Some areas of bare sand were retained including the sand hollow. Permission was also given to reinstate the boundary fence of the golf course.

13. Areas Physically Cleared

The clearance works at the southern end of the dune resulted in a significant change to the appearance of the dune and the percentage cover of scrub. In particular the removal of the established Sea buckthorn stand at the centre of the machine zone not only revealed a large sand hollow but transformed the character of the dune. This in combination with the hand clearance works in Zone A, B1 and B2 enhanced connectivity between optimal patches of dune grassland whilst maintaining a mosaic of native scrub. In contrast Area 2 tackled *Rosa rugosa* but the impact is less discernible given the larger spread of this scrub patch which emanates from adjacent National Trust land.

It is estimated that roughly 0.7 HA of dense scrub was tackled as part of the year 2 works and 4,500M² stabilised with Marram planting.

14. Evaluation

Lessons learnt from the Year 1 works certainly informed and help shape the outcomes for Year 2 which were set within the framework of the Survey, Science, Education and Conservation licence.

The detailed survey of the dune for Sand lizards provided valuable data as well as an insight to other key species and notable plants within the SSSI. This information supported an informed method statement which sought to protect features of interest whilst addressing the core objectives of the CES agreement. The project outcomes support this approach which has tackled a long running degradation of the dune at the hands of a number of invasive species of which Sea buckthorn and *Rosa rugosa* are the most pernicious and established.

Only one notable species was encountered during the delivery phase. This was a single adult Grass snake *Natrix natrix* disturbed from scrub bordering the golf course just east of the sand hollow on the 7th December. It was placed in a safe refuge area to the north east of the work zone and was the first known record for this species in the dunes (anecdotal evidence – CRAG pers. comms) although they are recorded regularly on the golf course. Evidence of an old nest was observed amongst the blackthorn arising's but the timings of the works obviated any risk of disturbance. Given the degree of survey and lead in time it had been possible to identify patches of optimal habitat within the clearance zones and these were marked and protected during the works phase. The use of the buffer zone should have minimised risk to the Sand lizards and this combined with hand clearance was considered the most appropriate form of intervention adjacent to populated compartments. John Hurlle and Sons were diligent in ensuring as much Marram as possible was retained in the buffer whilst trying to treat and remove the Buckthorn and Bramble.



Figure 5: Before and after of the machine clearance zone showing the dense area of Sea buckthorn and post works with the transplanted Marram grass. The buffer zone is in the foreground cleared by hand. The outline of zones B1 and B2 can also be seen on the right hand side of the bottom image.





Figure 6: The sand hollow before and after scrub clearance showing how the Sea buckthorn had completely dominated the area and hidden the topographical lie of the land. The bottom of the hollow and an adjacent area were not planted with Marram to preserve some bare sand habitat





Figure 7: Before and after of the southern end of the dune system (Zone A). The area to the west of the Privet patches is associated with the Sand lizards and summer survey established this link. It is hoped works will enhance the habitat for this species and Linnets which use the retained Blackthorn scrub





Figure 8: Before and after of Area 2 at the northern end of the dune. This area is dominated by *Rosa rugosa* which was cleared by hand with the intention to follow up spray treatment in summer 2018



The central area cleared by machine proved an effective and decisive intervention informed by experiences in year 1. Undoubtedly the addition of a second machine significantly increased productivity and enabled the site to be worked efficiently reducing vehicle tracking and movements. Importantly the use of the same contractor and staff provided a higher degree of confidence in execution of the works in this zone. A specially adapted grab was added to the second machine to enable it to move, shake and deposit material at the fire site. This had the benefit of not only improving the burning of arising's but also limiting sand contamination between the extraction and disposal points. Working in tandem it was feasible to clear, rake and finish out areas without traversing already worked ground. Clearance terminated at the sand hollow where a single fire site was used instead of the planned two. The land rake was again valuable in retrieving the extensive rhizomes of the Buckthorn and it is anticipated that rootstock regeneration will be relatively low within the clearance zone. Buffer areas cleared by hand may well require follow up chemical treatment but every effort was made to stump treat during removal. There is always the potential for re-colonisation from retained zones and margins which will need monitoring over the next couple of years.

A key challenge in this phase was disposal of arising's despite the site being located at greater distance from properties than in phase 1. Unfortunately wind direction (allied to some torrential rain) was problematic with strong northerly and easterly winds throughout the delivery phase which made it almost impossible to burn. As a result the arising's were dealt with on two separate days in week 1 and week 2 when it was agreed that conditions were acceptable. The mixture of Buckthorn and Bramble/ Ivy burnt well and it was therefore possible to dispose of the backlog quickly, although the action did generate a few complaints from residents in the vicinity of Constantine car park. The hand clearance contractor also reported a complaint from a vociferous dog walker when they were burning at the northern end of the dune in Area 2. Given the challenges faced by the weather the constriction of activity to just two of the 11 days did concentrate the impacts and in reality was probably a 'reasonable' and balanced approach.

The hand clearance contractor worked hard to improve the finish in Zone A, B1 and B2 and was able to achieve a high standard throughout. Attention to detail in clearing the buffer zone enabled Marram patches to be preserved to provide additional cover from predators in the event of male Sand lizards emerging in this area early in the spring. The density of scrub and some of the topographical features made it challenging to achieve a complete coverage of invasive's with an agreement that any regeneration or missed stumps would be picked up in the spring with foliar treatment. A number of optimal habitat patches were preserved along with some scrub elements including Privet in Zone A where survey suggested associations with the localised population of Sand lizards. Along with Zone D it was felt that sufficient dune grassland and cover was retained whilst opening up the opportunity for greater connectivity with the more densely used areas of the fore dune. Importantly the clearance of the sand hollow of dense Sea buckthorn provided a valuable sheltered site which has potential in the medium term both for breeding and early to late season shelter.

The re-planting of Marram across the site provided a degree of risk control given the dunes exposure to strong on shore winds. Although the CES agreement, and national guidance, talks of retaining a higher percentage of bare sand this needs to be equated across the dune as a whole and consider the bare areas created in Year 1. A decision was taken to retain clean sand within the base of the sand hollow but to re-plant in areas of higher risk. A key benefit of this approach is that the grass affords structure and a framework within which dune plants can seed or establish. Experience from the machine cleared area in year 1 suggest that woody scrub regeneration is minimal (>5%) with some early colonisers and notable species establishing within 6 months. Clearly ruderals are a concern in bare ground and follow up treatment for Ragwort, docks and thistles will be required along with any foliar treatment of regenerating invasive's. However results to date suggest this is not significant and with careful planning can be selectively managed whilst encouraging the dune grassland to re-establish.

It will also be interesting to evaluate how Ivy and Bramble responds in the hand clearance zones and this will need to be monitored over the next couple of years and may require some follow up or periodic management to ensure that Zone B2 in particular remains open. Similarly it would be useful to maintain some level of monitoring of the Sand lizards and refugia tins to understand the impact of the CES works and to determine if and how they use the newly cleared compartments?

Finally, a key outcome of the clearance work is the visual strengthening of the dune system particularly when viewed from the beach or the high ground on the southern dune section looking north. Whilst the eye is drawn to the bare sand within the machine clearance zone the combined impact of the two contracts is significant and has reinforced the dune grassland which was under threat from the expanding scrub communities. In just over 12 months a significant change has been implemented by the landowner which will hopefully be consolidated over the remaining years of the agreement.



Figure 9: View of Marram planting in the machine zone looking towards the sand hollow. Note the hand cleared and raked area in Zone B2

Figure 10: Images of the Year 2 CES Scrub Clearance Works in Progress



Top Images (L to R): This series of images shows the machine clearance zone with two the 360° excavators at work. Image 1 shows the two machines above the sand hollow with one fine raking roots and the other managing the fire site. Note the adapted grapple which was very effective in reducing sand burden and speeding disposal of arising's. Image 2 shows the topography of the cleared sand bowl with its steep sides and mature Sea buckthorn scrub. Image 3 reinforces the challenge of managing this species which has extensive rhizome root systems. The majority of these were removed by the land rake bucket but some follow up treatment will however be required for any regeneration of scrub and ruderals.



Bottom Images (L to R): Images 1 and 2 shows the hand clearance contractor at work in zone B2 using brushcutters with mulching blades to deal with very dense Ivy and Bramble scrub amongst residual Marram. A margin of scrub was left against the beach to deter access whilst a steeper bank (Zone D) wasn't cut to retain some habitat as a buffer for the area used by the Sand lizards at the southern end. The contractor achieved a very high standard as shown in the third image where Blackthorn and Ivy / Bramble have been removed and raked to leave a close finish. Stump treatment was carried out but some chemical follow up will be undertaken in spring / summer 2018. It is anticipated that as in year 1 the Marram will re-generate over the summer in the hand cleared zones.

15. Conclusion & Recommendations

The year two works were successfully completed to a high standard and within the prescribed timetable and consents as agreed with Natural England under licence. This has enabled the invasive species to be brought under control and with careful follow up treatment eradication in the short to medium term is now feasible. Importantly the framework to enable the grassland to regenerate is in place and this will also benefit other notable species including the introduced Sand lizard colony.

A number of follow on actions will need to be addressed to consolidate the winter works and inform any future CES programme. These include:

1. Follow Up Treatment – both areas (year 1 & 2) will require judicious follow up treatment either using spot chemical treatment of re-growth or hand roguing. There is also the potential for ruderals to seed including Dock and Ragwort.
2. Monitoring – it would be useful to set up a fixed point photographic record of the site to monitor changes year on year. This could be something that TGCC staff could undertake as part of the routine site calendar. It would also be helpful to record habitat change in zone 1A and presence of target features
3. EPS Licence – an EPS licence return is due by November 1st 2018 for the year 2 works. There may be a requirement for a further licence if works are proposed on the dune north of the beach stream for 2018/19
4. Sand lizards – it would be beneficial to continue to monitor the colony in 2018 both to substantiate the impact of year 2 works and to inform any licence application for future works
5. Future Clearance Methodologies – careful thought will be required to determine the use of appropriate treatments for the east facing slopes on the golf course or the dune hollow at the northern end. Ivy and Bramble are the two key constituents

