Comisiwn Coedwigaeth Cymru
Forestry Commission Wales

Newborough Forest Management Plan 2010-15

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

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SECTION 1: BACKGROUND

1.1 Ownership

1.1.1 Name of the forest:	Newborough Forest
1.1.2 Name of owner / occupier:	National Assembly for Wales (transferred from the Secretary of State for Wales – deeds LR378 & LR395 – and Ministry of Agriculture Food & Fisheries – deeds LR35, LR36, LR50 & LR74)
1.1.3 Basic details of the forest	See Appendix 1
1.1.4 Map of the forest	See Appendix 6
1.1.5 Management of the forest	Managed on behalf of the Welsh Assembly Government by Forestry Commission Wales
1.1.6 Address (of local office):	Forestry Commission Wales, Coed y Mynydd Forest District, Government Buildings, Arran Road, Dolgellau, Gwynedd, LL40 1LW

The freehold of Newborough Forest rests with the National Assembly for Wales (NAW) and is managed on behalf of the Welsh Assembly Government (WAG) by Forestry Commission Wales (FCW). The people of Wales, the local communities around the village of Newborough and visitors to the forest are therefore important stakeholders in the management of Newborough Forest.

The Countryside Council for Wales (CCW) leases the area of the shoreline between the mean high water mark and the base of the dunes, also a large area of saltmarsh to the north-west of the forest, both areas being managed as part of the National Nature Reserve (NNR). CCW also has an access lease for nature conservation purposes over the rest of Newborough Forest and leases Ynys Llanddwyn (Llanddwyn Island) from Isle of Anglesey County Council (IoACC). IoACC leases Newborough Beach (between the mean high water mark and mean low water mark) from Crown Estates.

1.2 Context of this Plan

1.2.1 Preparation of this draft of the Management Plan:	
Name:	John Browne
Position:	District Forester Planning
Address:	As above
Phone Number:	0300 068 0300
Email:	john.browne@forestry.gsi.gov.uk
Point of contact for this plan: District Forester Planning, details as above	

1.2.2 About the forest:	
Location:	Newborough, Isle of Anglesey
Total area of plan / of forest:	951 hectares / 689 hectares
Site designations:	SSSI, SAC, AONB • SAC documentation in Appendix 2 • LBAP in Appendix 3 Note that the small section of forest north east of the A4080 is outwith the SSSI, SAC and AONB (see Map 1.1 below)
Grid reference:	SH 414649 (Main entrance to the forest)

This management plan is required because Newborough Forest lies within a Special Area of Conservation (SAC) and is adjacent to two further SACs. The importance of this is explained further in Section 1.3 below, and more detailed information about the SACs can be found in Appendix 2. This coverage by SACs means that the forest is part of the wider Natura 2000 Network, a European designation aimed at conserving global biodiversity in line with international obligations. The objective of SACs is to enable vulnerable habitats and species – of which there are some 230 threatened habitat types and 1,000 listed species within Europe – to be maintained, or where necessary, restored to *favourable conservation status*. The Natura 2000 Network presently contains around 25,000 sites, or almost a fifth of the European territory. In Wales there are 90 sites including marine SACs but covering a total land area of some 187,614 hectares, or around 9% of the land area of Wales.

This management plan fulfils the function of a formal Forest Design Plan (FDP), a requirement for the management of all woodlands within the Assembly Woodland Estate (AWE). An FDP is also required for compliance with the UK Woodland Certification Scheme (UKWAS), a standard that enables FCW to market its range of products as *certified* under its two certification schemes: The Forestry Stewardship Council Scheme (FSC) and the Programme for the Endorsement of Forest Certification Schemes (PEFC).

The EU Habitats Directive guidance recommends using management plans to help establish dialogue between all interested parties and to communicate practical management solutions. This plan will be used to keep the Newborough Liaison Partnership (NLP) – and in due course its successor group – informed of developments and to seek the group's comments and guidance. The NLP was established in 2005 and initially met with a facilitator to debate the community aspirations from Newborough Forest, producing its recommendations in December 2006. These recommendations inform this management plan and where possible are incorporated within it. It is expected that the NLP will reform itself into a further liaison group to assist the management of the forest and dunes once this management plan is approved. This point will be explored further by the NLP in due course.

This plan acknowledges the work carried out by the Newborough Forest Science Review over the period 2009-10, which has involved scientists from the Newborough Forest Partnership (NFP) and is chaired by CCW. At the time of writing the science review is in arbitration, but when this process has concluded and is signed off by the Welsh Assembly Government (WAG) then this plan will be updated to incorporate WAG decisions on the forest. The science review is covered further in Section 1.3.1 below.

1.3 Legal and Other Issues

The main legislation applying to the forest is:

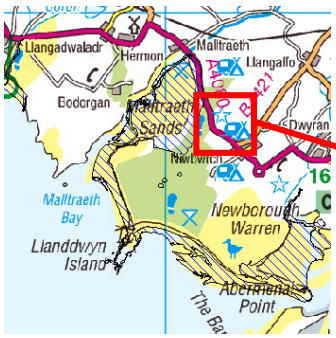
- The Habitats Regulations (*Conservation (Natural Habitats &c.) Regulations, 1994*), which transpose the *EU Habitats Directive 1992* (*Council Directive 92/43/EEC*) into UK law and establish protective regimes both for European sites and European protected species (EPS). The Regulations were further amended in 2007 and 2010 (*The Conservation of Habitats and Species Regulations 2010*). The main Special Area of Conservation (SAC) covering Newborough Forest – the Abermenai to Aberffraw Dunes Special Area of Conservation (SAC Reference UK0020021) – was designated under *EC Habitats Directive 1992* in 2004.
- *The Natural Environment & Rural Communities Act 2006* (Sections 40 & 42 regarding biodiversity duties).
- *The Countryside & Rights of Way Act 2000* (regarding open access, also Schedule 85 regarding the AONB).
- *The Environmental Impact Assessment (Forestry) (England and Wales) Regulations 1999* [*SI 1999/2228*], updated 2006.

- *The Wildlife & Countryside Act 1981* (as amended by Schedule 9 of the *Countryside & Rights of Way Act 2000*).
- *The Forestry Act 1967* as amended.

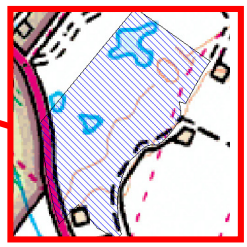
Newborough Forest lies almost completely within one Special Area of Conservation (Abermenai to Aberffraw Dunes SAC); has a slither within a second SAC (Anglesey Coast Saltmarsh SAC); and is adjacent to a third SAC (Glan-traeth SAC). Maps of these SACs are shown in Figure 1.1 below. The entire forest south of the A4080 is within the Ynys Llanddwyn-Newborough Warren Site of Special Scientific Interest (SSSI), and there are other SSSIs nearby (see Figure 1.2). The proximity of SACs is a further important consideration in carrying out the Habitats Regulations Assessment (HRA) on the operations proposed within this management plan.

Figure 1.1: Boundary maps of SACs covering & adjacent to Newborough Forest

Map 1.1a: Abermenai to Aberffraw Dunes SAC



Map1.1b: Anglesey Coast Saltmarsh SAC



Map1.1c: Glan-traeth SAC

Figure 1.2: Areas of SSSIs around Newborough Forest

Key: Notified Site of Special Scientific Interest (SSSI)

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SAC designation requires European member states to establish conservation measures corresponding to the ecological requirements of the Annex I habitats and Annex II species present on the site (Article 6.1), and to take appropriate steps to avoid deterioration of the natural habitats and habitats of species as well as significant disturbance of the species for which the site is designated (Article 6.2). This includes the HRA of the implications of any plans or projects that, alone or in combination, are likely to have a significant effect on the site in view of the site's conservation objectives (Article 6.3). Details of the 3 SACs illustrated in Figure 1.1 can be found in Appendix 2.

1.3.1 Abermenai to Aberffraw Dunes SAC

The Abermenai to Aberffraw Dunes SAC was designated in 2004 for the following habitat types and species listed in Annexes I & II of the 1992 EC Habitats Directive:

- Embryonic shifting dunes

- Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')
- Fixed dunes with herbaceous vegetation ('grey dunes')
- Dunes with *Salix repens* spp. *argentea* (*Salicion arenariae*)
- Humid dune slacks
- Petalwort (*Petalophyllum ralfsii*)
- Shore dock (*Rumex rupestris*)

CCW has advised FCW that to comply with Article 6.1 of the Directive and to move the five sand dune habitats and two species listed above towards *favourable conservation status* the trees in a limited area of Newborough forest need to be removed. CCW say that this is to allow the restoration of a natural dune zonation behind the shoreline and to address the perceived impacts of the forest on the hydrology of the designated habitats. The definition of *favourable conservation status* is given in Table 1.1 below:

Table 1.1: Definition of favourable conservation status (Article 1)

Article 1(e): The conservation status of a natural habitat will be taken as 'favourable' when:
- its natural range and areas it covers within that range are stable or increasing, and;
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and;
- the conservation status of its typical species is favourable as defined in Article 1(i).

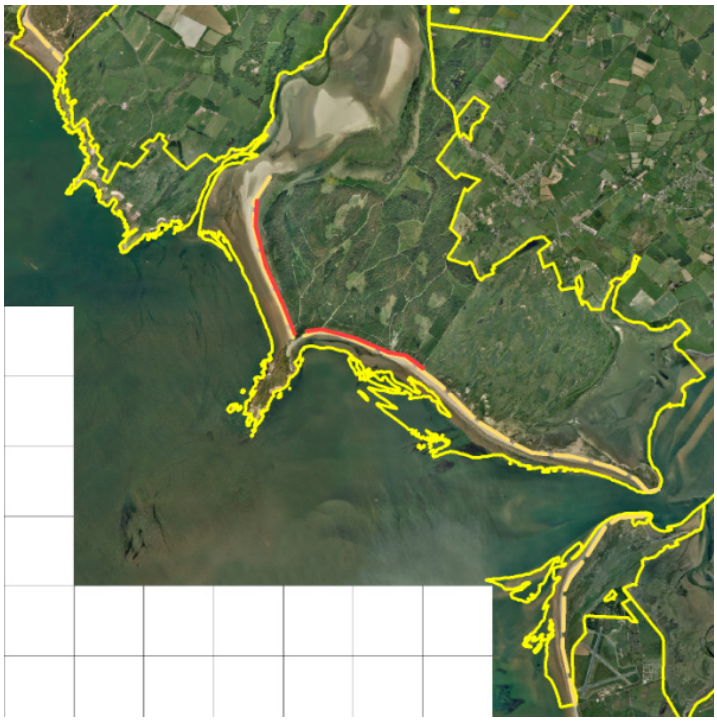
Article 1(i) The conservation status will be taken as 'favourable' when:
- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and;
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and;
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Figure 1.3 below shows how Newborough Forest fits within the wider area of SACs (Abermenai to Aberffraw Dunes SAC, Anglesey Coast Saltmarsh SAC and Glan-traeth SAC). The 728 hectares of Newborough Forest within SAC represents **39% of the area of the Abermenai to Aberffraw Dunes SAC**. The forest is therefore a significant feature within this SAC.

Figure 1.3 also shows the proportion of the SAC dune foreshore that is occupied by the forest, the forested foreshore being **30% of the SAC shoreline**.

SAC guidelines for identifying and managing Natura 2000 sites suggest a 5% tolerance factor for **areas that are unlikely ever to be brought within *favourable conservation status***. The fixed features of the forest, in particular the car parks, come to 3ha, or **0.1% of the SAC area**, which is well within this tolerance.

Figure 1.3: Proportion of SAC occupied by Newborough Forest



Key

SAC Boundaries
Coastal Frontage
Newborough Forest Frontage

CCW's advice to FCW on compliance with Article 6.1 of the Directive has been challenged by some members of the public, a challenge which has included the suggestion that the forest should not be part of the protected dune habitat. The Welsh Assembly Government (WAG) has therefore requested that the science underpinning CCW's advice be examined further, which is being done by CCW and involving scientists from the Newborough Forest Partnership (NFP). Five meetings of the Newborough Forest Science Review took place between November 2009 and August 2010 and although the notes of the meetings record agreement in many areas it has not been possible to reach overall agreement. The matter has now been referred to an independent arbitration panel.

The arbitration panel will look at the legal obligations, the intent of the Directive (in particular Articles 2, 4 & 6) and the interpretation of the accompanying N2K (Natura 2000) data form. The panel will also make recommendations as to the extent to which the sand dune habitats should be restored to *favourable conservation status*.

As the science review is in arbitration at the time of writing (November 2010) no further plans for action can be made through this management plan until the outcome of the arbitration panel is known. The map included in Figure 5.1 is purely to provide an indication of the possible extent of any clearfelling that may be required, and to provide some indication of possible scale. Inclusion of this map in the plan is not intended to anticipate or prejudge the outcome of the review in any way. As the terms of reference of the arbitration panel are not known at the time of writing it is inappropriate to comment further on how the findings of the panel may subsequently be incorporated into this plan. For now the plan stands alone independently of this review.

Sections 4 & 5 of this management plan contain statements on the desired characteristics and general approach to managing each of the SAC features, and these statements are used in HRA (Habitats Regulations Assessment) screening (see Appendix 2) to determine the *likely significant effect* of these proposals. This was done by

presenting the earlier draft management plan to CCW, the Newborough Liaison Partnership (NLP) and the wider public for information and comment, and thereafter to FCW Grants & Regulations, the forest industry regulator and legally defined competent authority, for HRA and Forest Design Plan approval.

1.3.2 Isle of Anglesey AONB

Newborough Forest is a major feature in the landscape of southern Anglesey and is especially visible when viewed across the Menai Strait from Caernarfon. With the exception of the section of forest to the north of the A4080 the forest lies within the Isle of Anglesey Area of Outstanding Natural Beauty (AONB).

The coastal zone of Anglesey was designated as an AONB in 1966 to protect Anglesey's coastal landscape and habitats from inappropriate development. The AONB was confirmed in 1967, and at 21,500 hectares is the largest AONB in Wales, covering almost one third of the island.

1.3.3 Anglesey LBAP

The Local Biodiversity Action Plan (LBAP) under the UK Biodiversity Action Plan (UKBAP) for Anglesey is *Working for the Wealth of Wildlife - Anglesey's Local Biodiversity Action Plan*. The UKBAP describes the biological diversity resources of the UK and sets out a detailed plan for their conservation. The Anglesey LBAP contains action plans for a number of species and habitats (see Appendix 3 for details).

The loss of biodiversity worldwide and wider performance against the 2010 biodiversity targets has been extensively covered in the press in recent months and does not need further elaboration here.

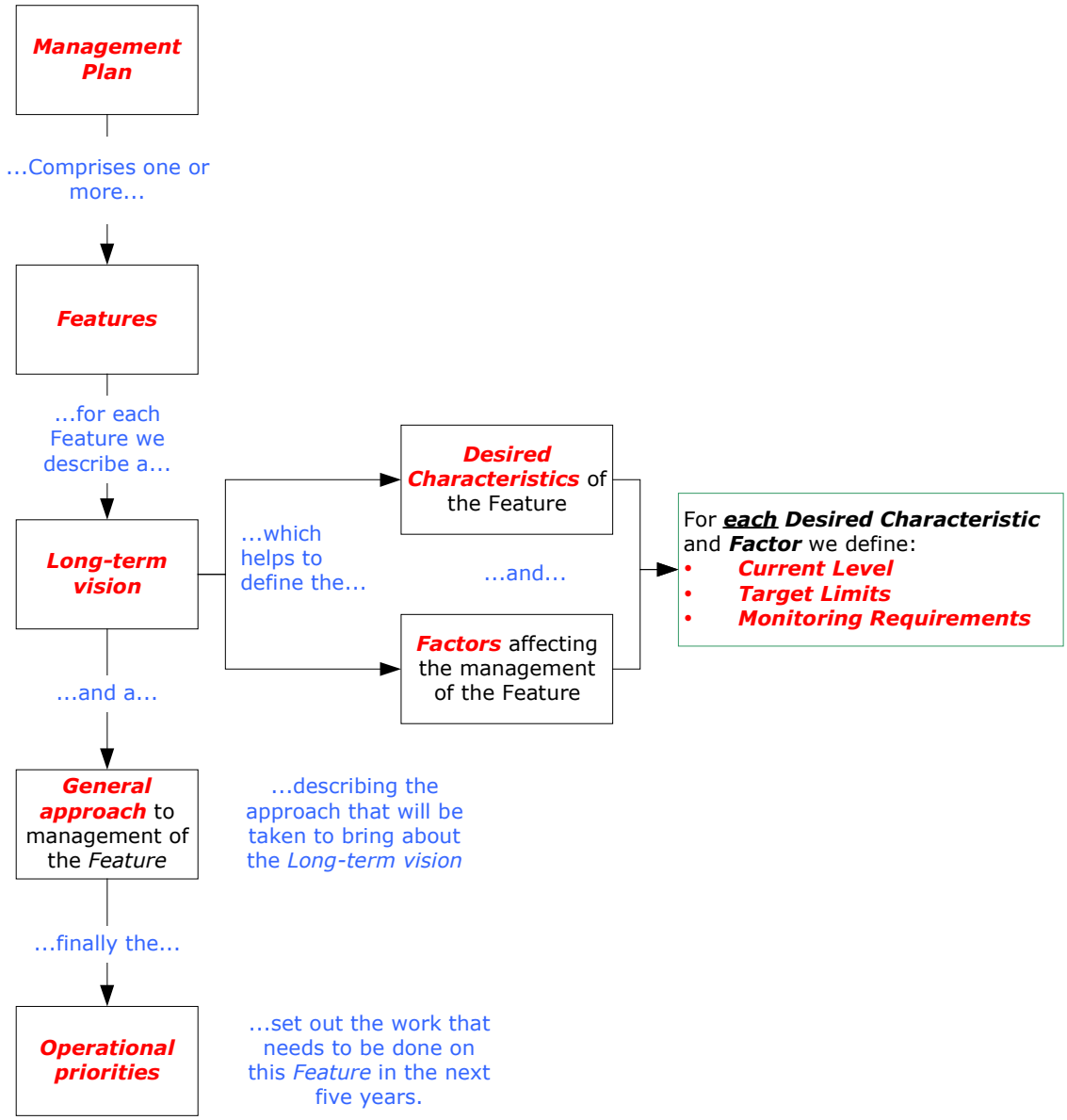
SECTION 2: MANAGEMENT PLAN FEATURES

2.1 List of Features

The following six features are regarded as qualifying features for the purpose of this management plan, which is for the forested section of the SAC:

2.1 Newborough Forest
2.2 Sand Dunes
2.3 Shore Dock
2.4 Recreation
2.5 Community Involvement
2.6 Geology & Geomorphology

Figure 2.1: Diagram showing how Features relate to policy & long-term vision



2.2 Rationale for Choosing Each Feature

These six features have been selected to cover what are regarded as the core aspects of management within Newborough Forest. These are the **forest** itself; the **sand dunes** & **shore dock** (features for which the SAC was designated); **recreation** (which is recognised as a major use of the forest), **community involvement** (because of the strong interests here); and **geology & geomorphology** (which are nationally important and part of the reason the area is designated as an SSSI). Further details of these 6 features together with a brief rationale for their selection are contained in Table 2.1.

Table 2.1: The six management plan features

Feature	Status	Factors	Rationale for Selection
2.1 Forest	Within SAC, SSSI & AONB	Resilience to pests & diseases and to climate change, European protected species (especially bats & amphibians), red squirrels, ravens, dune flora, transition to dunes & saltmarsh	The forest itself is of key public interest because of its social and economic importance [*Note: Some consultees to the plan have asked whether the forest would be better placed as a factor to the sand dune feature*]
2.2 Dunes*	Within SAC, SSSI & AONB	Embryo, mobile and fixed dunes, dune slacks & petalwort; SSSI features of flora, invertebrates & amphibians	Key EU legal requirement
2.3 Shore dock*	Within SAC, SSSI & AONB	Only population of shore dock in North Wales	Distinct SAC feature found only within the forest and needs specific consideration within this management plan. Note that petalwort, also a SAC feature, does not occur within the forest
2.4 Recreation		Walking, riding, cycling, nature study	Key public interest of social and economic importance
2.5 Community Involvement			Local stakeholders have strong interest here, also open government requirement to follow open and inclusive processes
2.6 Geology* / Geomorphology*	SSSI (Geological Conservation Review (GCR) status)	Solid rock, landforms, geological processes	Distinct features of national importance & driver of dune features. The GeoMôn project (described further below) will develop further economic linkages

** SAC/SSSI qualifying features*

This plan looks at the **desired characteristics** of each of these 6 features together with the key **factors** also affecting the feature and develops a **rationale** for its management. The management plan describes the **operational priorities** necessary to deliver the operational priorities and the **monitoring** which will provide information on management progress. Feedback from the monitoring will enable the effectiveness of management actions to be measured, and where necessary for management actions to be adjusted.

2.3 Description of Each Feature

2.3.1 Description of the Newborough Forest Feature

a. The Nature of Newborough Forest

Newborough Forest is 951 hectares in size, of which approximately 689ha is currently wooded and the remainder is salt marsh, existing open areas and recreational facilities. 88% of the forest was established between the late 1940s and the beginning of the 1970s, with Corsican pine being the predominant species at 93% of the tree cover. Newborough Forest is managed on behalf of the Welsh Assembly Government by Forestry Commission Wales (FCW).

b. Current Characteristics of the Forest Feature at Newborough Forest

- Species composition mostly Corsican pine with very little age structure and only a small proportion of other native woodland species.
- Poorly adapted to withstand climate change.
- Monoculture under threat from red band needle blight (RBNB).
- Capacity to sequester carbon in the timber crop.
- Extent of the forest makes this a dominant feature in the landscape, including the aesthetic value of the tall pine trees from within the forest itself.
- Provides both a sheltered environment (the forest) for recreation as well as shelter for the exposed environment (the beach and sea).
- Lack of connectivity with other areas of woodland within Anglesey.
- Population of red squirrels, which are important at a Wales and GB level.
- Overwintering and roosting sites for ravens, although numbers are declining.
- Open rides and roadsides. There is relatively poor invertebrate fauna in the forest except in clearfelled areas, where warm bare sand creates ideal conditions for Coleoptera (beetles) & Hymenoptera (sawflies, wasps, bees & ants) on a par with the open dune slacks.
- Open dune slacks and ponds with associated flora and fauna, e.g. great crested newt.
- Linear transition to sand dunes over a substantial length of the forested shoreline.
- Natural transition to (Cefni) saltmarsh through willow and alder scrub.
- Several key species of sand dune flora within the forest, such as dune helleborine.
- Some key non-native invasive species of plant.

c. Surrounding Context of Newborough Forest

Newborough Forest is an extensive area of low-lying pine forest on stabilised sand dunes on the southernmost tip of the Isle of Anglesey. To the seaward side is one of Wales' finest beaches; to the south is an area of mobile sand dunes of high conservation interest; and to the north is the Cefni estuary, with its mudflats and saltmarsh. This is all part of the Newborough Warren–Ynys Llanddwyn National Nature Reserve (NNR) that is managed by CCW.

Newborough Forest is of significant recreation and conservation value supporting over 170,000 visits each year to the beach car park and used all year round by local residents. The forest is increasingly seen as a tourist destination; facilities include car parks, toilets, interpretation boards, recreational paths and trails. There is access along the beach to the popular visitor destination of Ynys Llanddwyn (Llanddwyn Island), which is managed by Isle of Anglesey County Council (IoACC) and CCW.

In 2001 the section of forest, open land and saltmarsh to the south of the A4080 – some 890ha of land managed by FCW – was proposed as part of the Abermenai to Aberffraw Dunes candidate Special Area of Conservation (cSAC) and Anglesey Coast Saltmarsh cSAC. The sites were formally designated as SAC in 2004, which initiated a greatly increased focus on managing this area for conservation. Despite this increased focus the

2008 Core Management Plan for the SACs records many of the features as requiring action to bring them into *favourable conservation status*.

In recent years red squirrels have been reintroduced into the forest as part of a larger red squirrel conservation plan, which includes working towards the eradication of grey squirrels from Anglesey. Current monitoring suggests there are around 80 reds within the forest.

In 2005 the Newborough Liaison Partnership was established, and produced in 2006 a set of recommendations for the future management of the forest.

d. Management History of Newborough Forest

Newborough Forest was established between the late 1940s and the beginning of the 1970s with the main objectives of stabilising the sand dune system to prevent sand from blowing into the village of Newborough, creating a strategic reserve of timber and providing post war employment. Initially marram grass was used to stabilise the sand dunes and along Traeth Penrhos (Penrhos Beach) thatched fences and artificial dunes were created (see Appendix 1 for more details). Over the same period other dunes have become stable under grass as a result of natural cycles, possibly augmented by nitrogen pollution and the decline in rabbit populations.

Since its establishment Newborough Forest has been actively managed with regular thinning interventions and some clearfelling coupes, the latter being restocked predominately with Corsican pine.

Recreation has increased in importance in recent years with the forest now attracting large numbers of people for activities such as walking, riding and cycling and for family activities on the beach. FCW has responded to this demand by providing several car parks including the main beach car park, toilet facilities and numerous waymarked trails throughout the woodland.

The Site of Special Scientific Interest (SSSI) and SAC designations give particular importance to conservation objectives in the management of the forest and since 2000 FCW and CCW have been discussing how best to manage the forest with these designations in mind. This has taken some time with the result that in recent years the management of the forest has been less intensive than would otherwise have been the case. The last clearfell and restocking took place in 2002, the last thinning in 2005.

2.3.2 Description of the Sand Dunes Feature at Newborough Forest

a. Qualifying Features of the Sand Dunes at Newborough Forest

The SAC citation defines 7 key features – 6 of which occur within the forest – and there are 2 key SSSI features of particular relevance within the forest area as follows:

Table 2.2: Sand Dune SAC & SSSI Qualifying Features

Sand Dune Features	Ref	Description
2.1 SAC Features	(1)	Embryonic dunes
	(2)	Shifting dunes along the shoreline
	(3)	Fixed dunes with herbaceous vegetation
	(4)	Dunes with *Salix repens ssp argentea*
	(5)	Humid dune slacks
	(6)	Shore dock (*Rumex rupestris*)
	(7)	Petalwort (*Petalophyllum ralfsii*) -not generally in forest
2.2 Relevant SSSI	(1)	Solid geology - coastal landforms

Features		
	(6)	Strandline, foredune and mobile dune communities

Note: Ravens, amphibians, flora etc are all considered compatible factors with the management of the listed key features

The forest will be treated as a single feature for the purposes of this management plan.

b. Current Characteristics of the Sand Dunes Feature at Newborough Forest

- Lack of active landform processes and consequently lack of dune zonation.
- Fossilised sand dune features.
- Wet slacks.
- Bat species and bat hibernaculum present.
- Species composition with an absence of negative indicator species.

c. The Nature of the Sand Dunes at Newborough Forest

The porous structure of sandy beaches and dunes absorbs and dissipates wave energy, and sand stored in the fore dunes provides additional material, which re-enters the marine transport system and forms a new beach profile after erosion events. These natural processes allow sandy coasts to adapt their morphology and maintain their natural coastal defence role with minimal human intervention, providing there is space for natural dynamics to operate.

Sand dunes comprise a UK Biodiversity Action Plan priority habitat (see Appendix 3 for more details). Despite their apparent abundance on Anglesey they remain a rare and vulnerable habitat in the UK and western Europe. The juxtaposition of arid (dune) and wetland (slack) sub-habitat and the constantly changing, mobile nature creates a large range of ecological niches and a corresponding high biodiversity, particularly for plants, fungi and invertebrates. They also represent a unique geological environment in which active processes (wind and water, erosion and deposition) shape the landscape and provide evidence of Holocene landscape change. There are two aspects to this: the effect that the forest has on the sand dunes by restricting dune mobility and hydrological functions and the effect that the dunes have on the forest through inundation.

Embryonic dunes depend on organic strandline material and mobile sand. Shifting dunes depend on organic strandline material and mobile sand and the growth of, in particular, marram and lyme grasses.

d. Hydrology of the Sand Dunes at Newborough Forest

Groundwater level is important in determining the formation and ecology of dune slacks, the level determining the base of wind erosion and subsequent colonisation by wetland plants and animals. Winter flooding is particularly important in preventing colonisation by grasses. In simple terms there is concern that trees use more water than other vegetation cover, which may cause a lowering of the water table through the greater uptake of water and increased interception of rainfall.

e. Nature of the Soils at Newborough Forest

These dune soils are characterised by low levels of nutrients (N,P,K,) and high levels of calcium. Any form of fertilisation, including atmospheric Nitrogen Oxide (NO_x) pollution, encourages the growth of coarse grasses at the expense of desired species so the use of any form of artificial fertiliser should be avoided. Calcareous material tends to be removed from the upper horizons by acid waters but is returned to the surface through wind erosion and rabbit burrowing. Acid soils commonly develop under conifers due to the nature of their leaf litter. Stabilised dunes can also develop acid soils, which over time may lead to valuable dune heath habitat. This was formerly found naturally at Newborough in areas that were later afforested.

2.3.3 Description of the Shore Dock Feature at Newborough Forest

a. The Nature of Shore Dock at Newborough Forest

The SAC citation defines shore dock (*Rumex rupestris*) as a qualifying feature and key species within the management area of the forest. The SSSI citation also lists a large number of plant species – including dune helleborine (*Epipactis dunensis*) for example – which are also important and need to be considered as part of the management of the forest. This management plan will therefore regard these SSSI species as factors impacting on the management of the plan features, not as features in their own right. Shore dock is treated as a feature as this species only occurs within the forested area of the SAC. Petalwort (*Petalophyllum ralfsii*), although defined a SAC feature, does not generally occur within the forest and is therefore not considered further in this management plan.

b. Current Characteristics of the Shore Dock Feature at Newborough Forest

- Stable population of ≤100 plants.
- Occurs in 3 isolated locations within the forest that were formerly on the shoreline.
- Absence of a larger metapopulation (scattered colonies which can withstand local extinction by recolonisation from neighbouring areas) in a mobile environment.
- No opportunity for marine dispersal.
- Requires maintenance of a supply of freshwater.
- Requires maintenance of open ground and reduced competition.

This is the world's rarest dock, found at its most northerly European location, though strangely isolated from the shore, probably due to the growth of the dunes and the subsequent growth of the forest. Factors causing wider loss or decline include loss of habitat for recreational and sea defence purposes, 'coastal squeeze' caused by sea-level rise and increased storminess, and competition from established non-native species including bramble and other invasive species. Populations at Newborough occur in three locations north of the central rock ridge. Some of these are managed by grazing to maintain the required open light and the bare disturbed ground necessary to encourage regular germination. The genetic isolation and small population size of the colony is a potential problem.

2.3.4 Description of the Recreation Feature at Newborough Forest

a. Use of Newborough Forest for Recreation

Newborough Forest is heavily used for a wide range of recreational activities from informal dog walking to tourists who have travelled from the main urban centres of Liverpool and Manchester and beyond for day trips or for holidays to North Wales. Figures suggest that there are over 170,000 visits each year to the forest. The recreational experience is therefore an important element of this management plan.

b. Current Characteristics of the Recreation Feature at Newborough Forest

- High visitor numbers of over 170,000 visits per annum to the forest.
- Limited capture of local economic potential.
- Main car park with moderate easy access to the beach; space for 350 vehicles; public toilets; vehicle flows cause safety concerns.
- Further parking for 20 vehicles at each of the three smaller car parks: Cwningar, Malltraeth Estuary and Llyn Parc Mawr.
- There is also a private car park for residents of Newborough village, which is under threat from coastal erosion.

- Access to the forest controlled by a Hydrakerb barrier.
- Some conflict between user groups managed through separation and signage.
- Threat from random barbecues and beach fires
- Visitor access impact on village in high season due to limited parking.
- Increasing natural dune formation may become a barrier to beach access.
- Informal sheltered recreation within the forest.
- The forest provides some shelter to the beach and the sea as well as providing an attractive setting for this recreation.
- Information boards to inform and educate visitors.
- Leaflets describing riding, walking and cycling routes, and the all-ability trail. The following trails occur within the forest: Isle of Anglesey Coastal Path, Pines Trail, Hendai Trail, Newborough Geology Trail, Newborough Orienteering Course, Lon Las Cefni cycle route (which starts on the edge of the forest), and several horse and carriage routes.
- Adjacent Blue Flag beach (managed by Isle of Anglesey County Council).

Newborough Forest also has numerous informal trails and rides including a wide range of general public footpaths. The forest is declared open access land under the Countryside & Rights of Way Act 2000 with the only restrictions to pedestrian access being for safety reasons during forestry operations.

2.3.5 Description of Community Involvement at Newborough Forest

a. Community Involvement at Newborough Forest

The local community of Newborough is very active with a strong sense of *cynefin* or 'ownership' of the dunes and forest and with strong views over its management. There is a long history of community involvement, including a famous mass trespass in the 1930s to establish a claim over the route to Ynys Llanddwyn, and later involvement of the Community Council in a Joint Management Committee for the area. The community forms an important role within the Newborough Liaison Partnership, which produced the document *Newborough Forest and Warren–Conclusions and Recommendations* in 2006.

This document noted '*…because of the range of different interests in the area there is not a single clear direction for the future management of Newborough Forest and Warren that would suit everyone. People attach different values to various habitats and species; there are differing views also about the suitability of various recreational uses and ways of managing these to avoid conflict. There are also contrasting views about the implications of increasing economic activity in the area, about aesthetics and about the likely impact of long-term changes in the landscape'*. This is why Community Involvement is treated as a separate feature within this management plan, valuing the interest, energy and enthusiasm that this represents and that can be harnessed to assist the management protection and understanding of the area.

a. Current Characteristics of the Community Involvement Feature at Newborough Forest

- Strong local community associations with the area which go back many years.
- A separate forum – the Newborough Liaison Partnership – exists to support the management of the forest, but there are also other interest groups.
- Volunteers are involved in assisting the management of the site.
- The community is keen to engage with the management of the forest on an ongoing and continuing basis. Concerns over antisocial behavior have also been highlighted.
- There is a need to maintain the residents' car park and access through the forest as particular privileges of the local community.

The community both local and wider takes great interest in the management of the forest. Some will seek involvement and look to participate in events perhaps as volunteer wardens while others become involved when concerned with proposed management actions.

2.3.6 Description of Geology & Geomorphology

a. SSSI Features of the Geology & Geomorphology Feature at Newborough Forest

The geology & geomorphology SSSI features are:

- Precambrian rocks exposed in coastal cliffs, foreshore exposures and inland outcrops including fluid inclusions in hydrothermically precipitated quartz-filled drainage cavities of basaltic lava, i.e. traces of Precambrian ocean composition and early life.
- Coastal landforms and the active processes controlling beach and dune development.

The SSSI has Geological Conservation Review (GCR) status and the SSSI citation describes the solid rocks within the wider forest area as an earth science feature. GCR is produced by the Joint Nature Conservation Committee (JNCC) and identifies sites within the UK that display sediments, rocks, fossils and features of the landscape that increase understanding of Earth science, the geological history of the UK stretching back for hundreds of millions of years. Scientists are able to study the incursions of paleo seawater that were captured in the crystallising process of the quartz, which precipitated around 550 million years ago. During this geological period many important earth events occurred, including the snowball earth event and the Cambrian explosion of organisms. The study of the quartz-filled drainage cavities of basaltic lava in Ynys Llanddwyn is therefore very important and of great interest to universities and collectors.

The SSSI citation notes the quality of the Precambrian bedrock geology at Ynys Llanddwyn and although these rocks are well exposed on the island the rock ridge also outcrops through the centre of the forest. The SSSI citation also highlights the beach and dune landforms and the land forming processes as an important earth science feature.

b. Current Characteristics of the Geology & Geomorphology Feature at Newborough Forest

- Visible rock formations and landforms.
- Active geomorphological processes (on the beach and dunes).
- Fossilised landforms under forest cover.

The geological and geomorphological interest at Ynys Llanddwyn is also important for underpinning biological interests as well as being a significant recreational and economic interest in its own right.

SECTION 3: VISION FOR NEWBOROUGH FOREST AND COAST

3.1 Long-term vision for how the forest and coast should be in 20 to 50 years' time

Newborough Forest will be a well managed and healthy forest made up of more diverse stands of native and non-indigenous tree species. These stands will be managed to produce a range of social, environmental and economic benefits and where possible to deliver these benefits locally and regionally. The nature of the forest will change in places to become more native in character with opportunities sought to create the first representative site for Atlantic dune woodland in Wales.

The forest will continue to be managed through low impact silvicultural systems (LISS) to deliver a high quality environment better adapted to the impacts of a changing climate. It will accommodate a range of woodland and non-woodland species with specific qualities for the conservation of locally, regionally and internationally important species; for example breeding populations of red squirrels will continue to thrive in the forest.

Opportunities for forest expansion will continue to be explored with partners beyond the boundaries of existing land ownership to support the health and vigour of the woodland environment.

The forest will have an open and welcoming quality with safe, ongoing and improved access to both forest and coast where access and recreation facilities make the most of this, using and interpreting the natural environment for local people and visitors whilst bringing positive economic and health benefits.

Management of the forest and reviews of actions will continue to recognise the high level of local interest in this area and the desire for local people to continue to have involvement in crafting management decisions and being represented in activities which deliver day-to-day management. The site will continue to have the support from the community through representation on a land management forum.

The extent of the existing forest is expected to reduce over time to a degree. The exact extent and nature of any reductions will be determined in the shorter term by the science review when this has concluded. In the longer term natural processes are also expected to have their impact on the forest and dunes, giving rise to *coastal retreat* to a degree that cannot be precisely determined. Currently fixed dunes on parts of the seaward edge are expected to become exposed to more natural processes allowing for improved representation of a more complete dune system over a greater proportion of the designated coastline. Subject to the outcome of the science review some clearfelling may take place over a limited area after establishing a protected transition zone of newly established woodland and scrub to establish a more windfirm and robust tract of woodland. Parts of the forested coastline will be left to natural processes where limited intervention will keep the areas safe for visitors. The changes will be monitored and activity reviewed to ensure the dune habitat and associated species meet the required conservation conditions for this designated habitat.

SECTION 4: DESIRED CHARACTERISTICS OF EACH FEATURE

4.1 Desired Characteristics of the Forest Feature

Desired characteristics	Current level	Target level (& timescale)	Suggested actions (& monitoring requirements)
Diverse mixture of species	Predominantly Corsican pine	Diverse forest emulating Atlantic dune woodland (ADW) (start in this plan period)	FCW to follow prescriptions in this management plan, this to include the underplanting of Zone 5 (see Figure 5.1) with suitable shade tolerant ADW species (monitor over plan period)
Resilient to climate change	Limited species and age structure	Considerably more diverse and reduced incidence of disease e.g. RBNB (vision period)	As a first step FCW to follow the prescriptions in this management plan, then to renew these in the next plan (monitor over plan period and extend to next)
Sequester carbon	Important role in climate change mitigation	Retain current levels of C sequestration (vision period)	Monitor using the new FC pilot 'Woodland Carbon Code' (2010), including the effects of changing species (monitor at start of plan period then periodically thereafter)
Retain dominance in landscape	Dominant, especially the effect of the pines	Remain dominance but with greater diversity (vision period)	FCW to follow prescriptions in this management plan (monitor over plan period)
Improve connectivity with external woodlands & habitats	Currently poor	Some potential to improve (vision period)	Potential to target woodland grants to land adjacent to the forest through the new *Glastir* grant system (FCW to liaise with Menter Mon & Coed Cymru, to consider EPS and to monitor periodically)
Maintain population of red squirrels	Population 80	Population ≥80 (plan period)	Anglesey Red Squirrel Project to monitor numbers and control greys (liaise with ARSP and monitor periodically)
Maintain habitat for over-wintering ravens	250 (in 2009-10)	Population determined by extraneous factors beyond local control (plan period)	CCW & RSPB to continue to carry out their census (CCW & RSPB to monitor over plan period)
Increase the number of open rides and roadsides	Limited in number	Scope to improve (plan period)	FCW to follow prescriptions in this management plan. Open areas will also benefit the invertebrate population (warm, bare sand is ideal for

			Coleoptera (beetles) & Hymenoptera (sawflies, wasps, bees & ants) (monitor over plan period)
Maintain open dune slacks and ponds (and associated flora and fauna)	Great crested newts found near water bodies	Maintain habitat for GCN and prevent damaging ops (plan period)	CCW & University of Bangor to contribute to work plans (CCW & UoB to monitor great crested newt numbers over plan period)
Improve the transition between forest and sand dunes (both between forest & shore and forest & warren)	Absent over substantial length of the shoreline and alongside the open warren. Straight lines typical	95% shoreline with typical dune zones, ragged / indented boundary between dune and forest	FCW & CCW to incorporate a precautionary buffer zone along the dunes and investigate the hydrological impact of forest further (FCW & CCW to monitor aerial photography over plan period)
Improve the transition between forest and saltmarsh	Largely absent	Improve transition through natural regeneration (plan period)	Encourage further natural regeneration of willow and alder scrub between the boundary of the forest and the saltmarsh. Remove invasive species such as white poplar (*Salix alba*) (monitor over plan period)
Provide protection for sand dune flora	Suite of dune species present including dune helleborine, early sand-grass (*Mibora minima*) and yellow bird's nest (*Monotropa hypopitys*)	Maintain this suite of dune species present including – as already – dune helleborine, early sand grass & yellow bird's nest (plan period)	FCW to maintain present population of vulnerable sand dune species inc dune helleborine(*Epipactis dunensis*), also rare dune woodland species such as narrow-leaved helleborine (*Cephalanthera longifolia*) (monitor over plan period)
Adequate control of invasive plant species	Inadequate	Concentrate on key species	FCW to follow prescriptions in this management plan (monitor over plan period)

4.2 Desired Characteristics for the Sand Dune Feature

Desired characteristics	Current level	Target level (& timescale)	Suggested actions (& monitoring requirements)
Favourable conservation status to be achieved for the SAC	Not being met	To be met as per SAC core management plan – see Appendix 2 (plan period)	FCW to follow prescriptions in this management plan (monitor over plan period)
Range of different types of sand dunes to be represented in the forested section of	Although these can presently be found in the forested section their natural	All types of sand dune to be present and their natural distribution	The determination of the sand dune profiles will be determined by natural processes (CCW to monitor over plan

the SAC	distribution is constrained	unconstrained except where capital assets occur (initial start in plan period)	period)
Sand Dune Flora	Abundant	Maintain the present abundance of sand dune flora (plan period)	(CCW to monitor over plan period)
Invertebrates	Invertebrates of open dunes are presently confined to the narrow coastal belt	Typical dune invertebrates to be widespread on site (plan period)	The target level will be achieved by creating more open areas of dune within the forest. (monitoring by CCW and specialist recorders over plan period)
Amphibians	Although the forest has all the expected species of amphibians the populations are not sufficiently robust	Maintain the present full suite of native species of amphibians and create stronger populations (plan period)	This desired characteristic will be achieved when the prescriptions in this management plan are followed (monitoring to be carried out by CCW and University of Bangor over plan period)

4.3 Desired Characteristics for the Shore Dock Feature

Desired characteristics	Current level	Target level (& timescale)	Suggested actions (& monitoring requirements)
Meeting favourable conservation status	Not being met	Cannot be met because of limiting geography (immediate decision)	This management plan contains proposals for increasing the degree of wet ground, which will favour this species. Natural dispersal is not realistic though as shore dock's location is uncharacteristic (monitor over plan period)
Population mobility	Fixed	More mobile (plan period)	(CCW to monitor over plan period)
Numbers of shore dock plants	≤100	100	All efforts will be made to maintain a stable population (CCW to monitor over plan period)
Control of rough herbage	Grazed	Increase grazing (plan period)	Grazing animals to continue to be managed by CCW (CCW to monitor over plan period)

4.4 Desired Characteristics for the Recreation Feature

Desired characteristics	Current level	Target level (& timescale)	Suggested actions (& monitoring requirements)
Increase car parking at main beach car park	Present capacity for 350 cars	Capacity for 450 cars (ideally within one year but more realistically within 3 years)	The 450 spaces will include 27 disabled access bays. FCW to seek funding from EU funded Communities and Nature project (see OPTION 3 below). **Note that many of the proposed actions in this section will require planning permission from IoACC** (monitor over plan period)
Improve car parking facilities at main beach car park	Present infrastructure inadequate	Improve infrastructure to meet modern requirements (plan period)	Sign a one-way system around the beach car park and install a help button at the Hydrakerb barrier. FCW to seek funding from EU funded Communities and Nature project (monitor over plan period)
Maintain car parking at the other 3 car parks	Present capacity for 20 cars at each of the other 3 car parks	Maintain capacity for 20 cars at each of the other 3 car parks (plan period)	FCW to monitor these car parks to ensure they remain in good condition (monitor over plan period)
Residents' car park	On vulnerable position by foreshore	Relocate to new position back from foreshore (to be decided)	FCW to monitor the situation and take appropriate action in liaison with the residents (monitor over plan period)
Improve forest road linking main beach car park with residents' car park	Presently below acceptable safety standards	Improve to make acceptable (timescale as for above characteristic)	The link road to be slimmed down and traffic to be separated from walkers and cyclists (monitor over plan period)
Improve toilet facilities at main beach car park	Toilets at main beach car park not DDA compliant	Toilets at main beach car park to become DDA compliant (as soon as possible)	FCW to seek funding from EU funded Communities and Nature project. This will be to improve all ability access to these toilets, also to lay out nearby disabled parking bays with tarmac (monitor over plan period)
Improve picnicking facilities at main beach car park	Picnic facilities are presently inadequate	Construct a purpose built picnic area with fixed barbecue facilities (plan period)	FCW to seek funding from EU funded Communities and Nature project (monitor over plan period)
Improve other facilities at main beach car park	Other facilities are presently inadequate	Improve other facilities to bring them up	Improvements are required as follows: improve dog bin and litter signage; provide

		to modern standards (plan period)	information for campers to prevent overnight stays; provide a bin store to contain litter once this has been collected. FCW to seek funding from EU funded Communities and Nature project (monitor over plan period)
Improve other facilities (PHASE 1)	Some existing facilities are inadequate	Improve some existing facilities to bring them up to the standard visitors expect (as soon as practicable)	Create waymarked horse routes; open and maintain all public rights of way; create a waymarked circular route at Llyn Parc Mawr; install a trim trail; install a bench and create willow screen in place of the bird hides removed in early 2010. FCW to fund these activities from existing resources. OPTION 1 (monitor over plan period)
Improve other facilities (PHASE 2)	Some existing facilities are inadequate	Improve some existing facilities to bring them up to the standard visitors expect (as soon as practicable) Maintain easy access to the beach	Create an all ability access boardwalk with viewing platform and picnic area to link the main beach car park with the beach and forest trails; install a flexible and mobile boardwalk (not all-ability access) from the viewing area to the beach; create all-ability access pathways throughout the car park to create safe access routes; & install an outside shower for washing off sand. FCW to seek funding from EU funded Communities and Nature project. OPTION 2 (£150k of funding – includes OPTION 1 above too) (monitor over plan period)
Improve other facilities (PHASE 3)	Some existing facilities are inadequate	Improve some existing facilities to bring them up to the standard visitors expect (as soon as practicable)	Develop new site interpretation leaflets and boards; waymark two family cycle routes; commission a focal point artwork or sculpture in the car park to draw people to a site orientation and welcome area; provide benches around the forest trails at key points; increase the car park capacity to 450 spaces including 27 disabled access bays; create a drainage system for the car park to

			stop parking bays from flooding; & move the residents' car park inland. FCW to seek funding from EU funded Communities and Nature project. OPTION 3 (£300k of funding– includes OPTIONS 1&2 above too) (monitor over plan period)
Improved economic capture from Visitors	Not present except from hydrakerb	Would be a service to visitors if present (plan period)	Establish a mobile catering unit. FCW to explore a lease option for a mobile catering unit (initial monitoring at start of plan period)
Improve site safety	Inadequate at times	Requires improvement to meet visitors' expectations (plan period)	Further management is required to keep the site safe, e.g. from kite surfing, paragliding and motor biking (monitor over plan period)

4.5 Desired Characteristics for the Community Involvement Feature

Desired characteristics	Current level	Target level (& timescale)	Suggested actions (& monitoring requirements)
Continue meeting of NLP to point where management plan is agreed	NLP meetings held as required	Successor group to NLP to be formed (as soon as practicable)	FCW and CCW to engage with NLP over best arrangements here (as soon as practicable)
Liaise with NLP over 'recommendations' document	Informal contact	Formal response to be given (as soon as practicable)	FCW and CCW to continue to engage with the NLP until such time as it is agreed the management actions are achieved (as soon as practicable)
More proactive volunteering force	Current focus mainly on interest days and occasional work groups	Aim to change focus to regular work groups with occasional interest days (as soon as practicable)	FCW and CCW to engage with volunteers over these proposals (as soon as practicable)

4.6 Desired Characteristics for the Geology & Geomorphology Feature

Desired characteristics	Current level	Target level (& timescale)	Suggested actions (& monitoring requirements)
Protect vulnerable geological specimens	Permissions to take samples are refused	Continue to refuse permissions (immediate)	FCW to monitor this within Newborough Forest and to liaise with CCW & IoACC for consistency with Ynys Llanddwyn (monitor over plan period)
Coastal processes operating without constraints	Constrained by forest, car parks and over-development of dune vegetation	95% of SAC coastal frontage unconstrained. Exceptions for car parks, roads etc. (plan period)	(CCW to monitor at 5-year intervals to coincide with management plan renewal period)
Improve interpretation	Inadequate, especially on geomorphology	Improved (plan period)	FCW to make bid for funds (monitor over plan period)

SECTION 5: GENERAL APPROACH TO MANAGING EACH FEATURE

5.1 General Approach to Managing the Forest Feature

5.1.1 Vision for the Forest Feature

- Manage the forest feature for a range of benefits, social, environmental and economic, and manage it to increase its resilience to the possible effects of climate change.
- Maintain a large core area of woodland and manage this for increased diversification, both structurally (through thinning) and species composition (through planting and natural regeneration).
- Enable more shifting dunes between the sea and the forest along the western edge of the forest and south-eastern corner. Only dangerous trees to be removed from the remainder of the southern seaward edge of the forest in this initial plan period.
- Increasing species diversity will move the composition of the forest towards an Atlantic dune woodland in line with the UKBAP.
- Ensure connectivity within the forest canopy to facilitate the movement of red squirrels, provide sufficient food sources for reds and control greys.
- Continue to consider the roosting sites of the various bat species and the population of roosting ravens, although the latter is currently declining rapidly in number.
- The forest will be managed to increase its resilience to climate change.

CCW has advised that in order to comply with Article 6.1 of the EC Habitats Directive and to achieve *favourable conservation status* over the wider area of the Abermenai to Aberffraw Dunes SAC, the trees in a limited area of Newborough forest need to be removed. This is to restore a natural dune zonation behind the shoreline and address the perceived impacts of the forest on the hydrology of the designated habitats.

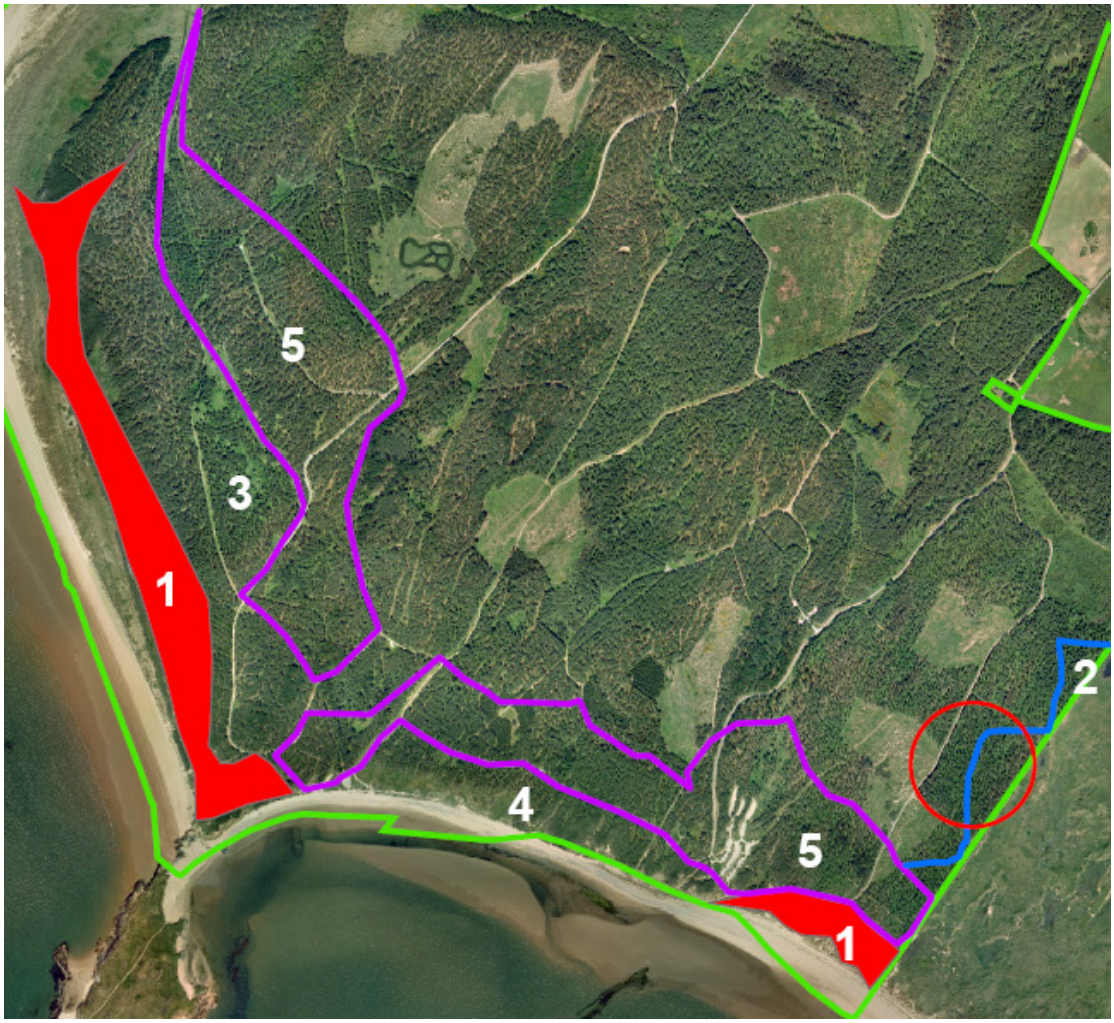
The Newborough Forest science review is currently in arbitration and the following actions are given solely to provide an indication of what <u>might</u> be appropriate after the review. Note once again that this is not intended to anticipate or prejudge the outcome of the review in any way. The following actions <u>may</u> be appropriate:

- **Fell 50 to 100 metres along the forest-warren boundary** to address landscaping and hydrological concerns (this is subject to further consultation).
- **Fell a small area of circa 4ha** as part of a **hydrological experiment** once adequate scientific rigour has been applied to the methodology. This area may be incorporated within the **forest-warren landscape felling** but is acknowledged that the objectives of these two operations are potentially separate and would only be combined if there were obvious synergies from doing so.
- **Fell the 22.5 hectares of shoreline felling** previously identified in a draft Forest Design Plan (comprising 17.2ha along the western seaboard and 5.3ha in the bottom south-eastern corner) to begin the remobilisation of this section of dune if required. The results of these fellings – only to be carried out if supported by the science review – would be monitored before any further amendments were made to the plan. These proposed clearfells are along the seaboard as these are the areas most likely to respond to increased sand dune mobilisation. Zone 1 is of particular interest to hydrologists due to its proximity to Newborough Warren.

Again, as stressed above, none of these areas will be scheduled for felling until the science review has concluded and these actions are supported. These proposals are only suggested as a possible means of addressing CCW's concerns proportionate to the presently perceived level of risk pending availability of more reliable scientific data.

The proposed areas of felling can be found in Figure 5.1 below, which together represent approximately **4% of the forested area** at Newborough.

Figure 5.1: Proposed areas of clearfelling and pre-emptive underplanting



Key

Areas of clearfelling to restore to mobile dunes*
Realignment of forest boundary with warren* ○ = proposed area of hydrological experiment*
Pre-emptive planting of ADW species as buffer against dune incursion

Zone	Description
1*	Clearfell and partial destumping. Encourage natural processes.
2*	Realignment of forest boundary with the warren (indicative felling edge)
3*	Low-intervention. Monitor and review over the plan period
4	Natural processes to be allowed to occur. Area of limited intervention.
5	Forest protection. Underplant to create an Atlantic dune woodland (ADW).

**Subject to the conclusion of the Newborough Forest Science Review 2010*

The area within the purple line (Zone 5) in Figure 5.1 above is the indicative underplanting zone of transition, which represents the point from where the remaining forest inland will be protected. This zone follows some ride features on the ground in the west, avoids areas already understocked and therefore potentially unsuitable for further planting, runs beyond the road linking the main car park with the residents' car park, and links in with the original proposed area of clearfelling in the south-eastern corner. This zone has been selected for its practicality on the ground, but note that not all areas will be planted. Dune slacks and potential dune slacks within this area deemed to have conservation value for their open space will be left, as will areas of the rock ridge so that outcrops which have become valuable landscape features are not obscured. The exact boundaries of Zone 5 may be redefined once the science review has concluded.

The original areas of red (Zone 1) in Figure 5.1 are the potential clearfelling coupes that will be scheduled for felling only once WAG is content with the conclusions of this aspect of the science review. It is anticipated that no felling will be carried out here until underplanting work has started in the forest protection area (Zone 5). The remaining area (Zone 3) between Zones 1 & 5 will be monitored for natural sand dune remobilisation following any felling and decisions made about any intervention when this management plan is subsequently reviewed. During the plan period only dangerous trees will be removed in Zone 4 and intervention will be limited to reducing dangerous cliffing of the dunes. If in the longer term a sufficient range in the natural dune profile (particularly in Zone 1 but also in Zones 3 & 4) is not considered to be forming then the option to fell further areas of dune currently fixed by the forest within this middle zone will be revisited. All of this is dependent on the outcome of the science review.

5.1.2 Rationale for the Objectives for the Forest

At present 93% of the forest consists of a single species, Corsican pine (see Appendix 1, Figure 1), which does not regenerate freely and is susceptible to red band needle blight (RBNB), a disease caused by the fungus *Dothistroma septosporum*. The damage this disease has already caused and has the potential to cause is giving rise to great concern at present and has resulted in a moratorium on the further planting of Corsican pine across the United Kingdom. Many other pine species look as if they might be similarly susceptible, but two pine species, maritime pine (*Pinus pinaster*) and Macedonian pine (*Pinus peuce*), appear to be more resistant and may have some potential here (see Appendix 4 for more details).

Climate change predictions suggest a high risk of pest and disease impacts, with existing pests and diseases potentially becoming more severe and new ones becoming established. Such attack can lead to reduced growth or even the complete removal of some tree species, so increasing tree species diversity is a necessary adaptation measure to this potential threat. Regular surveillance is essential to identify damage at an early stage and to allow suitable management to take place.

Newborough Forest is also structurally poor with 65% of the forested area planted in a 15-year period (see Appendix 1, Figure 3). Key actions are therefore to introduce further species of tree and shrub and to increase structural (age) diversity. The presence of RBNB removes the option of planting further Corsican pine, a species that had been so well suited to these conditions, so whatever is planted will similarly need to be able to grow well on sand and to be tolerant to salt. A list of potential species to plan can be found in Appendix 4. As red squirrels are a desired component of the forest any reduction in planting pine species will have some impact on food supplies, but this can be counter-balanced by providing additional food from other trees and shrubs together with maintaining the current zero policy on grey squirrels. The tree species selected also must not have adverse ecological impacts, such as being vigorous colonisers, threatening open areas within the forest or understorey, or impacting on the adjacent open warren. Invasive species such as Himalayan cotoneaster (*Cotoneaster simonsii*) can rapidly colonise the shrub layer to the exclusion of native species and make some areas impenetrable. Control of this and other invasive species such as white poplar (*Salix alba*), *Montbretia*, swamp stonecrop and tor-grass needs to be carried out using both mechanical and chemical treatments. Although the value of *Cotoneaster* for food for birds is recognised there is a strong need to control this invasive species. There will however always be some autumn food available for birds from the areas of *Cotoneaster* not controlled within any given season.

Adopting the above factors should considerably increase the forest's resilience to climate change but this does not answer the question of how fast this change process should

occur. The long-term projections involved in climate change modelling make it difficult to provide accurate predictions of the likely outcomes from climate change scenarios, but it is the long-term nature of forestry itself that makes the early adoption of this diversification policy so important. Further management plan revisions will allow the management strategy of increasing species and age diversity to be monitored and adapted as required.

Catastrophic events such as windblow may become more frequent, and although continuous cover forest management may help to reduce these impacts there will be a need to deal with unforeseen impacts on the forest. The coastline is likely to be affected by sea level rise, which may not occur in a linear fashion rather the complex dune topography may cause sudden and significant changes to the degree and impact of inundation by water. Studies also indicate that a moderate retreat of the shoreline inland over the course of the 21st century is likely. The main focus of management therefore will be to ensure that the forest is resilient to change but will accommodate natural change events when these happen.

The forest also has a role in contributing to climate change mitigation, sequestering carbon in its timber for use in construction (long-term removal of carbon from the atmosphere) or for biomass (immediate impact as a substitute for fossil fuels). Compared with the other services the forest provides, such as biodiversity conservation and recreation, carbon sequestration may not seem a major benefit, but as the most extensive area of forest on Anglesey it does nevertheless provide an important contribution in mitigating against climate change.

5.1.3 Securing the Forest

Our overriding objective in the management of Newborough Forest therefore is to secure the forest over the longer term so that a wide range of benefits can be achieved from the forest over time. Low impact silvicultural systems (LISS) will be used as an initial measure to create structural diversity. Increased species diversity will arise where new species of tree and shrub are introduced, whether from underplanting or where 'gaps' in the existing crops are restocked following the creation of 'holes' in the canopy. Such plantings are likely to be considerably smaller in size than the clearfelled areas of the past. Where RBNB is assessed as a likely problem then 'crown thinning' will be undertaken to remove the 'sub-dominants' and any clearly diseased trees, and to open up the crop to allow increased airflow. This increase in air circulation is expected to reduce the impact of RBNB but will be done in such a way as to maintain canopy connectivity for red squirrels to move around above ground level. Crown thinning also enables more light to reach the understorey and forest floor encouraging regeneration and aiding underplanting, but this will take place in a controlled way to limit the growth of bramble (*Rubus fruticosus*) in particular. Although extensive growth of bramble can smother new planting, in smaller amounts this can protect young trees as well as being a useful food source for red squirrels.

Where RBNB is assessed as 'not present' an *irregular shelterwood* system of LISS will be used where gaps no larger than 0.25ha, but more typically around 0.1ha in size, will be created and planted with suitable species depending on objectives. No further gaps will be created (typically on a 5-year cycle) adjacent to existing gaps until those gaps are established and canopy connectivity re-established. Approximately 100 hectares of forest per year will be thinned on average.

5.1.4 Environment

Maintaining over 600 hectares of forest with sufficient canopy connectivity should provide a sufficiently large habitat for red squirrels. Although research carried out by

Forest Research into creating the best conditions for red squirrels over greys has highlighted the need to minimise the numbers of large-seeded broadleaves the present work of the Anglesey Red Squirrel Project (ARSP) in eradicating greys is another way to tackle this issue and is especially appropriate on an island. The list of tree species to be planted (see Appendix 4) contains both native and non-native species and given the policy in the Woodlands for Wales Strategy 2009 for increased species diversity every opportunity will be taken to plant as wide a range of species as possible. The tree species to be planted in Newborough Forest need to be able to withstand and prosper in the extreme prevailing conditions, but increasing the numbers of tree species and encouraging greater structural diversity will also assist in habitat and food sources for other species, including bat species and ravens. The UKBAP target for Atlantic dune woodland will also be considered here (see Appendices 3 & 4).

Further consideration will be given to designating an area of natural reserve at a future point, but not within the period of this plan. Areas of natural reserve are an important aspect of good forest management and UKWAS requires a minimum of 1% of the forest estate to be so designated, but this is not a requirement of individual forests within the wider estate. The need to diversify the species and structural composition of the forest, the number of invasive species (from grey squirrel to tor-grass and *Cotoneaster*, all of which require intervention), and the need to manage high levels of public recreation make this designation unsuitable at present.

Areas of open space will provide suitable habitat for species such as shore dock (which requires a dynamic mobile landscape), medicinal leech, great crested newts (which only require small amounts of open space) and a number of dune plants. These areas will be kept clear of scrub vegetation. Recent studies have demonstrated the importance of maintaining open, scuffed, bare areas of sand in Newborough Forest for invertebrates. Where possible, open unplanted areas will be extended and joined to provide connections between these patches, and possibly also with the open warren and the fore dunes. The existing open slacks within the forest will be allowed to flood in winter and any drains that currently take water away from these areas will be blocked and the water table levels monitored to assess any impacts the forest might be having here.

The thinning programmes referred to in Section 5.1.3 above will allow attention to be given to the micro-design of the forest. Opportunities will be taken to break up the wall effect of the forest alongside public roads, forest roads and trails, also along long linear features such as the forest-warren boundary (the exact felling boundaries of which are still to be determined). The open areas so created will be maintained as open areas along with the open areas in glades and in wider rides.

5.1.5 Heritage

The heritage features within the forest are well mapped and have agreed work programmes to keep them free from scrub encroachment.

5.2 General Approach to Managing the Sand Dunes Feature

5.2.1 Vision for the Sand Dunes Feature

- The areas of fixed dunes presently to be found on sections of the seaward edge, in particular the western seaward edge, to be exposed to more natural processes allowing for improved representation of a more complete dune system over more of the SAC coastline.
- Felling will take place over a limited area with a protected transition zone of newly established forest and scrub to establish a more wind-firm and robust tract of trees.

- Parts of the forested coastline will be left to natural processes where limited intervention will keep this area safe for visitors. The changes will be monitored and activity reviewed to ensure the dune habitat meets the required conservation condition for this designated habitat.

5.2.2 Rationale for the Objectives for the Sand Dunes Feature

CCW has advised FCW that this habitat is presently in an *unfavourable* condition because the required range of zones from embryonic dunes through yellow dunes to fixed grassland is not present along the required 95% of the SAC frontage. The SAC core management plan gives the reason for this as the forest truncating the zonation and suggests restoration of the natural zonation by restoring 'embryonic shifting dunes', 'shifting dunes along the shoreline with *Ammophila arenaria*' and 'fixed dunes with herbaceous vegetation (grey dunes)'. The NFP and CCW have debated the definition of 95% zonation as part of the science review and whether this should apply to the whole site or just the part of the site already exhibiting zonation, and have been unable to reach a consensus view. The calculation in Section 1.3.1 (page 7) above has been done over the entire length of the SAC coastline to put the forest in perspective. **30% of the windward SAC coastline** is backed by coniferous forest.

Subject to the outcome of the science review if the seaward areas identified for felling are felled then some existing stumps will be removed on selected windward faces of dunes. A degree of mechanical stirring of the sand will also be inevitable, but note that there is no intention to carry out major sand engineering works here.

The core management plan states that 'fixed dunes with herbaceous vegetation (grey dunes)' and 'dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)' require light grazing to maintain open conditions. While this is not yet appropriate within the areas of clearfelling referred to in Section 5.1.1 above there are other parts of the forest where grazing is appropriate as a management tool. Grazing will continue to be used within a defined and agreed programme in areas such as Canada Pool and Dune Slack Pool and within areas of the forest where rough herbage is to be controlled.

The SAC core management plan notes that a restored water table would assist in the management of the 'dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)'. It is therefore proposed that existing slacks within the forest be further monitored, including Pandy Slack, Parnassus Slack, Dune Slack, Gullery, Brown Moss Bog and two further unnamed slacks, and that drains are blocked to raise the level of the water table in these areas. Maps of these areas can be found in Figure 6.5 (on page 47).

Artificial structures such as car parks and their access roads can also restrict natural processes. Where these are strategically important – for example the main beach car park and its access road, and the residents' car park and its linking road – they will be kept functioning as far as possible without major intervention. Proposals are contained in this plan for a landward development of the main beach car park and to move the residents' car park further inland. Natural processes will not be restricted at Traeth Penrhos, where some sand dune restoration is to be undertaken, so the road there may become buried by sand.

The Newborough Liaison Partnership (NLP) has expressed a desire to see greater integration of landscape and habitats, and one area in particular where the contrast between closed and open is especially marked is along the forest-warren boundary. The original intention had been to create small scallops along the linear boundary between forest and warren but this will now be replaced with the hydrological felling identified in Section 5.1.1 (page 27) above.

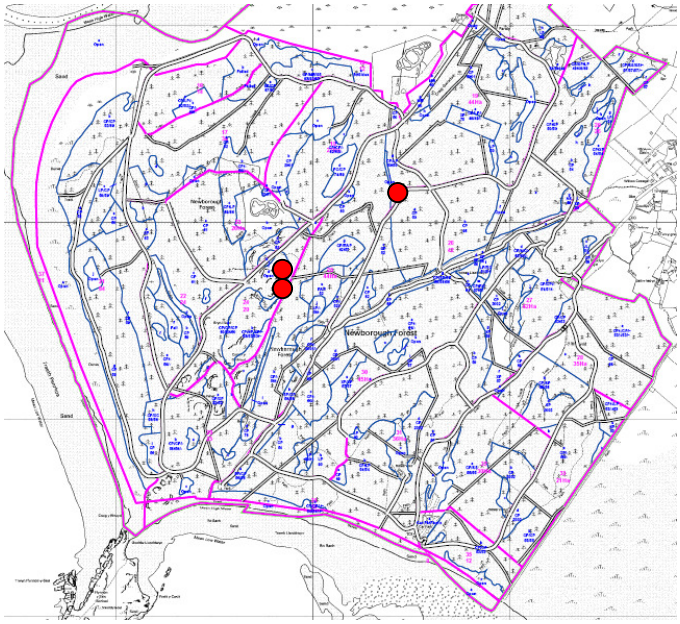
5.3 General Approach to Managing the Shore Dock Feature

5.3.1 Vision for the Shore Dock Feature

- Bring shore dock to a *favourable conservation* status, where all of the following conditions are satisfied:
- The population of shore dock to be stable or increasing (stream sites A & B ≥ 70 individuals; pond site ≥ 30 individuals).
- Shore dock to occur in at least 3 locations across the site (stream sites A & B and pond site).
- Some opportunities to be created for the dispersal of seed if this is possible.
- Maintain adequate habitats – open streamsides, coastal soft cliff seepages or dune slack pool habitat – for its survival.
- Maintain an adequate freshwater supply.
- Maintain bare ground or disturbed areas (e.g. by grazing animals) to permit germination.
- Control competition (including shading) from other species (no *Phragmites* or scrub or overhanging trees).
- Control all factors affecting the achievement of the above conditions.

Shore dock requires bare ground for seed to germinate. This can be provided through natural erosion or livestock poaching.

Figure 5.2: Shore Dock Locations



5.3.2 Rationale for the Objectives for Shore Dock

The successful management of shore dock requires habitat maintenance and restoration management. Because of lack of knowledge on the genetic diversity of the Newborough population conservation work will concentrate on habitat improvement and maintenance around the extant populations and adjacent areas of potential habitat (e.g. Dune Slack Pool).

Habitat Management.

For all three sites the required disturbance is not presently happening because the populations are located deep within the conifer forest and away from areas exposed to

natural erosion. Each of the three locations has in the past shown signs of becoming scrubbed over. In order to create disturbance a grazing regime will be established at the streamside locations. This will be done at the pond site by hand or machine as part of the annual work programme.

The hydrology characteristic is fulfilled at all three locations as fresh water is available, although there is a lack of lateral movement at the pond site as the pond is fed by natural seepage. The water quality characteristic is fulfilled at all three locations. It may be helpful to increase the relative proportion of broadleaves in the canopy around these sites to assist the water regime.

5.4 General Approach to Managing the Recreation Feature

5.4.1 Vision for the Recreation Feature

- Maintain the access and recreational uses that are currently permitted and accepted in the forest and improve them where possible.
- The forest will have open access on foot to those areas where management permits; this will include all-ability access to enable everyone to experience the unique characteristics of the site.
- The forest will continue to provide some shelter to beach users to maintain the particular attraction of this site.
- Paid vehicular access will be provided to the beach car park and for the residents of Newborough to the residents' car park by permit.
- Recreation management will help minimise conflict between users of the forest. There will be waymarked routes and interpretation of the site will be aided by the provision of suitable information about to the site. FCW will improve local and visitor knowledge of access routes and facilities at Newborough in a way that is compatible with maintaining the quiet, wild nature of the area.
- The Blue Flag Beach status will be supported.

5.4.2 Rationale for the Objectives for the Recreation Feature

Recreation at Newborough Forest is an extremely important feature of the site and one which has been successfully managed up to this point. Recreation is important at Newborough because the forest offers the opportunity for a wide range of recreational activities in a peaceful and tranquil environment that can hold large numbers of people whilst providing a feeling of isolation. On stormy days it offers shelter and on calm days it acts as the gateway to a majestic beach. The proximity of forest, beach and sea is important to those who use it. Any recreation management must retain these characteristics and not compromise them.

Recreation management will ensure that the site remains an attractive destination for visitors, whether local or from afar, and that facilities are provided such as access, car parking and waymarked trails with appropriate interpretation.

Open access on foot throughout the forest will be encouraged, and in those areas where this is not possible, for example where livestock is grazing, appropriate discreet signage will be provided. Public motorised access will only be permitted along the access road between the Hydrakerb and the beach car park and by permit for local residents to the residents' car park.

FCW will maintain the access and recreational uses that are currently permitted and accepted on the site and improve them where possible through improved micro-design of the forest and annual assessments of their condition and their ability to cater for all

abilities. Where there are currently deficiencies, such as in the provision of all-ability access, action will be taken to correct this.

FCW will not look to develop dedicated mountain bike facilities within the forest as Newborough is not identified as one of the centres within the FCW Mountain Bike Strategy, rather it is believed that the numerous forest roads provide excellent family mountain bike experience and link in with the Lon Las Cefni Bike Trail.

Actual conflicts between different recreational uses - or indeed with antisocial uses too – are rare (e.g. between horse riding and mountain biking, or kite surfing and family beach use, or all-night use of the beach car park). Where conflicts or antisocial usage are identified management actions will be put in place to deal with these (e.g. by providing a dedicated barbecue area to discourage associated fire risks in other areas of the forest).

Interpretation is an important aspect of the recreation experience and one that requires improvements within the forest and dunes. A dedicated interpretation plan will be produced in partnership with CCW. Improved interpretation could also add value across the range of archaeological features and the protected species and habitats present on the site.

Congestion in the village on certain weekends caused by the beach car park being full needs to be addressed. FCW will put forward proposals to expand the capacity of the beach car park whilst not expanding its footprint. There is potential for this to be relocated inland to free up the coastal zone.

The local community considers there is currently little direct economic benefit derived from Newborough Forest but there is scope for local enterprises to benefit economically from the large numbers of users of the forest, particularly through the provision of accommodation, food, hire of mountain bikes, and so on. There is potential for Rhosyr Community Council together with FCW, CCW and Menter Mon to develop a strategy for sustainable economic development. Contact will be made with Isle of Anglesey County Council's (IoACC) Economic Development Unit to assist with their work on a coastal footpath strategy for economic development.

There have been discussions recently regarding a possible visitor centre in the Newborough area. There are no firm proposals on the table but a feasibility study has been undertaken. This suggestion is looking unlikely in the present economic climate.

An established procedure exists for issuing permissions within the forest for activities other than pedestrian access (which is permitted under Countryside & Rights of Way Act 2000). The permissions procedure controls access to the forest for larger events and repeat activities. Permits for horseriding are issued through the Newborough Riding Association.

5.5 General Approach to Managing the Community Involvement Feature

5.5.1 Vision for the Community Involvement Feature

- FCW and CCW to continue to liaise with local stakeholders (for now through the NLP) and to consider the issues raised, also to continue to respect local issues and provide a means for views to be expressed.
- FCW & CCW to act on the recommendations set out in the NLP report and if undeliverable provide justification and dialogue.
- The forest to meet a wide range of objectives that contribute to local environmental, economic and recreational interests.

- The community to continue to play an important role in educating others and disseminating knowledge about the forest.
- The local community to retain its preferential access to the beach through the residents' car park and access road.
- The village not to suffer negatively from any traffic congestion as a result of the beach car park being full.
- No sand to blow into the village of Newborough.

5.5.2 Rationale for the Objectives for the Community Involvement Feature

Continued effective community involvement in the management of Newborough Forest is extremely important. A large proportion of the local community uses the forest on a daily basis, has an active interest in its management or a deep knowledge of its past history. Experience has shown that it is essential for the community to be involved not just in the decision-making process but also in the management of the forest. Community involvement will therefore be central to the management of the forest through the community council and NLP, or the latter's successor forum once established.

The community and others have expressed through the NLP what they value about the forest and the future developments they would like to see. FCW recognises the effort that has gone into the development of the NLP recommendations and has incorporated these where possible into this management plan. FCW will always seek to avoid compromising any aspect of the forest's special characteristics of tranquility, beauty, shelter, feeling of isolation, recreation opportunities in all weathers, close proximity of sea, beach and forest, walks and paths and open access on foot. If it is felt that this is unavoidable then justification will be given.

The residents' car park with its associated access is historically important to the community and FCW will retain this facility; however the natural shoreline erosion that is undermining the current car park will eventually force its relocation back from the beach. Proposals are included in this plan to relocate this car park to the barrier at the junction with the residents' access road.

Preventing sand incursion into the village was one of the original reasons for planting Newborough Forest and FCW will ensure that the forest continues to deliver this objective by identifying strategically important parts of the forest. It is noted that sand incursion is not a significant problem behind the open sand dunes and the sand incursion that occurred in the 1940s and '50s is now thought to be much less likely.

On certain days, usually during the summer or on bank holidays, the beach car park does not have enough capacity to accommodate all the visitors wishing to use it. On these occasions the traffic can back up all the way to the crossroads in the village and cause congestion. Proposals will be developed which seek ways to avoid this happening in the future.

5.6 General Approach to Managing the Geology & Geomorphology Feature

5.6.1 Vision for the Geology and Geomorphology Feature

- The physical composition, morphology and internal structure of the key landforms and sediments to remain intact and undisturbed by human interventions.
- Natural geomorphological processes to be unimpeded as far as possible, the levels of activity of these processes and their spatial domain to have the capacity to operate across their full range of natural variability.
- The extent of the key geomorphological features not to be diminished through physical damage or fragmentation.
- The small area of the rock ridge between the isthmus and the forest road is a GCR (Geological Conservation Review) feature and to continue to be given the highest degree of protection; the rest of the ridge is a Regionally Important Geological Site (RIGS), which will also be protected.

5.6.2 Rationale for the Objectives for Geology and Geomorphology

The coastal landforms should demonstrate the natural processes of sediment transfer and deposition within the local coastal system. These geomorphological processes (which move sand and mud to create beaches, dunes, slacks and estuarine flats) also create the physical template upon which biological features develop. These processes will be aided by minimising any activities or structures that would interrupt the natural movement of sediment and directly or indirectly cause damage to coastal landforms.

Natural erosion of the bedrock on Ynys Llanddwyn is negligible and has no effect on the site interest. Natural movement of sand in the vicinity of the island leading to the covering of rock will be tolerated. Movement of sand by coastal processes may reveal new exposures around Gwddw Llanddwyn and further inland, but note that most of the geological interest here lies outwith the Newborough Forest management boundary. If new exposures do arise these will need to be mapped and may reveal fresh examples of minerals which are depleted elsewhere.

Mineral and specimen collecting is a major threat to the geological interest on Ynys Llanddwyn and adjacent areas and there is a presumption against collecting geological specimens within the Newborough Forest management boundary. Visiting geologists should not be allowed to use hammers or drills in the forest and adjacent beach outcrops. As many universities already have specimens and sections from this area there will be a presumption against further collection unless demonstrably for new research.

Scrub will not be allowed to develop on the rock ridge and as thinning takes place around this feature the opportunity will be taken to draw back the tree cover where appropriate.

FCW will work with CCW to develop interpretation of the landforms and geology to ensure that there is a wider appreciation in this area. FCW will also link in with the GeoMôn project, which aims to promote the geological diversity of Anglesey and has won 'Geoparc' status for the island. GeoMôn is developing a number of initiatives to develop interpretation, education, conservation and appreciation of the geological heritage of the area. It also aims to increase economic activity within Anglesey through 'geotourism'.

SECTION 6: OPERATIONAL PRIORITIES FOR MANAGING EACH FEATURE

The majority of the recommendations from the NLP report 2006 will be found under the sections on Recreation Feature and Community Involvement Feature (Sections 6.4 & 6.5 respectively) below.

6.1 Proposed Actions for the Forest Feature

ACTIONS RELATING PRIMARILY TO PEOPLE

AP 6.1.1: Undertake tree safety checks throughout the forest to maintain public safety.
Target within 1 year: Checks initially to focus on main roads and trails within the forest and to follow the procedures contained within FC internal document OGB1.
Monitoring activity: Checks to be carried out annually.
Timescale (start/duration): Within a year / Plan period.

AP 6.1.2: Any trees that are removed along the shoreline in Zone 4, for example for safety reasons, will not result in a new linear tree line, rather the opportunity will be taken to follow contours and link in with fixed assets such as the car parks. As few trees as possible will be taken. ***NLP Recommendation No. D.1(ii)***.

The following extract map from Figure 5.1 shows Zone 4, which lies between the southern foreshore and the forest road between the main beach car park and the residents' car park.

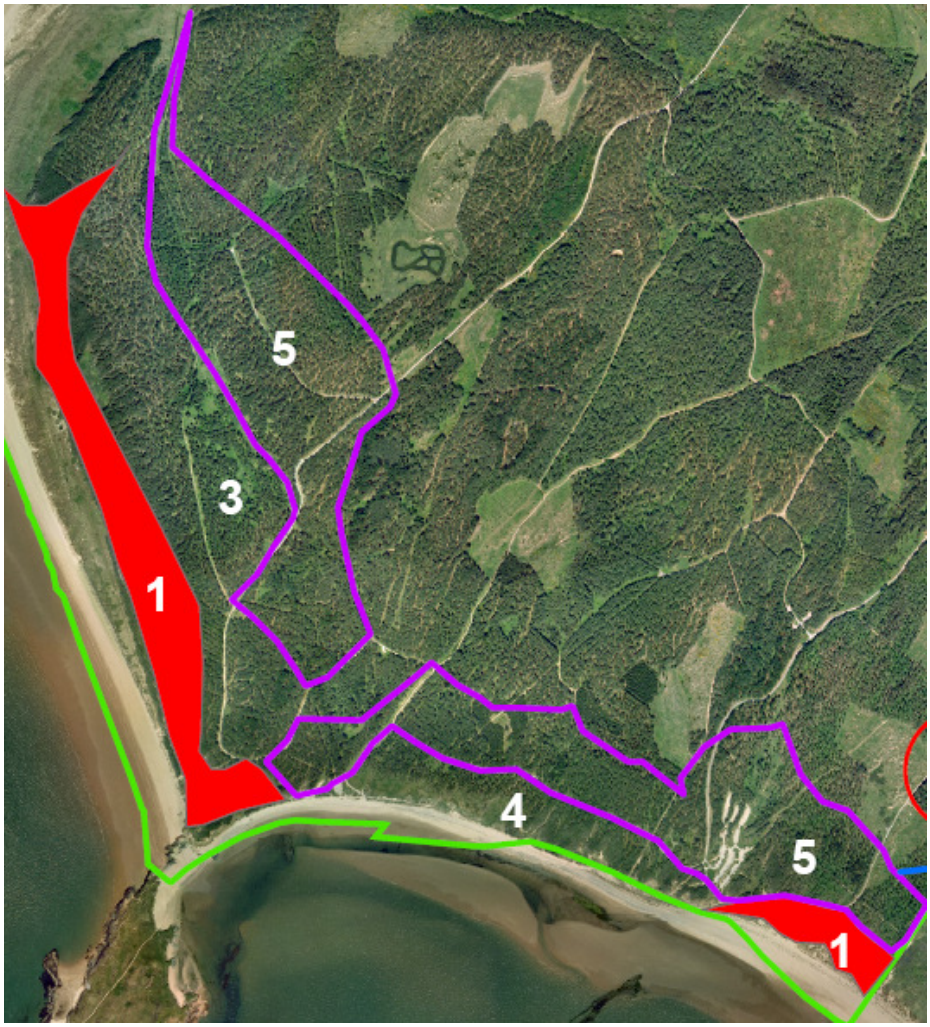
Target within 1 year: Carry out regular visual assessments along the forest road between the main beach car park and the residents' car park and along the beachfront.
Monitoring activity: Reassess at same time each year thereafter.
Timescale (start/duration): Within a year / Plan period.

AP 6.1.3: Agree an education strategy for the forest and organise interpretation and education activities to increase understanding of both the forest and the warren. ***NLP Recommendation No. B.1(ii)***.
Target within 1 year: Agree terms of reference for a strategy in liaison with the FCW education team and CCW.
Monitoring activity: Check progress with this annually.
Timescale (start/duration): Within a year / Plan period.

ACTIONS RELATING PRIMARILY TO THE ENVIRONMENT

AP 6.1.4: All dune habitat restoration will be managed to fit in with the natural pattern of sand dune zonation. ***NLP Recommendation No. D.1(iii)***. The areas most likely to be affected by this action point are the two areas of clearfell in Zone 1, although this work will only be carried out following the outcome of the science review.

The following extract map from Figure 5.1 shows the two areas of clearfell in Zone 1, also Zone 5, the forest protection area of underplanting, which is referred to below.



Target within 1 year: The Zone 1 felling coupes will only be felled once the arbitration panel has agreed this aspect of the science review. If this is indeed the outcome – which may require WAG approval – then the coupes will be scheduled for felling within the period of the plan, although the timing may depend on agreement over other aspects of the plan. The timing over the underplanting in Zone 5, the forest protection area, for example, may be a consideration in the timing of the clearfells.
Monitoring activity: Monitoring will start only after the coupes are felled.
Timescale (start/duration): Coupes to be scheduled when agreement reached subject to further discussion over Zone 5.

AP 6.1.5: An appropriate mix of trees suitable for planting in the maritime conditions at Newborough needs to be determined. ***NLP Recommendation No. D.2(iii)***. The exact mix will be subject to a degree of trial and error as experience is gained in this area. This includes further planting within the group selection areas within LISS thinnings and the underplanting within Zone 5 and the creation of Atlantic dune woodland (see Appendix 4). Some initial thinning may be needed here to enable a greater proportion of more light demanding species to be used, although it is likely that the crowns of existing trees will be sufficiently open given the incidence of red band needle blight.
Target within 1 year: Determining the best mix of species is likely to change over the plan period as more experience is gained.
Monitoring activity: Monitor annually after initial planting.

Timescale (start/duration): As soon as possible within the plan period / Plan period.

AP 6.1.6: Explore the potential for the forest as a carbon sink. ***NLP Recommendation No. D.2(vi)***.
Target within 1 year: To be considered as part of a wider exercise for the FD using Forestry Commission Information Note 48, '*Forests, Carbon and Climate Change: the UK Contribution*'. The use of the new FC pilot 'Woodland Carbon Code' (2010) in assisting here will be investigated.
Monitoring activity: Monitor as part of annual UKWAS audit.
Timescale (start/duration): Within a year / Maintain records for plan period.

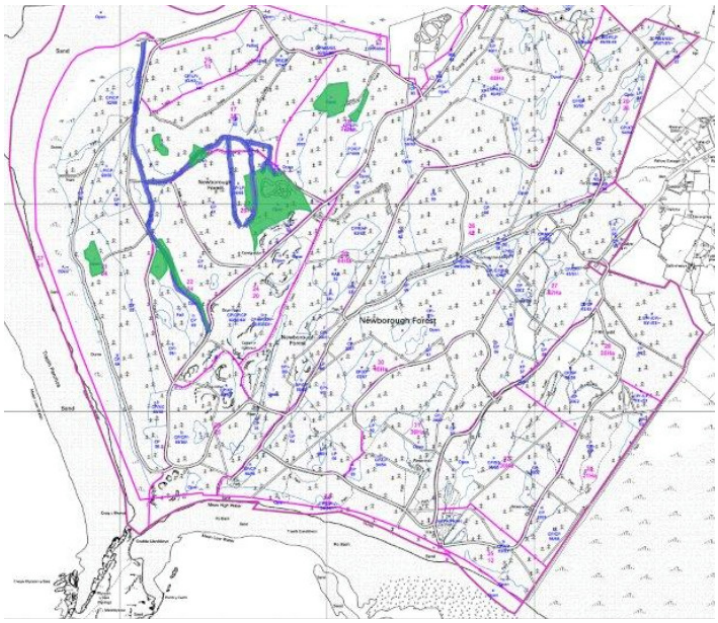
AP 6.1.7: Engage with Local Biodiversity Action Plan (LBAP) and Local Geodiversity Action Plan (LGAP) contacts (including the IoACC Biodiversity Officer) for monitoring results of action plans (see Appendix 3).
Target within 1 year: Develop a species monitoring plan and agree the frequency of monitoring required for key species with the Local Record Centre (LRC).
Monitoring activity: Annually or as appropriate (with assistance from expert volunteers).
Timescale (start/duration): Within a year / Plan period. Report back to LBAP / LRC.

AP 6.1.8: Further consideration to be given to designating an area of natural reserve in Newborough Forest not now, but as part of the full plan revision in 10 years' time. Creating Atlantic dune woodland may help to fulfil this objective in years to come. ***NLP Recommendation No. D.2(v)***.
Target within 1 year: No further action at present.
Monitoring activity: No further action at present.
Timescale (start/duration): Consider further at end of plan period.

AP 6.1.9: Contribute to the development of a viable red squirrel population on Anglesey in line with relevant strategies. ***NLP Recommendation No. D.1(iv)***. FCW will liaise with the Anglesey Red Squirrel Project to produce a project plan for red squirrels in Newborough that links in with the Squirrel Conservation Plan launched by Jane Davidson and Elin Jones in February 2010. This project plan will include the requirement for forest management measures (adequate connectivity in the forest and food sources) and adequate control measures (of grey squirrels, with this work being funded and controlled through the Anglesey Red Squirrel Project).
Target within 1 year: Agree the basis for a project plan with the Anglesey Red Squirrel Project.
Monitoring activity: Annually through the Anglesey Red Squirrel Project.
Timescale (start/duration): Within a year / Plan period.

AP 6.1.10: Raise the water table to encourage more winter flooding of dune slacks by changing the existing drainage. ***NLP Recommendation No. B.1(vii)***. Up to 3.2km of drains within the forest and a further length of drains outside of the forested area on the saltmarsh will be stopped up to see if this encourages winter flooding within the slacks (highlighted in green in the map below). The blocking of drains and raising water table levels is likely to benefit dune slack habitat and aquatic species and vegetation, and should lead to greater connectivity within the forest. This will benefit aquatic species including great crested newts, common toad, shore dock and water voles.

Figure 6.1: Locations of Drains to be Blocked



Target within 1 year: The stopping up of the drains will be scheduled for carrying out within the plan period.
Monitoring activity: Monitoring to commence once work has been completed. Environment Agency Wales will be involved in the specification of the ditch stopping work, also in monitoring to gauge increases in aquatic connectivity within the forest.
Timescale (start/duration): Within plan period / Monitor progress annually thereafter.

AP 6.1.11: Survey the forest to determine the extent of invasive species so that an annual programme of work can be devised and implemented. Invasive species to include *Cotoneaster*, sea buckthorn, white poplar, *Rhododendron*, swamp stonecrop and tor-grass. Plan to cover the entire forest in a five-year rolling programme.
Target within 1 year: Survey to be carried out within a year.
Monitoring activity: Annually within the business plan timescale.
Timescale (start/duration): Within a year of plan approval / Plan period.

AP 6.1.12: Agree and implement a grazing programme with CCW.
Target within 1 year: Agree a 5-year grazing programme.
Monitoring activity: Annually.
Timescale (start/duration): Within a year of plan approval / Plan period.

AP 6.1.13: All archaeological features will be clearly marked on the ground and have their own management plans consisting of a simple description of the feature and a brief statement of management actions. Provide interpretation for at least two archaeological features, perhaps at Hendai and Pandy Mill.
Target within 1 year: Management plans to be completed within plan period.
Monitoring activity: Business plan submissions to be made annually.
Timescale (start/duration): First plans within a year / All plans by end of plan period.

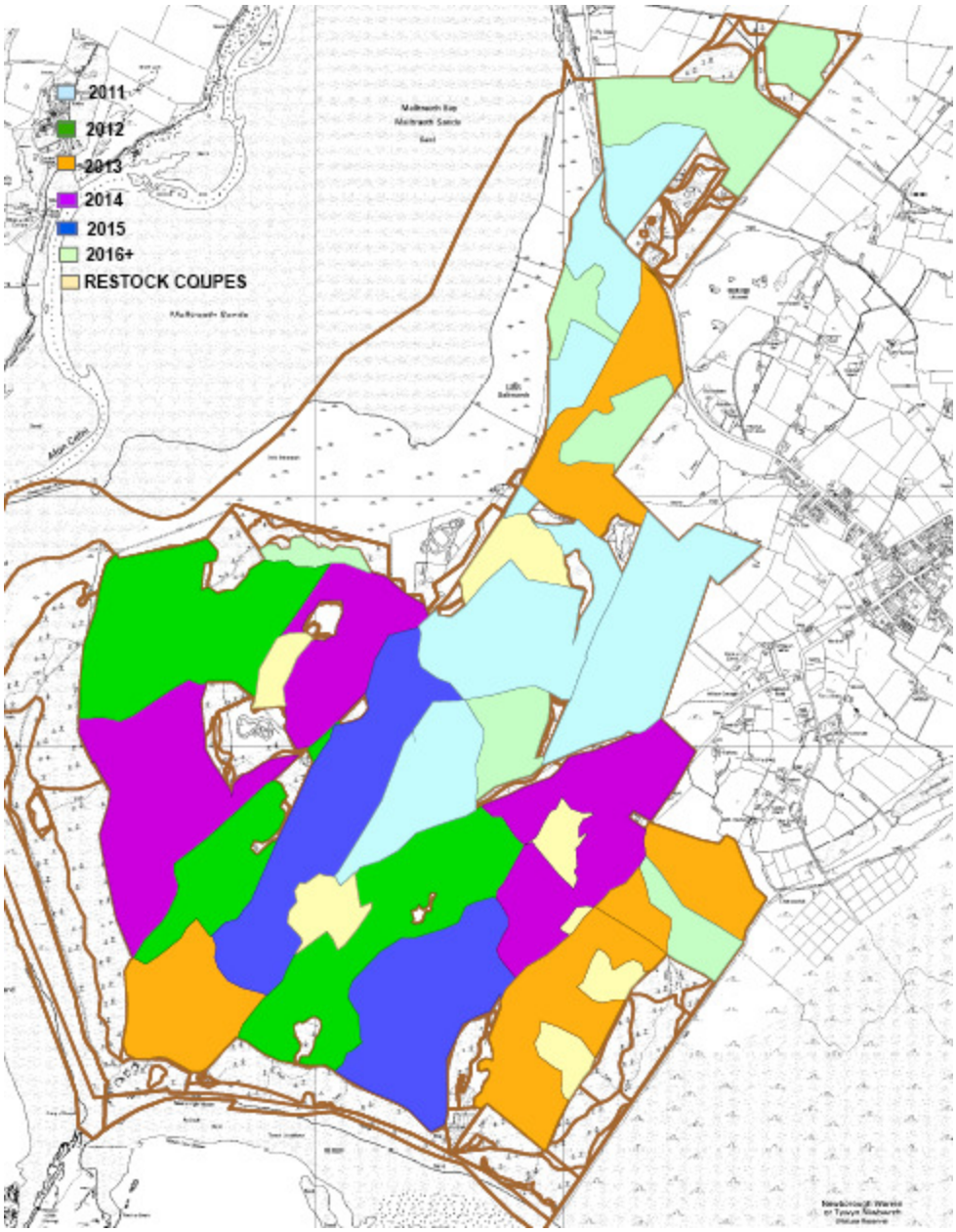
ACTIONS RELATING PRIMARILY TO ECONOMIC FACTORS

Note that a separate document titled 'ANNEX to Newborough Forest Management Plan v1.0' is also available on request to inform this section. This annex is not reproduced here as its size is potentially disproportionate to this main management plan document.

AP 6.1.14: The forest will be managed under a low impact silvicultural system (LISS) (referred to as Continuous Cover Forestry in the NLP recommendations document), with coupes up to 0.25ha in size. ***NLP Recommendation No. D.2(i)***.
Target within 1 year: Detailed prescriptions for managing LISS and restocking are to be found in the separate annex to this management plan. The first operation to be carried out under this plan will be the thinning described in AP 6.1.15 below. It is proposed that this be sold in the November 2010 eSale.
Monitoring activity: Business plan submissions to be made annually in line with the programmes described in this management plan. These are illustrated in Figure 6.2 below.
Timescale (start/duration): First operation over winter 2010 / Continue operations annually for plan period thereafter.

APs 6.1.15: Detailed prescriptions for managing the existing areas of the restocking and LISS coupes from 2011 through to 2015 are maintained in a separate schedule – see the annex to this plan – as there is too much detail for inclusion here.
Target within 1 year: Operations to be scheduled by year over the initial 5-year plan period; 90% of the forest area to be actively being managed under LISS, timber production from clearfell and thinning operations to be monitored annually; FDP progress against critical targets to be monitored.
Monitoring activity: Progress against 5-year plan monitored annually.
Timescale (start/duration): From start of approved FDP / Plan period.

Figure 6.2: Proposed Thinning Operations by Financial Year*



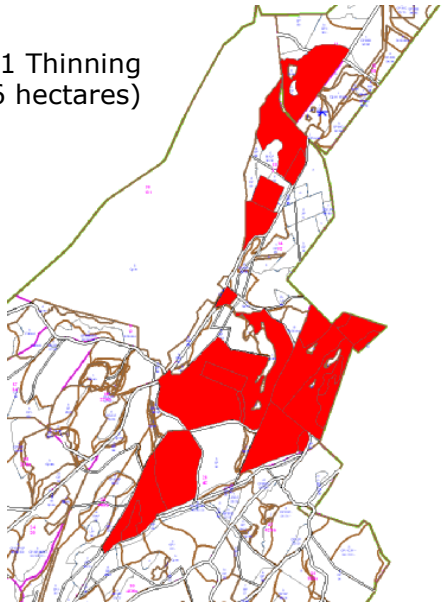
**Financial year is the year to 31 March from 1 April of the year before. A financial year of 2011 for example refers to the period 1 April 2010 to 31 March 2011.*

Areas of light green in the above map represent thicket stage crops. In due course these will be 'recruited' to this thinning map and allocated a thinning year.

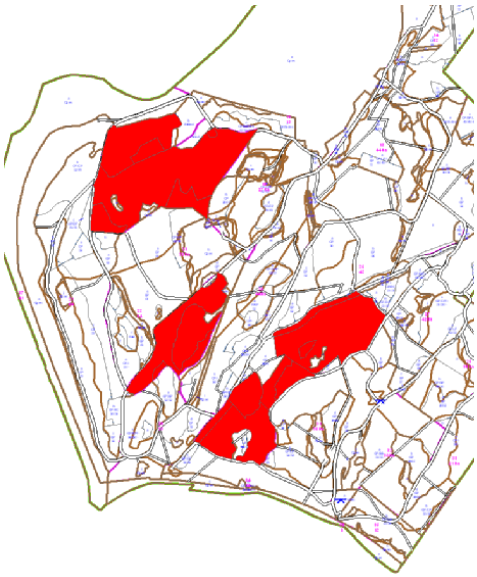
AP 6.1.16: The forest needs urgent thinning to increase air circulation within the crowns to reduce the impact of red band needle blight (RBNB) but care will be taken to ensure adequate connectivity is maintained in the canopy for red squirrels. The maps of the planned operations in 2010-11 and 2011-12 are shown below.
Target within 1 year: The first thinning parcel (see Figure 6.3 below) to be sold in the November 2010 eSale with an immediate start to minimise the impact on breeding animals (from great crested newts to red squirrels), also so that the timber is not affected by blue stain fungus.
Monitoring activity: By FCW as part of normal operational activity.
Timescale (start/duration): Sell in November 2010 / Complete by spring 2011.

Figure 6.3: Proposed Thinning Operations for 2010-11 & 2011-12

Right: Proposed 2010-11 Thinning
(Coupe 10041, 106 hectares)



Below: Proposed 2011-12 Thinning



Method statement for the first (2010-11) of the thinning operations above:
The aim of thinning this coupe (10041) is to:

- Open up the crop to increase airflow and reduce the incidence of RBNB
- Retain as much aerial connectivity as possible for the resident population of red squirrel (but note that RBNB is a major limiting factor in maintaining connectivity due to crown dieback).

All trees to be removed by thinning and small-scale group fellings (up to 0.25ha in size), carried out to marginal intensity using predominately feller-selection. Pre-marked sample areas to be used as a guide. Timber to be felled as shortwood.

Compartment 20 a-g to be worked first as this area is ideal to allow the operator to become familiar with the prescriptions (i.e. to get their 'eye in'). All dead and dying trees to be removed from the thinning coupe in the first instance.

Sub-compartments d & f were poorly thinned in the past and therefore require racking and an intermediate thinning within the matrix. The aim is to remove 25% of the volume from this area, and the same proportion of woodland edge trees.

There is an existing ride that separates these sub-compartments from the rest, which is not to be used for extraction along its length due to the diversity of existing regeneration of hawthorn, holly, yew and rowan. The ride to be crossed in several places though.

Within Sub-compartments a-c & e there will be more group felling with little or no thinning of the matrix, the aim being to create group fellings of approximately 20 x 20 metres (= 0.04 hectares per group). The exact areas felled will depend upon the crop, the topography and existing regeneration, but will be placed with the following factors in mind (in the following order of importance):

- firstly targeting groups of trees that are dead, dying or severely affected by RBNB;

- to 'release' areas of existing regeneration of any tree species;
- within crops of poor canopy connectivity;
- lastly within crops of good health where removal is not deemed detrimental to the aims of the intervention and is evenly spaced away from adjacent groups.

The aim will be to cut three of these group areas per hectare (= 49 m^3obs per ha), but this prescription is flexible and will be determined by nearby group sizes and whether any of the volume to be removed per hectare has already been removed in the matrix.

Some groups will be created along the fenceline in order to break up the straightness of the woodland edge.

Damage to known dipwell sites will be avoided. The locations of the various dipwells scattered throughout the forest have been provided to FCW.

The timber, after felling, will be extracted to forest roadside, where it will be stacked awaiting dispatch by timber lorry.

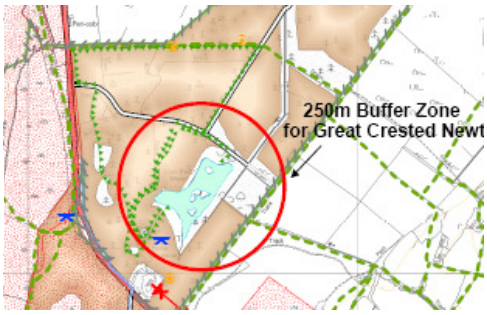
No specialised forest machinery is required on this site as it is completely flat and has no site obstacles; similarly no preparatory civil engineering, such as tracks or road extensions, is required.

The site will be worked over the winter months to minimise the impacts on fauna. The present draft contract period is set at 1 January 2010 to the end of April 2011 but an earlier start in December 2010 will be encouraged. The individual trees are large at over a cubic metre per tree, and there are no physical obstacles to harvesting.

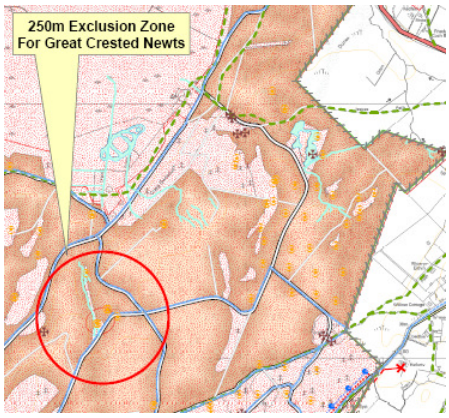
Staff from the forest district planning unit will maintain a strong initial presence and be available to give guidance to operators and site supervisors throughout the initial thinning area. Once Compartment 20 has been thinned the above prescriptions will apply to the remaining thinning coupe area

Figure 6.4: Great Crested Newt considerations with proposed thinning ops

Right: Great Crested Newt considerations with proposed 2010-11 Thinning

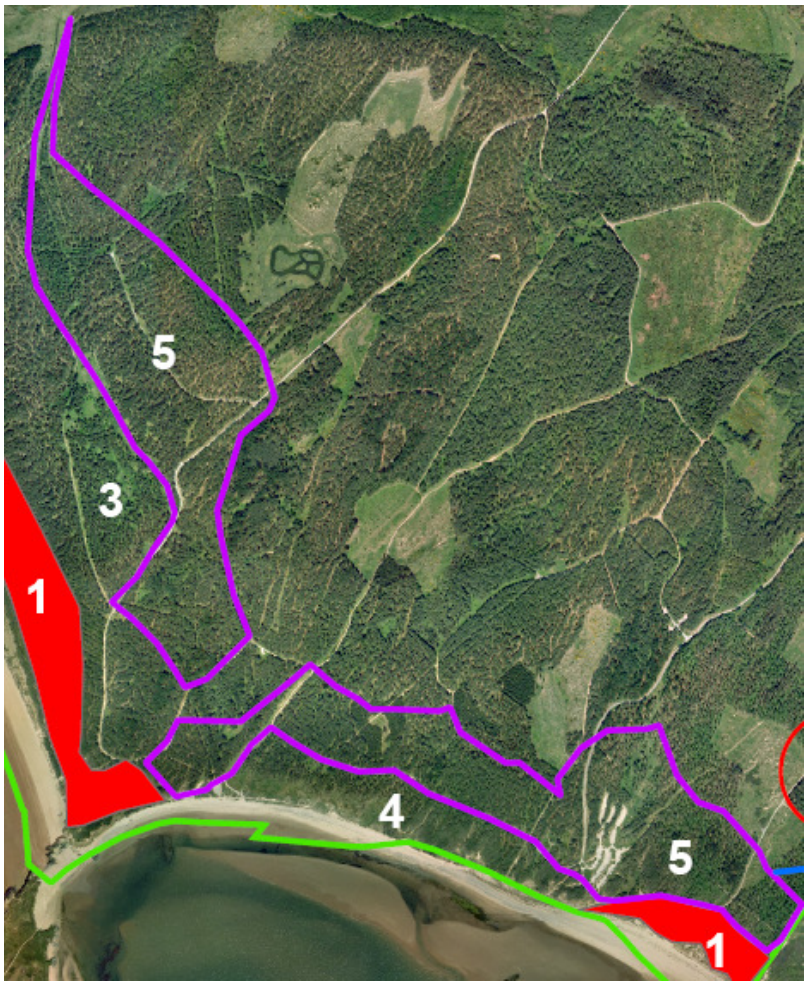


Below: Great Crested Newt considerations with proposed 2011-12 Thinning



A separate application for an EPS licence for the area around Llyn Parc Mawr has been submitted to CCW to allow operations to occur in the presence of great crested newts (the presence of fish in the lake here might indicate that the population density of newts is low). If there are delays in processing this application then the area within 250 metres of the lake at Llyn Parc Mawr will be excluded from the thinning operation. This represents around 5% of the thinning volume.

AP 6.1.17: Establish areas of underplanting in Zone 5 (see extract from Figure 5.1 below) using mainly ADW species but these need to be sufficiently shadebearing. Further consideration will be given to additional thinning in this zone to increase the number of species that can potentially be used. The planting density will be variable to relate to micro-site factors, sensitive sites such as rock outcrops and dune slacks will be left unplanted, and existing broadleaved regeneration will be favoured where this is found.



Target within 1 year: Planting to be carried out as soon as possible within the plan period subject to business planning approval.
Monitoring activity: Annually following initial planting work.
Timescale (start/duration): As soon as possible within the plan period / Plan period.

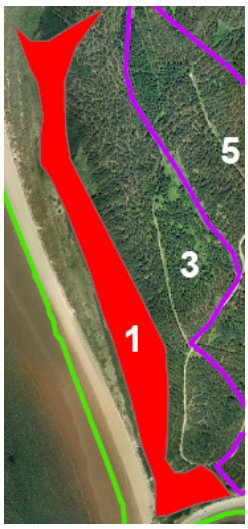
AP 6.1.18: Working with IoACC & Menter Mon establish a methodology to quantify the contribution the forest makes to the local economy.
Target within 1 year: Liaise further with IoACC & Menter Mon over this AP.
Monitoring activity: Annually thereafter.
Timescale (start/duration): Within a year / Plan period.

6.2 Proposed Actions for the Sand Dunes Feature

ACTIONS RELATING PRIMARILY TO THE ENVIRONMENT

AP 6.2.1: Subject to the outcome of the science review fell the coupes along the front at Traeth Penrhos totalling 17.2 hectares and in the south-eastern corner totalling 5.3 hectares to allow the restoration of natural processes and the formation of natural zonation in these areas.

The following extract maps from Figure 5.1 shows the linear area (17.2ha) of clearfell in Zone 1 stretching along the western seaboard of the forest and the small (5.3ha) area of clearfell lying in the bottom south-eastern corner of the forest.

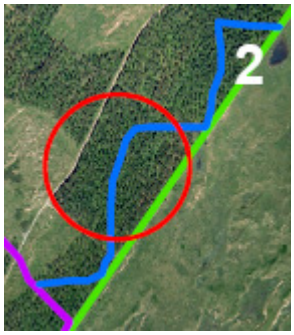


Target within 1 year: These areas of forest will be scheduled for felling as soon as this aspect of the science review is agreed.
Monitoring activity: Monitoring to commence once work has been completed.
Timescale (start/duration): Within plan period / Monitor progress annually thereafter.

AP 6.2.2: Remove the stumps on the seaward facing slopes to the west of the forest to aid the natural erosion of these areas.
Target within 1 year: Stumps to be removed within a year of felling operations.
Monitoring activity: Assess situation annually after felling. Also monitor dune erosion along the forest edge and manage trees where these are unstable or if roots are creating cliffing on the tops of actively eroding dune faces.
Timescale (start/duration): Schedule to start within a year of felling / Plan period.

AP 6.2.3: Create an undulating edge between the dune and the forest to improve landscaping and remove the existing straight lines. ***NLP Recommendation No. D.1(i)***. It is logical to tie this request in with the recommendation to carry out an independent hydrological experiment in this same area along the forest-warren boundary once a rigorous scientific methodology has been established.

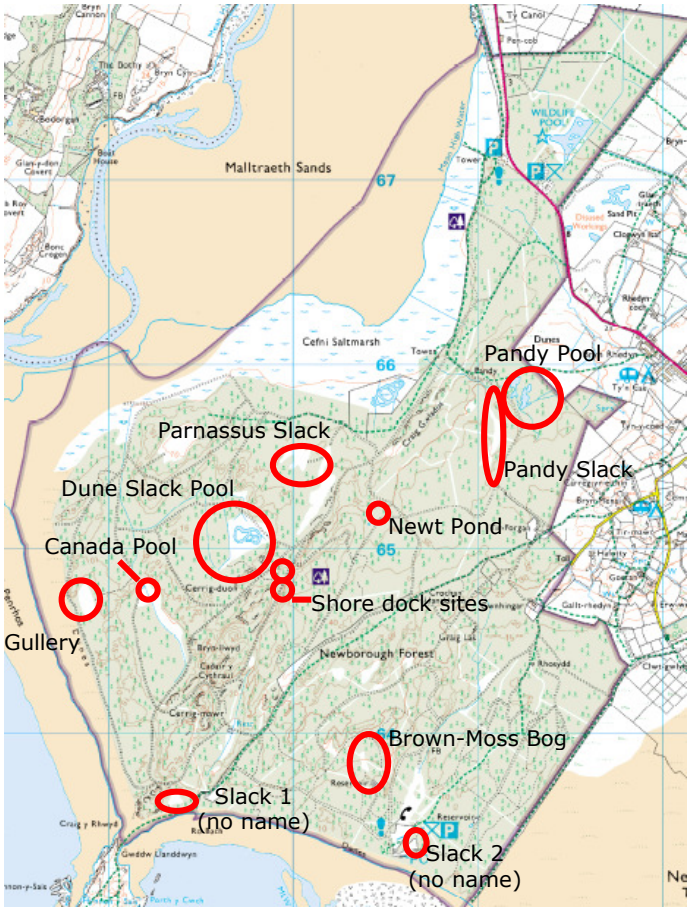
The extract map from Figure 5.1 below shows Zone 2, which lies along the eastern boundary of the forest between the forest and the warren. Note that the proposed clearfelling along the forest-warren boundary is subject to further discussion and that the exact location of the hydrological experiment is still to be determined. The wavy blue line in the following extract map is purely indicative and is subject to alteration.



Target within 1 year: The area of forest covered by the hydrological experiment (indicated by the red circle in the above extract map) will be scheduled for felling as soon as this aspect of the science review is agreed and the methodology has been satisfactorily determined. The exact location of the hydrological experiment is still to be determined.
Monitoring activity: Monitoring to commence once work has been completed.
Timescale (start/duration): Within plan period / Monitor progress annually thereafter.

AP 6.2.4: Monitor the dip wells already present in most of the slacks within the forest and open glades to assess winter flooding and nutrient levels. This will include Pandy Slack, Parnassus Slack, Dune Slack, Gullery, Canada Pool, Brown Moss Bog and the two further unnamed slacks. FCW Conservation & Heritage Manager to action Projects 3, 21, 35, 52, 57, 74-75, 77-79, 184 & 201, which have application here.*
**See list of active C&H projects at Newborough Forest after AP 6.3.9 below.*

Figure 6.5: Areas of Dune Slacks within Newborough Forest



Water bodies can also be found within the forest by the fire ponds

6.3 Proposed Actions for the Shore Dock Feature

ACTIONS RELATING PRIMARILY TO PEOPLE

AP 6.3.1: Ensure no permissions are issued or recreation activities permitted which would endanger the three shore dock locations.
Target within 1 year: Instruction to be given to FCW staff dealing with permissions from start of plan.
Monitoring activity: Spot checks to be carried out by FCW Conservation & Heritage Manager.
Timescale (start/duration): From start of plan / Plan period.

ACTIONS RELATING PRIMARILY TO THE ENVIRONMENT

AP 6.3.2: Assess the impact of the mature conifers and broadleaves at the pond location and remove where these are casting shade.
Target within 1 year: Assessment to be carried out within a year.
Monitoring activity: Monitoring by FCW Conservation & Heritage Manager.
Timescale (start/duration): From start of plan / Plan period.

AP 6.3.3: Manage the regenerating trees and invasive plants at the three shore dock locations by cutting and grazing.
Target within 1 year: Initial work to be carried out within two years.
Monitoring activity: Monitoring by FCW Conservation & Heritage Manager.
Timescale (start/duration): From start of plan / Plan period.

AP 6.3.4: Agree the specification for the fence at the open shore dock site with CCW. If the present fence is not stockproof then replace this and commence a programme of controlled grazing to control vegetation and create ground disturbance.
Target within 1 year: Initial work to be carried out within two years.
Monitoring activity: Monitoring by FCW Conservation & Heritage Manager.
Timescale (start/duration): From start of plan / Plan period.

AP 6.3.5: FCW Conservation & Heritage Manager to action Project 57a* on great crested newts and to expand this project to include shore dock management at the pond site. Ensure there is some disturbance of the bankside and that the pond shore dock site does not become shaded. Consider the role of debris piles as hibernacula for amphibians and broadleafed woodland as adult forage areas.
Target within 1 year: Initial work to be carried out within two years.
Monitoring activity: Monitoring by FCW Conservation & Heritage Manager.
Timescale (start/duration): From start of plan / Plan period.
**See list of active C&H projects at Newborough Forest after AP 6.3.9 below.*

AP 6.3.6: FCW Conservation & Heritage Manager to liaise with Environment Agency Wales and CCW over the likely spread of *Crassula helmsii* (known variously as New Zealand pygmyweed or Australian swamp stonecrop) within forest ponds and its likely impact on great crested newts and pond ecology.
Target within 1 year: Agreement to be reached with Environment Agency Wales and CCW over methods for eradicating *Crassula helmsii*.
Monitoring activity: Monitoring by FCW Conservation & Heritage Manager, EAW & CCW..
Timescale (start/duration): From start of plan / Plan period.

AP 6.3.7: Map the watercourses leading into and from the three shore dock locations. This will assist in determining seed movement and supply of fresh water.
Target within 1 year: Map to be produced within two years.
Monitoring activity: Monitoring by FCW Conservation & Heritage Manager.

Timescale (start/duration): From start of plan / Plan period.

AP 6.3.8: Put forward proposals for monitoring the hydrological regime at the three shore dock locations to ensure the water table is high enough to allow flow of water.
Target within 1 year: Proposals to be produced in consultation with CCW within two years.
Monitoring activity: Monitoring by FCW Conservation & Heritage Manager.
Timescale (start/duration): Within two years from start of plan / Plan period.

AP 6.3.9: More broadleaves would impact on the hydrology by allowing higher winter flows so ensure that the LISS restocking operations in Coupe 7 (2012) and Coupe 16 (2015) include broadleaves adjacent to the three shore dock locations.
Target within 1 year: Ensure the relevant details within this management plan are transferred to operational plans so that the work is scheduled to be programmed.
Monitoring activity: FCW District Forester Planning to oversee this work.
Timescale (start/duration): From start of plan / Year 1.

AP 6.3.10: The FCW Conservation & Heritage Manager will monitor the numbers of shore dock plants annually, also the levels of disturbance, water quality, availability of freshwater and the vegetation structure.
Target within 1 year: Initial work to be carried out within two years.
Monitoring activity: Monitoring by FCW Conservation & Heritage Manager.
Timescale (start/duration): From start of plan / Plan period.

Figure 6.1: Conservation & Heritage projects currently in place at Newborough

Project Ref	Project Title	Proposed Project Year (5-year period)*				
		11	12	13	14	15
003	Manage scrub development in slack – Pandy Slack	**X**	**X**	**X**	**X**	**X**
004	Manage *Brachypodium pinnatum* (tor-grass) – Newborough Forest		**X**		**X**	**X**
007	Manage sea buckthorn – Newborough Forest		**X**			**X**
013	Mow selected forest road verges – Newborough Forest	**X**	**X**	**X**	**X**	**X**
021	Scrub management – Parnassus Slack	**X**		**X**		**X**
035	Maintain open slack area – Brown Moss Bog.		**X**		**X**	
039	Manage *Cotoneaster* – Newborough Forest	**X**	**X**	**X**	**X**	**X**
052	Clear scrub development from open slack – Gullery	**X**			**X**	
057	Clean out quarter of pond vegetation - Newt Pool	**X**		**X**		**X**
074	Vegetation management – graze open area with ponies – Pandy Slack	**X**	**X**	**X**	**X**	**X**
075	Vegetation management – graze open area with ponies – Dune Slack Pool	**X**	**X**	**X**	**X**	**X**
077	Vegetation management – graze open area with ponies – Leech Pool	**X**	**X**	**X**	**X**	**X**
078	Vegetation management – graze open area with ponies – Brown Moss Bog	**X**	**X**	**X**	**X**	**X**
079	Install/renew fences in grazed areas – Canada Pool		**X**			

164	Site assessment – photo record – review SAM management plan – Hendai			**X**		
184	Install/renew fences in grazed areas – Dune Slack Pool & Parnassus Slack		**X**			
201	Scrub management around pool – Newt Pool - Newborough	**X**	**X**	**X**		

**e.g. 11 = financial year 2011 (= 1 April 2010 to 31 March 2011)*

6.4 Proposed Actions* for the Recreation Feature

**See also the list of projects submitted to the EU funded Communities and Nature project after AP 6.4.11 below.*

ACTIONS RELATING PRIMARILY TO PEOPLE

Note that several of the following actions will require planning permission from IoACC.

AP 6.4.1: Improve footpaths and circular routes. ***NLP Recommendation No. A.1(i)***.
Target within 1 year: Bid to be submitted by FCW Local Area Manager for funding.
Monitoring activity: FCW Local Area Manager to liaise with CCW.
Timescale (start/duration): From start of plan / Plan period.

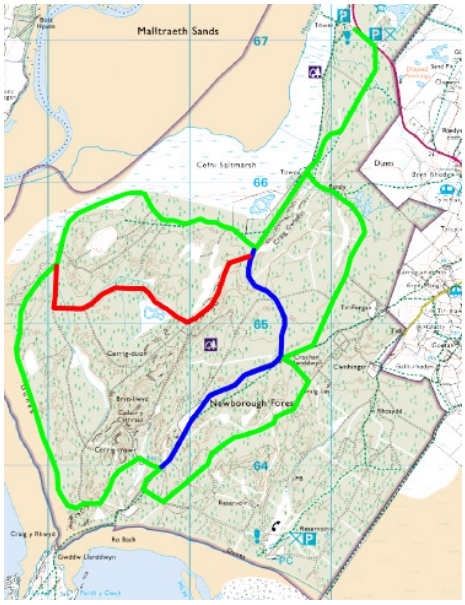
AP 6.4.2: Provide an all-ability access route from the main beach car park to the beach. ***NLP Recommendation No. A.1(i)***.
Target within 1 year: Bid to be submitted by FCW Local Area Manager for funding.
Monitoring activity: FCW Local Area Manager to liaise with CCW.
Timescale (start/duration): From start of plan / Plan period.

AP 6.4.3: Consider the creation of a circular boardwalk onto the Cefni saltmarsh from Malltraeth car park. ***NLP Recommendations No. A.1 (i) & (iii)***. This will require further liaison with CCW as previous activity in this area by cockle fishing gangs has caused damage in the past. Also create an additional route from the Hendai picnic area to provide elevated views. ***NLP Recommendation No. A.1(i)***.
Target within 1 year: FCW Local Area Manager to liaise further with CCW and to consider submitting a bid for funding.
Monitoring activity: FCW Local Area Manager to liaise with CCW.
Timescale (start/duration): From start of plan / Plan period.

AP 6.4.4: Provide better information and maps of routes from all car parks and access points. ***NLP Recommendation No. A.1(ii)***.
Target within 1 year: Bid to be submitted by FCW Local Area Manager for funding. Interpretation requirements also to be looked at by a cross-organisational group.
Monitoring activity: FCW Local Area Manager to liaise with CCW.
Timescale (start/duration): From start of plan / Plan period.

AP 6.4.5: Provide additional car parking at Malltraeth car park for horseriders. ***NLP Recommendation No. A.2(iv)***.
Target within 1 year: Bid to be submitted by FCW Local Area Manager for funding.
Monitoring activity: FCW Local Area Manager to liaise with CCW.
Timescale (start/duration): From start of plan / Plan period.

Figure 6.6: Proposed horseriding routes and linkage with Malltraeth car park

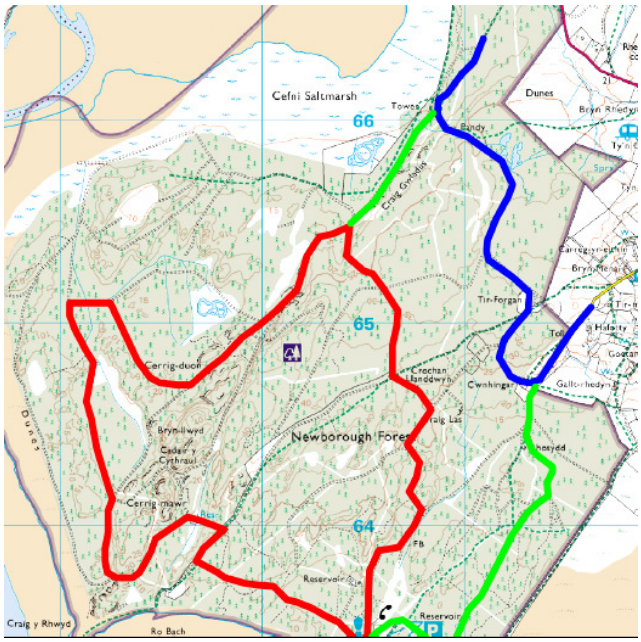


Key: Different colours on map show different abilities of route.
These routes are still being developed.

AP 6.4.6: Create an orienteering course. ***NLP Recommendation No. A.2(v)***.
Target within 1 year: Plans to be developed by FCW Local Area Manager. Some zoning will be required to avoid particularly sensitive times of the year.
Monitoring activity: FCW Local Area Manager to liaise with CCW.
Timescale (start/duration): From start of plan / Plan period.

AP 6.4.7: Although some thought has gone into the creation of further mountain biking opportunities (***NLP Recommendation No. A.2(vi)***) the present aim is to develop family cycling on forest roads throughout the forest and linking in with the Sustrans route that goes through part of the forest.
Target within 1 year: Plans to be developed by FCW Local Area Manager.
Monitoring activity: FCW Local Area Manager to liaise with CCW.
Timescale (start/duration): From start of plan / Plan period.

Figure 6.7: Proposed cycle routes at Newborough



Key: Different colours on map show different abilities of route.
These routes are still being developed.

AP 6.4.8: Work up proposals for a dedicated barbecue area. ***NLP Recommendation No. A.2(x)***
Target within 1 year: FCW has already identified preferred locations for barbecue areas. Local Area Manager to work these into more definite plans.
Monitoring activity: FCW Local Area Manager to monitor.
Timescale (start/duration): Within one year from start of plan / Start of plan period.

AP 6.4.9 Exclude motorised vehicles including quad bikes, motorbikes, 4x4s and tractors, also all vehicular access to launch boats except where agreed under existing rights and privileges. This is to avoid impacts on other site users, wildlife disturbance and footpath erosion, as well as avoiding undue interruption to the tranquillity of the location. Some vehicles however will be allowed further access to the forest in order to take the less mobile to remoter areas. ***NLP Recommendations No. A.2(xii) & (vii) respectively***.
Target within 1 year: Both aspects of this action point to be put immediately into place. Extending access to certain vehicles will be controlled through the permissions process.
Monitoring activity: Ongoing by FCW Local Area Manager.
Timescale (start/duration): From start of plan / Plan period.

AP 6.4.10 Increase the capacity in the main beach car park. ***NLP Recommendation No. C.1(viii)***. This will also have a positive impact on the management of traffic that can otherwise back up into the village of Newborough. ***NLP Recommendation No. C.1(vi)***.

Figure 6.8: Proposed Car Park Improvements and Extension

Target within 1 year: Plans are in place to extend the main beach car park from its present capacity of 350 vehicles to 450.
Monitoring activity: Currently being worked on by FCW Local Area Manager.
Timescale (start/duration): From start of plan / Plan period.

AP 6.4.11: Clarify the key aspects surrounding the provision of a new visitor centre at Newborough and share this information with the Newborough Liaison Partnership.
Target within 1 year: Continue to liaise with IoACC and Menter Mon. Menter Mon has commissioned a consultant's report on this.
Monitoring activity: FCW Forest District Manager to consider funding issues.
Timescale (start/duration): Current economic climate is likely to preclude overly ambitious plans here but opportunities will still be taken to investigate sources of European funding / Plan period.

Figure 6.2: The 3 Options currently being considered for funding (Sep 2010)

Option 1: Covers legal requirements & improvements based on existing budgets	
General	• Maintain existing recreation infrastructure within the forest
Toilet Block	• Improve all-ability access to the toilet block and lay out dedicated disabled car parking bays with tarmac
Picnic Area	• Install a purpose built picnic area with fixed barbecue facilities by the side of the car park
Car Park	• Improve dog bin and litter facilities and their signage • Provide information for campers to tackle overnight stays • Provide a bin store to contain litter once collected • Sign a one way system around the beach car park • Install help button by the Hydrakerb barrier
Forest Infrastructure	• Slim down the link road between the main beach and residents' car parks and separate vehicular traffic from walkers and cyclists • Create waymarked horse routes • Open and maintain all public rights of way • Create a waymark circular route in Llyn Parc Mawr • Install a trim trail • Install a bench and create a willow screen in place of the bird hides that were removed in early 2010
Volunteers	• Aim to change the focus from mainly interest days and occasional work groups to regular work groups with occasional interest days

Option 2: Based on Option 1 plus £150,000 in additional funding	
All-ability access boardwalk	• Maintain existing recreation infrastructure within the forest
Mobile boardwalk	• Install a flexible and mobile boardwalk (not all-ability access) from the viewing area to beach
All-ability access pathways	• Create all-ability access pathways throughout the car park to create safe access routes and to link all facilities
Outside shower	• Install an outside shower for washing off sand

Option 3: Based on £300,000 in additional funding (includes Options 1 & 2)	
Interpretation leaflets and boards	• Develop new site interpretation leaflets and boards
Family cycle routes	• Waymark two family cycle routes
Artwork / Sculpture	• Commission a focal point artwork or sculpture in the car park to draw visitors to a site orientation & welcome area
Benches	• Provide benches at key points around the forest trails
Increasing the capacity of the main beach car park	• Increase the car park capacity to 450 spaces, this figure to include 27 disabled access bays

Preventing flooding within the main beach car park	• Create a drainage system for the main beach car park to prevent some of the parking bays from flooding
Relocating the residents' car park	• Move the residents' car park inland

6.5 Proposed Actions for the Community Involvement Feature

ACTIONS RELATING PRIMARILY TO PEOPLE

AP 6.5.1: Get involved with as many activity groups as possible to build their understanding of the acceptable ways the forest can be used without causing difficulties to other users. Options here might include zoning different activities. Work with Isle of Anglesey County Council coastal wardens and Coastal Development Project. ***NLP Recommendation No. A.2(viii)***.
Target within 1 year: Initial work to be carried out by FCW Local Area Manager and Woodland Manager.
Monitoring activity: Monitoring by FCW Local Area Manager using the *Eyes and Ears* project as far as possible to build relationships.
Timescale (start/duration): From start of plan / Plan period.

AP 6.5.2: Investigate the potential use of the forest and warren as a local training and career development initiative, relating to environmentally sensitive harvesting, processing and use of local timber and development of ecological and visitor management skills. ***NLP Recommendation No. B.1(iii)***.
Target within 1 year: The FCW Forest District Manager will consider any suggestions submitted on this. All proposals must be non-polluting and not damage the forest.
Monitoring activity: Monitoring by FCW Forest District Manager.
Timescale (start/duration): From start of plan / Plan period.

AP 6.5.3: Keep residents and visitors regularly informed of site-related topics and activities. ***NLP Recommendation No. B.2(i)***. The FCW Local Area Manager to co-ordinate a regular newsletter through the FCW and CCW communications teams. FCW District Forester Planning to update the dedicated web pages. The FCW Local Area Manager also to consider ads in papers and information transfer through site wardens and volunteers as appropriate
Target within 1 year: At least two newsletters to be produced and circulated.
Monitoring activity: Monitoring by FCW Local Area Manager.
Timescale (start/duration): From start of plan / Plan period.

AP 6.5.4: Investigate the potential for local people to be involved in the management of the forest and warren, especially at weekends. ***NLP Recommendation No. A.2(vi)***.
Target within 1 year: FCW Local Area Manager and Woodland Manager to consider possibilities here, including a possible joint wardening scheme, new volunteer initiatives and the possibility of working closer with other agencies.
Monitoring activity: Monitoring by FCW Local Area Manager.
Timescale (start/duration): From start of plan / Plan period.

AP 6.5.5: Investigate ways for local people to supply goods and services without commercialising the site, for example wardening services, litter collection, forest management, facilities maintenance and other small, local and appropriate commercial ventures.
Target within 1 year: The FCW Forest District Manager will consider any suggestions submitted on this. All proposals must be non-polluting and not damage the forest.
Monitoring activity: Monitoring by FCW Forest District Manager.
Timescale (start/duration): From start of plan / Plan period.

AP 6.5.6: Agree with interested parties the future of the Newborough Liaison Partnership and the structure of a future group. Ensure regular meetings that are run in conjunction with CCW to cover 'whole' site (i.e. the warren as well as the forest).
Target within 1 year: FCW Forest District Manager to discuss with the NLP & CCW directly.
Monitoring activity: Monitoring by FCW Forest District Manager.
Timescale (start/duration): Following start of plan / Within Year 1 of plan.

6.6 Proposed Actions for the Geology & Geomorphology Feature

ACTIONS RELATING PRIMARILY TO PEOPLE

AP6.6.1: Develop a circular geological trail to encompass the sand dune landforms as well as some of the rocks which are exposed on the shore and the rock ridge within the forest. ***NLP Recommendation No. D.3(i)***. The trail should incorporate geomorphology too and there needs to be further interpretation.
Target within 1 year: FCW Local Area Manager to liaise with Isle of Anglesey County Council (IoACC) and GeoMôn.
Monitoring activity: Monitoring by FCW Local Area Manager.
Timescale (start/duration): Start within a year / Plan period.

AP 6.6.2: As a general rule no permissions to be given for geological specimen collection, in particular the use of hammers is forbidden. Some concession may be given for the collection of loose material, and permits for more extensive work of academic merit may be given to universities. At time of writing the latter will be initially considered through the FCW permissions procedure and then link in with the OLDSI (Operations Likely to Damage the Special Interest) system for SSSIs. Note that OLDSI was formerly known as PDO (Potentially Damaging Operations). This mechanism to be reviewed in due course to make it more efficient.
Target within 1 year: Instruction to be given to FCW staff dealing with permissions from start of plan and to be reviewed thereafter as required.
Monitoring activity: Spot checks to be carried out by FCW Forest District Manager.
Timescale (start/duration): From start of plan / Plan period.

AP 6.6.3: Assess the risk to part of the geology trail as part of its route is in an area of sand dune restoration.
Target within 1 year: Assessment of risk to be carried out in liaison with CCW & GeoMôn.
Monitoring activity: Monitoring by FCW Local Area Manager.
Timescale (start/duration): From start of plan / Plan period.

ACTIONS RELATING PRIMARILY TO THE ENVIRONMENT

AP 6.6.4: Establish the extent of scrub and tree regeneration on the geological feature and devise an annual programme of work. Monitor and remove scrub and tree regeneration on the geological feature.
Target within 1 year: Survey to be carried out within a year.
Monitoring activity: Annually within the business plan timescale.
Timescale (start/duration): Within a year of plan approval / Plan duration.

SECTION 7: APPENDICES

APPENDIX 1: Newborough Forest Statistics

Stock Map of Newborough Forest

Figure 1 shows how the forest consists predominately of Corsican pine (*Pinus nigra* ssp *laricio*) [also known as *Pinus nigra* ssp *salzmannii* var *corsicana* and *Pinus nigra* ssp *maritima*)] with very few native species.

Figure 1: Species Area

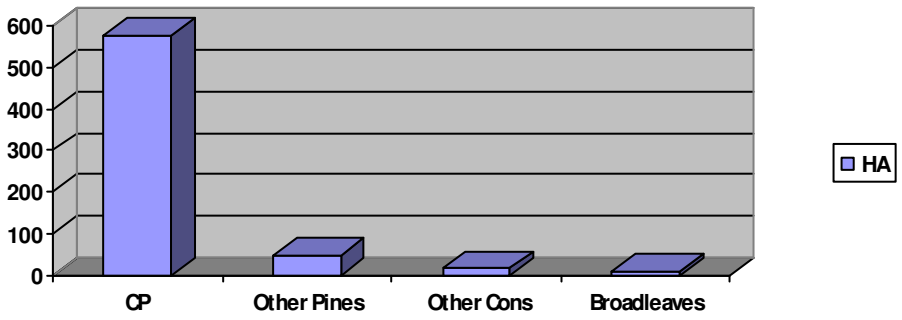


Figure 2 shows that the forest is predominately high forest. The open areas are existing slacks, newly created open areas within the forest for conservation reasons or recreation areas such as car parks.

Figure 2: Land Use Area

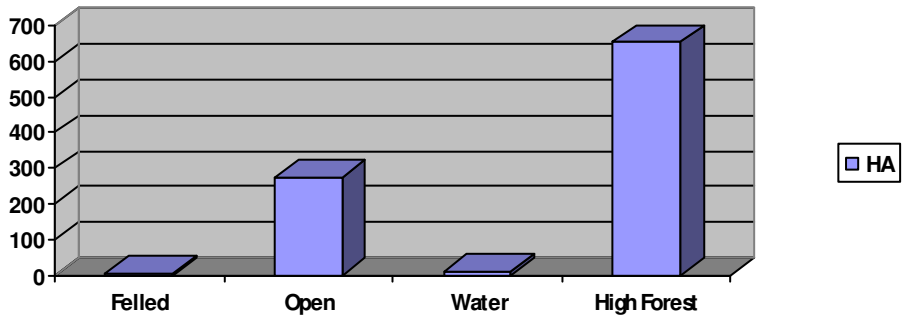


Figure 3 shows the age structure of the forest is dominated by the plantings that took place between the late 1940s and the beginning of the 1970s.

Figure 3: Planting Years

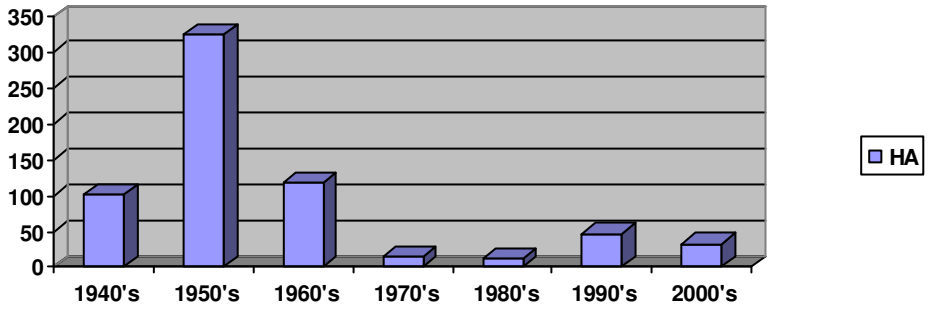


Figure 4 shows the distribution of Yield Classes within the forest and the dominance of Yield Class 12 crops. Note that the potentially severe presence of the fungal disease red band needle blight (RBNB) is expected to have a significant impact on the productivity of Corsican pine, the main species of tree at Newborough and therefore on the overall productivity of the forest.

Figure 4: Yield Class

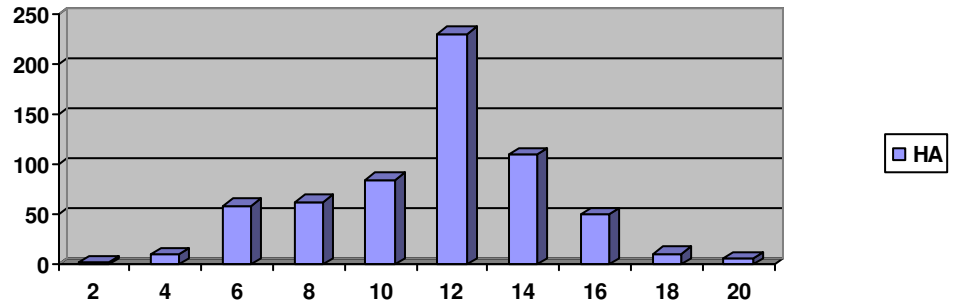
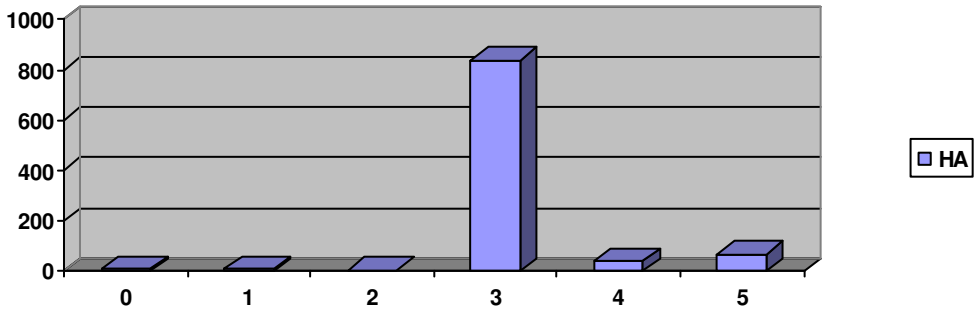


Figure 5 shows that the majority of the forest is classed as wind hazard class 3, which should allow maximum flexibility in thinning the forest.

Figure 5: Wind Hazard Class



APPENDIX 2: Special Areas of Conservation (SACs)

This appendix contains details of three SACs, also a summary of the Habitats Regulations Assessment screening, as follows:

- **APPENDIX 2A:** Abermenai to Aberffraw Dunes SAC
- **APPENDIX 2B:** Anglesey Coast Saltmarsh SAC
- **APPENDIX 2C:** Glan-traeth SAC
- **APPENDIX 2D:** HRA Screening for Newborough Forest

APPENDIX 2A. Abermenai to Aberffraw Dunes SAC

Country	Wales
Unitary Authority	Gwynedd; Ynys Môn / Isle of Anglesey
Grid Reference	SH 413642
SAC EU code	UK0020021
Status	Designated Special Area of Conservation (SAC)
Area (ha)	1871.03

General site character

Coastal sand dunes. Sand beaches. Machair (55%)
Shingle. Sea cliffs. Islets (2.9%)
Inland water bodies (standing water, running water) (2.6%)
Bogs. Marshes. Water fringed vegetation. Fens (0.3%)
Heath. Scrub. Maquis and garrigue. Phygrana (1.4%)
Coniferous forest (37.8%)

Annex I habitats that are a primary reason for selection of this site

2110 Embryonic shifting dunes
Abermenai to Aberffraw Dunes is one of two sites selected to represent Embryonic shifting dunes in north Wales. Embryonic dunes form a zone across a broad part of the beach/dune interface, making this site one of the most extensive examples of this habitat type in the UK. It is a site where, in contrast to some others in north Wales, recreational damage is minimal.

2120 Shifting dunes along the shoreline with Ammophila arenaria ('white dunes')
Abermenai to Aberffraw Dunes is one of two sites selected in north Wales. It contains one of the largest areas of lyme-grass *Leymus arenarius* shifting dune community in Wales. The mobile dunes at the southern end of the site support an abundance of sea-holly *Eryngium maritimum*, and there is well-developed zonation of dune types, including both seaward transitions between mobile dune and foredune, and landward transitions to fixed dune and dune slack.

2130 Fixed dunes with herbaceous vegetation ('grey dunes') * Priority feature
Within this dune complex in north Wales are extensive areas of both fixed dune vegetation with red fescue *Festuca rubra* and lady's bedstraw *Galium verum* and semi-fixed dune grassland with marram *Ammophila arenaria* and red fescue. Despite the fact that a large proportion of the open vegetation has been afforested, the remaining communities retain considerable interest. Notable species of the site include early sand-grass *Mibora minima*. On the south side of Menai Strait, the dunes at Morfa Dinlle include a lichen-rich community with *Coelocaulon aculeatum* (SD11), a type of vegetation which is very rare in Wales.

2170 Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)
Abermenai to Aberffraw Dunes in north Wales comprises an extensive area of dunes with a complete range of dune vegetation, including substantial areas of slack vegetation dominated by creeping willow *Salix repens* ssp. *argentea*. Despite the extent of afforestation, the dune aquifer retains its overall integrity, although changes in water table, partly attributable to the growth of the forest, have influenced the development of the dune slacks. There is long-term potential for further improvement.

2190 Humid dune slacks
Abermenai to Aberffraw Dunes represents Humid dune slacks in north Wales. There are large areas of open dune vegetation and many Humid dune slacks remain, although there have been changes in the water table that are partly attributable to the growth of the commercial forest. The changes have influenced the development of humid dune slacks, which nonetheless retain most the essential features of the habitat type.

Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site

3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation

Annex II species that are a primary reason for selection of this site

1395 Petalwort (*Petalophyllum ralfsii*)
Abermenai to Aberffraw Dunes is an extensive complex of sand dunes, dune slacks, marsh, shingle and cliffs in south-west Anglesey, north Wales. There is a large population of petalwort *Petalophyllum ralfsii* here that was first recorded in 1828. This historical continuity indicates that the site is especially favourable for the survival of this species. Although partly afforested, the open dunes have a very rich bryophyte flora, including the mosses *Amblyodon dealbatus*, *Catoscopium nigritum* and the liverwort *Southbya tophacea*, particularly in damp, calcareous slacks and flats.
1441 Shore dock *(Rumex rupestris*)
Abermenai to Aberffraw Dunes in north Wales is important as it represents shore dock *Rumex rupestris* at the far north-west of its geographical range. It is remote from other known sites for this species, and shore dock occurs in an unusual situation: along a small stream bed and on damp pond edges, formerly in duneland, now in a clearing in a conifer plantation. There are two small colonies, which held 21 flowering plants in 1994, 26 in 1995 and 53 in 1996.

Annex II species present as a qualifying feature, but not a primary reason for site selection: Not applicable (but note that great crested newt, otter and lesser horseshoe bat are all present).

APPENDIX 2B. Anglesey Coast Saltmarsh SAC

Country	Wales
Unitary Authority	Ynys Môn/ Isle of Anglesey
Grid Reference	SH380655
SAC EU code	UK0020025
Status	Designated Special Area of Conservation (SAC)
Area (ha)	1058

General site character

Tidal rivers. Estuaries. Mud flats. Sand flats. Lagoons (including saltwork basins) (80%)
Salt marshes. Salt pastures. Salt steppes (15%)
Shingle. Sea cliffs. Islets (5%)

Annex I habitats that are a primary reason for selection of this site

1310 Salicornia and other annuals colonising mud and sand
This is part of a complex of saltmarsh and dune habitats lying either side of the dune systems at Newborough Warren, north Wales. It is therefore important in terms of the structural integrity of the site, which has been selected primarily for a range of sand dune Annex I types. The most significant stands of *Salicornia* spp. saltmarsh occur on Malltraeth Sands in the Cefni estuary.
1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
This site, which includes both the Braint and Cefni estuaries, forms a complex of saltmarsh and dune habitats lying either side of the dune systems at Newborough Warren. **Atlantic**

salt meadows form the bulk of the saltmarsh vegetation, but much of it is far from typical. In the Braint estuary the vegetation is characterised by unusually large amounts of greater sea-spurrey *Spergularia media*, whilst in the Cefni estuary the more typical Atlantic salt meadow is subordinate to saltmarsh dominated by sea rush *Juncus maritimus*. In fact, this is one of the largest stands of *Juncus maritimus* saltmarsh in Britain, and has affinities with **1410 Mediterranean salt meadows** (***Juncetalia maritimi***), an Annex I vegetation type that is not now considered to occur in the UK.

Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site

1130 Estuaries

1140 Mudflats and sandflats not covered by seawater at low tide

Annex II species that are a primary reason for selection of this site: Not applicable.

Annex II species present as a qualifying feature, but not a primary reason for site selection: Not applicable.

APPENDIX 2C. Glan-traeth SAC (adjacent to Newborough Forest)

Country	Wales
Unitary Authority	Ynys Môn/ Isle of Anglesey
Grid Reference	SH417666
SAC EU code	UK0030042
Status	Designated Special Area of Conservation (SAC)
Area (ha)	14.1

General site character

Coastal sand dunes. Sand beaches. Machair (90%)
Inland water bodies (standing water, running water) (10%)

Annex I habitats that are a primary reason for selection of this site: Not applicable

Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: Not applicable.

Annex II species that are a primary reason for selection of this site

1166 Great crested newt (*Triturus cristatus*)

Situated in north-west Wales, high counts since the mid-1980s confirm the presence of a large and viable **great crested newt (*Triturus cristatus*)** population occupying water-filled depressions that have resulted from sand extraction from the dune system. Glan-traeth is lightly grazed by domestic livestock, thereby maintaining the open terrestrial habitat required for feeding and sheltering of adults.

Annex II species present as a qualifying feature, but not a primary reason for site selection: Not applicable

APPENDIX 2D. HRA Screening for Newborough Forest

1. Habitats Regulations Assessment for Likely Significant Effects of a Forest Design Plan (FPD) Renewal on a European (or Ramsar) Site	
Habitats Regulations Assessment of forestry operations / activities likely to have a significant effect on a European site under Regulation 48 of the Conservation (Natural Habitats, &c.) Regulations 1994 and in accordance with the Habitats Directive (Council Directive 92/43/EEC).	
1. Proposed operation / activity:	Programmed felling/thinning/forest management operations and subsequent restocking as per the agreed (2010) Newborough Forest Management Plan.
2. HRA reference no:	
3. Site name / ref:	Newborough Forest
4. Location grid ref:	SH401652
5. Brief description of proposal:	a. To fell/thin the crop trees and remove all merchantable conifer produce from the programmed coupes. b. Re-plant some areas as per the agreed (2010) Newborough Forest Management Plan. c. Carry out forest management operations e.g. forest road edge mowing and the creation/management of recreation facilities as described in the (2010) Newborough Forest Management Plan.
6. European site name and status:	a. Glannau Mon: Cors heli / Anglesey Coast: Saltmarsh SAC; b. Y Twyni o Abermenai i Aberffraw / Abermenai to Aberffraw Dunes SAC; c. Glan-traeth.
7. List of Interest Features which may be affected:	1. Embryonic dunes 2. Shifting dunes along the shoreline 3. Fixed dunes with herbaceous vegetation 4. Dunes with *Salix repens* ssp *argentea* 5. Humid dune slacks 6. Shore dock (*Rumex rupestris*) 7. Great crested newt
SCREENING	
8. Is the whole of the proposal directly connected with or necessary to the management of the Site for nature conservation? The answer here should only be 'No'. An application for AA should not be made if the proposals are directly connected with the management of the European or Ramsar site.	No

9. What potential hazards are likely to affect the interest features?

Interest Feature	Potential Hazard	Mitigation
1. Embryonic dunes [Outside of operation area].	• Damage caused by harvesting vehicles accessing operation area. • Brash and harvesting debris dropped on to the feature.	• Vehicles will not need access over this feature. However, ensure this is included in all documentation e.g. operational contract to specify the need to keep all vehicles off these areas. • During the felling operation any brash/lop & top that incidentally falls onto this feature must be removed before the end of each day.
2. Shifting dunes along the shoreline [within Zone 1 & 4].	• Damage caused by harvesting vehicles accessing operation area. • Brash and harvesting debris dropped on to the feature.	• Vehicle access will only be required where any tree cover is present. Access should be limited to the area behind the dunes (furthest from the sea). • Some areas where any tree cover has been removed may also require stump removal. All associated debris will be removed from this feature.
3. Fixed dunes with herbaceous vegetation [within Zones 3,4,5 & LISS]	• Localised accumulation of brash and harvesting debris. • Operational damage to existing open 'green' areas. • Planting into existing open areas where desirable botanical species presently occur and which require an open aspect.	• All lop & top will be distributed (rather than used as brash mats) throughout the operation areas in order to reduce localised increase of dominant species i.e. bramble etc. • No vehicles to travel across/through existing vegetated areas. Also, trees must be felled away from these areas. • Existing open habitat deemed to be valuable for existing desirable botanical species will not be planted.
4. Dunes with *Salix repens* ssp *argentea* [within Zones 3,4,5 & LISS]	• Localised accumulation of brash and harvesting debris. • Operational damage to existing open 'green' areas. • Planting into existing open areas where desirable botanical species presently occur and which require an open aspect.	• All lop & top should be distributed (opposed to the use of brash mats) throughout the operation areas in order to reduce localised increase of dominant species i.e. bramble etc. • No vehicles to travel across/through existing vegetated areas. Also, trees must be felled away from these areas. • Existing open habitat deemed to be valuable for existing desirable botanical species will not be planted.

5. Humid dune slacks [within Zones 3,4,5 & LISS]	• Brash and harvesting debris dropped on to the feature. • Vehicle access damage caused to existing open slacks.	• All associated debris (lop & top) will be removed from these features. Also, trees must be felled away from these areas. • No vehicles to travel across/through existing slacks which will be identified on all operational maps.
6. Shore dock (*Rumex rupestris*) [within LISS]	• Damage caused by harvesting vehicles accessing operation area. • Disrupting water supply. • Causing any form of pollution to enter water supply. • Planting trees to close to areas of Shore dock.	• Keep all vehicles a minimum of 20 metres from any locations where Shore dock occurs. These vehicle exclusion areas will be identified on all operational maps. • No alteration to watercourses flowing into locations known to contain shore dock. • No vehicles to travel across any watercourses. No trees to be felled onto/into any watercourses. • Locations where shore dock occurs will remain open and not be planted with trees. These open areas will depend on aspect and should be shown on any operational restock maps.
7. Great crested newt [within Zone 5 & LISS]	• Damage/disturbance caused by harvesting vehicles accessing operation area. • Felling trees into breeding ponds. • Any form of pollution entering ponds/ watercourses. • Tree planting in areas of Great crested newt breeding ponds.	• Keep all vehicles a minimum of 50 metres (EPS licence required) from any great crested newt breeding ponds. These vehicle exclusion areas will be identified on all operational maps. • All trees to be felled away from breeding ponds when within 3 tree-lengths from pond. • Immediately remove any brash that may fall into any ponds. • Keep all refuelling points a minimum of 50 metres from any watercourse/pond. Use straw bales in any watercourses during periods of continual heavy down pours of rain. Remove bales once threat has passed. Use only Glyphosate Probiactive when managing broadleaf scrub growing within 50 metres of any breeding pond/water course. • Locations where great crested newt breeding ponds occur will remain open and not planted with trees. These open areas will depend on aspect and should be shown on all operational restock maps.

10. Is the potential scale or magnitude of any effect likely to be significant?

	Y/N/ Uncertain	**Comments**
a). Alone?	N	It is believed sufficient mitigation measures have been provided above to avoid any detrimental damage to any of the SAC features.
b). In combination with other plans or projects?	N	As above.
11. Conclusion: Is the proposal likely to have a significant effect alone or in combination on a European site?	N	As above.

CCW should be consulted on the completed screening.

APPROPRIATE ASSESSMENT

Feature	Nature of potential impact	How would the conservation objectives be affected adversely?	If an adverse effect, can additional mitigation measures be introduced into the plan or imposed by conditions to remove risk or can operations be removed to avoid the risk? (describe / explain)	Residual adverse effect? (Y or N and explain reason)

Has it been ascertained that the scheme will not adversely affect the integrity of the Natura 2000 site(s) concerned?

Yes, without any additional conditions		**Yes, but only subject to additional conditions**		**No**	

If Yes, without additional conditions, scheme can be approved.			
If Yes, but only subject to additional conditions, scheme can be approved subject to the following conditions:			
Condition 1			
Condition 2			
12. Name and address of assessor:			
		Date:	
13: CCW comments on assessment:			
2. 14. Name of CCW officer:		**Date:**	
3. ATTACHMENTS:			
Approval by Grants & Regulations, Forestry Commission Wales (the Competent Authority)	NAME: POSITION: Signed on behalf of Forestry Commission Wales		
Conditions:			
1.			
2.			
3.			

APPENDIX 3: Isle of Anglesey LBAP

The UK Biodiversity Action Plan (UKBAP) arose from the Earth Summit in Rio de Janeiro, the first treaty to provide a legal framework for biodiversity conservation, and describes and sets out a detailed plan for the conservation of the biological diversity resources of the UK. The Anglesey Local Biodiversity Action Plan (LBAP) is *Working for the Wealth of Wildlife - Anglesey's Local Biodiversity Action Plan*, which contains action plans for the following species and habitats:

1. Species for which action plans have been prepared

Group	Species
Amphibians	Great Crested Newt (*Triturus cristatus*)
Birds	Skylark (*Alauda arvensis*)
Birds	Bittern (*Botaurus stellaris*)
Birds	Corncrake (*Crex crex*)
Birds	Grey Partridge (*Perdix perdix*)
Birds	Song Thrush (*Turdus philomelos*)
Butterflies	Marsh Fritillary (*Eurodryas aurinia*)
Damsel/dragonflies	Southern Damselfly (*Coenagrion mercuriale*)
Liverworts	Petalwort (*Petalophyllum ralfsii*)
Mammals	Water Vole (*Arvicola terrestris*)
Mammals	Brown Hare (*Lepus europaeus*)
Mammals	Otter (*Lutra lutra*)
Mammals	Harbour Porpoise (*Phocoena phocoena*)
Mammals	Pipistrelle Bat (*Pipistrellus pipistrellus*)
Mammals	Lesser Horseshoe Bat (*Rhinolophus hipposideros*)
Mammals	Red Squirrel (*Sciurus vulgaris*)
Mosses	Slender Green Feather-moss (*Hamatocaulis vernicosus*)
Vascular plants	Three-lobed Water-crowfoot (*Ranunculus tripartitus*)
Vascular plants	Shore Dock (*Rumex rupestris*)
Worms	Medicinal Leech (*Hirudo medicinalis*)

2. Habitats for which action plans have been prepared

Group	**Habitat**
Broad Habitats	Rivers and streams
Priority Habitats	Ancient and/or species-rich hedgerows
Priority Habitats	Coastal and floodplain grazing marsh
Priority Habitats	Coastal sand dunes
Priority Habitats	Fens
Priority Habitats	Limestone pavements
Priority Habitats	Lowland heathland
Priority Habitats	Reedbeds
Priority Habitats	Saline lagoons
Priority Habitats	Seagrass beds

APPENDIX 4 – Trees Potentially Suitable for Planting at Newborough

General

Tree planting at Newborough will be done to encourage greater diversity as diversification is considered the best way to plan for a future with an uncertain climate (by avoiding 'all eggs in one basket'). The choice of tree and shrub species to be chosen for planting will endeavour to create **Atlantic dune woodland**, which although endemic to parts of the Atlantic seaboard is not known to have occurred at Newborough in the distant past.

There will be a considerable amount to learn about the best ways to create this type of woodland so the prescriptions outlined are of necessity only indicative at this stage. As more is learned through experience and practise, including overcoming technical issues such as obtaining appropriate stock and successfully establishing new species of trees, then these proposals can be sharpened up over time. This includes the precise proportions of different species of tree (including the balance between broadleaves and conifers) and which trees to plant in which conditions (e.g. more shade-bearing species beneath existing tree canopies and pines in more open areas).

Table 1: Likely species of tree & shrub to plant to create ADW

Species of Tree & Shrub
Willow, various species (*Salix* spp) [but not *S. alba*]
Alder (*Alnus glutinosa*)
Downy birch (*Betula pubescens*)
Ash (*Fraxinus excelsior*)
Sycamore (*Acer pseudoplatanus*) [will be accepted as natural regeneration but will not be planted]
Oak, various species (*Quercus* spp)
Elm (*Ulmus glabra*)
Hazel (*Corylus avellana*)
Elder (*Sambucus nigra*)
Hawthorn (*Crataegus monogyna*)
OTHER species of broadleaves, including rowan (*Sorbus aucuparia*), bullace (*Prunus domestica* var *institia*), wild cherry (*Prunus avium*), crab apple (*Malus* spp) [*Consultees have expressed mixed views on use of beech (Fagus sylvatica); sweet chestnut (Castanea sativa) has also been suggested as a possible species)*]
Pine, various species (*Pinus* spp)

Many of the species in Table 1 above will be expected to come in naturally to a degree, and natural regeneration will be encouraged as a silvicultural tool at Newborough as much as possible, in particular broadleaved regeneration. Other species, including species of pine, some of which may have self-regeneration capability, will be controlled through ongoing management.

Although use will be made of natural regeneration where possible there will also be a considerable amount of planting at Newborough. The species – and provenances – chosen need to be presently well suited to the site and be likely to remain suited to the site under most climate change predictions. All species of trees are expected to cope better with the effects of climate change once they have become established (after moving from thicket stage to pole stage). This fact also supports not delaying the creation of a more diverse forest, a process that should take place over a period of time but not be delayed in starting.

Table 2 shows information published by Forest Research (FR) on likely suitable species for site type and climatic zone at Newborough, which is '*warm and dry below 50 metres asl*'. It is also noted that soil fertility is a factor that can become limiting to a degree.

Table 2: Species recommended for sandy soils by Forest Research

Soil Type	Broadleaves	Conifers
Skeletal / Rankers	Downy birch (*Betula pubescens*) Sycamore (*Acer pseudoplatanus*) Alder (*Alnus glutinosa*) Rowan (*Sorbus aucuparia*)	Macedonian pine (*Pinus peuce*) lodgepole pine (*Pinus contorta*) Scots pine (*Pinus sylvestris*) Pines, various (*Pinus* spp)

Possible use of other pines at Newborough

The susceptibility of Corsican pine (*Pinus nigra* ssp *laricio*) [also known as *Pinus nigra* ssp *salzmannii* var *corsicana* and *Pinus nigra* ssp *maritima*)] to red band needle blight (RBNB) has already been mentioned. The *Pinus* genus is known to fare well in hostile maritime environments and given that there are many other pine species in existence alternative species need to be investigated. Table 3 below categorises a large number of species of pine into different levels of susceptibility. Some species come into more than one category.

Table 3: Table showing susceptibilities of different species of pine to RBNB

Susceptibility Category*	Species of Pine
Highly susceptible	*P. attenuata, P.* x *attenuradiata, P. brutia, P. canariensis, P. cembroides, P. contorta* var. *latifolia, P. engelmannii, P. halepensis, P. jeffreyi, P. muricata, P. nigra* ssp *laricio, P. nigra* ssp. *nigra, P. pinea, P. ponderosa, P. radiata, P. sabineana, P. sylvestris, P. thunbergii*
Moderately susceptible	*P. bungeana, P. canariensis, P. caribaea, P. coulteri, P. cubensis, P. densiflora, P. echinata, P. echinata* x *taeda, P. elliottii, P. flexilis, P. jeffreyi, P. kesiya, P. lambertiana, P. massoniana, P. monticola, P. mugo* ssp. m*ugo, P. muricata, P. occidentalis, P. palustris, P. pinaster, P. pungens, P. radiata* var. *binata, P. resinosa, P. roxburghii, P. strobiformis, P. strobus, P. taeda, P. thunbergii*
Slightly susceptible	*P. aristata, P. ayacahuite, P. contorta, P. coulteri, P. devoniana, P. elliottii, P. elliottii* var. *densa, P. hartwegii, P. heldreichii, P. koraiensis, P. merkusii, P. montezumae, P. monticola, P. nigra* ssp. *nigra, P. oocarpa, P. patula, P. pseudostrobus, P. rigida, P. sabineana, P. serotina, P. sibirica, P. strobus, P. strobus* L. var. *chiapensis, P. sylvestris, P. tabuliformis, P. taeda, P. torreyana, P. wallichiana*
Susceptibility unknown	*P. albicaulis, P. arizonica* var. *cooperi, P. banksiana, P. cembra, P. clausa, P. contorta* x *banksiana, P. contorta* var. *contorta, P. kesiya* var. *kesiya, P. maximinoi, P. mugo* ssp*. rotundata, P. mugo* subsp*. uncinata, P. peuce, P. sylvestris* var *mongolica, P.tecunumanii*

**Some of the pine species above come into more than one susceptibility category*

Note that there is much still to be learned about the susceptibility of different pine species to RBNB, also in how susceptibility changes with different factors such as soil type, micro-climate, stress factors, etc. The above table is therefore only indicative at this stage.

Some of these pine species are known to regenerate freely but within the context of the forest this can be managed through cleaning and thinning in the early years of a crop's management. Problems can also arise when freely regenerating species produce large quantities of seed or start to sucker. For these reasons any species of pine that has potential invasive tendencies will be kept away from open dunes and dune slacks within the forest (see Figure 6.5 on page 46 above).

It should be noted however that pine regeneration may not always occur as expected. Corsican pine (*Pinus nigra* ssp *laricio*) for example hardly regenerates at all at Newborough although this species normally freely regenerates. Lodgepole pine (*Pinus contorta*), on the other hand, does regenerate freely at Newborough but the are of this pine species is relatively small.

There is presently a moratorium on planting Corsican pine due to red band needle blight (RBNB) but two other pine species, maritime pine (*Pinus pinaster*) and Macedonian pine (*Pinus peuce*), appear to be more resistant to this disease and may have some potential for planting at Newborough.

Earlier literature suggests that the performance of maritime pine at Newborough was considered inferior to Corsican pine but this appears to have been based on limited trialling and, being a coastal pine that is widely planted on the sands of south-west France, will be given further consideration. Provenance testing is being included in Forest Research's new series of species trials, and it is presently intended to include further plots of this species at Newborough.

Macedonian pine has also only had limited trialling at Newborough and there is an existing plot of this species that shows potential for this species. Two other pines – Monterey pine (*P. radiata*) and bishop pine (*P. muricata*) – have been trialled here but both are too susceptible to RBNB now to be planted. There is little specific information on the performance of Scots pine (*Pinus sylvestris*) at Newborough, presumably because the decision was made to go with Corsican pine from the start.

A number of species plots were established many years ago in Newborough Forest and were visited once again by Forest Research in 2007 to assess their value for RBNB studies. It was noted at the time that RBNB was well established in the forest and that the crowns of Corsican pine were generally looking thin.

Table 4: Pine provenance trials at Newborough

Compartment	Notes on the various pine species (2007)
Newborough pinetum, Cpt 13	This pinetum originally had 25 plots of various pine species planted 1949-60 of which only remnants now remain. There are some large specimens of Monterey pine (*P. radiata*) (P51) and relatively intact plots of Virginia pine (*P. virginiana*) (P52) and Japanese red pine (*P. densiflora*) (P60), both of which are relatively small. There is a large plot of reasonably uniform Macedonian pine (*P. peuce*) (P58) and a few scattered remnants of Jeffrey pine (*P. jeffreyi*) (P57). The pinetum will be retained and may even be considered as part of a minor arboretum.
Newborough Cpt 12, P75	This compartment contains plots of Corsican pine (*Pinus nigra* ssp *laricio*), Monterey pine (*P. radiata*), and bishop pine (*P. muricata*). One plot of Monterey pine was high pruned in the 1990s for the *Potential Plantation Species* programme. The trees are all in reasonable condition but are probably too old for use in RBNB studies. This experiment will be retained for long-term retention.
Species plots	This compartment contains a series of species plots close to the large

Cpt 30	plot of Macedonian pine (*P. peuce*) (see below). The plots contain *Abies*, *Picea* and *Thuja* species but no pines. The origin of these plots is uncertain as no experiments with these species are recorded on the database under Newborough (but they could be a under a different forest name, which requires further investigation). These plots are of limited value for RBNB studies.
Pinus peuce Cpt 30	This large plot of Macedonian pine (*P. peuce*) is marked only as XP on the stock map and is probably P59. The trees are variably spaced, have slow growth, and most have good form, are apparently healthy, and regenerating. A useful plot of this potential plantation species.

There are also plots of other conifers already established at Newborough which are worthy of further scrutiny in deciding which coniferous species are likely to be best suited to plant from here on.

Table 5: Susceptibility of other conifer species to RBNB

Susceptibility Category	Other Species of Conifer (other than Pine)
Not known (but thought to be of low susceptibility)	Norway spruce (*Picea abies*) Serbian spruce (*Picea omorika*) Colorado blue spruce (*Picea pungens*) Sitka spruce (*Picea sitchensis*) Schrenk's spruce (*Picea schrenkiana*) Douglas fir (*Pseudotsuga* menziesi) European larch (*Larix decidua*) **[Note that Japanese larch (*Larix kaempferi*) is now known to be susceptible to *Phytophthora ramorum*, which is why there is presently a moratorium on planting this species, but the situation with European larch is less clear]**

At present the susceptibility of other conifer species to RBNB is largely unknown.

Forest Research is continuing its research into the suitability of new species and provenances of pine as part of the climate change adaption programme. It is also acknowledged that other species and provenances – in particular oak species – need more work.

The list of species likely to be deemed suitable for creating Atlantic dune woodland (Table 1 supplemented by the species in Tables 2, 3 & 5 above) at Newborough is likely to become refined over time as our experience of planting new species develops. It is important to give an indication of any new species that will be required as soon as these are known as many species will take time to source or to grow from seed in the nursery. Macedonian pine for example will take 4 years to grown from seed.

Atlantic dune woodland

Tree planting at Newborough will be carried out predominantly to favour the creation of Atlantic dune woodland (ADW), which in the Atlantic region is defined as '*wooded dunes*' or '*coastal dunes with near-natural woodland'.*

ADW consists of natural or semi-natural forests within the Atlantic region coastal dunes with a well-developed woodland structure and an assemblage of characteristic woodland species. It corresponds to oak groves and beech-oak groves with birch on acid soils.

Pioneer stages are open forests with *Betula* spp. and *Crataegus monogyna*, mixed forests with *Fraxinus excelsior*, *Quercus robur*, *Ulmus glabra* and *Acer pseudoplatanus* or, in wet dune slacks, pioneer forests with *Salix alba* which develop into humid mixed forests or marsh forests.

In the UK, the Joint Nature Conservation Committee (JNCC) considers there to be no substantive examples of this habitat at the present time in the UK. The UK Sand Dune BAP recognises that it may formerly have been present and proposes the selection of 5 sites for the experimental creation of Atlantic dune woodland.

Atlantic dune woodland at Newborough:

With regard to Newborough Forest the key element of the definition is 'natural or semi-natural forests (long established)...with a well developed woodland structure and an assemblage of characteristic woodland species'. Newborough Forest is presently none of these things; it is not natural or semi-natural having been planted mainly less than 50 years ago and comprising mainly non-native tree species. It has a poor woodland structure lacking a diversity of age classes, understorey or ground layer. Many of the plant species within the forest are relicts from the earlier dune flora and only the landward portions are beginning to acquire common woodland plants by (mostly) natural colonisation. Some areas are also acquiring an interesting fungus flora but nowhere are there indicators of ancient woodland.

Atlantic dune woodland can potentially develop at Newborough in time, with birch, oak and sycamore being the main species. The dune slacks will probably become willow dominated with alder perhaps less abundant due to its limited dispersal in this terrain. Ash might occur where water levels are stable and an understorey of shrubby species including hazel, elder and hawthorn can be expected. The varied topography of the terrain is likely to lead to quite sudden spatial variation (e.g. from oak/birch to willow dominance at the edges of slacks) and a diverse mosaic of vegetation types. Corsican pine – RBNB permitting – is likely to remain as the overlying structure of the forest for a period to come but the dominance of this species is expected to reduce fairly rapidly as new species are introduced.

APPENDIX 5 – Abbreviations

- **AA**: Appropriate Assessment, required as part of Habitats Regulations Assessment
- **ADW**: Atlantic Dune Woodland, a type of woodland native to the Atlantic region
- **AP**: Action point. These are covered in Section 6, proposed actions
- **ASL**: Above Sea Level, the altitude above mean sea level usually measured in metres
- **AONB**: Area of Outstanding Natural Beauty
- **ARSP**: Anglesey Red Squirrel Project
- **AWE**: Assembly Woodland Estate, the area of woodland owned by the National Assembly for Wales and managed by Forestry Commission Wales
- **BAP**: Biodiversity Action Plan, see Appendix 3
- **CCW**: Countryside Council for Wales
- **CEH**: Centre for Ecology & Hydrology
- **DDA**: Disability Discrimination Act
- **EPS**: European Protected Species, defined species given protection under the Habitats Directive
- **FCW**: Forestry Commission Wales
- **FD**: Forest District, the management unit of FCW, here Coed y Mynydd FD
- **FDM**: Forest District Manager, the manager for Coed y Mynydd FD and an FCW employee
- **FDP**: Forest Design Plan
- **FSC**: Forestry Stewardship Council, a certification body
- **FR**: Forest Research, an agency of the Forestry Commission
- **GCN**: Great Crested Newt, a species of amphibian which is also an EPS (see above)
- **GCR**: Geological Conservation Review
- **HRA**: Habitats Regulations Assessment, see also AA above
- **IoACC**: Isle of Anglesey County Council
- **IPCC**: Intergovernmental Panel on Climate Change
- **JNCC**: Joint Nature Conservation Committee
- **LA**: Local Area, a management unit of Coed y Mynydd FD, here Eryri LA
- **LAM**: Local Area Manager, the manager for the Eryri LA and an FCW employee
- **LISS**: Low Impact Silvicultural System, a method of continuous cover forestry
- **LRC**: Local Record Centre
- **m^3obs**: Cubic metres overbark standing, a measure of standing volume of timber
- **MTI**: Management Table Intensity, the amount of timber that should be removed in thinnings – given declared parameters such as species and growth rate – according to FC Booklet 48
- **N2K**: Natura 2000
- **NAW**: National Assembly for Wales
- **NFP**: Newborough Forest Partnership, officially formed in 2005
- **NLP**: Newborough Liaison Partnership
- **NNR**: National Nature Reserve
- **OGB**: Operational Guidance Booklets, internal guidance information for FC staff; OGB1 covers tree safety
- **OLDSI**: Operations Likely to Damage the Special Interest. This was formerly known as PDO (Potentially Damaging Operations)
- **PEFC**: Programme for the Endorsement of Forestry Certification, a certification body
- **PDO**: Potentially Damaging Operations
- **RBNB**: Red Band Needle Blight, a disease caused by the fungus *Dothistroma septosporum* which attacks pine, in particular Corsican pine although other pines are similarly susceptible.
- **RIGS**: Regionally Important Geological Site
- **SAC**: Special Area of Conservation [cSAC: Candidate SAC]
- **SAM**: Scheduled Ancient Monument
- **SSSI**: Site of Special Scientific Interest

- **UKWAS**: UK Woodland Assurance Scheme, the certification standard used by FCW. The second edition of the standard was introduced in 2006 and a third edition is expected in 2011
- **YC**: Yield Class, a measure of the growth rate of crops (YC14 for example refers to a gross growth rate of 14m^3 overbark standing per hectare per year. The amount of timber to be removed in one hectare of a marginal intensity thinning in this example would be 14m^3 x 1ha x 5 years (or other thinning cycle) ÷ 1.21 (conversion from m^3obs to tonnes))

APPENDIX 6 – Map of Newborough Forest