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Project	**Tree and woodland survey Greenlink Interconnector - Ireland**		
Client	**ARUP**		
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1. Statement of Authority

The author, Mark Donnelly, holds a BSc. Hons in Forestry from Bangor University, Wales, and is a member of the Institute of Chartered Foresters. He has worked as an arboricultural consultant for the National Trust in Wales for 22 years and as a lecturer in Forest Ecology at Bangor University. In Ireland, he has undertaken a range of arboricultural and ecological surveys for projects including wind farms, quarries, local authorities, housing developments, roads and pipelines. Carl Dixon MSc has 20 years' experience as an ecological consultant and project manager.

2. Report Limitations

The statements, findings and recommendations made within the report do not take into account any effects of extreme climate and weather incidences, vandalism, changes in natural and build environment around the trees after the date of this report nor any damage whether physical, chemical, or otherwise. Mark Donnelly cannot accept any liability in connection with the above factors, nor where recommended tree management is not carried out in accordance with modern tree care techniques.

3. Introduction

This tree survey was carried out along the onshore route of the proposed Greenlink interconnector between Baginbun Beach and Great Island, County Wexford.The survey area can be divided into two types of tree cover: roadside trees and dense woodland, each requiring its own survey methodology and thus these categories are described separately. The purpose of the survey is to identify trees that could be adversely affected by the proposed works, assess these impacts and make recommendations including mitigation to minimise adverse impacts on the trees.

4. Site description

The landscape is described in the Wexford County Development Plan 2013-2019 as *"rolling undulating farmland".* The Hook Peninsula is recognised as a landscape of Greater Sensitivity within the broader coastal landscape.

The landscape is dominated by arable land and pasture, creating a patchwork of fields bounded by stone and earth banks with hedgerows and occasional trees. Trees are generally scarce on the exposed coasts but are more common inland along roads and river valleys.

5. Proposed works

Greenlink is a nominal 500-megawatt subsea and underground cable electricity interconnector between the existing electricity grids in Ireland and Great Britain. This report relates to the onshore route of approximately 23km of buried cables which will be connected to marine cables at the landfall at Baginbun Beach and run to Great Island. The underground cables are generally routed along local roads.

The buried cable comprises two direct current power cables and a fibre optic cable for control purposes. Excavation trenches will generally be approximately 1.5 metres deep and 700 millimetres wide along existing roads.

At the Campile Estuary it is proposed that a horizontal directional drill (HDD) will pass under the estuary and woodland at a depth of >10m. An overview of the route is provided in **Figure 1.**

Figure 1: Cable Route and Locations of Construction Compounds (indicated thus ● | background mapping from Bing © Microsoft 2020)

6. Methodology

The site was surveyed on the 24th May and 2ndJune, 2019, covering roadside trees and woodland across the extent of the proposed development.

6.1 Roadside Trees

The overland route from Baginbun Head to within 110m of Dunbrody Bridge, is approximately 19.8km and runs primarily along public roads. All trees within 3m of the road surface edge were included and recorded as either individual trees or as groups. The latter was defined as where more than one tree is in close proximity and not necessarily the same species. Their GPS coordinates were recorded and locations mapped. Maps are included as **Attachment A.**

6.2 Woodland

There is a strip of mature woodland north of the Campile River Estuary adjacent to Dunbrody Bridge. Many of the trees were established during estate planting in the early 19th century creating a Mixed Broadleaved Woodland (WD1). However, it retains some characteristics of a semi-natural, oak-birch-holly woodland (WN1) which probably existed on this prior to the 19th century planting.

The woodland occupies a steep, sheltered slope, facing south east and running down to the high-water mark. It is classified as a mixed broadleaved and conifer plantation. An area of approximately 60m x 40m was surveyed in detail, with all individual trees recorded and

numbered with consecutive plastic tags (01181-01932). GPS coordinates were recorded for each tree. The woodland survey area is shown below in **Figure 2.**

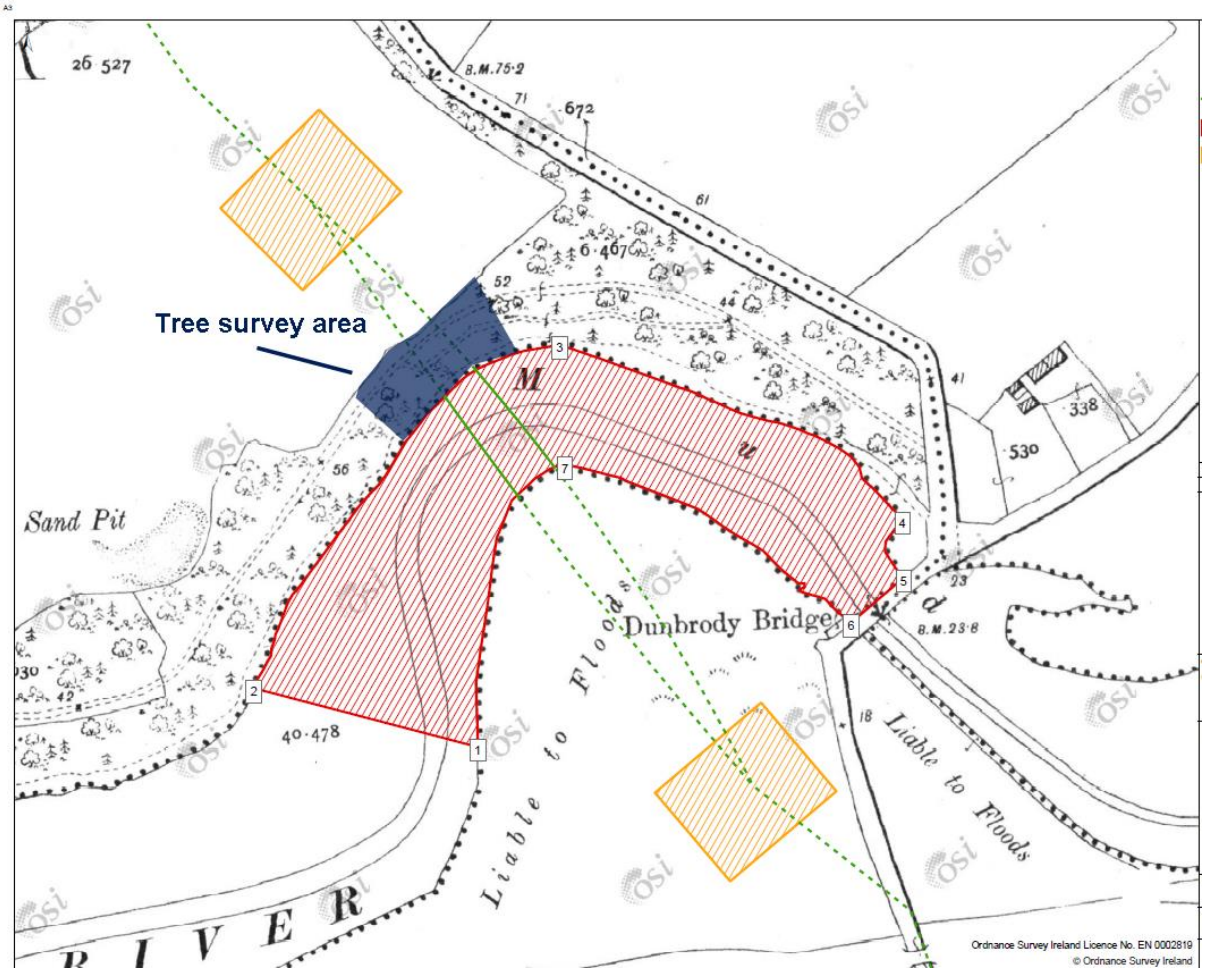


Figure 2 Tree Survey Area | not to scale

6.2.1 Survey Key

The survey key utilised for the survey, which is based on the guidelines outlined in the British Standard *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations* as detailed below in **Table 1.**

Table 1 Survey Report Key

Column 1	Reference number	Individual and groups of trees identified on location maps.
Column 2	Coordinates	Irish Grid Reference Coordinates
Column 3	Species	Lists species
Column 4	Age	IM - An immature tree – greater than 150 mm diameter but regarded as a sapling SM - Semi mature – a young tree but less than 50 % of its ultimate size M - Mature – a tree having attained dimensions typical of a fully-grown specimen of its species

		OM -Over Mature – an old specimen of a species showing signs of decline in health. Usual symptoms include crown starting to break up and decreasing in size.
Column 5	Girth (mm)	Stem diameter (at approximately 1.3 m above ground) in mm
Column 6	Height (m)	Tree height in metres
Column 7	Spread	Approximate tree canopy spread in meters.
Column 8	Roadside location	Tree located on either left (L) or right (R) of road travelling north from Baginbun Beach.
Column 9	Condition	Good -Full healthy canopy with good form and health Fair - A specimen whose overall condition is typical of the site and may exhibit slightly reduced leaf cover/minor deadwood or may be predisposed to defects, e.g. Coppiced growth, but otherwise in good health. Poor - A specimen which through defect or disease has a limited longevity or may be unsafe.
Column 10	Group or individual	Recorded as growing in a group or as an individual tree.
Column 12	Comments	Any information relating to trees condition not covered previously and recommendation for removal/retention.
Column 13	Priority	1.An individual tree or group of trees that are prominent visually and/ or culturally in the landscape, may be of high biodiversity value, healthy and likely to contribute to the amenity of the location for the long term, 15-60 years. 2.An individual or group of trees that are in poor condition and unlikely to contribute to the amenity of its locality beyond the short to medium term, i.e. up to 15 years.

6.2.3 Root Protection Area

The Root Protection Area is the radius measured from the tree centre in metres. The RPA is the minimum radial range of tree protection necessary to safeguard tree roots and would normally be the same as the “Construction Exclusion Zone” enclosed by fencing during construction. The RPA is calculated as follows:

Single stem tree: RPA radius = stem diameter x 12 (See Root Protection Area, Table 2)

Trees with more than one stem arising below 1.50 m above ground level: RPA radius = equivalent resultant combined stem diameter for multi-stemmed trees.

Table 2 Root Protection Areas

Single stem diameter mm	Radius of nominal circle m	RPA m2	Single stem diameter mm	Radius of nominal circle m	RPA m2
75	0.90	3	675	8.10	206
100	1.20	5	700	8.40	222
125	1.50	7	725	8.70	238
150	1.80	10	750	9.0	255
175	2.10	14	775	9.30	272
200	2.40	18	800	9.60	290
225	2.70	23	825	9.90	308
250	3.0	28	850	10.20	327
275	3.30	34	875	10.50	346
300	3.60	41	900	10.80	366
325	3.90	48	925	11.10	387
350	4.20	55	950	11.40	408
375	4.50	64	975	11.70	430
400	4.80	72	1000	12.0	452
425	5.10	81	1025	12.30	475
450	5.40	92	1050	12.60	499
475	5.70	102	1075	12.90	519
500	6.0	113	1100	13.20	547
525	6.30	124	1125	13.50	573
550	6.60	137	1150	13.80	598
575	6.90	150	1175	14.10	625
600	7.20	163	1200	14.40	652
625	7.50	177	1225	14.70	679
650	7.80	191	1250	15.0	707

7. Results - Details of individual trees

Individual trees and their characteristics are detailed below in **Table 3.** The root protection areas (RPAs) for relevant trees are listed in **Table 4.**

Table 3: Individual Trees and Their Characteristics

Reference number	Coordinates		Species	Age	Girth (mm)	Height (m)	Spread (m)	Side of road L/R	Condition	Group or individual	Comments	Priority
1.	52.171069	-6.863578	Ash 20+	SM	<400	5	3	L	Fair	Group	Unmanaged hedge Windswept	2
2.	52.174282	-6.868831	Sycamore	SM	250	4	5	R	Fair		In cottage garden	2
3.	52.177299	-6.87649	Ash, Sycamore	SM	>300	9	15	L	Good	Group	10 trees	1
4.	52.177489	-6.876557	Ash, Sycamore	M	400	9	10	L	Fair	Group	10 trees Adjacent to ruin	2
5.	52.17758	-6.877332	Sycamore	M	350	9	5	R	Good		Garden hedgerow	1
6.	52.178069	-6.880454	Willow	M	300	11	5	R	Fair		Garden Unstable	2
7.	52.179027	-6.882909	Ash, Elm	SM	300	5	5	R	Good	Group	Mature hedge of 10+ trees (Sitka spruce, Lodgepole pine)	1
8.	52.179199	-6.885985	Conifers	M	300	11	10	R	Fair	Group		2
9.	52.179677	-6.886928	Sycamore	SM	250	8	8	R	Good	Group	8 trees	1

Reference number	Coordinates		Species	Age	Girth (mm)	Height (m)	Spread (m)	Side of road L/R	Condition	Group or individual	Comments	Priority
10.	52.179779	-6.887016	Willow	SM	250	7	3	L	Fair		White willow	2
11.	52.180684	-6.890212	Ash, Sycamore	SM	300	10	6	R	Good	Group		1
12.	52.180684	-6.890212	Sycamore	SM	350	9	6	L	Good	Group	Sycamore and *Macrocarpa sp.*	2
13.	52.189247	-6.896259	Ash	SM	300	6	4	R	Fair			2
14.	52.206871	-6.89709	Elm, Ash	SM	250	7	6	R	Fair	Group		1
15.	52.21093	-6.898017	Ash, Sycamore	SM	350	9	10	R	Good	Group	13 trees– planted Garden	1
16.	52.212212	-6.89857	Ash	SM	300	10	8	R	Good	Group	10+ trees	1
17.	52.213962	-6.899098	Conifer	M	800	13	12	R	Good	Group	3 x Sittka Spruce 5 x Monterey Cypress	1
18.	52.215853	-6.89984	Ash	M	300	8	5	R	Good	Group	2 trees	1
19.	52.217037	-6.900361	Conifers	M	400	12	7	R	Fair	Group	2 trees, Scots Pine, Sittka Spruce	2
20.	52.22104	-6.902486	Mixed	M	600	12	12	L	Fair/Good	Group	Horse Chestnut, Monterey Pine, Ash, Sycamore	1 / 2
21.	52.22104	-6.902486	Ash	SM	300	6	9	L	Good	Group	Overgrown hedge	1
22.	52.222511	-6.902148	Ash, Sycamore	SM	250	8	5	R	Good	Group	Includes, XX Oak Garden	1

Reference number	Coordinates		Species	Age	Girth (mm)	Height (m)	Spread (m)	Side of road L/R	Condition	Group or individual	Comments	Priority
23.	52.225191	-6.902004	Ash, Sycamore	SM	250	10	5	R	Good	Group	Woodland Edge	1
24.	52.237033	-6.907498	Beech, Sycamore	M	600	12	10	R	Good	Group	25+ trees planted	1
25.	52.242353	-6.907855	Ash, Sycamore	M	400	13	9	R	Fair	Group	Old Hedgerows	2
26.	52.242353	-6.907855	Ash, Sycamore	M	450	12	10	L	Fair	Group	Old Hedgerows	2
27.	52.244632	-6.912054	Sycamore	SM	350	9	8	L	Good	Group	2 Groups Former Hedgerows	1
28.	52.244739	-6.913342	Cypress	M	400	12	4	R	Good		Monterey 2. and Leyland Cypress	1
29.	52.24486	-6.915556	Ash, Alder, Aspen, Black Poplar	IM	200	6	4	2.R	Good	Group	50+ trees 5mfrom road outside school etc.	1
30.	52.245048	-6.917545	Ash	M	600	13	8	L	Good		Fine Tree	
31.	52.245905	-6.922647	Mixed	M	400	14	8	R	Good	Group	Scots Pine, Ash, Sycamore	1
32.	52.245147	-6.93001	Ash	SM	35O	10	9	L	Good	Group	Overgrown hedge	1
33.	52.2145616	-6.930179	Ash, Sycamore	SM	350	10	9	R	Good	Group	Overgrown hedge	1
34.	52.253375	-6.934321	Ash	SM	250	7	4	L	Good	Group	Garden Hedge	1
35.	52.25524	-6.93571	Ash	M	400	9	5	R	Good	Group	2 Trees	1
36.	52.257041	-6.937441	Sycamore	SM	300	9	5	R	Good	Fair		2

Reference number	Coordinates		Species	Age	Girth (mm)	Height (m)	Spread (m)	Side of road L/R	Condition	Group or individual	Comments	Priority
			Sitka Spruce									
37.	52.258325	-6.939413	Ash	M	500	13	8	R	Good		Priority Tree	1
38.	52.259619	-6.94111	Ash, Elm	SM	250	10	5	L	Fair	Group	Overgrown hedge	2
39.	52.263667	-6.944571	Ash, sycamore	IM	200	8	4	L	Fair	Group	Overgrown hedge	2
40.	52.264655	-6.945355	Ash, Sycamore	SM	450	11	8	R	Good	Group	Notable oak	1
41.	52.265484	-6.945626	Sycamore	SM	400	12	5	L	Fair		Multi-stemmed	2
42.	52.26642	-6.946148	Ash, Sycamore	IM	250	8	5	L	Fair	Group	Overgrown hedge (Garden)	2
43.	52.266856	-6.946557	Sycamore	M	450	12	6	R	Fair			1
44.	52.272329	-6.951953	Evergreen Larch, Sitka Spruce	M	400	16	6	R	Fair	Group	Mature Trees, prominent	1
45.	52.274643	-6.952616	Turkey Oak	SM	300	15	5	R	Good	Group	Overgrown hedge	2
46.	52.2758	-6.953127	Sycamore	SM	200	10	5	L	Fair	Group	Old quarry	1
47.	52.277585	-6.955351	Ash, Sycamore	IM	250	11	5	L	Fair	Group		
48.	52.278955	-6.956817	Sycamore	SM	400	11	8	L	Good		Prominent tree	1
49.	52.279496	-6.957515	Lawsons	M	300	10		L	Good	Group	Garden hedge	1
50.	52.280023	-6.957926	Ash	SM	300	8	4		Fair		Overgrown hedge	2

Table 4 Root protection areas for Priority 1 individual trees and groups of trees

No.	Coordinates		Species	R.P.A (m)
3	52.177299	-6.87649	Ash, Sycamore	3.6
5	52.17758	-6.877332	Sycamore	4.2
7	52.179027	-6.882909	Ash, Elm	3.6
9	52.179677	-6.886928	Sycamore	3
12	52.180684	-6.890212	Ash, Sycamore	4.2
14	52.206871	-6.89709	Elm, Ash	3
15	52.21093	-6.898017	Ash, Sycamore	4.2
16	52.212212	-6.89857	Ash	3.6
17	52.213962	-6.899098	Conifer	9.6
18	52.215853	-6.89984	Ash	3.6
20	52.217037	-6.900361	Mixed	3.6
21	52.22104	-6.902486	Ash	3.6
22	52.222511	-6.902148	Ash, Sycamore	3.0
23	52.225191	-6.902004	Ash, Sycamore	3.0
24	52.237033	-6.907498	Beech, Sycamore	7.2
27	52.244632	-6.912054	Sycamore	4.2
28	52.244739	-6.913342	Cypress	4.8
29	52.24486	-6.915556	Ash, Alder, Aspen, Black Poplar	2.4
30	52.245048	-6.917545	Ash	7.2
31	52.245905	-6.922647	Mixed	4.8
32	52.245147	-6.93001	Ash	4.2
33	52.2145616	-6.930179	Ash, Sycamore	4.2
34	52.253375	-6.934321	Ash, Cypress	3.0
35	52.25524	-6.93571	Ash	4.8
37	52.258325	-6.939413	Ash	6.0
40	52.264655	-6.945355	Ash, Sycamore	5.4
43	52.266856	-6.946557	Sycamore	5.4
44	52.272329	-6.951953	Evergreen Larch, Sitka Spruce	4.8
45	52.274643	-6.952616	Sycamore	2.4
47	52.277585	-6.955351	Ash, Sycamore	3.0
48	52.278955	-6.956817	Sycamore	4.8
49	52.279496	-6.957515	Lawsons	3.6

7. Conclusions and recommendations

7.1 Woodland at Campile

The woodland occupies a steep, sheltered slope, facing south east and running down to the high-water mark. It is classified as a mixed broadleaved/ conifer plantation. An area of approximately 60m x 40m was surveyed in detail. The underlining soil substrate is free draining shale and drift with brown earth on the woodland floor.

The extent of the surveyed woodland is 0.79ha in size and supports 52 trees. Approximately 40% of the trees are oak and 50% of these oak trees are mature. Approximately 10% of the

trees consist of mature Scots Pine and European Larch. The remaining percentage (50%) consists of birch, sycamore and ash and these are predominantly immature trees.

The extent of root growth depends on species and the soil/substrate. Factors that influence the latter include compaction, subsoil structure and depth and bedrock. Examination of trees uprooted by wind in the locality and on a similar substrate, indicates that tree rooting is shallow and of horizontal orientation.

Oak is a deep rooting species that naturally develops a tap root. This tap root would generally extend to approximately 1-2m in depth. At Campile, the root depth is considerably less and most roots for oak and for the other species recorded within the woodland would be located within 0.5 m of the surface due to the prevailing ground conditions.

The proposed HDD under the Campile Estuary and woodland, at a minimum depth of 10m, and the associated temporary construction compounds will not interfere with tree roots and thus will not adversely affect tree health and stability. However, tree health can be affected by damage to trees within the Root Protection Areas (RPA). An extended buffer zone of 50m will be provided to ensure there is no loss of adjacent trees which protect the surveyed area from the risk of wind damage.

It is noted that some of the surveyed trees, particularly mature trees with cavities, rough bark and dead wood are suitable as roosts and breeding sites for bats. A preliminary ground level roost assessment was carried out to identify, from ground level in daylight using close-focusing binoculars, any potential roost features (PRF) within trees or structures that had suitability to support roosting bats. The results were used to grade trees as having Negligible, Low, Moderate, or High suitability for roosting bats in accordance with Bat Conservation Trust guidelines (Collins, 2016). The trees detailed within **Table 5** were identified as being of high suitability for bats, however in the absence of any impact on this woodland, there will be no adverse effects on roosting sites or feeding/commuting habitat for bats.

Table 5. Trees of high suitability for bat surveys

Tree No.	Species	Coordinates	
01881	Mature Scots Pine	52.17.1424	6.57.3253
01888	Mature Sessile Oak	52.17.133836	6.57.329364
01898	Mature Scots Pine	52.17.133188	6.57.346068

7.2 Roadside trees

There is a relatively low population of roadside trees along the proposed cable route compared to other agricultural landscapes in Wexford, particularly in the sections of the route with high levels of exposure to coastal winds with high salt levels. Fifty individual trees/groups of trees were identified along the proposed cable route. It is noted that over 50% of the trees along the route are ash which are susceptible to ash die-back disease and there is a strong probability that these trees will be infected in the short-term. It is also noted that there are large numbers of immature elm along the roadsides and Dutch elm disease, which is endemic in Ireland, will prevent them from reaching maturity.

Excavations within the road surface or within the road verges have the potential to damage existing tree roots within the root protection area. The R.P.A is an exclusion zone around the trees within which excavation and related activities, including material and machinery storage would ideally not take place

The RPA for each tree/group of Priority 1 trees is provided in **Table 4.** However, root structure is influenced by the surrounding environment, in particular soil structure. In reality the exact RPA will vary according to species, soil/substrate characteristics, watertable and surrounding land use.

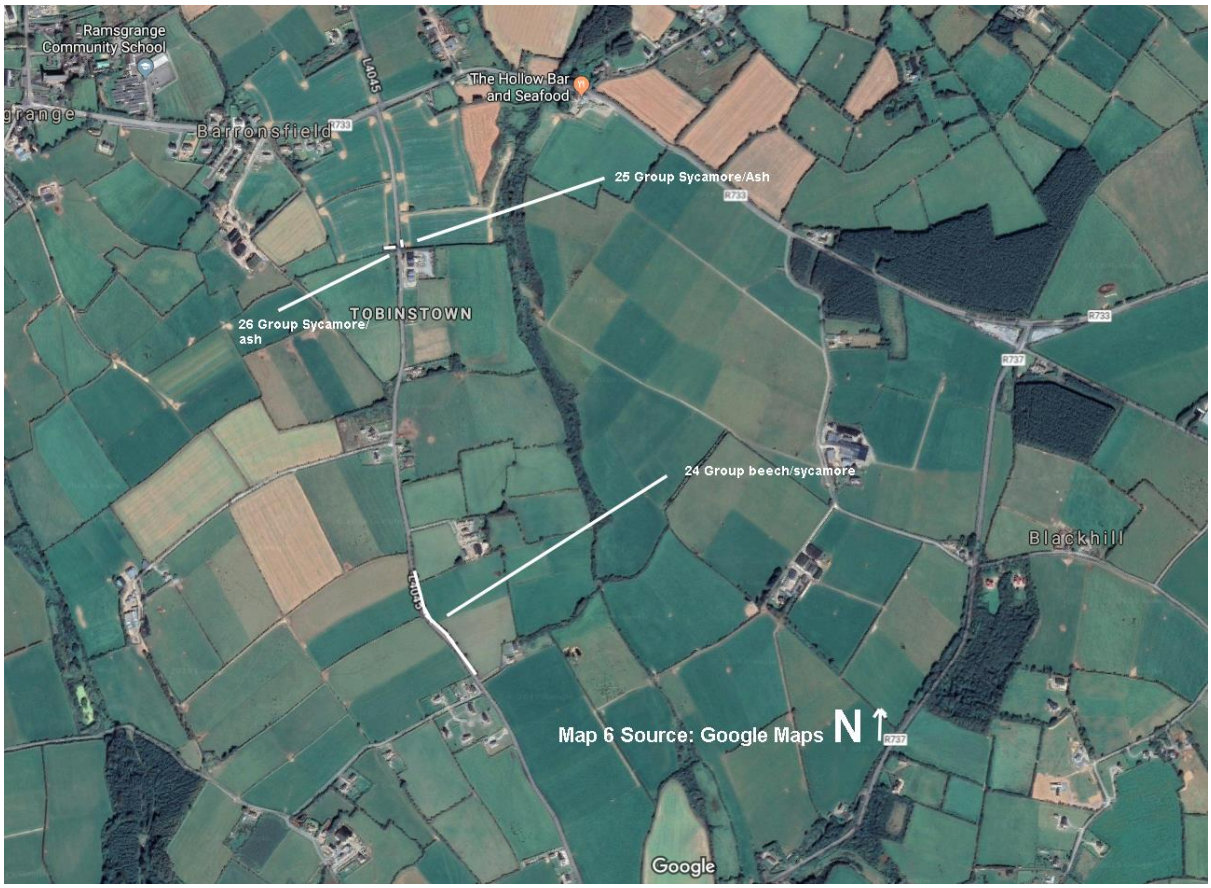
Of particular relevance to this survey is the influence of soil compaction and hard surfaces on trees growing alongside roads. Generally, these trees will respond naturally by producing deeper roots or by sending roots in alternative directions, which will mitigate against damage from excavations in the road within the normal RPA. However, for all trees recorded the excavations should be located as far as possible from the tree to minimise the potential for impacts. For Priority 1 trees (table 4) particular attention will be paid to protecting the RPA's and where the excavations cannot be rerouted to the opposite side of the road, the supervising aboriculturalist will assess if there is a requirement for remedial tree surgery, for example crown reduction, post works, to improve the tree's survival in the long term.

Attachment A Mapping

Map 3 Source: Google Maps


Booley Bay
L4045
L4045
13 Group Ash/
Sycamore
14 Group Ash/Elm
Map 4 Source: Google Maps
N
Google


Wallace
Valley View
20 Group Pine/Horse Chestnut/Ash Sycamore
21 Group Ash
L4045
L4045
L4045
L4045
Concas
22 Group Oak/Ash/ sycamore
23 Group ash/sycamore
18 Group Ash
19 Group Pine/Sitka Spruce
17 Group Sitka Spruce/Cypress
16 Group Ash
Map 5 Source Google Maps
N
Google


Ramsgrange Community School
L4045
The Hollow Bar and Seafood
Barronsfield
25 Group Sycamore/Ash
26 Group Sycamore/ ash
TOBINSTOWN
24 Group beech/sycamore
Blackhill
Map 6 Source: Google Maps
N
Google


Grange Lawn
33 group ash/sycamore
31 group pine/ash/s sycamore
29 group ash/ alder/ aspen/black poplar
28 group cypress
32 group alder/ ash
Ramsgrange National School
Ramsgrange Community School
Ramsgrange
Barronsfield
Suttons Cross
R733
30 ash
27 group sycamore
Map 7 Source: Google Maps
N
Google


34 group Monterey Cypress/ash
37 ash
36 group sitka/sycamore
35 group ash
Map 8 Source: Google Maps
N
Google


42 group ash/sycamore
41 sycamore
40 group ash/sycamore/oak
43 sycamore
39 ash/sycamore/
38 group ash/elm
37 ash
Map 9 Source: Google Maps
N


River Suir
49 Lawsons Cypress
50 group Ash
48 sycamore
Dunbrody Abbey
47 Ash, Sycamore
R733
Dunbrody Abbey
Visitor centre
R733
46 group sycamore
45 Turkey Oak
R733
44 group
E. Larch
Sitka Spruce
Map 10 Source: Google Maps
N