frontiers | Frontiers in Sustainable Cities

TYPE Original Research
PUBLISHED 28 July 2023
DOI 10.3389/frsc.2023.1195807

OPEN ACCESS

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RECEIVED 28 March 2023
ACCEPTED 11 July 2023
PUBLISHED 28 July 2023

CITATION
Walsh C and Allan P (2023) Encountering grasslands: a collective approach to urban biodiversity. *Front. Sustain. Cities* 5:1195807. doi: 10.3389/frsc.2023.1195807

Encountering grasslands: a collective approach to urban biodiversity

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While the prolific nature of many grass and herbaceous species in urban parks offers an opportunity to cultivate more biodiverse and dynamic grasslands, widespread maintenance practices and complex cultural, economic, and bureaucratic forces often result in the undervaluing and regular destruction of these plant species. The research described in this paper reimagines the way grassy landscapes are cared for and understood in urban environments. Located in an urban park in inner Sydney, Australia, and using design research methods of observation, physical care, storytelling and installation, the research proposes three "frames of care" to assist landscape architects and other spatial designers to engage with communities at a local level. The frames have the potential to expand collective understandings of grassland communities, test alternative maintenance practices, and better support urban biodiversity and seasonal flux. With acknowledgment to the complexities of urban sites such as these, experimental installation provided a promising space to meaningfully engage with the local community and build a foundation to generate greater reciprocity between humans and non-humans of the site.

KEYWORDS

urban resilience, community resilience, urban grasslands, adaptive management, landscape architecture

1. Introduction

During the heavy rains of La Niña in the summer of 2021–2022, the mowers were forced to stop for a little while and the parkland lawns of Sydney's Inner West grew long. They seemed to embrace a new quality; they were softer and more lively. The grass started to hum with insects. After only a few weeks a diversity of herbaceous and grass species began to emerge and these plant species were able to do what they do best: build healthy soils, hold rainwater, clean toxins from the air and form flowers that would feed and house a variety of other beings.

Human and grass relations are complex and entangled. We have traded and grown this plant group for thousands of years around the world and across cultures. Australia grows, sells, cuts, poisons, and destroys this family of plant, investing billions of dollars in the protection of some and destruction of others (Marshall et al., 2013) and yet many would not think twice about their everyday encounters with grass. Countless species have been introduced to Australia with agricultural and social interests at heart. Complex native grasslands are replaced by monocultures of cereal and lawn grasses and understorey grassland species are removed to simplify maintenance regimes or appease cultural attitudes. In a time of ecological and biodiversity crisis (WWF, 2020), the prolific presence of shortly cut grass in urban environments contributes little toward combatting these issues (Aronson et al., 2017).

FIGURE 1
Physical care and learning through manual plant removal of grassland species in Camperdown Memorial Rest Park, Sydney.

Like the root system of a grassland, a healthy urban community is resilient, interconnected, and interdependent. Made up of both humans and non-humans, they exist in a mesh of networks that bind together to form an ecosystem that can adapt in the face of changing circumstances. Grassroots approaches like these are agile, often less bound to bureaucratic obligation or regulation, more closely relying on relationships, energy to advocate, and local knowledge and skills (Rauws, 2017; Allan and Plant, 2022). This kind of community-led approach to support grassland health in urban areas enhances biodiversity whilst simultaneously strengthening community interaction of humans together within their more-than-human environments (Kuo, 2015), through increased ecological knowledge and literacy.

The research described in this paper reimagines the way we consider and care for grassy landscapes in urban environments[1] (Figure 1). It focuses on what can be done to promote biodiversity in urban environments at a local community scale, calling for a grassroots approach where economic, social, and bureaucratic constraints provide challenging circumstances for change-making. Sited in an urban park in inner Sydney, where remnants of Western Sydney's grasslands exist in an adjacent historic cemetery walled off from the park, the research uses methods of observation, physical care, installation, and community engagement to explore how human/landscape relations might be reconfigured. It advocates for ongoing relations with a landscape or site and suggests alternative practices of care and maintenance which are at the heart of an emerging shift in the landscape architectural discipline.

2. Background

2.1. Cultural grassy landscapes

The roots of our cultural ties with the lawn stem back to the time when park landscapes were emerging in Europe. Regarded by wealthy English landowners in the seventeenth century as a status symbol due to the heavy reliance on labor intensive methods to weed and scythe the grass, the role of the lawn in these landscapes was to mimic the appearance of a green carpet, rather than encourage the coexistence of species in a dynamic ecosystem (Ignatieva and Hedblom, 2018). Though once a landscape of luxury, the lawn is now widespread due to its ease of maintenance with the advent of powered mowers and cheap selective herbicides. It has become one of the most widely used landscape typologies within public urban areas, making up an average of 11% of the total areas of our cities (Ignatieva et al., 2020).

In contrast to the lawn, grass*lands* composed of a matrix of long-lived perennial grasses and forbs and a variety of seasonal short-lived species (Benson, 1996) are lively entities, responsive and dynamic within their environments, rippling with winds, glowing in sunlight, and flattened by rains. Though grassland communities form the foundations of the food chain in many ecosystems, supporting the life cycles of many insect, bird, and mammal species, from afar their diversity is subtle and if one does not look closely, their complexity and detail can be missed.

Grasslands thrive on disturbance: First Nations Peoples of South Eastern Australia managed the grasslands with fire to attract kangaroos to the new grass shoots and clear the dead biomass, leaving light and space for forbs to grow (Gammage, 2012), providing the roots that made up a significant part of the First Peoples' diet. Soil was continually aerated and species thinned as bulbs were dug up (Williams et al., 2015). Cultural practices are tightly woven with the physical form of landscapes. Songlines, performed through intricate song, dance, and art, assemble practical knowledge, teaching harvesting methods, cultural customs, and land management practices (Neale and Kelly, 2020) that build and store knowledge by associating it with a real-world space. The "embodied" nature of these cultural practices and deep connectedness with the landscape reflect knowledge, values and stories that are inextricably connected to the environments in which they take place (Neale and Kelly, 2020).

Part of the endangered Cumberland Plain Woodland community, Sydney's original grasslands have mostly disappeared. Only 9% remain (NSW OHE, 2022) in small reserves, on patches of private property and in cemeteries, which because of their distribution and spatial extent across the urban landscape can provide a network of steppingstones for birds while individual sites, when relatively undisturbed, can operate as biodiversity refugia for grasses, trees, mosses, lichens, orchids, rare mushrooms and herbs (Löki et al., 2019). Urban environments may seem unlikely places of refuge for grasslands. But with adjustments to maintenance regimes, urban parks, road verges and backyard spaces can encourage a diversity of exotic and native species of grass to thrive and even support species that in their natural habitat are threatened.

Globally, there is increased awareness and research that supports diverse management techniques and the establishment meadow/grassland-like conditions in urban spaces. *"No mow"* approaches that allow wildflower meadows to emerge have been embraced in many cities in the United Kingdom (UK); road verges in Finland with delayed and partial mowing found higher species richness and abundance of butterflies and moths, compared to mid-summer and late-summer complete mowing (Valtonern et al., 2006 qtd in Wintergerst et al., 2021) and experimental mowing practices

1 Undertaken as part of a Masters of Landscape Architecture at UTS, Sydney.

in the United States show how novel species in lawn design and management can foster more interesting spatial conditions (Geffel, 2021). Research on perennial urban meadows across Europe found that they support many more invertebrates than mown lawns even when not in flower (Hoyle and Mell, 2022). And in Los Angeles, practitioners are working incrementally with parkland test plots, slowly building ecological knowledge and community connection through educational and creative workshops (Godshall and Jones, 2021).

Novel or spontaneous ecologies, considered to be assemblages of both non-native and native plant species that grow in disturbed sites from human activity, (Hobbs et al., 2006; Fischer et al., 2020) are becoming increasingly recognized for their biodiversity value and role in green infrastructure. The presence of ongoing regular disturbance, soil and nutrient changes and exposure to pollution (air and run off) in many urban areas indicates restoration of exclusively historic native species is untenable (Marshall et al., 2013). Reintroduction of native species to disturbed novel sites, however, has been tested in Germany with promising results. Introducing seed and from surrounding provenance to existing tilled areas of novel ecologies, found significant greater species richness in all tested plots in comparison to control plots (Fischer et al., 2020). In Italy, studies of a site inhabited with spontaneous ecologies, before and after it was shifted to be managed as an urban park, found a significant reduction in species diversity, primarily in native species (80%) over non-native (50%) (Filibeck et al., 2016). The study emphasized the importance of supporting native and endemic plants in urban environments. Whilst being pragmatic about the eradication of non-natives, integrating a range of alternative management techniques such as sheep grazing instead of mowing, will help prevent the biotic homogenisation of urban spaces (Filibeck et al., 2016). Whilst this research is promising, the application of these techniques, such as overseeding of spontaneous ecologies, requires further testing within the Australian context, where native grassland species require differing conditions to those studied in Europe.

2.2. The challenges of establishing diverse grassy landscapes in Australian cities

While there is increased public acceptance and support globally for converting short cut lawns into meadows in the interests of biodiversity (Fischer et al., 2013). This is correlated to the level and density of flowering species in grassy meadows. Acceptance in Australia, where grassland flowering species density is lower, is more difficult to achieve (Hoyle and Mell, 2022). Urbanized environments in Australia (Ignatieva et al., 2020) present further complexities: Local Council politics; a lack of biodiversity focused projects; economic constraints; social and cultural forces (where perceptions of messiness play a key role); and constraints within the landscape architecture discipline itself all make establishment of grassy landscapes in Australian cities particularly challenging.

A reduction in federal and state government funding in New South Wales for local councils has forced many smaller councils to amalgamate (Patricia, 2021). Recent research identifies five management techniques that act as key constraints on biodiversity in urban areas; maintenance of lawn; removal of habitat; pruning and leaf litter removal; simplification of habitat structure; and herbicide and pesticide applications (Aronson et al., 2017), and faced with economic and resource constraints and complaints about unmown grass from residents some councils employ all five of these, increasing mowing rates and directing limited resources toward suppressing grass and "weed" species (Inner West Council, 2021). Sydney's Inner West Council's Urban Biodiversity Strategy for example targets "weeds" as a threat (Marrickville Council, 2011) and almost all spontaneous herbaceous plants are sprayed, despite many non-native spontaneous plants providing important habitat and ecological services (Kirkpatrick and Greene, 2021). This, coupled with an almost exclusive focus on conservation efforts incrementally adds to the homogenisation of the urban landscape.

This emphasis on the suppression of weeds is complicated by the native vs exotic debate in Australia. Plant choices have become political choices, particularly in public urban environments (Kirkpatrick and Greene, 2021). It was only in the mid-late twentieth century that celebration and protection of this continent's flora and fauna took hold within (colonial) Australia's culture. Forty years ago the winners of the Royal Park design competition in Melbourne envisaged "a coherent," informal pattern of dominant eucalypts in a naturalistic woodland, crowned with the hill covered in native grasses focusing largely on the picturesque encounters of a "native Australian landscape." Its implementation took several years, many replantings, extensive herbicide application and clearing of existing "exotic" species (Instone, 2010). Now, the "threat" to these species' manifests within planting practices in the city, with the use of sterile "politically native" plants, despite the erasure of endemic ecologies in these spaces happening long ago (Kirkpatrick and Greene, 2021).

While as a discipline landscape architects have focused on "designing with nature" (McHarg), there is also a tendency to design spaces based on aesthetic, political and theoretical perceptions (Kwak et al., 2021), more about "making a place of art" with the landscape as canvas, rather than interacting within a broader network of energies and ecologies (Howett, 1985). In some areas, the discipline has seen practitioners begin to move away from approaches such as these, integrating spontaneous ecologies and new forms of ongoing management (Geffel, 2021; Waterman, 2022; Catalano et al., 2023), however, is largely research based and has yet to be integrated into widespread industry practice. Contemporary parkland management exists far from nuanced understandings of landscapes, where often little knowledge of plants species is required or of the strategies necessary to maintain them. Landscape architects are rarely involved with projects beyond the 12 months "post-completion" phase (Van Valkenburgh, 2013) and the "maintenance" of landscape architectural projects, still the costliest phase over the project's life cycle, is the phase that is generally most undervalued and overlooked during the design process (Prior and Vial, 2016). Instead, landscape architects are primarily engaged for the design and documentation of a spatial outcome, rather than ongoing and iterative management of a site. As Jess Stewart notes, "lean fees and program constraints… results in a surface view of landscape, with limited ability to understand in any depth… [the] many intangible aspects of place" (Stewart, 2022).

Even when designers manage to make space in their practice for alternative approaches, there can be difficulties. Recently, landscape architect Sue Barnsley designed the southern edge of Sydney's Prince Alfred Park as a testing ground for native and novel species to grow. Residents were outraged, perceiving the grasses as messy and unkempt so Barnsley and the City of Sydney Council defined the area as "Native Meadow" recalling, through signage, the site's history and ecological significance and in doing so softening the outrage toward its perceived "messiness" (ABC Network, 2014).

2.3. Community-based care practices

One of the first steps to move away from this "mow, blow, and go" approach is to expand the timescales of engagement, and to integrate closer embodied care and learnings about plants and the broader landscapes in which they live. This kind of practice helps to shift away from a "settler common sense" that centers human exceptionalism and exploitation, to methods that reframe our understanding of the land that better comprehends more-than-human sentience (Myers, 2020).

Architect Jeremy Till for example, proposes a framework of participatory or tactical urbanism that emphasizes the agency of people, communities and non-human actors in shaping the built environment (Awan et al., 2013). More broadly in landscape architecture and urban design, community engagement has been critiqued for its "shallow level of 'public consultation'… often only informing certain members of the public about the already-agreed-on plan" (Firns and Grabasch, 2016). In contrast to this, participatory urbanism is a framework that aims to address these concerns. Architect Fritz Haeg's "Edible estates," a project Till refers to in his book Spatial Agency, embraces architecture as a tool for shaping social and environmental systems, working actively together with local residents to convert their front lawns into urban food gardens. The success of projects such as these rely on relationships, communities, and the complex systems in which the architectural intervention exists, rather than necessarily the design itself. Joan Nassauer reinforces these notions through her work, emphasizing the need for designers to collaborate with local communities to create landscapes that are socially meaningful as well as ecologically healthy, and that if the former is not acknowledged, the success of the project as a whole could be compromised (Nassauer, 1995).

When communities value and advocate for urban ecological landscapes it can have significant impacts on the resilience of plants, people, and their complex inter-relationships. Community-led organizations such as Bushcare, Landcare and "urban forestry" groups are increasingly popular in Australia, and interest in these locally led movements is evidence of a desire for connection to and stewardship for local ecological communities. A report conducted in 2021 outlines the benefits that Landcare volunteers experience; 90 per cent of participants reported feeling more connected to people, and 93 per cent feel more connected to the environment (Fitzsimmons, 2022). A majority of both groups, and particularly younger people, said their mental wellbeing had improved as a result. Community gardens are another popular way for communities to build ecological and social connections. A study into a community garden in Waterloo, Sydney, for example, found that the garden helped residents reclaim public space, connect with nature, develop a sense of community, and learn about the environment (Corkery, 2004). Other local government initiatives such as Adopt-a-Park allow residents to improve their local parks through community plantings, rubbish clean ups and cultural and education programs.

FIGURE 2
Dominated by lawns, there is little biodiversity of Camperdown Memorial Rest Park. Looking toward the walls confining Camperdown Cemetery beyond.

These precedents are particularly useful as examples of alternative governance, care and maintenance practices that can help residents develop more meaningful relationships with the open spaces in their local community.

3. The site

The research set out to reimagine the design and maintenance of Camperdown Memorial Rest Park (CMRP) in Newtown in the Inner West of Sydney in a way that might support a more biodiverse, resilient, and connected community of humans plants, soils and animal species. Like many urban parks in the area, CMRP emerged during the late 19th to mid-20th centuries reflecting "Western"[2] colonial ideals, values of the picturesque and order with an emphasis on a human/nature dichotomy (Figure 2). Dominated by lawn, crosscut by desire lines, paved pathways and embellished with clumps and borders of trees, these spaces are rarely associated with the notion of biodiversity.

The park sits at the tip of a shale wedge that expands out toward Western Sydney (Geoscience Australia, 2014) at a junction between the sandstone landscapes of the east and the much softer and more subtle clay-based shale hills visible to the west that once supported open wooded grasslands where understorey was dominated by a matrix of grasses, forbs and low growing shrubs (Benson and Howell, 1990). What differentiates this site from other urban parks is that it is one of the oldest colonial cemeteries in

2 The term Western is used in this paper for lack of a better word that broadly describes settler and colonial culture and worldviews of the United Kingdom, USA, Canada, Australia, and New Zealand.

FIGURE 3
Remnant grass species are free to grow as they please in Camperdown Cemetery.

Sydney (Figure 3), a large portion of its perimeter was converted to public park in 1950s and the remaining internal portion of the cemetery was walled off.[3] The conditions on either side of the wall evolved in ways that reflect how we value and perceive certain kinds of landscapes and in turn, maintain or care for them: the park side of the wall is intensively managed and controlled, with little diversity or seasonal flux.

Mowing takes place on a 3-week cycle, mulch to suppress spontaneous plant growth is spread accordingly and the spraying of herbicides occurs twice yearly.[4] In contrast, on the cemetery side, the landscape is allowed to largely do what it likes. Its colonial heritage supports its protection and minor manual work by the *"Friends of"* group means the grasses ebb and flow in growth and dormancy. Remnant grasslands still grow between the crumbling and eroding headstones,[5] as well as many non-natives.[6]

4. Methodology

Given the complexity of the challenges previously described, design was used as the primary research methodology because it "integrates analytic research (i.e., modeling and examination) and design creation (i.e., place-making) using processes that incorporate feedback to help adaptively achieve resilient design solutions" (Kwak et al., 2021).

The design research focused on a variety of alternative maintenance and care practices that would effect small shifts whilst fostering deeper ecological knowledge and appreciation of the area. This took two forms: the first proposed physical changes to the park to increase biodiversity and seasonal flux; the second, a series of installations, aimed to engage with the cultural understandings and perceptions of the grassy landscapes within the park and resulted in expanded knowledge and perceptions for both researchers and those who encountered the work. Both approaches aimed to offer an alternative lens through which human visitors might comprehend the plant species of the park that better recognized their role within urban ecosystems and expand their ideas of what "community" means.

Two principles arose from and guided the practice: "Learning through doing and designing 'with' *rather than 'for'*." Working with these suggested ways to slowly build biodiversity, knowledge, and care within the park and engage community members through an emphasis on the personal and emotional sides of human/plant relations.

4.1. Learning through doing

Knowledge of the soils and the plants that grow from them evolved through a process of *learning through doing*, for example in the physical tending of the cemetery's remnant grasslands with the local "friends of" group. Information relayed by the group coordinator and employee of the local council urban biodiversity team, Helen Knowles of each plant and its growth habits as certain species were pulled or left to grow was an engaging and memorable method for building/sharing knowledge compared with more traditional methods of learning the science of plants. It became clear this was an effective mnemonic technique: knowledge of the plants became embedded in the site itself and through the experience of touching and tending to them and was further reinforced through discussion and conversation of the plants with other volunteers.

4.2. Designing with

Designing with aims to work with those systems that are already actively shaping the site and will continue to after any kind of intervention is implemented. Using information gained through observations of the ecological, cultural and governance systems already operating, instead of a singular spatial design, *designing with* proposes small shifts that might begin to tweak or alter conditions. In this sense, harnessing Julian Raxworthy's notion of the "viridic," (referring to the design opportunities that the growth processes of plants offer) (Raxworthy, 2018) and expanding this to all the active ecological, cultural, and economic systems that continue to shape a site overtime, can offer a grounded way to approach design.

This included proposing to shift existing mowing and maintenance practices, the addition of more plant species within

3 The site was converted to a park after the awful murder of an 11 year old girl in the cemetery and locals called for it to transform from the "uncared for blot on our community" and the "Newtown Jungle"; into a space that was open, orderly and safe (Ollivain, 2021). They built an impenetrable sandstone block wall that divided the small area of cemetery to be retained and the new park which was created through the removal of the headstones (that now line the internal walls of the cemetery), desire line concrete paths and a layer of soil over the existing ground and seeding with turf.

4 This information was obtained through a conversation with the head of maintenance at the Inner West Council.

5 Kangaroo Grass (themeda triandra), Weeping Grass (Microlaena stipoides), Red leg grass (Bothriochloa macra), Basket grass (Oplismenus aemulus), Glycine tabacina are just some of the native species found.

6 Such as Kikuyu (Pennisetum clandestinum), Couch (Elymus repens) and Bermuda (Cynodon dactylon).

FIGURE 4
Excerpt from 10m fabric grassland drawing.

the site, and testing ways in which to tweak or alter cultural perceptions of the site. The role of design here was used in a way that hoped to alter how visitors of the park might use and engage with its grassy landscapes. This kind of adaptive practice makes efficient use of available resources and establishes an iterative method of designing overtime where feedback from each of the active systems described above could be integrated into future work.

4.3. Installations

Preliminary research suggested that if advocacy for these species was to develop and expand others' cultural understandings of them within the park, communication of the technical information surrounding the health and value of grasslands and specific species with the community was essential. That information was therefore reconfigured using techniques of drawing, storytelling, and embodiment to vividly render encounters and ways of experiencing the information (Figures 4–6).

Small experimental installations to be exhibited in the park took various forms: a fabric grassland drawing (Figure 5); a foldable leaflet; plant tale postcards (Figure 5); and an audio guided walk, each using different methods of expression to propose alternative ways of encountering and sensing grasses and plant species. Designed to be accessible to the public, the language used assumed no prior knowledge of ecology or landscape architecture and the methods of communication avoided the use of static information signage prevalent in public space design. The aim of the installations was to evoke qualitative or emotional responses toward the plant species and encourage those that encountered them to decentre themselves within the urban landscape (Figure 5).

5. Results

The following describes the design research in greater depth.

5.1. Iterative interventions to encourage diverse grassland typologies

The project's physical proposal reimagines the park as an interconnected grassland that weaves between trees, through sun and shade, one that is not exclusive to natives but would support

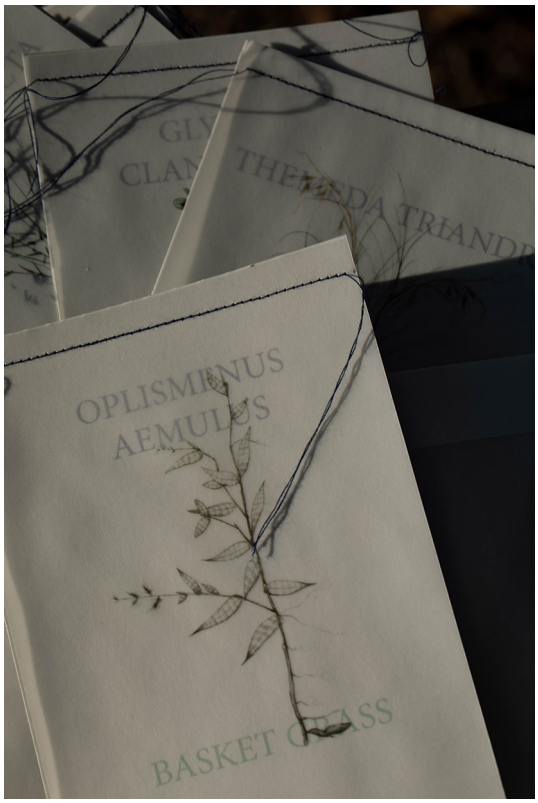

FIGURE 5
Park installation: plant tale postcards.

FIGURE 6
Park installation: fabric drawing.

water retention, habitat building and early plant succession. The proposal includes a series of typologies of grassland that sit on a spectrum of input level and available resources; *spontaneous grasslands*, *ephemeral grasslands*, *seeded endemic grasslands*, *planted endemics and spontaneous hybrids*, each intended to be used simultaneously to test various establishment and maintenance methods that build a diversity of conditions across the site (Figure 7).

Mowing is the current dominant maintenance practice that shapes and suppresses growth of grass and herbaceous species within the park. Adjusting this practice through differential mowing—a lawn management practice that describes cutting or leaving areas to grow at different rates—would increase biomass and diversity, reduce fuel costs, noise pollution, and save time and labor (Hostetler, 2021). This mowing approach would leave pockets to grow longer, predominantly along edges where human activity is minimal. Ceasing the use of herbicides, would allow broad-leafed species to begin to grow. These areas could be managed as *spontaneous grasslands*, where small forbs and herbaceous plants grow amongst the grasses and only taller shrubs and tree saplings are removed.

The *ephemeral grasslands*, where mowing is more regular, could take place in more heavily used areas such as the central lawn to the north[7] where patterns such as grassy graves (a reflection of the site's history) and ecological "islands," offering a variety of social habitats, would be periodically mown more frequently when use is high. While this approach encourages users of the park to contemplate how the maintenance of the grass changes its character as well as increasing biomass and species diversity.

The establishment of areas of *seeded endemic grasslands* is a more intensive intervention, though still relatively low on cost and input. Scalping is a practice used in grassland restoration that removes the top 100-200mm of soil to remove any "weed" seedbank (Williams et al., 2015). The application of builder's sand (or other media) to the area and dispersal of native seed mixes (held down by mesh or mat to prevent erosion in early phases) allows the plants to grow at high densities in a more cost-effective way than tube stock.[8] Sun and Shade mixes were proposed that emphasize high species diversity and would be planted at a density that prevents the establishment of spontaneous plants. Whilst spontaneous plants are not unwanted here, they can dominate and suppress natives, so early establishment methods such as high-density planting support the health of the natives long-term. This is not primarily a restoration project, however reintroducing species that have lived in the area or region previously will provide greater plant diversity and habitat for many native birds, lizards, and insects. Obtaining viable seed for grassland establishment has previously been a barrier for these kinds of projects, but the work of Paul Gibson-Roy and other specialists in developing seed production and harvesting techniques has made this less of a concern (Gibson-Roy, 2019). Such work has resulted in the selection of some species in the planting mixes that are not endemic to the area but indicate they could survive here.[9] In addition to seed quantity and quality being available, these species have been used in other grassland establishment projects.

7 The habits and preferences of human inhabitation within the site was observed in embodied care and therefore guides where and how interventions or maintenance practices should be implemented.

8 Seed will cost roughly 50c per sqm, though this does not include the equipment or labour to scalp the topsoil.

9 Species such as Dichelachne inaequiglumis (Edgar and Connor), Cymbopogon refractus, (Barbed-wire grass), Poa annua (Annual poa), Poa Labillardierei (poa), Dichanthium sericeum (Silky Blue grass).

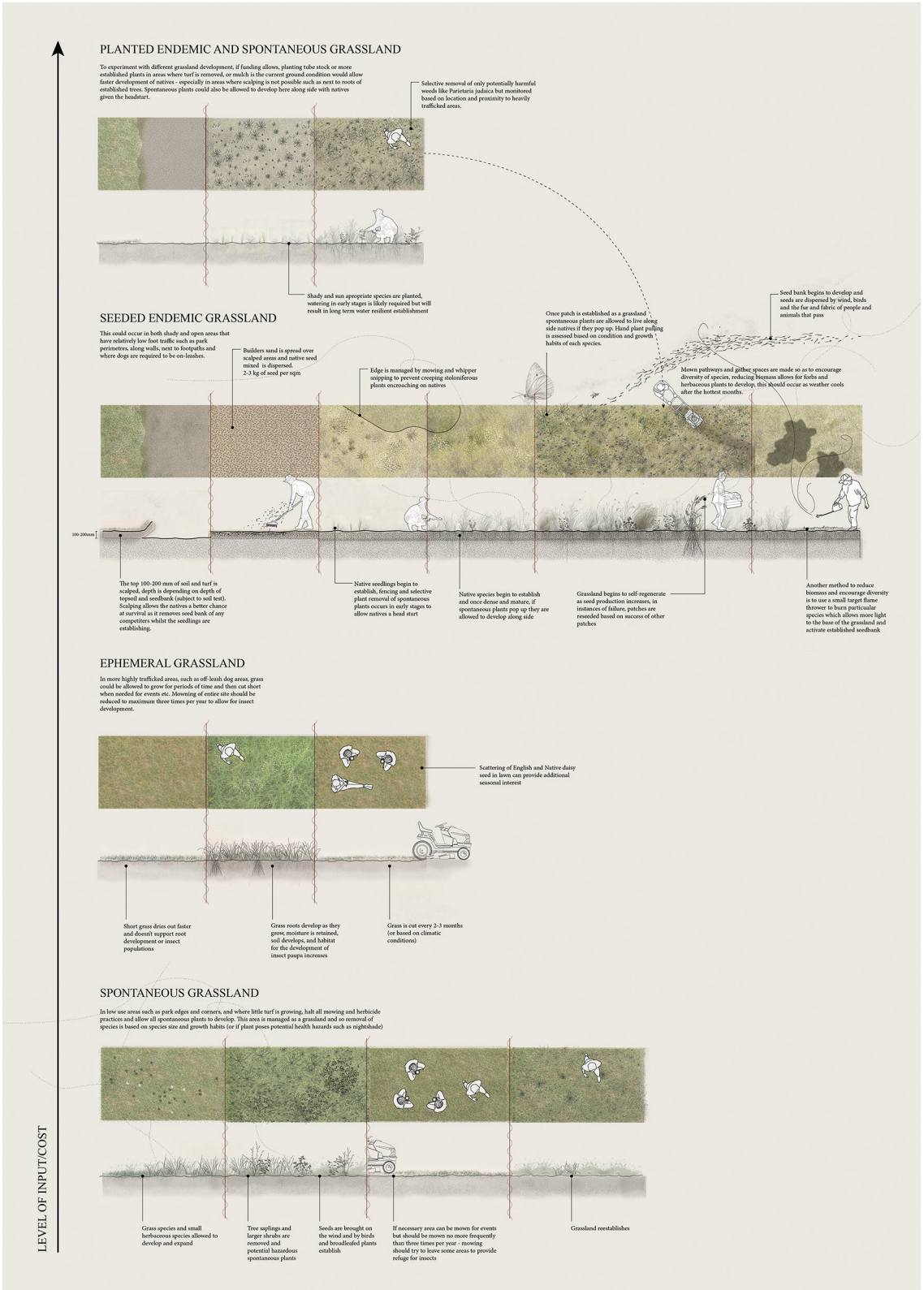

FIGURE 7
A spectrum of grassland typologies.

The final typology could be implemented where scalping is not possible (such as where tree roots are of concern). Planting tube stock and allowing growth of spontaneous plants would help develop diversity and ground cover where previously only bare soil and mulch were present. This approach may result in interesting plant assemblages but would likely also be one of the least accepted by the public and would require more manual weeding to prevent the native tube stock from being overrun.

Finally, mowing also provides a role in giving structure to the site. Curved shapes and mown pathways give form to the planting and a consistency across all the typologies. In addition, infrastructural interventions such as fencing, brick pathways, and areas of crushed concrete can prevent trampling and provide equitable access and gathering spaces but are also "cues to care" and can help frame the perceived "messiness" of these plant assemblages (Nassauer, 1995). These interventions help to give structure to the site but are "light-touch" and should be moved as plant growth evolves and changes. Incorporating design into these typologies is essential to engage with visitors in a spatial way. The configuration of each would alter how users might occupy the park, and therefore it is important to consider how they might balance the demands of both people and grassland species.

5.2. Fabric drawing installation

A fabric drawing, alongside the leaflets and postcards, was installed in the park over a series of three days in August 2022 at varying times of day to capture a variety of park users, whilst the audio guided walk was accessible via a QR code provided on a sign at the entry to the cemetery and remains a semi-permanent installation (as of May 2023). The installations were sited to encourage casual encounters with the material. The primary researcher periodically stood alongside the installation whilst also moving to observe and document from afar. Proximity to the installation allowed for conversations between the researcher and those who encountered it, who asked questions or gave insights and responses to the work. These conversations were informal and led by the individuals encountering the work. A few passers-by provided contact details for follow-up conversations and were later asked to provide further feedback on their responses to the installations.

The drawing printed on a large-scale piece of fabric was developed over the course of the research to better understand the growth habits of each species. Like a piece of fabric woven together by thousands of threads, a grassland is a mesh of thousands of leafy blades, entangled and interwoven that together build an entity. At almost one-to-one scale the canvas was a generous 10m long, allowing the complexity of the grassland to unfold as it changes over the course of two growth cycles. Stretched between three trees at the intersection of two key pathways within the park (Figure 8), the grassland connects back into itself, a never-ending cycle of flowering, seed dropping and dormancy as the grasslands evolve and change. Written components sewn into the drawing told stories of the grasses or offer prompts to the viewer that they might not have otherwise considered. The drawing was placed near a key walking route through the park.

FIGURE 8
Park installation: community interacting with fabric drawing, leaflets, and plant tale postcards.

A foldable leaflet accompanying the drawing allowed the viewer to continue to uncover and unfurl more information. With no implicit hierarchy, each flip and turn offered a different perspective to see and understand the grasses. A5 postcards presented technical scientific information retold as a story about several species illustrated in the drawing, encouraging the contemplation of each species as its own distinct being. Both leaflet and postcards allowed people to take part of the installation home with them.

The installation was open-ended, asking a series of questions that asked people how they might feel if the grass were to be left long; if the weeds were to grow; if they would be interested in getting involved; or how they might feel about the planting of natives. Butcher's paper and pencils encouraged people to respond, beginning conversations about what could be possible. It also provided a way in which to measure the receptiveness to the installation.

Each day that the fabric installation was displayed resulted in new insights and understandings. Many people first encountered the leaflets and postcards which were placed on a temporary bench adjacent to the installation and then followed on to examine the fabric drawing. Those who began to read the sewn stories were observed to follow the length of the drawing. It was evident these written prompts encouraged people to linger and examine the details, providing a direction in which to follow. The questions on the butcher's paper provided tangible responses from those who encountered the work, however, most responded directly to individual questions rather than the work as whole. Despite this, the respondents provided valuable insights and suggestions. Many aligned with the work that was already being developed as a part of the physical proposal for the park, with an emphasis on the planting of native and locally endemic grass species.

The conversations that resulted from the installations made clear the connection people have to the site. They shared their own stories of the park which could be incorporated into future installations. As noted by one resident, "the success of your installation was in leaving the visitor to respond to each of these considerations according to their own priorities and in their own time" and "has prompted me to examine my own ideas about open

spaces in general and grasses, as I'm sure it has for others." These tests and installations begin the advocacy work, however continued engagement with the local council is necessary if any physical changes are to be made to the park in the future. While preliminary and informal, what these early tests have the potential to do is plant a seed within the community that builds momentum and support for alternative practices and care of grasslands in urban parks.

The following table collates responses and comments from those who encountered the Installations (Figure 9).

5.3. Audio guided walk

Subtle features of the site and knowledge of the landscape were woven into a meditative walk through a landscape more often celebrated for its colonial history. The recording which is still live (as of May 2023) guides walkers around the cemetery, asking them to register how they feel, noticing the climatic and seasonal conditions of the site, as well as sharing information about what species live there. The nature of telling these stories expands the listener ways of seeing and understanding the site. It asks visitors to begin their own practice of embodied care in the site. Documentation of the results of the audio-guided walk can also be found in Figure 9.

6. Discussion

6.1. Three frames

Three frames: *Embodied care [for]*, *[building an archive of] Material knowledges* and *Entangled plant people socialities* emerged over the course of the research through the work of the installations and the testing of various design proposals. These were driven largely through physical encounters and learnings with the landscape and its inhabitants both human and more than human. Whilst presented individually here, each frame interacts with the others overlapping in various ways. The action of each simultaneously builds an approach that feeds a slower, more iterative, and attentive way of working with sites such as these.

The frames are a useful way to approach dense urban and contested sites. They encourage deeper knowledge of local specificities, the broader ecological, political, and cultural landscape and find where future opportunities or efforts might lie. They emerged *because* of social and observational encounters on site. In this way, they are a reflection of the site's "genius temporum" where *temporum* describes nested notions of time and seasons to the qualities of a place (Waterman, 2022). *Embodied care* and *Materials knowledges* provide the foundation for action, and our understandings of *Entangled plant people socialities* highlight the cultural context in which that action might take place.

Each of the frames was used as a lens for interpreting the knowledge collated over the course of the research—scientific, observational, conversational—giving each meaning and calling for them to be shared in alternative ways.

6.1.1. Embodied care [for]

Spending time in the landscape allows its nuanced qualities and ecological processes to be revealed. And care offers a multidimensional way in which to build relations to and with a site (Jones, 2019). It causes both a visceral and emotional need to act on and advocate for, whilst simultaneously taking the form of physical labor (Puig de la Bellacasa, 2017). The pairing of observation with an active practice of tending offers a way for humans to decentre themselves within a landscape. Ongoing and regular encounters with the site over the course of the research allowed close observation of its inhabitants and ecological processes as they changed over time. Unlike formal gardens, grassland plants are deeply entangled with each other, so removing a weed requires the body to negotiate each plant, careful not to trample or remove others in the process. Physical embodiment in a landscape becomes a direct way to understand it; the human body is just one amongst many that might alter or inhabit the site (Figure 1).

The research evolved to also expand and invite others to take part in their own *embodied care* for the site. By participating in the audio guided walk or spending time reading through the installation, a community of people began to embed the knowledge passed on, forming their own understandings and memories grounded in the site that might influence the way they encounter it in the future.

6.1.2. [Building an archive of] material knowledges

"When we learn plants names and their gifts, it opens the door for reciprocity" (Kimmerer, 2019).

This frame acknowledges the notion that knowledge is situated in time, culture and geographic space and asks us to contextualize the knowledge we hold (Haraway, 1988). Building upon *Embodied care*, the *archive of material knowledges* layers different forms of knowledge with observations of site over time to understand it more deeply. Scientific research, drawing, physical care and conversations were documented in a variety of different ways. An archive of material knowledge developed in this way has the potential to shape cultural and social worldviews. Storytelling and narrative play an important part in this process as a tool with which to both learn and pass knowledge on (Kimmerer, 2013). The installation, a temporary archive within the park, acted as both an educational/sharing tool and as a catalyst to embed further knowledge gained from those who encountered it.

Geological, chemical, and botanical knowledge were all layered into this archive of drawing, writing, photographs, audio, and video. The act of drawing each species growth habit, root system and seed head, together with the mnemonic effect of calling out species names and techniques whilst tending to them in the cemetery, all became ways to embed and synthesize different forms of knowledge.

6.1.3. Entangled plant people socialities

This frame recognizes the long and complex histories that build and shape the practices and aesthetics of landscape care and maintenance in urban environments today. Many practitioners, environmentalists, and academics acknowledge that lawn is

	Conversational comment	Written response
Fabric Installation	*'What you've done is beautiful, I've been having a rough time and these trees here are so important to me. They feel like my friends and so I think it's so nice that you've gone and made this drawing. Trees do so much for the world and we don't always recognize that'* *'People and their kids are scared of long grass, I see people actually pull their children away from it, they're scared of snakes or other things, but the snakes are of no concern in a place like this. It's still probably a concern for them even if it's not rational.'* *'We think it's great what you're doing. Some areas might better for planting [native grasses], perhaps over towards Lennox street where it's a bit quieter'* *'I did a little bit of volunteering for a Bushcare kind of group when I lived in Tasmania, I did it for the social side just as much [as environmental]. I'd love to do something around here too.'* *'What I really liked about it was how emotional it felt. It was really touching to read some of the little poem stories you'd written alongside the drawings and how important it is to feel a connection to nature. We all want that.'* *'I have some friends who do ecology who I think would be really interested in this'*	*'I love kangaroo grass, more of those please!'* *'Ideally native grasses everywhere!'* *'I would be interested in helping to tend the grasslands, is there a Facebook page I could follow?'* *'Would this be a breading ground for mosquitoes?'* *Correspondence from follow up conversations:* *'I thought your installation was very innovative and should have made passing users of the park curious to find out more.'* *'The installation was informative, the illustrations were particularly interesting and very well done along with the notes on the various species. I liked the way the presentation raised questions and invited the viewer to consider alternatives to current conventions. Your installation has prompted me to examine my own ideas about open spaces in general and grasses in particular, as I'm sure it has for others. I think part of its success was its "open-endedness" in terms of where we're headed and why. I think we also owe it to ourselves to question what we have come to consider as "normal". But the success of your installation was in leaving the visitor to respond to each of these considerations according to their own priorities and in their own time.'*
Qualitative knowledge of site gained through installation	*'My kids planted these trees here when they went to school around here in the 80's, a few of us [neighbours] have lived here for 45 years! There used to be no trees at all, it was really open, but there was a community planting thing with the school and each student got to plant a tree. They're absolutely beautiful'* *'Maybe you could plant out along the wall with natives, that'd be nice, hide a bit of the graffiti on that beautiful sandstone wall. It's made from some of the only pink sandstone in Sydney.'*	-
Audio-guided walk	-	*'You managed to weave in botany and geology with artistic description quite delicately which I reckon would be hard... it was exactly what I needed this afternoon,'* *'The way you told the story about the kangaroo grass was great because it wasn't 'here are all the facts', it was super personable so I felt that familial feeling'* *'Thank you. That was a lovely experience.'* *'This was so calming, informative and enjoyable, thank you!'*

FIGURE 9
Table of installation responses.

resource intensive and offers low environmental benefits, however, it continues to be implemented in design work because of its utility and the multi-million-dollar turf industry that props up its development and maintenance. What can be understood from the research is the role that culture, and social perceptions of plants play in how we treat them. It is therefore not enough to only develop an alternative management and intervention plan and expect it to be adopted. It is also essential to advocate for these herbaceous and grass species that are so undervalued in our urban environments by engaging with local communities, care groups, and government at all levels.

6.2. Looking beyond the project: future practices and grassroots initiatives

The three frames promote a practice of landscape architecture that can be developed and pursued beyond the project.

Integrating ongoing observations and care to a design practice that is further layered with scientific understandings builds a grounded foundation in which to make design moves. Furthermore, understanding how certain spatial interventions in a site will be received within their cultural contexts allows designers to make more efficient, meaningful, and long-lasting interventions. Using the frames as a lens encourages the landscape architect to become an ongoing negotiator between plants and people within the site, "embracing the dirt" (Frichot, 2019) and working with a community of many species. This kind of practice could involve ongoing consultation, action, and reflection building an iterative model of working with a site. Taking cues from tactical urbanism, design might begin with small low-cost tests, experimenting, gaining vital feedback from the community of both human and more than human that then informs larger changes. True resilient design means testing, reflecting and adjusting, allowing for better informed judgements for future resource allocation. Applying this iterative, and adaptive approach to a landscape architectural practice builds an agile and efficient way of working whilst acknowledging the agency of the landscape's inhabitants.

There are still many barriers in the industry preventing landscape architects from practicing in this iterative and ongoing way including a client's willingness, and various regulatory and economic structures. Open ended contracts for design experimentation are difficult for underfunded and under resourced local councils. For now, this kind of practice must largely rely on unpaid, grassroots approaches and advocacy from practitioners. What is possible within industry, however, is embedding components of this approach into existing practice to shift the way we approach sites such as these at a larger scale. Advocating for longer timeframes in contracts; integrating mowing/plant management into maintenance plans; ongoing site visits and observation; the use of installation and open community conversations, all support to build more meaningful design and healthier urban environments. There are several emerging small firms that have already begun to test these modes of working (Terremotto, Bush Projects, Wagon Landscaping, Estudi Marti Franch to name a few). In addition, carving out space within larger firms may also be possible where a consistent flow of projects can prop up more experimental forms of practice.[10] Each of these avenues should be pursued by those interested in altering practice, for change is made both within the system and outside of it.

Another approach might be establishing a Grassland Guardians collective of stewards to oversee the care of the park. The Guardians could become the mediator between grasslands and people who use the site providing the opportunity for education and experimentation. A collective of existing maintenance crews, landscape architects, ecologists and members of the local community could undertake a training program and upskill their knowledge of caring for sites and the plants that grow there. The program could partner with universities and local councils to manage the establishment of the grasslands as well as cultural programs to educate and involve the local community along the way.[11] This kind of program would require coordination, management and funding, however, grant programs such as the Green Neighborhoods Grant program run by the NSW Government provides funding for community groups and local councils for various "greening projects." These mostly focus on tree planting strategies and implementation, but successful past projects have also focused on education and research.

Within the time constraints and resources available during this research project a grassroots approach was the fastest and most flexible way to begin discussions with the community around grassland management. It became evident that the use of site-specific knowledge, and storytelling to convey the emotional connections/relationships humans have or might have with plants rendered an effective tool to influence those who encountered the installations. A social media presence and digital access to the guided walk allowed the project to continue to resonate with people, keeping the project alive and encouraging new connections and relationships to develop, although in the future, simultaneously pursuing an online presence of advocacy whilst continuing the installation might be an effective way to clarify communication and documentation of the qualitative information being collected.

What became clear over the course of the research is the role that grassroots, community led initiatives can play in building momentum and advocacy for healthy ecologies in our urban spaces. Furthermore, this practice of care need not be exclusive to landscape architects: it requires individuals from all areas to connect with these concepts and ecologies to be successful. Working with the broader community through a grassroots approach encourages encounters and care that can bring a level of meaning, connection, sense of community and ecological knowledge that would be impossible to develop otherwise. As urban communities are forced adjust to changing climate, political and economic challenges, an agility to move and respond quickly is required that often local government agencies cannot keep pace with. Tight community relations and local knowledge will ensure the health and resilience of both communities and the urban spaces they care for.

10 Although this may come with grievances surrounding projects that become "sacrificial."

11 This work could be implemented through a program such as the Adopt-a-park initiative outlined in the literature review.

The findings that have emerged from the research can be more broadly applied to various design fields, art practices or anyone that is interested in beginning a grassroots movement for ecological health within our cities. The Grasslands Guardians concept, for example, relies on a diversity of skills, rather than a strict form of landscape architectural practice. It is about collective learning and experimentation within public space that advocates for the voices of ecology and biodiversity in the city where they are so often stifled.

If managed appropriately, urban parks such as CMRP could become the refugia we need in our cities for a diversity of local endemic and other species to thrive. The emphasis on diversity is key here, the extensive use of pesticides and herbicides reduces the range of plants that can support various native and non-native insect, bird, and reptile populations (Carrington, 2019). Embracing pockets across the city and in our parks to create refugia like conditions will build a network of diverse habitat and spatial conditions for both humans and more-than-humans to survive and connect with one another.

7. Conclusion

In his book Ways of Seeing, James Bridle suggests "we are who we are because of our encounters with the more-than-human world. Any future in which we survive and thrive will require us to become even more together—in our lives, in our thinking, in our being and in our society," (Bridle, 2022).

The research described here proposes an ongoing practice of care for grass and herbaceous plants in urban environments that de-centers the human within a design process, a first step in reconfiguring our human and more-than-human relationships. It demonstrates how *Embodied care* for/with a place (instead of maintenance), when informed by *Material knowledges*, and understandings of *Entangled plant people socialities*, can offer a slow, more ecologically centered, inclusive and resource effective way of working with contested urban sites. The frames provide a structure in which to undertake site analysis (a practice of care) when practicing landscape architecture, and further, ways in which acting upon and with the landscape can develop over time. With each iteration and method tested, new learnings and information are revealed. Interventions such as maintenance and tending practices, low-cost iterative interventions and installation work all offer agile and adaptive methods that together can begin to shift both cultural perceptions as well as ecological configurations of a site. These approaches inherently rely on feedback and iteration from each method. The proposals are specific to CMRP but could be expanded to other sites of Sydney's Inner West.

Expanding humans' relations with grasslands in urban environments requires previous practices and cultural norms to be examined and understood to imagine alternative futures with these plant ecologies. There is opportunity here to expand our understandings of these plants and recognize their agency as lively beings that will contribute to more biodiverse, dynamic and healthy urban environments.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

Author contributions

Both authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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