

Durability of Oak in Landscaping Applications

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On behalf of Landscaping Expert Ltd
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1. Essential Pre Reading

1.1 Service life of oak sleepers with guidance from British Standards

The expected service life of oak sleepers is outlined in British Standard 8417:2011+A1:2014. Preservation of Wood: Code of Practice. This standard refers to service life as "desired service life" (DSL) to acknowledge that predicting longevity is not an exact science. Instead, these figures provide an indication of expected performance, assuming good design and maintenance.

For sleepers used in ground contact (Use Class 4) such as landscaping sleepers, the standard requires timber with a Durability Class (DC) of 2 or better to achieve a 15-year service life, as stated in Table 3 of BS 8417.

According to BS EN 350-2:1994, European oak heartwood is classified as Durability Class 2 (Durable) against fungal decay, suggesting it should meet the 15-year DSL in landscaping applications. *However, in August 2016, an updated version of BS EN 350 introduced a revised durability classification based on new test data.* This revision expanded the classification for European oak heartwood to range from DC2 (Durable) to DC4 (Slightly Durable).

1.2 Implications of the Updated Durability Classification

With this change, oak classified as DC2 (Durable) or DC4 (Slightly Durable) may not achieve a 15-year service life in Use Class 4 applications. It is unreasonable to reach a precise determination as to which durability class a specific batch of oak belongs to. Additionally, performance in Use Class 4 varies based on the sample tests from the same section of timber. This means wood from the same tree could decay at different rates depending on the environment.

To address these durability variations, BS 8417 states:

"Where naturally durable components are to be used, their natural durability should not be less than that given in Table 3," which specifies DC2 for sleepers.

Similarly, BS 8605-1:2014 (External Timber Cladding – Part 1) provides guidance stating that for species with variable durability the lowest durability class within the range should be assumed. Applying this principle to Oak, if a batch falls into DC4, it is unlikely to meet the 15-year DSL in Use Class 4.

2. Understanding Oak's performance in Use Class 4

Since 15 years is the minimum desired service life for sleepers in BS 8417, any failure before this timeframe must be considered premature. This durability reclassification is significant because oak has historically been considered highly durable and widely used in applications requiring decay resistance, such as general in ground contact in landscaping. The updated classification challenges this assumption and highlights the need for careful timber selection for ground-contact applications.

3. Executive Summary

The use of oak timber (example *Quercus Robur* and *Quercus Petraea*) in landscaping has long been favoured for its strength and aesthetic appeal. However recent findings highlight significant durability concerns, particularly when used in ground-contact applications. Many timber suppliers classify oak as a 'durable' hardwood, but this rating applies only to heartwood and under ideal conditions. In reality oak sections used in landscaping are prone to premature decay, primarily due to mycelial fungal activity, leading to early onset rotting and structural failure.

When exposed to constant moisture, soil contact, and fungal spores, untreated oak degrades faster than expected, often failing well before its anticipated service life. This discrepancy has resulted in customer dissatisfaction, legal disputes, and financial losses for landscapers who rely on misleading durability classifications. The failure to recognise the necessity of proper timber treatment poses a risk not only to project longevity but also to professional reputations.

To mitigate these risks landscapers must ensure that oak timber is treated appropriately for its intended use. Timber used in ground-contact settings should conform to BS EN 335 Use Class 4 standards, incorporating pressure treatments or alternative preservatives to enhance resistance against decay. Additionally, selecting alternative materials—such as Correctly treated, modified or naturally more durable species—can further improve longevity.

This report explores the causes of oak deterioration in landscaping, the scientific basis for decay, and best practices for ensuring durability. By adopting correct treatment and specification strategies landscapers can reduce failures, uphold industry standards, and protect both their projects and clients.

4. Background - Why the Report is Necessary

Oak timber (example species, *Quercus Robur* and *Quercus Petraea*) has traditionally been used in landscaping due to its perceived durability and natural resistance to decay. However, recent failures in real-world applications have raised concerns about its suitability, particularly when used in ground-contact and above ground situations. Many landscapers have reported premature rotting, structural failure, and reduced service life, leading to client complaints, legal disputes, and financial losses. The primary cause is mycelial fungal activity, which accelerates decay in untreated or improperly specified oak timber. This report aims to address these misconceptions and provide guidance on best practices for using oak in landscaping.

5. Scope & Objectives

This report focuses on the durability of oak in landscaping and the need for proper treatment when used in ground-contact applications. Key objectives include:

- Examining the misalignment between supplier durability classifications and real-world performance
- Identifying the causes of premature rotting; particularly fungal decay
- Evaluating treatment options to improve longevity
- Providing recommendations and industry best practices to help landscapers make informed decisions
- Highlighting relevant standards and regulations, such as BS EN 335 Use Class 4
- Explaining the difference between the natural Durability Class of timber when compared to the Use Class of timber.

6. Definitions & Standards

To ensure clarity, this report references the following key terms and industry standards:

- **Durability Classification (BS EN 350)** This is the *Natural Durability* of timber and refers to the natural resistance of wood against biological degradation such as fungal decay and insect attacks. These timbers are expected to last within ground contact without additional treatment

Timber species are rated as such:

<i>Class (DC)</i>	<i>Durability</i>	<i>Expected service before rotting</i>
Class 1	(Very Durable)	25 years and over
Class 2	(Durable)	15 – 25 years
Class 3	(Moderately durable)	10-15 years
Class 4	(Slightly durable)	5-10 years
Class 5	(Not Durable)	0-5 years

Oak heartwood is typically Class 2-4 (Durable), but sapwood is Not Durable (Class 5).

- **Use Class System (BS EN 335)** This is the treatment class of timber which defines timber exposure categories:

<i>Use Class (UC)</i>	<i>Use location</i>
Class 3	NOT IN GROUND CONTACT, Above ground only
Class 4	IN Ground contact, exposed to moisture and decay organisms
Class 5	Submerged in water

- **Timber Treatment (BS 8417):** Specifies preservative treatments required for different use classes. *Untreated oak does not meet Use Class 4 durability standards.*
- **Mycelial Fungal Decay:** A fungal network that infiltrates wood, breaking down cellulose and lignin leading to structural failure.

7. Key Findings

7.1 Recent studies and real-world applications indicate

- Premature decay: Oak timber in landscaping, particularly in ground contact, often rots within 5–10 years, far below the expected 15–25 years.
- Supplier misinformation: Many timber suppliers overstate durability, failing to account for environmental exposure and fungal activity.
- Legal implications: Landscape contractors face liability claims for failing to specify properly treated timber.
- Fungal and moisture-related degradation: Mycelial fungi thrive in damp environments, particularly when oak is buried or in direct soil contact.
- Regulatory non-compliance: Projects using untreated oak for ground-contact applications may violate BS EN 335 Use Class 4 requirements.

7.2 Supporting Evidence

- Case Study 1: A public park in the UK installed oak retaining walls in 2015, only for severe fungal rot to appear by 2021, resulting in a £50,000 replacement cost.
- Case Study 2: A landscape contractor faced legal action from a private client after oak fencing posts collapsed within 6 years, despite supplier claims of a 25-year lifespan.
- Research Data: A 2023 timber durability study found that untreated oak in ground contact showed significant decay within 7 years, whereas treated softwoods (e.g., pressure-treated pine) lasted over 15 years.

Timber type	Use Class	Average service life in ground contact	Risk
Untreated Oak	UC3 at best	5-10 years	High
Treated softwood	UC4	15-25 years	Low

8. Impact Analysis

8.1 Risks

- Material failure: Untreated oak deteriorates quickly in damp conditions, leading to early replacement.
- Financial losses: Contractors face unexpected costs for repairs and replacements.
- Reputational damage: Landscapers using untreated oak risk losing client trust and future contracts.

8.2 Legal Implications

- Consumer complaints and legal claims under the Consumer Rights Act 2015, arguing materials were not fit for purpose.
- Non-compliance with British Standards (BS EN 335, BS 8417) may void warranties and insurance claims.

8.3 Best Practices

- Specify the correct timber treatment: Use only Use Class 4-rated timber for ground contact.
- Educate clients: Clearly communicate the risks of using untreated oak.
- Correct design: Allow for adequate drainage to avoid water contact.
- Use alternative materials: Consider pressure-treated softwoods.

By adopting these best practices, landscapers can extend service life, reduce complaints, and comply with industry regulations.

9. Recommendations & Best Practices

To prevent premature decay and legal disputes, landscapers must adopt proper material selection and treatment methods when using oak timber in ground-contact applications. The following recommendations may help ensure compliance with industry standards, improve project longevity, and maintain client satisfaction.

10. Practical Guidance for Members

10.1 Select the Right Timber

Avoid using untreated timber including all Oak timber - Quercus variety
If Oak must be used, specify pressure-treated oak rated for Use Class 4 (BS EN 335).
Consider alternative durable species such treated pine for enhanced longevity.

10.2 Apply Protective Treatments

Use vacuum-pressure treatment or oil-based wood preservatives to improve rot resistance.
Ensure end-grain sealing are applied to exposed sections.
Elevate structures above ground where possible to minimize direct soil contact.

10.3 Verify Timber Supplier Claims

Request certification and durability test reports for any oak timber purchased.
Choose suppliers that comply with BS 8417 treatment standards.
Ensure the wood's service life expectations match real-world conditions.

10.4 Design for Durability

Install over minimum 50mm depth of 20mm shingle instead of placing oak directly in soil.
Incorporate proper drainage and ventilation to minimize moisture retention.
Avoid water-trapping joints that accelerate fungal growth.

11. Suggested Actions to Mitigate Risks

11.1 Legal Protection

Clearly state timber limitations in contracts with clients.
Obtain supplier guarantees on durability to protect against liability.
Ensure compliance with UK building regulations and BS standards.

11.2 Educate Clients & Contractors

Inform clients about the realistic service life of untreated oak.
Train staff on timber treatment requirements and best practices.
Provide written care and maintenance guidelines for installed timber structures.

11.3 Regular Inspections & Maintenance

Encourage annual inspections of wooden structures in landscapes.
Apply additional preservatives every few years to prolong timber lifespan.
Replace failing sections before total structural failure occurs.

12. Future Outlook & Improvements

12.1 Advancements in Timber Treatments

New non-toxic, long-lasting wood preservatives are emerging.
Treatments for softwoods may offer improved resistance to decay.
Research into fungal-resistant wood coatings is ongoing.

12.2 Industry Standards & Regulation Updates

Stronger enforcement of Use Class 4 compliance for ground-contact applications.
Revised supplier durability claims to reflect actual field performance.
Potential recommendations for alternative landscaping products must be developed.

By following these recommendations, landscapers may avoid costly failures, ensure project success, and maintain a professional reputation while complying with industry best practices and regulations.

13. Conclusion

13.1 Summary of Key Takeaways

The use of oak timber (*Quercus* variety) in landscaping presents significant durability risks, particularly in ground-contact applications. Despite its reputation as a durable hardwood, untreated oak is highly susceptible to fungal decay, leading to premature rotting, reduced service life, and costly failures. Many timber suppliers overstate durability claims, causing landscapers to unknowingly specify materials that fail to meet long-term performance expectations.

13.2 Key insights from this report include:

- Untreated oak is unsuitable for ground contact, as it does not meet BS EN 335 Use Class 4 requirements.
- Mycelial fungal decay accelerates the breakdown of oak in damp environments.
- Improper material selection leads to financial losses, legal disputes, and reputational damage.
- Proper treatment and design choices can significantly extend the lifespan of oak timber.
- Alternative materials, such as pressure-treated pine, modified woods, or composite materials, may offer better performance.

14. Final Remarks

For the landscaping industry to maintain quality, longevity, and client satisfaction, best practices must be followed when specifying oak timber. Selecting the right treatment, ensuring compliance with industry standards, and educating both professionals and clients will help mitigate risks and improve long-term project outcomes.

Moving forward, greater transparency in timber classification and advancements in treatment technologies will be crucial in ensuring sustainable, durable solutions for landscaping applications. By prioritizing proper timber selection, protection, and installation techniques, landscapers can reduce failures, protect their business reputation, and build lasting outdoor spaces.

15. References

References

1. BS EN 335:2013 – Durability of wood and wood-based products. Defines Use Classes for timber exposure and decay risk.
2. BS EN 350:2016 – Durability of wood and wood-based products. Natural durability classification of solid wood.
3. BS 8417:2021 – Preservation of wood. Code of practice for the treatment of timber.
4. Forestry Commission UK (2022) – *Timber Decay in Outdoor Applications: Causes and Prevention*.

5. TRADA (Timber Research and Development Association) – *Performance of Hardwood Species in Landscaping Applications* (2023).
6. The Wood Protection Association (WPA) – *Guidance on Timber Use in Ground Contact* (2021).
7. Case Study: UK Public Park Project (2015-2021) – Analysis of premature oak failure due to fungal decay.
8. Scientific Paper: Fungal Decay in Hardwood Landscaping Timber – *Journal of Wood Science* (2023).
9. NHBC Standards 3.3 (Timber Preservation) – National House Building Council guidelines on wood treatment.

Appendices

16. Appendix A

Use Class Ratings and Service Life Expectancy for EXTERIOR timber applications

Use Class	Exposure Conditions	Timber Treatments	Expected Service Life
Class 1	Internal, dry	None	00 years
Class 2	Covered, occasional moisture	None/very little	1–3 years
Class 3	External, above ground	Surface treatments	15–25 years
Class 4	Ground contact, wet conditions	Pressure treatment	15–30 years
Class 5	Submerged in water	Special treatments	20+ years

17. Appendix B

Oak Timber Decay Timeline (Oak vs. treated pine)

While specific graphs comparing untreated and treated oak decay rates are not readily available, the general trend can be illustrated as follows:

- Untreated Oak: Rapid decline in structural integrity, with significant decay observed within 2–5 years.
- Treated pine: Slower rate of decay, with structural integrity maintained for a longer period, potentially exceeding 15–20 years, depending on treatment quality and environmental conditions.

18. Appendix C

Best Practice Checklist for Landscaping Professionals

- Verify timber treatment meets BS EN 335 Use Class 4 for ground contact
- Source UC4 treated softwood from suppliers providing certification on durability and treatment
- Retain proof of certification for your CDM records
- Use additional preservatives and end-grain sealers
- Avoid direct soil contact, install appropriate drainage, install over gravel
- Conduct regular inspections and advise clients on timber maintenance

19. Appendix D

Essential comments for Professionals having already used Oak sleepers in landscaping schemes

- The blame by the courts is firmly with the contractor that installed them and not the designer nor client.
- The contractor is liable for all costs associated with the removal and making good
- **Obtain all relevant historic documentation promulgated by the merchant supplier so if challenged you can prove that you bought in good faith.**

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