

LIFFEY VALLEY SPECIAL AMENITY AREA ORDER

Ordú Limistéar Thaitneamhach Speisialta Gleann na Lifé

Flora Survey Report

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Áras i Roinn na Luibheolaíochta, Ollscoil Átha Cliath, Coláiste na Tríonóide

for:

Fingal County Council *Comhairle Contae Fhine Gall*: Parks Division

Summer 2005

Samhradh 2005

*When glades were green
where Dublin stands to-day
And limpid Liffey,
fresh from wood and wold
Bridgeless and fordless,
in the lonely Bay
Sank to her rest
on sands of stainless gold.....*

Samuel Ferguson, from 'Mesgedra:
A Lay of the Western Gael'



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Summary

The Liffey Valley Special Amenity Area Order was established in 1990 by the Minister for the Environment, officially recognizing the Liffey Valley region of southern Fingal as an area of scientific interest and “outstanding natural beauty.” Under the statutes created during establishment of the Protection Order, it is required that the SAAO area be reviewed every five years to assess the impact of recreational pressure, amenity, development, conservation efforts, and other short and long-term management plans for the region (*Fingal Co.Council*).

To assist in the five-year review of the SAAO area, the author, under the supervision of Dr. Daniel Kelly of Trinity College, Dublin, was employed by the Parks Division of Fingal County Council to produce a flora survey of the woodlands in the Liffey Valley. The survey attempts to give a comprehensive view of the plant community structure of the major woodlands found in the Liffey Valley SAAO, particularly in the walled demesnes of Luttrellstown, Knockmaroon & St. Catherine’s. Whilst the survey focused mainly on woodland vegetation, calcareous grasslands were also sought out for study since they are rare and declining habitats classified as an Annex I priority habitats of the EU Habitats Directive; and support many rare species, including orchids (Fossitt 2000). The combined information found in this report will be made available to local authorities and to the public as a powerful tool for the conservation of vulnerable and species-rich habitats.

Woody Species

The tree composition of the three major Liffey Valley woods is a product partly of planting history and partly of natural conditions. Of the three wooded demesnes, Luttrellstown was found to have the most species as well the highest value for Oak (*Quercus robur*, *Q. petraea* and putative hybrids). St. Catherine’s and Knockmaroon, in contrast, are dominated by a mixture of native *Fraxinus excelsior* (Ash) and exotic *Fagus sylvatica* (Beech). Knockmaroon also has a large population of *Pinus sylvestris* (Scots Pine) and the even-aged nature and distribution of the stand clearly indicates that they were planted. The understory is well-developed in both St. Catherine’s and Luttrellstown, with sizeable *Corylus avellana* (Hazel), *Ulmus glabra* (Wych Elm) and *Ilex aquifolium* (Holly). It is sparser in Knockmaroon, with grassland species in the ground flora and shade-intolerant *Ulex europaeus* (Gorse), *Rosa canina* agg. (Dog-Rose), and *Crataegus monogyna* (Whitethorn) in the shrub layer; suggesting clearance of much of the wood in the recent past, an observation further supported by the general lack of woodland on maps of the area pre-dating the late 19th century (*Ordnance Survey Ireland 1847-1901*). Alien and potentially invasive species such as *Prunus laurocerasus* (Cherry-laurel), *Daphne laureola* (Spurge-laurel) and *Symphoricarpos albus* (Snowberry) are often present in the shrub layer, especially at Luttrellstown and Knockmaroon. Knockmaroon also has sapling and seedling *Quercus cerris* (Turkey Oak) and *Q. ilex* (Holm Oak) in the understory, two exotic species currently considered to have low recruitment potential in Ireland (Reynolds 2002); but which are invasive in parts of Great Britain (Stace 1997) and may be expected to become so here in response to climate change.

Herbaceous Flora

The existence of a well-developed ground flora comprised mainly of native calcicolous herbs in St. Catherine's and Luttrellstown denotes a strong affinity with the Corylo-Fraxinetum association of native woodlands over limestone (Kelly & Kirby 1982). In these two wooded demesnes of the Liffey Valley, the presence of rare or slow-to-establish woodland specialists indicates a long period of continuous forest cover, and even suggests possible ancient woodland status. These woods contain (or formerly contained) three species that are on the shortlist of species considered indicators of ancient woodland in Ireland (Henry 1914, Praeger 1934): *Monotropa hypopitys* (Yellow Birds-nest), *Lathraea squamaria* (Toothwort) and *Milium effusum* (Wood Millet). Of these, only *Milium* and *Lathraea* were found in the Liffey Valley woods during the course of this study.

Additional noteworthy species found in the Liffey Valley, and not necessarily in woodlands, include *Sanguisorba minor* (Salad Burnet), *Lamium galeobdolon* ssp. *montanum* (Yellow Archangel), *Senecio erucifolius* (Hoary Ragwort), *Orobancha hederæ* (Ivy Broomrape), the endangered *Scrophularia umbrosa* (Green Figwort), and the nationally protected Red Data Book species, *Hypericum hirsutum* (Hairy St. John's Wort) (Curtis & McGough 1988).

The existence of species-rich habitats, as well as ancient and secondary woodland, in such close proximity to the rapidly developing urban centre of Dublin raises concerns regarding the necessity of establishing conservation methods and guidelines to protect these areas from further development. Also critically needed are controls on the increasing levels of recreational pressure, since diminishing green spaces and the subsequent overuse of those remaining may result in vulnerable habitats and species being trampled into oblivion. Consistent monitoring is necessary and potential developers and the public should be directed away from areas containing sensitive species and those in which natural regeneration has declined due to mismanagement and overuse. Alien and potentially invasive species also need to be controlled, particularly in unique and threatened habitats, whilst other highly fragmented habitats should be expanded to enable the persistence and proliferation of the native flora. With care and thoughtful management, the beauty and distinctiveness of the Liffey Valley will remain for generations to come.

1.0 INTRODUCTION

1.1 Study Area

The Liffey Valley Special Amenity Area Order comprises a region of approximately 200 square kilometers in Dublin spanning from Leixlip on the border of County Kildare in the west to Chapelizod, Castleknock, and the Knockmaroon Gate of Phoenix Park in the east (*Fig. 1*). The area is bordered by the N4 motorway (Escher Ridge) to the south and the Royal Canal to the north (*Map 1*). The region encompasses much of the scenic valley of the River Liffey, as well as a part of the nearby glacial Escher Riada, all within the borders of Dublin and Fingal regions (formerly North County Dublin). This shallow and broad river valley has a long history of human use and still preserves a great deal of the character of bygone days. The valley also has tremendous ecological

significance in the form of a wide variety of habitats which support diverse plant and animal species, including some not found elsewhere in Ireland. The Liffey Valley Special Amenity Area Order, hereafter called the SAAO, was established in 1990 by the Minister for the Environment to preserve the natural and cultural heritage of this area from the encroaching urban and suburban sprawl in recent years of the adjacent city of Dublin (*Dublin Co. Council, 1993*). Parts of the Liffey Valley are now a proposed Natural Heritage Area (pNHA) under the Wildlife Act of 2000 and the SAAO area may even be expanded in the near future (*Fingal Co. Council*).

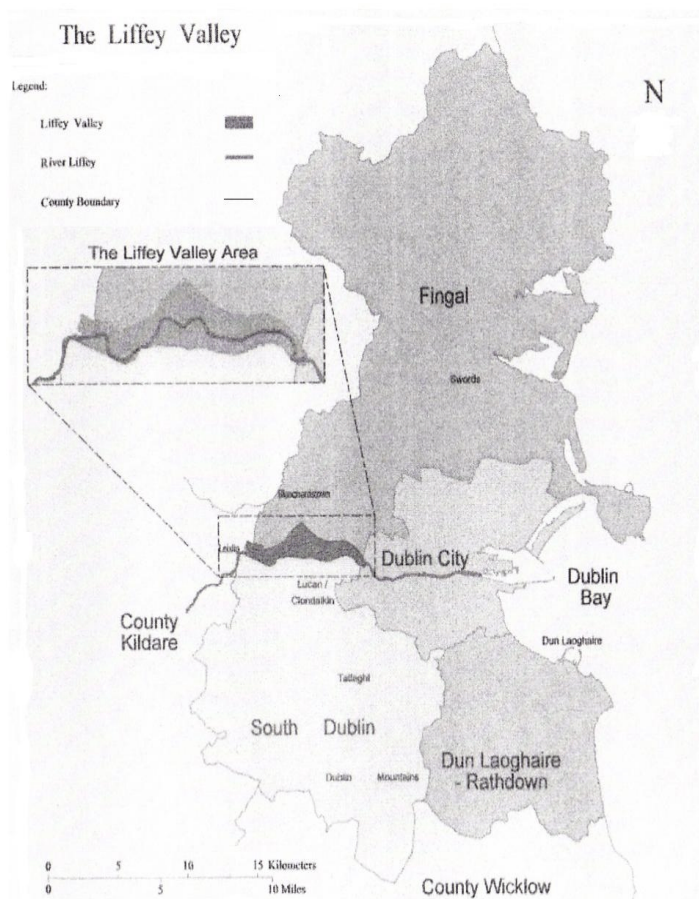


Figure. 1. The Liffey Valley area of interest within the Tri-County area of Dublin, Kildare and Meath. (*Source: Fingal County Council*).

1.2 Problems

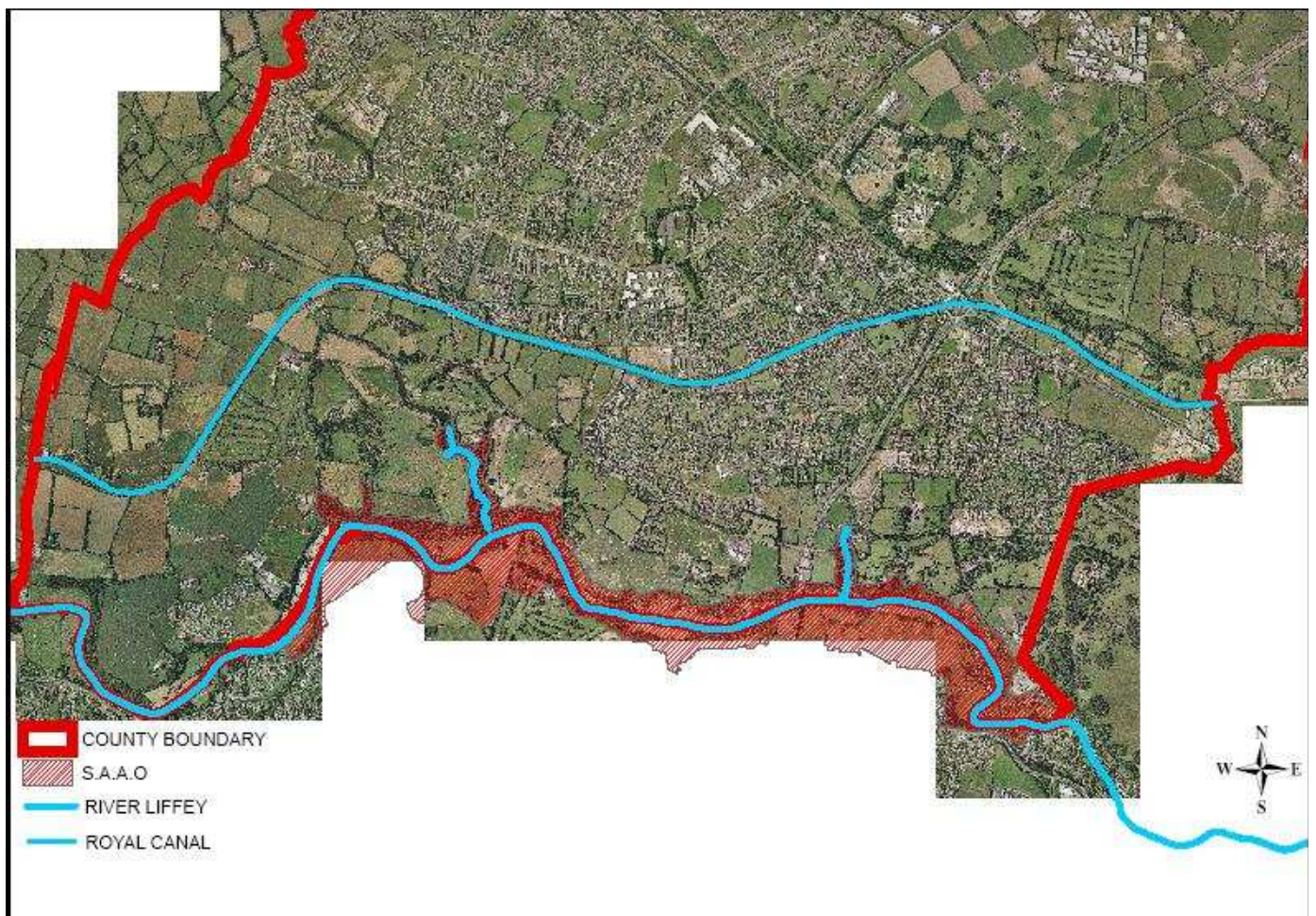
The success of the ‘Celtic Tiger’ economies of recent years has brought unprecedented economic growth to Ireland, especially to the greater Dublin area. This rapid development and growth has put considerable strain on Ireland’s natural resources and the Liffey Valley area is no exception. The growth of the city of Dublin has resulted in a migration outwards to quieter suburban and rural areas, and what were formerly small, isolated villages and hamlets linked only by winding country roads have become subsumed into the expanding capital city. As of the 2002 census, Fingal alone boasted a population of 196,413 people, making it the 4th largest district in Ireland with approx. 5% of the national population. The recent 2006 census has revealed a still-expanding population of nearly 240,000, the result of an increase of 43,400 people in the district since 2002. This is a growth rate of nearly three times the national average and this figure is expected to rise as the population grows in excess of 260,000 people by 2010, making Fingal the fastest growing region of Ireland (www.fingal.ie, *Fingal Development Board 2006*).

The rapid growth has resulted not only in the loss of agricultural lands and many historic and cultural treasures, but it is also causing considerable environmental degradation and the loss of flora and fauna of natural, amenity, and recreational areas that are now either being engulfed in housing development, or are experiencing an unprecedented level of human use and traffic. In addition, the modern phenomenon of agricultural ‘intensification’ has enabled farmers to generate more produce on less land using synthetic fertilizers and pesticides, as well as heavy machinery. The ensuing pollution, erosion, and eutrophication of soils and waterways caused by the leaching of excess fertilizers and manure has put an even greater strain on the remaining habitats, including those that are protected from further development. Also, the current tendency towards highly efficient methods of tillage produces ‘clean’ fields in which the vegetation of field boundaries and hedgerows have been removed to eradicate possible weedy competitors and to enable the maximum amount of space to be utilized for desirable crop species. In livestock farming, wire fencing has largely replaced hedgerows in many areas; and as with golf courses, formerly mixed grasslands are often removed and replanted with a pure sward of more productive grass species such as *Lolium perenne*, which are deemed easier for modern stock breeds to digest. Other amenity grasslands are simply ‘improved’ by the application of fertilizers, which produces a nitrophilous and species-poor sward. The resulting effects on wild flora and fauna have been catastrophic. Hedgerows, grassy verges, field margins, riparian zones, woodlands, and even moderately grazed, mixed grasslands are all essential for the movement and survival of wild plant and animal species, acting as reservoirs or corridors of safety in an otherwise hostile and largely agricultural landscape. Their destruction and large-scale disturbance results in the impoverishment of Ireland’s distinctive flora and fauna.

1.3 Flora Survey and Aims

In the summer of 2005, a vascular plant study of the Liffey Valley SAAO area, funded by the Parks Division of Fingal County Council, was carried out by the author under the direction of Dr. Daniel Kelly of the Botany Department at Trinity College Dublin (TCD). This study comprises only that part of the SAAO area contained within the boundaries of Fingal and focuses on remaining woodland and grassland habitats in the area, both inside the SAAO and the surrounding study area, as well as some of the emergent and marginal vegetation of the River Liffey and its tributaries (*Map 1*). It is one of several projects funded by the Parks Division to obtain a clearer picture of the diverse habitats to be found within the jurisdiction of Fingal, the plants and animal species they contain, and which areas are in need of the greatest attention. The focus is to map the various habitats using

Geographic Information System capabilities (GIS), establish critical areas, and to come up with a low-intensity, low-cost management plan for the valley that accommodates the needs of all the inhabitants of the SAAO area, human, plant and animal. In addition, rare vascular plant species are identified and mapped on GIS maps using Global Positioning Satellite coordinates (GPS) and their habitats prioritized for future “action-plans” that aim to preserve, protect and even possibly, expand the habitats of noteworthy species.



Map 1. The Liffey Valley SAAO study area within the Fingal region. The current extent of the SAAO is marked in red, while the study area contained within Fingal’s jurisdiction lie between this and the Royal Canal to the north and extends from Chapelizod in the east to Leixlip in the west. *OSI map Discovery Series. 3rd ed. Reduced from a scale of 1:50,000. Reproduced with permission from Ordnance Survey Ireland and Fingal Co.Council.*

1.4 Natural History of the SAAO Area

1.4.1 Geology and Soils of the SAAO Area

The vegetation of the Liffey Valley, although much altered by the activities of man, owes a great deal of its structure and composition to the underlying geology of the area. Much of the valley sits on a relatively flat early Carboniferous limestone plain that stretches across the midlands to the west of

Ireland and is rimmed by mountains roughly to the north and south, of which only the Dublin and Wicklow Mountains to the south and southeast are directly involved in the hydrological cycle of the River Liffey (Fig.2). On this undulating limestone plain are many distinctive features laid down by successive periods of glaciation, including drumlins, pingos, kettle-holes and glacial drift, often in the form of eskers, kames and moraines (Figure 3). These all give Ireland's landscape its low, hilly relief. The River Liffey is a former glacial "drain" for the meltwater of icecaps that once crowned the Dublin and Wicklow Mountains to the south, and it empties into Dublin Bay over a glaciofluvial terrace upon which the modern city of Dublin sits.

The Liffey Valley to the west and south is bounded by glacial deposits and eskers, the most significant of which is the famed Esker Riada (*Eiscir Riada*), which has its 'official' beginning at Esker, near Lucan township, although it actually begins beneath the streets of Dublin, near ChristChurch. Eskers are ridges of sand and gravel alluvial deposits formed by the meltwater streams of ancient glaciers. When the glaciers retreated at the end of the last Ice Age (Midlandian), these ridges were left standing above the surrounding lowlands. They were in ancient times used as major thoroughfares across areas of treacherous bog. In fact, the word

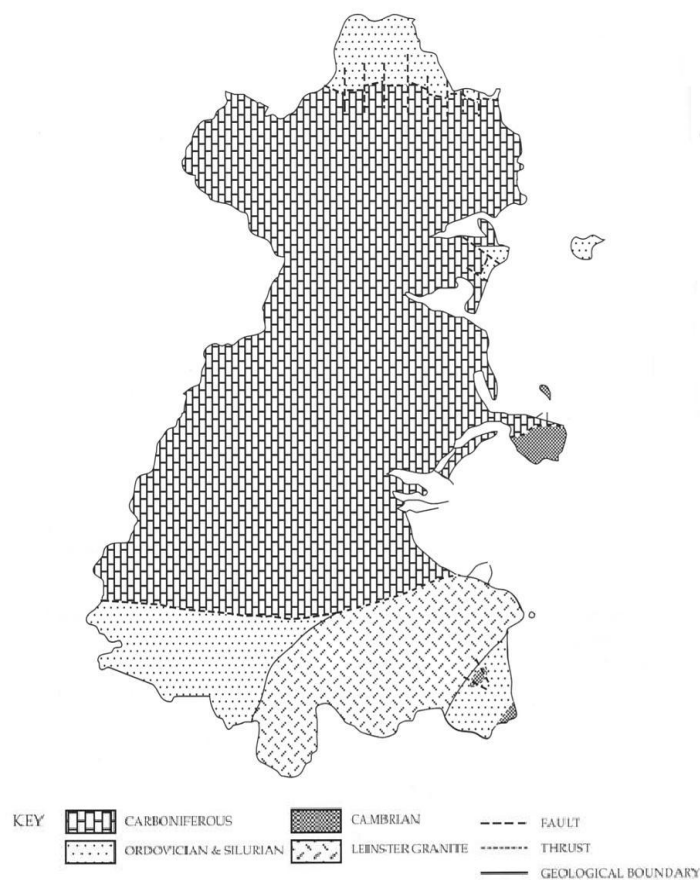


Figure 2. Simplified map of the geology of County Dublin.
Source: *The Flora of County Dublin* (Doogue 1998)

'esker' comes from the Irish word *eiscir*, which was applied to any raised, and therefore dry, glacial deposit that could be used as a natural causeway over the low areas of the Irish Midlands. The Esker Riada was a 'royal' processional way and one of the five ancient roads of Tara, the *Slí Mor*, or 'Great Highway' that crossed the low and boggy central plain of Ireland, joining the royal provinces of the east with those in the west. Today, although like many eskers throughout Ireland, the Esker Riada is much altered and diminished by road-straightening and quarrying, the N4 motorway from Dublin to Galway still follows much of this ancient esker road, passing above the Liffey valley and the towns of Lucan and Leixlip before crossing the plains of Kildare on its journey west.

In much of the province of Leinster, to which County Dublin belongs, the Carboniferous limestone bedrock is covered with a layer of highly alkaline glacial “till”, or boulder clay, which is an undifferentiated mix of clay and gravel often studded with limestone boulders and pulverized rock (*Figure 3*). In his *A Topographical Dictionary of Ireland*, Samuel Lewis described the soils of the Dublin/Fingal region as “generally shallow, being chiefly indebted to the manures from the metropolis (Dublin) for its high state of improvement.” He also describes it as being “argillaceous, though everywhere containing an admixture of gravel, which may generally be found in abundance within a small depth of the surface (1837)”. This poorly stratified mix of sand, clay and stone of various sizes form can be clearly seen in a very high cliff face on the west side of a stream that runs in a north to south direction from Castleknock to the River Liffey, just to the west of Knockmaroon. Upon all of this glacial debris sits a shallow layer of mull humus soils that was built up by the vegetation communities that developed since the last Ice Age. The presence of the underlying lime-rich substrata potentially gives the majority of the soils a high pH value, and the corresponding vegetation tends to be calcicolous (lime-loving) in nature. In some areas where soils are deeper or surface leaching of lime has been greater, the soils have become neutral or even acidic, and may even support a plant community typical of soils with lower pH values. Although some acid soils do occur occasionally in the Liffey Valley area, calcifuge (lime-hating) plant communities are virtually absent (Doogue 1998) though they are common elsewhere in Ireland, particularly in mountain regions, on the surface of peat bogs, or in areas of very high rainfall.

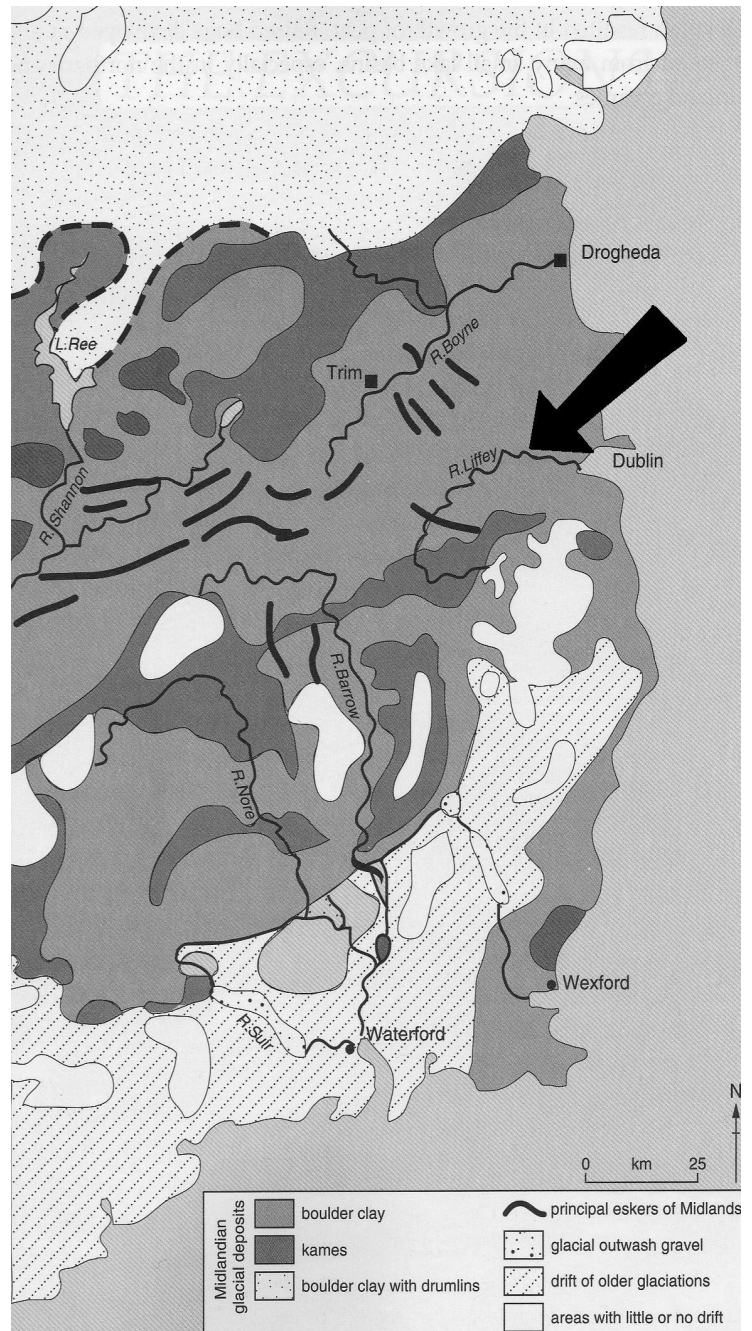


Figure 3. Glacial features of the Midlandian period (80,000-13,000 years ago) for the province of Leinster to which County Dublin belongs. The Liffey Valley area is near the right center of the map, as indicated by the arrow (*Source: Stillman & Sevastopulo 2005*).

1.4.2 Present-Day Climate

The present-day climate of the Liffey Valley SAAO area is typical of inland areas of County Dublin. Like much of Ireland, it enjoys a mild oceanic climate in which extreme fluctuations of temperature are a rarity. Mean daily air temperatures average 19° C in the summer and seldom dip below 2.5° C in the winter months (Fig 4A, *MetEireann*). Deep frosts are also a rarity, particularly near the coast, and likewise high summer temperatures are rare, with 33° C being the highest ever recorded in Ireland (Mitchell & Ryan 2001). Both yearly and daily temperature ranges are very narrow (5.5- 10° C between the minimum and the maximum), producing an environment that sustains many plant species which would fail in the greater ranges of temperatures on the Continent. As one progresses westward across Fingal, however, the ameliorating affect of the Irish Sea lessens and frosts are more frequent in the western part of the county, including the Liffey Valley area. The eastern regions of Ireland, including Dublin and Fingal, are also some of the driest parts of the island, with a mean annual precipitation rate of 750mm near the city to upwards of 1000 mm or more in the Dublin and Wicklow Mountains to the south (Figure 4B, *MetEireann*). The Liffey Valley area can be estimated to receive somewhere in the neighborhood of 750-800 mm of precipitation per year, mostly in the form of rainfall, as snow seldom lies long in Ireland (Doogue 1998).

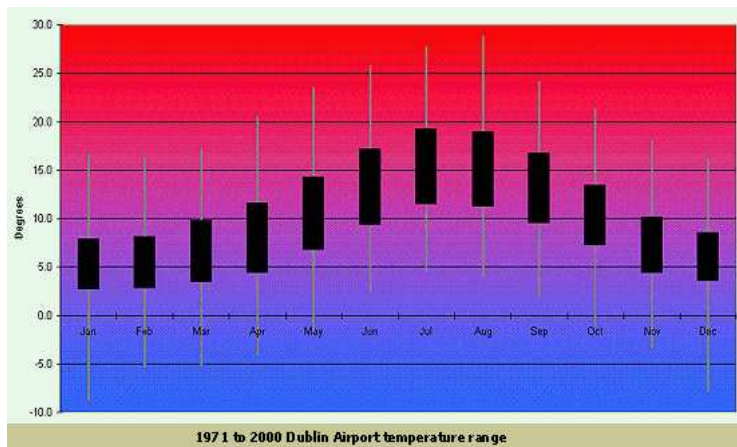


Figure 4A. 30-year Temperature range as measured at Dublin Airport, County Fingal. (Source: MetEireann.)

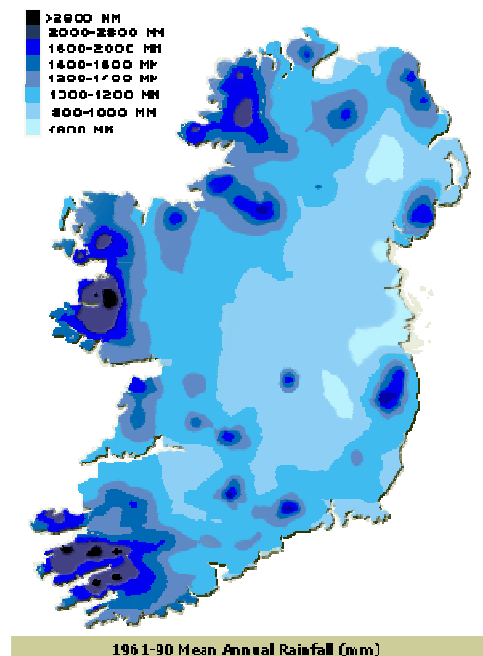


Figure 4B. 30-year Mean Annual Rainfall in Ireland. (Source: MetEireann)

1.5 History of Irish Woodlands

Periods of glaciation and amelioration have occupied nearly 2 million years of Irish history, each time resulting in the advancement of vegetation northwards in warmer interglacial periods and a retreat in cold glacial periods. The general trend of the climate of Ireland (and Europe) that began at the end of the Midlandian Phase of the Ice Age some 13,000 years ago has been a warming trend, in spite of a short period (~500 years) of severe cold lasting until nearly 10,000 years ago. After the return to warmth following this brief cold, the vegetation once again advanced across Ireland, reaching a closed woodland phase between 9,000-10,000 years ago under climatic conditions slightly warmer than or similar to those of today (Mitchell & Ryan 2001). Therefore, it is generally agreed that without disturbance from man, and under present climatic conditions, the natural vegetation of Ireland and indeed of much of Europe, would be deciduous woodland (Mitchell & Ryan 2001, Cross 1998, Dierschke 1982).

1.5.1 Flora of Ireland from Prehistory to the Present

Nearly half the time woodlands have been present in Ireland however, they have seen disturbance to varying degrees from man. Although humans are believed to have reached Ireland 9,000 years ago, just as the forests had finished closing over the island and were advancing towards their climax in species richness, the impact of primitive man on the woods at first must have been slight. These early Mesolithic people were hunters and gatherers, with no tools, or need, for the large-scale felling of trees. From palynological studies, Irish woodlands have been determined to have reached their greatest extent between 7000 and 5900 years ago (Mitchell & Ryan 2001).

By about 5,000 years ago, the climate had become wetter and oceanic in nature, and the woodlands altered (Mitchell, G.F. 1982). Major changes included a reduction in Scots Pine (*Pinus sylvestris*) and expansion of alder (*Alnus glutinosa*), as demonstrated in fossil pollen counts (Mitchell & Ryan 2001). The primeval woods of Ireland would have been dominated by hazel (*Corylus avellana*), oak (*Quercus robur*, *Q. petraea*), Wych elm (*Ulmus glabra*), and alder; with oak, elm, and alder eventually dominating the richer lowland soils and birch (*Betula pubescens*, *B. pendula*) and pine holding out on the better drained upland soils (Mitchell & Ryan 2001). This climax phase continued until about 5900 years ago, when the pollen record shows a drastic reduction in elm populations, coinciding with the rise of Neolithic farmers in Ireland (c3900 BC). The reduction in elm populations may have been the direct result of human clearance of the lowland woods, or of disease, similar to the Dutch elm disease that plagues elms today (Mitchell & Ryan 2001, Kelly & Kirby 1982). Large elms are rare in Irish woods today although they may be seen in some regions of Great Britain (Mitchell, G.F. 1982).

The woodlands of Ireland continued to decline under human influence from Neolithic times through the Norman period of the 12th and 13th centuries, when they would be most drastically reduced by the new methods of farming, forest management and increase in population that would be the Norman legacy to Ireland. The Normans were feudal lords and the feudal system was built upon the threefold currency that was land, stock and grain. Much of eastern Ireland fell under their

control, especially the region known as “the Pale” stretching in a 20-mile radius from Dundalk in the north to Kildare in the west and Wicklow in the south, and including much of counties Kildare, Meath, Louth, Dublin, and all of the present-day region of Fingal. In this settlement area, agriculture was intensified to feed a growing population, and within the Dublin Pale and other areas under Norman control, the forest cover continued to decline further, reaching its lowest between Tudor times and the agricultural revolution of the 1700s. The Tudors have long been blamed for the deforestation of Ireland, which they no doubt had a hand in, but as we have seen, the process began in prehistory (Mitchell & Ryan 2001, Mitchell 1982).

By 1700, so depleted were the Irish forests that wood had to be imported, and Parliament began the enactment of the many so-called ‘Enclosure Acts’ encouraging the re-planting of trees, often in the form of hedgerows and field boundaries that gave Ireland much of the patchwork quilt pattern it retains today. The safer, more settled way of life of that followed through the 18th and 19th centuries saw the rise of manor houses and the owners of these new demesnes planting trees as shelterbelts and for the ornamentation of their vast estates. In addition to native trees, many exotics were planted; some from Europe and others from places further afield that were still in the process of being discovered. It was during this time of fashionable estate planting that Scots Pine (*Pinus sylvestris*) was re-introduced to Ireland from Scotland after becoming extinct (or nearly so) in the early Middle Ages (Mitchell & Ryan 2001, Dierschke 1982). With it came many of the trees that are still seen in the old demesnes of Fingal and elsewhere today including, Horse Chestnut (*Aesculus hippocastaneum*), sycamore (*Acer pseudoplatanus*), Spanish Chestnut (*Castanea sativa*), lime (mainly *Tilia x europaea*), English and Common Elm (*Ulmus procera*, *Ulmus minor*) and beech (*Fagus sylvatica*). Some of those introduced have since escaped the walled forest estates and naturalised in Ireland’s remaining native woodlands, including the highly invasive rhododendron (*Rhododendron ponticum*), Cherry-laurel (*Prunus laurocerasus*), beech (*Fagus sylvatica*), and sycamore (*Acer pseudoplatanus*). Beech and sycamore have both naturalised widely, and are often regarded as pests because their dense shade crowds out the shade-intolerant native species, while they themselves can grow in the shade of others, renewing the cycle and displacing the natives.

The 18th and 19th centuries were also a time of tremendous growth and the population of Ireland more than doubled in size in less than a century! The large population put considerable strain on natural resources as every scrap of usable land was farmed and anything that could be burned for fuel was used, including peat and the trees and shrubs of woods and hedgerows (Mitchell 1982). The stress on already over-exploited natural resources would increase to the breaking point until the Irish population crashed in the devastating Famine Years of 1845-51.

The years that followed the Famine saw extensive land-reform and the fall of landlordism and the “Big House” in Ireland. Rising debt and eroding power resulted in the collapse and abandonment or sale of many of the estates of the landed classes, but often not before they had liquified their assets, including much of the timber that adorned their demesnes. This, and the need for timber in the two World Wars that followed in the 20th century, saw Ireland’s already scarce woodlands reduced yet once more (Mitchell 1982). By the early 1900s Ireland was the least wooded country in Europe, with less than 1% forest cover (Higgins 2004). Much headway has been made against this in recent decades, and afforestation is again on the rise in Ireland, much of it in the form of the controversial use of non-native conifers in forestry plantations (Higgins 2004, BIOFOREST).

1.6 History of Land Use within the SAAO Area

As discussed earlier, eskers and other similar glacial deposits are distinctive features in the otherwise flat landscape of midland regions of Ireland. Their height above the surrounding landscape would have enabled those traveling on eskers to see potential trouble a distance before it reached them, and this may have been another reason they were so extensively used as roadways in ancient times. The Norman invaders in later centuries would capitalize on this idea, building their castles, fortifications and walled demesnes on prominent geologic features that elevated them above the surrounding plain. This rendered the sites more defensible against a potentially hostile native population, but also the soils on such features were better drained, and therefore more suited to agriculture. In the Liffey Valley, many old castles and demesnes survive on eskers and glacial ridges above the river valley including, but not limited to, Leixlip and Lucan Castles, Castleknock, Luttrellstown and Knockmaroon, which are all good examples of the affinity of the Norman-English for strategic sites. To a lesser extent, the site of the former St. Catherine's monastery is also strategically located upon an elevated ridge.

While the more accessible areas on top of, and below glacial ridges were used for agriculture, lawns, gardens and all manner of amenities necessary to support the owners and staff of large demesnes like Luttrellstown and Knockmaroon, the steep and difficult slopes were often left forested and from time to time, provided additional income in the form of timber or game. In this manner, native broadleaved woodlands that had disappeared on better soils and more accessible sites managed to survive within demesnes located on eskers and other difficult sites (Kelly & Kirby 1982, Cross 1992). In these woodland estates, native tree species were often supplemented with non-natives desirable for timber or ornamental purposes, such as beech, lime, hornbeam, Horse Chestnut, Spanish Chestnut, sycamore, Scots Pine*, and a variety of conifer species indigenous to mainland Europe, Asia and America (Mitchell, 1982).

The continuous forest cover and lack of agriculture on these slopes may have enabled the development of typical forest soils and the persistence of woodland species to the present day. Grazing pressure too may have been minimal on the difficult slopes, enabling the development of a rich ground flora characteristic of older woodlands (Rackham 1976, 1996, p 131). The minimal disturbance regime might also have allowed for the persistence of slow-to-establish, long-lived species characteristic of more ancient woodlands. These putative ancient woodland indicator species are absent from areas that have been formerly used for agriculture in the distant past and have since re-established as forest. They are also absent from woodlands that have seen intense grazing pressure, whether by deer, cattle or sheep. Their occurrence in wooded sites on ridges and within the older demesnes suggests the presence of continuous forest cover throughout historic times, and possibly even a connection to the original wildwood (Rackham 1995).

* Scots Pine (*Pinus sylvestris*) although formerly native (believed to have become extinct in medieval times) has been re-introduced to Ireland from Scottish stock, and is widely planted. Due to its rapid rate of growth, it was often used as a 'nurse' species for the slower growing broadleaves. Its persistence in the canopies of many Liffey Valley woods (while absent from the understory) may reflect this former use of the species.

St. Catherine's Park, located just east of Dublin's western suburb of Leixlip (Co. Kildare), is a mixed use park consisting of broadleaved woodland, conifers, semi-natural grassland, scrub and amenity grassland (football greens, etc). The variety of habitats and the presence of broadleaved woodland and the adjacent River Liffey corridor, made St. Catherine's a prime candidate for study.

The L-shaped wooded area of St Catherine's has a prominent southwest/west facing aspect and consists of a rather rounded (steep in some areas) well-drained slope clothed in trees, some semi-natural and some planted. The slope descends to a relatively flat area which was likely a former floodplain of the Liffey and much of which is now treated as a semi-natural "wildflower meadow" by the Parks Division. Over this flat plain, and immediately adjacent to the wood is a paved pedestrian path that travels from the west (Leixlip, Co. Kildare) entrance past the wildflower meadow before turning south through the riparian woodland adjacent to the river. A branch of this path splits the wood in two as it travels in a northeasterly direction before joining the drive from the eastern (Lucan, Co. Dublin) entrance to the park. At the westernmost end of the wood are signs of former habitation in the form of crumbling stone buildings, including a stable, a chapel and north of these, a ruined medieval church as well as a pair of holy wells dating from an earlier period. Here, another pedestrian path courses in a north to south direction, joining the housing development to the northwest, the medieval church, chapel, and amenity areas with the Leixlip entrance before leading south over the Liffey to join the main pedestrian path of the Liffey Valley Park contained within the jurisdiction of South Dublin County (*Map 3*).

History of the Park

The current site of St. Catherine's Park has a long history that stretches back to the Norman-English settlement of the Pale in the 12th and 13th centuries. King Henry II granted lands seized from the native Irish to his most loyal knights, who in turn, often redistributed these "generous" gifts to their own followers under the English feudal system of the time. In this manner, one Richard de Peche acquired the lands of Lucan and surroundings in the early 13th century. In 1219, Warris de Peche gave much of the site of the current park to the canons of the order of St. Victor for the establishment of the Priory of St. Catherine's (Lewis, 1837, Joyce 1920). By 1323, the Priory had become bankrupt and turned its holdings over to Dublin's Abbey of St. Thomas (Joyce 1920). The Abbey then held the site until the Dissolution of the Monasteries under Henry VIII in the 16th century, after which it passed through many owners, including the family of Patrick Sarsfield of Boyne fame, and one Nicholas White by the time of William Petty's 1657 survey map of County Dublin. Nothing remains of the original Priory but two holy wells and a small chapel from a later date. The site has been recently acquired by the Irish Government's Office of Public Works from its previous owner, Frank Senior, as a core location for the establishment of a Liffey Valley Regional (or National) Park and feasibility studies are now being carried out (www.erm.com). The site is currently managed by the Parks Division of Fingal County Council.

Luttrellstown, according to its website (www.luttrellstown.ie), is a privately-owned demesne of 560 acres and boasting a splendid 600 year-old manor house. This enormous demesne is located on the north banks of the Liffey just to the north of Lucan Village and stretches from Lucan Road (Liffey) northwards nearly to Clonsilla and west from Astagob to Tinker Hill Road (*Map 4*). The walled estate of Luttrellstown, like St. Catherine's, is an area situated on a glacial ridge, but the presence of rock outcroppings, caves, waterfalls and a natural stream-course greatly enhance the beauty of this peaceful demesne and the diversity of flora and fauna it harbors. The demesne has seen a mixture of land use throughout its history and, as at St. Catherine's, there is little remaining that is truly natural. Nevertheless, the mixed use has resulted in a mosaic of vegetation including broadleaved woodland as well as amenity grasslands including golf courses, lawns, and shooting greens, and infrequently mowed or managed areas of grassland and scrub, especially along woodland rides. The extensive woods clothing the steep slopes and the relative absence of the public within the demesne has enabled some of the shyer forest creatures such as hawks, foxes, badgers, hedgehogs, and numerous songbirds to prosper here. Deer can also be occasionally found in these woods, and a now disused warren and an active pheasant run have provided additional fauna in the form of rabbit and pheasant for hunting. Also present in the demesne, and seen by the author, is the rare and declining Irish Hare whose favored habitats are species-rich grasslands and heathlands. This subspecies of European Mountain Hare (*Lepus timidus*) is endemic to Ireland, protected by the Wildlife Act of 1976, and is a Red Data Book species of international importance (Whilde, 1993).

History of Luttrellstown

Luttrellstown derives its name from the Luttrell family that owned the demesne and a great deal of property around the Dublin area from the Anglo-Norman settlement in the early 13th century onwards. The first member of the family, Sir Geoffroi Luttrell was granted lands in Ireland by King John of England (of Magna Carta fame) for his loyal services, including the site of the present demesne. His descendants are associated with the area from this time on, and in the 15th century the current residence was built. Succeeding generations of Luttrells held the land, added their own touches to the manor, and built for themselves an enormous fortune; with many Luttrells playing a large role in the shaping of Dublin's history (Ball 1906, 1920). The estate passed on through the family until the extinction of the male line and the death of Lord Carhampton in 1829, upon which the estate was sold to Luke White, whose son, Henry (Lord Annaly) renamed the estate 'Woodlands.' (Gerard 1898). The present owner of the demesne is Mr. D. Primat of the PrimWest Group, who acquired the castle and demesne in 1983. Current plans for Luttrellstown include the expansion of the golf courses, the construction of hotels and residences, and the opening of the manor and demesne to the public (pers comm.)

Knockmaroon, like Luttrellstown is a private demesne with broadleaved woodland on its steeper south-facing slopes above the Liffey. The estate is located just east of the M50 bridge over the Liffey and is approximately 50-60 meters above the valley floor, sharply sloping away south and west to the Strawberry Beds (*Map 3*). The greatest difference between Knockmaroon and the previous two estates lies in land use. Very little grassland in Knockmaroon is used for amenity purposes (except lawns and gardens around the house). The majority of the grassland is grazed by cattle and horses, or if outside of the fenced areas, it is used to produce hay in the traditional method of hand-cutting, stacking and drying. The grassland areas have also been planted in the distant past with widely spaced trees, mainly beech, for ornamental purposes. Very little replanting has been done in recent years, and the result is a park-like setting of closely cropped grass and enormous old trees, many past their prime. The extremely steep south and western slopes are clothed in broadleaved trees with a mix of conifers, possibly the result of “ornamentation” in the distant past. There is very little woodland edge since the north end of the wood is periodically grazed and there are no rides through the wood as at Luttrellstown and St. Catherine’s. The lack of public access also enables the survival of shy forest creatures such as fox and badger, while fallow deer, escapees from nearby Phoenix Park, graze within the wood.

1.6.4 Other Sites

The areas around the active quarry on the north side of the Liffey near Lucan are of considerable interest; especially sites that have received spoil from the quarry in the past or have been abandoned. The lime-rich nature of the spoil and exposed areas enable colonization by calcicolous plant communities, including many rare or uncommon species. Two such sites studied in the Liffey Valley include a gravel “car park” area beside the river, and a strip of grassland between the active quarry and Tinker Hill Road, here called the “Quarry site” (*Map 4*) Also of interest are small remnant patches of calcareous grasslands scattered throughout the Strawberry Beds and sites near Chapelizod (*Map 5*), as well as the riparian vegetation of the river corridor itself.

2.0 MATERIALS & METHODS

2.1. *Aerial Survey and Maps*

With the aid of an Ordnance Survey Ireland aerial survey photo obtained from the Parks Division of Fingal County (*Map 2*), the vegetated regions of the Liffey Valley SAAO area were noted and areas of interest stratified from the surrounding tillage and grazed lands. The relevant sites proved to be those contained within the old demesnes of Luttrellstown, Knockmaroon and the current park of St. Catherine's, which contains former monastic grounds as well as part of the old Lucan demesne. As the study aims to describe those plant communities under the jurisdiction of Fingal Parks Division, only that part of St Catherine's woodland and grassland areas on the north side of the River Liffey were investigated, in spite of numerous interesting features on the south banks of the Liffey, including many ancient oak standards set in the park-like setting of ungrazed grassland. This area south of the river is managed by the South Dublin County (Liffey Valley Park) authority. Also of interest were the margins of the River Liffey corridor, as well as small remnant grassland areas of the Strawberry Beds below the M50 bridge over the river. Once the relevant areas of interest were located on the map, ground work could begin in earnest.



Map 2. Portion of 1995 OSI Aerial Survey Photograph of Southern Fingal, with the Liffey Valley SAAO area highlighted in red, and major towns and areas of study labeled. (*Reproduced with permission: Fingal County Council Parks Division & OSI Ireland*)

2.2 *Ground Survey*

2.2.1. General Overview

A primary survey of the Liffey Valley SAAO area was carried out throughout the growing season between April and October 2005, and all plant species encountered were identified using standard manuals for the area (Fitter & Fitter 1996, 1984; Jahns 1983, Webb, et al. 1996; Stace 1997, Smith 2004). Nomenclature is in accordance with Stace, and all species found are listed in Appendix I.

2.2.2. Ecological Survey and Site Selection

Due to varying degrees of human interference and disruption of the natural plant communities of the Liffey Valley area, as well as variations in topography, soils, and forest cover, the vegetation of the Liffey Valley is not contiguous, but rather a patchwork mosaic of plant communities. Reconnaissance of the site, using aerial maps and photographs, as well as ground investigation, enabled the division of the SAAO area into different vegetation types, within which subjective sampling was done. This method of stratified sampling produces a more detailed picture of the various plant communities and their associated species than just randomly sampling the entire area with no regard to community types. The division of the area under investigation into different types also reduces the chance that rare and uncommon species may be overlooked because of their possible affinities for one community over another. From the selected areas, species lists were obtained and habitats described and classified according to Fossitt (2001) and Rodwell (1991, 1992, 1995). In woodland, and some riparian and grassland areas, the species lists obtained for the areas were accompanied by more intensive survey in the form of relevés. All relevant habitats and their associated species are listed in Appendix I. Additional habitats of interest include hedgerows and the Royal Canal that marks the boundary of the SAAO area in the north. However, good hedgerows are largely absent in the SAAO area although they occur elsewhere in Fingal. Those few encountered were comprised almost entirely of whitethorn (*Crataegus monogyna*), beech (*Fagus sylvatica*), hornbeam (*Carpinus betulus*) or cypress (*Chamaecyparis sp.*). Treelines are more common, the result of either deliberate tree planting or old hedgerows in an advanced stage of neglect. Time and transportation constraints also limited access to the Royal Canal and the grassland and riparian vegetation in its vicinity.

2.2.3. The Relevé Method: *Quadrat sampling*

The primary wooded areas of the SAAO area are those contained within the demesnes of Luttrellstown, Knockmaroon and St. Catherine's Park, and all of these were the focus of the study. For these woodlands, 4 relevés of 10 x 10 meter quadrats were randomly selected from larger, relatively homogenous areas within each wood, preferably away from edges and other factors that influence vegetation composition, rendering it different from that contained within the forest interior. In each quadrat, the girth at breast height (GBH) of all canopy trees was measured

and percent cover estimated. Understory trees and woody shrubs were also measured if greater than 5 cm diameter at breast height, otherwise only the species were recorded and cover estimated. In addition, all vascular plant species of the field layer were recorded and cover-abundance values given according to the Domin-Krajina cover-abundance scale (Mueller-Dombois & Ellenberg 1974). Lower plants and bryophytes were only recorded if cover was significant (greater than 6cm²). Difficult-to-identify species were collected, pressed and dried for comparison with herbarium specimens at the Botany Department of Trinity College, Dublin. Nomenclature is in accordance with the standard manuals for the area (Webb, et al. 1996, Stace 1997, Smith 2004). Physical features of the site such as slope, aspect, lithology (rock type), litter, bare ground, deadwood, and hydrology (drainage) were also noted and recorded (Mueller-Dombois & Ellenberg 1974).

In grassland relevés within these three demesnes and elsewhere, samples were obtained randomly using similar methods, but with 1 x 1 m quadrats. All grass and herb species were identified and cover estimated for each using the Domin scale as with the ground flora of woodland areas. Woody species, where present, were also identified and cover estimated. Seedling trees were counted and size noted, to indicate possible future conversion of field to forest by natural succession.

Riparian areas saw a different approach. The linear and dynamic nature of river corridors generally prevents homogeneity, especially in areas of high anthropogenic disturbance, as in the Liffey Valley. In addition, most areas immediately adjacent to the Liffey are not under woodland, but are relatively open, and bounded on the landward side by either pavement or mowed areas. As a result, much of the north bank of the Liffey has only a narrow riparian zone of vegetation, often exceeding no more than 3 to 5 meters width in some places. This prevents the use of the streamside sampling methods used by Coroi and Sheehy-Skeffington (2004) in which 4 x 25 m transects were laid down perpendicular to the water feature. Instead, much of the riverside vegetation in the Liffey Valley was described as detailed species lists (Appendix 1) and in some places, belt transects of 4 m x 25 m were laid down *parallel* to the river's edge, using the river as one of the long sides (25m) of the transect. From these narrow transects, species were recorded and cover estimated as above. Where trees were present, their girth at breast height (GBH) was also recorded.

2.2.4. Data Analysis

The floristic data obtained by quadrat sampling were analysed using a variety of quantitative methods. The values for trees and woody shrubs greater than 16 cm circumference at breast height (CBH) or 5 cm diameter (DBH) were tabulated, frequency and density determined, and basal area calculated using the formula $BA = (1/2d)^2 \times \Pi$, where d is the diameter of the tree, and Π is the constant value of pi (3.1416). These are listed in Table 1.

2.3 Soil Analysis

For the woodland areas, 5cm³ samples of soil were taken from the center of each quadrat, while one 3cm³ sample was collected from a homogeneous area in the grasslands being sampled. These samples were labeled and tested as soon as possible for pH values, organic matter content, and % calcium carbonate. All methods used are after David Jeffrey (1970).

1. *pH Test*: In the pH test, field fresh soil was made into a 1:1 soil to water paste, and once equilibrium was reached, the mixture was tested with a glass electrode pH meter.

2. *% Organic Matter*: In this test 1g of oven-dried soil from each sample is carefully weighed in a crucible, the whole batch then ignited at 500° C in an oven, to oxidize organic carbon compounds. Once cooled, the samples were re-weighed and the % difference reflects the organic carbon content of the soil.

3. *Calcium carbonate test*: Total insoluble calcium carbonate in soils with pH greater than 6.5 was determined by the addition of 20ml of 1N hydrochloric acid (HCl). Any carbonate in the soil neutralizes the acid. After an hour of equilibration, 5mls of the soil/acid supernatant is titrated with 1N sodium hydroxide (NaOH) using phenol red as an indicator. A blank titration of 5 mls 1N HCL is done first as a control. Sample titrations are subtracted from the control as follows: Blank titre (control) - actual titre (sample) = the amount of HCl, in mililiters, that has been neutralised.

The carbonate content of the soil sample can then be determined by multiplying this value by 20g per 100g of soil. This value reflects the amount of insoluble CaCO₃ (calcium carbonate) present in the soil. Data are presented in Appendix II.



Sunlight on Wych Elm (Leamhán)

Photo by the author

3.0 RESULTS

3.1 *Woodland Quadrats*

Four quadrats were sampled in each of the three wooded demesnes of the Liffey Valley SAAO Area, plus an additional sample of the riparian wood at St. Catherine's, for a total of 13 relevés. A quantitative analysis of the woods at Luttrellstown, St. Catherine's and Knockmaroon is presented in Table 1. The basal area of a tree reflects stem cover, or the space occupied by a single trunk (or multiple trunks with a cumulative basal area of 5 cm or greater at breast height). Total basal area per species then reflects the space occupied by individuals of the same species within a quadrat. When these values are tallied for multiple quadrats, the dominance of tree species within the wood may be obtained (Graph 1) (Curtis 1959, Muller-Dombois & Ellenberg 1974). The total basal areas can also be used to generate percent basal area, reflecting species dominance of the trees within each sample area (Graph 2).

3.1.1. Tree Species Composition

From the results (Table 1, Graphs 1A, 1B), it appears that beech (*Fagus sylvatica*) and ash (*Fraxinus excelsior*) are the most significant tree species in the Liffey Valley woods, followed by sycamore (*Acer pseudoplatanus*), Scots Pine (*Pinus sylvestris*) and oak (*Q. robur*, *Q. petraea* and hybrids), with understory holly (*Ilex aquifolium*) and hazel (*Corylus avellana*) occasionally reaching sizes great enough to be recorded.

Oak reaches its greatest density and significance in the woods of Luttrellstown, while it remains infrequent or scarce in the woods of St. Catherine's and Knockmaroon (not recorded in the quadrats). The especially high value for total basal area of oak in Luttrellstown reflects the large size of those trees encountered in the relevés. In St. Catherine's, oak is mainly the species Pedunculate Oak (*Quercus robur*), and occurs mostly along the banks of the River Liffey and in wood margins. In Knockmaroon, oak is scarce, and those found were located on rock outcroppings or in steep gullies, and were mostly Sessile Oak (*Quercus petraea*). Both species and potential hybrids occur in Luttrellstown.

Ash is most significant (30-40%) in St. Catherine's and in Knockmaroon where it is co-dominant with beech. Ash also appears to be locally dominant in Luttrellstown, especially the "Rabbit Warren" area of the southeastern part of the wood (observation only). Elm (*Ulmus glabra*), holly (*Ilex aquifolium*) and hazel (*Corylus avellana*) are all common in the understory of both Luttrellstown and St. Catherine's but hazel and holly are infrequent in Knockmaroon, while elm is very local and seldom large enough to be recorded. The open nature of Knockmaroon woods also allows elder (*Sambucus nigra*) to colonise the forest interior, while at St. Catherine's and Luttrellstown, it is largely confined to gaps, rides, hedges, and wood-margins and so is not represented in quadrats taken in the forest interior. The differences in canopy species between the three wooded demesnes may reflect past management regimes, while the understory is influenced by canopy type, density and shade, as well as grazing levels.

Table 1. Frequency, Basal Area & Estimated Density of Tree and Shrub species of SAAO Area

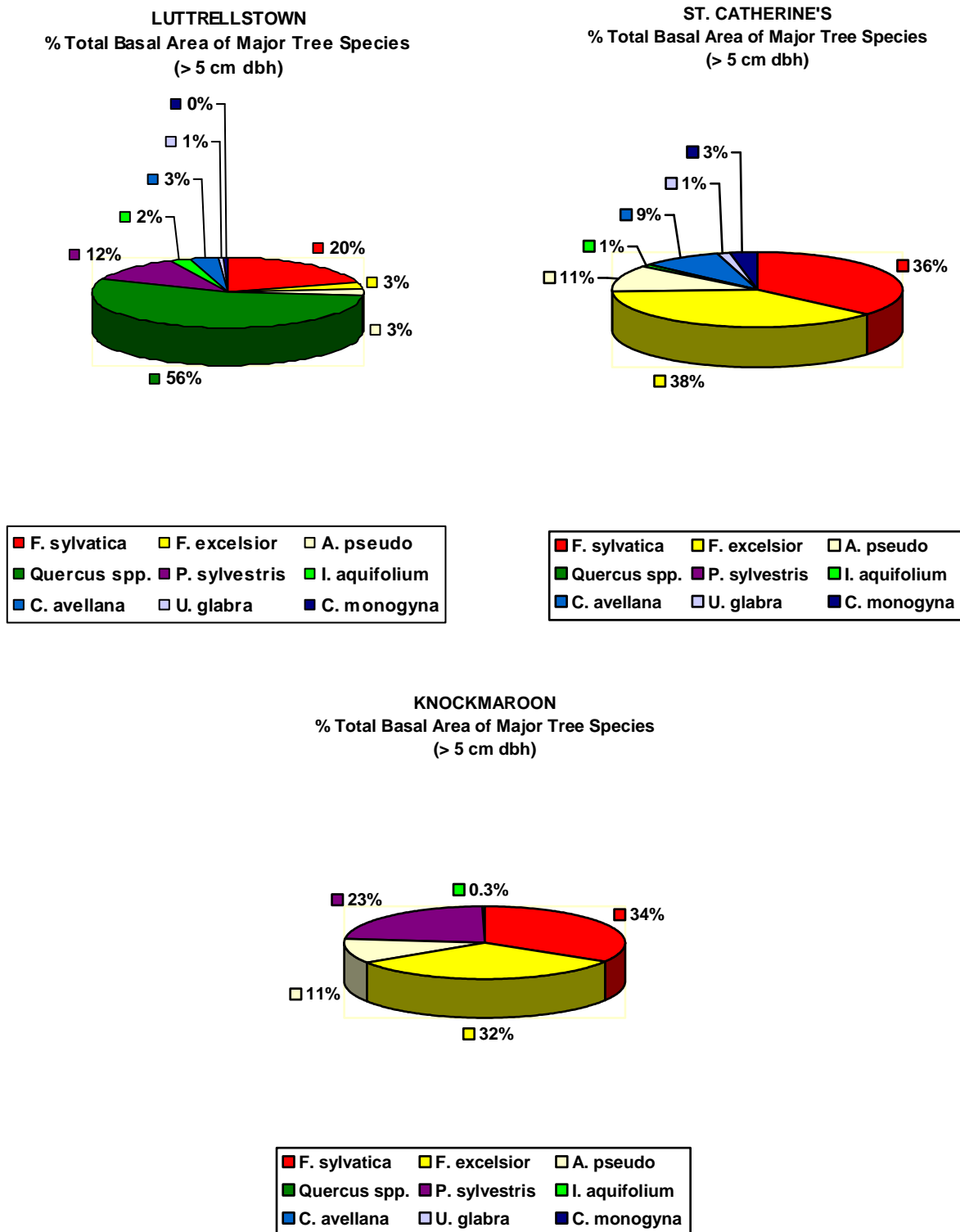
<i>Species and Location</i>	<i>Trees (DBH 5cm and over)</i>			<i>Shrubs and Saplings (DBH under 5cm)</i>	
	Frequency (%)	Basal Area (cm ²)	Mean density per hectare	Frequency (%)	Mean density per hectare
Luttrellstown					
<i>Fagus sylvatica</i> *	27.9	9,337.55	300	0.97	25
<i>Fraxinus excelsior</i>	14.0	1,513.07	150	6.8	175
<i>Acer pseudoplatanus</i>	16.3	1,322.76	175	8.7	225
<i>Quercus spp.</i> ¹	14.0	25,230.23	150	0	+
<i>Pinus sylvestris</i>	4.7	5,502.09	50	0	+
<i>Ilex aquifolium</i>	4.7	1,412.30	50	48.5	1250
<i>Corylus avellana</i>	9.3	1,556.48	100	0	+
<i>Ulmus glabra</i>	4.7	270.26	50	30.1	775
<i>Crataegus monogyna</i>	2.3	19.63	25	2.91	75
<i>Abies alba</i> *	2.3	35.05	25	0.97	25
<i>Euonymus europaeus</i>	0	0	0	0.97	25
St. Catherine's					
<i>Fagus sylvatica</i> *	26.5	20,593.65	440	21.1	100
<i>Fraxinus excelsior</i>	22.9	21,307.31	380	26.3	80
<i>Acer pseudoplatanus</i> *	10.8	6,406.58	180	21.1	80
<i>Quercus spp.</i> ¹ (<i>Q. robur</i>)	+	+	+	5.3	20
<i>Pinus sylvestris</i>	+	+	+	0	0
<i>Ilex aquifolium</i>	8.4	592.51	140	+	+
<i>Corylus avellana</i>	7.2	5,067.63	120	10.5	40
<i>Ulmus glabra</i>	9.6	843.64	160	--	--
<i>Crataegus monogyna</i>	7.2	1,647.11	120	15.8	60
<i>Abies alba</i> *	+	+	+	+	+
<i>Prunus avium</i>	4.8	782.81	80	+	+
<i>Carpinus betulus</i>	2.4	497.60	40	0	0
Knockmaroon					
<i>Fagus sylvatica</i> *	19.2	8,276.43	125	13.2	100
<i>Fraxinus excelsior</i>	34.6	7,921.80	275	10.5	125
<i>Acer pseudoplatanus</i> *	11.5	2,681.00	50	26.3	250
<i>Quercus spp.</i> ¹ (<i>Q. petraea</i>)	+	+	+	+	+
<i>Pinus sylvestris</i>	30.7	5,681.39	175	0	0
<i>Ilex aquifolium</i>	3.8	66.9	25	15.8	150
<i>Corylus avellana</i>	+	+	+	+	+
<i>Ulmus glabra</i>	+	+	+	+	+
<i>Crataegus monogyna</i>	+	+	+	13.2	+
<i>Abies alba</i> *	+	+	+	+	+
<i>Sambucus nigra</i>	0	0	0	21.1	200

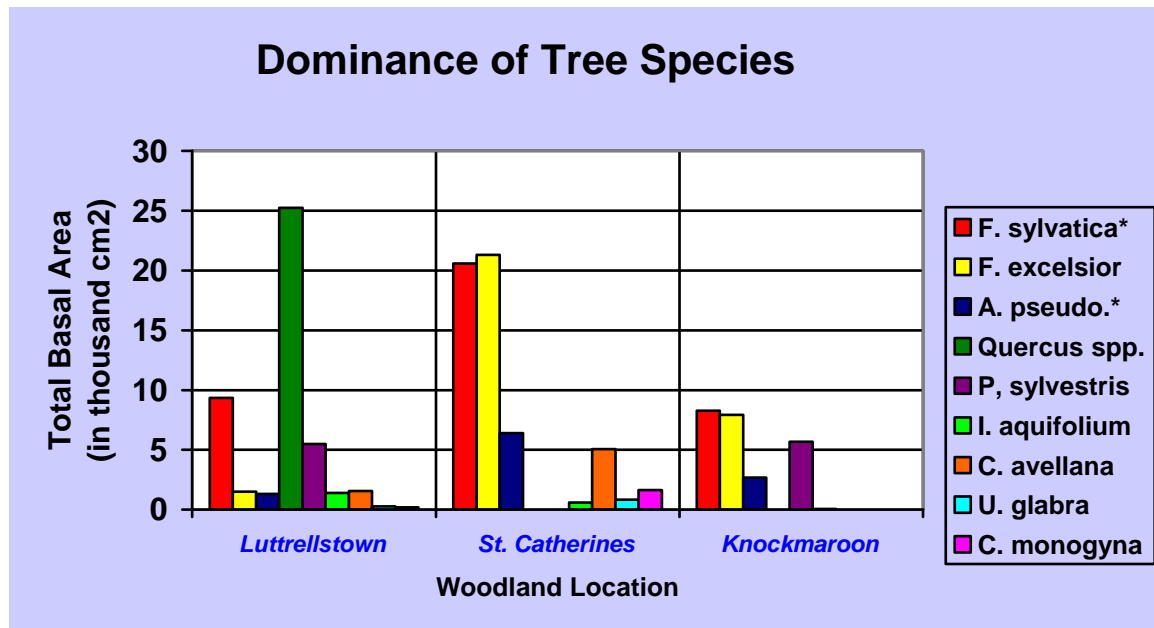
*indicates non-native tree species

+ indicates trees not present in quadrats but occur elsewhere in the wood

¹ The oaks of Liffey Valley woods are mostly *Quercus robur*, but *Q. petraea* and possible hybrids also exist. The difficulty in distinguishing the species and hybrids, especially in large canopy trees, results in their grouping here as one.

Graph 1A. Percent total basal area reflecting dominance of the major tree species in the three wooded areas of the Liffey Valley SAAO. (All tree diameters > than 5cm at breast height).





Graph 1B. Dominance of Tree species in the Liffey Valley SAAO area



Some Woody Plants of the Liffey Valley: From left to right, *Rosa canina*, *Crataegus monogyna*, *Alnus glutinosa*, *Ligustrum vulgare* and *Rubus fruticosus* agg. Photos by Shawn McCourt.

3.1.2. Ground Flora

The ground flora in all three Liffey Valley woodlands is comprised mainly of vernal geophytes that grow and flower before the canopy fills out in the early summer months, including *Hyacinthoides non-scripta*, *Anemone nemerosa*, *Ranunculus ficaria*, *Allium ursinum*, and *Arum maculatum*. Shade-tolerant early-blooming herbs include *Primula vulgaris*, and *Viola spp.* and the shade-tolerant grass, *Melica uniflora*. These in turn, are followed by the flowering of shade-tolerant summer herbs such as *Geranium robertianum*, *Sanicula europaeus*, *Veronica chamaedrys*, and *Glechoma hederiae*. Ferns and sedges are also abundant, especially *Phyllitis scolopendrium*, *Dryopteris filix-mas*, *Polystichum setiferum*, and *Carex sylvatica*. On damp sites *Carex pendula* is frequent, while on dry, calcareous sites with reduced shade, *Carex flacca* is abundant. Ivy (*Hedera helix*) is also very abundant in many areas, to the exclusion of all but ferns and some geophytes. Bryophyte cover is generally very low, and limited to damp hollows and rock outcroppings.

A notable exception is the larger portion of the southwest end of Knockmaroon, where the open canopy, sparse underwood and other factors allow a grassy field layer to flourish, dominated by the shade tolerant False Brome (*Brachypodium sylvaticum*). Dominant values for all field layer species sampled in the relevés are given in Table 2. Unlike trees, which reflect management and planting schemes, the ground flora in the woods of the Liffey Valley can often reflect soil conditions such as pH and moisture, which may be caused by differences in slope, drainage, organic matter content, and the underlying substrata.



Some Typical Ground Flora of Liffey Valley Woodlands: From left to right, *Allium ursinum*, *Hyacinthoides non-scripta*, *Phyllitis scolopendrium*, *Veronica chamaedrys* and *Primula vulgaris*.

Photos by Shawn McCourt.

Table 2. DOMIN Values for the Ground Flora of all Woodland Quadrats (10m x 10m)

	<i>LUTTRELLSTOWN</i>				<i>KNOCK MAROON</i>				<i>ST. CATHERINES</i>				
RELEVÉ #	1	2	3	4	5	6	7	8	9	10	11	12	13
<i>Woody species</i>													
<i>Hedera helix</i>	10	10	10	4	3	4	2	+	10	9	10	9	10
<i>Lonicera periclymens</i>	5	8	4	2									
<i>Ribes rubrum</i>	4		2										
<i>Rosa arvensis</i>			1		1								4
<i>Rubus ssp.</i>			1	2	3		4	4	4				4
<i>Ulex europaeus</i>					+								
<i>Ligustrum vulgare</i>					+	+		+					
<i>Daphne laureola*</i>							2	4					
<i>Herbaceous species</i>													
<i>Ajuga reptans</i>				1									1
<i>Allium ursinum</i>	5	4		7			4	4					
<i>Agrostis capillaris</i>					1								
<i>Anemone nemerosa</i>	+	+	+	+					+	+	+	+	+
<i>Anthriscus sylvatica</i>							1	4	2	6			2
<i>Arum maculatum</i>	1								1	1	1		1
<i>Brachypodium sylvaticum</i>					9	7	6	7					2
<i>Bromopsis ramosa (Bromus ramosus)</i>					7								
<i>Carex flacca</i>					5								
<i>Carex pendula</i>													+
<i>Carex strigosa</i>													1
<i>Carex sylvatica</i>	1	4	1										+
<i>Circaea lutetiana</i>				2									+
<i>Dactylis glomerata</i>					3								

RELEVÉ #	1	2	3	4	5	6	7	8	9	10	11	12	13
<i>Filipendula ulmaria</i>													1
<i>Galium aperine</i>	5	2	1	3				2					+
<i>Galium odoratum</i>				1									
<i>Galium verum</i>					2								
<i>Geranium robertianum</i>				5									+
<i>Geum urbanum</i>		2		2		4		4					2
<i>Glechoma hederæ</i>				1									
<i>Heracleum sphondylium</i>									4				3
<i>Hyacinthoides non-scripta</i>	2												
<i>Orobanche hederæ</i>													1
<i>Oxalis acetosella</i>	1												
<i>Plantago lanceolata</i>					1								
<i>Potentilla sterilis</i>	1												
<i>Primula vulgaris</i>				+									1
<i>Ranunculus ficaria</i>	5	3		3								4	
<i>Rumex sanguineus</i>				1									
<i>Sanicula europæus</i>						1						+	1
<i>Veronica chamaedrys</i>		2	+	+			2						1
<i>Veronica Montana</i>	4			1									
<i>Viola riviniana</i> agg.	1	1		2	3	1	2	2				+	1
<i>Pteridophytes (ferns)</i>													
<i>Dryopteris affinis</i>	1			1									
<i>Dryopteris dilatata</i>	3		2	1								2	
<i>Dryopteris filix-mas</i>	1			4					2				
<i>Phyllitis scolopendrium</i>		2	2	2			+	1		4			+
<i>Polystichum setiferum</i>	2	4		2					2	5	2	2	+
Bare ground	3		2	1		3	4	4		2			
Litter	2	1				7	7	5		2	2		
soil pH	5.2	7.6	7.4	4.3	7.8	6.4	N/D	N/D	7.3	7.3	6.9	7.2	7.5

(+) indicates presence of species outside of quadrat, N/D indicates no data available

3.2 Grasslands

Semi-natural grassland areas appear to be very scarce in the Liffey Valley, being reduced to small remnants found on roadside verges, wood margins, steep hillsides, abandoned field lots and other areas that have escaped “improvement.” In the SAAO area, some of the larger remnants are found within the wooded demesnes themselves, often surviving along wood margins and rides, or where trees are absent, on the steep slopes in and around the demesnes. Only in St. Catherine’s is there deliberate maintenance of a semi-natural grassland habitat in the form of the “wildflower meadow” maintained by the Parks Division of Fingal County Council. Some of the more species-rich grassland habitats are found on shallow and extremely lime-rich soils on difficult slopes in Luttrellstown and in the Strawberry Beds below Knockmaroon. Domin values for all grassland releves are given in Table 3, with releves 1-8 being from Luttrellstown, 9-11 and 1SB from Knockmaroon and the Strawberry Beds and 12-27 from St. Catherine’s Park.



Some Flowers of Liffey Valley Grasslands: From left to right, *Centaurea nigra*, *Lotus corniculatus*, *Anacamptis pyramidalis*, *Knautia arvensis*, and *Ononis repens*.
Photos by Shawn McCourt

Table 3. DOMIN Values for Grassland Quadrats (1m x 1m)

	<i>LUTTRELLSTOWN</i>								<i>KNOCK MAROON</i>				<i>ST. CATHERINES</i>																	
Quadrat	1 C	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9 W	1 0 W	1 1 W	1 1 B	1 2 M	1 3 M	1 4 M	1 5 M	1 6 M	1 7 M	1 8 M	1 9 M	2 0 M	2 1 S	2 2 S	2 3 S	2 4 S	2 5 S	2 6 S	2 7 S		
Graminae (Grasses)																														
<i>Agrostis capillaris</i>	+																					4	4	5	4	8	5	4		
<i>Agrostis stolonifera</i>													+	+	+	+	+	+	+	5	5	+	+	+	+	2	+	2		
<i>Arrhenatherum elatius</i>	+											4						5	+	+	5	7	7	7	7	5	7	7		
<i>Avenula pubescens</i>	+											+																		
<i>Brachypodium sylvaticum</i>	4	8	5	4	4	3	4	4	7	5	6	7																		
<i>Briza media</i>	+								+	3	+																			
<i>Bromopsis ramosa</i> (<i>Bromus ramosus</i>)	1	+	+	+	+	+	+	+	4	8	7																			
<i>Cynosuros cristata</i>	+												+	+	+	+	+	2	+	+	+	+	+	+	+	2	5	+		
<i>Dactylis glomerata</i>	4								5	1	4	+										4	8	4	+	2	+	5		
<i>Holcus lanatus</i>	1								1				1 0	1 0	1 0	9	4	6	8	9	7	7	4	4	7	4	+	+		
<i>Lolium perenne</i>													+	+	+	+	+	8	+	+	4									
<i>Poa annua</i>													+	+	+	+	+	1	6	4	4									
<i>Poa nemoralis</i>									4																					
<i>Poa pratensis</i>																						2	+	+	+	+	+	+		
<i>Trisetum flavescens</i>	+											+										+	+	+	2	+	+	2		
Sedges																														
<i>Carex flacca</i>	5	4	4			+	4	+	3	1		8																		
<i>Carex pendula</i>																														
<i>Carex sylvatica</i>		1	5		4	+	+	4																						

Broadleaved Herbs

[illegible]

27

<i>Phyllitis scolopendrium</i>	5	5	4						
--------------------------------	---	---	---	--	--	--	--	--	--

Woody Species

<i>Hedera helix</i>	1	1	5	1	1	+	+	4	4
	0	0		0	0				

<i>Ribes rubrum</i>				+					
---------------------	--	--	--	---	--	--	--	--	--

<i>Rubus sp.</i>	5	5	5	7	5				1 5
------------------	---	---	---	---	---	--	--	--	-----

<i>Ulex europaeus</i>	7								
-----------------------	---	--	--	--	--	--	--	--	--

**Woody Seedlings
<0.5 m**

*Acer pseudoplatanus**

<i>Alnus glutinosa</i>						+	4	+	+	+	+	+	+	+
------------------------	--	--	--	--	--	---	---	---	---	---	---	---	---	---

Fagus sylvatica

<i>Fraxinus excelsior</i>		-	1	-		+	+	+	+	+	+	+	+	+
---------------------------	--	---	---	---	--	---	---	---	---	---	---	---	---	---

<i>Ilex aquifolium</i>	1		1	4	5									
------------------------	---	--	---	---	---	--	--	--	--	--	--	--	--	--

<i>Quercus robur</i>						+	1	+	+	+	+	+	+	+
----------------------	--	--	--	--	--	---	---	---	---	---	---	---	---	---

<i>Salix spp.</i>						+	+	+	+	+	+	+	+	+
-------------------	--	--	--	--	--	---	---	---	---	---	---	---	---	---

(+) indicates presence of species outside of quadrat

C = calcareous remnant in Luttrellstown, R = woodland rides (Lutr), W = grassy area with wood at Knockmaroon, M = “Wildflower Meadow” (St. Cath.) and SW = SW slope grassland in St. Catherine’s Park.

3.3 Riparian Areas

The River Liffey, as it flows through the SAAO area is a slow-moving channel with a flow rate averaging 9.5 meters per second (Reynolds 1998). The low flow rate, the shallow nature of the river and deep silt and gravel deposits support a rich aquatic community characteristic of lowland rivers in Ireland. Aquatic species most commonly encountered include Common Club-rush (*Shoenplectus lacustris*), Bur-reed (*Sparganium spp.*), Yellow-flag (*Iris pseudacorus*), Reed Sweet-grass (*Glyceria maxima*), watercress (*Rorippa nasturtium-aquaticum*), Water Mint (*Mentha aquatica*), pondweeds (*Potomegeton spp*, *Elodea spp.**), duckweed (*Lemna minor*) and Yellow Water-lily (*Nuphar lutea*) The vegetation of the river banks is comprised of tall herb species characteristic of wetlands and eutrophic soils including Angelica (*Angelica sylvestris*), Cow-Parsley (*Anthriscus sylvestris*), Greater Willow-herb (*Epilobium hirsutum*), Meadowsweet (*Filipendula ulmaria*), Hogweed (*Heracleum sphondylium*), Butterbur (*Petasites hybridus*), figworts (*Scrophularia spp.*), Stinging Nettle (*Urtica dioica*), and grasses. Woody trees and shrubs commonly found along the riparian fringe include sycamore, alder (*Alnus glutinosa*), ash, oak (always *Q. robur*), and willows (*Salix alba**, *S. fragilis**, *S. viminalis**, and occasionally the native *S. caprea* and *S. cineria*). Tributaries of the Liffey may support similar aquatic vegetation, albeit without many of the mid-river species such as *Potomegeton spp.* and *Schoenplectus lacustris*.

3.4 St. Catherine's Park

3.4.1. Woodland

The wooded area of St. Catherine's Park contained within the borders of Fingal, is an L-shaped wood of roughly 15 hectares in size (Map 3). Much of the wood is situated on an occasionally very steep, sloping glacial ridge and faces the River Liffey to the south and west. Primary survey work revealed that the majority of the wood is dominated by beech (*Fagus sylvatica**), and ash (*Fraxinus excelsior*), with a mix of other native and exotic species including Silver Birch (*Betula pendula*), hornbeam (*Carpinus betulus**), Wild Cherry (*Prunus avium*), Common Oak (*Quercus robur*), Grey Poplar (*Populus x canescens**), sycamore (*Acer pseudoplatanus**) and Common Lime (*Tilia x europaea**). The understory is comprised of abundant hazel (*Corylus avellana*), holly (*Ilex aquifolium*), and elm (*Ulmus glabra*). Others present in the shrub layer include whitethorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), yew (*Taxus baccata*), spindle (*Euonymus europaeus*), bramble (*Rubus ssp.*) and seedling canopy species.

St. Catherine's has high tree species diversity, with seven species recorded in four relevés and 22 outside of the relevés. Oak is not very common here, and having been largely displaced by beech from the main wood, it is confined to the riverside, grassland and wood margins. Yew is even rarer, although one or two individuals were encountered during survey work. Scots Pine is largely absent from these woods, while a few individuals of other exotic conifer species exist scattered throughout the wood, mainly Sitka Spruce (*Picea sitchensis**), Douglas Fir (*Pseudotsuga menziesii**), and Silver Fir (*Abies alba**) with Silver Fir showing some sign of

recruitment from the forest floor. Silver Birch (*Betula pendula*) is locally common in St. Catherine's; and many of these have now reached the end of their life cycle as canopy species as attested by the presence of so many fallen individuals, particularly in the even-aged beech wood along the north-east road. Other tree species in St. Catherine's include *Populus tremula*, *Castanea sativa**, *Ulmus minor** and in the riparian wood, moisture-loving species such as *Alnus glutinosa*, *Populus x canescens**, *Salix alba**, *Salix fragilis**, and *Salix cineria* may be found. Sycamore is also abundant in St Catherine's, possibly due to its preference for mesic sites.

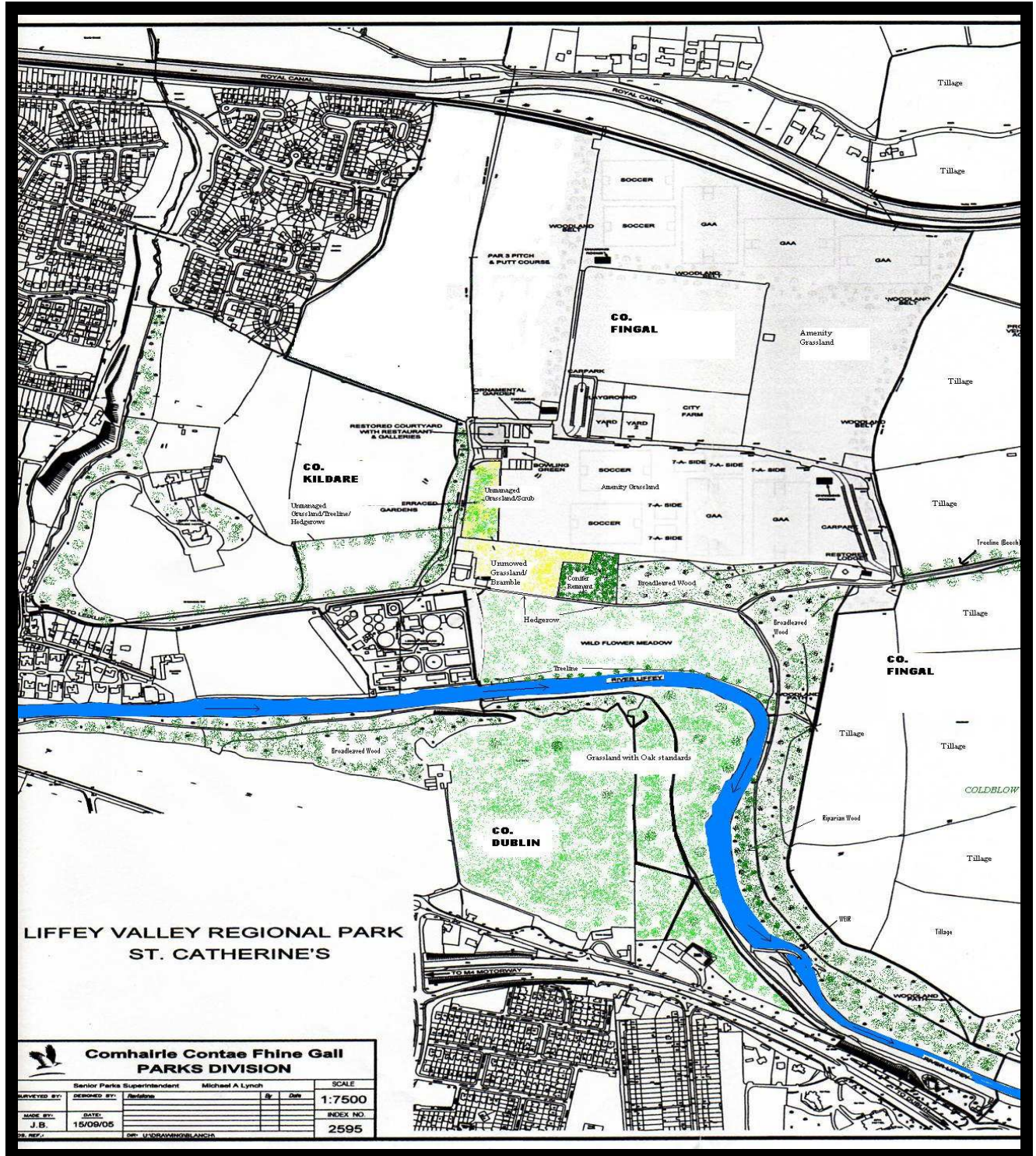
Understory species such as *Crataegus monogyna*, *Sambucus nigra*, *Prunus spinosa*, *Ilex aquifolium* and *Corylus avellana* are common in St. Catherine's, with *Corylus* stools near the riparian wood being exceptionally large and thick, possibly the result of former coppicing. In localized areas of the wood, large colonies of the invasive cherry-laurel (**Prunus laurocerasus*) may also be found.

The pH of the soils under woodland in St. Catherine's, as in all habitats, may vary with soil depth, leaching, underlying substrate and organic matter content, however the soils of the woodland areas under study were found to be circum-neutral, with a pH range of 6.90 to 7.48 (#15-18, Appendix 2).

Conifer Stand

To the east of the park, near the chapel ruins and the main entrance from Leixlip, a small even-aged forestry plantation of approximately ½-1 acre in size may be found. The conifers are chiefly non-native spruce (*Picea spp.**) and fir (*Abies spp.**) grown under unnaturally close conditions, creating a very dark wood. The dark and dry conditions also appear to be hostile to ground layer vegetation and bryophytes, as none were found in this stand. Only the shade-tolerant ivy (*Hedera helix*) appears to be able to persist near the margins of the stand and nothing grows in the interior.





Map 3. St. Catherine's Park of within Lucan demesne near Dublin. Vegetation of interest is shaded in color, while the study focused on the areas north of the River Liffey (Source: *Fingal County Council*)

3.4.2. Ground flora of St. Catherine's Wood

A long history of continuous forest cover may have helped to make the ground flora of St. Catherine's especially rich, with it being composed of spring-blossoming geophytes such as *Anemone nemorosa*, *Allium ursinum*, *Arum maculatum*, *Hyacinthoides non-scripta* and *Ranunculus ficaria*. They are followed by shade-tolerant spring and summer-blooming herbs such as *Ajuga reptans*, *Geranium robertianum*, *Geum urbanum*, *Potentilla sterilis*, *Primula vulgaris*, *Galium odoratum*, *Sanicula europaeus*, *Viola riviniana* and *Viola reichenbachiana*, and rarer species, including the parasitic *Lathraea squamaria*. Another rare parasitic herb is *Monotropa hypopitys* which has been recorded in St. Catherine's but has not been re-found in the Liffey Valley since the early 19th century (Doogue 1998).

Ferns are also commonly encountered, especially the calcicolous *Phyllitis scolopendrium*, and *Dryopteris filix-mas*, while in some areas of the wood, particularly along the densely shady North-east Road, *Polystichum setiferum* produces nearly pure stands and virtually dominates the field layer to the exclusion of all but the ever-present ivy, *Hedera helix*. The Common Polypody Fern (*Polypodium vulgare* agg.) can also be found growing as an epiphyte on some trees throughout the wood. Grasses and sedges include *Brachypodium sylvaticum*, *Carex sylvatica*, and the more uncommon *Melica uniflora*. In damp sites, especially where the wood meets the riverside, *Carex pendula*, *Carex remota* and the less common *Carex strigosa* may be found alongside numerous ferns, *Ajuga reptans* and wood violets (*Viola odorata*, *V. riviniana*, *V. reichenbachiana*).

Woodland Rides and Margins

In St. Catherine's Park, the majority of roads and paths are paved or new, and are located immediately adjacent to woodlands or amenity grasslands, leaving little room for the development of an edge and its characteristic vegetation. Along the south boundary of the wood is an old and overgrown stone wall that is overtaken by the wood and a planted mixed hedge in most areas, however gaps in the wood or hedge and periodic trimming of the wood eaves enables small populations of edge, gap, and grassland species to maintain themselves here. Among those found are *Stachys sylvatica*, *Glechoma hederaceae*, *Galium aparine*, *Stellaria media*, *Catapodium rigidum*, *Geranium robertianum*, *Fragaria vesca*, *Lapsana communis*, *Potentilla reptans*, *Vicia sepium*, and *Hypericum perforatum*.



3.4.3. Grassland

To a visitor to St. Catherine's Park, the grassland areas may seem far more extensive than the woodland, but the vast majority of it is species-poor grassland, especially the greens at the north end of the park that are being developed for amenity use (football, etc). All the grassland areas to the north of the wood have been graded and re-seeded with a virtual monoculture of *Lolium perenne* cultivars for the purpose of football and other amenity greens. Only two areas had higher species diversity and proved to be of some interest. They include the central "Wildflower Meadow" and a small remnant of unmowed grassland on a southwest-facing ridge just off the corner of the new football green, here identified as the "SW Grassland."

3.4.3.1 "Wildflower Meadow"

The central area of the park on the north side of the Liffey (*Map 3*) is an extensive grassy area that is maintained as a wildflower meadow by Fingal County Council's Parks Division. This grassy meadow receives very little grazing and is unimproved with fertilizers, but is mowed 2-5 times a year, especially in late summer, enabling the growth of tall herbs and grasses. It is an unimproved grassy meadow typical of lowland areas, and is dominated by mesotrophic grass species, including *Holcus lanatus*, *Arrhenatherum elatius*, *Lolium perenne*, *Cynosuros cristatus*, *Agrostis stolonifera*, *Agrostis capillaris*, and *Poa pratensis*. The broadleaved component is very obviously dominated by ragwort (*Senecio jacobaea*) and thistles (*Cirsium arvense*, *C. vulgare*) but also included are clovers (*Trifolium ssp.*), plantains (*Plantago major*, *P. lanceolata*), docks (mainly *Rumex obtusifolius*), and sow-thistle (*Sonchus oleraceus*). A more frequently mowed path through this meadow enables pedestrian access and the persistence of smaller plant species tolerant of trampling such as *Trifolium repens*, *Mendicago lupulina*, *Poa annua*, and *Odontites verna* that would otherwise be shaded out by the taller grasses. The soils of the meadow are somewhat heavy, neutral to alkaline alluvial soils with a pH of 7.71 (# 24, Appendix 2).

3.4.3.2 'SW Grassland' on Ridge

The southwest facing slope just below the new football field and above the chapel ruins near the Leixlip entrance to the park (*Map 3*) is largely covered in brambles and the non-native Russian Comfrey (*Symphytum x uplandicum*), heirs to a former patch of conifer forestry that was cleared prior to 1992 (Bohan 1997). This grassland remnant (approx 400 square meters) is unmowed and being overtaken by scrub, mostly bramble (*Rubus fruticosus* agg., *Rubus ulmifolius*), elder (*Sambucus nigra*), roses (*Rosa canina*) and whitethorn (*Crataegus monogyna*). Dominant grassy species include False-Oat grass, *Arrhenatherum elatius*, Yorkshire-fog (*Holcus lanatus*), Bent-grass (*Agrostis capillaris*) and Cock's-foot, (*Dactylis glomerata*). Other grassy species include *Cynosurus cristatus*, *Poa pratensis*, and the calcicoles, *Festuca ovina*, and *Trisetum flavescens*. Broadleaved herbs include Red Clover (*Trifolium pratense*), White Clover

(*Trifolium repens*), Bush Vetch (*Vicia sepium*), yarrow (*Achillea millefolium*), Germander Speedwell (*Veronica chamaedrys*), Oxford Ragwort (*Senecio squalidus*), Ribwort Plantain (*Plantago lanceolata*), Creeping thistle (*Cirsium arvense*), Meadow Vetchling (*Lathyrus pratensis*), Black Medick (*Medicago lupulina*) and cleavers (*Galium aparine*). A calcicolous element is present in the form of small populations of *Galium verum*, *Pimpinella saxifraga*, *Plantago lanceolata*, *Linum catharticum* (on shallow soil), *Geranium molle*, *Hieracium* spp., *Leontodon hispidus*, and *Lotus corniculata*. Bryophytes are also abundant, especially on shallow soils. The soil pH was determined to be in the range of 7.29 to 7.78 (samples 20-23 in Appendix 2).



St. Catherine's Park: "Wildflower Meadow"

Photo by the author.

3.4.4. The Liffey at St. Catherine's (riparian)

To the west, as it passes the "wildflower meadow", the alluvial forest separates from the adjacent higher forest and becomes reduced to a gappy treeline on the Liffey's north bank, no more than one large tree canopy size in width. Here the dominant tree is alder (*Alnus glutinosa*), but also present are sycamore, ash, oak (*Quercus robur*), willow (*Salix alba**, *S. fragilis**), whitethorn, an infrequent holly or two, and one sickly beech. Gaps in the treeline have an abundance of nutrient-loving species characteristic of eutrophic soils and open, riparian areas such as Meadowsweet (*Filipendula ulmaria*), Stinging-Nettle (*Urtica dioica*), Meadow-grass (*Poa spp.*), Fescue (*Festuca spp.*), Couch-grass (*Elymus repens*), Cock's Foot (*Dactylis glomerata*), False-Oat (*Arrhenatherum elatius*), Creeping Bent (*Agrostis stolonifera*), Cleavers (*Galium aperiens*), butterbur (*Petasites hybridus*), bindweed (*Calystegia sepia*), Creeping buttercup (*Ranunculus repens*), thistle (*Cirsium arvense*), Hogweed (*Heracleum sphondylium*), Hairy Willow-herb (*Epilobium hirsutum*), burdock (*Arctium minus*) and dock (*Rumex obtusifolius*). Scattered throughout these open areas are two species of figwort; Green Figwort (*Scrophularia umbrosa*) and the more common Water Figwort (*Scrophularia auriculata*). Abundant seedlings of alder, ash and oak were also found in the margin between the unmowed riparian fringe and the adjacent meadow.

The River Liffey at St Catherine's is a shallow, slow-moving waterway and the relative clarity of water, shallowness, and deep silt and gravel bed supports a wide diversity of aquatic plant life. Although present on the north and east sides of the channel, the marginal and emergent vegetation appeared to be most abundant on the south and west sides, as well as the middle of the channel, perhaps due to deeper soils, shallower water and the lack of an overhanging forest canopy. On much of the north and east sides of the channel, the woodland flows continuously to the riverbank allowing for the development of very little herbaceous streamside or marginal vegetation. These only occur in the wood where fallen trees in or near the river have created significant gaps, producing micro-environments suitable for emergent vegetation characteristic of quiet pools, including Fool's Water-Cress (*Apium nodiflorum*), Marsh Marigold (*Caltha palustris*), Floating Sweet-grass (*Glyceria fluitans*), , Reed Sweet-grass (*Glyceria maxima*), Yellow-flag (*Iris pseudacorus*), Duckweed (*Lemna minor*), Water Mint (*Mentha aquatica*), Yellow Water-lily (*Nuphar lutea*), Water Cress (*Rorippa nasturtium-aquaticum*), Common Club-Rush (*Schoenoplectus lacustris*), Unbranched Bur-reed (*Sparganium emersum*), Branched Bur-reed (*Sparganium erectum*), and the rarer Arrowhead (*Sagittaria sagittifolia*), Flowering Rush (*Butomus umbellatus*) and Green Figwort (*Scrophularia umbrosa*). The area around the abandoned weir spanning the Liffey from the wooded area of St Catherine's Park on the north and east bank to the Liffey Valley Park of Lucan on the south and west bank is particularly rich in species and utmost care should be used when repairing the weir not to disturb the vegetation or greatly alter the river's course. In addition to the above species, others found only at this site in the park include *Mimulus guttatus**, *Stellaria media*, *Persicaria hydropiper*, *Lysimachia nemorum*, *Veronica beccabunga*, *Rorippa palustris*, *Mentha x verticillata*, and *Impatiens glandulifera*.*

3.5 Luttrellstown

3.5.1. Woodland

Luttrellstown is a 560-acre demesne north of Lucan, in the Parish of Clonsilla, that may have been wooded since at least the 13th century when the first Normans began to settle in the Dublin region. The woodland as it exists today appears to be much reduced in size and its tree composition has been altered by planting and felling down through the centuries into the present. The dominant tree species are beech (*Fagus sylvatica**), ash (*Fraxinus excelsior*), and oak (*Quercus robur*) with holly (*Ilex aquifolium*) and Wych elm (*Ulmus glabra*) being notably abundant in the understory. Although beech and ash are both abundant in Luttrellstown, they lose importance in some areas (particularly the southwest end of the wood) where many large oaks (predominantly *Q. robur* or *Q. robur* x *Q. petraea* hybrids (*Q. x rosacea*)) persist from some time of planting in the past. Some examples of *Quercus petraea* can be clearly identified on elevated ridges and outcroppings, with one planted individual also occurring in the glen containing the woodland stream. Yew (*Taxus baccata*) is common on limestone outcrops with one old individual which, at 26 meters high, is the tallest yew in Ireland (Tree Council 2005). It is located beside the Georgian folly on a limestone outcrop above the stream glen. Rowan (*Sorbus aucuparia*) is also occasional to rare here, with one recently fallen tree bearing a girth of 2.35 m at breast height (1.4m), the second widest of the species in Ireland (Tree Council 2005). Even-aged canopy emergent Scots Pine (*P. sylvestris*) is scattered throughout the wood with no additional recruitment from the forest floor or wood margins, perhaps a relic of “ornamentation” of the wood in times past, or else it was formerly used as a nurse species for the existing broadleaves.

Luttrellstown’s woodlands appeared to have the greatest diversity of tree species with 9 species recorded in the four quadrats and 18 more identified throughout the wood (Table 1 and Appendix I). Active planting by the owners contributes to diversity, often in the form of exotic species. One exotic, Silver Fir (*Abies alba**), is actually naturalising in the woodland, no doubt due to its high shade tolerance. Other trees include abundant sycamore (*Acer pseudoplatanus**), the occasional Spanish Chestnut (**Castanea sativa*), hornbeam (*Carpinus betulus**), Horse Chestnut (*Aesculus hippocastaneum**) lime (*Tilia x europaea**) and a wide range of exotic conifers, including a Giant Sequoia (*Sequoiadendron giganteum*) which, at 50 m, is the second tallest of its kind in Ireland. Also in Luttrellstown is a European Larch (*Larix decidua*) that is the tallest of its kind, at 37.8 m high (Tree Council 2005). A small arboretum on the grounds supplies even more tree and shrub species, but unless planted or naturalised in the adjacent wood, they are not listed here.

The understory of the wood is dominated by holly (*Ilex aquifolium*) and Wych Elm (*Ulmus glabra*) but also hazel (*Corylus avellana*), ash and sycamore (*Acer pseudoplatanus**) saplings, and in some localized areas, the invasive Cherry-laurel (*Prunus laurocerasus**). Holly and hazel are both abundant throughout the wood, with hazel being somewhat more localized. Elm is larger and more common in these woods than elsewhere, though this is not reflected in the relevés. Whitethorn (*Crataegus monogyna*) is occasional throughout the wood, but is more common in wood margins, banks and open glades. Blackthorn (*Prunus spinosa*) and elder (*Sambucus nigra*) are largely confined to the margins of the wood, with elder being most common along roads and rides. Wild Cherry (*Prunus avium*) and more rarely, Silver Birch (*Betula pendula*) can be found in wood margins and on the high bank separating the wood from the fields and amenity areas of the demesne. In some localized areas within the wood, as in St. Catherine’s, dense colonies of the

invasive exotic, Cherry-laurel (*Prunus laurocerasus**) have displaced the typical understory species and suppress seedling development and the recruitment of potential canopy species. An unusual feature of Luttrellstown is the presence of honeysuckle (*Lonicera periclymens*) in the wood interior and abundantly in wood margins and rides. This species is rare in St. Catherine's and apparently absent from Knockmaroon.



Oak in Luttrellstown woods

Photo by Shawn McCourt

3.5.2. Ground Flora of Luttrellstown woods

As in St Catherine's, a long history of forest cover, the varied geographic features, and variations in soil pH have helped to foster a rich ground flora in the wooded areas of Luttrellstown demesne. The woodland flora is comprised of slow-spreading, spring blooming geophytes such as *Allium ursinum*, *Anemone nemerosa*, *Hyacinthoides non-scripta*, and *Ranunculus ficaria* which are followed by summer bloomers such as Bugle (*Ajuga reptans*), Herb-Robert (*Geranium robertianum*), Wood-Avens (*Geum urbanum*), Germander Speedwell (*Veronica chamaedrys*) and violets (*Viola riviniana*, *V. reichenbachiana*). Mid to late summer bloomers include Enchanter's Nightshade (*Circaea lutetiana*) and Sanicle (*Sanicula europaea*). Carices (sedges) are abundant, especially *Carex sylvatica*, *Carex pendula*, *Carex remota* and the rarer *Carex strigosa* and *Carex divulsa*. Grasses are represented by the shade tolerant and uncommon *Melica uniflora* and *Milium effusum*. Ferns are also abundant, especially *Phyllitis scolopendrium*, *Dryopteris filix-mas* and *Polystichum setiferum*, but also found were *Dryopteris dilatata* and *Dryopteris affinis*. On stone walls and crevices, the epiphytic ferns *Polypodium vulgare* and *Asplenium ruta-muraria* can be found. Mosses are largely uncommon, but those present may include *Thamnobryum alopecurum*, *Mnium hornum* and *Thuidium tamariscindum*. The soils of Luttrellstown woods are often acidic in nature, in spite of the underlying calcareous substrate. The pH under woodland was found to be between 4.32 and 5.16 on west-facing slopes above the stream glen in spite of being over a limestone outcrop, and between 7.36 and 7.58 on south-facing slopes above Lucan Road.



Luttrellstown: Woodland gap with Ramson's and Bluebells.

Photo by the author.

3.5.3. Grasslands

Grasslands are abundant in Luttrellstown, but most of these are either the amenity grasslands that make up two large golf course and the lawns around the mansion or the grassy rides previously discussed. Also present are some semi-improved grassy verges found around the lawns, gardens, buildings, and areas of cultivation. These tend to support tussock grasses, mainly *Arrhenatherum elatius*, *Lolium perenne*, *Festuca* spp., *Poa* spp., *Cynosurus cristata* and *Dactylis glomerata*. and large, coarse broadleaves such as *Senecio jacobaea*, *Cirsium arvense*, *Anthriscus sylvestris*, *Heracleum sphondylium*, *Epilobium* spp., *Sonchus* spp., *Crepis biennis*, *Lapsana communis*, *Rumex* spp., and *Chamaenerion angustifolium*. Also present are grassy rides through the wooded areas and a small species-rich remnant at the edge of Luttrellstown golf course.

Woodland Rides and Edges

The presence of roads and well-maintained rides immediately adjacent to woodlands produce a semi-shaded edge effect in which species of grasslands and woodland gaps are able to co-exist. Some examples found in Luttrellstown include *Brachypodium sylvaticum*, *Bromopsis ramosus*, *Festuca* spp., *Deschampsia caespitosa*, *Carex flacca*, *Carex sylvatica*, *Stachys sylvatica*, *Glechoma hederiae*, *Galium aperine*, *Geranium robertianum*, *Fragaria vesca*, *Lapsana communis*, *Vicia sepium*, *Ajuga reptans*, *Glechoma hederiae*, *Anthriscus sylvestris*, *Linum catharticum*, *Crepis biennis*, *Potentilla sterilis*, *Potentilla reptans*, *Valeriana officinalis*, *Primula vulgaris*, *Ranunculus ficaria*, *Ranunculus repens*, *Veronica chamaedrys*, *Veronica officinale*, *Veronica montana*, *Rubus fruticosus* agg., *Rubus idaeus*, and *Viola* spp. Some, including *Stachys sylvatica* and five *Hypericum* species, seem to prefer woodland rides to all other habitats, since they are almost never found in the wood interior, nor do they occur often in open grassland. One sample site revealed the pH of a south-facing side of woodland ride to have a pH of 5.78, but this varies along the rides, depending on soil depth, substrate, leaching and adjacent woodland vegetation.



Calcareous remnant

To the northeast of the stream valley (*Map 4*) on a limestone outcrop that continues beneath the wood to the floor of the valley, and at the very edge of the newly renovated golf course, is a small remnant of semi-natural, dry calcareous grassland. This relic has been severely reduced by the expansion of the adjacent golf course and is threatened by fertilizer run-off from the greens as well as invasion of the site by gorse (*Ulex europaeus*). The little that does remain (approx 20-25 m²) supports many interesting calcicolous species such as *Ononis repens*, *Knautia arvensis*, *Leucanthemum vulgare*, *Galium verum*, *Bromopsis ramosa*, *Briza media*, *Trisetum flavescens*, *Avenula pubescens*, *Dactylis glomerata*, *Prunella vulgaris*, *Leontodon hispidus*, *Vicea cracca*, *Centaurea nigra*, *Succisa pratensis*, *Hypericum pulchrum*, *Lotus corniculata*, *Primula veris*, *Mendicago lupulina*, *Potentilla reptans*, *Hieracium* spp., *Pimpinella saxifraga*, *Linum catharticum*, *Achillea millefolium*, *Carex flacca*, *Trifolium* spp., *Plantago lanceolata*, *Anacamptis pyramidalis*, *Agrimonia eupatoria*, and *Sanguisorba minor*. Species richness is exceptionally high, with at least 40 species identified for this site alone. See Appendix I for a complete species list. The pH value of a soil sample taken at this site was also very high at 8.23, corresponding with this strongly calcicolous plant community.

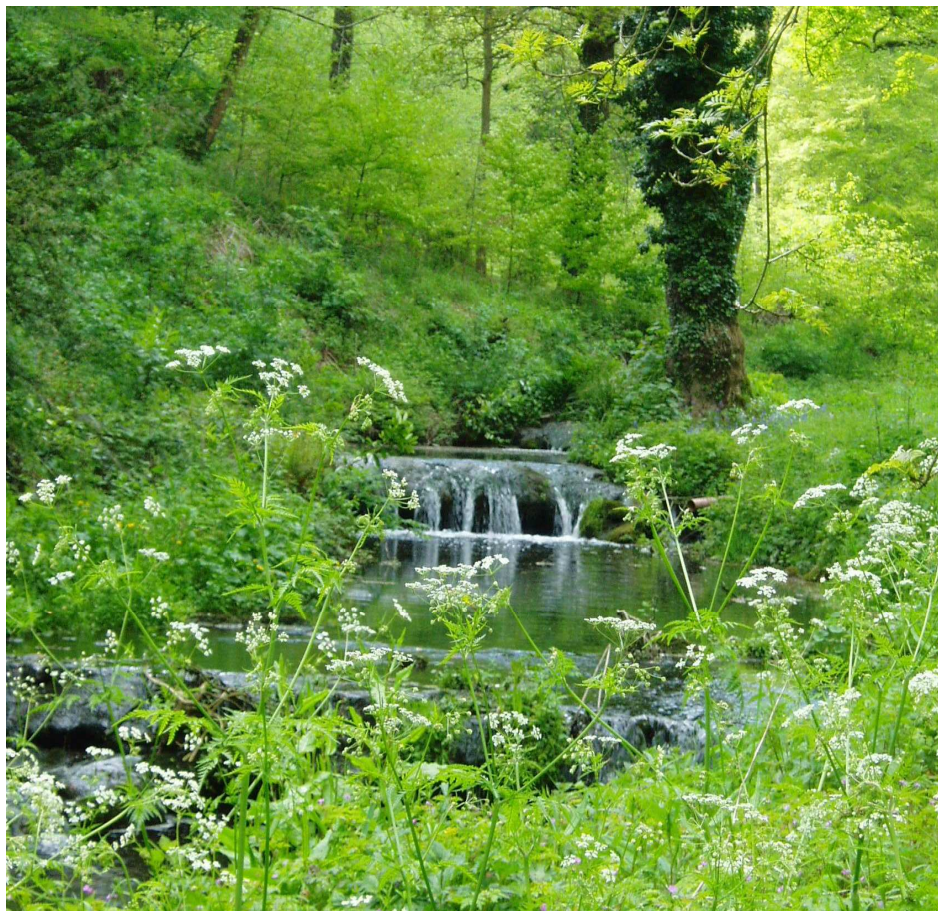


Galium verum in dry grassland.

Photo by the author

3.5.4. Woodland stream at Luttrellstown

A small feeder stream flows through two ponds on the golf course before falling over a rock outcropping into a deep glen in Luttrellstown, where it takes a natural meandering course over several small falls before flowing out of the demesne under Lucan Road to join the River Liffey. As it flows through the glen, the stream supports many marginals and species of alluvial soils in the adjacent low-lying grassland. Characteristic species include abundant *Anthriscus sylvestris*, *Carex pendula*, *Sparganium erectum*, *Myosotis scorpioides*, *Mentha aquatica*, *Iris pseudacorus*, *Prunella vulgaris*, *Angelica sylvestris*, *Filipendula ulmaria*, *Festuca* spp., *Agrostis stolonifera*, *Caltha palustris*, *Chrysosplenium oppositifolium*, *Heracleum sphondylium* and *Scrophularia* spp. (*S. auriculata*, *S. umbrosa*). The stream also supports a few aquatics, particularly in deeper pools, including *Nuphar lutea*, *Lemna minor*, **Elodea* spp, and *Callitriche stagnalis*. The golf course ponds support a few additional species in the form of *Nymphaea alba*, *Typha latifolia*, *Schoenoplectus lacustris*, *Phalaris arundinacea*, *Persicaria hydropiper*, *Equisetum fluviatile*, *Hippuris vulgaris*, *Alisma plantago-aquatica*, *Epilobium hirsutum* and *Juncus effusus*. See Appendix I for a complete listing.



Luttrellstown- Woodland stream with Cow-Parsley in the foreground.

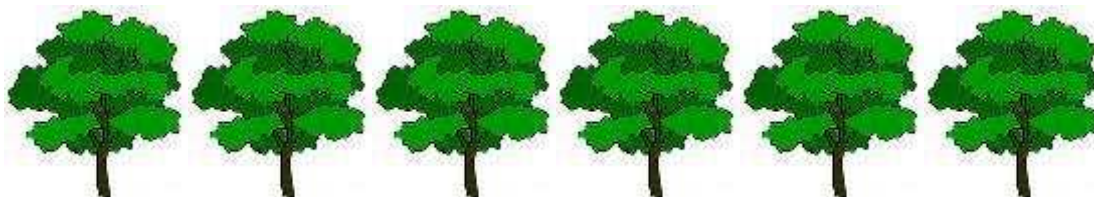
Photo by the author.

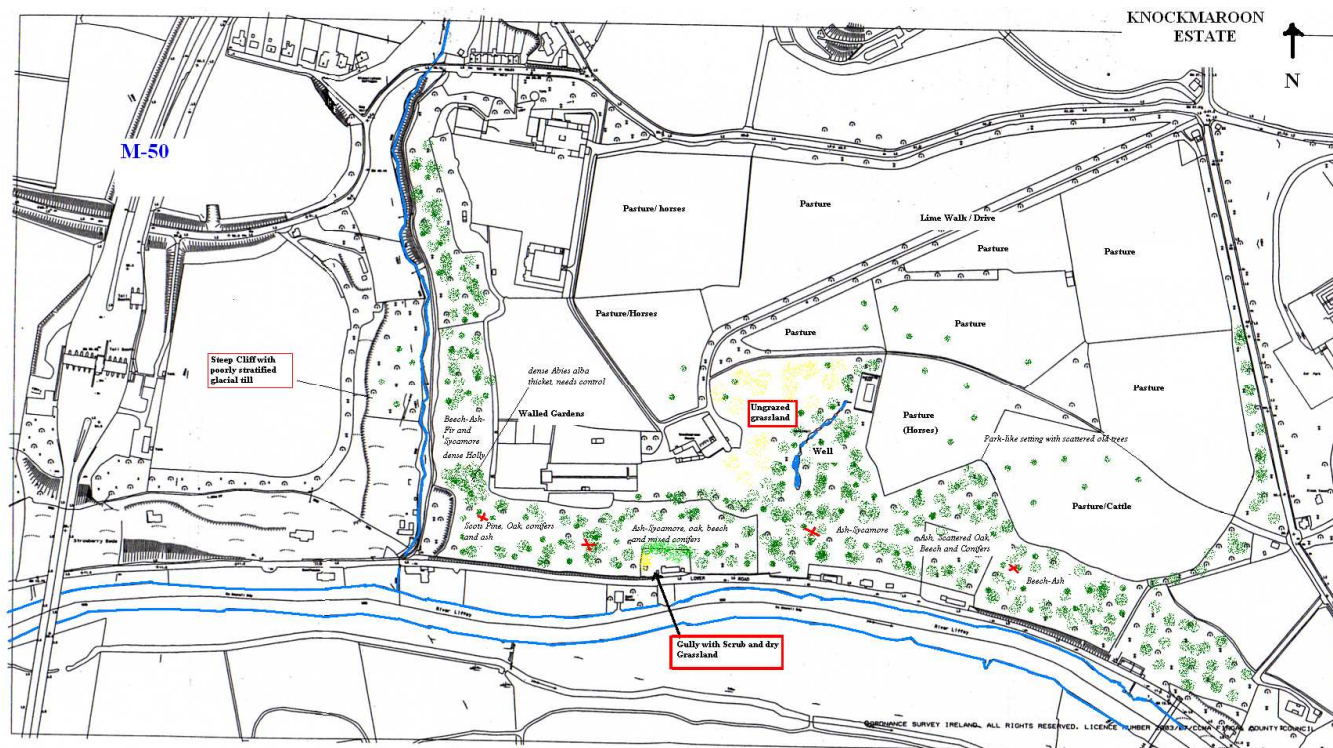
3.6 Knockmaroon

3.6.1. Woodland

Knockmaroon is located just east of the M50 bridge and its steep, wooded slopes span nearly a mile of the north side of the Liffey (*Map 5*). The wood is very open in nature, with ash and beech being co-dominant, and the field layer sparse or grassy. Only 5 tree species were recorded in the four quadrats sampled, possibly reflecting the greater distance between trees rather than lower species richness. 19 tree species were found in all, widely scattered throughout the wood. The species composition of Knockmaroon wood is similar to the previous two, but stand density and the frequencies of the individual species are somewhat different, although beech and ash remain the most important canopy species. Active planting and felling have not occurred in at least three generations of ownership (pers. comm.), resulting in a forest that has largely been left to its own. As in St. Catherine's, beech and ash are the dominant species (*Graph 2*), but the open nature of the wood, shallow, dry soils and past management regimes have resulted in the flourishing of conifer species, especially Scots Pine (*Pinus sylvestris*), with *Larix spp.**, *Pinus contorta**, and *Pinus radiata** occurring occasionally throughout the wood, especially on south-facing slopes. Sycamore (*Acer pseudoplatanus**) is also abundant throughout the wood, and its saplings compete with the locally abundant ash and whitethorn saplings for space in the understory. On local sites, particularly in the damper western areas of the wood, large Silver Fir (*Abies alba**) trees flourish and produce an understory of seedlings and saplings thick enough to choke out would-be competitors and the field layer. The north end of the wood is bounded by shallow bank and is dominated by large beeches, possibly planted as boundary markers separating the estate fields from the wood. Oak and yew (*Taxus baccata*) are uncommon, occurring mostly on dry ridges, or in the gullies and steep ravines that are so common in Knockmaroon woods. The oak species encountered most was *Quercus petraea*, not the *Quercus robur* that is more commonly planted. Some exotic oaks also occur in these woods, apparently self-sown from the estate and neighboring properties. These include mature plants and saplings of Turkey Oak (*Quercus cerris**) and most unusually, *Quercus ilex**, the Holm Oak of Mediterranean regions that is generally reluctant to spread in the damp Irish climate and soils.

The understory of Knockmaroon is sparse, with a grassy field layer. Elm, hazel, and holly are less common here than in the previous two woods, but are by no means absent even if they were not recorded in the relevés (see Appendix I). Understory saplings include ash and sycamore, but also beech and locally, Silver Fir. Also occurring in the understory are abundant colonies of Wild Privet (*Ligustrum vulgare*) and more locally, Spurge Laurel (*Daphne laureola**), both of which occur less frequently in Luttrellstown. On south facing ridges within the wood, whitethorn (*Crataegus monogyna*) is abundant in the understory with species of more open sites such as roses (*Rosa canina*, *Rosa arvensis*), and gorse (*Ulex europaeus*).





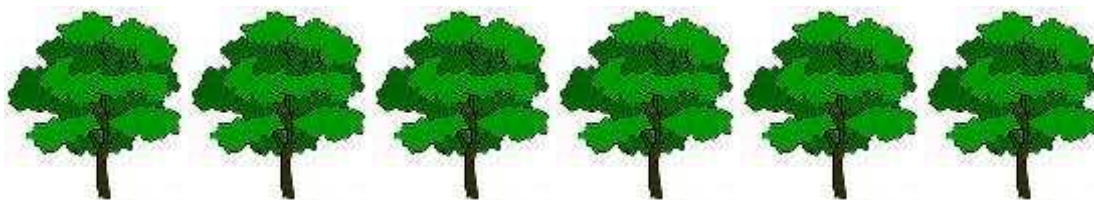
Map 5. Knockmaroon Estate, Castleknock, No. County Dublin (Fingal). Vegetation areas of interest are shaded in green for woodlands and yellow for grasslands while waterways are outlined in blue. Note the River Liffey to the south, M-50 motorway and Strawberry Beds to the south and west. Approx. sites of sample woodland quadrats marked with a red 'X'.
(Reproduced with permission from OSI, maps produced for Fingal County Council)

3.6.2. Ground Flora

Due to its extremely steep slopes and shallow soils, as well as the lack of woodland rides or significant riparian influence in the form of streams (as in Luttrellstown) or rivers (as in St. Catherine's) Knockmaroon Wood is somewhat impoverished in species. Species found in the main wood include *Allium ursinum*, *Primula vulgaris*, *Ranunculus ficaria*, *Arum maculatum*, *Anthriscus sylvestris*, *Sanicula europaeus*, *Geranium robertianum*, *Phyllitis scolopendrium*, *Dryopteris filix-mas*, *Dryopteris affinis*, and *Ranunculus repens*, but these are often sparse and localized. Ivy cover is also notably poor, and bare ground is frequent in many areas throughout the wood, possibly due the steepness of slopes and the activities of badgers, which have built extensive setts throughout the central part of the wood. The herbaceous vegetation and ivy cover may also be low because of heavy grazing by deer. Exposed soils and sparse vegetation have also favored the growth of pleurocarpous mosses, especially *Mnium hornum*, *Brachythecium spp.* and *Eurhynchium praelongum*.

The open nature of the southwestern area of Knockmaroon woods (*Pinus sylvestris* canopy) has produced a ground flora more characteristic of semi-shaded, open areas like the woodland rides in Luttrellstown. The shrub layer is dominated by roses (*Rosa canina*, *Rosa arvensis*), gorse (*Ulex europaeus*), whitethorn, holly and some seedling and sapling oaks, including two non-native species (*Quercus cerris**, *Quercus ilex**).

Soils are slightly acid to calcareous in nature, with the pH determined to be in the range of 6.41 to 7.75, with the lower pH occurring under beech in the central and eastern end of the wood.



3.6.3. Grasslands

Grasslands on the grounds of Knockmaroon estate are mostly species poor and heavily grazed by livestock (cattle and horses). Some areas just outside of the animal pens (near the chicken run) and along the drive are “unimproved” areas of tussock grasses, legumes and umbellifers such as *Dactylis glomerata*, *Arrhenatherum elatius*, *Holcus lanatus*, *Cynosurus cristatus*, *Festuca spp.*, *Poa spp.*, *Heracleum sphondylium*, *Vicia sepium*, *Trifolium pratense*, *Trifolium repens* and *Mendicago lupulina*. They also support a calcicolous element in the form of *Pimpinella saxifraga*, *Conopodium majus*, *Trisetum flavescens*, *Galium verum* and the orchid, *Anacamptis pyramidalis*. These areas are mowed by hand and stacked and dried in the traditional method of haymaking.

Grassland within the wood

As mentioned previously, the southwest slopes of Knockmaroon wood bear a sparse canopy cover of Scots Pine, enabling some grassland species to persist (Table 5, relevé #5). Grass species found on this site include *Brachypodium sylvaticum*, *Bromopsis ramosus*, *Arrhenatherum elatius*, *Briza media* and *Dactylis glomerata*. Herbs and sedges also include some species typical of open, neutral or calcareous grassland such as *Galium verum*, *Pimpinella saxifraga*, *Plantago lanceolata*, *Carex flacca* and *Potentilla reptans*. Woodland species include *Veronica chamaedrys*, *Viola riviniana* and a sparse covering of *Hedera helix*. The soil pH for this area was found to be in the range of 7.64 and 7.75 (Appendix 2).

3.6.4. Riparian Areas of Knockmaroon

A small stream also flows down to the Liffey below the west end of Knockmaroon, but it flows in a very deep gorge with steep sides, through woodland most of the way, and therefore has very little in the way of marginal vegetation other than the wood itself. Abundant fern species can be found on the stream banks as it flows through the wood, including *Polystichum setiferum*, *Dryopteris spp.*, and *Phyllitis scolopendrium*. Where the stream leaves the wood is a highly disturbed and trampled gravel area used by bikers and by the phone company (Eirecom) to access newly installed telephone poles. Very little streamside vegetation remains but *Petasites hybridus*, *Rorippa nasturtium-aquaticum*, *Apium nodiflora*, *Impatiens glandulifera**, and just before it flows under Lucan road, *Sparganium erectum*.

3.7 Other Sites of Interest

3.7.1. Lucan ‘Car Park’

This site on the north bank of the Liffey just across from the active limestone quarry is a mix of grassland, bare ground/gravel (possibly refuse from adjacent quarry), scrub, ruderal and riparian vegetation with scattered trees. It is maintained by occasional mowing.

The majority of the site is covered in rank vegetation in the form of coarse grasses and herbs typical of eutrophic and alluvial soils. Some examples include *Petasites hybridus*, *Rubus fruticosus* agg., *Senecio jacobaea*, *Eupatorium cannabinatum*, *Filipendula ulmaria*, *Scrophularia auriculata*, *Sonchus* spp., *Vicia sepium*, *Sinapsis arvensis*, *Epilobium* spp., *Brassica napus*, *Rumex* spp., *Heracleum sphondylium*, *Urtica dioica*, *Arrhenatherum elatius*, *Holcus lanatus*, *Festuca rubra*, *Poa annua*, *Glyceria maxima*, *Impatiens glandulifera**, *Centaurea nigra*, *Silene alba*, and *Cirsium* spp. The river margin supports a rich riparian vegetation typical of the River Liffey basin, including some rarer species.

The central part of the area is comprised of shallow, skeletal soils over a layer of calcareous gravel, possibly spoil from the adjacent quarry. The site may have been used as a car park for amenity access to the river (ie, angling). The high pH of 8.15-8.27 (see Soil analysis data, Appendix II) and shallow soils result in a diminutive community comprised of mainly calcicolous species, including *Linum catharticum*, *Bellis perennis*, *Cerastium* spp., *Potentilla reptans*, *Fragaria vesca*, *Trisetum flavescens*, *Prunella vulgaris*, *Menticago lupulina*, *Lotus corniculatus*, *Trifolium* spp., *Festuca ovina*, *Achillea millefolium*, *Hypericum pulchrum*, *Veronica chamaedrys*, *Plantago lanceolata*, *Geranium robertianum*, *Myosotis* spp., *Hieracium* spp., *Saxifraga tridactylites* and the orchid, *Anacamptis pyramidalis*.

Woody species also present include *Alnus glutinosa*, *Quercus robur*, *Prunus spinosa*, *Salix alba*, *Salix fragilis** and *Acer pseudoplatanus** in a narrow belt along the river bank while spread out around the central area are *Crataegus monogyna*, *A. pseudoplatanus**, *Ulmus glabra*, *Rosa canina*, *Sambucus nigra*, *Prunus spinosa*, a few seedling *Betula* spp. and abundant *Rubus fruticosus* agg.



3.7.2. Quarry Site

Just to the east of the previous site, on the west side of Luttrellstown demesne, and adjacent to Tinker Hill Road is a narrow strip of grassland and scrub running up a very steep slope. It may have been a part of the adjacent quarry and contains abundant spoil and gravel, particularly at the base of the slope. As at the Lucan “car park” site, the soils are very shallow and rocky with a high pH value of 8.01 (see sample #8, Soil Analysis data in Appendix II). In spite of the presence of gravel, the soils at the base of the slope are somewhat impeded and may flood in some places seasonally. The variety of moisture levels and depths of soil enables a wide range of grassland and scrub species to colonise the site, while the high pH gives it a calcicolous element. Species of the impacted soils and damp hollows include abundant *Epilobium spp.*, *Carex hirta*, *Carex pendula*, *Carex sylvatica*, *Juncus effusus*, *Juncus inflexus*, *Holcus lanatus*, *Stellaria media*, *Tussilago farfara* and *Eupatorium cannabinatum* while abundant willow saplings (*Salix cineria*, *Salix caprea*) threaten to shade out all. Higher up slope and on slightly elevated pockets of ground around the hollows one finds calcicoles and species of mesic areas including *Senecio erusifolius*, *Potentilla reptans*, *Centaurea nigra*, *Lathyrus pratensis*, *Trifolium spp.*, *Mendicago lupulina*, *Lotus corniculatus*, *Hypericum maculatum*, *Hypericum hirsutum* and *Arrhenatherum elatius*. Remnants of former cultivation can be seen in the presence of non-natives such as *Lathyrus grandifolia**, *Foeniculum vulgare**, and one double-flowered, magenta cultivar of rose (*Rosa spp.*). The invasive snowberry (*Symphoricarpos albus**) and cotoneaster (*Cotoneaster spp.**) have been planted along Lucan and Tinker Hill Roads, and threaten to overtake the vegetation of the site. *Buddleja davidii** and *Leycestria formosa** are also present and invasive, and should be monitored and removed where possible.

3.7.3. Strawberry Beds

Two sites in the “Strawberry Beds” contain examples of dry grassland that is seldom mowed, and is ungrazed by livestock. They are species-rich and may be remnants from a time when the steep slopes of this area were used for quarrying, as well as low-grade cultivation and hay-making. The soils here are calcareous in nature due to the abundance of limestone till near the surface, and one sample tested produced a pH of 7.85 (Appendix 2).

The first area is located just west of the M50 bridge over the River Liffey and above St. Anthony’s residence on Lower (Lucan) Road. The grassland is found mid-slope on a steep southwest-facing hill, sandwiched between the gardens and cultivated areas of the homes along Lucan Road, and a young woodland encroaching from the top of the hill. Species richness is quite high, with species including *Agrostis capillaris*, *Arrhenatherum elatius*, *Bromopsis ramosus*, *Cynosurus cristatus*, *Phleum pratense*, *Dactylis glomerata*, *Vicea sepium*, *Vicea sativa*, *Senecio jacobaea*, *Centaurea nigra*, *Mendicago lupulina*, *Lonicera periclymens*, *Rumex sanguineus*, *Lathyrus pratensis*, *Rubus fruticosus* agg. and the uncommon *Allium vineale*. A more calcareous element can be seen in the presence of calcicoles like *Briza media*, *Trisetum flavescens*, *Lotus corniculatus*, *Senecio erusifolius*, *Hieracium spp.*, *Daucus carota*, *Knautia arvensis*, *Succisa pratensis*, *Galium verum*, *Agrimonia eupatoria* and at least one orchid species, *Anacamptis*

pyramidalis. A relic of cultivation can also be seen in the presence of a large colony of culinary sage (*Salvia officinalis*) in the grassland.

The other site is located east of the M50 bridge, nearly under the eaves of the southern end of Knockmaroon woods where a steep and wide gully of gravel-rich soils stretches to the valley floor. At the floor of the gully, a former gravel pit, is a private residence surrounded by gardens and planted trees and shrubs. In between these cultivated areas and the woodland proper is a small strip of unmowed and ungrazed grassland on a steep, south-facing slope. Although species richness is not as high as the former, possibly due to more disturbance, a calcicolous element does persist in the presence of species including *Bromopsis ramosus*, *Briza media*, *Trisetum flavescens*, *Knautia arvensis*, *Fragaria vesca*, *Lotus corniculatus*, *Conopodium majus*, *Galium verum*, and *Pimpinella saxifraga*. Scattered throughout the site are also plants of the cultivated strawberry **Fragaria x ananassa*, possibly relics of the many strawberry fields that gave this region of the Liffey Valley the name of “Strawberry Beds,” however, they are more likely to be of recent origin. Also of note are the presence of a young, and possibly self-sown, Scots Pine (*Pinus sylvestris*), two Laburnums (*Laburnum anagyroides**) and several Sessile Oaks (*Quercus petraea*). A large colony of the exotic snowberry (**Symphoricarpos albus*) is steadily creeping up from the gardens below and overtaking this narrow strip of grassland.



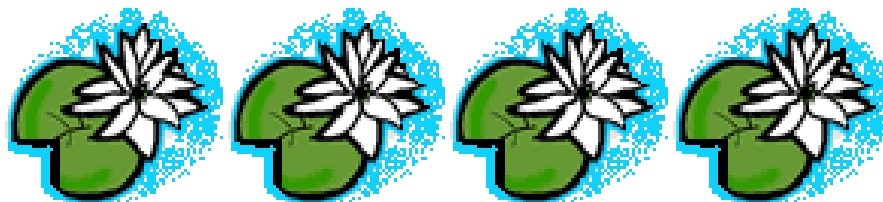
Liffey Valley- Photo of the Liffey Valley above Lucan Road taken from the easternmost end of the SAAO area, facing west. Note the M50 bridge over the Strawberry Beds and the river in the distance. The forested slopes of Knockmaroon are to the right of the picture, stretching almost to the M50.

photo by: Shawn McCourt

3.8 River Liffey Corridor

The River Liffey in the SAAO area is a characteristic lowland river, whose sluggish and nutrient-rich waters support a variety of marginal and submerged vegetation. It has been highly modified by human activity, and very little remains that has not been altered in some manner. The extent and thickness of overhanging woody vegetation often has a direct impact on marginals and aquatics found there, and regularly reflect adjacent land use. Marginal plants also often grade into adjacent grassland, or less commonly, woodland areas (in gaps) making it difficult to distinguish truly marginal plants from those of rich, alluvial soils. *Eupatorium cannabinum*, *Petasites hybridus*, *Urtica dioica*, *Anthriscus sylvestris*, *Heracleum sphondylium*, *Filipendula ulmaria* and two of the three *Scrophularia* species are notoriously difficult in this respect, as they are not limited to just the river margins but are found elsewhere in the SAAO area on rich, damp soils. Typical aquatic and emergent vegetation encountered growing in the Liffey include Marsh Marigold (*Caltha palustris*), Common Club-rush (*Schoenoplectus lacustris*), Reed Sweet-grass (*Glyceria fluitans*), pondweeds (*Potamogeton crispus*, *P. natans*, *P. pectinatus*), Yellow Water-lily (*Nuphar lutea*), Arrowhead (*Sagittaria sagittifolia*), bur-reeds (*Sparganium emersum*, *S. erectum*), speedwells (*V. beccabunga*, *V. anagallis-aquatica*), Canadian Pondweed (*Elodea canadensis**) and Flowering Rush (*Butomus umbellatus*), the latter of which is rare in County Dublin (Doogue, et. al, 1998). Marginal species include Watercress (*Rorippa nasturtium-aquatica*), Fool's Watercress (*Apium nodiflorum*), Yellow-flag (*Iris pseudacorus*), Reed Sweet-grass (*Glyceria maxima*), Reed Canary-grass (*Phalaris arundinacea*), Water Forget-me-not (*Myosotis scorpioides*), Water Mint (*Mentha aquatica*), Angelica (*Angelica sylvestris*), Bittersweet Nightshade (*Solanum dulcamara*), Pendulent Sedge (*Carex pendula*), and figworts (*Scrophularia auriculata* and *S. umbrosa*). Occasional invasive exotics encountered include Japanese Knotweed (*Fallopia japonica**) and Indian Balsam (*Impatiens glandulifera**). The river at Broomfield (just across Lucan Road from Luttrellstown woods) contributed additional species to the list with Pink Water-Speedwell (*Veronica catenata*), Nuttal's Pondweed (*Elodea nuttali**), Marsh Ragwort (*Senecio aquaticus*), Gypsywort (*Lycopus europaeus*), Amphibious Bistort (*Polygonum amphibium*) and an apparently naturalized pink-flowered cultivar of Fuchsia (*F. magellanica**).

Principal among tree species found growing at the river margins were alder (*Alnus glutinosa*), willows (*Salix fragilis**, *S. alba*, *S. viminalis**) sycamore (*Acer pseudoplatanus**), Ash (*Fraxinus excelsior*) Aspen (*Populus tremula*) and more rarely, Common Oak (*Quercus robur*), beech (*Fagus sylvatica*), poplars (*Populus x canescens**, *P. nigra**) and Wych Elm (*Ulmus glabra*). Shrub species include Blackthorn (*Prunus spinosa*), Whitethorn (*Crataegus monogyna*) and all too often, cotoneaster (*Cotoneaster spp.**) and the invasive Snowberry (*Symphoricarpos albus**). Also present in abundance along the river corridor are brambles (*Rubus spp.*), Dog Rose (*Rosa canina*), ivy (*Hedera helix*) and its associated parasite, Ivy Broomrape (*Orobanche hederæ*) which although relatively uncommon and declining elsewhere, is abundant along the River Liffey and its adjacent woodlands, hedges, and walls; seemingly wherever ivy grows in plenty (Doogue, et al. 1998).



4.0 DISCUSSION

4.1 *Overview*

Preliminary survey work revealed the Liffey Valley SAAO area to be a highly fragmented, patchwork mosaic of vegetation, the result of a wide variety of landscape uses. Since the focus of this study was to determine which areas have the greatest ecological significance within the Liffey Valley SAAO, all amenity, tillage, cultivated, and built areas were excluded from the survey. The areas that remained for study then were woodland, some of the richer grasslands and the riparian vegetation of the River Liffey corridor (and tributaries). Nationally rare and protected species were found in all three major habitats of study in the Liffey Valley SAAO and of these, two are almost confined to the Liffey Valley region of Ireland, with small, outlying populations in Northern Ireland. For conservation purposes, their whereabouts are not revealed in this report, but populations are deemed to be stable for the present. Threatened habitats in need of the most immediate attention include the grasslands present on steep slopes and limestone outcrops in the Liffey Valley. These are extremely species-rich and their loss will impoverish the flora of the SAAO area.

4.2. WOODLAND

Woodland is the rarest major habitat in Ireland (Higgins 2004) and native, semi-natural woodland is the rarest type, with approximately 100,000 hectares in existence, or less than 0.7% of the island (Higgins 2004). These highly fragmented woodlands, in spite of modification by man and the introduction of exotic species, nevertheless support a large population of native tree species and a rich diversity of flora and fauna. Such woodlands are very valuable to wildlife, as habitats for rare species, and as a source of seed for native planting stock. They are priority habitats for which the creation of Natural Heritage Areas (under the Wildlife Act) and Special Areas of Concern (SACs) should be implemented in accordance with the National Biodiversity Plan (European Commission 1998). Portions of the Liffey Valley SAAO area are part of a proposed Natural Heritage Area, but like the other 1,100 such proposed areas, it has not yet been formally designated (Higgins 2004) and as a result, is vulnerable to destructive activities by humans. The principal semi-natural, wooded areas of the Liffey Valley lie within the former Lucan demesne, of which St. Catherine's Park forms a part, as well as the steep slopes of the walled demesne of Luttrellstown and the estate of Knockmaroon, in Castleknock. The three wooded demesnes of Luttrellstown, Knockmaroon and St. Catherine's wood reflect, in part, the vegetation that might cover nearly all of County Fingal if human activities, tillage, and grazing pressure all ceased. Though much altered themselves by planting, felling, and other human disturbance, the three wooded estates still preserve a species-rich ground flora, suggesting at least partial forest cover throughout historic times (Rackham 1976).

4.2.1. Canopy trees

In spite of the high incidence of exotic tree species, especially beech, the tree assemblages of the woodlands of the SAAO area, reflect the Corylo-Fraxinetum (Ash-Hazel) association within the Querco-Fagatea (Oak-Beech) classification that occurs over limestone in Ireland (White 1982, Kelly & Kirby 1982). Fossitt describes this “oak-ash-hazel” sub-community as being typical of free-draining, base-rich soils and is usually dominated by oak (usually *Quercus robur*), ash (*Fraxinus excelsior*) and hazel (*Corylus avellana*) or various mixtures of some or all of these (2000).

Ash is the dominant tree species of the woods of the Liffey Valley, but the non-native beech (*Fagus sylvatica**) has largely replaced oak on most sites, often co-dominating in the canopy with ash. One exception to this occurs in the southwestern and northeastern areas of Luttrellstown woods, where scattered large oaks (*Q. robur*) maintain themselves in the canopy. There is very little recruitment of saplings from the forest floor, however, due to dense shade cast by the beech and sycamore which now contend with ash and oak for a place in the canopy. In St. Catherine’s, beech has virtually displaced oak (either naturally or through active planting in the past), especially along the northeast road where a dense, even-aged stand crowds out would-be contenders, while ash holds its own in other areas of the wood. Oak can only be found along the wood margins or the riverside, where pressure from beech is lessened. In Knockmaroon, oak is scarce, and is usually the species *Quercus petraea*, which persists on high ridges or in steep gullies. Beech and ash are co-dominant in the remainder of the wood, and sycamore occurs at a high frequency in the understory.

Other tree species found in the Liffey are mainly exotics that had been planted in some time in the past, particularly in the 18th and 19th centuries, when it was fashionable to dress up a wood with foreign species. The large old hornbeam, Scots Pine, Monterey Pine (*Pinus radiata*), Horse Chestnut, and lime (*Tilia x europaeus*) found in the Liffey Valley woods, as well as the many conifers found in Luttrellstown and locally in Knockmaroon, reflect this past ornamentation of the wooded demesnes by their former owners. Most of these species do not spread, and therefore pose little threat to the native trees. Lime has a long history of being planted outside of its native range in England and mainland Europe, and was once widely planted by estate-holders, mainly in the 18th century, to mark the boundaries of their estate or the wooded part of their estate (Rackham 1976). This tree is often encountered in Luttrellstown, but rare elsewhere in the Liffey Valley. In Luttrellstown, lime can be found planted in a relatively straight line along the south and west ends of the demesne, bounded by Lucan Road and Tinker Hill Road, as well as scattered individuals in the north bank separating the wood from the cultivated areas and golf courses of the demesne. Lime is also found along the east wall and to the south-east, separating the ash wood of the “Rabbit-Warren” area from the older beech wood to the north and west of it, possibly an old boundary that has since been overtaken by trees (*Map 4*).

Scots Pine, a formerly native tree of Ireland that is believed to have died out in the Christian Period and was later re-introduced, is frequent in both Luttrellstown and Knockmaroon. The similar size, girth, and height of the trees indicates that they may be even-aged and were all planted out at the same time, perhaps as a nurse species for more desirable broadleaves. The absence of saplings or seedlings from the understory or wood fringes also make it evident that without continued re-planting, these trees will die out from the Liffey woods. An exception is one young individual found on a steep slope in the Strawberry Beds below Knockmaroon. It may be a chance seedling, but is also just as likely to have been planted.

A distinguishing feature of St. Catherine's is the presence of so many old coppice stools. Many species appear to have been coppiced in the past, including hazel, ash, oak, holly, chestnut and beech, and this is evident by the large bases and even-aged, multiple-stemmed nature of individuals of these species scattered throughout the wood. The beech wood along the northeast road also appears to have been coppiced in the past. The presence of old and now dying, Silver Birch (*Betula pendula*) in this wood may be the result of the germination of wind-blown seed in the open gaps created after coppicing of the beech (Rodwell 1991. p115). The birch have now reached the end of their life-cycle (or have been shaded out by the now mature beech coppice), as indicated by the presence of so many fallen individuals in the wood. Young individuals still persist on a south-facing ridge at St. Catherine's where the canopy is relatively open, perhaps the result of some recent disturbance that enabled this shade-intolerant species to colonise the site.

4.2.2. Understory

Understory trees associated with the Corylo-Fraxinetum on calcareous soils in Ireland include Wych Elm (*Ulmus glabra*), yew (*Taxus baccata*), holly (*Ilex aquifolium*) and hazel (*Corylus avellana*), all of which can be found, in varying abundance, in the woods of the Liffey Valley SAAO (Kelly & Kirby 1982). *Ulmus* is most abundant in Luttrellstown, where the largest trees in the study area were observed (though not recorded in quadrat sampling) and is scattered elsewhere. In all areas, it does not reach the canopy, though in the absence of disease, it will grow as a canopy tree. The multi-stemmed nature of understory elms in the SAAO area reflects trees whose original boles have been felled by disease (or in some cases, humans) and have re-sprouted from the base.

Yew is a rare tree in the Liffey Valley, but like elm, it is most abundant in Luttrellstown, where it grows on limestone outcroppings and steep slopes. It also seems to be able to persist here naturally, since both large old individuals and young seedlings less than a meter high were found. As in Luttrellstown, *Taxus* persists on steep slopes and rock outcrops in Knockmaroon, where it occurs with Sessile Oak (*Quercus petraea*). Although it is less frequent here than in Luttrellstown, it also seems to be able spread naturally. *Taxus* appears to be rarest in St. Catherine's with no old individuals found, and a few younger individuals persisting mid-slope under the canopy of ash. The rarity of yew in St. Catherine's may be due to its slow growth, which causes it to be out-competed by other species on the more favorable moist, circumneutral soils. There are few limestone outcrops in St. Catherine's on which it can grow free from the overriding competition of other species.

Holly is abundant in all three woods of the Liffey Valley, where it forms a large part of the understory. It is most frequent in Luttrellstown where its growth may have been encouraged and less common in Knockmaroon, where heavy grazing by deer may prevent many seedlings from ever reaching the sapling stage.

Hazel is found in all three woods as well, but the greatest density and largest individuals occur in localized areas of both Luttrellstown and St. Catherine's where it may have been formerly coppiced. It is relatively scarce in Knockmaroon, possibly due to grazing and the removal of part of the forest cover in the past.

Also present within the woods of St. Catherine's and Luttrellstown and to a lesser extent, Knockmaroon, are large colonies of the invasive Cherry-laurel (*Prunus laurocerasus**). This aggressive species casts very deep shade that is detrimental to the field layer and to the potential

recruitment of future canopy and understory species. Unless active measures are taken, a wood overtaken by Cherry-laurel becomes impoverished, therefore suggestions for control of this species are indicated in the management section of this report.

4.2.3. Ground Flora

The ground flora and field layers of woodlands are more likely to reflect local climatic and soil conditions than trees or shrubs, which are more directly affected by anthropogenic activity (silviculture, felling, etc) (Rodwell 1991). In the Corylo-Fraxinetum association of Irish woodlands, the ground flora tends to be very rich in broadleaved herbs, many of which are geophytes that grow and bloom before the canopy of the woodland closes over in late spring. Kelly & Kirby define the most characteristic species of the Corylo-Fraxinetum as being *Arum maculatum*, *Circaea lutetiana*, *Conopodium majus*, *Potentilla sterilis*, *Fragaria vesca*, *Primula vulgaris*, *Sanicula europaea*, *Hyacinthoides non-scriptus*, *Ranunculus ficaria*, *Allium ursinum*, *Galium odoratum* and a variety of orchid species (1982). As seen in Table 1 and Appendix I, all of these species, except the orchids, form a major component of the ground layer of the three wooded demesnes of the Liffey Valley SAAO area. Kelly & Kirby also describe the characteristic ferns of the Corylo-Fraxinetum as including *Dryopteris filix-mas*, *Polystichum setiferum* and *Phyllitis scolopendrium*, all of which are abundant in the Liffey Valley (1982). A number of rare and interesting plants that also occur in the Liffey woods include Wood Melick (*Melica uniflora*), Wood-Millet (*Milium effusum*), Toothwort (*Lathraea squamaria*), Ivy Broomrape (*Orobancha hederaceae*), Yellow Archangel (*Lamium galeobdolon*) and the nationally protected Hairy St. John's Wort (*Hypericum hirsutum*) (Curtis & McGough 1982).

These woodland communities may also have affinities with the Fraxinus-Acer-Mercurialis and Fagus-Mercurialis woodland communities in Britain, as described by Rodwell (1991).

4.2.4. Age of the Liffey Valley Woods

There is no primaeval woodland remaining in Ireland, but some ancient, semi-natural forests do survive. These are woodlands that are known to have been in existence prior to the 15th century, when they first appear on maps from this time (Peterken 1993, 1995, Rackham 1995). Many of these woods have since been heavily modified by planting and felling, and therefore bear little resemblance to the original wildwood that may have existed on the site. Not all have been modified to the same degree, and those closest to their natural state (ie, have the largest proportion of native species) have the highest conservation value, since they may be directly descended from the original wood. These primary ancient woodlands are defined by Rackham as “woodland or wood-pasture which has been brought under human control without ever having been cleared of trees (1980)”. The older the wood then, the more likely that it may be descended from the original wildwood. Ancient woods often contain undisturbed soil structures or relic flora and fauna, including ‘ancient woodland indicators’ or species of long-established wood whose presence, along with other supporting evidence, may be a sign of the antiquity of a wood (Rackham 1995, Peterken 1993). Other features indicative of ancient woodland often include the presence of coppice stools and medieval ditches and banks within the wood.

In the Liffey Valley SAAO area, both St. Catherine’s and Luttrellstown are potential candidates for the term “ancient, primary woodland.” John Rocque’s 1760 map of County Dublin reveals that both sites were wooded much as they are today, with St. Catherine’s also being identified as a wood on William Petty’s Down Survey map of 1655. Both woodlands have an external ditch and bank, with the one at St. Catherine’s being larger, deeper and almost completely subsumed into the wood. The ditch at Luttrellstown separates the wooded areas from the cultivated fields, and although not engulfed by the wood, some very large old beeches grow upon it, indicating that it is at least a few hundred years old. The smaller size of the ditch could also have less to do with age and more to do with drainage, as Luttrellstown is elevated higher above the valley than St Catherine’s, and therefore may not have needed the excess drainage. These types of structures appear to be absent from the south end of Knockmaroon, but an earthen bank runs along the west end, and was planted with a row of trees possibly to screen out the view of the gully that was scored with gravel pits at the time of the 1863 OSI survey.

The presence of a well-developed ground flora comprised of slow-spreading herbs and geophytes in St. Catherine’s and Luttrellstown woods is also suggestive of age, though it does not mean the woods are ancient since many of these species, given time, will colonise new woodlands. The presence of possible rare “indicator” species such as the *Monotropa hypopitys* that was recorded in St. Catherine’s by Praeger (1934) but has not since been re-found, may also suggest ancient woodland status (Rackham 1980). Praeger also suggests *Lathraea squamaria* and *Milium effusum* to be indicative of old (ancient) woods in Ireland (1934). *Lathraea* was found in both St. Catherine’s and Luttrellstown, but not in Knockmaroon. *Milium effusum* is a rare woodland species that is an indicator of ancient woodland status in eastern England, but is sometimes planted in pheasant-rearing estates (Preston, et. al. 2002). It was found only in Luttrellstown, which has a history of pheasant-rearing that continues to the present day, and therefore may have been planted. Many other species have a strong affinity for ancient woodlands, being slow to colonise secondary woodlands. Of the species found in the Liffey Valley, Peterken notes the following to be strongly associated with ancient woodland in England (Lincolnshire): *Anemone nemerosa*, *Carex pendula*, *Carex strigosa*, *Lamiasium galeobdolon*, *Galium odoratum*, *Lathraea squamaria*, *Lysimachia nemorum*, *Melica uniflora*, *Milium effusum*,

Oxalis acetosella, *Potentilla sterilis*, *Primula vulgaris* and *Scrophularia nodosa* (1981). Of these, only *Lamium galeobdolon* was not found in Luttrellstown, and *Carex strigosa* and *Milium effusum* were absent from St. Catherine's, while only *Galium odoratum*, *Primula vulgaris* and *Anemone nemorosa* were found in Knockmaroon.

The woods at Knockmaroon appear to be secondary woodland that has sprung up since 1760, when John Rocque's map of County Dublin reveals only a scattering of trees planted along Lucan Road in the Strawberry Beds and along the other roads that bound the present demesne. In spite of its steepness, the southern slope was cleared of trees, possibly for haymaking and the cultivation of low intensity crops, such as the strawberries that give this part of the valley its name. The Ordnance Survey map of 1863 reveals that only a small portion of the demesne was planted with trees, with these occurring mainly around the house and adjacent fields and with some stretching downslope from the well area to Lucan Road (Map 5). These trees may be the old beeches, chestnut and ash that still survive in the fields and are scattered throughout the upper slopes of the wood. Also present near the southwest corner of the hill was a quarry and further west, beside the stream, a gravel pit. The steep western slope facing the stream valley was forested by this time, except near the gravel pits at the northern and southern ends. The current presence of slowly-multiplying woodland species such as *Allium ursinum*, *Anemone nemorosa*, and *Primula vulgaris* may be the result of spread from isolated patches of wood that persisted on the demesne or from adjacent woodland areas, supporting the idea that connectivity of habitats is important for the proliferation of species.

4.3 GRASSLAND

Grasslands are not a climax community in Ireland, since the potential natural vegetation is woodland (Cross 1998, Dierschke 1982) but they are the direct result of a long history of forest clearance for wood products and agriculture (Peterken 1993, Rackham 1976, 1980). Given time, woodlands will regenerate and re-colonise abandoned grasslands. Nevertheless, grasslands, particularly older, species-rich grasslands and semi-natural grasslands on calcareous soils, are areas of tremendous ecological value and worthy of long-term conservation efforts.

Much of the SAAO area has been cultivated to varying degrees, and in many areas development and urbanization are displacing former fields and hedges. The agriculture that does remain has intensified in recent years as traditional methods of farming, pasturage and haymaking have been abandoned in favor of tillage and modern methods of silage (Doogue, et. al 1998). Rampant development and other anthropogenic activities are also taking their toll. The grassland areas that do remain in the SAAO area have been largely "improved" with fertilizers, reseeding, and herbicides to improve their productive value for livestock or amenity purposes. The result is a species-poor sward with little diversity in plant life, and few areas of the landscape remain in a natural or semi-natural state (Doogue et al. 1998).

4.3.1. Mesotrophic Grasslands

Mesotrophic grasslands are the most abundant grasslands of lowland Ireland, with the Molinio-Arrhenatheretea (Tuxen 1937) class being the most common. This is further divided into two orders and six alliances, with only those grasslands of the association Arrhenatheretalia elatioris being of importance in this study. The association is further divided into two distinct alliances, the Arrhenatheretum elatioris and the Cynosurion cristati, each characterized by their own species, and both of which appear to be represented in St. Catherine's Park (O'Sullivan 1982, Rodwell 1992). These correspond with the 'dry meadows and grassy verge' (GS2) habitats of Ireland described by Fossitt (2000). The Arrhenatheretalia is now very rare in Ireland, and is described as occasionally-mowed, infrequently-grazed, temporary grassland of circum-neutral to calcareous soils (Fossitt 2000, Rodwell 1992, O'Sullivan 1982). They are typically found in areas where heavy grazing, frequent mowing and other major disturbances are absent, such as roadway verges, old pasture, and other areas not grazed by livestock. These "lowland hay-meadows" in Ireland are listed as Annex I habitats requiring special conservation measures under the EU Habitats Directive (Fossitt 2000, European Commission, 1996).

SW Grassland

The SW Grassland at St. Catherine's was found to have a pH range of 7.29 to 7.72 with the sward being particularly species-rich and dominated by the grass species *Arrhenatherum elatius*, *Agrostis capillaris*, *Holcus lanatus* and *Dactylis glomerata*, and with at least 23 species of broadleaved herbs, including occasional calcicoles such as *Galium verum*, *Leontodon hispidus*, *Linum catharticum*, *Lotus corniculatus*, and *Pimpinella saxifraga*.

Rodwell describes the *Arrhenatherum elatius* grassland as a community of coarse tussock grasses dominated by *Arrhenatherum elatius* with smaller proportions of *Dactylis glomerata* and *Holcus lanatus* with a broadleaved component often comprised of *Anthriscus sylvestris*, *Heracleum sphondylium*, *Cirsium arvense*, *Centaurea nigra*, *Urtica dioica*. Also found in the *Arrhenatherum* are *Festuca rubra*, *Lolium perenne*, *Poa trivialis*, *Poa pratensis*, *Elymus repens*, *Trifolium pratense*, *Trifolium repens*, *Achillea millefolium*, *Plantago lanceolata*, *Lotus corniculatus*, and *Taraxacum officinale* agg. (1992). All of these species were found, in varying abundance, in the SW grassland at St Catherine's (Table 2, Appendix 1) The *Arrhenatherum* grasslands are a short-lived seral stage between open grassland and woodland or scrub, with a species richness that can only be maintained by regular and infrequent cutting, provided the cut material is removed (Rodwell 1992, 34-5). Such grasslands are often rapidly invaded by scrub, as is evident in the SW grassland at St. Catherine's, where mainly *Rubus*, but also *Crataegus* and *Sambucus* now cover more than 75% of the vanishing grassland. In lowland Britain, *Arrhenatherum* grasslands on brown earths, grey-brown podzols, or well-drained alluvial soils such as those at St. Catherine's, are precursors to woodland dominated by *Fagus sylvatica* and *Rubus fruticosus* agg. (Rodwell 1991, 247-8, O'Sullivan 1982, 134-6) Though *Fagus* is not native to Ireland, its community development on identical soils, climate, and geologic features may be very similar. Complete cessation of mowing or any other type of human disturbance in these grasslands therefore, may see them develop first into scrub dominated by *Rubus fruticosus* and eventually, into high forest dominated by *Fagus sylvatica* and *Fraxinus excelsior* like much of the existing woodland in St Catherine's.

Wildflower Meadow

The 'Wildflower Meadow' appears to fit the *Lolio-Cynosuretum typicum* grassland habitat described by Rodwell (1992). These mesotrophic pastures are common on "moist, but freely-draining circum-neutral brown-earth soils in lowland Britain" and are dominated by grasses, with *Lolium perenne* often being the most abundant, followed by *Cynosurus cristatus*, *Festuca rubra*, *Agrostis capillaris*, *Agrostis stolonifera*, *Holcus lanatus*, *Dactylis glomerata*, *Poa pratensis* and *Poa trivialis*. Characteristic broadleaved herbs include *Trifolium repens*, *Cerastium fontanum*, *Plantago lanceolata*, and *Ranunculus repens*. Also the *Lolio-Cynosuretum* often have abundant *Senecio jacobaea* and *Cirsium arvense* in the sward, as the meadow at St. Catherine's does (1992). This is often a sign of overgrazing by rabbits, but in this case, may be the result of mowing the sward too short and the ensuing "poaching" of surface soils (Preston, et al. 2002). The meadow has not seen invasion by scrub, due to the mowing regime practiced by the Parks Division, however the southeastern area of the meadow that borders the riparian zone of the Liffey must flood frequently as the mowers have left a wide swath of seedling and sapling alder (*Alnus glutinosa*) and willow (*Salix caprea*, *S. cineria*) to grow. If left unmowed, this area will revert back to scrub and then high forest, with *Alnus glutinosa*, *Fraxinus excelsior*, *Quercus robur* and *Salix spp.* leading the way, as indicated by the large number of seedlings of these three species, (with a smaller proportion of *Quercus*), found in the adjacent grassland prior to mowing in September.

4.3.2. Calcareous Grasslands

A small number of species-rich grassland remnants comprised of thermophilic, strongly calcicolous species persist in the Liffey Valley, and are found mostly on south-facing slopes, old quarry sites, and other difficult areas, as they are in nearby Phoenix Park (Doogue 1998, Reilly 1993) These very small and highly fragmented areas support many interesting species, and are threatened by further disturbance, improvement regimes, development, and encroaching scrub and woodland. Such endangered grassland remnants may support rare species, including orchids, and are part of the "semi-natural dry grasslands and scrubland facies on calcareous substrates" classification of Annex I priority habitats of the EU Habitats Directive (Natura 2000 code 6210) (Fossitt 2000, European Commission 1996). In addition to calcicolous grasses, a diverse broadleaf component may exist and species richness can be as high as 45 species per 4m² (Fossitt 2000, O'Sullivan 1982), making them virtual gardens for butterflies and other nectar-seeking insects.

The remnant in Luttrellstown had the highest species diversity, with at least 41 species identified for the entire site (Appendix I) including one nationally rare species and others of interest. This tiny and threatened remnant was the best example found in the SAAO area of a strongly calcicolous plant community characteristic of the *Mesobromion* sub-association of the *Festuco-Brometea* class of thermophilous calcareous grasslands found on limestone-derived soils in Europe. In Ireland, these types of plant communities are largely restricted to eskers, moraines and the limestone karst of the Burren where soils are extremely shallow (O'Sullivan 1982). Of the characteristic species that define this association, three were found in the Luttrellstown remnant,

including *Avenula pubescens*, *Anacamptis pyramidalis*, *Sanguisorba minor* and *Leontodon hispidus*. Other calcicolous species identified include *Ononis repens*, *Knautia arvensis*, *Galium verum*, *Briza media*, *Primula veris*, *Trisetum flavescens*, *Pimpinella saxifraga*, and *Linum catharticum*. One additional characteristic species, *Bromopsis erecta*, may have been overlooked, due to the presence of the similar species *Brachypodium sylvaticum* and *Bromopsis ramosa* on the site and in the adjacent woodland ride. Further study would be needed to distinguish the three species.

O'Sullivan states that the strongly calcicolous Brometalia communities, like the fragment in Luttrellstown, are confined to skeletal soils on the tops and sides of eskers, moraines and other limestone deposits, but grade into communities of the Centaureo-Cynosuretum galietosum (Cynosurion cristati alliance of the order Arrhenatherion elatioris) on the deeper soils near the bases. Characteristic species of the Centaureo-Cynosuretum galietosum include *Hypochoeris radicata*, *Carex flacca*, *Lotus corniculatus*, *Centaurea nigra*, *Primula veris*, *Agrimonia eupatoria*, *Trisetum flavescens*, *Galium verum*, *Pimpinella saxifraga*, *Daucus carota*, *Mendicago lupulina*, *Briza media* and *Avenula pubescens*, all of which were found at the site in the Strawberry Beds, on the west side of the M50 (behind St. Anthony's), along with frequent *Anacamptis pyramidalis*. The site on the east side of the M50, below Knockmaroon, is somewhat more impoverished, yet still contained all but *Daucus carota*, *Agrimonia eupatoria*, *Avenula pubescens*, *Primula veris* and *Anacamptis pyramidalis*. Luttrellstown and the western Strawberry Beds site also had Devil's Bit Scabious (*Succisa pratensis*) present in the sward, a plant of conservation interest. While not rare itself, it is a larval food plant for a rare butterfly, the Marsh Fritillary (*Euphydryas aurinia*), which is listed as a protected species under the Habitat Directive, requiring the designation of Special Areas of Conservation (SACs) (Keena, C. 2003).

4.4 RIPARIAN AREAS

4.4.1. River Liffey

Due to their dynamic nature, riverine and streamside habitats are very diverse, and support a varied flora and fauna. They are extremely sensitive to change and human disturbance in the form of woodland clearance, farming, development and the ensuing erosion, pollution, eutrophication, siltation, and loss of natural riparian flora can affect their ability to filter run-off and to function properly as a whole. Riparian zones adjacent to rivers and streams have a direct impact on river function and the diversity of species found in adjacent habitats, and natural riparian zones are among the most biologically diverse habitats. Most have suffered from human disturbance in the form of pollution, litter, deforestation, damming, channelization, overuse, and the alteration of adjacent habitats (Giller and Malmqvist 1998). In Ireland, lowland rivers and streams were wooded in the past, but have since been greatly altered by human activity (Coroi, et. al. 2004). The River Liffey is no exception. As Dublin's major river, it supplies the city with water from a man-made reservoir at Blessington, and power from two dams, one at Pollaphuca and another at Leixlip. From the western fringe of Dublin in Chapelizod to Ringsend and Dublin Port on the Irish Sea the river has been channelised, and very little natural vegetation remains (Healy 1988). Where the river flows through Fingal's portion of the SAAO area, some natural streamside

vegetation remains in the form of a narrow band of trees and grassy banks, reaching its greatest extent at St. Catherine's Park. The Liffey here is also classified as a moderately polluted river (Tiernan, 2000, Flanagan & Larkin 1992), largely due to run-off of pollutants from the surrounding urban and agricultural areas. Yet in spite of this, and the loss of a large part of its adjacent riparian flora, the Liffey still supports a diverse riparian community within the channel with many pondweeds (*Potamogeton spp.*) and Floating Sweet-grass (*Glyceria fluitans*) dominating the submerged vegetation while Common Club-rush (*Schoenoplectus lacustris*) and Branched Bur-reed (*Sparganium emersum*) dominating the emergent vegetation of the stream course. The banks support a tall-herb riparian community, with plants typical of moist, eutrophic soils such as *Eupatorium cannabinum*, *Urtica dioica*, *Epilobium hirsutum*, *Filipendula ulmaria*, *Scrophularia auriculata* and one nationally rare species.

4.4.2. Tributaries

Some of the smaller tributaries, particularly those that flow through wooded demesnes like Luttrellstown, have escaped the fate of damming and channelisation, but are not immune to human disturbance. The woodland stream in Luttrellstown may be affected by activities upstream, particularly fertilizer runoff and siltation from the grading and improvement of the Luttrellstown golf course through which it flows. Yet in spite of this, the River Liffey corridor and tributaries support a wide range of native and non-native plant species typical of rich, alluvial soils, including a number of uncommon Irish species and one Red Data book species that in Ireland is generally found only in the catchment areas of the rivers Bann and Liffey (Webb, 1996, Curtis & McGough 1988, Doogue, 1998). The river itself and surrounding areas also support a tremendous array of fish, mammals, birds, and invertebrates, all of which are dependent upon the health of these habitats so near the heart of Ireland's capitol city (Tiernan 2000).



Some Flowers of the River Liffey: From left to right, *Solanum dulcamara*, *Glyceria maxima*, *Mentha aquatica*, *Filipendula ulmaria* and *Butomus umbellatus*.
Photos by Shawn McCourt

4.5 Problematic Alien Species

4.5.1. Overview

Ireland has a long history of introduced plant species, beginning with the arable weeds that came with the Neolithic farmers some 6,000 years ago, when pollen evidence indicates the rise of new species at about the same time as woodland was being cleared (Hodson, 1998). Alien species now nearly outnumber the native flora in Ireland, with 920 vascular species and hybrids found between 1800 and 2001. In contrast, the native Irish flora is comprised of 900 vascular species, 200 hybrids and 80 additional species whose status as native is still uncertain (Reynolds 2002). Fortunately, only a handful of these have proved to be troublesome weeds, proliferating beyond control and invading habitats, to the detriment of the native flora. The most well-known example of this is *Rhododendron ponticum* in the West of Ireland, and on other acid heath and woodland sites throughout the island.

4.5.2. Alien Species of Liffey Valley Woodlands

Trees

Many non-native trees have historically been widely planted in the Liffey Valley and of these, beech (*Fagus sylvestris**), sycamore (**Acer pseudoplatanus**) and Silver Fir (*Abies alba**) are species of the European mainland that are successfully able to colonise Irish forests naturally, occasionally achieving local dominance. These three species, unlike many of the native trees, are shade-tolerant and therefore able to get a head-start growing under the canopy of older trees. They in turn, as canopy dominants, cast such dense shade that very little can grow underneath them, including much of the typical field layer plants of Irish native woodlands. Only early spring blooming geophytes, shade-tolerant ferns, and ivy seem to be able to grow well underneath beech and sycamore. Seedlings of beech and sycamore also grow well in the shade of the canopy of older members of the species, thereby renewing the cycle and displacing natives altogether.

Beech and sycamore are particularly abundant in St. Catherines, especially along the north-east road, where an extensive even-aged stand of beech dominates the canopy. It may require thinning, particularly in the even-aged stands to prevent the complete shading of the forest floor, to enable recruitment, and to create a woodland with an un-even aged structure that is more conducive to diversity of flora and fauna (Peterken 1981, Forest Service, 2000). The understory and field layers are sparse, comprised of holly, ivy and a few shade-tolerant herbaceous plants, including ferns. In contrast, the areas of the wood in which ash is a greater component, have a diverse understory and richer ground flora.

The density of sycamore and Silver Fir seedlings in the west end of Knockmaroon wood is of some concern. Sycamore, like beech, casts dense shade, but appears to be less of a problem and occurring only occasionally as a canopy emergent in the wooded demesnes of the SAAO. Hand thinning of its seedlings and saplings may encourage better recruitment of the more desirable native species. Silver Fir is extremely localised, but threatens to take over a large part of the western end of Knockmaroon woods, due to the presence of older and apparently fertile trees at that end of the wood.

Good management appears to have kept beech thinned out in Luttrellstown, and sycamore is infrequent, however there are some areas of the wood that are densely shaded by large canopy beeches, to the impoverishment of the ground flora.

Sycamore also appears to be spreading along the River Liffey margins, where the damp soils may be more to its liking. Here, young trees should be actively removed and native oaks, willows and alder encouraged in their stead. Existing larger trees should be left standing though, particularly since their roots help prevent erosion of the river banks.

Woody Shrubs

Four additional plants of concern in the Liffey Valley woodlands are the woody shrubs *Prunus laurocerasus**, *Symphoricarpos albus**, *Leycesteria formosa**, and *Cornus sericea**. *Prunus laurocerasus*, or Cherry-laurel, is a dense evergreen broadleaved shrub widely planted in demesne woodlands and grounds. The shrub spreads by layering, and more rarely, by seed, but attains local dominance in woodlands, particularly woodlands over limestone. In these areas it achieves such densities as to shade out the ground flora and prevent natural forest regeneration. As a result, a wood overtaken by this species becomes impoverished (Reynolds 2002). In spite of its aggressive tendencies, Cherry-laurel is still sold in the nursery trade and widely planted in Ireland. Dense stands of Cherry-laurel were found in localized areas of the Liffey Valley demesnes, particularly along woodland rides in the central and western ends of Luttrellstown and along the northeast road in St. Catherine's. It was not found in Knockmaroon wood proper, but occurs below the hill in the Strawberry Beds, where it is often used as hedging material.

Symphoricarpos albus or American Snowberry is another shade-tolerant, aggressive species that was widely planted in woodland demesnes as cover for game (ie. pheasant). It can persist for years under a densely shaded canopy and spreads by underground stems, forming extensive colonies to the exclusion of all else. There are large colonies of it in the south end of the riparian wood at St. Catherine's, where it grows right to the river's bank. It has also been extensively planted along woodland rides at Luttrellstown, where it may overtake the unique flora of these wood-margins. It is also invading grasslands in the Liffey Valley, especially the calcareous remnants in the Strawberry Beds and the Quarry site west of Luttrellstown. This species, like Cherry-laurel is favored by landscapers and unfortunately in spite of its invasive nature, is still widely planted.

Himalayan Honeysuckle, *Leycesteria formosa*, is widespread, especially in pheasant-rearing demesnes, where it was often planted as a covert for pheasants. These game birds have a high affinity for the berries as attested by the alternate name for the plant, "Pheasant-berry" and do much to aid its dispersal. No doubt wild birds like the berries too, since the plant has begun to spread outside of the demesnes and is increasing in semi-natural areas (Reynolds 2002). In the Liffey Valley, Himalayan Honeysuckle was found only in wood-margins and along the rides in Luttrellstown, which has a history of pheasant-rearing, and in the adjacent Quarry site, west of the demesne. It is spreading and if not checked, the future may see this plant invading all of the Liffey Valley wood-margins and dry grasslands.

Cornus sericea or Red-Osier Dogwood is another colony-forming woody shrub with aggressive tendencies. This plant's preferred habitat is in the damp or flooded ground along river and stream margins, where it overwhelms the native streamside vegetation. A large colony of it exists in the stream glen in Luttrellstown, while it was not found at Knockmaroon or St.

Catherine's though it may exist elsewhere along the River Liffey corridor. The only good thing is that this plant is thus far incapable of spreading by seed, so large colonies can be dealt with where they are found, with no worries that it might return from seed.

Other potentially disruptive alien woody plants encountered in the Liffey Valley woods and grasslands include *Buddleja davidii**, *Hypericum androsaemum**, *Cotoneaster spp.**, *Prunus lusitanica**, *Philadelphus spp.**, and *Ribes rubrum**.

Spurge-laurel (*Daphne laureola**) is another non-native species of interest in the Liffey Valley. It is likely to be a garden escape, and appears to be self-maintaining and able to naturalise in woodlands, usually only on calcareous soils. In Luttrellstown, it can be found in remote areas of the wood on steep slopes and inaccessible rock crevices, while it appears to be absent from St. Catherine's Wood altogether. *Daphne laureola* is particularly abundant in the southern portion of the woods of Knockmaroon Estate, whose old walled gardens above the woodlands may well be the source of most of the individual *Daphne* plants found in the valley (pers.comm.). *Daphne laureola* is native in southern England, where it is considered an indicator species of ancient woodland (Whild, S.J. 2003). However, *The New Atlas of the British Flora* disagrees, commenting that while "*D. laureola* is usually regarded as a native in England and Wales, it is also a relic of cultivation or an introduction in many sites; and across much of its British range is more typical of pheasant-rearing estates and parklands than semi-natural woodland (Preston et.al. 2002)." At any rate, at the very least, it is an indicator of base-rich soils.

4.5.3. Problematic Aliens of Grassland and Riparian Areas in the Liffey Valley

Grasslands

Surprisingly, while exotic species do exist in the grasslands of the Liffey Valley, those with invasive tendencies tend to be absent. Two aggressive species that are regarded as noxious weeds of grassland and pasture in the Liffey Valley are actually the natives, Ragwort (*Senecio jacobaea*) and Creeping Thistle (*Cirsium arvense*). Ragwort is especially hated because it is poisonous to livestock. These two species tend to occur on overgrazed land, especially rabbit-grazed land (Preston, et. al. 2002). At St Catherine's however, the abundance of these species (and *Cirsium vulgare*) in the "wildflower meadow" may be due to cutting the sward too short since the exposure to light, and poaching of the soils mimic overgrazing and tend to favor fast-growing biennial species that seed as prolifically as Ragwort and thistles do. Herbicides are often ineffective on these species, since regeneration can occur from root buds in *Senecio jacobaea*, and from adventitious roots in the perennial, *Cirsium arvense* (Rodwell 1992, p 67). Spear Thistle (*Cirsium vulgare*) is a biennial like Ragwort, and also occurs in abundance in the "wildflower meadow." Hand-pulling and reducing the mowing to the late autumn and early winter months to control woody species and raising the blade on the cutters several inches should alleviate the Ragwort and thistle populations in the meadow. This method will favor the competitive growth of clump grasses and reduce the number of propagules of the two troublesome weeds from making contact with the soil.

Riparian

The linear nature of rivers and streams makes them natural corridors for the movement of alien species, particularly if those aliens have seeds that can be dispersed by water. Along the River Liffey, two particularly aggressive species to monitor and eradicate where possible are Japanese Knotweed (*Fallopia japonica**) and Indian Balsam (*Impatiens glandulifera**). Japanese Knotweed is a tall (2-3m) colony-forming herb of the damp alluvial soils of rivers, streams and other wetland areas. Its height, large leaves and rapid spread make it difficult to control, and as a result it is often left to its own. Where it grows on the banks of the Liffey, it dominates the vegetation around it, and as the colony grows, it eventually displaces its neighbors. There is one large clump on the Liffey banks at the Lucan “car park” site and more around the weir upstream in Lucan, on both sides of the river.

4.5.4. Exotic Oak Species in the Liffey Valley SAAO

Two non-native oak species were also found growing wild in the Liffey Valley SAAO area. One, Holm Oak (*Quercus ilex**) is an evergreen oak native to the Mediterranean and planted as a street tree or ornamental throughout much of County Dublin. It is not used for forestry purposes, and it is also not able to naturalise well in Ireland (pers. comm.) possibly due to the perpetually damp climate, however, a small group of young specimens ranging from 1-6m in height were found growing wild on a very dry, grassy, southwest-facing limestone outcrop in Knockmaroon woods. They were found underneath the lightly shaded canopy of a grove of Scots Pine (*Pinus sylvestris*). The trees now growing up under the pines were not planted in this difficult to reach area, as no planting has been done in the woods in some time (pers.comm.) The nearest mature, planted specimens of *Q. ilex* can be found growing along the road between Knockmaroon and Castleknock, from which some acorns must have been carried by squirrels down into the woods below, where they found the localized dry area to their liking and flourished. There are no records of Holm Oak being able to spread in semi-natural areas in Ireland and from this unusual encounter, it can be seen that Holm Oak can, and will naturalise under conditions similar to those in its native range.

Also found in the vicinity were seedlings (less than 0.5 m height) of another exotic oak species, *Quercus cerris** or Turkey Oak. The nearest mature adult appears to be a large specimen on the grounds of Knockmaroon, near the house. Sylvia Reynolds suggests that this species is only occasionally found in Ireland growing from viable seed and seldom grows to maturity (2002). The only record of Turkey Oak becoming established from self-sown seed in Ireland is from nearby Phoenix Park, when in 1979 a single recorded specimen had grown up near mature trees (Reynolds 2002). This species is native to Eastern Europe and Asia Minor, and is cause for some concern as it is the alternate host of the Knopper Gall that destroys the acorns of *Quercus robur*. This species should therefore never be planted and should be weeded out wherever found growing.

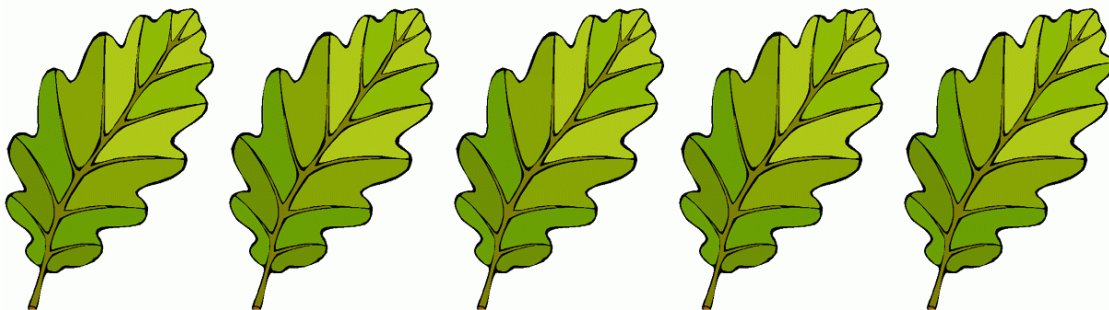
5.0 Management Recommendations

5.1 Overview

Globally, the world is experiencing an unprecedented level of human use as the overall population surges past the 6 billion mark. In addition, the transformation of formerly tradition agrarian societies to highly technological societies in which people are no longer directly dependent on the land for their sustenance, but practice high and wasteful levels of consumerism, has put even greater strain on natural resources. Together, with the rapid expansion of urban and suburban areas, the increasing intensification of agriculture to support the “technological” population has decimated nearly all remaining natural areas and their corresponding flora and fauna. Virtually no area on the globe has escaped human influence, whether it is in the form of direct land use such as forestry, housing, amenity, recreation, mining, agriculture and industrialization; or the indirect products of all of these, namely, pollution, erosion, siltation, destruction of habitat, trampling, eutrophication, litter, and the deliberate or accidental introduction of alien and invasive species to vulnerable areas. This list is by no means exhaustive, but illustrates the need for more responsible stewardship of the Earth’s finite resources, whether at the individual level or at the global level, particularly as developing countries reach the level of consumption currently practiced by Europe, Japan and North America.

Why Manage?

Management of natural and semi-natural areas can be good for many reasons, and not just for purely scientific or conservation purposes. The most common reasons for management, particularly of woodlands, are often economic. In the case of woodland, invasive or unwanted species are managed to prevent competition with more desirable species and to preserve the gene pools of native species. Woodlands and grasslands are essentially storehouses of raw material for the development of new food, medicinal and industrial crops (Neff 1974). Also, habitats are managed to maximize biodiversity and maintain stable ecosystems in a world of rapidly vanishing natural systems. Overgrazing by animals, both wild and domestic, also needs to be controlled to prevent the elimination of seedlings and saplings, particularly in areas where woodlands have become scarce, and therefore valuable, as in much of Ireland. Aggressive, non-native species may also become a problem and need monitoring and management to prevent them from overwhelming a community and thereby diminishing the biodiversity of habitats.



5.2 Management recommendations for the Liffey Valley SAAO

5.2.1. Woodland

Since the potential natural vegetation of much of Ireland is woodland, particularly in lowland areas, it can be deduced that the Liffey Valley would have at one time been covered entirely in forest. This continuous woodland would have been comprised mainly of broadleaves such as oak, ash, Wych Elm, birch, hazel and holly, with willows and alder occurring along the river banks and in marshy areas. The continuity of this extensive broadleaved forest would have been broken only where natural geologic features such as the river itself, streams, rock outcroppings occur and where treefall and other natural or early anthropogenic disturbances had temporarily cleared away some of the forest cover. The intervening centuries between the present day and this ancient primaeval wood have seen tremendous human alteration and destruction of the original forest cover, reducing it to scattered fragments of woodland that are even more susceptible to further disturbance. Older woods, in spite of disturbance and planting, have never been cleared away entirely, and thus maintain a link to the primary forest. These woods are richest in rare and old woodland species, and are in greatest need of protection from further disruption.

While the majority of the woodland in the Liffey Valley has seen planting in the past, the current assemblage of tree and shrub species, in addition to variations in soils, has a dramatic affect on the richness of the ground flora. In addition, the presence of gaps and woodland rides, particularly south-facing ones, enable shade intolerant species to grow within the wood and contribute to overall species diversity. Some species, including many *Hypericum spp.*, seem to prefer woodland rides and margins to all other habitats, including the wood interior. Unfortunately, the planting of exotic species within or near the wood has resulted in some of the more aggressive of these to take over to the detriment of native species. To enhance the ability of woodlands in the Liffey Valley SAAO to support maximum diversity of plant and animal species, the following recommendations are established:

St. Catherine's

- Removal of all Cherry-laurel from the understory of the wood
- Thinning and gradual removal of conifer stand at the west end of the park,
- Possible thinning of beech along the Northeast road
- Removal of all snowberry from the south end of the riparian wood
- Thinning or discouraging growth of beech & sycamore in favor of oak, ash and other natives
- Encourage use of clearly marked trails and discourage trampling of ground flora
- Protection of rare species and maintenance of their habitats

Luttrellstown

- Removal of all Cherry-laurel and seedling Silver fir from the wood
- Removal of Snowberry and Himalayan Honeysuckle from woodland rides
- Encourage the use of native trees of local provenance in future planting schemes
- Protection of rare species and their habitats

Knockmaroon

- Encourage recruitment of native species from the forest floor
- Removal of all Silver fir, including mature trees, and thinning/ removal of Sycamore saplings
- Control deer grazing within the wood
- Encourage development of an ungrazed wood margin

5.2.2. Management of Grassland Areas of the Liffey Valley

Dry, calcareous grasslands and old meadows are the most threatened habitat in the Liffey Valley, with the extremely species-rich remnant on the edge of Luttrellstown golf course in immediate danger from grading and fertilizer run-off from the adjacent golf course as well as invasion by gorse scrub. Woodland rides and their unique assemblages of woodland and grassland species are in danger from excessive herbicide use and from invasion by scrub, especially gorse and the exotic snowberry. Open grasslands on slopes above the Liffey are in danger of encroachment by human land use and development as well as by being overtaken by scrub and trees. Calcareous grasslands are Annex I priority habitats, while 'lowland hay meadows' are Annex I habitats of concern (Fossitt 2000).

Management recommendations include:

St. Catherine's

SW grassland

- Decrease mowing to once yearly (autumn/winter months) to control scrub

- Avoid fertilizer runoff from adjacent football fields
- Avoid excessive use of herbicides
- Enable the development of infrequently mowed grassy rides
- Protection of rare species and their habitats

Wildflower Meadow

- Decrease mowing to once yearly (autumn/winter months) and raise the blade to avoid close-cropping and poaching of soil
- Leave a larger swath of unmowed vegetation along the river, to encourage development of riparian Alder-ash woodland that is an Annex I priority habitat (Wet pedunculate oak-ash woodland WN4) with only residual stands remaining in Europe (Fossitt 2000)

Luttrellstown

Calcareous remnant

- Cessation of all activities in the immediate vicinity of the remnant (fertilizing, mowing, etc)
- Allow the slope on north and south sides of remnant to regenerate
- Removal of gorse
- Protection of rare species and their habitat

Strawberry Beds

Calcareous remnants

- Cessation of all activities in the immediate vicinity, unless it is low level grazing

- Removal of invasives (ie, snowberry) and encroaching woody scrub and trees
- Discourage fertilizer and herbicide use
- Protection of rare species and their habitats

Lucan Sites

Quarry

- Monitor and remove aggressive aliens (ie. snowberry, Himalayan Honeysuckle)
- Protection of rare species

“Car Park”

- Mow the central grassland area infrequently
- Provide access points for fishermen and boaters to enter the river, to reduce trampling of the grassland and the aquatic vegetation of the river
- Removal of trash from site and from the river bed
- Protection of rare species and their habitat

5.2.3. Riparian

The River Liffey, in spite of a long history of anthropogenic disturbance, still supports a rich and varied plant community, including a rare species seldom found elsewhere in Ireland. Yet, as Dublin and Fingal grow, urbanisation, pollution, the spread of invasive species and increased human use are taking their toll on the riparian vegetation of the river. Development and other human activities are fragmenting and destroying many of the adjacent habitats, leading to increased siltation, pollution and run-off into the Liffey.

River Liffey

- Periodic removal of unsightly litter, as it smothers plants, disrupts current flow, contributes to eutrophication and reduces the scenic value of the river
- Control of invasive exotics, especially Japanese knotweed and Indian balsam
- Encourage the planting of the exposed faces of the Laraghcon road cutting (north of Lucan bridge over the Liffey) with native, fast-growing shallow-rooted species such as birch, hazel, and ivy to minimize the run-off and siltation that is obvious in the river immediately below
- provide access points for fishermen and boaters to enter the river, to reduce trampling of grassland and aquatic vegetation of the river, especially near the west gate of Anna Liffey Mills, and Lucan “car park” where heavy poaching of the soil and litter have destroyed the riparian vegetation, increasing risk of runoff and siltation of the river
- increase riparian buffer zone with plantings of native species where possible
- use native trees of local provenance in future planting schemes
- protection of rare species and their habitat

Tributaries- Luttrellstown

- removal of Dogwood colony in the stream glen
- prevention of fertilizer run-off from golf course
- encourage maximum riparian and wetland community to act as filter for fertilizer runoff (cease/reduce mowing stream area)
- maintain riparian area between stream and wood at the western end of the valley, including the removal of abundant Himalayan Honeysuckle and Cherry-laurel, and the occasional trimming back of the eaves of the wood to prevent the riparian vegetation from being overwhelmed.

6.0 Conclusions

The Liffey Valley SAAO area is an area of tremendous ecological value. The wide variety of natural and semi-natural habitats in the form of the wooded demesnes, grasslands and the riparian vegetation of the River Liffey and tributaries all support many unique vascular plant species, including some that are very rare in Ireland. The wooded demesnes of St Catherine's, Luttrellstown, and Knockmaroon, the River Liffey and the adjacent Phoenix Park to the east together have the potential to act as a corridor for the movement plant and animal species, and have high conservation and amenity value in an increasingly urbanised landscape. The connectivity of the woodlands, grasslands and the adjacent riparian fringe of the river should be maintained and where possible, expanded to enhance the habitat and amenity values of the entire SAAO area.



“Hope for the future”

photo by the author.

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APPENDIX I : Species Lists

-St. Catherine's

-Luttrellstown

-Knockmaroon

-Other

Compiled by:

Shawn McCourt & Dr. Daniel Kelly
Trinity College Dublin

April-October 2005

Species lists by S.C. McCourt and Dr. Daniel Kelly

Left-hand column: Botanical name

Middle column: Common name

Right-hand column: *Abundance levels, as rough, conservative estimates only:* A = abundant,

D = dominant, F = frequent, L = local(ly), O = occasional, R = rare, V = very,

* indicates introduced plant species,

indicate probably introduced species.

(w) indicates plants growing on stone walls

@ indicates submerged aquatic and marginal plants

All habitat classification is in accordance with A Guide to Habitats in Ireland (Fossitt, 2000).

Liffey Valley Regional Park, St Catherine's Wood, St. Catherine's, Co. Fingal-

St Catherines Wood- Those species denoted with an (I) are found in the riparian wood between the river and path only and those denoted with an (m) are found in wood margins only. Habitat classifications : WD1, '*Mixed broadleaved woodland*' with some elements, most notably in the ground flora, of WN2, the '*Oak-Ash-Hazel woodland*' (Corylo-Fraxinetum) that occurs on base-rich soils in Ireland (Kelly & Kirby 1982, Fossitt 2000)

Woody species

* <i>Abies alba</i>	Silver Fir	I	R
* <i>Acer pseudoplatanus</i>	Sycamore		F
* <i>Aesculus hippocastanum</i>	Horse Chestnut		O
<i>Alnus glutinosa</i>	Alder	I	O
<i>Betula pendula</i>	Silver Birch		O
* <i>Carpinus betulus</i>	Hornbeam		O
* <i>Castanea sativa</i>	Spanish Chestnut	I	R
* <i>Cornus sericea</i>	Dogwood	I	O
<i>Corylus avellana</i>	Hazel		F, LA
<i>Crataegus monogyna</i>	Hawthorn, Whitethorn		O
<i>Euonymus europaeus</i>	Spindle		O
* <i>Fagus sylvatica</i>	Beech		F
<i>Fraxinus excelsior</i>	Ash		F
<i>Ilex aquifolium</i>	Holly		F
<i>Ligustrum vulgare</i>	Wild Privet		R
* <i>Philadelphus sp.</i>	Mock Orange		O
* <i>Picea abies</i>	Norway Spruce (1 stand)		O
* <i>Picea sitchensis</i>	Sitka Spruce	I	R
<i>Populus x canescens</i>	Grey Poplar	I	L F

<i>Prunus avium</i>	Wild Cherry	F
* <i>Prunus laurocerasus</i>	Cherry Laurel	F
* <i>Prunus lusitanica</i>	Portugal Laurel	O
<i>Prunus spinosa</i> (m)	Blackthorn	O
(* <i>Pseudotsuga menziesii</i>	Douglas Fir	I R
<i>Quercus robur</i>	Pedunculate Oak	I O
* <i>Ribes rubrum</i>	Red Currant (by N road)	L O
<i>Rosa arvensis</i>	Field Rose	O
<i>Rubus fruticosus</i> agg.	Bramble	O-F
(* <i>Rubus idaeus</i>	Raspberry	O
* <i>Sasa palmata</i>	Bamboo	I VLR
<i>Salix caprea</i>	Goat Willow	I -
<i>Salix cinerea</i>	Sally	I -
<i>Sambucus nigra</i>	Elder	F
* <i>Symphoricarpos albus</i>	Snowberry (invasive)	O, LVA
* <i>Syringa vulgaris</i> (m)	Lilac	O
<i>Taxus baccata</i>	Yew	R-O
* <i>Tilia x europaea</i>	Common Lime	R
<i>Ulmus glabra</i>	Wych Elm	F
* <i>Ulmus minor</i> (m)	Small-leaved Elm	R-O

Vines

<i>Hedera helix</i>	Ivy	A, LD
<i>Lonicera periclymenum</i>	Woodbine, Honeysuckle	O
* <i>Vinca minor</i>	Lesser Periwinkle (sign of former cultivation)	-

Broadleaved Herbs

* <i>Aconitum napellus</i>	Monkshood	I	-
<i>Ajuga reptans</i>	Creeping Bugle	I	L F
<i>Alliaria petiolata</i> (m)	Garlic Mustard		O
<i>Allium ursinum</i>	Ramsons		LF
<i>Anemone nemorosa</i>	Wood Anemone		A
<i>Anthriscus sylvestris</i>	Cow Parsley		O
<i>Arctium minus</i> (m)	Burdock		R
<i>Arum maculatum</i>	Lords-and-Ladies		O-F
<i>Epilobium hirsutum</i>	Hairy Willow-herb	I	L A
<i>Filipendula ulmaria</i>	Meadowsweet	I	L F
<i>Galium aparine</i> (m)	Cleavers		O
<i>Galium odoratum</i>	Sweet Woodruff		R-O
<i>Geranium robertianum</i>	Herb-Robert		R

<i>Geum urbanum</i>	Wood Avens	R-O
<i>Glechoma hederacea</i> (m)	Ground Ivy	O
<i>Heracleum sphondylium</i>	Hogweed	F, LA
<i>Hyacinthoides non-scripta</i>	Bluebells	O
<i>Hypericum hirsutum</i> (m)	Hairy St. John's Wort	O
<i>Lamiastrum galeobdolon</i> subsp. <i>montanum</i>	Yellow Archangel	O-R
<i>Lathraea squamaria</i>	Toothwort	R
<i>Orobanche hederæ</i>	Ivy Broomrape	R
<i>Potentilla sterilis</i>	Barren Strawberry	R
<i>Primula vulgaris</i>	Primrose	I O-R
<i>Ranunculus ficaria</i>	Lesser Celandine	A
<i>Ranunculus repens</i>	Creeping Buttercup	I (glade) O-R
<i>Rumex sanguineus</i>	Dock	R
<i>Scrophularia nodosa</i>	Figwort	O
<i>Scrophularia umbrosa</i>	Green Figwort	I (glade) R
<i>Stachys sylvatica</i> (m)	Woundwort	O
<i>Urtica dioica</i>	Nettle	I O
<i>Veronica chamaedrys</i>	Germander Speedwell	O
# <i>Viola odorata</i>	Sweet Violet	I R
<i>Viola reichenbachiana</i>	Early Dog Violet	O
<i>Viola riviniana</i>	Dog Violet	O-F

Grasses, Sedges and Rushes

<i>Brachypodium sylvaticum</i> (m)	False Brome	R
<i>Carex pendula</i>	Pendulent Sedge	O
<i>Carex sylvatica</i>	Wood Sedge	O
<i>Melica uniflora</i> (m)	Wood Melick	O-R
(<i>Poa trivialis</i>)	Rough Meadow grass	I O-R

Ferns

<i>Dryopteris filix-mas</i>	Male-Fern	F
<i>Phyllitis scolopendrium</i>	Hart's-Tongue	O-F
<i>Polypodium vulgare</i> agg.	Common Polypody	I (epiphytic) O-R
<i>Polystichum setiferum</i>	Soft Shield Fern	LVF,O

Riparian-Along the River Liffey and margin (to 5 meters from water edge): Habitats WN5- ‘Riparian Woodland’, WL2- ‘Treeline’, GS2- ‘Grassy verge’, FW2- ‘Depositing/Lowland Rivers’.

Woody species

* <i>Acer pseudoplatanus</i>	Sycamore	V F
<i>Alnus glutinosa</i>	Alder	A
<i>Crataegus monogyna</i>	Whitethorn	O
* <i>Fagus sylvatica</i>	Common Beech	R
<i>Fraxinus excelsior</i>	Ash	O
<i>Ilex aquifolium</i>	Holly	O
<i>Quercus robur</i>	Pedunculate Oak	O-R
<i>Rosa canina</i>	Dog Rose	O
<i>Rubus fruticosus</i> agg.	Bramble	L F
<i>Salix alba</i>	White Willow	O
* <i>Salix fragilis</i>	Crack Willow	O-F
<i>Sambucus nigra</i>	Elder	O
* <i>Symphoricarpos albus</i>	Snowberry	L A
<i>Ulmus glabra</i>	Wych Elm	O

Seedlings-

<i>Alnus glutinosa</i> (0-<3m high)	Alder	L A
<i>Salix caprea</i> (0-1 m high)	Goat Willow	L, O-F
<i>Salix cinerea</i> (0-1 m high)	Sally	L, O-F

Vines-

<i>Hedera helix</i>	Ivy	L F, A
* <i>Clematis vitalba</i>	Clematis, Traveller’s-Joy	L F

Herbaceous species

<i>Anthriscus sylvatica</i>	Cow Parsley	A
<i>Arum maculatum</i>	Lords -and-Ladies	O-R
<i>Arctium minus</i>	Burdock	O
<i>Calystegia sepia</i>	Bindweed, Morning Glory	L F
<i>Cirsium arvense</i>	Creeping Thistle	F
<i>Cirsium vulgare</i>	Spear Thistle	O
<i>Epilobium angustifolium</i>	Fireweed, Rose Bay Willow-herb	L, O
<i>Epilobium hirsutum</i>	Great Willow-herb	L F
<i>Eupatorium cannabinum</i>	Hemp Agrimony	L F
<i>Filipendula ulmaria</i>	Meadowsweet	L F

<i>Galium aperine</i>	Cleavers	F
* <i>Geranium rotundifolium?</i>	Geranium (one site near bridge)	R
<i>Geranium robertianum</i>	Herb-Robert	O-F
<i>Glechoma hederæ</i>	Ground Ivy	O
<i>Heracleum sphondylium</i>	Hogweed	O
<i>Hypericum maculatum</i>	Imperforate St. John's Wort	O
<i>Iris pseudacorus</i>	Yellow-flag Iris	VL, O
* <i>Impatiens glandulifera</i>	Indian Balsam	O
<i>Lapsana communis</i>	Nipplewort	O
<i>Medicago lupulina</i>	Black Medick	O
<i>Mentha aquatica</i>	Water Mint	O
<i>Odontites vernus</i>	Red Bartsia	O-F
<i>Orobanche hederæ</i>	Ivy Broomrape	L O
<i>Petasites hybridus</i>	Butterbur	L F
<i>Plantago lanceolata</i>	Ribwort Plantain	F
<i>Prunella vulgaris</i>	Self-Heal	O
<i>Ranunculus repens</i>	Creeping Buttercup	F
<i>Rumex obtusifolius</i>	Broad-leaved Dock	A
<i>Rumex sanguineus</i>	Dock	O
<i>Scrophularia auriculata</i>	Water Figwort	A
<i>Scrophularia nodosa</i>	Common Figwort	O
<i>Scrophularia umbrosa</i>	Green Figwort	O-R
<i>Senecio jacobaea</i>	Ragwort	O
<i>Solanum dulcamara</i>	Bittersweet Nightshade	O
<i>Sonchus arvensis</i>	Sow Thistle	O-F
<i>Sonchus oleraceus</i>	Smooth Sow Thistle	O
<i>Stachys sylvatica</i> (m)	Woundwort	O-R
<i>Symphytum x uplandicum</i>	Russian Comfrey	R
<i>Torilis japonica</i>	Hedge-Parsley	R
<i>Trifolium repens</i>	White Clover	F
<i>Urtica dioica</i>	Stinging Nettle	L F
<i>Vicia sepium</i>	Bush Vetch	F

Grasses, sedges and rushes

<i>Agrostis capillaris</i>	Common Bent	L F
<i>Agrostis stolonifera</i>	Creeping Bent	A
<i>Arrhenantherum elatius</i>	False-Oat Grass	F
<i>Brachypodium sylvaticum</i> (m)	False Brome (margins of trees only)	L F
<i>Bromopsis ramosus</i> (m)	Hairy Brome	O
<i>Carex pendula</i>	Pendulent Sedge (wood only)	O
<i>Dactylis glomerata</i>	Cock's-Foot Grass	F
<i>Elytrigia repens</i>	Common Couch	O
<i>Festuca gigantea</i>	Giant Fescue	O
<i>Festuca ovina</i>	Sheep's Fescue	O

<i>Festuca rubra</i>	Red Fescue	V F
<i>Glyceria maxima</i>	Reed Sweet-grass (river margin only)	L A
<i>Holcus lanatus</i>	Yorkshire-fog	V A
<i>Poa annua</i>	Annual Meadow grass	V F
<i>Poa pratensis</i>	Smooth Meadow Grass	F
<i>Poa trivialis</i>	Rough Meadow Grass	O

Aquatics and Emergents (*submerged or fringing the river Liffey*)

<i>Butomus umbellatus</i>	Flowering Rush	O-R
* <i>Elodea canadensis</i>	Canadian Pondweed	O
<i>Lemna minor</i>	Duckweed	VL, O
<i>Myosotis scorpioides</i>	Water Forget-me-not	O-R
<i>Sparganium emersum</i>	Unbranched Bur-Reed	L F
<i>Sparganium erectum</i>	Branched Bur-Reed	L F
<i>Glyceria fluitans</i>	Floating Reed Sweet-grass	A
<i>Potamogeton spp.</i>	Pondweed	L F
<i>Sagittaria sagittifolia</i>	Arrowhead	R
<i>Scirpus lacustris</i>	Common Club Rush	A

“Wildflower Meadow” Habitat classification- “Improved agricultural grassland,” GA1 and “Grassy verge,” GS2.

Woody species (seedlings approx. 3-8cm tall)

<i>Alnus glutinosa</i>	Alder	A
<i>Fraxinus excelsior</i>	Ash	O
<i>Salix caprea</i>	Goat Willow	O
<i>Salix cinerea</i>	Sally	O
<i>Quercus robur</i>	Pedunculate Oak	O-R

Herbaceous species

<i>Achillea millefolium</i>	Yarrow	O-F
<i>Chamaenerion angustifolium</i>	Rose-bay Willow-herb	O

<i>Cirsium arvense</i>	Creeping Thistle	A
<i>Cirsium vulgare</i>	Spear Thistle	V F
<i>Daucus carota</i>	Wild Carrot	O-R
<i>Dipsacus fullonum</i>	Teasel	O-R
<i>Eupatorium cannabinum</i>	Hemp-Agrimony	O
<i>Epilobium hirsutum</i>	Great Willow-herb	L F
<i>Epilobium palustre</i>	Marsh Willow-herb	L F
<i>Epilobium parviflorum</i>	Hoary Willow-herb	O
<i>Filipendula ulmaria</i>	Meadowsweet	O
<i>Heracleum sphondylium</i>	Hogweed	O
<i>Hypericum maculatum</i>	Imperforate St. John's Wort	O-F
<i>Lapsana communis</i>	Nipplewort	O-F
<i>Medicago lupulina</i>	Black Medick	F
<i>Plantago lanceolata</i>	Ribwort Plantain	V F
<i>Plantago major</i>	Common Plantain	F
<i>Ranunculus repens</i>	Creeping Buttercup	F
<i>Rumex obtusifolius</i>	Broadleaved Dock	A
<i>Scrophularia auriculata</i>	Water Figwort	F
<i>Senecio jacobaea</i>	Ragwort	V A
<i>Sonchus arvensis</i>	Sow Thistle	O
<i>Taraxacum spp.</i>	Dandelion	F
<i>Torilis japonica</i>	Hedge-Parsley	O-R
<i>Trifolium pratense</i>	Red Clover	V F
<i>Trifolium repens</i>	White Clover	L V F

Grasses, sedges and rushes

<i>Agrostis capillaris</i>	Common Bent	L F
<i>Agrostis stolonifera</i>	Creeping Bent	F
<i>Arrhenatherum elatius</i>	False-Oat Grass	F
<i>Cynosurus cristatus</i>	Crested Dog's-Tail	F
<i>Dactylis glomerata</i>	Cock's-Foot	O
<i>Elytrigia repens</i>	Common Couch	O
<i>Holcus lanatus</i>	Yorkshire-Fog	A
<i>Lolium perenne</i>	Rye-grass	V F
<i>Poa annua</i>	Annual Meadow-grass	L F
<i>Poa pratensis</i>	Rough Meadow-grass	O-F

“SW-facing Grassland” Habitat classification: GS2- ‘Grassy verge’ with elements of GS1, ‘Dry calcareous/neutral grassland’ (Fossitt 2000).

Woody species

<i>Crataegus monogyna</i>	Whitethorn, hawthorn	O, L F
<i>Sambucus nigra</i>	Elder	O
<i>Rubus fruticosus</i> agg.	Bramble	A
<i>Rubus ulmifolius</i>	Bramble	A

Herbaceous species

<i>Achillea millefolium</i>	Yarrow	F
<i>Cirsium arvense</i>	Creeping Thistle	L F
<i>Conopodium majus</i>	Pignut	O-R
<i>Galium verum</i>	Lady’s Bedstraw	O
<i>Geranium molle</i>	Dove’s-foot Cranesbill	R
<i>Pilosella</i> sp.	Hawkweed	O
<i>Lathyrus pratensis</i>	Meadow Vetchling	O
<i>Leontodon hispidus</i>	Hawk-bit	F
<i>Linum catharticum</i>	Fairy-flax	VL, O
<i>Lotus corniculatus</i>	Bird’s-foot Trefoil	O
<i>Medicago lupulina</i>	Black Medick	O-F
<i>Pimpinella saxifraga</i>	Burnet-saxifrage	O-R
<i>Plantago lanceolata</i>	Ribwort Plantain	O- F
<i>Plantago major</i>	Greater Plantain	O
<i>Potentilla reptans</i>	Creeping Cinquefoil	F
<i>Ranunculus acris</i>	Meadow Buttercup	O-R
<i>Senecio squalidus</i>	Oxford Ragwort	R
<i>Sonchus arvensis</i>	Sow-Thistle	O
<i>Trifolium pratense</i>	Red Clover	V F
<i>Trifolium repens</i>	White Clover	V F
<i>Veronica chamaedrys</i>	Germander Speedwell	O
<i>Vicia sativa</i>	Common Vetch	O-R
<i>Vicia sepium</i>	Bush Vetch	F

Grasses, Sedges and Rushes

<i>Agrostis capillaris</i>	Common Bent	F
<i>Agrostis stolonifera</i>	Creeping Bent	L, O
<i>Anthoxanthus odoratum</i>	Sweet Vernal Grass	O
<i>Arrhenatherum elatius</i>	False Oat-Grass	A
<i>Cynosurus cristatus</i>	Crested Dog’s Tail	F
<i>Dactylis glomerata</i>	Cock’s-Foot	F

<i>Festuca arundinacea</i>	Tall Fescue	O
<i>Festuca ovina</i>	Sheep's Fescue	F
<i>Festuca rubra</i>	Red Fescue	F
<i>Holcus lanatus</i>	Yorkshire-Fog	F
<i>Poa pratensis</i>	Meadow Grass	O
<i>Trisetum flavescens</i>	Yellow Oat-Grass	O

River Liffey Valley, Leixlip to Lucan/Laraghcon, Co. Fingal- from east entrance of St Catherine's Wood to the weir below Lucan Village. *A mixture of habitats encountered along the road, including arable land (BC1), grassland (GA1, GA2, GS2), the riparian zone immediately adjacent to the River Liffey (FW2,FS2, WN5), and woodlands (WD1, WD2) upon the steeper slopes. Throughout all are homes, gardens and a few large estates (Fossit, 2000).*

River Liffey and margin (to 5 meters from water edge): Habitat classification FW2, FS2, WN5.

Woody Species

* <i>Acer pseudoplatanus</i>	Sycamore	F
<i>Alnus glutinosa</i>	Common Alder	F
<i>Crataegus monogyna</i>	Hawthorn, Whitethorn	O
<i>Fraxinus excelsior</i>	Common Ash	O
<i>Prunus spinosa</i>	Blackthorn, Sloe	L O
* <i>Populus x canescens</i>	Grey Poplar	L O
* <i>Salix alba</i>	White Willow	F
* <i>Salix fragilis</i>	Crack Willow	F
<i>Sambucus nigra</i>	Elder	O
<i>Ulmus glabra</i>	Wych Elm	O

Herbaceous species

<i>Angelica sylvestris</i> @	Angelica	O
<i>Anthriscus sylvestris</i>	Cow Parsley	V A
<i>Apium nodiflora</i> @	Fool's Watercress	LA
* <i>Elodea canadensis</i> @	Canadian Pondweed	LVF
<i>Epilobium hirsutum</i>	Hoary Willow-Herb	LV A
<i>Eupatorium cannabinum</i>	Hemp-Agrimony	O
<i>Filipendula ulmaria</i>	Meadowsweet	L A
<i>Galium aparine</i>	Cleavers	O
<i>Galium palustre</i>	Marsh Bedstraw	O

<i>Geum urbanum</i>	Wood Aven	O
<i>Heracleum sphondylium</i>	Hogweed	A
<i>*Impatiens glandulifera</i>	Indian Balsam (marginal, invasive)	O
<i>Lemna minor</i> @	Duckweed	L F
<i>Mentha aquatica</i>	Common Water Mint	O
<i>Myosotis scorpioides</i>	Water Forget-Me-Not	O-R
<i>Nuphar lutea</i> @	Yellow Water Lily	L O
<i>Petasites hybridus</i>	Butterbur	L F
<i>Plantago lanceolata</i>	Ribwort Plantain	O
<i>Plantago major</i>	Plantain	L O
<i>Potamogeton</i> spp. @	Pondweed	LV A
<i>Ranunculus repens</i>	Creeping Buttercup	F
<i>Rorippa-nasturtium-aquaticum</i> @	Water cress	L F
<i>Rubus fruticosus</i> agg.	Bramble	V F
<i>Rumex conglomeratus</i>	Common Dock, Sorrel	A
<i>Rumex obtusifolius</i>	Broad-lvd. Dock	O
<i>Sagittaria sagittifolia</i> @	Arrowhead	VR
<i>Scrophularia auriculata</i>	Water Figwort	O-F
<i>Solanum dulcamara</i>	Bittersweet Nightshade	O
<i>Sparganium erectum</i> @	Branched Bur-Reed	O-LF
<i>Sparganium emersum</i> @	Unbranched Bur-Reed	O
<i>Urtica dioica</i>	Stinging Nettle	VA

Grasses, Sedges and Rushes

<i>Carex pendula</i>	Pendulent Sedge	O
<i>Dactylis glomerata</i>	Cock's Foot Grass	A
<i>Festuca gigantea</i>	Giant Fescue	O
<i>Glyceria fluitans</i> @	Floating Sweet Grass	A
<i>Glyceria maxima</i> @	Reed Sweet Grass	L A
<i>Holcus lanatus</i>	Yorkshire Fog	LV A
<i>Scirpus lacustris</i> @	Common Club Rush, Bulrush	L F

Woodland- Just south and west of the new developments of Laraghcon, approx. 50 meters above the valley floor is a narrow stretch of woodland over a former limestone quarry. Habitat Classifications: WD1- 'Mixed Broadleaved Woodland' but possibly a highly modified remnant of Oak-Ash-Hazel Woodland (WN2). The small remnant of conifer plantation (WD4) has been neglected and is reverting back to broadleaved wood, mostly in the form of immature Ash (*Fraxinus excelsior*).

Woody Species

<i>*Abies alba</i>	Silver Fir (forestry remnant)	LF
<i>*Acer pseudoplatanus</i>	Sycamore	F
<i>*Aesculus hippocastanum</i>	Horse Chestnut	O

<i>Crataegus monogyna</i>	Hawthorn, Whitethorn	O
* <i>Fagus sylvatica</i>	Common Beech	F
<i>Fraxinus excelsior</i>	Common Ash	A
<i>Ilex aquifolium</i>	Holly	F
* <i>Larix spp.</i>	Larch (forestry remnant)	L O
<i>Ligustrum vulgare</i>	Wild Privet	O
* <i>Picea sp.</i>	Spruce (forestry remnant)	L O
<i>Pinus sylvestris</i>	Scots Pine (forestry remnant)	L O
* <i>Populus x canescens</i>	Grey Poplar	L O
<i>Prunus avium</i>	Bird Cherry	O
<i>Quercus robur</i>	Pedunculate Oak	O
# <i>Ribes rubrum</i>	Red Currant	R
<i>Rosa arvensis</i>	Field Rose	O
<i>Rubus fruticosus agg.</i>	Bramble	V F
<i>Sambucus nigra</i>	Elder	O
* <i>Symphoricarpos albus</i>	Snowberry	L, VA
<i>Ulmus glabra</i>	Wych Elm	O
* <i>Ulmus minor</i>	Small-leaved Elm	O

Climbers

<i>Hedera helix</i>	Ivy	V A
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Herbaceous species

<i>Anthriscus sylvestris</i>	Cow Parsley	V A
<i>Galium aparine</i>	Cleavers	F
<i>Heracleum sphondylium</i>	Hogweed	F
<i>Hypericum hirsutum</i>	Hairy St John's Wort	R
<i>Viola riviniana/reichenbachiana</i>	DogViolet	O

Ferns, etc.

<i>Dryopteris filix-mas</i>	Male Fern	O
<i>Phyllitis scolopendrium</i>	Hart's Tongue Fern	F

River Liffey Valley, Lucan/Laraghcon, Co. Fingal- from the weir below Lucan Village north and east to Anna Liffey/Shackleton Mills. All species recorded within 20 meters of the river's edge (Mixed grassland, woodland and ruderal sites). The majority of the River Liffey and margins are classified as a '*depositing/lowland rivers*' habitat (FW2). '*Eroding/upland river*' type habitat occurs only in the reaches immediately adjacent to the weir at the Shackleton Mills site. Also present are semi-natural '*Dry meadows/Grassy verge*' (GS2), fragmented '*Riparian woodland*' (WD1, WN5), '*scrub*' (WS1), and '*recolonizing bare ground*' (ED3).

River Liffey and margin (to 5 meters from water edge): Occasional fallen trees (esp *Salix* spp.) provide a foothold for many marginal and aquatic species. Habitats: WN5, FW2.

Woody Species

* <i>Acer pseudoplatanus</i>	Sycamore	V F
<i>Alnus glutinosa</i>	Common Alder	F
* <i>Cornus sericea</i>	Red Osier Dogwood	VL, O
<i>Crataegus monogyna</i>	Hawthorn, Whitethorn	O
<i>Fraxinus excelsior</i>	Common Ash	O
<i>Prunus spinosa</i>	Blackthorn, Sloe	LF
<i>Populus tremula</i>	Aspen	O
* <i>Populus x canescens</i>	Grey Poplar	L,O
<i>Quercus robur</i>	Pedunculate Oak	O
<i>Salix alba</i>	White Willow	O
* <i>Salix fragilis</i>	Crack Willow	O-F
<i>Sambucus nigra</i>	Elder	A
* <i>Symphoricarpos albus</i>	Snowberry	L A
* <i>Tilia x europaea</i>	Lime (near Anna Liffey Mills west gate)	VL,R
<i>Ulmus glabra</i>	Wych Elm	O

Vines

<i>Hedera helix</i>	Ivy	V A
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Herbaceous species

<i>Allium ursinum</i>	Ramson's, Wild Leek	O this site, otherwise A
<i>Angelica sylvestris</i> @	Angelica	O
<i>Anthriscus sylvestris</i>	Cow Parsley	V A
<i>Apium nodiflorum</i> @	Fool's Watercress	O-LF
<i>Butomus umbellatus</i> @	Flowering Rush	O
<i>Caltha palustris</i> @	Marsh Marigold	R
<i>Calystegia sepium</i>	Bindweed, Morning-glory	V A
* <i>Centranthus ruber</i>	Red Valerian	L O

<i>*Cerastium tomentosum</i>	Snow-in-Summer	VL, R
<i>*Elodea canadensis</i> @	Canadian Pondweed	LVF
<i>Epilobium hirsutum</i>	Hoary Willow-Herb	V F
<i>Eupatorium cannabinum</i>	Hemp-Agrimony	L F
<i>Filipendula ulmaria</i>	Meadowsweet	L A
<i>Galium aperine</i>	Cleavers	F
<i>Geum urbanum</i>	Wood Avens	O
<i>Heracleum sphondylium</i>	Hogweed	A
<i>*Fallopia japonica</i>	Japanese Knotweed	O
<i>*Impatiens glandulifera</i>	Indian Balsam	O
<i>Lemna minor</i> @	Duckweed	L F
<i>Mentha aquatica</i>	Common Water Mint	O
<i>Myosotis scorpioides</i>	Water Forget-Me-Not	O-R
<i>Nuphar lutea</i> @	Yellow Water Lily	L F
<i>Orobanche hederæ</i>	Ivy Broomrape	VL, A
<i>Petasites hybridus</i>	Butterbur	L F
<i>Plantago lanceolata</i>	Ribwort Plantain	O
<i>Plantago media</i>	Hoary Plantain	L O
<i>Potamogeton</i> spp. @	Pondweed	LV A
<i>Ranunculus repens</i>	Creeping Buttercup	F
<i>Rorippa nasturtium-aquaticum</i> @	Water cress	L F
<i>Rubus fruticosus</i> agg.	Bramble	V F
<i>Rumex conglomeratus</i>	Common Dock, Sorrel	A
<i>Rumex obtusifolius</i>	Broad-lvd. Dock	O
<i>Rumex sanguineus</i>	Wood Dock	A
<i>Sagittaria sagittifolia</i> @	Arrowhead	VR
<i>Scrophularia auriculata</i>	Water Figwort	O-F
<i>Scrophularia nodosa</i>	Figwort	F
<i>Scrophularia umbrosa</i> @	Green Figwort	R
<i>Solanum dulcamara</i>	Bittersweet Nightshade	O
<i>Sparganium erectum</i> @	Branched Bur-Reed	O-LF
<i>Sparganium emersum</i> @	Unbranched Bur-Reed	O
<i>Urtica dioica</i>	Stinging Nettle	VA

Grasses, Sedges and Rushes

<i>Agrostis stolonifera</i>	Creeping Bent grass	L A
<i>Arrhenatherum elatius</i>	False Oat-grass	F
<i>Carex pendula</i>	Pendulous Sedge	O
<i>Dactylis glomerata</i>	Cock's Foot Grass	A
<i>Festuca gigantea</i>	Giant Fescue	O
<i>Festuca pratensis</i>	Meadow Fescue	O-F
<i>Glyceria fluitans</i> @	Floating Sweet Grass	A
<i>Glyceria maxima</i> @	Reed Sweet Grass	L A
<i>Holcus lanatus</i>	Yorkshire Fog	LV A

<i>Lolium perenne</i>	Ryegrass	F
<i>Poa annua</i>	Annual Meadow Grass	A
<i>Schoenoplectus lacustris</i> @	Common Club Rush, Bulrush	L F

Lucan “Car Park”-Re-colonising disturbed site with scattered patches of immature trees and grassland/grassy verge with calcareous elements. Also 1 patches of shallow gravel, supporting calcicoles: (All more than 5 meters from Liffey edge). ‘Mixed broadleaved woodland’ (treeline), ‘Scrub’ and ‘Grassy verge’. Habitats WD1, WS1, GS2, ED2, ER4, ED3 (Fossitt, 2000). Included in this category are the stone walls near the Lucan weir and the Shackelton Mills site (BL1). All wall specialists are denoted with a (w).

Woody Species

* <i>Acer pseudoplatanus</i>	Sycamore	V F
<i>Alnus glutinosa</i>	Common Alder	F
<i>Betula pendula</i>	Silver birch (2-5cm seedlings)	R
* <i>Buddleia davidii</i> (w)	Butterfly Bush	O
<i>Corylus avellana</i>	Hazel	O
* <i>Cotoneaster</i> spp.	Cotoneaster	R-O
<i>Crataegus monogyna</i>	Whitethorn	O
<i>Fraxinus excelsior</i>	Common Ash	O
<i>Prunus spinosa</i>	Blackthorn, Sloe	L F
<i>Quercus robur</i>	Pedunculate Oak	O
<i>Rosa canina</i> agg.	Dog Rose	O-F
<i>Rosa arvensis</i>	Field Rose	O
* <i>Syringa vulgaris</i>	Lilac (planted, near bridge)	R
* <i>Salix alba</i>	White Willow	O-F
* <i>Salix fragilis</i> @	Crack Willow	O-F
<i>Sambucus nigra</i>	Elder	A
<i>Ulmus glabra</i>	Wych Elm	O

Climbers

* <i>Clematis vitalba</i>	Wild Clematis, Traveller's Joy	L A
<i>Hedera helix</i>	Ivy	A

Herbaceous species

<i>Achillea millefolium</i>	Yarrow	L F
# <i>Aegopodium podagraria</i>	Bishop's Weed	O
<i>Alliaria petiolata</i>	Garlic Mustard	A
<i>Allium ursinum</i>	Ramson's	L F
<i>Anacamptis pyramidalis</i>	Pyramidal Orchid	(2 plants only!) V R
<i>Anthriscus sylvestris</i>	Cow-Parsley	VA
<i>Arctium minus</i>	Burdock	O
<i>Arum maculatum</i>	Lords-and-Ladies	O
<i>Bellis perennis</i>	Daisy	L F
<i>Brassica napus</i>	Oil-seed Rape	O
<i>Brassica rapa</i>	Wild Turnip	O
<i>Calystegia sepium</i>	Bindweed, Morning-glory	V A
<i>Cardamine pratensis</i>	Cardamine	O R
<i>Centaurea nigra</i>	Common Knapweed	O F
* <i>Centranthus ruber</i> (w)	Red Valerian	walls or exposed gravel, O
<i>Cerastium fontanum</i>	Common Mouse-Ear	F
<i>Cerastium glomeratum</i>	Sticky Mouse-Ear	O
* <i>Chamerion angustifolium</i>	Rosebay willow herb	L F
<i>Cirsium arvense</i>	Creeping Thistle	L A
<i>Cirsium vulgare</i>	Spear Thistle	L F
<i>Crepis biennis</i>	Rough Hawksbeard	O
* <i>Cymbalaria muralis</i> (w)	Ivy-leaved Toadflax	L F
<i>Epilobium hirsutum</i>	Hairy Willow-herb	F
<i>Epilobium obscurum</i>	Short-fruited Willow-herb	O F
<i>Epilobium parviflorum</i>	Hoary Willow-herb	F
<i>Eupatorium cannabinum</i>	Hemp-Agrimony	O
<i>Euphorbia helioscopia</i>	Sun Spurge	(west side of Lucan bridge) R
<i>Filipendula ulmaria</i>	Meadowsweet	L A
<i>Fragaria vesca</i>	Wild Strawberry	L F
<i>Galium aparine</i>	Common Cleavers	V A
<i>Geranium robertianum</i>	Herb-Robert	L A
<i>Geum urbanum</i>	Wood Avens	L A
<i>Heracleum sphondylium</i>	Hogweed	V A
<i>Hieracium sp.</i>	Hawkweed	O
<i>Hypericum maculatum</i>	Imperforate St. John's Wort	O
<i>Hypericum pulchrum</i>	Slender St. John's Wort	O
<i>Lamium purpureum</i>	Red Deadnettle	old walls only, O R
<i>Lapsana communis</i>	Nipplewort	A
<i>Lathyrus pratensis</i>	Meadow Vetchling	O
<i>Linum catharticum</i>	Fairy Flax	exposed gravel only, L F
<i>Lotus corniculatus</i>	Birdsfoot Trefoil	F

<i>Medicago lupulina</i>	Black Medick	O
<i>Myosotis arvensis</i>	Field Forget-me-not	OR
<i>Orobanchae hederaceae</i>	Ivy Broomrape	LF
<i>Parietaria judaica</i> (w)	Pellitory-of-the-Wall	F
<i>Petasites hybridus</i>	Butterbur	LA
<i>Plantago lanceolata</i>	Ribwort Plantain	VF
<i>Plantago major</i>	Greater Plantain	F
<i>Potentilla anserina</i>	Silverweed	A
<i>Potentilla reptans</i>	Creeping Cinquefoil	LF
<i>Potentilla sterilis</i>	Barren strawberry	LF
<i>Prunella vulgaris</i>	Self-Heal	F
<i>Ranunculus acris</i>	Meadow Buttercup	O
<i>Ranunculus bulbosus</i>	Bulbous Buttercup	(found on elevated mound) R
<i>Ranunculus ficaria</i>	Lesser Celandine	OR
<i>Ranunculus repens</i>	Creeping Buttercup	F
<i>Rubus fruticosus</i> agg.	Bramble	VF
<i>Rumex conglomeratus</i>	Dock	A
<i>Rumex obtusifolius</i>	Broad-ld. Dock	A
<i>Rumex crispus</i>	Curled Dock	F
<i>Rumex sanguineus</i>	Wood Dock	LF
<i>Saxifraga tridactylites</i>	Annual Saxifrage (gravel only)	VL, R
<i>Scrophularia auriculata</i>	Water Figwort	O
<i>Scrophularia nodosa</i>	Figwort	O
# <i>Sedum spurium</i> (w)	Dragon's Blood Sedum	VR
<i>Senecio jacobaea</i>	Ragwort	A
<i>Senecio vulgaris</i>	Groundsel	F
<i>Silene latifolia</i> (alba)	White Campion	R
<i>Sinapis arvensis</i>	Charlock	O
<i>Sonchus arvensis</i>	Perennial Sow-thistle	O
<i>Sonchus oleraceus</i>	Smooth Sow-thistle	O
<i>Stachys sylvatica</i>	Woundwort	F
<i>Stellaria media</i>	Chickweed	O
<i>Taraxacum</i> sp.	Dandelion	F
* <i>Torilis japonica</i>	Hedge Parsley	O
<i>Trifolium pratense</i>	Red Clover	A
<i>Trifolium repens</i>	White Clover	F
<i>Urtica dioica</i>	Stinging Nettle	VA
<i>Veronica chamaedrys</i>	Germander Speedwell	VA
* <i>Veronica filiformis</i>	Creeping Speedwell	R
<i>Vicia sepium</i>	Bush Vetch	A

Grasses, Sedges and Rushes

<i>Agrostis stolonifera</i>	Creeping Bent grass	LA
<i>Arrhenatherum elatius</i>	False Oat-grass	F

<i>Carex divulsa</i>	Sedge	F
<i>Carex pendula</i>	Pendulous Sedge	O
<i>Carex remota</i>	Remote sedge	O
<i>Catapodium rigidum</i> (w)	Fern-grass	L F
<i>Dactylis glomerata</i>	Cock's Foot Grass	A
<i>Festuca gigantea</i>	Giant Fescue	O
<i>Festuca pratensis</i>	Meadow Fescue	O-F
<i>Festuca ovina</i>	Sheep fescue	O
<i>Festuca rubra</i>	Red Fescue	A
<i>Glyceria fluitans</i> @	Floating Sweet Grass	A
<i>Glyceria maxima</i> @	Reed Sweet Grass	L A
<i>Holcus lanatus</i>	Yorkshire Fog	LV A
<i>Lolium perenne</i>	Ryegrass	F
<i>Poa annua</i>	Annual Meadow Grass	A
<i>Schoenplectus lacustris</i> @	Common Club Rush, Bulrush	L F

Ferns, etc.

<i>Asplenium ruta-muraria</i> (w)	Wall-Rue	F
<i>Asplenium trichomanes</i> (w)	Maidenhair Spleenwort	VL, O
<i>Asplenium ceterach</i> (w)	Rustyback Fern	VL, R
<i>Equisetum arvense</i>	Horsetail	L F
<i>Phyllitis scolopendrium</i>	Hart's Tongue Fern	F
<i>Polypodium vulgare</i> agg.	Common Polypody Fern	O-R

ANNA LIFFEY MILLS SITE- some additional species found on the Mills site. Cultivated area. (WD5, WS3, BC4).

Woody Species

* <i>Aesculus hippocastaneum</i>	Horse Chestnut	O
<i>Fraxinus excelsior</i>	Ash	O
* <i>Prunus laurocerasus</i>	Cherry-laurel	L F
* <i>Symphoricarpos albus</i>	Snowberry	L A
* <i>Taxus baccata</i> cv. 'Fastigiata'	Irish Yew cultivar (planted)	R
* <i>Tilia x europaea</i>	Common Lime (planted near Mills)	O

Herbaceous Species

# <i>Aquilegia sp.</i>	Columbine (mixed colors)	O
* <i>Cyclamen hederifolium</i>	Sowbread	L F
* <i>Gunnera tinctoria</i>	Giant Rhubarb (potentially invasive)	R
<i>Hyacinthoides non-scripta</i>	Bluebell	L F
# <i>H. hispanica x non-scripta</i>	Hybrid Bluebell	L F
<i>Orobancha hederaceae</i>	Ivy Broomrape	L F
<i>Carex remota</i>	Remote Sedge	L F

LUCAN “QUARRY” SITE- Immediately east of Lucan’s active quarry- a steep, rocky slope of shallow soil running south to the river Liffey above Anna Liffey/Shackleton Mills site, along the west side of Tinker Hill Road. The shallow, rocky soils, left over from either the adjacent quarry or road cutting, produce poor vegetation cover in some places, while recolonization by immature trees, most notably *Salix* and *Populus spp.* is also occurring. At the lower end of the slope, drainage appears to be poor and there is an abundance of *Juncus*, *Carex* and *Salix spp.*, while the higher end is predominantly grassy. Habitat classification type ED3, ER4 with WS1/WS2.

Woody Species

* <i>Buddleja davidii</i>	Butterfly-bush	O-F
* <i>Cotoneaster spp.</i>	Cotoneaster	L F
<i>Populus tremula</i>	Aspen	L F
<i>Prunus spinosa</i>	Blackthorn, Sloe	F
<i>Salix caprea</i>	Goat Willow	F
<i>Salix cinerea</i>	Sally	V F
<i>Sambucus nigra</i>	Elder	F
* <i>Rosa cv.</i>	Magenta climbing rose (<i>remnant of cultivation</i>)	R
* <i>Symphoricarpos albus</i>	Snowberry	L A

Herbaceous species

<i>Achillea millefolium</i>	Yarrow	O
<i>Centaurea nigra</i>	Common Knapweed	F
<i>Cirsium arvense</i>	Creeping Thistle	L A
<i>Cirsium vulgare</i>	Spear Thistle	L F
<i>Crepis biennis</i>	Rough Hawksbeard	O
<i>Epilobium hirsutum</i>	Great Willow-herb	F
<i>Epilobium obscurum</i>	Short-fruited Willow-herb	O-F
<i>Epilobium parviflorum</i>	Hoary Willow-herb	F
<i>Eupatorium cannabinum</i>	Hemp-Agrimony	O
# <i>Foeniculum vulgare</i>	Fennel	V L F

<i>Filipendula ulmaria</i>	Meadowsweet	L A
<i>Galium aparine</i>	Common Cleavers	V A
<i>Geranium robertianum</i>	Herb-Robert	L F
<i>Geum urbanum</i>	Wood Avens	L A
<i>Hypericum maculatum</i>	Imperforate St. John's Wort	O
<i>Hypericum perforatum</i>	Perforate St. John's Wort	O
<i>Lapsana communis</i>	Nipplewort	A
# <i>Lathyrus grandiflora</i>	Large-flowered Everlasting Pea (<i>relic of cultivation</i>)	R
<i>Lathyrus pratensis</i>	Meadow Vetchling	O
<i>Lotus corniculatus</i>	Birdsfoot Trefoil	O
<i>Medicago lupulina</i>	Black Medick	F
<i>Myosotis arvensis</i>	Field Forget-me-not	R
<i>Odontites vernus ssp. serotinus</i>	Red Bartsia	O
<i>Petasites hybridus</i>	Butterbur	L F
<i>Plantago lanceolata</i>	Ribwort Plantain	F
<i>Plantago media</i>	Plantain	F
<i>Potentilla reptans</i>	Creeping Cinquefoil	L F
<i>Ranunculus acris</i>	Meadow Buttercup	O
<i>Ranunculus repens</i>	Creeping Buttercup	A
<i>Rubus fruticosus agg.</i>	Bramble	V F
<i>Rumex conglomeratus</i>	Dock	A
<i>Rumex obtusifolius</i>	Broad-ldv Dock	O
<i>Scrophularia nodosa</i>	Figwort	O
<i>Senecio erucifolius</i>	Hoary Ragwort	O- R
<i>Senecio jacobaea</i>	Common Ragwort	F
<i>Senecio vulgaris</i>	Groundsel	F
<i>Taraxacum sp.</i>	Dandelion	F
<i>Trifolium pratense</i>	Red Clover	A
<i>Trifolium repens</i>	White Clover	F
<i>Tussilago farfara</i>	Colt's-Foot	L A
<i>Urtica dioica</i>	Stinging Nettle	O
<i>Veronica chamaedrys</i>	Germander Speedwell	O
<i>Vicia sativa</i>	Common Vetch	F
<i>Vicia sepium</i>	Bush Vetch	V A

Grasses, Sedges and Rushes

<i>Arrhenatherum elatius</i>	False Oat-Grass	F
<i>Bromopsis ramosa</i>	Hairy Brome	L O
<i>Brachypodium sylvaticum</i>	False Brome	L F
<i>Carex flacca</i>	Glaucous sedge	L F
<i>Carex hirta</i>	Hairy Sedge	R
<i>Carex pendula</i>	Pendulous Sedge	O
<i>Carex remota</i>	Remote Sedge	O
<i>Dactylis glomerata</i>	Cock's Foot grass	F
<i>Holcus lanatus</i>	Yorkshire Fog	F

<i>Juncus inflexus</i>	Hard Rush	F
<i>Juncus effusus</i>	Soft Rush	O

River Liffey Valley, Luttrellstown, Co. Fingal- Luttrellstown demesne

WOODLAND- Habitat classification type “oak-ash-hazel woodland” WN2, “mixed broadleaved woodland” WD1. (Fossitt 2000).

Woody Species

* <i>Abies alba</i>	Silver fir	L F
* <i>Acer pseudoplatanus</i>	Sycamore	A
* <i>Aesculus hippocastanum</i>	Horse Chestnut	O
* <i>Aucuba sp.</i>	Gold Dust Plant	O-R
# <i>Carpinus betulus</i>	Hornbeam	R
# <i>Castanea sativa</i>	Spanish Chestnut	R
# <i>Cornus sericea</i>	Red-Osier Dogwood	VL,O
<i>Corylus avellana</i>	Hazel	F
<i>Crataegus monogyna</i>	Whitethorn	F
# <i>Daphne laureola</i>	Spurge Laurel	V R
<i>Fagus sylvatica</i>	Common Beech	V A
<i>Fraxinus excelsior</i>	Common Ash	A
<i>Ilex aquifolium</i>	Holly	V A
<i>Ligustrum vulgare</i>	Wild Privet	V L, LD
<i>Prunus spinosa</i>	Blackthorn, Sloe	L F
* <i>Picea spp.</i>	Spruce	(Planted) R
<i>Prunus avium</i>	Bird Cherry	O
* <i>Prunus laurocerasus</i>	Cherry-laurel	L A
* <i>Prunus lusitanica</i>	Portugal Laurel	L F
<i>Prunus spinosa</i>	Blackthorn	L A
* <i>Quercus cerris</i>	Turkey Oak	V R
<i>Quercus robur</i>	Pedunculate Oak	L F
<i>Quercus petraea</i>	Sessile Oak	O
* <i>Ribes rubrum</i>	Red Currant	L F
* <i>Rhododendron ponticum</i>	Rhododendron	R
<i>Rosa canina</i>	Dog Rose	O

<i>Rosa arvensis</i>	Field Rose	O
# <i>Ruscus aculeatus</i>	Butcher's Broom	VR
<i>Sambucus nigra</i>	Elder	A
<i>Sorbus aucuparia</i>	Rowan	R
* <i>Symphoricarpos albus</i>	Snowberry	LA
<i>Taxus baccata</i>	Yew	O-R
* <i>Tilia x europaea</i>	Common Lime	O
<i>Ulmus glabra</i>	Wych Elm	VF
* <i>Ulmus minor</i>	Elm	LF
* <i>Ulmus procera</i>	English Elm (always planted)	O

Climbers

<i>Hedera helix</i>	Ivy	VA
<i>Lonicera periclymenum</i>	Honeysuckle	A

Herbaceous species

# <i>Aegopodium podagraria</i>	Bishop's Weed	LA
<i>Ajuga reptans</i>	Bugle	LF
<i>Alliaria petiolata</i>	Garlic Mustard	A
<i>Allium ursinum</i>	Ramson's, Wild Leek	VA
<i>Anemone nemorosa</i>	Wood Anemone	F
<i>Anthriscus sylvestris</i>	Cow-Parsley	VA
<i>Arum maculatum</i>	Lords-and-Ladies	O-F
<i>Chrysosplenium oppositifolium</i>	Golden Saxifrage	LA
<i>Circaea lutetiana</i>	Enchanter's Nightshade	LA
<i>Conopodium majus</i>	Pignut	R
<i>Galium aparine</i>	Common Cleavers	VA
<i>Galium odoratum</i>	Sweet Woodruff	O-R
<i>Geranium robertianum</i>	Herb-Robert	VA
<i>Geum urbanum</i>	Wood Avens	VA
<i>Glechoma hederacea</i>	Ground Ivy	LF
<i>Heracleum sphondylium</i>	Hogweed	VA
<i>Hyacinthoides non-scripta</i>	Bluebell	LA
<i>Hyacinthoides hispanica x non-scripta</i>	Hybrid Bluebell	R
<i>Lathraea squamaria</i>	Toothwort	VR
<i>Lysimachia nummularia</i> ?	Creeping Jenny	R
<i>Oxalis acetosella</i>	Wood-Sorrel	VL, O
<i>Primula vulgaris</i>	Primrose	O, LF
<i>Ranunculus ficaria</i>	Lesser Celandine	LF
<i>Rumex sanguineus</i>	Wood Dock	LF
<i>Sanicula europaea</i>	Sanicle	O
<i>Stachys sylvatica</i>	Woundwort	A
<i>Taraxacum agg.</i>	Dandelion	F

<i>Urtica dioica</i>	Stinging Nettle	L A
<i>Veronica chamaedrys</i>	Germander Speedwell	VA
<i>Veronica montana</i>	Wood Speedwell	L F
<i>Viola riviniana</i>	Dog Violet	F
<i>Viola reichenbachiana</i>	Early Dog Violet	R

Grasses, Sedges and Rushes

<i>Carex divulsa</i>	Sedge	O
<i>Carex pendula</i>	Pendulent Sedge	L F
<i>Carex remota</i>	Remote Sedge	F
<i>Carex strigosa</i>	Thin Spiked Wood Sedge	R
<i>Carex sylvatica</i>	Wood Sedge	V A
<i>Festuca rubra</i>	Red Fescue	F
<i>Melica uniflora</i>	Wood Melick	O-R
<i>Milium effusum</i>	Wood-millet	O-F

Ferns, etc.

<i>Athyrium filix-femina</i>	Lady fern	O
<i>Blechnum spicant</i>	Hard Fern (acidophile-one site)	V R
<i>Dryopteris affinis</i>	Scaly Male Fern	F
<i>Dryopteris filix-mas</i>	Male Fern	V A
<i>Phyllitis scolopendrium</i>	Hart's Tongue Fern	V A
<i>Polystichum setiferum</i>	Wood Fern	V F

WOODLAND EDGE/ GRASSY VERGE*- Due to the maintenance of rides and continuous gravel drives, a mix of woodland and grassland species can be found along these linear areas that lead throughout the wooded areas of the demesne. Habitat type- GS2, 'Grassy verge' with some elements of hedgerow/treeline (WL1/WL2) as described by Fossitt (2000),

Woody species

* <i>Abies alba</i>	Silver Fir	O-R
* <i>Acer pseudoplatanus</i>	Sycamore	F
<i>Corylus avellana</i>	Hazel	O
<i>Crataegus monogyna</i>	Whitethorn	A
<i>Euonymus europaeus</i>	Spindle	O
* <i>Fagus sylvatica</i>	Beech	F
<i>Fraxinus excelsior</i>	Ash	A

<i>Ilex aquifolium</i>	Holly	F
<i>Ligustrum vulgare</i>	Wild Privet	VL,F
<i>Prunus avium</i>	Bird Cherry	O-F
* <i>Prunus laurocerasus</i>	Cherry-Laurel	LVF
* <i>Prunus lusitanica</i>	Portugal Laurel	O
<i>Prunus spinosa</i>	Blackthorn, Sloe	L F
<i>Quercus robur</i>	Pedunculate Oak	O
<i>Rosa arvensis</i>	Field Rose	O
<i>Rosa canina</i>	Dog Rose	F
<i>Sambucus nigra</i>	Elder	A
<i>Ulex europaeus</i>	Gorse	VL, F
<i>Ulmus glabra</i>	Wych Elm	A
* <i>Ulmus minor</i>	Small-leaved Elm	O
* <i>Ulmus procera</i>	English Elm	O-R

Herbaceous species

# <i>Aegopodium podagraria</i>	Bishop's Weed	L A
<i>Ajuga reptans</i>	Bugle	L F
<i>Alliaria petiolata</i>	Garlic Mustard	A
<i>Allium ursinum</i>	Ramson's, Wild Leek	LA
<i>Anemone nemerosa</i>	Wood Anemone	O
<i>Anthriscus sylvestris</i>	Cow-Parsley	VA
# <i>Aquelegia vulgaris</i>	Wild Columbine (<i>1 plnt, dk.blue, poss.garden escape</i>)	V R
<i>Arctium minus</i>	Burdock	O-F
<i>Arum maculatum</i>	Lords-and-Ladies	O-F
<i>Cardamine pratensis</i>	Cardamine	O
* <i>Centranthus ruber</i>	Red Valerian (<i>Rare in edge</i>)	R
<i>Cerastium fontanum</i>	Common Mouse-Ear	O
<i>Chamerion angustifolium</i>	Rose-Bay Willow herb	V F
<i>Circaea lutetiana</i>	Enchanter's Nightshade	L A
<i>Conopodium majus</i>	Pignut	R
* <i>Crepis vesicaria</i>	Beaked Hawksbeard	F
* <i>Epilobium ciliatum</i>	American Willow-herb	F
<i>Epilobium hirsutum</i>	Downy Willow -herb	F
<i>Epilobium obscurum</i>	Short-fruited Willow-herb	O-F
<i>Epilobium parviflorum</i>	Hoary Willow-herb	F
<i>Filipendula ulmaria</i>	Meadowsweet	A
<i>Fragaria vesca</i>	Wild Strawberry	V L, O
<i>Galium aparine</i>	Common Cleavers	V A
<i>Galium odoratum</i>	Sweet Woodruff	O-R
# <i>Geranium pyrenaicum?</i>	Hedgerow Geranium (<i>Found near rubbish heap</i>)	V R
<i>Geranium robertianum</i>	Herb-Robert	V A
<i>Geum urbanum</i>	Wood Avens	V A

<i>Glechoma hederacea</i>	Ground Ivy	L F
<i>Heracleum sphondylium</i>	Hogweed	VA
<i>Hesperis matronalis</i>	Dame's Rocket	V L, R
<i>Hyacinthoides non-scripta</i>	Bluebell	L A
<i>#Hypericum androsaemum</i>	Tutsan	F
<i>Hypericum maculatum</i> (m)	Imperforate St. John's Wort	O
<i>Hypericum perforatum</i> (m)	Slender St. John's Wort	O
<i>Hypericum pulchrum</i> (m)	Slender St John's Wort	R
<i>Lamium purpureum</i> (m)	Red Deadnettle	O
<i>Lapsana communis</i>	Nipplewort	F
<i>Lathyrus pratensis</i>	Meadow Vetchling	O
<i>Lotus corniculatus</i>	Birdsfoot Trefoil	O
<i>*Lunaria annua</i> (m)	Honesty	R
<i>Medicago lupulina</i>	Black Medick	O
<i>Myosotis arvensis</i>	Field Forget-me-not	R
<i>Petasites hybridus</i>	Butterbur	L A
<i>Plantago lanceolata</i>	Ribwort Plantain	O
<i>Potentilla anserina</i>	Silverweed	L F
<i>Potentilla reptans</i>	Creeping Cinquefoil	L F
<i>Primula vulgaris</i>	Primrose	O, L F
<i>Ranunculus acris</i>	Meadow Buttercup	O
<i>Ranunculus ficaria</i>	Lesser Celandine	L F
<i>Ranunculus repens</i>	Creeping Buttercup	F
<i>Rubus fruticosus</i> agg.	Bramble	V F
<i>Rubus idaeus</i>	Wild Raspberry	L A
<i>Rubus ulmifolius</i>	Bramble	F
<i>Rumex obtusifolius</i>	Broad-lvd. Dock	A
<i>Rumex crispus</i>	Curled Dock	F
<i>Rumex sanguineus</i>	Wood Dock	L F
<i>Sanicula europaea</i>	Sanicle	O
<i>Scrophularia auriculata</i>	Water Figwort	O
<i>Scrophularia nodosa</i>	Figwort	O
<i>Senecio erucifolius</i>	Hoary Ragwort	L, O
<i>Senecio jacobaea</i>	Ragwort	O
<i>Senecio vulgaris</i>	Groundsel	F
<i>Silene latifolia</i>	Campion	V L, R
<i>Sonchus oleraceus</i>	Smooth Sow-Thistle	O
<i>Stachys sylvatica</i>	Woundwort	A
<i>Taraxacum</i> sp.	Dandelion	F
<i>Trifolium pratense</i>	Red Clover	F
<i>Trifolium repens</i>	White Clover	A
<i>Urtica dioica</i>	Stinging Nettle	L A
<i>Valeriana officinalis</i> (m)	Valerian	O, R
<i>Veronica beccabunga</i>	Brooklime	R

<i>Veronica chamaedrys</i>	Germander Speedwell	VA
<i>Veronica montana</i>	Wood Speedwell	LF
<i>Veronica officinalis</i>	Heath Speedwell	O-R
<i>Vicea sativa</i>	Vetch	O
<i>Vicea sepium</i>	Bush Vetch	A
<i>Viola riviniana</i>	Dog Violet	F
<i>Viola reichenbachiana</i>	Early Dog Violet	R

Grasses, Sedges and Rushes

<i>Arrhenatherum elatius</i>	False Oat-grass	F
<i>Brachypodium sylvaticum</i>	False Brome	VA
<i>Bromus ramosus</i>	Hairy Brome	F
<i>Carex divulsa</i>	Grey Sedge	O
<i>Carex flacca</i>	Glaucous Sedge	LA
<i>Carex pendula</i>	Pendulent Sedge	LF
<i>Carex remota</i>	Remote Sedge	F
<i>Carex strigosa</i>	Thin Spiked Wood Sedge	R
<i>Carex sylvatica</i>	Wood Sedge	VA
<i>Dactylis glomerata</i>	Cock's-Foot	F-A
<i>Deschampsia cespitosa</i>	Tufted Hair-Grass	O-R
<i>Festuca arundinacea</i>	Tall Fescue	O
<i>Festuca gigantea</i>	Giant Fescue	O
<i>Festuca rubra</i>	Red Fescue	F
<i>Juncus effusus</i>	Common Rush	R
<i>Juncus inflexus</i>	Hard rush	R
<i>Melica uniflora</i>	Wood Melick	O,R
<i>Milium effusum</i>	Wood-millet	F
<i>Phragmites australis</i>	Reed	VL,O
<i>Poa pratensis</i>	Smooth Meadow Grass	F
<i>Poa trivialis</i>	Rough Meadow Grass	F

Ferns, etc.

<i>Asplenium ruta-muraria</i> (w)	Wall-Rue	F
<i>Dryopteris affinis</i>	Scaly Male Fern	F
<i>Dryopteris filix-mas</i>	Male Fern	VA
<i>Equisetum arvense</i>	Field Horsetail	LF
<i>Phyllitis scolopendrium</i>	Hart's Tongue Fern	VA
<i>Polystichum setiferum</i>	Wood Fern	VF
<i>Polypodium vulgare</i> (w)	Polypody	O

GRASSLAND- Both improved and unimproved grasslands are well-represented in Luttrellstown, due to the wide variety of uses. There is the highly improved and species poor amenity grasslands of the golf courses (GA2) and the semi-improved grassy verges (GS2) found around the lawns, gardens, buildings, and areas of cultivation. Also, there is a small remnant of semi-natural, dry calcareous grassland (GS1) on slopes and limestone outcroppings.

Woody species

<i>Rosa canina</i>	Dog rose	O
<i>Rubus fruticosus</i> agg.	Bramble	R
<i>Ulex europaeus</i>	Common Gorse (invading calc. grassland)	LA
<i>Ulex gallii</i>	Western Gorse (calcifuge)	R

Herbaceous species

<i>Achillea millefolium</i>	Yarrow	O
<i>Agrimonia eupatoria</i>	Agrimony	R
<i>Anacamptis pyramidalis</i>	Pyramidal Orchid	R
<i>Centaurea nigra</i>	Common Knapweed	F
<i>Cirsium palustre</i>	Marsh Thistle	O
<i>Cirsium vulgare</i>	Spear Thistle	O
<i>Fragaria vesca</i>	Wild Strawberry	O-R
<i>Galium aparine</i>	Cleavers	F
<i>Galium verum</i>	Lady's Bedstraw	O-F
<i>Geranium robertianum</i>	Herb-Robert	O
<i>Pilosella</i> sp.	Mouse-ear Hawkweed	O
<i>Hypericum perforatum</i>	Perforate St. John's Wort	O-R
<i>Knautia arvensis</i>	Field Scabious	V L, R
<i>Lathyrus pratensis</i>	Meadow Vetchling	O
<i>Leucanthemum vulgare</i>	Shasta Daisy	R
<i>Lotus corniculatus</i>	Bird's-foot Trefoil	L, O
<i>Medicago lupulina</i>	Black Medick	F
<i>Ononis repens</i>	Rest-harrow	V L, R
<i>Potentilla anserina</i>	Silverweed	O
<i>Potentilla reptans</i>	Creeping Cinquefoil	O
<i>Primula veris</i>	Oxlip	R
<i>Prunella vulgaris</i>	Self-Heal	F
<i>Sanguisorba minor</i>	Salad Burnet	V L, V R
<i>Senecio erucifolius</i>	Hoary Ragweed	O
<i>Succisa pratensis</i>	Devil's Bit Scabious	V L, R
<i>Trifolium pratense</i>	Red Clover	F
<i>Vicia cracca</i>	Common Vetch	O

Grasses, sedges and rushes

<i>Avenula pubescens</i>	Downy Oat grass	O
<i>Brachypodium sylvaticum</i>	False Brome	L F
<i>Briza media</i>	Quaking Oat grass	V L, R
<i>Bromus ramosus</i>	Hairy Brome	O F
<i>Carex flacca</i>	Glaucous Sedge	LA
<i>Dactylis glomerata</i>	Cock's-Foot Grass	F
<i>Holcus lanatus</i>	Yorkshire Fog	F

RIPARIAN- Flowing through the estate (including golf courses and ponds) is small, natural stream which joins the river Liffey below Luttrellstown. The relatively infrequent maintenance (ie., mowing, weeding) and the inaccessibility of much of the west and southwest side of the stream due to steep cliffs, enables it to support a rich and diverse plant life characteristic of streambanks. Habitat classification-FW2-'depositing/ lowland rivers', where it crosses the low plain between waterfalls, with some elements of GS4, 'wet grassland' and WD5 'scattered trees and parkland,' all fringed by 'mixed broadleaved woodland' WD1(Fossit, 2000)

All plants listed here are found within 5 meters of the streamside.

Woody species

* <i>Aesculus hippocastanum</i>	Horse Chestnut	(Planted)	O
# <i>Carpinus betulus</i>	Hornbeam		R
* <i>Cornus sericea</i>	Dogwood		VL, A
* <i>Fagus sylvatica</i>	Beech	(Planted)	O
* <i>Prunus laurocerasus</i>	Cherry-Laurel	(invasive, spreading threat)	L A
<i>Quercus robur</i>	Pedunculate Oak		O
<i>Sambucus nigra</i>	Elder		A
<i>Ulmus glabra</i>	Wych Elm		F

Herbaceous species

<i>Anthriscus sylvestris</i>	Cow Parsley		A
<i>Allium ursinum</i>	Ramson's, Wild Leek		A
<i>Angelica sylvestris</i>	Angelica		F
<i>Caltha palustris</i> @	Marsh Marigold		O
<i>Callitriche stagnalis</i> @	Water Starwort		L F
<i>Calystegia sepium</i>	Bindweed		A
<i>Chrysosplenium oppositifolium</i>	Golden Saxifrage		L A
* <i>Elodea canadensis</i> @	Canadian Pondweed		V F
<i>Eupatorium cannabinum</i>	Hemp Agrimony		O
<i>Filipendula ulmaria</i>	Meadowsweet		L A

<i>Geum urbanum</i>	Wood Avens	A
* <i>Gunnera tinctoria</i>	Giant rhubarb (<i>near pool, probably planted</i>)	R
<i>Heracleum sphondylium</i>	Hogweed	A
<i>Hesperis matronalis</i>	Dame's Rocket	V L, R
<i>Iris pseudacorus</i>	Yellow-Flag Iris	VL, O
<i>Lemna minor</i> @	Duckweed	L F
<i>Lysimachia nummularia</i>	Creeping Jenny	R
<i>Mentha aquatica</i> @	Water Mint	VL, O
<i>Myosotis scorpioides</i> @	Water Forget-me-not	L F
<i>Nuphar lutea</i> @	Yellow Water Lily	L F
<i>Ranunculus repens</i>	Creeping Buttercup	A
<i>Rorippa nasturtium-aquaticum</i> @	Watercress	L F
<i>Rubus fruticosus</i> agg.	Bramble	V A
<i>Rumex conglomeratus</i>	Dock	A
<i>Rumex obtusifolius</i>	Broad-lvd. Dock	O
<i>Scrophularia auriculata</i>	Water Figwort	O-F
<i>Scrophularia nodosa</i>	Figwort	O
<i>Solanum dulcamara</i>	Bittersweet Nightshade	O
<i>Sparganium emersum</i> @	Unbranched Bur-Reed	O-L F
<i>Sparganium erectum</i> @	Branched Bur-Reed	O-L F
<i>Urtica dioica</i>	Stinging Nettle	VA

Grasses, sedges and rushes

<i>Carex pendula</i>	Pendulous Sedge	F
* <i>Sasa palmata</i>	Bamboo	VL, A

Ponds- The two ponds on the golf courses, through which the stream flows, support a variety of marginal and aquatic plants, some of which are not found in the moving waters of the stream itself. Habitat classification includes 'artificial ponds' (FL8) with elements of 'Eutrophic Lakes and Ponds' (FL5) and 'Reed and Large Sedge Swamps' (FS1) (Fossitt 2000).

Woody species

* <i>Cornus sericea</i>	Dogwood	L F
* <i>Salix fragilis</i>	Crack Willow	O
<i>Salix caprea</i>	Goat Willow	L F

<i>Salix cineria</i>	Sally	O
<u>Herbaceous species</u>		
<i>Alisma plantago-aquatica</i> @	Water Plantain	R
<i>Angelica sylvestris</i>	Angelica	F
<i>Cirsium vulgare</i>	Spear Thistle	F
<i>Epilobium hirsutum</i>	Downy Willow-herb	A
<i>Epilobium palustre</i>	Marsh Willow-herb	O
<i>Epilobium</i> sp.	Willow-herb	O
<i>Eupatorium cannabinum</i>	Hemp Agrimony	O
<i>Iris pseudacorus</i> @	Yellow Flag iris	L F
<i>Heracleum sphondylium</i>	Hogweed	A
<i>Lemna minor</i> @	Lesser Duckweed	L A
<i>Mentha aquatica</i> @	Water Mint	F
<i>Nuphar lutea</i> @	Yellow Water Lily	O- F
<i>Nymphaea alba</i> @	White Water Lily	VL A
<i>Polygonum amphibium</i> @	Amphibious Bistort	O
<i>Sparganium emersum</i> @	Unbranched Bur-Reed	L A
<i>Sparganium erectum</i> @	Branched Bur-Reed	L A
<i>Typha latifolia</i> @	Bulrush, Cattail	L F
<u>Grasses, sedges and Rushes</u>		
<i>Carex pendula</i>	Pendulous Sedge	O
<i>Phragmites australis</i>	Reed	L A
<u>Ferns, Horsetails, etc</u>		
<i>Equisetum fluviatile</i> @	Water Horsetail	O
<i>Hippuris vulgaris</i> @	Marestail	VL, A

River Liffey Valley, Co. Fingal- below Luttrellstown Demesne east to Strawberry Beds and M50 overpass.

Riverside: To a maximum of 10 meters from the edge of the River Liffey, or from Road to water's edge. 'Depositing/ lowland rivers' habitat classification FW2 and FS2, 'Tall-herb swamps' habitat classification FS2, and narrow stretches of riparian woodland (treelines?); habitat classification WN5 (WL2).

Woody Species

* <i>Acer pseudoplatanus</i>	Sycamore	V A
* <i>Aesculus hippocastanum</i>	Horse Chestnut	L F
<i>Alnus glutinosa</i>	Common Alder	A
<i>Corylus avellana</i>	Hazel	F
<i>Crataegus monogyna</i>	Whitethorn	F
* <i>Fagus sylvatica</i>	Common Beech	L F
<i>Fraxinus excelsior</i>	Common Ash	L F
<i>Ilex aquifolium</i>	Holly	L A
<i>Prunus spinosa</i>	Blackthorn, Sloe	A
* <i>Prunus laurocerasus</i>	Cherry-laurel	O
* <i>Prunus lusitanica</i>	Portuguese Laurel	L F
<i>Quercus robur</i>	Pedunculate Oak	O
* <i>Salix alba</i>	White Willow	F
* <i>Salix fragilis</i> @	Crack Willow	O
* <i>Salix viminalis</i>	Osier	LF
<i>Sambucus nigra</i>	Elder	A
* <i>Tilia x europaea</i>	Lime	O
<i>Ulmus glabra</i>	Wych Elm	V F
* <i>Ulmus procera</i>	English Elm	O

Climbers

* <i>Clematis vitalba</i>	Wild Clematis, Traveller's Joy	L A
<i>Hedera helix</i>	Ivy	A
<i>Lonicera periclymenum</i>	Honeysuckle	L A

Herbaceous species

# <i>Aegopodium podagraria</i>	Bishop's Weed	L A
<i>Ajuga reptans</i>	Bugle	O-R
<i>Alliaria petiolata</i>	Garlic Mustard	A
<i>Allium ursinum</i>	Ramson's, Wild Leek	A
<i>Allium vineale</i>	Wild Onion	R
<i>Anemone nemerosa</i>	Wood Anemone	V L,O
<i>Anthriscus sylvestris</i>	Cow-Parsley	VA
<i>Arctium minus</i>	Burdock	L F
<i>Arum maculatum</i>	Lords-and-Ladies	F
<i>Brassica rapa</i>	Wild Turnip	O
<i>Butomus umbellatus</i> @	Flowering Rush	R

<i>Cardamine pratensis</i>	Cardamine	O
* <i>Centranthus ruber</i>	Red Valerian	O
<i>Chamerion angustifolium</i>	Rose-Bay Willow herb	V F
<i>Circaea lutetiana</i>	Enchanter's Nightshade	O
* <i>Elodea canadensis</i> @	Canadian Pondweed	L F
* <i>Elodea nuttallii</i> @	Nuttall's Pondweed	L F
<i>Epilobium hirsutum</i>	Downy Willow Herb	F
<i>Filipendula ulmaria</i>	Meadowsweet	A
<i>Galium aparine</i>	Common Cleavers	V A
<i>Geranium robertianum</i>	Herb-Robert	L F
<i>Geum urbanum</i>	Wood Avens	V A
<i>Glechoma hederacea</i>	Ground Ivy	F
<i>Heracleum sphondylium</i>	Hogweed	V A
* <i>Impatiens glandulifera</i>	Indian Balsam	LF
<i>Iris pseudacorus</i> @	Yellow Flag Iris	O
<i>Lamium purpureum</i>	Red Deadnettle	O
* <i>Lamium album</i>	White Deadnettle	(one location, Strawberry Fields) R
<i>Lemna minor</i> @	Lesser Duckweed	L A
<i>Nuphar lutea</i>	Yellow Water Lily	L O
<i>Petasites hybridus</i>	Butterbur	L A
<i>Plantago lanceolata</i>	Ribwort Plantain	O
<i>Potentilla reptans</i>	Creeping Cinquefoil	L F
<i>Potamogeton</i> spp. @	Pondweeds	L A
<i>Primula vulgaris</i>	Primrose	O
<i>Ranunculus acris</i>	Meadow Buttercup	O
<i>Ranunculus ficaria</i>	Lesser Celandine	L R
<i>Ranunculus repens</i>	Creeping Buttercup	V A
<i>Rorippa nasturtium-aquaticum</i>	Water cress	L F
<i>Rubus fruticosus</i> agg.	Bramble	V F
<i>Rumex obtusifolius</i>	Broad-ld. Dock	A
<i>Rumex crispus</i>	Curled Dock	F
<i>Rumex sanguineus</i>	Wood Dock	L F
<i>Sagittaria sagittifolia</i>	Arrowhead	L,O-R
<i>Scrophularia auriculata</i>	Water Figwort	O
<i>Scrophularia nodosa</i>	Figwort	O
<i>Scrophularia umbrosa</i>	Green Figwort	R, but L O
<i>Senecio vulgaris</i>	Groundsel	F
<i>Sonchus oleraceus</i>	Smooth Sow-Thistle	O
<i>Solanum dulcamara</i>	Bittersweet Nightshade	O
<i>Stachys sylvatica</i>	Woundwort	F
<i>Taraxacum</i> sp.	Dandelion	F
<i>Urtica dioica</i>	Stinging Nettle	VA
<i>Veronica chamaedrys</i>	Germander Speedwell	VA
<i>Vicia sepium</i>	Bush Vetch	A
<i>Viola riviniana</i>	Dog Violet	F

Grasses, Sedges and Rushes

<i>Phleum pratense</i>	Timothy grass	F
<i>Carex divulsa</i>	Sedge	O
<i>Carex pendula</i>	Pendulent Sedge	O
<i>Glyceria fluitans</i> @	Floating Sweet Grass	A
<i>Glyceria maxima</i> @	Reed Sweet Grass	L A
<i>Juncus effusus</i> @	Soft Rush	O
<i>Schoenoplectus lacustris</i> @	Common Club Rush, Giant Bulrush	F

Ferns, Horsetails, etc.

<i>Asplenium ruta-muraria</i> (w)	Wall-Rue	F
<i>Phyllitis scolopendrium</i>	Hart's Tongue	L A
<i>Polystichum setiferum</i>	Wood Fern	L F
<i>Polypodium vulgare</i> (w)	Polypody	O

River Liffey Valley, Co. Fingal- Broomfield Estate, just below below Luttrellstown Demesne, on the south side of Lucan Road, stretching east towards Strawberry Beds.

Habitat classifications: GA1, Improved Agricultural Grassland; WL2, *Treeline* (following course of Liffey); GS2-Grassy verge and woodland edge now open to grazing by cattle; Riparian fringe, GM1-*Marsh* (river banks) and FW2- '*Depositing Lowland Rivers*' (the Liffey)

Riverside-Beginning at east end of Broomfield- most of treeline to within 5 meters of water's edge, A large Badger sett can be located in the dense Snowberry (*Symphoricarpos albus*) scrub.

Woody Species

* <i>Acer pseudoplatanus</i>	Sycamore	F
<i>Alnus glutinosa</i>	Common Alder	F

<i>Crataegus monogyna</i>	Whitethorn	A
<i>Fraxinus excelsior</i>	Ash	F
* <i>Salix alba</i>	White Willow	O
<i>Salix caprea</i>	Goat Willow	O
* <i>Salix fragilis</i>	Crack Willow	A
* <i>Salix viminalis</i>	Osier	A
* <i>Ulmus minor</i>	Small-leaved Elm	V F
* <i>Ulmus procera</i>	English Elm	O
* <i>Fuchsia magellanica</i>	Fuchsia	R
<i>Hedera helix</i>	Ivy	A
* <i>Symphoricarpos albus</i>	Snowberry (enormous colony)	L A

West end- treeline opens to small woodlot, and riverside ‘treeline’ widens to 30 m from water’s edge. River Liffey also runs more rapidly over shallow substrate, perhaps changing habitat designation to FW1- ‘Eroding/ upland rivers’.

Woody Species

* <i>Acer pseudoplatanus</i>	Sycamore	F
<i>Alnus glutinosa</i>	Alder	A
* <i>Castanea sativa</i>	Spanish Chestnut	R
<i>Corylus avellana</i>	Hazel	R,LO
<i>Crataegus monogyna</i>	Whitethorn	A
<i>Fraxinus excelsior</i>	Ash	A
<i>Quercus robur</i> (large specimens)	Pedunculate Oak	O
* <i>Salix alba</i>	White Willow	O
<i>Salix caprea</i>	Goat Willow	O
<i>Salix cineraria</i>	Sally	O
* <i>Salix fragilis</i>	Crack Willow	O-F
* <i>Salix viminalis</i>	Osier	O
* <i>Ulmus minor</i>	Small-leaved Elm	F
 <i>Hedera helix</i>	 Ivy	 A

Herbaceous species- West and East ends of Broomfield

<i>Angelica sylvestris</i>	Angelica	O
<i>Apium nodiflorum</i> @	Fool's Watercress	A
<i>Butomus umbellatus</i> @	Flowering Rush	VL, O
<i>Cirsium arvense</i>	Creeping Thistle	A
<i>Cirsium vulgare</i>	Spear Thistle	F
* <i>Elodea canadensis</i> @	Canadian Pondweed	F
* <i>Elodea nuttallii</i> @	Nuttall's Pondweed	LF
<i>Eupatorium cannabinum</i>	Hemp-Agrimony	V F
<i>Filipendula ulmaria</i>	Meadowsweet	A
<i>Galium aperine</i>	Cleavers	F
<i>Geranium robertianum</i>	Herb-Robert	O
<i>Geum urbanum</i>	Wood Avens	O
<i>Glechoma hederæ</i>	Ground Ivy	O
<i>Glyceria fluitans</i> @	Floating Sweet-Grass	V A
<i>Glyceria maxima</i>	Sweet Grass (on <i>Salix</i> log)	O
* <i>Impatiens glandulifera</i>	Indian Balsam	A
<i>Iris pseudacorus</i>	Yellow-Flag Iris	VL, O
<i>Lemna minor</i> @	Lesser Duckweed	L F
<i>Lycopus europæus</i>	Gypsywort	VL, R
<i>Mentha aquatica</i>	Water Mint (on <i>Salix</i> log and banks)	V F
<i>Myosotis scorpioides</i>	Water Forget-me-not (on log)	F
<i>Oenanthe crocata</i>	Hemlock Water Dropwort	O
<i>Plantago major</i>	Plantain	O
<i>Polygonum amphibium</i>	Amphibious Bistort	L, R
<i>Potamogeton</i> spp.	Pondweeds	V A
<i>Ranunculus repens</i>	Creeping Buttercup	A
<i>Rorippa nasturtium-aquaticum</i>	Watercress	F
<i>Rumex sanguineus</i>	Wood Dock	A
<i>Rumex conglomeratus</i>	Dock	A
<i>Sagittaria sagittifolia</i>	Arrowhead	R
<i>Scrophularia auriculata</i>	Water Figwort	O
<i>Scrophularia umbrosa</i>	Green Figwort	R
<i>Senecio aquaticus</i>	Marsh Ragwort	O
<i>Senecio jacobaea</i>	Ragwort	V A
<i>Solanum dulcamara</i>	Bittersweet Nightshade	O
<i>Sparganium erectum</i>	Branched Bur-Reed	O
<i>Urtica dioica</i>	Stinging Nettle	V A
<i>Veronica catenata</i>	Pink Water Speedwell	R
<i>Veronica chamaedrys</i>	Germander Speedwell	O

River Liffey Valley, Knockmaroon, Co. Fingal- Knockmaroon Estate.

WOODLAND – *Habitat classification:* Mixed Broadleaved Woodland WD1, with some elements of native Oak-ash-hazel wood, WN2.

Woody Species

* <i>Abies alba</i>	Silver fir	(spreading)	L V A
* <i>Acer pseudoplatanus</i>	Sycamore		A
* <i>Aesculus hippocastanum</i>	Horse Chestnut		O
<i>Corylus avellana</i>	Hazel		O
* <i>Cotoneaster spp.</i>	Cotoneaster		O-R
<i>Crataegus monogyna</i>	Whitethorn	(mostly naturalized saplings)	A
# <i>Daphne laureola</i>	Spurge-Laurel	(naturalized, apparently bird-sown)	L VF
<i>Euonymus europaeus</i>	Spindle		O-R
* <i>Fagus sylvatica</i>	Common Beech		V A
<i>Fraxinus excelsior</i>	Common Ash		V A
<i>Ilex aquifolium</i>	Holly		F
* <i>Laburnum sp.</i>	Laburnum	(two specimens at south fringe of wood)	R
* <i>Larix sp.</i>	Larch		O
<i>Ligustrum vulgare</i>	Wild Privet		F, LA
* <i>Pinus contorta</i>	Lodgepole Pine		O
* <i>Pinus radiata</i>	Monterey Pine	(few large specimens mid-slope)	O
# <i>Pinus sylvestris</i>	Scots Pine		L F
<i>Prunus avium</i>	Wild Cherry		O-R
* <i>Prunus laurocerasus</i>	Cherry-Laurel	(invasive)	L, O
* <i>Prunus lusitanica</i>	Portugal Laurel		R
<i>Prunus spinosa</i>	Blackthorn	(in gully)	V L, A
* <i>Quercus cerris</i>	Turkey Oak	(naturalising in some areas)	O-R
* <i>Quercus ilex</i>	Holm Oak, Holly Oak	(naturalising in some areas)	R
<i>Quercus robur</i>	Pedunculate Oak		L F
<i>Quercus petraea</i>	Sessile Oak		O-R
<i>Rosa arvensis</i>	Field Rose		O
<i>Rosa canina</i>	Dog Rose		O
<i>Rubus fruticosus</i> agg.	Bramble		V L A
<i>Sambucus nigra</i>	Elder		A
<i>Taxus baccata</i>	Yew		O-R
<i>Ulex europaeus</i>	Gorse		VL O
<i>Ulmus glabra</i>	Wych Elm		O

Climbers

<i>Hedera helix</i>	Ivy	F
# <i>Vinca minor</i>	Lesser Periwinkle	L A

Herbaceous species

<i>Alliardia petiolata</i>	Garlic Mustard	A
<i>Allium ursinum</i>	Ramson's	VA
<i>Anemone nemerosa</i>	Wood Anemone	L F
<i>Anthriscus sylvestris</i>	Cow Parsley	V A
<i>Arum maculatum</i>	Lords-and-Ladies	O-F
<i>Chrysosplenium oppositifolium</i>	Golden Saxifrage (well area)	VL, O
<i>Circaea lutetiana</i>	Enchanter's Nightshade	L A
<i>Cirsium arvense</i>	Creeping Thistle	L A
<i>Conopodium majus</i>	Pignut	L,O-R
* <i>Fallopia japonica</i>	Japanese Knotweed (well area)	R
<i>Filipendula ulmaria</i>	Meadowsweet (well area)	VL, O
<i>Galium aparine</i>	Common Cleavers	V A
<i>Galium odoratum</i>	Sweet Woodruff	O-R
<i>Galium verum</i>	Lady's Bedstraw	VL, R
<i>Geranium robertianum</i>	Herb-Robert	V A
<i>Geum urbanum</i>	Wood Avens	V A
* <i>Helleborus foetidus</i>	Stinking Hellebore	VL,O
<i>Heracleum sphondylium</i>	Hogweed	VA
<i>Hypochaeris radicata</i>	Cat's Ears	O-R
<i>Lathyrus pratensis</i>	Meadow Vetchling	O
<i>Leontodon hispidus</i>	Hawk-bit	VL, R
<i>Lotus corniculatus</i>	Bird's-foot Trefoil	VL, O
<i>Orobanche hederæ</i>	Ivy Broomrape	L, O
<i>Petasites hybridus</i>	Butterbur	L F
<i>Pimpinella saxifraga</i>	Burnet-Saxifrage (On sunny ridges in wood)	O, R
<i>Plantago lanceolata</i>	Ribwort Plantain	L F
<i>Primula vulgaris</i>	Primrose	F
# <i>Primula vulgaris</i> cv.	Red-flowered Primrose (escape from gardens)	O
<i>Ranunculus ficaria</i>	Lesser Celandine	L F
<i>Ranunculus repens</i>	Creeping Buttercup	VL, O
<i>Rumex conglomeratus</i>	Dock	O
<i>Rumex sanguineus</i>	Dock	L F
<i>Sanicula europaea</i>	Sanicle	O
<i>Stachys sylvatica</i>	Woundwort	A
<i>Taraxacum agg.</i>	Dandelion	F
<i>Urtica dioica</i>	Stinging Nettle	L A
<i>Veronica chamaedrys</i>	Germander Speedwell	VA
<i>Viola riviniana</i>	Dog Violet	F

Grasses, Sedges and Rushes

<i>Arrhenatherum elatius</i>	False-Oat Grass	L, O
<i>Brachypodium sylvaticum</i>	False Brome	A

<i>Bromopsis ramosa</i>	Hairy Brome	L F
<i>Briza media</i>	Quaking Grass	VL, R
<i>Carex flacca</i>	Glaucous Sedge	L F
<i>Carex pendula</i>	Pendulous Sedge	L O
<i>Carex remota</i>	Remote Sedge	O
<i>Carex strigosa</i>	Sedge	R
<i>Carex sylvatica</i>	Wood Sedge	V A
<i>Dactylis glomerata</i>	Cock's Foot	
<i>Festuca rubra</i>	Red Fescue	F
<i>Holcus lanatus</i>	Yorkshire-Fog	VL, O
<i>Melica uniflora</i>	Wood Melick	O,R
<i>Milium effusum</i>	Wood-millet	F
<i>*Phyllostachys sp.</i>	Bamboo (2 large clumps, spreading little)	R
<u>Ferns, etc.</u>		
<i>Dryopteris affinis</i>	Scaly Male Fern (well area)	F
<i>Dryopteris filix-mas</i>	Male Fern	V A
<i>Phyllitis scolopendrium</i>	Hart's Tongue Fern	V A
<i>Polystichum setiferum</i>	Wood Fern	V F

GRAZED LAND (Scattered aging trees) *Habitat classification WD5 'Scattered Trees and parkland and GA1 'Improved agricultural grassland'*

Woody species

<i>Betula pendula</i>	R
<i>Crataegus monogyna</i>	O-F
<i>Fagus sylvatica</i>	A
<i>Fagus sylvatica</i> cv. 'Dawyck' (planted, cv discovered by grandfather of current owner)	R-O
<i>Fraxinus excelsior</i>	F
<i>Quercus cerris</i> (Includes 1 large field specimen)	R-O
<i>Quercus robur</i>	O-F
<i>Quercus rubra</i> (confined to mixed Lime Avenue entering the estate, American sp.)	L O
<i>Sorbus aria</i> (?) (Seedling in crevice of large ash)	VR
<i>Tilia x europaea</i> (confined to a mixed Lime Avenue entering the estate)	LA

Grasses, Sedges and Rushes

<i>Lolium perenne</i>	Perennial Rye
<i>Festuca rubra</i>	Red Fescue
<i>Dactylis glomerata</i>	Cock's-Foot
<i>Poa annua</i>	Annual Meadow grass

UNIMPROVED GRASSLAND– small patch near the house and hen coop. *Habitat classification*
GS2 'grassy verge' with a few species characteristic of GS1 'dry neutral/calcareous grassland.'
Species richness here is poorer than in GS1 habitat types, and mowing and grazing are rare .

<i>Anthriscus sylvestris</i>	Cow-Parsley	VA
<i>Galium aparine</i>	Cleavers	A
<i>Galium verum</i>	Lady's Bedstraw	R-O
<i>Anacamptis pyramidalis</i>	Pyramidal Orchid	R
<i>Heracleum sphondylium</i>	Hogweed	VA
<i>Prunella vulgaris</i>	Self-Heal	O
<i>Trifolium repens</i>	White Clover	F
<i>Trifolium pratense</i>	Red Clover	
<i>Vicia sepium</i>	Bush Vetch	
<i>Urtica dioica</i>	Nettles	

Grasses, Sedges and Rushes

<i>Arrhenatherum elatius</i>	False Oat grass	F
<i>Cynosurus cristatus</i>	Crested Dog's-tail	O
<i>Dactylis glomerata</i>	Cock's Foot	A
<i>Festuca spp.</i>	Fescue	A
<i>Holcus lanatus</i>	Yorkshire Fog	F
<i>Poa spp.</i>	Meadow grass	F
<i>Trisetum flavescens</i>	Yellow Oat grass	O-R

River Liffey Valley, Co. Fingal- Strawberry Beds and M50 overpass. This small hamlet consists of semi-natural grassland, farmed land and fallow fields, hedges, gardens and semi-natural riverside vegetation. The steep slopes on the north side of Lucan Road behind many of the homes in this area make cultivation difficult (although it was practiced in the past.) (*Unimproved, improved grassland, open glade (woodland edge) and riparian*). *Habitat classifications: FW2, depositing lowland rivers, BC3, tilled land, BC1, arable crops, ED3, recolonising bare ground, GS2, grassy verge, GS1, dry calcareous grassland, WD1, mixed broadleaved woodland, WS1, Scrub WS2, immature woodland. Also present are scattered hedgerows, habitat classification WL1. (Fossitt, 2000)*

Unimproved GRASSLAND (dry calcareous)- Strawberry Beds, just below Knockmaroon Woods, east of the M50. A steep gully ringed with scrub and grassland above a house on Lucan Road.

Woody species

<i>Hedera helix</i>	Ivy	O
* <i>Symphoricarpos albus</i>	Snowberry	VL, A

Herbaceous species

<i>Achillea millefolium</i>	Yarrow	F
<i>Anthriscus sylvestris</i>	Cow-Parsley	O
<i>Centranthus nigra</i>	Knapweed	O
<i>Cirsium arvense</i>	Creeping Thistle	O
<i>Fragaria vesca</i>	Wild Strawberry	F
<i>Fragaria x ananassa</i>	Cultivated Strawberry	VL, F
<i>Galium aperine</i>	Cleavers	O
<i>Galium verum</i>	Lady's Bedstraw	O
<i>Heracleum sphondylium</i>	Hogweed	R
<i>Knautia arvensis</i>	Field Scabious	L F
<i>Lathyrus pratensis</i>	Meadow Vetchling	O
<i>Mendicago lupulina</i>	Black Medick	O
<i>Pimpinella saxifraga</i>	Burnet-saxifrage	O
<i>Primula veris</i>	Oxlip	R
<i>Senecio erucifolius</i>	Hoary Ragwort	R
<i>Succisa pratensis</i>	Devil's-bit Scabious	O-R
<i>Vicia sepium</i>	Bush Vetch	O

Grasses, Sedges and Rushes

<i>Arrhenatherum elatius</i>	False-Oat Grass	F
<i>Brachypodium sylvaticum</i>	False Brome	VA
<i>Bromopsis ramosa</i>	Hairy Brome	O
<i>Carex flacca</i>	Glaucous sedge	A
<i>Dactylis glomerata</i>	Cock's-foot	O

Unimproved GRASSLAND (dry calcareous)-Strawberry Beds, steep slope behind St. Anthony's, west of, and adjacent to M50 overpass.

Woody Species

<i>Crataegus monogyna</i>	Whitethorn	F
<i>Fraxinus excelsior</i>	Ash	F
<i>Malus domestica</i> cv.	Apple (cultivated)	O
<i>Prunus avium</i>	Wild Cherry	A
<i>Rosa canina</i> agg.	Dog Rose	O
<i>Ulmus glabra</i>	Wych Elm	O

Vines

<i>Lonicera periclymenum</i>	Honeysuckle	O
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Herbaceous Species

<i>Agrimonia eupatoria</i>	Agrimony	R
<i>Allium oleraceum</i>	Field Garlic	O
<i>Anacamptis pyramidalis</i>	Pyramidal Orchid	O
<i>Daucus carota</i>	Wild Carrot, Queen Anne's Lace	O
<i>Centranthus nigra</i>	Knapweed	F
<i>Galium verum</i>	Lady's Bedstraw	F
<i>Pilosella</i> sp.	Hawkweed	F
<i>Knautia arvensis</i>	Field Scabious	F
<i>Lathyrus pratensis</i>	Meadow Vetchling	O
<i>Lotus corniculatus</i>	Bird's-foot Trefoil	F
<i>Medicago lupulina</i>	Black Medick	F
<i>Rubus fruticosus</i> agg.	Bramble	A
<i>Rumex sanguineus</i>	Wood Dock	F

<i>*Salvia officinalis</i>	Culinary Sage (relic of cultivation)	L,A
<i>Succisa pratensis</i>	Devil's-Bit Scabious	O
<i>Vicia sativa</i>	Common Vetch	O
<i>Vicia sepia</i>	Bush Vetch	O

Grasses, Rushes and Sedges

<i>Agrostis capillaris</i>	Bent Grass	L,F
<i>Dactylis glomerata</i>	Cock's-foot	F
<i>Bromopsis ramosa</i>	Hairy Brome	V A

Recolonizing BARE GROUND (On steep slope under M50 overpass, and among newly planted trees)

Woody species (all planted)

<i>*Acer platanoides</i>	Norway Maple
<i>Alnus glutinosa</i>	Common Alder
<i>*Alnus cordata</i>	Italian Alder
<i>Betula pendula</i>	Silver Birch
<i>Corylus avellana</i>	Hazel
<i>Crataegus monogyna</i>	Whitethorn
<i>*Fagus sylvatica</i>	Beech
<i>Quercus robur</i>	Pedunculate Oak
<i>#Pinus sylvestris</i>	Scots pine
<i>Prunus avium</i>	Wild Cherry
<i>Prunus spinosa</i>	Blackthorn, Sloe
<i>Sorbus aucuparia</i>	Rowan

Climbers

<i>*Clematis vitalba</i>	Traveller's-joy	A
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Herbaceous species

<i>Anthyllis vulneraria</i>	Kidney Vetch	O
<i>Chrysanthemum segetum</i>	Corn Marigold	F
<i>Cirsium arvense</i>	Creeping Thistle	A
<i>Cirsium vulgare</i>	Spear Thistle	VF
<i>Daucus carota</i>	Wild Carrot, Queen Anne's Lace	F
<i>Dipsacus fullonum</i>	Teasel	O

<i>Epilobium hirsutum</i>	Hairy Willow-Herb	F
<i>Epilobium montanum</i>	Broad-leaved Willow-Herb	O
<i>Galium verum</i>	Lady's Bedstraw	R
<i>Lotus corniculatus</i>	Bird's-foot Trefoil	O
<i>Melilotus officinalis</i>	Melilot	L A
<i>Medicago lupulina</i>	Black Medick	F
* <i>Papaver rhoeas</i>	Corn Poppy	
R		
<i>Petasites hybridus</i>	Butterbur	L
A <i>Plantago lanceolata</i>	Ribwort Plantain	O
<i>Reseda luteola</i>	Weld	F
<i>Rubus fruticosus</i> agg.	Bramble	A
<i>Rumex crispus</i>	Curled Dock	
O		
* <i>Smyrniurn olustratum</i>	Alexanders	O
<i>Tripleurospermum inodorum</i>	Scentless Mayweed	A
<i>Tussilago farfara</i>	Coltsfoot	A

Grasses, Sedges and Rushes

<i>Carex flacca</i>	Glaucous sedge	L A
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APPENDIX II

Soil Analysis Data- Liffey Valley SAAO Area

October 2005

Sample #	pH	Weight of air dried soil (a)	Weight of ignited soil Rep #1	Weight of ignited soil Rep #2	Average weight of ignited soil (b)	% Organic Loss on ignition = (a)-(b)/ (a) x 100	Blank Titre (5.7ml) - Actual Titre = t (ml) of 1N HCl	Concentration of Calcium Carbonate in soil (t x 20g per 100 g of soil)	% Calcium carbonate in soils
1 (WLutr1)	5.16 (avg)*	1.05	0.892	0.881	0.8865	15.57 = 15.6 %	-----	-----	N/A
2 (WLutr2)	7.58	1.05	0.814	1.011	0.9125	13.095 = 13.1 %	0.5	0.10	10 %
3 (WLutr3)	7.36	1.05	0.841	0.830	0.8355	20.43 = 20.4 %	0.1	0.02	2 %
4 (WLutr4)	4.32 (avg)*	1.05	0.900	0.921	0.9105	13.286 = 13.3 %	-----	-----	N/A
14 (LutrRide)	5.78	1.05	0.958	0.951	0.9545	9.095 = 9.1 %	-----	----- ---	N/A
8 (Lutr calc)	8.23 (avg)*	1.05	0.994	.990	0.992	5.5238 = 5.5 %	3.3	0.66	66 %
5 (Lucan CP 1)	8.27	1.05	1.030	0.801	1.0155	3.286 = 3.3 %	2.2	0.44	44 %
6 (Lucan CP 2)	8.15	1.05	1.028	1.022	1.025	2.38 = 2.4 %	2.7	0.54	54 %
7 (Quarry 1)	8.01	1.05	1.009	1.042	1.0255	2.33 = 2.3 %	0.2	0.04	4 %
9 (W01Km) *	7.75	1.05	0.841	0.845	0.843	19.71 = 19.7 %	0.6	0.12	12 %
10 (GS01Km) *	7.64	1.05	0.804	0.853	0.8285	21.095 = 21.1 %	0.6	0.12	12 %
11 (GS02Km) *	7.75	1.05	0.845	0.855	0.8500	19.048 = 19.0 %	0.7	0.14	14 %
12 (W02Km)	6.41	1.05	0.826	0.812	0.8190	22.00 = 22.0 %	----- -	-----	N/ A
13 (GS01SB)	7.85	1.05	0.891	0.889	0.890	15.24 = 15.2 %	1.0	0.20	20 %

15 (W01SC)	7.26	1.051	0.892	---	0.892	15.13 %	---	---	N / A
16 (W02SC)	7.31	1.052	0.888	---	0.888	15.59 %	---	---	N / A
17 (W03SC)	6.90	1.055	0.922	---	0.922	12.61%	---	---	N / A
18 (W04SC)	7.23	1.058 5	0.861	---	0.861	18.66%	---	---	N / A
19 (RW01SC)	7.48	1.055	0.948	---	0.948	10.14 %	---	---	N / A
20 (SWGS01 SC)	7.30	1.056	0.9055	---	0.9055	14.25%	---	---	N / A
21 (SWGS02 SC)	7.72	1.053	0.940	---	0.940	10.73 %	---	---	N / A
22 (SWGS03 SC)	7.29	1.05	0.909	---	0.909	13.43 %	---	---	N / A
23 (SWGS04 SC)	7.78	1.057	0.911	---	0.911	13.81 %	---	---	N / A
24 (RGS01SC)	7.71	1.054	0.979	---	0.979	7.12 %	---	---	N / A

Lutr= samples from Luttrellstown

Km= Knockmaroon

SB= Strawberry Beds

SC= St. Catherine's Park

Lucan CP= Lucan Car Park (ruderal site along Liffey, disused car park?)

Lutr Ride= refers to woodland edge, a ride along a forest track through Luttrellstown

Quarry= site adjacent to Lucan Quarry, along west side of Tinker Hill Rd., near Anna Liffey Mills, random sample

Prefixes:

W= Woodland

GS= Grassland

R= Riparian

(W01Km), (GS02Km) and (GS02Km)* (Nos. 9 and 10) are essentially the same site, one (W01Km) is a sample of the woodland as a whole, while the other two are samples of the grassland within the wood. That they are on the same site is reflected in the nearly identical pH values.

(avg)* denotes variables that were repeated because of unexpected pH values. The mean of the two values is the value used in this case to rule out possible experimental error.

All soil samples were weighed and recorded at room temperature (22.5EC)

Soils were air dried in a warm kiln then sifted through a 2.0 mm. sieve to remove stones. Next, 1.05 grams of each soil sample (2 repetitions) was weighed out in a pre-weighed crucible before being transferred to a furnace, where they were ignited at 500 E C to remove all organic matter. After a cooling period of several hours, the samples were re-weighed and the percent loss of organic matter calculated to give an estimate of the organic content of the soils at the sampled locations.

Soil Descriptions:

Luttrellstown

- 1-WLUTR1- South slope, reddish- brown to tan, friable, lightweight soils, rich in loam (organic matter) and clays.
- 2-WLUTR2- East slope above stream, brown soil, friable, lightweight, loamy clay rich in organics.
- 3-WLUTR3- East slope above stream, brown soil, friable, lightweight and rich in organics (loam)
- 4- WLUTR4- South slope, reddish- brown soil, friable, lightweight, loamy clay.
- 5-LCP1- (Lucan site beside Liffey) Dark brown, almost black, moist soils with clay, and high stone/gravel content.
- 6- LCP2- (Lucan site beside Liffey) Dark brown, almost black, moist soils with clay, and high stone/gravel content.
- 7- Quarry- (taken from lower end of site) Poorly drained, dark brown, almost black, saturated soils with clay and very high stone/gravel content.
- 8-LUTR CALC1- Very pale whitish “chalky” soil (obtained from near limestone outcropping on edge of Luttrellstown golf course). Extremely fine, dry and soft in texture.
- 14-LUTRRIDE- (taken from a south-facing ride in Luttrellstown)- Soil is poor in organic content (very little plant debris, leaf litter, etc) but has more clay and some stone. Heavy, non-friable soil that hardens when dry.

Knockmaroon

- 9-W01KM- (Knockmaroon woods)- dark brownish soil, rich in organic loam as well as macroscopic soil organisms (woodlice, worms, nematodes,etc). Friable soil, with moderate moisture, texture and weight.
- 10-GS01KM (grassy slope within Knockmaroon woods)- from within same site as previous- Dark brownish soil, rich in organic loam as well as macroscopic soil organisms (woodlice, worms, nematodes,etc). Friable soil, with moderate moisture, texture and weight.
- 11-GSO2KM- (grassy slope within Knockmaroon woods)- from within same site as previous- Dark brownish soil, rich in organic loam as well as macroscopic soil organisms (woodlice, worms, nematodes,etc). Friable soil, with moderate moisture, texture and weight.
- 12-W02KM- (east end of Knockmaroon, under deep forest cover)- brown soil with clays, rich in organic loam, friable, with moderate moisture and moderate weight.
- 13-GS01SB- (Strawberry Beds just below Knockmaroon, vegetation exhibits some calcareous elements)- dark brownish soil, rich in organic loam as well as macroscopic soil organisms (woodlice, worms, nematodes,etc). Soil with low moisture, average texture and average weight. Also present are numerous gravel pieces the size of a pea, adding to the freely-drained nature of this soil.

St Catherine's

15-W01SC- (1st woodland quadrat in St Catherine's, west end, top of slope)- "average" brown earth type of soil with some clay, friable, rich in loam

16- W02SC (2nd woodland quadrat in St Catherine's, west of NE road, north end of wood)- "average, brown earth type, friable, rich in loam.

17- W03SC (3rd woodland quadrat in St. Catherine's, east of NE road, south end of wood) - "average" soil with a slight reddish cast to it. Not a great deal of organic matter, but free-draining soil with only a little clay.

18- W04SC (4th woodland quadrat in St Catherine's, west end, mid slope)- "average soil", brown earth type with some clay, rich in loam, supporting geophytes.

19- RW01SC (5th quadrat, riparian wood in St Catherine's, on east bank of Liffey)- Soils are impeded and compacted somewhat. Heavy and rich in clay. Very little loam and leaf litter and ground is bare in many places.

20-GS01SC

21-GS02 SC- (*Arrhenatherum* grassland on circumneutral soils west of conifer stand)- Soils heavy and clayey, 23-GS03SC but free to moderately draining. Grey-brown in color and fairly high in organic matter (ie, decayed grass leaves).

24- RGS01SC- ("Wildflower Meadow") Drainage is impeded and soil is very heavy and clayey. Grey soils with poor organic matter content. Gleys?