



General Condition Tree Survey of *Picea abies* – Norway spruce.

Prepared For:
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9th July 2026

Prepared by:

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1 Introduction

- 1.1 **Instruction:** I am instructed by Enda Farrell, of the Parks Department on behalf of Galway City Council to carry out a general tree condition survey of 3.5-hectares of commercial forestry consisting of *Picea abies* (Norway Spruce). This section is a small part of the original 33 hectares that were established in the 1960's by the State Forestry Department. The survey will not detail individual trees but the forest as a whole. The survey was raised due to concerns regarding the structural integrity of the trees after storm Eoghan, which occurred on January 25th, 2025.
- 1.2 **Qualifications and experience:** This report is based on my site observations and any provided information, interpreted in the context of my experience. I have 25 years' experience in forestry and arboriculture and 4 years as a practising consultant. I have a Diploma in arboriculture and a Professional Tree Inspection certification; further qualifications can be reviewed at www.beithtreeconsultancy.ie.
- 1.3 **Documents and information provided:** Arial view of area marked up from Google maps.
- 1.4 **Methodology:** The survey focusses on determining whether any trees have the potential to fail (in whole or part) and cause harm within the survey period.
All preliminary assessments of trees on site are surveyed using the Lonesdale approach (RIDER), recognising defects, interpretation, detailed assessment (when required), evaluation and a recommendation of options. (Lonesdale. D. 1999). This procedure is linked to Visual Tree Assessment (VTA - ICED) Identify, Confirm, Evaluate and make a Decision on failure criteria if required. (Mattheck & Breloer 1994). Only trees with critical defects¹ receive further inspection and are recorded in the Survey Schedule. Only information relevant to the decision-making process is collected. (negative recording) A separate note is recorded if further investigations are required. Failure criteria used will be from static integrated assessment approach using wind load, cross-sectional geometry and wood material. (L. Wessolly and M. Erb).
At the surveyor's discretion trees without critical defects may also be recorded. Reasons for recording these trees generally include tree prominence and their proximity to potential targets.
The approximate location of recorded trees is also plotted on the Tree Location Plan. The level of risk posed by the recorded trees, to people or property, is considered and used to guide recommendations for any risk control measures. See Appendix 3 for further detail.
- 1.5 **Report limitations:** Where there is restricted access to the base of a tree, its attributes are assessed from the nearest point of access. My observations were limited to symptoms and defects visible from positions on the ground and climbing inspections are not carried out during a walkover tree survey. Where heavy ivy is present, tree condition is assessed from what can be seen from the ground.
This report is valid for **2 years** from the date of my survey but excludes deliberate or accidental harm, severe weather conditions, pests and diseases which can all effect rapid change to the condition of trees. In addition, changes to the site layout or its use following my survey may invalidate my assessment of tree risk.
All dimensions are estimated unless otherwise indicated.

¹ A critical defect is a defect compromising the tree's structural integrity, rendering it more likely to fail.



2 Site Visit

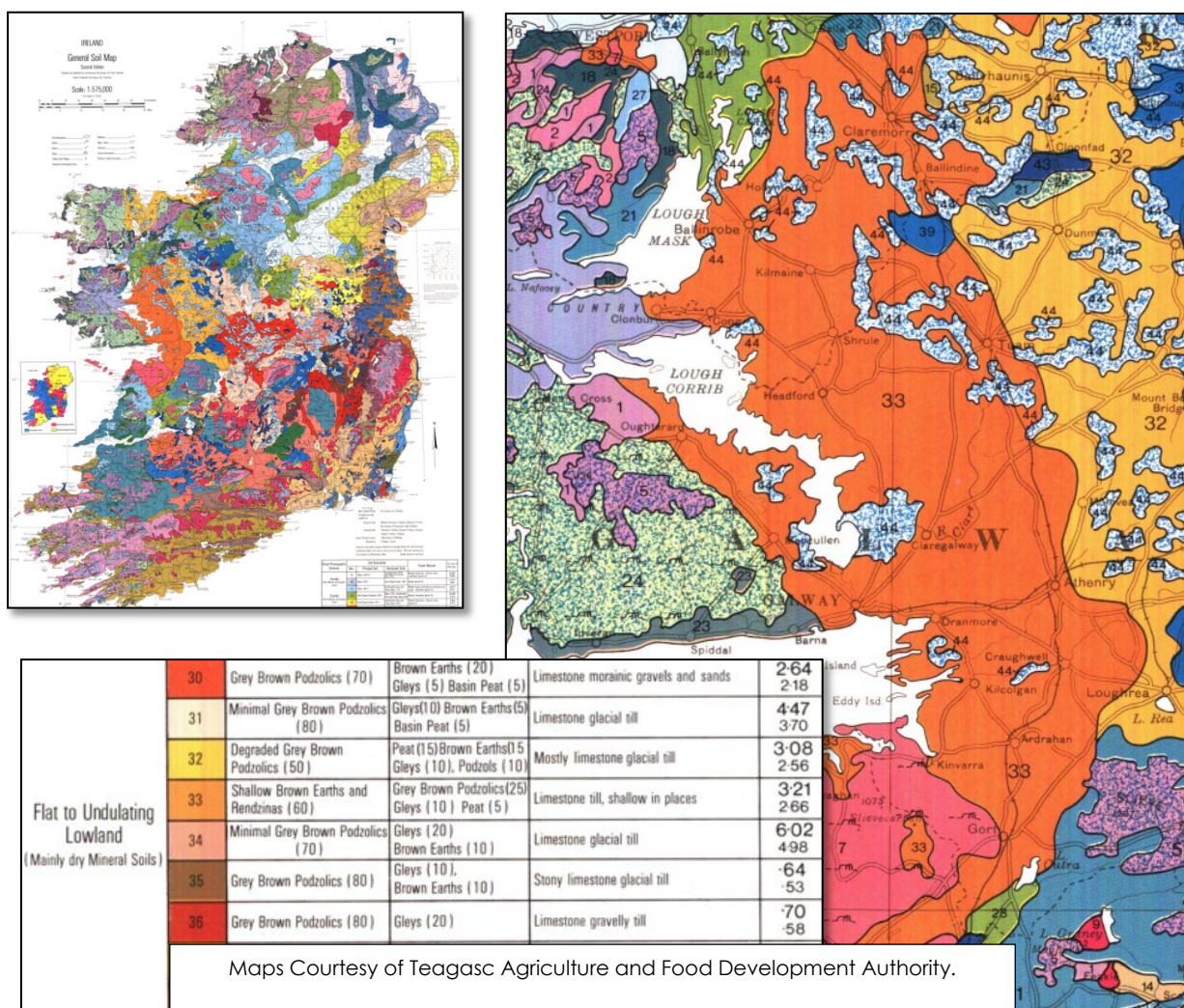
2.1 **Site visit:** I carried out my site visit on Tuesday the 7th July 2026. All my observations were from ground level and did not include invasive investigations. The weather at the time of my survey was warm, bright spells with cloud but with good visibility, enabling clear observation of the trees.

2.2 Site description:

Historically, Merlin Park Woods and The Merlin Park Hospital occupy the former Waithman Estate. The State Forestry Department purchased the estate in 1945 and planted 146 acres of mainly *Picea abies* (Norway spruce) in the north wood in the 1960's as a commercial crop, however this has not been managed commercially for many years. (Galway City Biodiversity). More recently the Parks Department of Galway City Council have been managing the north wood in Merlin Park Woods.

Merlin Park Woods is approximately 4.8km east of Eyre Square in Galway City, 1.4km from the shoreline to the south and sits 34m above sea level.

General Soil Maps

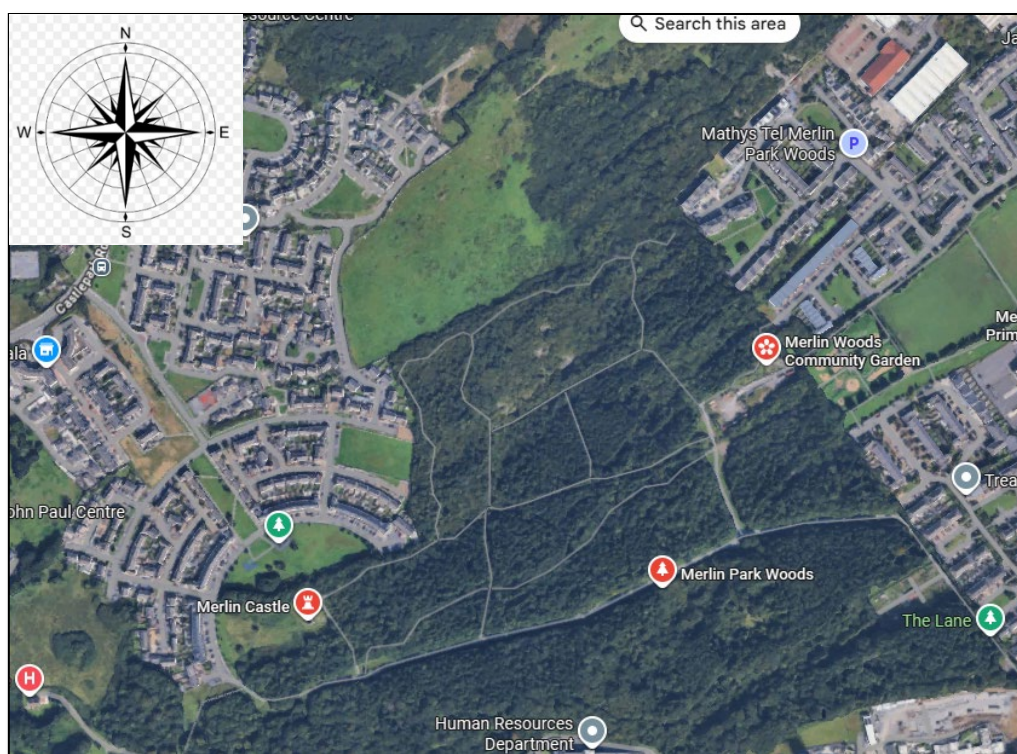


Merlin Park woods are in section 33 indicated on the map above colour coded in orange, this is an area indicated to contain shallow brown earth over limestone rock.



The north wood is bordered by residential properties and public infrastructure. These include Doughhiska to the eastern aspect which includes extensive leisure facilities such as a skatepark, astro pitches, grass soccer pitches, a playground and the Merlin Woods Community Garden. While on the northwestern and western aspect is Castlepark and Ballybane residential areas, providing an estimated population of in region of 30,000 people living in the proximity. To the south is Merlin Park Hospital.

The north wood in Merlin Park is an important urban woodland park and supports a vast number of recreational leisure activities such orienteering, running, cycling, walking, dog walkers etc for individuals and families as well as supporting a variety of community events the wood provides a commuter corridor for work and school. This is widely due to an extensive network of access routes, from 4m wide gravelled pathways, 2m wide gravel pathways to narrow compacted pathways (without gravel) and desire lines throughout the woodland.



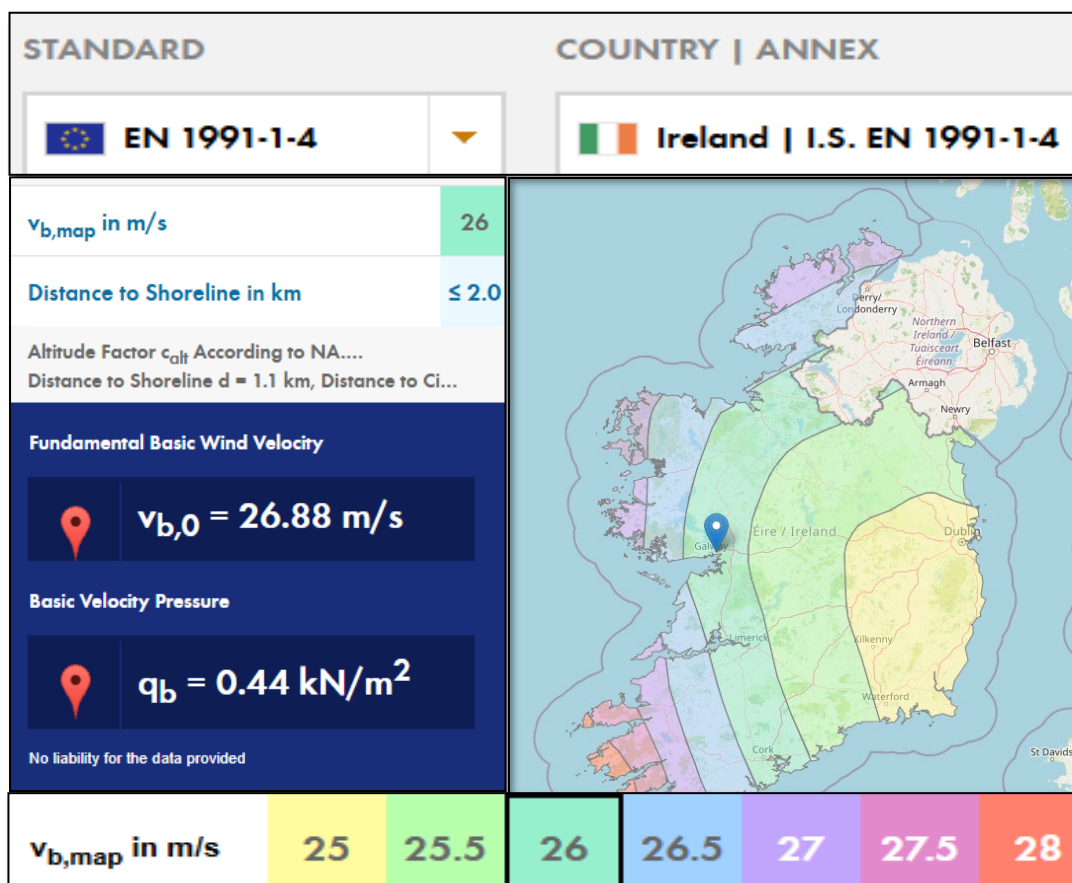
Arial view of the North Wood in Merlin Park Woods.

- 2.3 **Presence of Tree Preservation Orders (TPO) or Conservation Area Designation:** The trees are not covered by a TPO and are not located in a recognised conservation area. However, the north wood in Merlin Woods is part of the Galway City Council Biodiversity Action Plan and contains heritage features.

3 Observations and Survey Results

- 3.1 **Tree observations:** Trees receiving closer inspection during my survey are recorded on the schedules included as Appendix 1, together with any risk control recommendations.
- 3.2 **Identification and location of the trees:** The approximate location of recorded trees is shown on the Tree Location Plan included as Appendix 2.

Wind Speed Maps for Merlin Park Woods.

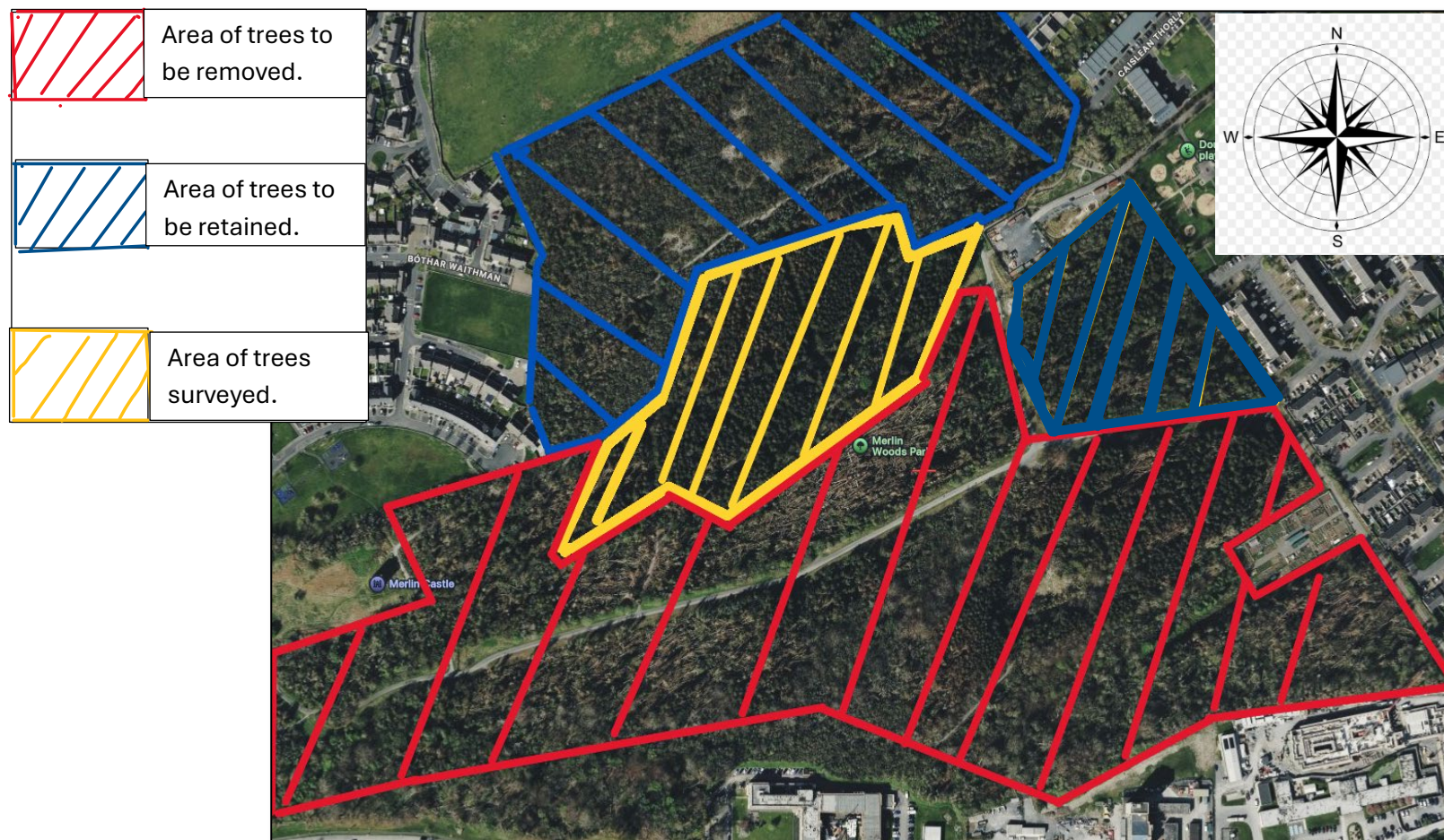


4 Implementation of Intervention Works

- 4.1 **Standards of work:** All tree works should be carried out to BS 3998 *Recommendations for Tree Work* as modified by more recent research. It is advisable to select a contractor that is suitably qualified with references.
- 4.2 **Trees subject to statutory controls:** If trees are covered by a Tree Preservation Order (TPO) or located in a conservation area, it will be necessary to consult the Local Planning Authority (LPA) before any works, other than certain exemptions, can be carried out. The works specified in the schedule are necessary for reasonable management and should be acceptable to the LPA. However, tree owners should appreciate that the LPA may take an alternative point of view and have the option to refuse consent.
- 4.3 **Statutory wildlife obligations:** The Wildlife Act 1976 as amended by the Wildlife (Amendment) Act 2000, 2010, 2012 provides statutory protection to birds, bats and other species that inhabit trees. All tree work operations are covered by these provisions and advice from an ecologist must be obtained before undertaking any works that might constitute an offence.

Area to be surveyed

The 3.5 hectares of forest to be surveyed in the north wood are indicated in Yellow on the map below. The area is predominantly coniferous woodland consisting of *Picea abies* – Norway spruce.



Arial view of the 3.5 hectares to be surveyed in the north wood, map provided by Galway City Council Parks Department.



Evaluation of *Picea abies* – Norway spruce

Norway spruce is a coniferous species native to central and southern Europe with a wide distribution across eastern and northern Europe but introduced into Ireland around the 1500's. This species accounts for almost 4% of the forest area (NFI 2017) and is the third most commonly planted forest conifer in Ireland. The timber is widely used in the building industry as structural timber and joinery known as white deal.

Strengths

- Long lived species reaching 200 - 400 years in its natural range or much longer as a clone.
- Popular on sites prone to early or late frosts common in the midlands of Ireland.
- Valuable commercial timber crop for the building industry.
- Supports pine martin and red squirrel populations and several invertebrate species.
- Coniferous, providing year-round shelter.
- An accommodating species growing on a wide variety of soil mediums.

Weaknesses

- Non-native thought to be introduced to Ireland in the 1500's.
- Spruce has a shallow root system, so are vulnerable to windthrow, especially in pure dense stands when shelter is removed.
- *Picea abies* (Norway spruce) is generally not suitable for exposed coastal regions in Ireland. While highly popular in the Irish midlands, it lacks the necessary tolerance for the strong, salt-laden Atlantic gales common to the west coast (including Co. Galway). (Ted Horgan, 2003)
- Fire tolerance is very poor.
- Susceptible to *Hylobius abietis* L. – Large Pine Weevil. Considered ubiquitous across commercial conifer plantations across Ireland.
- In Europe, and England, the larger eight toothed European spruce bark beetle *Ips typographus* is a significant pest. Although not present in Ireland any suspected sighting should be reported to DAFM to plantandpests@agriculture.gov.ie.
- Susceptible to the parasitic fungi *Armillaria mellea* and *Heterobasidion annosum*.

Conclusion

Historically, *Picea abies* has been widely planted in commercial forests across Ireland but suffered some decline as Sitka Spruce – *Picea sitchensis* proved to have superior productivity and greater tolerance to exposure. However, in a changing climate, Norway spruce's ability to withstand drier conditions and suitability for growing in mixtures mean that it is of increasing interest. (Research)

Survey Schedule:

Site: Merlin Park Woods, 3.5h of Picea abies in the North Wood.

Surveyed by: Drew Bardell DipArbL4 'TechArborA'.

Survey period: 2 years

Date of survey: 7th July 2026.

Weather: Overcast, sunny periods with good visibility.

Survey Start time: 11:00am **Survey end time:** 15:10pm

Target Information	
Site use	Busy Urban Woodland Park used for commuters', schools run, and leisure activities
Visitor numbers	No official figures. However, dense residential population in the surrounding area. Circa 30,000 people.
Visitor concentrations	Peak commute hours, weekends and evenings.
Notes	Extensive storm damage in the area.

Observations

The stand of trees to be inspected are mature *Picea abies* – Norway Spruce, the trees range in height from 20-25m tall. There has been severe storm damage to the south of the stand where a large area of trees have been windblown, approximately 17.5 hectares being affected. These trees are planned to be harvested. There is also significant storm damage within the 3.5-hectare survey area. While, Galway City Council Parks Department have cleared the trees directly affecting passage along most of the footpaths post storm Eowyn there is still sections of footpath with trees partially windblown leaning toward footpaths and a section of footpath closed due to the volume of trees that require mechanical removal.

Areas where there is a wider formal path, 4m wide, the stand is bordered by a variety of broadleaf tree species ranging in age. Where the canopy of the stand has been opened by historic tree failure there is an increase in ground flora, including tree saplings, as light reaches ground level.

Notably, there is a stream/drain running along the southern aspect of this 3.5-hectare area. The stream/drain enters the eastern aspect from Doughiska between two of the formal pathways, that are 2m wide gravel, at reference post 52 on the tree location map. This stream/drain travels the full length of the area to be surveyed on the northern aspect of the lower of these two pathways exiting the survey area close to reference point 10 at the bridge to the southeast.

Reference points used below are visible on the tree location map.

Specific targets: Users of the formal footpaths and desire lines within and around the 3.5 hectares in the north woods.

Key: **RED** – High risk storm damage.

Blue – Moderate risk storm damage.

Grey – Low risk storm damage.

Species	Comments	Risk of harm:	Recommendation?	Within what timeframe?
Ref 01	Top of windblown <i>Picea abies</i> obstructing footpath at eye level between 0.5 and 2m above ground level. Obstruction is 1.5m into the 2m wide gravel pathway.	YES Low	Clear the footpath of the obstruction chip waste into forest stand.	6 months
Ref 02	Broken Ash limb fallen across full width of footpath.	Yes Low	Clear the footpath of the obstruction chip waste into forest stand.	6 months
Ref 03	Windblown spruce over the full width of pathway stem 600mm above ground level. Snapped top of spruce on eastern edge of footpath. Multiple windblown trees leaning toward footpath hung up and on the ground blocking desire lines.	Yes Moderate	Harvest trees with southern section.	5 months

Key: **RED** – High risk storm damage.

Blue – Moderate risk storm damage.

Grey – Low risk storm damage.

Reference Point	Comments	Risk of harm:	Recommendation?	Within what timeframe?
Ref 04	Multiple mature windblown trees, leaning west to east, laying on the ground and hung up leaning over the foot path, multiple trees laying on each other and resting on trees located on the eastern aspect of the 2m wide gravel path. The footpath is blocked and not passable heading north toward Ref point 17 located on the 4m wide gravel footpath at orienteering post 58. Large gaps in forest canopy at this point. There are also multiple dead standing trees within the stand at this location some of which are, unfortunately, being used for firwood, fire pit with stones present, and there are signs of other antisocial behaviour.	YES High	Harvest trees with southern section.	5 months
Ref 05	Large opening in the forest canopy due to windblown trees and 2 snapped stems on the northern aspect of the footpath.	No Low	None	Survey period

Key: **Red** – High risk storm damage.

Blue – Moderate risk storm damage.

Grey – Low risk storm damage.

Reference Point	Comments	Risk of harm:	Recommendation?	Within what timeframe?
Ref 06	Severe windblow damage from the south of the path. A large corridor of trees has been damaged, either fully windblown, partially windblown, hung up on adjacent trees or the stems have snapped. Multiple trees leaning toward the footpath, blown from south to north direction. There is a very large opening in the forest canopy at this point. The main path has been cleared however; a previous desire line is blocked. There are also multiple desire lines blocked heading east from the 4m wide gravel path toward the castle close to Post 56 and windblown trees that are hung up leaning toward the path.	YES High	Harvest trees with southern section.	5 months
Ref 07	Further extension of severe windblow of multiple mature trees from Ref point 6 on the northern aspect of the 2m wide gravel path. A wide corridor of windblown trees, crossed over one another with root plates exposed, trees are at ground level and hung up on adjacent trees. Hence another large opening in the forest canopy at this point.	Yes High	Harvest trees with southern section.	5 months

Reference Point	Comments	Risk of harm:	Recommendation?	Within what timeframe?
Ref 08	This area is being used for antisocial behaviour largely void of any ground vegetation and there are fire pits present, fuelled by the surrounding deadwood. Multiple partially windblown trees leaning into the area hung up on trees that align the edge and windblown trees on the ground east into the stand. This is the tip of the wide corridor of trees lost at Ref 08 and Ref 07.	YES High	Harvest trees with southern section.	5 months
Ref 09	Sever windblow and storm damage to the trees at this point over a wide area looking south southeast. Most of the trees are completely blown over some dead standing and snapped stems remain. Trees from the corridor from Ref point 08, from the south, are windblown obstructing the path, stems are between 400mm above ground level to 1.5m above ground level. The path is complete blocked at Ref point 9. No further access northeast or southwest.	Yes High	Harvest trees with southern section.	5 months

Key: **RED** – High risk storm damage.

Blue – Moderate risk storm damage.

Grey – Low risk storm damage.

Reference Point	Comments	Risk of harm:	Recommendation?	Within what timeframe?
Ref 10	Severe windblow and storm damage in this area. The path east is blocked by windblown trees immediately after the bridge and there is no access beyond this point.	YES High	Harvest trees with southern section.	5 months
Ref 11	Severe windblow at the T junction of a narrow path that exits the 2m wide gravel path starting at Post 52, heading south. looking south, southeast and southwest, there is extensive storm damage and a large opening in the forest canopy. South side of the stream.	YES High	Harvest trees with southern section.	5 months
Ref 12	A continuation of the storm damage from the bridge at Ref 10. The path is blocked at this point with fallen trees. No passage beyond this point heading southwest. Sever damage to a large area of trees south of the stream.	YES High	Harvest trees with southern section.	5 months

Key: **RED** – High risk storm damage.

Blue – Moderate risk storm damage.

Grey – Low risk storm damage.

Species	Comments	Risk of harm:	Recommendation?	Within what timeframe?
Ref 13	Further continuation of this corridor of storm damaged trees, some trees fully windblown others are partially windblown hung up on other trees. Large root plate on desire line. All damage is southeast of the stream. Again, significant opening of forest canopy.	YES High	Harvest trees with southern section.	5 months
Ref 14	The path is blocked at this point with a significant number of windblown trees, some fully windblown some are partially windblown hung up on adjacent trees. Multiple desire lines into the stand are also blocked south of the stream.	YES High	Harvest trees with southern section.	5 months
Ref 15	Looking south into the stand, approximately 20m, of <i>Picea abies</i> from the 4m wide gravel footpath, extensive windblow damage can be observed with the outside few rows to the north (path side) still standing. No access to this point.	YES High	Harvest trees with southern section.	5 months

Key: **RED** – High risk storm damage.

Blue – Moderate risk storm damage.

Grey – Low risk storm damage.

Ref point	Comments	Risk of harm:	Recommendation?	Within what timeframe?
Ref 16	Looking south from the 4m wide gravel footpath toward Ref point 05 along the 2m wide gravel footpath there are multiple windblown trees laying along the edge of the main foot path and blocking the narrower path heading south. Mature trees are crossed over one another and hung up on adjacent trees.	YES High	Harvest trees with southern section.	5 months
Ref 17	This point is in the red zone for tree removal due to the extensive storm damage to the trees. It is included here as the path is blocked and surrounding desire lines. No access.	YES High	Harvest trees with southern section.	5 months



Photo Gallery



Ref 04;

Severe windblow damage with multiple trees hung up over the path and leaning toward the footpath, blown from south to north direction. A large corridor of trees has been damaged,



Ref 06;

Severe windblow damage from the south of the path. A large corridor of trees has been damaged, either fully windblown, partially windblown, hung up on adjacent trees or the stems have snapped. Multiple trees leaning toward the footpath.



Ref 09;

Sever windblow and storm damage to the trees at this point over a wide area looking south southeast. Most of the trees are completely blown over. Trees from the corridor from Ref point 08, from the south, are windblown obstructing the path prior to the path being completely blocked.



Ref 13;

Lifted root plate after windblow, the root plate is only 350mm deep with no visible sinker roots.

Additional notes

This general condition safety survey of 3.5 hectares of *Picea abies* – Norway spruce has been carried out during the summer months with vitality being assessed by needle density. This area is part of a larger stand of Norway spruce which totals approximately 33 hectares that was originally intended as a commercial timber crop, these trees are accompanied by other broadleaf tree species that reside in the north wood of Merlin Park Woods.

As the duty holder for the north woods, Galway City Council must ensure the safety of all stakeholders that use the facility and ensure that the trees that grow within the woods are within tolerable levels of safety for the site. Owing to the current structural instability of some of the trees within the survey area mitigation needs to be applied due to the combination of widely available access through formal footpaths, narrow formal footpaths, compacted footpaths and desire lines and to the volume of recreational users. Due to the multiple open access points into the north wood, it is not practical to close the perimeter completely during any signified wind events.

The survey has identified two main corridors of windblown trees, the largest stretching from the south and west into the 3.5-hectare survey area from the 17.5-hectare area identified for harvesting and replanting with native broadleaf tree species. In particular, from reference point 17 joining into reference point 06 through to 08 and 12. The formal footpath to the south of reference post 52 is completely impassable beyond reference point 14 to reference point 13 and again from reference point 12 to reference point 10 at the bridge due to fallen trees and this include numerous associated desire lines.

The second area of concern is to the north at reference points 03, 04, 15 and 16. All of the above locations have multiple trees that are in an unstable condition leaning toward formal footpaths and desire lines that travel through the stand of Norway spruce. These trees are providing a significant slip/trip hazard as they are blocking/partially blocking footpaths and desire lines.

Final thoughts

Firstly, the loss of 17.5 hectares of mature Norway spruce to the south and west has left the remaining trees very exposed to prevailing winds, these outer edge trees have a larger stem taper and root system compared to trees within the stand, it is these trees that contribute the most to the structural stability of the stand as a whole. Norway spruce as a species is known to be shallow rooting particularly on thinner soils over limestone where the penetration of sucker roots into the soil is restricted.

Secondly, the remaining trees will be significantly affected by a change in wind damping – Hydraulic damping happens when there is drag forces on the foliage in the wind. This effect is reduced every time a tree is lost from the stand. Mass damping describes the interaction of side branches following the branch hierarchy. For example, tertiary branches to secondary branches into the primary branch structure into the main stem and down to the roots. This mechanism enables branches to dissipate kinetic energy from the wind, reducing harmful harmonic vibrations

reducing the potential of windthrow. The removal of further unstable windblown trees within the 3.5 hectares will contribute to an increase in wind load to any trees that are retained increasing the risk of further tree failure in future years, particularly in the winter months when the weather is more inclement.

Thirdly, the fact that these mature Norway spruces are top loaded with foliage, with live foliage occupying the top 25% of the tree means that they carry a higher wind load and are biomechanically more likely to fail during wind events due to slenderness.

Finally, the volume of trees that have been severely damaged by storm Eowyn, either windblown or stems snapped, have since died and now provide a significant fire hazard during the summer months. It is noted in the survey that there are two separate areas identified where campfires are being lit and the surrounding deadwood is being used as a fuel source.

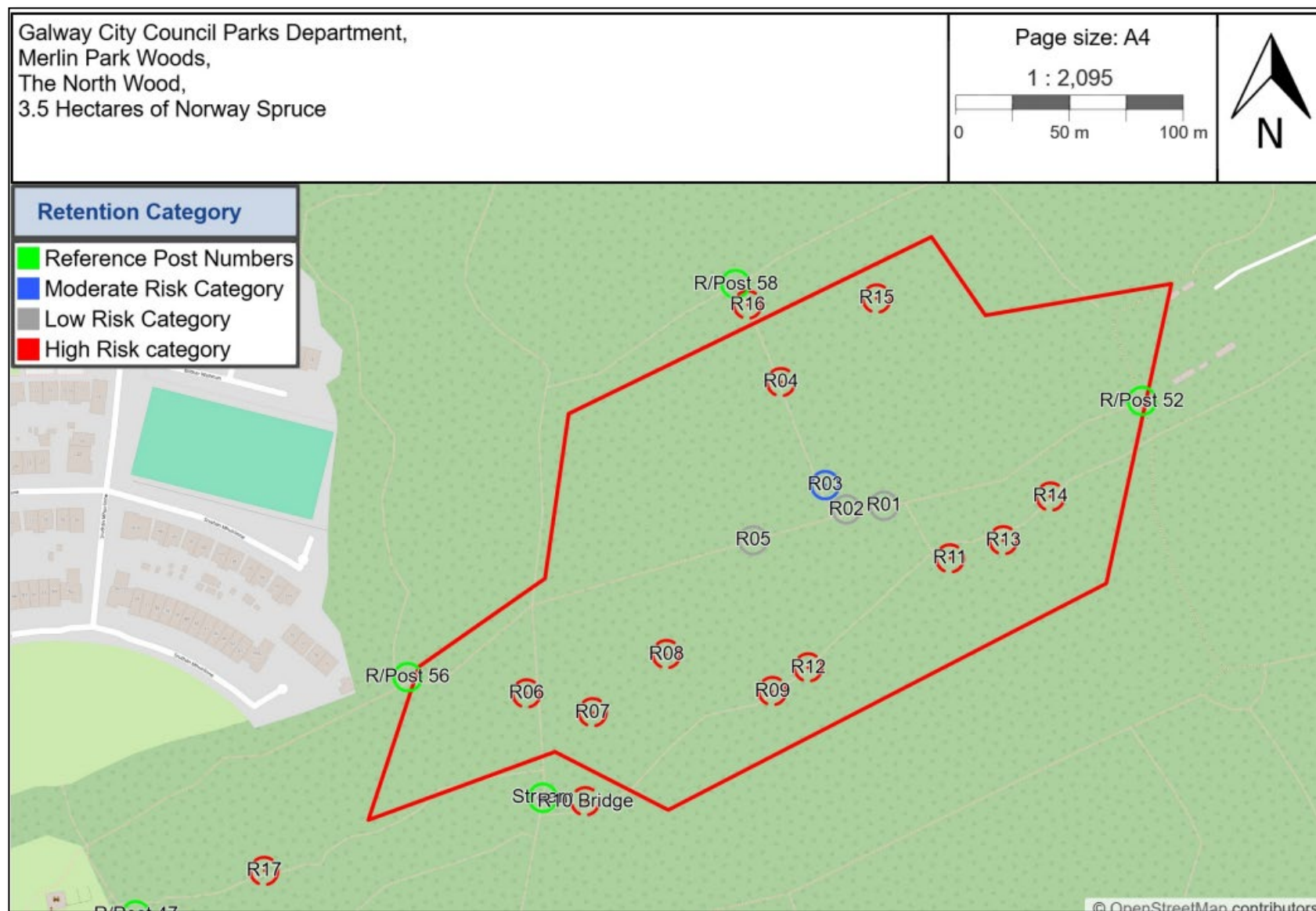
Recommendation

This recommendation is a considered approach considering the topography of the site, the geology, the location in proximity to the western seaboard and tree species characteristics. I am recommending that the 3.5-hectares is harvested and replanted with native broadleaf tree species along with the 17.5-hectare area. The time frame has been adjusted to accommodate to coincide with nesting season. I believe this is a great opportunity for GCC and all the stakeholders to use the catalyst of storm Eowyn, which caused such significant damage to this coniferous stand of trees, to create a new larger area of native broadleaf woodland within the north wood. This new establishment will create thicker denser habitat for wildlife and provide opportunities to close off some of the desire lines and less formal access routes throughout the wood affording wildlife space and reducing management responsibilities.

An active woodland management plan can help to minimise risk. The next survey is scheduled in 2 years' time, which will allow for a continued assessment of the tree's vitality on the site as well as any structural considerations.

All measurements are approximate.

Tree Location Map





RISK VS. BENEFIT ASSESSMENT METHODOLOGY

A tree risk rating (RR) is calculated by considering the following inputs:

1. the presence of targets (people or property) that may be harmed by a tree failure
2. the likelihood of a whole or partial tree failure during the survey period
3. the severity of harm arising from a failure based on the size of part most likely to fail

The following values are used to calculate the risk rating:

Target presence (TP)	Potential to fail (PtF)	Severity / Size of part (SoP)
1 Very likely: Constant	1 Very likely: 76 – 100%	1 Fatality: 300mm+ diameter
2 Likely: Frequent	2 Likely: 50 – 75%	2 Significant injury: 150 – 299mm diameter
3 Unlikely: Infrequent	3 Unlikely: less than 49%	3 Minor injury: 50 – 149mm diameter

Risk rating calculation:

Target presence 2 + Potential to fail 2 + Severity/size 1 = **Risk rating 5**

To guide the extent of any risk control measures needed, and the timeframe for their implementation, the risk is next considered for its tolerability.

Trees provide many benefits, where these benefits are tangible a higher level of risk may be tolerable if risk control measures are likely to remove or significantly reduce the benefits, especially if the control measures will achieve only a minor reduction of the risk.

The tree is assigned a benefit value, on the following basis:

Benefits	Benefit value (BV)
Ecological, Cultural and Aesthetic	3
Ecological or Cultural and Aesthetic	2
Ecological or Cultural or Aesthetic	1
None	0



Benefit definitions and examples:

An **Ecological** benefit is provided by a tree hosting at least one confirmed habitat associated with a European Protected Species (EPS) and/or other niche habitats identified by an Ecologist.

A **Cultural** benefit is provided by, a tree planted to commemorate a specific event or a tree of such an age that it provides a direct link to local history.

An **Aesthetic** benefit is provided by a tree making a significant contribution to the local landscape character, either by itself or as an important part of a tree group.

A risk tolerability score is determined using the calculation described below:

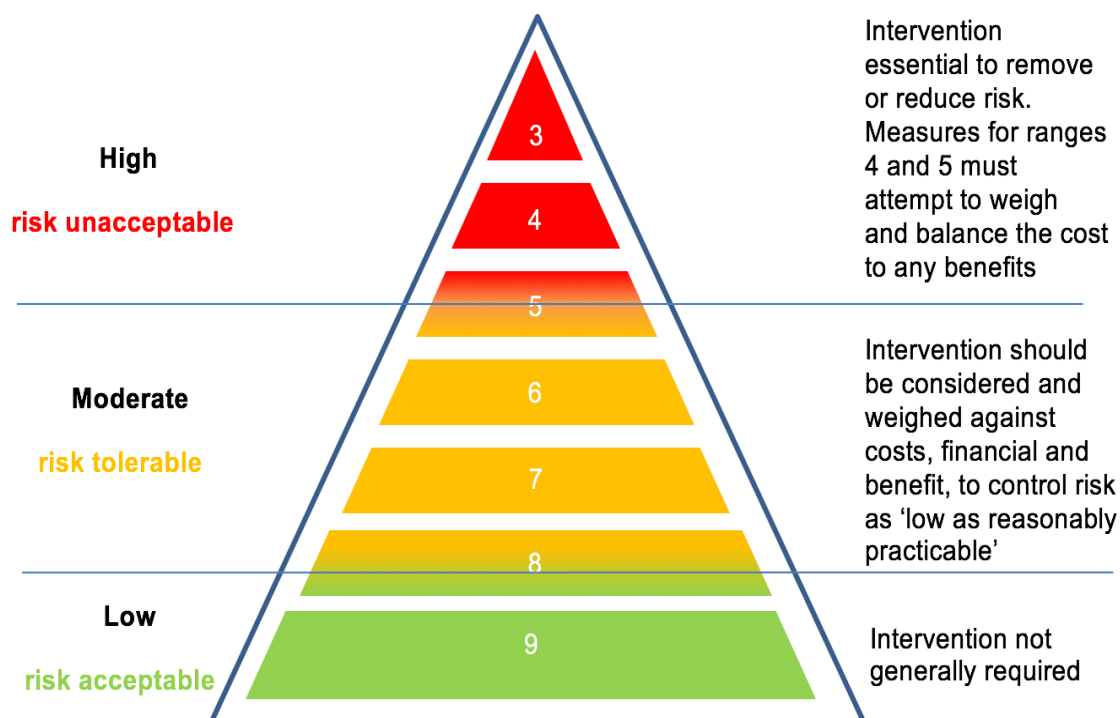
The assigned 'benefit value' is added to the 'risk rating' to provide the 'risk tolerability score' for the subject tree.

Risk tolerability score calculation:

$$\text{Risk rating } \underline{5} + \text{Benefit value } \underline{1} = \text{Risk tolerability score } 6$$

The 'risk tolerability score' is now compared against the Risk Matrix below, to determine any risk control measures required and the timeframe for their implementation.

RISK MATRIX





INTERVENTION PRIORITISATION MATRIX

	Risk tolerability score	Intervention measures	Timeframe / priority of implementation
Very high	3	Remove or significantly reduce risk	Within 1 month
High	4 - 5	Remove or significantly reduce risk balancing measures against their cost to the benefits of the tree. Firstly consider options to remove or reduce target or that provide a 'fail-to-safe'	Within 3 months
Moderate	6 - 7	Consider any 'low-cost' measure to reduce risk as low as reasonably practicable	Within 6 months
Low	8 +	No action generally required	Within 12 months
Very low			



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