AUTOSPRAY SYSTEMS

Aerial Direct Seeding by Drone in UK Woodland Creation

A ministerial white paper on policy recognition, procurement reform, operational assurance and silvicultural evidence

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CORE PROPOSITION

Aerial direct seeding by drone should be recognised as a legitimate, tightly governed woodland-establishment method for suitable sites. It should not be mandated everywhere and it should not displace UK Forestry Standard safeguards. But it should no longer be excluded from public schemes and tenders by default where access, ground impact, safety and delivery-window constraints make conventional methods sub-optimal.

This paper deliberately takes a high-scrutiny position. It does not claim that drone seeding replaces planting, guarantees establishment, or removes the need for ecological design. Its argument is narrower and stronger: where woodland creation is already justified, and where direct seeding is biologically and operationally suitable, the public sector should allow drone delivery models to compete on outcomes, standards and evidence rather than assume legacy methods are the only compliant choice.

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EXECUTIVE SUMMARY

UK woodland creation remains strategically important but materially below ambition. Forest Research reports 15.58 thousand hectares of newly created woodland in the UK in 2024/25, while government and Forest Research material continue to point to an ambition to establish 30,000 hectares annually and England has a statutory target to reach at least 16.5% tree canopy and woodland cover by 2050. The Woodland Trust supports an even more ambitious national direction, calling for UK woodland cover to rise from 13.5% to 19% by 2050. The policy direction is therefore clear: the UK needs more woodland creation, more ecological accountability, and more delivery models capable of working on difficult sites without avoidable ground damage or missed seasonal windows. [1-4]

Aerial direct seeding by drone is not a universal answer to that challenge, but it is now credible enough to warrant formal recognition within UK woodland-creation policy, public procurement and publicly funded pilot programmes. The correct framing is neither promotional nor disruptive. Drone seeding is a targeted establishment method within the wider restoration toolbox. It becomes compelling where steep terrain, fragile soils, waterlogged access, or short operational windows make conventional delivery difficult, and where exact stem-by-stem placement is not the principal objective. [6-10]

The science is not permissive; it is conditional. Direct seeding can be faster, lower-impact and more naturalistic, but the process is more exacting and the outcome less reliable than planting. Successful use depends on seed quality, dormancy treatment, provenance, species-site fit, microsite availability, weed competition, browsing and predation pressure, and follow-up monitoring. That does not weaken the public case. It sharpens it: government should recognise drone seeding precisely as a tightly governed, evidence-led method for appropriate sites, not as a shortcut around silviculture. [8-12]

There is now meaningful UK proof of concept. At Dubh Allt near Roshven, within a broader 300-hectare restoration landscape where manual planting was not feasible, a 3-hectare hillside was seeded by drone in spring 2024 with native pioneer species. Public reporting states that quadrat surveys later recorded a 2.7% germination rate against a hoped-for 1% threshold. Read properly, this does not prove universal equivalence to planting; it does demonstrate that drone direct seeding can exceed practical proof-of-concept expectations on a suitable site and therefore merits structured inclusion in procurement and policy pilots. [16, 17]

AutoSpray Systems also reports that more than 130 hectares have been sown during the 2025/26 winter season under its national ASPN operating framework. That statement is important not because hectares alone prove biological success, but because it indicates that the capability has moved beyond isolated demonstration into coordinated national delivery. The correct policy response is not to accept those hectares uncritically, but to bring them inside a transparent evidence and monitoring architecture. [CS1, 18-20]

Five decisions ministers and public authorities can take now

1. Recognise aerial direct seeding by drone as an eligible woodland-establishment method where UKFS compliance and ecological suitability are demonstrated;
2. Require technology-neutral, outcome-based tender specifications rather than planting-only assumptions;
3. Use preliminary market engagement and trial pilot lots under the Procurement Act 2023 to test and refine the model;
4. Define a minimum evidence pack for seed provenance, delivery assurance and post-sowing monitoring;
5. Support an agreed industry-policy standard for forestry drone operations rather than allowing ad hoc practice to shape the market.

The central recommendation of this paper is therefore straightforward: government should not mandate drone direct seeding, but it should stop excluding it by default. Public procurement and public woodland programmes should allow it to compete where site conditions justify it, where delivery is properly assured, and where post-operation evidence can be gathered transparently and assessed against clear success criteria. [13-15]

Metric	Current public position	Why it matters for this white paper
UK annual woodland ambition	30,000 ha per year [4]	Delivery models must be capable of operating at scale and on increasingly difficult terrain.
UK woodland created in 2024/25	15.58 thousand hectares [3]	The gap between ambition and delivery remains material.
England statutory canopy / woodland target	At least 16.5% by 2050 [2]	Policy is already moving toward expansion, not retrenchment.
Woodland Trust advocacy target	19% UK woodland cover by 2050 [1]	Independent pressure for higher ambition is intensifying.
Public procurement framework	NPPS + Procurement Act 2023 allow public procurement to support wider objectives and flexible procedure design [13-15]	Technology-neutral tender design is already legally and procedurally compatible with current reform.

1. WHY THIS MATTERS NOW

That imbalance is not benign. By focusing narrowly on what might go wrong with drones, we risk The strategic case for woodland creation in the UK is already well established. Government policy, Forest Research evidence and the Woodland Carbon Code all point in the same direction: woodland creation is expected to contribute not only to climate mitigation, but also to wildlife support, soil protection, flood reduction, water quality, timber supply, shelter and wider social value. The policy question is no longer whether woodland matters. It is how the UK delivers more of it, more intelligently, on a wider range of sites, without eroding ecological standards. [2, 4-7]

That shortfall is critical because the easy hectares are not the whole task. A growing proportion of the remaining opportunity sits in landscapes where access is difficult, soils are fragile, slopes are steep, weather windows are narrow, or ground traffic would create avoidable ecological damage. In those environments the choice is not always between planting and drone seeding; it is often between a carefully governed aerial method and no timely intervention at all.

The Woodland Carbon Code reinforces this point. It is the UK quality-assurance standard for woodland carbon projects and requires woodland creation not only to remove carbon dioxide but also to deliver wider environmental and social benefits. In other words, high-integrity woodland policy is already outcome-based. The delivery mechanism matters insofar as it helps or hinders those outcomes. Better delivery methods are therefore relevant to carbon policy, but they do not replace proper woodland design. [5]

2. WHAT THIS PAPER IS - AND IS NOT - ARGUING

Because this paper is intended for ministers and regulators, it is important to state clearly what is not being claimed. This is not a request to weaken UKFS safeguards, to allow inappropriate planting on deep peat or priority habitats, to treat drone seeding as equivalent to planting on every site, or to accept company data in place of independent monitoring. It is a request to recognise a credible, bounded capability and to create a public framework in which that capability can be evaluated, procured and improved responsibly.

TABLE 2. THREE CLAIMS THIS PAPER DELIBERATELY DOES NOT MAKE

Claim avoided	Reason the claim would be unsound
Drone seeding can replace planting everywhere	It cannot; exact placement, immediate stocking certainty and some high-value schemes still favour planting.
Drone seeding guarantees establishment	It does not; direct seeding remains biologically conditional and often less reliable than planting.
Technology choice should override ecological design	It must not; UKFS compliance and site suitability remain primary.

The practical argument is more modest and more robust. Aerial direct seeding should be recognised as a legitimate method for suitable woodland-creation and restoration scenarios. Public tenders and programmes should not assume that only hand planting or ground-based distribution can count as acceptable delivery. They should define the woodland outcome required, the ecological constraints that apply, and the assurance evidence expected, then allow providers to compete on how best to deliver within those guardrails. [13-15]

3. WHERE AERIAL DIRECT SEEDING FITS - AND WHERE IT DOES NOT

The strongest argument for aerial direct seeding is not that it can replace every other establishment method. It is that it can widen the number of sites that can be treated sensibly and safely. Forest Research defines direct seeding as sowing tree seed in its final growing position rather than transplanting nursery-grown stock, and it makes the caution explicit: direct seeding has advantages such as lower cost, more rapid canopy development and more naturalistic establishment, but the process is more exacting and the outcome less reliable than planting. For external audiences, that sentence is not a weakness. It is an essential credibility anchor. [8-10]

Accordingly, aerial seeding should be presented as a targeted tool for steep or inaccessible ground; fragile or waterlogged surfaces where machinery would do disproportionate damage; broad restoration areas where diffuse establishment and natural selection are acceptable outcomes; and situations where the operational window is so narrow that delay would cost the project the season. It should not be presented as the best answer for every site, every species mix or every owner objective.

TABLE 3. BEST FIT VERSUS POOR FIT FOR AERIAL DIRECT SEEDING

Best fit for drone seeding	Where planting usually remains preferable
Steep, remote or unsafe terrain where human or machine access is poor	Sites needing exact stem-by-stem placement or formal spacing from day one
Fragile or waterlogged ground where avoiding traffic and compaction is a core objective	High-value schemes where stocking certainty is the overriding priority
Large areas where broad establishment and natural selection are acceptable	Sites with severe browse or predation pressure unless practical protection is already planned
Projects constrained by a narrow weather or access window	Species or seedlots poorly suited to direct seeding or with highly unreliable seed years

That is why the policy objective should not be to replace planting, but to allow blended and site-specific establishment strategies. Some projects will remain planting-led. Some will rely mainly on natural regeneration. Some will sensibly combine planting, fencing, browse management and direct seeding by drone across different compartments within the same scheme. Tender structures and woodland programmes should be designed to allow those mixed models, not suppress them.

4. EXISTING UK OPERATIONAL CAPABILITY: WHAT AUTOSPRAY PILOTS CAN DO NOW

Operationally, the important point is that aerial tree seeding is no longer just about getting a drone airborne with seed in a hopper. The AutoSpray Systems Pilot Network (ASPN) is already a UK-wide capability for aerial tree seeding, with operational delivery this past season spanning the south coast to the Scottish Borders. The key point is that this capability now exists at national scale and is ready to deliver significantly larger hectare volumes each year. For forestry clients and public bodies alike, the issue is no longer whether drone seeding can be done, but how quickly procurement and policy can adapt to make proper use of it, they are now buying consistent delivery, legal clarity and repeatable standards not novelty. [18-20]

In practical terms, a defensible forestry seeding workflow starts with site screening. The first question is not whether a drone can physically reach the site. It is whether woodland creation is ecologically appropriate at all. That means reviewing slope, access, soils, hydrology, existing vegetation, utilities, public access, designated habitats and other constraints before any seeding prescription is designed. Under the UK Forestry Standard, the woodland objective comes before the delivery method. [6, 7]

The second stage is prescription design. A serious operator has to know what is being spread, why that species mix has been chosen, what density is intended, whether dormancy has been broken where needed, whether the material flows reliably, and how success will later be assessed. AutoSpray's own authorised applications material treats native tree seed as a governed input rather than an informal add-on, which is the correct posture for a capability that is intended to be taken seriously by regulators. [19]

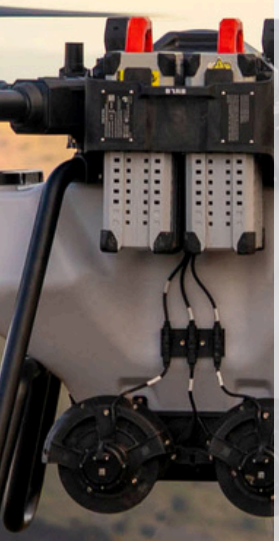
The third stage is mission planning and calibration. Aerial seeding should be treated much more like a controlled spreading task than a publicity exercise: hopper output matched to a target application rate; swath behaviour checked before live work; terrain-follow settings validated; exclusion areas respected; and route logic designed to maintain coverage over variable ground. None of that removes biological uncertainty, but it does remove a large amount of avoidable operational noise.

Finally comes verification. Coverage maps, flight logs, seed-batch traceability, photographs and post-operation notes all matter. When establishment is later assessed, the project team must be able to separate biological factors from delivery error. That is one of the clearest differences between professional aerial seeding and opportunistic drone use. It is also why a nationally governed framework such as ASPN is key: it turns individual sorties into a consistent service model. [18-20]

TABLE 4. CRITICAL OPERATIONAL CONTROL POINTS

Control point	Why this is critical	Minimum standard for a credible operator
Site suitability	Prevents technology-led seeding on ecologically unsuitable land	Confirm the woodland objective is justified before deciding how to seed it.
Seed specification	Establishment depends on provenance, viability and pretreatment	Know the species mix, lot, pretreatment status and flow characteristics.
Calibration	Delivery error can masquerade as biological failure	Validate hopper output and swath assumptions against the target rate before live work.
Flight planning	Slope, access and environmental constraints affect coverage and safety	Use terrain-follow, exclusion zones and route logic suited to the site.
Records	Without records, outcomes cannot be interpreted properly	Retain logs, maps, photographs and batch information.
Follow-up monitoring	Success is biological as well as operational	Treat monitoring as part of the job, not an optional extra.

AutoSpray Systems reports that more than 130 hectares have been sown during winter 2025/26. Presented properly, that is not a vanity metric. It indicates that the pilots within the system are no longer waiting for a theoretical future market; they are already delivering forestry seeding work at meaningful scale. Equally, ministers and regulators should view that figure as a reason to ask for stronger evidence capture, not weaker scrutiny. Hectares sown show readiness of deployment; they do not, on their own, prove establishment outcomes. [CS1]



5. THE WOODLAND SCIENCE THAT DETERMINES WHETHER SEEDING WORKS

For public credibility, the science has to be stated plainly. Forest Research notes that early direct-seeding work showed low germination where seed was taken by birds and rodents, where viability was variable, and where emerging seedlings then had to compete with fast-growing weeds. Further Forest Research guidance notes that direct seeding requires more technical expertise in ground and seed preparation, large volumes of seed and an appropriate silvicultural regime. Those are not marginal details; they are the central constraints. [8-10]

This is why good aerial seeding is really a silvicultural and ecological exercise delivered by aviation, not an aviation exercise loosely attached to ecology. Species must suit the soil, moisture regime, altitude and surrounding vegetation. Dormancy must be broken where necessary. The seed must encounter a favourable establishment niche. Competition, browsing and predation must be managed to the extent the site allows. The broader UAS regeneration literature reaches the same conclusion: species selection, site preparation and follow-up conditions are decisive for establishment and early development. [9, 10, 12]

One implication follows immediately. Seed placement alone is not a sufficient success metric. Successful delivery cannot be reduced to "the drone flew accurately". Aerial direct seeding should be assessed against a chain of outcomes: seed quality, delivery accuracy, encounter with suitable microsites, emergence, early survival, and the extent to which the emerging cohort aligns with the woodland objective. That is also why public procurement should demand a monitoring plan rather than accept application activity as an end in itself.

The emerging technology literature is relevant but should be used carefully. Research on protective seed carriers and pelleting shows there may be ways to improve precision and survivorship in future. Those developments are promising, but they do not erase the central truth that site ecology remains the dominant filter. In policy terms, the correct conclusion is not "technology will solve biology"; it is "technology may improve delivery if the biology is already understood". [11]

6. PUBLIC PROOF OF CONCEPT: GERMINATION EVIDENCE AND WHAT IT ACTUALLY PROVES

The strongest public proof-of-concept currently available from the UK is the Dubh Allt project near Roshven on the Moidart peninsula. SCOTLAND: The Big Picture reports that a 3-hectare hillside was seeded by AutoSpray Systems in spring 2024 with a native mix including birch, rowan, alder, Scots pine, aspen and willow. The site sits within a broader 780-acre landholding and a larger restoration context where manual planting over the wider 300-hectare target area was described as impractical. Public reporting states that quadrat sampling later found a seedling germination rate of 2.7%, above a hoped-for rate of 1%. [16, 17]

This evidence should neither be exaggerated nor dismissed. It does not prove that drone seeding will deliver 2.7% germination on all sites, for all species mixes, or under all grazing and weather conditions. It is not a substitute for replicated trials. But it does show three things that matter greatly for public policy:

- The method is operationally deliverable on a difficult site.
- Germination outcomes can beat initial success thresholds
- Surveying and reporting can be structured in a way that permits scrutiny rather than anecdote. [16, 17]

Read in that measured way, the Dubh Allt case is exactly the kind of evidence that should unlock formal public commercial adoption and technology-neutral procurement wording. It is strong enough to justify inclusion, but not so strong that it should be used to bypass evaluation. That is the right threshold for ministerial action.

How this proof should be used
The Dubh Allt result is best treated as evidence of viability on a suitable site, not as a universal performance guarantee. The policy implication is “test and include”, not “mandate and generalise”.

AutoSpray’s own public case study strengthens that reading by describing the wider landscape challenge, the pioneer-species strategy and the intended germination threshold. Taken together, the external press release and the company case study support a careful statement: on a steep and access-constrained UK restoration landscape, aerial broadcasting of native pioneer species by drone produced an observed germination rate materially above the project’s hoped-for threshold. [16, 17]

The next step for policy should be obvious. The UK should move from isolated proof-of-concept stories to a monitored evidence programme: multiple sites, comparable survey methods, defined intervals, and transparent reporting of both success and failure. This is precisely the kind of maturation pathway public procurement reform and pilot design are intended to support. [14, 15]

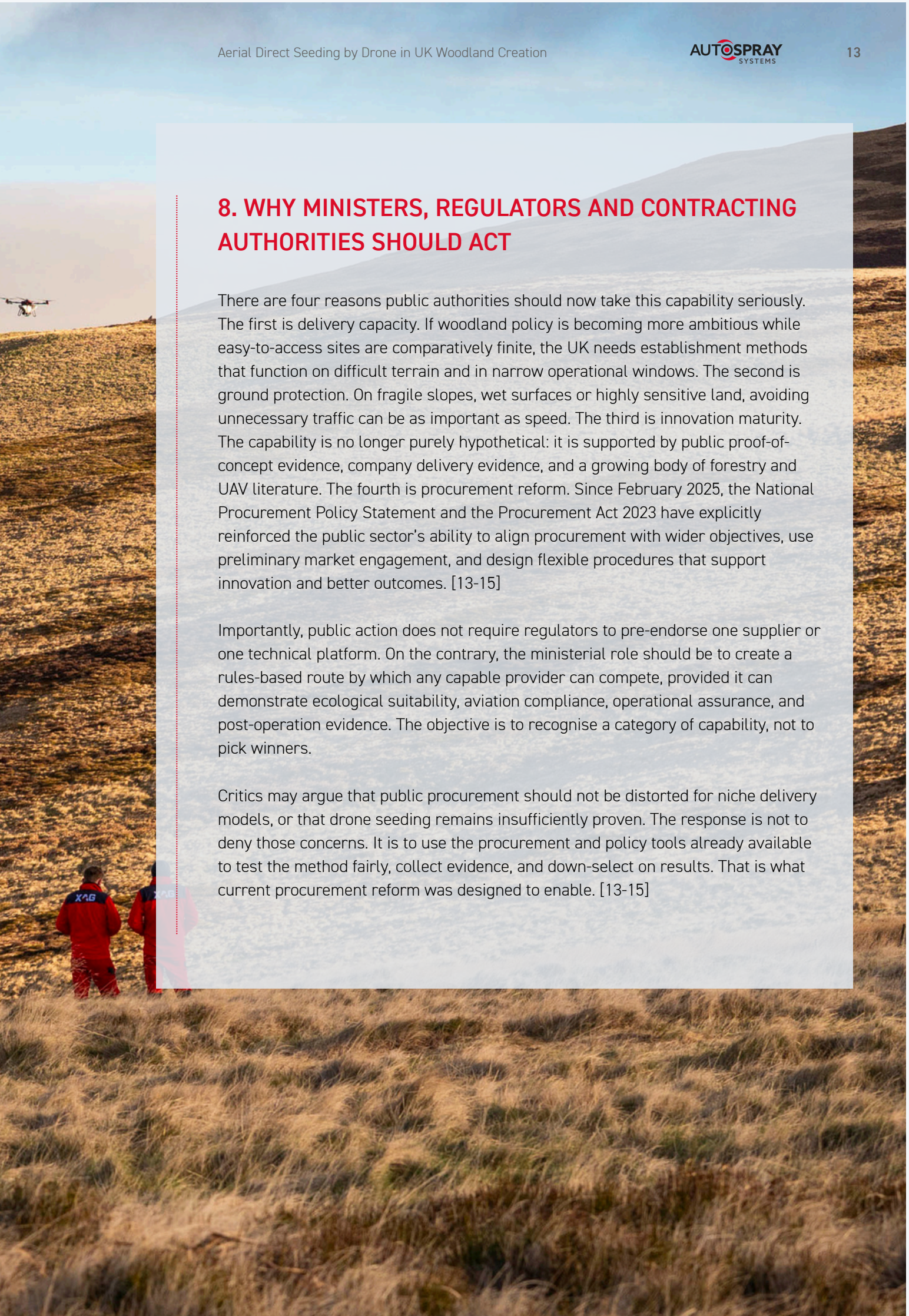
7. POLICY AND ENVIRONMENTAL GUARDRAILS

For a UK forestry audience, the most important policy anchor is the UK Forestry Standard. The UKFS is the technical standard for sustainable forest management in the UK and provides a basis for regulation, monitoring and grant-making. In practical terms it is the framework that keeps woodland creation attached to biodiversity, landscape, water, soil, climate and historic-environment responsibilities rather than allowing technology choice to drive design. [6]

The complementary message from government woodland-creation guidance is equally direct: planting must be the right tree in the right place. Government and Forestry Commission material emphasise that new woodland must integrate with landscape, soils, water and habitats, and that inappropriate planting on deep peat or priority habitats is unacceptable. That sentence belongs near the centre of any serious drone-seeding narrative, because it shows that the sector is not asking ministers to relax environmental safeguards in order to accelerate hectares. [6, 7]

The carbon-policy link is important but must also be handled carefully. The Woodland Carbon Code is the UK government-backed quality-assurance standard for woodland carbon projects. It requires new woodland to remove carbon dioxide while also supporting nature and delivering wider benefits. The implication is not that drone seeding is a carbon project in itself; rather, better establishment methods can help sound woodland projects happen in places where the design is already environmentally justified. [5]

For ministers and regulators, the correct policy line is therefore simple: recognition of drone direct seeding must be explicitly conditional on UKFS compliance, right-tree-right-place principles, and clear environmental exclusions. That is not a limitation to apologise for. It is what makes the capability governable at national scale.



8. WHY MINISTERS, REGULATORS AND CONTRACTING AUTHORITIES SHOULD ACT

There are four reasons public authorities should now take this capability seriously. The first is delivery capacity. If woodland policy is becoming more ambitious while easy-to-access sites are comparatively finite, the UK needs establishment methods that function on difficult terrain and in narrow operational windows. The second is ground protection. On fragile slopes, wet surfaces or highly sensitive land, avoiding unnecessary traffic can be as important as speed. The third is innovation maturity. The capability is no longer purely hypothetical: it is supported by public proof-of-concept evidence, company delivery evidence, and a growing body of forestry and UAV literature. The fourth is procurement reform. Since February 2025, the National Procurement Policy Statement and the Procurement Act 2023 have explicitly reinforced the public sector's ability to align procurement with wider objectives, use preliminary market engagement, and design flexible procedures that support innovation and better outcomes. [13-15]

Importantly, public action does not require regulators to pre-endorse one supplier or one technical platform. On the contrary, the ministerial role should be to create a rules-based route by which any capable provider can compete, provided it can demonstrate ecological suitability, aviation compliance, operational assurance, and post-operation evidence. The objective is to recognise a category of capability, not to pick winners.

Critics may argue that public procurement should not be distorted for niche delivery models, or that drone seeding remains insufficiently proven. The response is not to deny those concerns. It is to use the procurement and policy tools already available to test the method fairly, collect evidence, and down-select on results. That is what current procurement reform was designed to enable. [13-15]

9. PROCUREMENT AND TENDER REFORM

This is the section where policy ambition must become administratively usable. The current barrier is rarely a matter of legality; rather, it is a critical lack of visibility and awareness within the procurement process. Because many public schemes and framework assumptions specify conventional planting by default, aerial direct seeding remains invisible at the commercial design stage. We must move beyond 'planting-only' assumptions to ensure this capability is seen and considered where it is the most proportionate option.

The National Procurement Policy Statement now in force states that public procurement can support wider policy objectives such as skills, jobs and net zero, and contracting authorities must have regard to that statement when carrying out procurement under the Procurement Act 2023. The Act and its guidance also provide for preliminary market engagement and flexible competitive procedure design. That means ministers and public authorities do not need new primary legislation to begin incorporating aerial direct seeding where justified. They need better procurement design and clearer policy signalling. [13-15]

The first reform should be specification design. Public tenders for woodland creation, rewilding, catchment restoration and inaccessible-land establishment should be written in outcome terms wherever possible. Instead of assuming one acceptable method, they should state the woodland objective, the environmental constraints, the evidence required, and the performance measures for establishment. Suppliers should then be permitted to propose planting, direct seeding by drone, assisted natural regeneration, or mixed-method approaches where consistent with the site and the tender rules.

The second reform should be early market engagement. Government guidance under the Procurement Act states that preliminary market engagement is particularly important because contracting authorities now have significant flexibility to design and tailor competitive procedures. It can also improve access for SMEs and new entrants. In this context, a targeted market-engagement phase would allow public authorities to understand what drone seeding can and cannot credibly deliver, what evidence suppliers can provide, and how pilot lots should be structured without giving any supplier unfair advantage. [14]

The third reform should be the deliberate use of trials pilots. The Sourcing Playbook is clear that trials pilots are a best-practice route for understanding environment, constraints, requirements, risks and opportunities, and that they generate quality data capable of informing technical specifications. Where services are being introduced for the first time, or where authorities are testing new technology or innovation, pilots are specifically recommended. That is exactly the circumstance here. [15]

The fourth reform should be lot design. Instead of forcing all woodland-establishment work into one homogenous procurement bundle, contracting authorities should be able to create lots for inaccessible terrain, fragile ground, pilot restoration blocks, or mixed-method demonstration areas. This would allow conventional planting to continue where it is strongest while giving aerial methods a fair route to compete where their strengths are relevant.

TABLE 5. TENDER AND PROCUREMENT CHANGES THAT WOULD MATERIALLY IMPROVE THE POLICY ENVIRONMENT

Current problem	Recommended reform	Why the reform stands up to scrutiny
Planting-only assumptions in specifications	Move to technology-neutral, outcome-based specifications	Does not lower standards; it widens method choice while keeping ecological and performance requirements fixed.
Limited understanding of drone capability among buyers	Use preliminary market engagement notices and open engagement events	Explicitly supported under the Procurement Act 2023 guidance and improves competition and transparency.
Fear of scaling an immature method	Create pilot lots and monitored proof-of-concept phases	Supported by the Sourcing Playbook and creates quality data before full rollout.
Mixed sites procured as if one method fits every compartment	Use lots for inaccessible terrain, fragile ground or mixed-method areas	Improves proportionality and avoids forcing unsuitable methods onto unsuitable land.
Weak post-award evidence requirements	Specify mandatory monitoring and data-return protocols	Ensures government buys outcomes and learns from delivery rather than activity alone.

A useful ministerial instruction would be that future public woodland-establishment tenders should not exclude aerial direct seeding by drone where the supplier can demonstrate: UKFS-compliant woodland design; species and seed rationale; aviation legality and operational assurance; a defined monitoring methodology; and transparent reporting of outcomes. That is the practical pivot point between rhetoric and implementation.

Illustrative procurement wording

"Suppliers may propose planting, direct seeding by drone, assisted natural regeneration or a mixed-method approach, provided the proposed method is demonstrably appropriate to the site, consistent with the UK Forestry Standard, and supported by a monitoring and assurance plan proportionate to the ecological and operational risks."

This would not oblige contracting authorities to award contracts to aerial methods. It would simply stop them ruling such methods out before evidence has been considered. That is the correct standard for a public sector operating under both environmental safeguards and procurement reform.

10. STANDARDS, SKILLS AND NATIONAL POLICY DEVELOPMENT

A capability becomes serious when it is translated into rules, training, data, and shared expectations. That is the stage UK forestry drone operations are now entering. AutoSpray Systems has established a UK-wide capability built on universal standards and Lantra-accredited training, delivered through the AutoSpray Pilot Network (ASPN). This professional ecosystem operates under a unified 'operator-of-record' model with standardised application categories and centralised directory governance to ensure commercial readiness. AutoSpray Systems further states that it is engaging with FISA to support the development of a national policy position for drone use in forestry, and that it is developing a seeding- and fertilising-specific training course and qualification with a UK national awarding body. Those are strategically important developments because they move the conversation away from isolated flights and toward sector standards. [18-20, CS2, CS3]

For ministers and regulators, the policy opportunity is to channel that development into an agreed minimum standard rather than allow fragmented practice to establish the de facto market norm. A credible standard would include four pillars.

- Aviation legality and operator governance: clear responsibility, permissions, operating procedures and competency.
- Silvicultural competence: species knowledge, seed handling, establishment limitations, and site-suitability judgement.
- Environmental assurance: UKFS alignment, habitat exclusions, records and traceability.
- Evidence and monitoring: standard methods for reporting sowing rate, coverage, emergence and follow-up outcomes.

None of this needs to be over-engineered. The danger at this stage is not under-regulation alone; it is also the creation of an impossible approval burden that blocks learning entirely. A proportionate standard should therefore distinguish between pilot work, routine commercial delivery and higher-risk contexts such as sensitive designated landscapes or larger-scale public procurement. The right model is graduated assurance, not either laissez-faire or paralysis.

The ASPN roll-out is relevant here. A nationwide operating framework means the sector is increasingly able to move beyond "one exceptional pilot on one exceptional site" and toward repeatable regional delivery under common governance. If government wishes to encourage resilient, competitive supply rather than single-site novelty, that is the sort of operational architecture it should want to see.

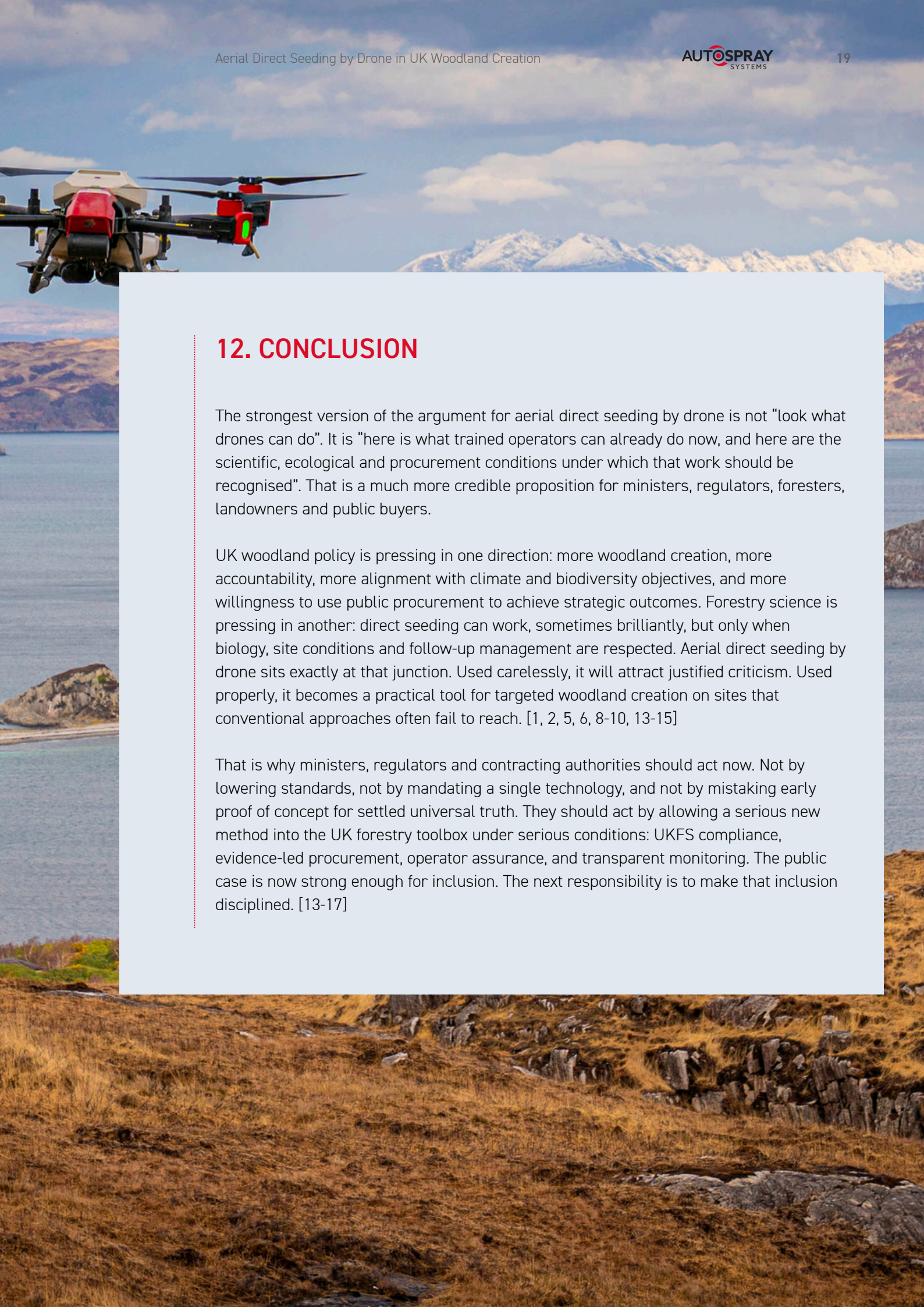
11. IMPLEMENTATION ROADMAP

The route from capability recognition to routine use does not need to be speculative. A practical implementation pathway is available now.

TABLE 6. A RAPID PUBLIC-SECTOR ROADMAP FOR 2026-2027 UPTAKE

Phase	Action	Primary outcome
0-3 months	Issue a clear policy signal that aerial direct seeding by drone is an eligible woodland-establishment method where UKFS compliance and site suitability are demonstrated; convene an expert roundtable with Forest Research, Woodland Trust, National Trust, Academia and UK contractors to agree the fastest credible route to wider deployment.	Removes default exclusion immediately and aligns science, land management and delivery expertise in time to influence the 2026-2027 season.
3-6 months	Run preliminary market engagement, publish an interim minimum evidence pack, and identify tender lots and trial-commercial opportunities for inaccessible, fragile or mixed-method sites in the 2026-2027 season.	Accelerates commercial uptake for the next season by giving buyers a usable route to market and suppliers a clear basis for competition.
9-12 months	Award technology-neutral procurements and monitored contracts on suitable sites, with standardised reporting on sowing rate, coverage, emergence and establishment so early commercial delivery can be scaled on evidence rather than delay.	Turns policy intent into hectares delivered, creates comparable first-season evidence and supports year-on-year growth toward climate and woodland-creation goals.
12-18 months	Update framework wording, guidance and evaluation templates using operational evidence; recognise assured delivery models and expand repeat procurement where results are positive.	Moves from proof-of-concept procurement to routine but conditional market inclusion.

At each stage, the discipline should remain the same: maintain UKFS guardrails, specify evidence requirements in advance, and separate biological performance from delivery performance as far as the data allow. Where pilots fail, the public sector should learn openly. Where they succeed, it should refine and scale. That is how emerging delivery models become mature public capability.



12. CONCLUSION

The strongest version of the argument for aerial direct seeding by drone is not "look what drones can do". It is "here is what trained operators can already do now, and here are the scientific, ecological and procurement conditions under which that work should be recognised". That is a much more credible proposition for ministers, regulators, foresters, landowners and public buyers.

UK woodland policy is pressing in one direction: more woodland creation, more accountability, more alignment with climate and biodiversity objectives, and more willingness to use public procurement to achieve strategic outcomes. Forestry science is pressing in another: direct seeding can work, sometimes brilliantly, but only when biology, site conditions and follow-up management are respected. Aerial direct seeding by drone sits exactly at that junction. Used carelessly, it will attract justified criticism. Used properly, it becomes a practical tool for targeted woodland creation on sites that conventional approaches often fail to reach. [1, 2, 5, 6, 8-10, 13-15]

That is why ministers, regulators and contracting authorities should act now. Not by lowering standards, not by mandating a single technology, and not by mistaking early proof of concept for settled universal truth. They should act by allowing a serious new method into the UK forestry toolbox under serious conditions: UKFS compliance, evidence-led procurement, operator assurance, and transparent monitoring. The public case is now strong enough for inclusion. The next responsibility is to make that inclusion disciplined. [13-17]

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[CS3] AutoSpray Systems company statement supplied for this paper: development of a seeding- and fertilising-specific training course and qualification with a UK national awarding body.