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Wylfa Newydd

Horizon Nuclear Power

Ancient Woodland Botanical Survey Report

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1. Introduction

The proposed Site Preparation and Clearance site for Wylfa Newydd contains three small units of woodland identified as ancient in the Ancient Woodland Inventory for Wales (Table 1, Figure 1). The names given in Table 1 are not official and are adopted for ease of reference only.

Table 1. Ancient woodlands within the Wylfa Newydd Development Area (Forestry Commission, 2016)

Woodland name	Ancient Woodland Inventory 2011 ID number	National Grid Reference	Area	Ancient Woodland Inventory 2011 category
Manor Garden Manor Garden	26060	SH 356 938	0.3 ha	Ancient Semi Natural Woodland
Simdda- WenSimdda-Wen	26059	SH 353 932	0.32	Ancient Semi Natural Woodland
The Firs Hotel Hotel	26075	SH 352 929	0.52	Restored Ancient Woodland Site

This report presents the results of botanical surveys of these woods and discusses how these results relate to the identification of the woodlands as ancient woodland. The concept of ancient woodland and the origin of the Ancient Woodland Inventory are first described in order to fix ideas for later reference.



Figure 1. Locations of designated Ancient Woodland according to the Ancient Woodland Inventory

1.1 Ancient Woodland in Wales

Ancient woodland is defined as land that has been tree-covered since at least 1600 A.D. This can include a diversity of woodland origins and types, either woodland derived from primary post-glacial forest or secondary woodland that arose before this date (e.g. following abandonment of land associated with agricultural depressions or plagues). An ancient woodland can have passed through a variety of specific uses since 1600 A.D., but it shall never have been destroyed and converted to another kind of land use, such as arable farming. The long continuity of an ancient woodland makes it potentially of great nature conservation value as a habitat for rare flora and fauna, or assemblages of such not found elsewhere.

The concept of ancient woodland has its origins in the work of Oliver Rackham and George Peterken in the late twentieth century (e.g. Rackham (1980) and Peterken (1981)). In order to establish continuity of woodland these researchers combined primary documentary evidence (maps, court rolls etc.) with field evidence in the form of archaeological features (ancient earthworks, saw pits etc.), ancient trees, and aspects of flora and fauna suggestive of ecological continuity.

Using this historical approach, the Nature Conservancy Council, as it was, instigated the Ancient Woodland Inventory, an attempt to identify all ancient woodlands in England, Wales and Scotland. The digital version of the Inventory for Wales was first published in 2004 and is available from the Forestry Commission (Forestry Commission, 2016). The Ancient Woodland Inventory places woodland into one of four categories (Natural Resources Wales, 2016):

- **Ancient Semi-Natural Woodland (ASNW)** – broadleaf woodlands comprising mainly native tree and shrub species which are believed to have been in existence for over 400 years.
- **Plantation on Ancient Woodland Sites (PAWS)** – sites which are believed to have been continuously wooded for over 400 years and currently have a canopy cover of more than 50 percent non-native conifer tree species.
- **Restored Ancient Woodland Sites (RAWS)** – woodlands which are predominately broadleaves now and are believed to have been continually wooded for over 400 years. These woodlands will have gone through a phase when canopy cover was more than 50% non-native conifer tree species and now have a canopy cover of more than 50 percent broadleaf.
- **Ancient Woodland Site of Unknown Category (AWSU)** – woodlands which may be ASNW, RAWS or PAWS. These areas are predominantly in transition and existing tree cover is described as 'shrubs', 'young trees', 'felled' or 'ground prepared for planting'.

Boundaries of woodland within the Inventory were deduced from the earliest available mapping. For most of Wales, in particular for Anglesey, this is the 1st edition of the Ordnance Survey (OS), *circa* 1830 and at a scale of one inch to the mile. The later six inch to the mile OS county series dates from 1888 to 1913. Given such recent documentary evidence, 'the AWI was always considered to be provisional and subject to refinement and was never intended as a definitive listing of ancient ... woods' (Natural Resources Wales, 2016).

1.2 Ancient Woodland Indicators

The work of Rackham, Peterken and others gave rise to the concept of Ancient Woodland Indicator (AWI) plants. These are species of fern and flowering plant associated primarily with woodland which on other grounds would be accepted as ancient in origin, and which might be slow to disperse into more recent woodland. Lists of AWI have been published for the southern-most regions of England (collated e.g. in Rose & O'Reilly (2006)), where the documentary evidence is sufficient to substantiate a correlation between continuity of woodland and the occurrence of certain plant species. The concept of AWI is widely applied by analogy to other parts of Britain where such evidence is lacking.

The AWI concept is not without its limitations. Some listed AWI species are popular garden plants (e.g. primrose [*Primula vulgaris*] or hart's-tongue fern [*Asplenium scolopendrium*]); the use of these as AWI for a given wood

therefore needs to be weighed against the proximity of habitation and signs of human influence on the woodland flora. Some species are also considered as AWI in some parts of the country but not others, due to absence or being non-native there, or because they are found widely outside of ancient woodland.

A convincing ancient woodland may contain at least 15 to 20 AWI, but some may contain very few. Some species, especially those forming colonies (e.g. bluebell [*Hyacinthoides non-scripta*]), spread readily from ancient woodland into suitable neighbouring habitat, while other species are more reliable indicators (such as oxlip [*Primula elatior*]). A range of evidence should therefore be used when investigating the origin of woodland.

2. Survey Methodology

The botanical survey of the three woodlands took place on 6th June 2016 and aimed to:

- assign, where possible, each woodland to a community code within the National Vegetation Classification;
- compile a list of vascular plants and mosses and liverworts (bryophytes) found in each wood, paying particular attention to AWI species and non-native species; and,
- take note of human influences on the woodland, ancient or recent.

Vascular plant nomenclature follows Stace (2010), Bryophytes of walls and other man-made structures within the woods were ignored, as were those of weedy situations. The nomenclature for bryophytes follows Hill *et al* (2008).

Photographs were taken of each wood and are included in Appendix B.

2.1 National Vegetation Classification

The National Vegetation Classification (NVC) is based upon a sample of semi-natural vegetation across the UK, and aims to describe the national range of floristic trends. The assignment of units within this classification relies upon the identification of floristically uniform stands, i.e. the largest area of vegetation in which the most conspicuous species are present at a more-or-less constant frequency. Zones where these community dominants change are ignored or sampled separately.

The NVC sampling methodology for woodlands is outlined in Hall, et al. (2004), and is by means of quadrats of fixed size with at least five replicates. From the replicates a so-called floristic table is compiled, and this is either inputted into a computer program able to calculate which NVC community statistically best fits the results, or used more informally to work through the keys to communities published in the above guide or in the woodland volume of the NVC (Rodwell, 1991).

For the present survey the small size of the woodlands meant that sufficient replicates would overlap considerably. Moreover, the Manor Garden and Simdda-Wen woodlands were perceived to be so uniform as to make recording these small woods *in toto* the most sensible approach. While slightly larger and less uniform, the ground and shrub layers of The Firs Hotel were found to consist almost entirely of either non-native garden plants or 'weedy' plants, and bore no resemblance to any semi-natural woodland ground or shrub layer flora. This wood was therefore also recorded in entirety with more attention paid to the canopy composition, which was more uniform, in the determination of NVC category.

For each species recorded in each wood, its frequency across the wood was assigned using the DAFOR system, where

D = dominant species, A = abundant, F = frequent, O = occasional and R = rare.

The prefix 'local' may be added to The Firs Hotel three to indicate heterogeneity in distribution; thus, LA means 'locally abundant'.

While not standard practice, this approach is sufficient to enable one to use the keys to woodland communities, together with their descriptions, to reach a determination. This was felt to be the simplest approach for such small, uniform woodlands with limited sampling options.

2.2 Limitations

Many woodland plants typically emerge from dormancy and flower in spring and early summer. With the timing of the present survey, therefore, there is the possibility that some species were missed, while some may have been misidentified or unidentifiable, e.g. native vs hybrid bluebell (*Hyacinthoides x massartiana*). Every effort was made to identify plants from dead remains or from vegetative material.

3. Results and Discussion

The flora of the three woods surveyed is described below and NVC affinities explained. The extent to which these and other results of the survey support the status of the woods as ancient is then discussed.

3.1 Woodland Flora and NVC Affinities

Lists of vascular plant and bryophyte taxa for each wood together with their relative frequency can be found in Appendix A.

The canopies of all three woods were found to be dominated by mature sycamore (*Acer pseudoplatanus*), a non-native species. That of The Firs Hotel was a little more varied than the others, with frequent ash (*Fraxinus excelsior*) and common lime (*Tilia x europaea*), and occasional wild cherry (*Prunus avium*). Manor Garden and The Firs Hotel both contained a small number of mature pine trees (*Pinus* spp.). There was no direct evidence of planting of any of the trees, but at least common lime and pine species are presumed to have been planted. None of the trees appeared to be older than a hundred and fifty years, most were likely much younger; those in Simdda-Wen were mostly not more than fifty years in age.

Assuming that these woods are semi-natural, the overall prevalence of sycamore with an appearance by ash, and the lack of oak (*Quercus* spp.) or other generally more calcifugous trees, indicates for all three woodlands an affinity with either W8 *Fraxinus excelsior* – *Acer campestre* – *Mercurialis perennis* woodland or its more oceanic relative W9 *F. excelsior* – *Sorbus aucuparia* – *M. perennis* woodland. The complete absence, however, of dog's mercury (*Mercurialis perennis*) casts some doubt on these assignments, though it could have been grazed out of the Manor Garden woodland. Indeed, the ground flora tended to be of rather generic shade tolerant species, with none of the species usually indicative of these calcicolous woodland types, e.g. wood false-brome (*Brachypodium sylvaticum*).

The woods are further discussed individually.

3.1.1 Manor Garden Manor Garden

The canopy composition of Manor Garden is described above. Two footpaths/tracks pass through the wood, meeting at the gate at its southern boundary: that running to the west has very little tree cover and is very grassy; the canopy over the main track heading north is more-or-less complete (Photo 1). The woodland ends abruptly in neutral grassland.

Manor Garden was largely lacking in a native shrub layer except for the occasional hawthorn (*Crataegus monogyna*). There were three moderately sized elms (*Ulmus*) intermediate between shrub and canopy layers. Two of these trees most resembled wych elm (*U. glabra*) but the third appeared to be a cultivar. Wych elm is frequently regarded as an AWI but it is a common tree in the west of Britain, where it is not an especially strong indicator of old woodland, and may also be planted. There were also several bushes of garden privet (*Ligustrum ovalifolium*) and a laburnum (*Laburnum anagyroides*).

In the field layer, lesser celandine (*Ficaria verna* subsp. *verna*) appeared to have been widespread and abundant earlier in the year, and together with the frequent occurrence of wood dock (albeit as the presumed non-native red-veined variety *Rumex sanguineus* var. *sanguineus*) this suggests an affinity with the W8b *Anemone nemorosa* subcommunity rather than either of the subcommunities of W9. Otherwise, the ground flora was a species-poor sward dominated by rough meadow grass (*Poa trivialis*) with a small number of weedy herbs of low total cover, a situation likely attained through grazing by sheep. The southern corner by the wall held a small colony of bluebell (*Hyacinthoides non-scripta*), but there were otherwise no species one might consider as AWI. There were also several plants of the non-native pink sorrel (*Oxalis articulata*), usually a garden relict

3.1.2 Simdda-Wen

The woodland by the Simdda-Wen was in two parts: a small block in the west, closest to the club, and a larger one to the east; a treeless, grassy area separated the two and the southern perimeter was bounded by walls (Photo 4).

Of the three woodlands surveyed, this had perhaps the most natural shrub flora, with English elm (*Ulmus procera*) and hawthorn frequent and hazel (*Corylus avellana*) occasional in the eastern part of the wood, and wych elm present in the western.

The ground flora had abundant cleavers (*Galium aparine*) and cow parsley (*Anthriscus sylvestris*), frequent herb robert (*Geranium robertianum*), stinging nettle (*Urtica dioica*), and was also rather grassy with rough meadow grass frequent (Photo 5). Garden cultivars of daffodil (*Narcissus* sp.) were present in some quantity in the western block of the wood, but of less certain origin were the frequent primrose and, in the eastern half, abundant ramsons (*Allium ursinum*). There was some bluebell in the eastern block of woodland; this was difficult to identify at the time of survey but was probably the hybrid garden bluebell. Under the wall in the western block were also a few plants of hart's-tongue fern and male fern (*Dryopteris filix-mas*). The former species, considered an AWI in southern Britain, appeared to be a natural population.

The general 'weedy' appearance of the ground flora described above suggests an affinity with W8e *Geranium robertianum* subcommunity. The abundance of ramsons in the western block of the wood might also suggest an affinity with W8f *Allium ursinum* subcommunity, but this was such a small area as to be almost meaningless.

3.1.3 The Firs Hotel

There was a drive running through The Firs Hotel either side of which were mature trees. These did not meet over the track, leaving it well illuminated (Photo 6). The woodland was confined to either side of the track, with the tree cover breaking around a small 'glade', and a large opening where once there had been a building (Photo 7).

The highly derivative nature of the ground and shrub layers, which contained many non-native garden herbs (such as elephant ears [*Bergenia crassifolia*] and monk's hood [*Aconitum napellus*]) and shrubs (such as New Zealand holly [*Olearia macrodonta*] and rhododendron [*Rhododendron ponticum*]) together with 'weedy' plants suggestive of abandonment, makes it impossible to determine the precise NVC affinities of this wood. Indeed, the NVC was devised to describe semi-natural vegetation, which The Firs Hotel gave very little appearance of being.

Garden bluebell was abundant in one corner of the wood, together with a small colony of ramsons and several plants of hart's-tongue fern. The latter two species might be considered AWI but are common garden plants also, and so their status as AWI should be questioned in this situation.

3.2 Status as Ancient Woodland

All three of the woods were associated with built structures: Manor Garden with a gateway and drive (the house, Wylfa, being long since demolished; Figure 2), the wood having the appearance of an avenue of trees (Appendix B, Photo 2); Simdda-Wen with the adjacent Simdda-Wen, its carpark and enclosing walls (Photo 4); while The Firs Hotel was clearly the woodland garden of a demolished dwelling (Photo 6), the site now in use as a petrol dump. This same relationship between the woods and buildings is clear also on the OS six inch map of 1888-1913 (Figure 2). The modern structures were clearly relatively recent, and there was no evidence of older land use. Indeed, such evidence (e.g. earthworks) is unlikely to be found in such tiny woods.



Figure 2. The three woodlands on the OS six inch map with ancient woodland inventory boundary overlaid (in green): Manor Garden along the drive to Wylfa; Simdda-Wen next to Simdda-wen; and The Firs Hotel, around the house of that name. OS six inch series 1888-1913 courtesy of National Library of Scotland

Given the above, the lack of support for ancient ecological continuity and the frequency of non-native tree, shrub and herb species, it is considered that there is insufficient evidence to regard any of the three woods as ancient in origin.

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Appendix A. Species Lists

Table 2. Vascular plants recorded from Fisherman's Carpark woodland

Scientific name	Common name	Frequency
Canopy layer		
<i>Acer pseudoplatanus</i>	sycamore	D
<i>Fraxinus excelsior</i>	ash	R
<i>Pinus pinaster</i>	maritime pine	R
<i>Quercus robur</i>	oak	R
<i>Ulmus cf. x hollandica</i>	Dutch elm	R
<i>Ulmus glabra</i>	wych elm	R
Shrub layer		
<i>Crataegus monogyna</i>	hawthorn	O
<i>Laburnum anagyroides</i>	laburnum	R
<i>Ligustrum ovalifolium</i>	garden privet	R
<i>Rubus fruticosus</i> agg.	bramble	R
<i>Sambucus nigra</i>	elder	R
<i>Ulex europaeus</i>	gorse	R
Ground layer - grasses		
<i>Anthoxanthum odoratum</i>	sweet vernal-grass	O
<i>Dactylis glomerata</i>	cock's-foot	F
<i>Festuca rubra</i>	red fescue	R
<i>Poa annua</i>	annual meadow grass	R
<i>Poa trivialis</i>	rough meadow grass	D
Ground layer - forbs		
<i>Acer pseudoplatanus</i> (seedling)	sycamore	R
<i>Anthriscus sylvestris</i>	cow parsley	R
<i>Arctium minus</i>	lesser burdock	R
<i>Cerastium fontanum</i>	common mouse-ear	R
<i>Ficaria verna</i> subsp. <i>verna</i>	lesser celandine	A
<i>Galium aparine</i>	cleavers	F
<i>Glechoma hederacea</i>	ground ivy	R
<i>Heracleum sphondylium</i>	hogweed	F
<i>Hyacinthoides non-scripta</i>	bluebell	R
<i>Oxalis articulata</i>	pink sorrel	R
<i>Potentilla reptans</i>	creeping cinquefoil	R
<i>Ranunculus repens</i>	creeping buttercup	O
<i>Rumex acetosa</i>	common sorrel	R
<i>Rumex sanguineus</i> var. <i>sanguineus</i>	wood dock	F
<i>Stellaria media</i>	chickweed	F
<i>Taraxacum officinale</i> agg.	dandelion	R
<i>Trifolium repens</i>	white clover	R
<i>Urtica dioica</i>	stinging nettle	F
<i>Veronica hederifolia</i> subsp. <i>lucorum</i>	ivy-leaved speedwell	F

Bryophytes

Kindbergia praelonga

R

Table 3. Vascular plants recorded from Simdda-Wen woodland

Scientific name	Common name	Frequency
Canopy layer		
<i>Acer pseudoplatanus</i>	sycamore	D
<i>Aesculus hippocastanum</i>	horse chestnut	R
<i>Fraxinus excelsior</i>	ash	R
<i>Tilia x europaeus</i>	common lime	R
Shrub layer		
<i>Corylus avellana</i>	hazel	O
<i>Crataegus monogyna</i>	hawthorn	F
<i>Ilex aquifolium</i>	holly	R
<i>Ulmus glabra</i>	wych elm	R
<i>Ulmus procera</i>	English elm	F
Ground layer - grasses		
<i>Alopecurus pratensis</i>	meadow foxtail	F
<i>Dactylis glomerata</i>	cock's foot	F
<i>Festuca rubra</i>	red fescue	F
<i>Holcus lanatus</i>	Yorkshire fog	F
<i>Poa trivialis</i>	rough meadow grass	A
Ground layer - forbs		
<i>Allium ursinum</i>	ramsons	LA
<i>Anthriscus sylvestris</i>	cow parsley	A
<i>Asplenium scolopendrium</i>	hart's-tongue fern	R
<i>Chamerion angustifolium</i>	rosebay willowherb	R
<i>Dryopteris filix-mas</i>	male fern	R
<i>Ficaria verna</i> subsp. <i>verna</i>	lesser celandine	F
<i>Galium aparine</i>	cleavers	A
<i>Geranium robertianum</i>	herb robert	F
<i>Hedera helix</i>	ivy	F
<i>Heracleum sphondylium</i>	hogweed	F
<i>Hyacinthoides x massartiana</i>	garden bluebell	F
<i>Lapsana communis</i>	nipplewort	O
<i>Narcissus</i> sp. (cultivar)	daffodil	F
<i>Primula vulgaris</i>	primrose	F
<i>Ranunculus repens</i>	creeping buttercup	F
<i>Rumex obtusifolius</i>	broad-leaved dock	O
<i>Senecio jacobaea</i>	ragwort	R
<i>Smyrniolum olusatrum</i>	alexanders	F
<i>Urtica dioica</i>	stinging nettle	F
<i>Veronica hederifolia</i> subsp. <i>lucorum</i>	ivy-leaved speedwell	O

Bryophytes

Kindbergia praelonga

R

Table 4. Vascular plants recorded from The Firs Hotel woodland

Scientific name	Common name	Frequency
Canopy layer		
<i>Acer pseudoplatanus</i>	sycamore	A
<i>Aesculus hippocastanum</i>	horse chestnut	F
<i>Fraxinus excelsior</i>	ash	F
<i>Pinus nigra</i>	black pine	R
<i>Prunus avium</i>	wild cherry	O
<i>Salix caprea</i>	pussy willow	R
<i>Tilia x europaea</i>	common lime	O
Shrub layer		
<i>Berberis</i> sp.	a berberis	R
<i>Buddleja davidii</i>	Buddleja	R
<i>Crataegus monogyna</i>	hawthorn	O
<i>Eucalyptus</i> sp.	a eucalyptus	R
<i>Laurus nobilis</i>	laurel	R
<i>Olearia macrodonta</i>	New Zealand holly	F
<i>Rhododendron ponticum</i>	rhododendron	F
<i>Rosa multiflora</i>	many-flowered rose	R
<i>Rosa rugosa</i>	Japanese rose	R
<i>Rubus fruticosus</i> agg.	bramble	F
<i>Thuja plicata</i> (cultivar)	western red-cedar	R
<i>Ulmus glabra</i>	wych elm	R
<i>Viburnum opulus</i> (cultivar)	guelder rose	R
Ground layer - grasses		
<i>Anthoxanthum odoratum</i>	sweet vernal-grass	R
<i>Arrhenatherum elatius</i>	false oat-grass	O
<i>Festuca rubra</i>	red fescue	F
<i>Holcus lanatus</i>	Yorkshire fog	F
<i>Poa trivialis</i>	rough meadow grass	F
Ground layer - forbs		
<i>Aconitum napellus</i>	monkshood	R
<i>Allium ursinum</i>	ramsons	R
<i>Anthriscus sylvestris</i>	cow parsley	O
<i>Asplenium scolopendrium</i>	hart's-tongue fern	R
<i>Bellis perennis</i>	daisy	F
<i>Bergenia crassifolia</i>	elephant ears	R
<i>Carex pendula</i>	pendulous sedge	O
<i>Cerastium fontanum</i>	common mouse-ear	F
<i>Chamerion angustifolium</i>	rosebay willowherb	R
<i>Cirsium arvense</i>	creeping thistle	F

<i>Cirsium vulgare</i>	spear thistle	F
<i>Crocosmia x crocosmiiflora</i>	crocosmia	F
<i>Epilobium montanum</i>	broad-leaved willowherb	F
<i>Galium aparine</i>	cleavers	A
<i>Geranium robertianum</i>	herb robert	A
<i>Hedera helix</i>	ivy	A
<i>Helminthotheca echinoides</i>	prickly ox-tongue	O
<i>Hyacinthoides x massartiana</i>	garden bluebell	O
<i>Matricaria discoidea</i>	pineapple weed	R
<i>Medicago lupulina</i>	black medick	R
<i>Myosotis arvensis</i>	field forget-me-not	F
<i>Narcissus</i> sp. (cultivar)	daffodil	O
<i>Pentaglottis sempervirens</i>	green alkanet	R
<i>Plantago lanceolata</i>	ribwort plantain	F
<i>Plantago major</i>	greater plantain	R
<i>Prunella vulgaris</i>	self-heal	O
<i>Ranunculus repens</i>	creeping buttercup	F
<i>Rumex sanguineus</i> var. <i>viridis</i>	wood dock	F
<i>Ruscus aculeatus</i>	butcher's broom	R
<i>Sagina procumbens</i>	procumbent pearlwort	R
<i>Sedum album</i>	white stonecrop	R
<i>Senecio jacobaea</i>	ragwort	O
<i>Silene dioica</i>	red campion	A
<i>Smyrniololus atrum</i>	alexanders	A
<i>Stellaria media</i>	chickweed	O
<i>Trifolium repens</i>	white clover	F
<i>Urtica dioica</i>	stinging nettle	A

Appendix B. Photographs



Photo 1. Manor Garden looking north along the track from gate

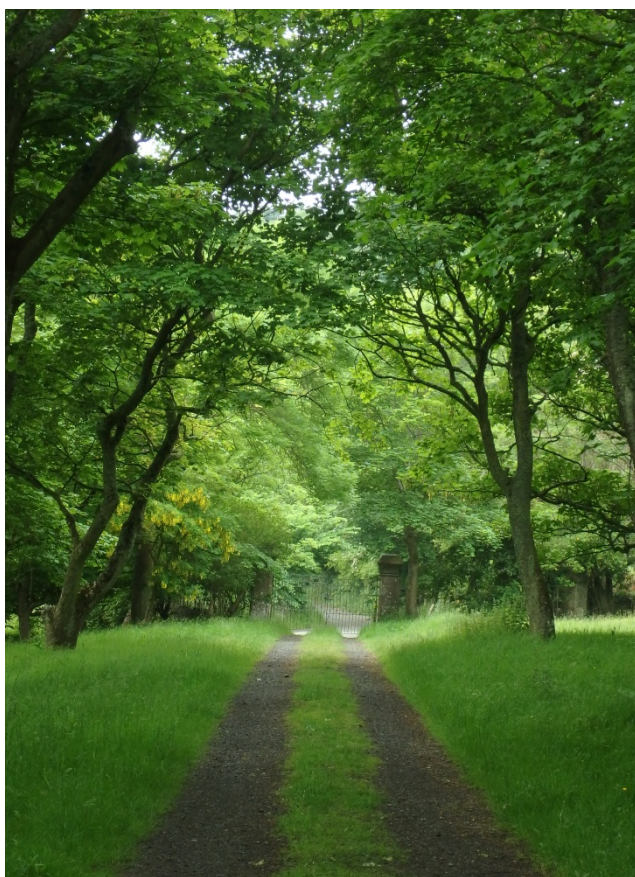


Photo 2. Looking south back along the track toward the gated entrance



Photo 3. The corner of the woodland along the wall with a few bluebells, beginning to fruit and not visible



Photo 4. Looking toward Simdda-Wen woodland from the Carpark: the Ancient Woodland Inventory refers to the block of woodland on the left and the small group of trees on the right as ancient woodland.



Photo 5. The ground flora of Sport and Social Club, dominated by cow parsley and cleavers. Note the youth of the trees.



Photo 6. The drive running through The Firs Hotel from the road. The concrete raised bed along the drive is visible on the left.



Photo 7. Open area adjacent to woodland, site of former habitation, colonized by wild and garden plants