Wildlife Trust for Beds, Cambs & Northants

Monitoring & Research Report

Report on ride re-profiling at Waresley and Gransden woods

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Summary

This report presents the results of 4 years of monitoring woodland rides at Waresley and Gransden Woods. A section of ride was re-profiled in autumn 2021 to attempt to improve drainage and reduce the amount of muddy, trampled bare ground. The first year of monitoring was in 2021 before management, and the following three years were after management. Comparison of sketches of ride profiles, fixed-point photos, and plant species records show that so far the trial has been successful at reducing the bare ground on the ride, and without a loss in numbers of plant species. Access to the re-profiled section was restricted until 2023, and a return to higher levels of public use did result in an increase in bare ground again, but the increase in overall ride width means there is more undisturbed ride vegetation to either side than before re-profiling.

Introduction

The rides and paths at Waresley and Gransden Woods have increasingly become trampled and muddy during periods of wet weather in recent years. On the main rides, this is partly due to the physical profile of the ride being lower towards the centre, which holds water on the ride surface rather than encouraging it to drain off towards the ditches at either side. The ditches themselves have also become filled in with sediment and vegetation in many places, further reducing drainage. Many visitors to the wood avoid the central muddy areas by walking around/to the side of them, which gradually results in an increase in the area of bare ground and loss of vegetation. The same conditions occur across many woodland nature reserves, particularly those on clay soil.

In 2021 it was decided to trial re-profiling a section of the main ride at Waresley and Gransden. The aims were:

- To reduce the amount of bare ground which is prone to becoming muddy and restore the ride to a more vegetated state by:
    - Reshaping the ride to a 'whaleback profile' creating a slightly higher point in the centre, to help water drain to the edges of the ride and integrating the ditches into the edges of the ride so that a tractor and flail collector can mow right to the edges of the whole structure
    - widening the ride to increase the amount of grassland habitat within the woodland
    - breaking up compacted soil
- To monitor the impacts so that, if successful, re-profiling could be rolled out to additional sections of ride at Waresley and other reserves, and results can be shared with other teams and organisations

Some woodland reserves have been closed to visitors during wet conditions, to attempt to reduce the impacts. However, muddy paths and site closures can both be the subject of visitor complaints. A potential additional benefit of the trial could therefore also be to improve access for visitors and reduce the number of complaints.

This report presents the results of monitoring of the trial from 2021-2024.

Methods

In 2021, three 200m sections were mapped out: two on the main ride (also known as Howard's ride) and one on the cross ride (Mears ride). See figure 1. One main ride section would be managed by re-profiling, and the other would be monitored as a control. There was a possibility of extending the trial into this control section, hence the addition of a second control on the cross ride, to ensure data could be collected on an un-managed section of ride.

The re-profiling was done in September 2021. All of the soil and other material was re-used on site within the re-profiled area, and no additional material was brought in.

The re-profiled section of ride was closed to the public until August 2023, to allow the structure to stabilize and new vegetation to establish.

Waresley ride re-profiling trial map showing monitored sections

Figure 1. Ride sections

Ride profile recording

In order to record the physical differences in the ride before and after re-profiling, and to allow some assessment of the effects of management on the width/extent of muddy bare ground in particular, four line transects were set up across each section. These were located at 10m, 70m, 130m and 190m from

the beginning of each section. Line transects recorded the general vegetation type across the ride from the outside edge of one ditch across to the outside edge of the other ditch.
Transects were recorded facing south-east on the main ride and facing west on the cross ride.

Waresley ride re-profiling trial map showing transects across monitored sections

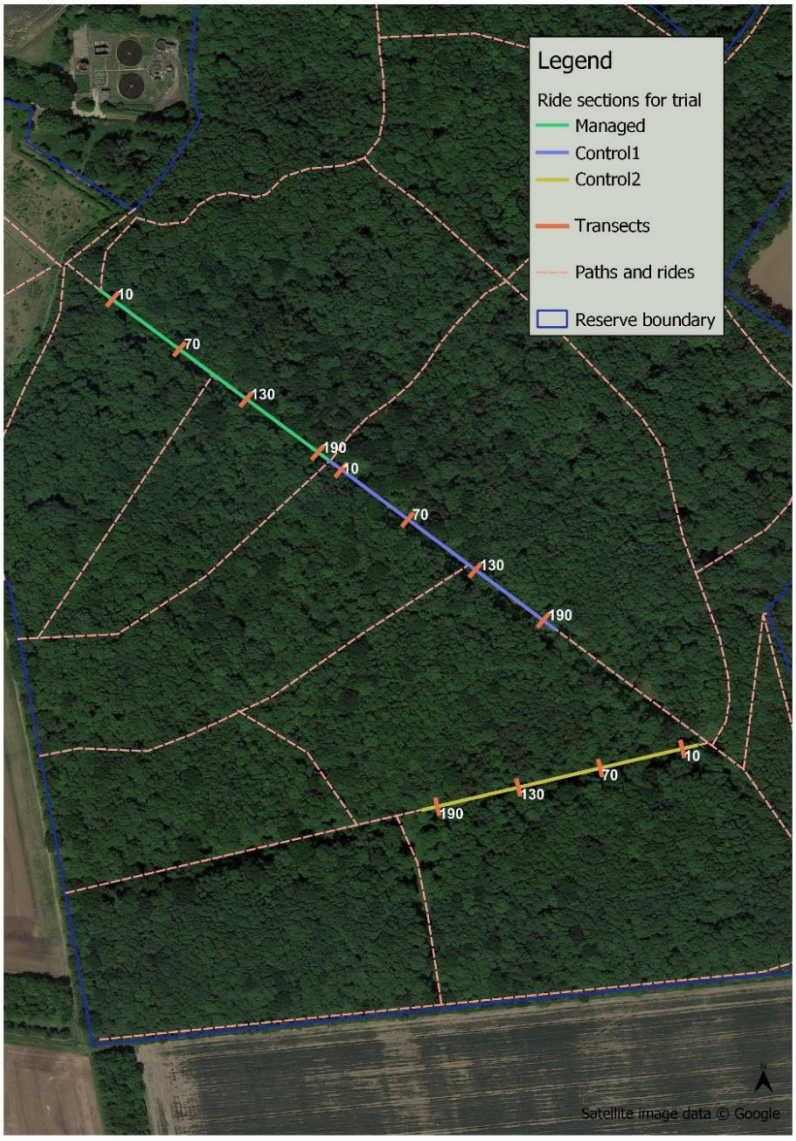


Figure 2. Map showing ride sections and transect locations

Fixed point photos

Photos were taken from each end of the managed section, looking into the section, each year.
Additional photos were taken at each of the transect locations, on all three sections, in 2021 and 2023.

Transect photos were facing the same direction as the transects (south-east on the main ride and west on the cross ride).

Plant species recording

Vegetation on the ride was recorded using quadrats, with 10 quadrats in each section. Quadrats were located at randomised distances from the start of each section. A random number generator was used to generate 10 numbers between 0 and 200, all ending in 5 or 0.
2 x 2m quadrats were placed midway between the centre of the trodden path and the near side of the ditch. If the quadrat location ended in 5, quadrats were placed on the left-hand side. If the quadrat location ended in 0, quadrats were placed on the right-hand side. Left and right were determined based on a surveyor facing south-east on the main ride and west on the cross ride.

All plant species present within each quadrat were recorded, with no assessment of abundance.

A sweep up/walkover of each section was done after the quadrats were completed, to add any species not recorded within quadrats.

Quadrat surveys were completed in late May/early June each year, but there was an additional earlier visit in April with a quick walkover just to note any species (e.g. violets, oxlip, primrose) that would be harder to identify by June. These sweep-ups allowed an overall species list to be created for each ride, which could then be compared with data from previous surveys (2000 and 2007). Note that the previous surveys did not divide the rides into sections in the same way.

The number of quadrats a species was found in was used to give a simple measure of abundance for the ride section. Dominant = occurred in 8-10 quadrats, abundant = 5-7 quadrats, frequent = 3-5 quadrats, occasional = 2 quadrats, rare = 1 quadrat. Species only recorded in sweep-ups were classed as rare.

Seeding

An additional small-scale trial of sowing locally collected seed of some woodland species was started in 2022. Seeds from 8 different species were sown. Species and amounts of seed used are listed in table 1.

Table 1. Seed sown

Species	Weight (g)	Approx. #seeds/g
Purple loosestrife	41	20,000
Meadowsweet	35.3	1,000
Wild angelica	28.5	100
Enchanter's nightshade	2.8	625
Devil's bit scabious	2.5	650
Agrimony	1.0	60
Betony	0.9	700
Hairy St. John's-wort	0.7	12,000

The location for the seeding was a small strip 27m long and averaging approximately 1m wide, in one of the wider areas of the re-profiled ride. The seeding was confined to this section so that it would not

influence results of the general monitoring. The ride is wide enough in this area that quadrats placed halfway between the centre and edge of the ride would not be within the seeded area.

Figure 3. Map showing approximate extent of re-profiled ride, and location of seeding trial

There was much more seed for three of the species than for the others; purple loosestrife, meadowsweet and wild angelica. Therefore, seed could not be scattered evenly for all species. The three most abundant species were sown all the way along the seeded section, with two different methods (scattered evenly and sown in clumps) to see if this made any difference to germination. The remainder of the species were all scattered at one end of the seeded plot (See figure 4).

Figure 4. Detail of seeded area, showing locations of different species, and sowing methods

Results

Ride profiles

As a result of the management work, the overall width of the ride in the re-profiled section has increased. The average width from outer ditch edge to outer ditch edge was 6.6m in 2021, and 11.5m in 2022. However, the width of muddy, bare ground has decreased. The average width of the central area of trampled bare ground on the re-profiled section was 0.9m in 2021. In 2022 and 2023 there was no trampled bare ground on this section. In 2024, after the ride was re-opened, the increased level of access has created some bare ground again. The average width in 2024 was 0.4m.

It should be noted that despite the re-profiled section being closed to the public in 2022/23, it was still being used. A path appeared very quickly around the Heras fencing panels blocking access onto the closed section of ride, and visitors have been observed going around the fencing. However, many visitors did respect the closure, so the level of foot traffic was much lower than normal.

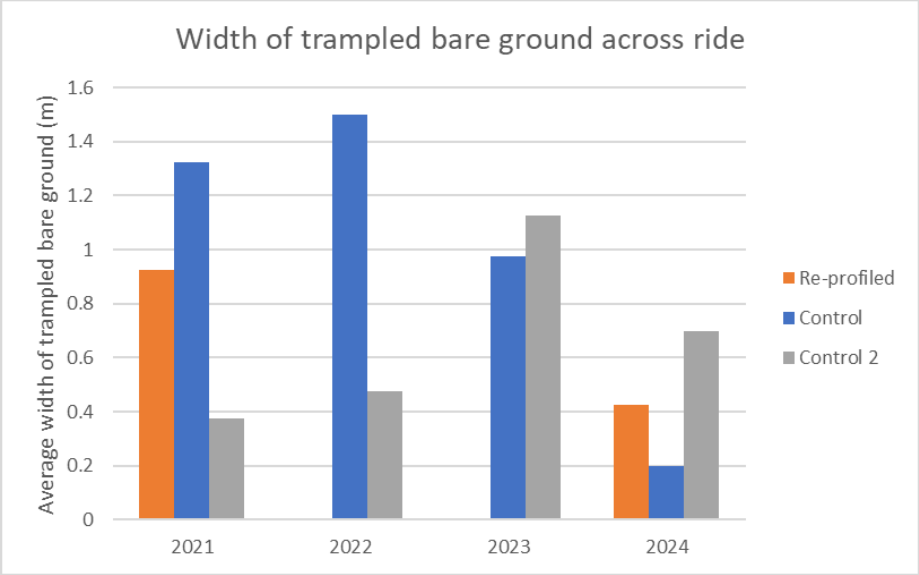


Figure 5. Average width of trampled bare ground across each section of ride.

As well as completely bare and trampled areas, on some transects there were additional areas of bare ground forming a mosaic with short grass and herbs. These are not always as heavily trampled, but are still areas of concern, as there is little vegetation to help protect the ground from becoming muddier. In the re-profiled section there was initially some bare ground/vegetation mosaic as plants colonized the ride. But here, by 2023 most of the areas that had been a mosaic of bare ground and vegetation had filled in to be completely covered by vegetation. Average height of vegetation was also taller by 2023 (see fixed point photos and figure 7). However, after re-opening the re-profiled section, the average width of bare ground and bare/vegetation mosaic together was back up to being very similar to the average for the first control.

The average width of just bare ground on the first control section has decreased since 2022. There has been significant tree felling adjacent to this section, which has allowed more light in. The decreased shading is probably the reason the trampled areas have become less muddy in this section and shifted from mostly bare ground to a smaller area of bare ground, with more bare ground/vegetation mosaic. The overall trampled width, including bare/vegetation mosaic, has been increasing slightly in control 1 over time.

The amount of bare ground and bare/vegetation mosaic in control two was slightly higher in 2023, possibly because more people were using this ride as part of their route while the re-profiled section was closed. The amount of trampled area then decreased again in control 2 in 2024. This was likely due to a combination of re-opening of the managed section, and the whole wood being closed for much of the autumn/winter 2023/24.

It is concerning that despite the wood closure, levels of trampling on the main ride (managed section and control 1) were still high.

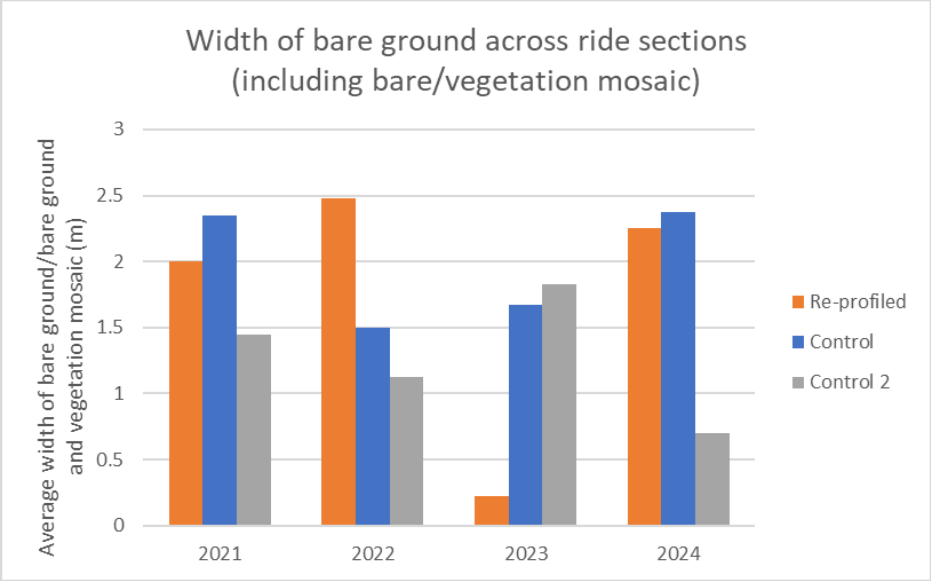


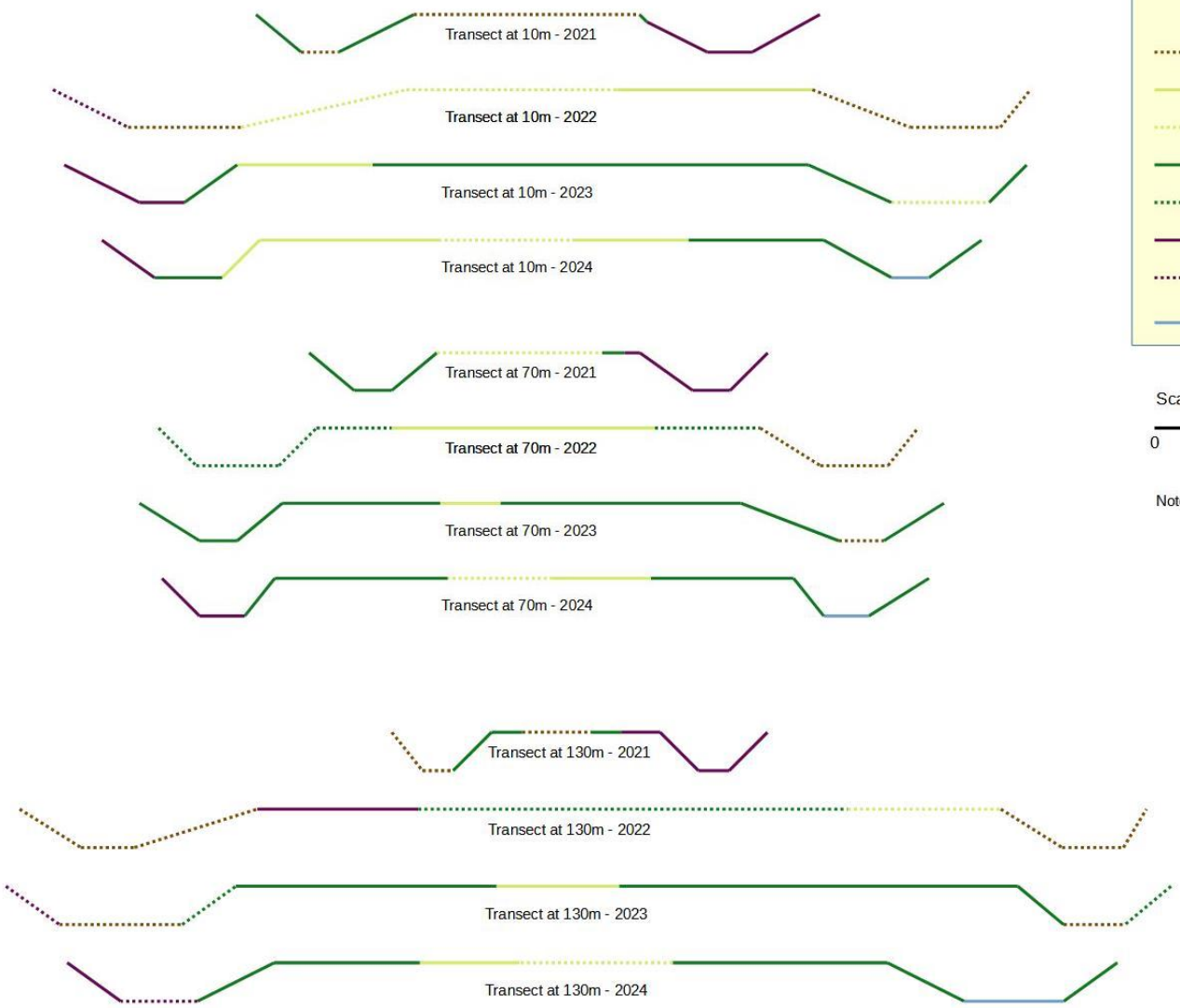
Figure 6. Average width of bare ground and/or bare ground and vegetation mosaic across each section of ride.

Further monitoring should help to determine whether there is any long-term trend in the amount of bare ground and/or bare ground/vegetation mosaic following re-profiling.

Figure 7 shows the detail of vegetation types present across all the transects on the re-profiled section each year.

Transects across managed section of Waresley ride showing vegetation types

(distances are from the end of the managed section closest to Brownes' piece, transect drawn facing SE along ride)



LEGEND

- Bare ground
- Short grass/herbs
- Scattered short grass/herbs on bare ground
- Long grass/herbs
- Scattered long grass/herbs on bare ground
- Bramble
- Scattered bramble on bare ground
- Standing water

Scale (m)

0 1 2

Note depth/vertical not to scale

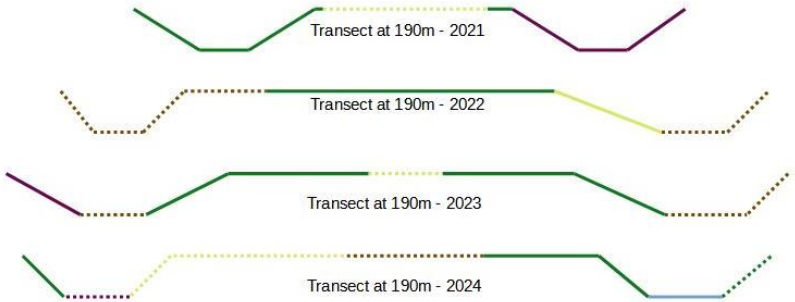


Figure 7. Comparison of transects across the re-profiled section each year.

Fixed point photos

Fixed point photos of the re-profiled section clearly show the progression of colonization by vegetation after management. Figures 8-12 show the re-profiled section from the northwest end, and figures 13-17 show the view from the southeast end.

Figure 8. April 2021, managed section, before re-profiling , from NW end

Figure 9. September 2021, managed section, immediately after re-profiling, from NW end

Figure 10. June 2022, managed section, from NW end

Figure 11. May 2023, managed section, from NW end

Figure 12. May 2024, managed section, from NW end

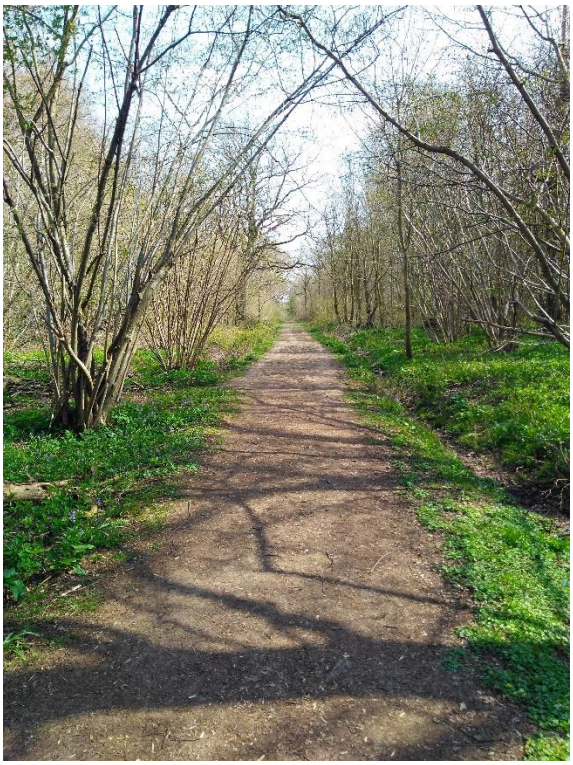


Figure 13. April 2021, managed section, before re-profiling , from SE end

Figure 14. September 2021, managed section, immediately after re-profiling, from SE end

Figure 15. June 2022, managed section, from SE end

Figure 16. May 2023, managed section, from SE end

Figure 17. May 2023, managed section, from SE end

Photos of the first control section demonstrate that although the transects recorded a shift from just bare ground to more bare ground/vegetation mosaic, the overall amount of trampling has been fairly consistent. As an example, figures 18-20 show control 1 (main ride), from the northwest end.

Figure 18. Figure 16. June 2021, control 1 from NW end

Figure 19. May 2023, control 1 from NW end

Figure 20. May 2023, control 1 from NW end

Plant species recording

The total number of plant species recorded on the re-profiled section was not significantly different before and after management.

Table 2. Number of plant species recorded on each ride section 2021-2023

N.B. Records which are potential duplicates (e.g. dock sp. when a specific dock such as wood dock was also listed) have not been included in these totals.

Section	Year	Total	In quadrats	From sweep-up/ spring visit
Re-profiled	2021	71	52	19
	2022	68	51	17
	2023	72	61	11
	2024	78	67	11
Control 1	2021	61	45	15
	2022	53	43	10
	2023	59	49	10
	2024	61	48	13
Control 2	2021	58	45	13
	2022	49	38	11
	2023	60	46	14
	2024	62	46	16

The species list for the re-profiled section is slightly different before and after management. A total of 10 species which were recorded in 2021 have so far have not been recorded after the re-profiling. None of these were more than rare in 2021, so there has been no loss of formerly abundant species.

Table 3. Plant species recorded on the re-profiled section in 2021, but not afterwards

Scientific name	Common name
Anthriscus sylvestris	Cow parsley
Clinopodium vulgare	Wild basil
Convolvulus arvensis	Field bindweed
Crepis biennis	Rough hawk's-beard
Juncus inflexus	Hard rush
Prunus avium	Wild cherry
Stellaria media	Chickweed
Valeriana officinalis	Common valerian
Viburnum lantana	Wayfaring tree
Viola riviniana	Common dog-violet

Comparison with records before 2021

There are species records for the rides at Waresley and Gransden from surveys done in 2000, and 2007. These are not directly comparable with the current monitoring. The 2007 survey used the same randomized quadrat methods, but not the same sections. The 2000 survey was a more general walkover survey. Therefore records just for the re-profiled area can't be separated out. However, the total number of species for the main ride (combining the re-profiled area and control 1 for 2021-23) can be compared across all years.

Table 4. Total number of plant species recorded on the main ride, by year

Year	Total number of species
2024	91
2023	83
2022	79
2021	81
2007	93
2000	58

Differences in which species are present can also be compared over this longer time period.

17 species have been recorded after management, which were not recorded in any of the 2000, 2007 or 2021 surveys, i.e. these are "new" species for the ride. Some of these are species associated with disturbed ground, which were only recorded in the first year or two after re-profiling. 23 species have been recorded following management that had not been recorded in 2021, but were present earlier (2000 and/or 2007), i.e. "returned" species.

Table 5. Plant species not recorded in 2021, that have been recorded post re-profiling (Species highlighted in yellow are "returned" species, i.e. were recorded previously, in 2000 and/or 2007)

Scientific name	Common name
Alliaria petiolata	Garlic mustard
Alopecurus myosuroides	Black-grass
Anagallis arvensis	Scarlet pimpernel
Arctium minus	Lesser burdock
Betula pendula	Silver birch
Bromus hordaceus	Soft-brome
Callitriche sp.	Water starwort
Carex pallescens	Pale sedge
Centaureum erythraea	Common centaury
Cerastium fontanum	Common mouse-ear
Chenopodium sp.	Goosefoot
Cirsium arvense	Creeping thistle
Cirsium vulgare	Spear thistle
Crepis capillaris	Smooth hawk's-beard
Cynosurus cristatus	Crested dog's-tail
Epilobium montanum	Broad-leaved willowherb
Fragaria vesca	Wild strawberry
Galium uliginosum*	Fen bedstraw
Geranium dissectum	Cut-leaved cranesbill
Helminthotheca echioides	Bristly oxtongue
Hypericum tetrapterum	Square-stalked St. John's-wort
Juncus articulates	Jointed rush
Juncus bufonius	Toad rush
Lapsana communis	Nipplewort
Listera ovata	Common twayblade
Lolium perenne	Perennial rye-grass
Myosotis arvensis	Field forget-me-not
Persicaria maculosa	Redshank
Plantago lanceolata	Ribwort plantain
Populus tremula	Aspen
Prunella vulgaris	Self-heal
Ribes sp.	Currant
Schedonorus arundinacea	Tall fescue
Scrophularia nodosa	Common figwort
Senecio vulgaris	Common groundsel
Silene flos-cuculi	Ragged robin
Sonchus asper	Prickly sow-thistle

Sonchus oleraceus	Smooth sow-thistle
Trifolium repens	White clover
Viola reichenbachiana	Early dog-violet

*Note that Galium palustre was previously recorded – one of these may be a mis-identification

Seeding

Six out of the eight seeded species had established in the seeded area by June 2023. Purple loosestrife, meadowsweet, wild angelica, enchanter's nightshade and hairy St. John's-wort were also present elsewhere on the ride, from the existing seedbank. Devil's bit scabious is the only species which is present in the seeded area, but has not come up naturally in other areas of the ride. By 2024, betony had also appeared in the seeded area. Agrimony so far has not appeared.

There is no noticeable difference so far between the scattered and clumped seeding areas.

Discussion

Overall the results of this trial so far are positive. The disturbance to the soil and existing vegetation was a potential concern, but there has been no drop in the number of plant species recorded, and the overall plant community is very similar before and after the work.

There was an initial decrease in the area of muddy, bare ground after re-profiling, but once this area was re-opened to “normal” levels of access, this decrease may have been reversed. Further monitoring should help to determine whether this was a temporary change, or a long-term trend. However, even if the re-profiling has not succeeded in reducing the area trampled in the long term, the overall widening of the ride means that there is more space either side of the trampled are for ride vegetation to survive.

Monitoring of control sections of ride have demonstrated that there is some natural variation from year to year anyway in both ride structure/area of bare ground and in the number of plant species recorded. It is not yet clear whether there are any long-term trends in either direction in the records from the control sections.

Vegetation established rapidly from bare soil after re-profiling, and the number of plant species that have colonised naturally is very similar to the number of species that were present before management. Hopefully this means that in any future re-profiling, there will be no need to re-seed an area to get a good range of plant species.

A few species have not been recorded since before the re-profiling, but only some of these would be desirable on a grassland ride anyway. Some may return naturally with time anyway, as the plant community continues to evolve. If there was a particularly strong reason to re-introduce a species, the seeding trial demonstrated that many species can successfully be seeded in, again within one year’s growing season.

The number of “new” and “returned” species that have appeared on the ride since re-profiling is encouraging. A few of these are less desirable, but are early colonisers associated with disturbed ground, so have gradually decreased of their own accord.

Initially, the re-profiling was also very successful at reducing the area of muddy, bare ground. However, now that levels of foot traffic down the ride have returned to more like pre-management levels, areas of muddy bare ground have re-appeared. It remains to be seen what the impacts will be in the long term, and whether the return to increased access will change the plant community.

The first control section is being re-profiled in 2024, so comparison with control 1 will no longer be possible.

It is recommended that monitoring should continue for at least another two seasons (2025 and 2026), to continue to record any changes in plant communities on the first re-profiled section and to get a better idea of the effects of a return to normal levels of foot traffic. Monitoring of the second re-profiled section should show whether there is a similar result in terms of number of plants species recorded, and how quickly vegetation re-establishes.

Control 2 is a slightly different character – it is on a narrower, more shaded ride. However, it can still provide a general comparison with both re-profiled sections.