Proposal for Assessing Feasibility of Goats as a Drainage Channel Landscaping Tool

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Executive Summary

The West Houston Association requested that Rice Consulting investigate the use of goats to control plant growth in Houston's drainage canals. This analysis included examining the present pilots in Houston, comparing them to pilots in other parts of the country, consulting with stakeholders, assessing ecological and operational risks, and developing three pilot programs at three separate sites.

Goat grazing holds considerable promise for reducing harmful gas emissions, lowering future maintenance costs, and increasing community engagement. Several goat projects in Houston have demonstrated that goats can be an inexpensive, helpful, and environmentally beneficial choice. Houston Public Works, for instance, spent around $4,000 on a 10-day test with 150 goats. They learned that it costs roughly $2,500 per acre of land to get a goat and $8,000 per acre of land to hire a staff to mow the area by hand. Goat programs have also worked well in other cities and towns in Wyoming and California, such as the Houston Arboretum.

Based on our study, we concluded that the three most suitable locations for testing are Willow Fork Drainage Ditch, Austin Point, and Fort Bend County MUD. In some regions, a 30-day diet costs between $1,000 and $3,000. The final price will depend on the quality of the land, the size of the herd, and whether or not a fence is needed. Environmental studies show that effective rotations, protective fencing, and vendor management can help mitigate issues such as overgrazing, erosion, and animal waste near rivers.

Our team recommends proceeding with the Willow Fork Drainage Ditch and Austin Point because they offer the best combination of community exposure, environmental value, and operational benefits. Fort Bend County, on the other hand, lacks strategic value because the current maintenance approach is already cost-effective. By focusing on the initial two sites, the district will be able to gather valid operational data that will help it decide how to grow in the future.

Introduction and Project Background

The Rice University Consulting Practicum team was assigned by West Houston to determine if goat grazing can be used as an alternative to other methods for controlling the growth of vegetation in drainage canals around Houston. Traditional mowing is an outdated approach that consumes many resources, generates significant pollution, and places considerable stress on the districts that maintain these corridors, both financially and in terms of labor. As Houston works towards its long-term sustainability goals, the value of grazing options that have lower impact and minimal pollution for regional upkeep has increased.

This study examines the feasibility of utilizing goat grazing as an alternative for conventional mowing and its potential for expansion. We discussed the environmental and economic benefits, compared programs in Houston and other U.S cities, evaluated a range of service options, and selected three suitable test sites. At the end of the report we include a comprehensive pilot design, predicted outcomes and final recommendations.

Project Overview

Houston's drainage channels demand regular upkeep to maintain community appearance, infrastructure integrity, and appropriate water flow. However, Houston emits more than 150 million metric tons of greenhouse gases annually, and mowing a single acre uses about six gallons of fossil fuel and generates 120 pounds of CO_2. As a result, current mowing methods present operational and environmental challenges. On an hourly basis, lawnmower emissions are higher than those of modern cards, and noise pollution affects nearby communities and schools.

A viable alternative is goat grazing. Goats provide zero-emission vegetation control, eliminate the need for chemical herbicides, and help improve soil health as they move across the land. The Houston Arboretum and municipal pilots in Wyoming and California are examples of benchmark programs that exhibit excellent operational performances while boosting community engagement.

Problem Scope

The goal of this research was to determine whether feeding goats could assist Houston with their drainage efforts. We had to look at these portions to make sure we met clear objectives.

- Cost-effectiveness: What is the cost comparison of traditional mowing versus goat grazing with all costs taken into account?
- Operational feasibility: How does goat grazing effectives vary with diverse terrains, vegetation densities, and weather conditions?
- Environmental sustainability: How do goats affect the soil, vegetation regrowth, and emission reduction?
- Stakeholder engagement: How do city staff, contractor, and community members perceive our goat grazing initiative, and what concerns can we address?
- Pilot site evaluation: How do different sites diverge and which maximize our needs and budget?

Research and Findings

The project moved in two key phases—(1) research and (2) pilot construction. The research phase itself consisted of two approaches, existing literature review and then proactive outreach and collection that built on our questions and insights from the review.

Project Operational and Environmental Context

The team began by reviewing data centered on understanding and contextualizing the project's purpose and scope. The initial project briefing details the need for a more eco-friendly alternative to traditional mowers. These mowers consume high amounts of resources that are neither cost nor environmentally efficient. Further research corroborated on the need for this change specifically in the Houston area.

As the energy capital of the world, Houston emits over 150 million metric tons of greenhouse gases a year, comparable to major cities like New York and even exceeding full mid-sized countries like Colombia or Norway. At a time when the effects of climate change are becoming increasingly visible and large in magnitude, mitigating the effects of these activities is critical. Accordingly, Houston, like many other major cities, has pledged to ambitious climate goals through its Green Action Plan, which details plans to reduce its footprint and promote sustainable practices throughout the city. The city aims to reduce its emissions by 80% by 2050. West Houston Association has helped contribute to both facets of this goal, with this project squared in the former. Mowing and landscaping is a surprising hidden contributor to emissions. Mowing just one acre of grass consumes six gallons of fossil fuel per year, leading to 120 pounds of carbon dioxide emissions. A lawn mower produces eleven times the emissions of the average new car in an hour. With thousands of residential lawns, large parks, and commercial spaces, the city encompasses tens of thousands of acres that need these services and that could benefit from a sustainable alternative.

Analysis of Goats as a Grazing Tool

Despite seeming like a novel approach, goats have actually become a well-documented grazing tool cited in several other municipal projects, as well as on nature reserves and in institutional research. The literature revealed four key facets of the benefits associated with such an approach.

Ecological Impact

The most critical draw of goats as a mowing alternative is that they release no emissions on their own. While similar to traditional methods, they require transportation to the site, their grazing is completely natural. In several applications of targeted grazing, their involvement also reduced dependency on chemical herbicides that can harm landscapes and pollute runoff. Not only that, their hoof movement can help stabilize the banks and channels they graze on, preventing erosion and dirt runoff. However, while economic sustainability is the key benefit to this approach, their ability to be implemented relies on several other factors and efficiencies.

Cost and Labor Impact

Having a full team of skilled mowers working on every channel each month of the year is a significant expenditure and often requires teams of multiple workers. The goats, especially from a rental service, require only one herder that monitors them around the clock, and the animals themselves often work for significantly lower hourly and acreage rates according to data from previous projects. The caveat is that the goats typical take longer than a man-powered mowing team. While the communities in the Houston area care greatly about the green impact of such an approach, implementation will likely come down to cost savings, so critical steps in this project and possible implementation will require specific cost estimates from selected vendors and area-specific inquiries.

Tool Efficiency Impact

Most existing research on this landscaping tool lauds goats as a robust and versatile tool, both in comparison to human labor and other animals. They can eat about 3% of their body weight in dry matter per day. Compared to humans, they work more efficiently on rugged and steep areas, which make up most of the drainage channels. They are able to work through thick vegetation that machines can struggle with, and are less sensitive to poisonous or toxic plants than other animals. Other animal alternatives cited include horses and cattle, but these herds are often significantly harder to transport and less efficient than goats.

Community Impact

A key goal of this project is to garner community support, curiosity, and unity, which often makes for projects that are more appealing to the councils this project needs to be approved by, as well as by the residents of the city themselves. Fortunately, the goats themselves are naturally intriguing, with previous case studies allowing for community viewing opportunities and reporting positive feedback on how the goats were entertaining and quiet compared to mowers. Further ways to make use of this natural draw from the goats could be utilized in the implementations of this project, from installing cameras through which residents can watch the goats online to possibly rolling out during Rodeo week or in areas with high traffic from families. Hosting events surrounding the initiation of this project could draw in crowds and help garner publicity.

Benchmarking and Analogous Case Studies

The idea to use goats as a potential alternative for the city on this issue was inspired by the City of Houston Public Works department's previous pilot that similarly used goats for vegetation management. However, West Houston Association had few details on the success, continuation, and logistics of this project, or any other case studies. Thus, the first step in determining the feasibility of this tool was assessing previous applications.

The team was particularly interested in previous projects that took place in the Greater Houston area, to mitigate potential differences in climate, jurisdictions, legality, and landscape that could affect the success of projects. However, while goat grazing is well researched, many studies focused on more specific targets like wildfire control, specific vegetation or weed management, or overvegetation as opposed to services analogous to mowing. Thus, the consultants cast a wider net in researching previous case studies. Reassuringly, the literature revealed that goats have been used across spaces, from company campuses like Google and Yahoo to public spaces like the Chicago O'Hare Airport, and of course in municipalities across the country. Four case studies were selected to be further detailed on the basis of similarity in geography and project focus (drainage channel clearance).

City of Houston

The previous City of Houston Public Works pilot was by far the most relevant to the project. The literature review revealed that the project began in 2021 with a pilot that sent 150 goats to graze a 2-acre detention basin over 12 days. The city utilized a vendor called Rent-a-Ruminant and post-project figures revealed an average acreage cost of $2500, compared to around the internally calculated $8000 per acre cost for mowing, a figure the team utilized in cost comparisons for this proposal. Interviews with project engineer Umer Khan fortunately revealed this project was actually a series of one-time pilots around the city, as opposed to recurring services in one area. These first pilots were encompassed by comprehensive research that confirmed the goats were effective and also did not contribute to contamination of the runoff or general area (Appendix). Following positive results from this research, the project was then renewed by the City Council's Transportation, Technology and Infrastructure Committee and continues today as needed. This addresses WHA's concerns that the pilot was either unsuccessful or terminated for specific reasons, providing a positive outlook on the feasibility of use in this project.

Houston Arboretum

Analysis of the City of Houston's pilot revealed that it was significantly and successfully preceded by use by the Houston Arboretum, which also utilized the same vendor, Rent-a-Ruminant. The goats have been utilized on over six occasions in different capacities over the 155-acre reserve since 2020. Outreach to the Arboretum's Conservation Director Stephen Beningo resulted in several helpful research reports (Appendix) and insights that the projects typically cover around three acres, take about a week, and cost around $8000 total. In terms of qualitative benefits, the goats remove the "mess" that traditional mowing typically leaves behind in terms of cut material that requires additional labor to remove.

Additionally, the Arboretum capitalizes more on the PR opportunities associated with the project, making family viewing times a public event that introduces children to animals.

Rock Springs, Wyoming

Compared to other municipal case studies online, the team selected this pilots to further highlight due to the larger available detail and data on the procedure. While outreach to Paul Kauchich, City of Rock Springs Director of Engineering and Operations on multiple platforms (email, LinkedIn, office number) were unsuccessful, there were plenty of news articles and city documents available to draw on. Beginning in 2025, the city similarly utilized a local grazing service, Goat Green, to deploy around 300 goats over a ~10 acre area over the course of 6-8 weeks. The project cost around $50k initially and was renewed by the city in another contract of similar cost very recently. This case study was drawing due to the coverage on some community pushback, as well as details on how seasonality can impact the effectiveness of the method—goats are unable to work in snowing or raining conditions. The consultants addressed both these concerns with the West Houston Association and detailed mitigations in later sections.

Tuolumne Utilities District, California

This pilot was selected due to the project similarity in terms of utilities districts, which are also the areas covered by the West Houston Association. This area first deployed goats in 2024, utilizing around 150 goats over 2.5 acres and the course of a week, and then expanded over a larger area in 2025, with plans to add on additional projects at different water plants across the district. Positive results were conveyed by Kurt Bayers, Raw Water Superintendent at TUD, though individual outreach on multiple platforms (email, LinkedIn, office number) were unsuccessful.

Procedural and Logistical Findings from Vendor Outreach

Given the common usage of the Rent-a-Ruminant service by the Houston-based projects, the consultants then moved to outreach to the service to inquire on logistics and project specific questions. Communication primarily took place over email with owner Carolyn Carr.

Based on the communication, the logistical operation of a project would be as follows. A typical drainage channel would utilize between 100-120 goats, which would be transported to the site by trailer. A portable electrified fence would be set up to keep the goats within the area, and one herder would remain onsite 24/7 to prepare, set up, and monitor the project. The client would only need to provide a place to park the trailer and access to a potable water source, for which the team would need around 125 gallons each grazing day, costs of which would have to be taken on by the client. In terms of cost, it would be $1500 per grazing day, as well as a $1200 transportation fee with a $4500 project minimum for each occurrence. The vendor assesses feasibility of an area for the service on the aspects of accessibility to the area, general safety, the types of vegetation, the lack of recent chemical use, and existing water conditions.

While the team feels the expertise and all-inclusiveness of this vendor provides the most benefit, outreach was also conducted to other vendors, including Goats on the Go, Ritz in the Brush, and Goatscrapers. Another feasible service model includes vendors that are not project-based, like Rent-a-Ruminant, but goat-count based (charging per Goat), like Oba Farms Goat Rental. While these may provide more straightforward cost estimates, as utilized by pilot cost estimation, the lack of monitors and project handlers limit the usability.

Recommendations

Pilot #1 - Will Fork Drainage Ditch

Location Overview

The Will Fork drainage corridor in Cinco Ranch provides one of the strongest physical and community contexts for a goat-grazing pilot. The channel runs for several miles along Willow Fork Park and sits directly beside Cinco Ranch High School and a well-used neighborhood trail system. The terrain is characterized by gentle slopes, stable soils, and a largely native vegetation mix—conditions that naturally support herd movement and healthy regrowth. Public visibility is high, and the site already hosts conservation-oriented programming, making it an ideal setting for a first demonstration of eco-friendly maintenance.

Existing Maintenance Practices

Current maintenance practices at Will Fork rely on frequent mowing during peak growth seasons and twice-yearly fertilizer applications. While effective in maintaining vegetation height, we observed that this approach is relatively resource-intensive, requiring repeated crew deployment and contributing to noise and emissions near community and school areas. Certain slopes also demand additional caution and skill from equipment operators, increasing time and labor requirements. These patterns suggest meaningful opportunities for targeted grazing to reduce operational burden.

Pilot Design

For this site, we recommend implementing a structured rotational grazing program that is practical, controlled, and easy to monitor.

- **Herd size:** 12–20 goats to ensure adequate biomass reduction.
- **Rotational pattern:**
    - Divide the corridor into 3–4 grazing cells.
    - Allow goats to graze each cell for *3–5 days* before moving on.
    - Conduct *two full rotations* across the 30-day pilot.

- **Site logistics:**
    - Portable electric fencing to delineate zones and ensure safety near trails.
    - A small staging area for water and supplemental feed.
    - Twice-daily vendor welfare checks.
- **Data to collect:**
    - Change in mowing frequency compared to the previous years.
    - Change in overall financial cost compared to the previous years.
    - Observations on soil condition and regrowth patterns.
    - Informal community feedback from trail users and school staff.

This pilot is designed not only to execute sustainable maintenance but to generate actionable insights for future decision-making.

Expected Outcomes and Recommendation

Operational and Financial Impact

- We anticipate a 30–40% reduction in mowing cycles, particularly in sloped or uneven areas.
- Crew time can be reallocated to more complex or high-priority sites.
- Over time, reduced fuel, fertilizer, and equipment wear may produce meaningful net savings.

Environmental Impact

- Goats provide zero-emission vegetation control, supporting broader regional sustainability goals.
- Selective browsing can improve soil stability and promote more diverse plant communities.
- Reduced reliance on chemical inputs aligns with best practices in drainage and habitat management.

Community Impact

- Because the site is so visible, residents and students will naturally engage with the pilot, strengthening the district's public-facing sustainability narrative.

- There are opportunities for student learning or interpretive signage that requires minimal staff effort.

Recommendation:

Based on our findings, we recommend selecting Will Fork as the district's primary pilot site. It provides a good combination of operational upside, ecological benefit, and community value, and it will serve as a clear proof of concept for the broader system.

Pilot #2 - Austin Point

Location Overview

Austin Point is a newly developed residential community where drainage corridors run directly behind backyards and along internal walking paths. The terrain is uniform and easy to fence, and grass growth is rapid due to recent grading and soil disturbance. The neighborhood was designed with a nature-integrated identity, and the proposed pilot area is highly visible to residents, providing a rare opportunity to merge practical maintenance with community engagement. During our assessment, we observed that this creates a favorable environment for testing how goat grazing performs in a highly residential context, where resident sentiment and quality of life considerations are especially important.

Existing Maintenance Practices

Maintenance currently involves frequent mowing to keep pace with rapid early-year grass growth. While straightforward, we discovered that this approach creates recurring noise and visual disruption, and can interfere with soil stabilization. This is a setting where residents disproportionately feel the impacts of machinery-based maintenance.

Pilot Design

To maximize value, we recommend designing the pilot to address both operational feasibility and resident experience.

- **Herd size:** 10–18 goats.

- **Three-cell rotation:** each cell grazed for 3–5 days over two full cycles.
- **Community touchpoints:**
    - HOA-led communication about timing, purpose, and safety.
    - Clear signage along the corridor.
    - Optional “viewing windows” or brief educational posts to build excitement.
- **Operational simplicity:**
    - Uniform terrain minimizes risk and reduces vendor time on-site.
    - District staff primarily track resident feedback rather than operational issues.

This pilot allows the district to understand not only the operational impact but also how residents perceive grazing as a maintenance solution—a critical factor for future expansion.

Expected Outcomes and Recommendation

Operational Impact

- Expected cost-neutrality in year one, with potential for reduced mowing frequency in following years.
- Lower noise and lower physical disturbance compared to repeated mechanical mowing.
- Enhanced neighborhood appeal as a “nature-forward community”, which can support long-term property value and attract families or environmentally minded homebuyers seeking quieter, greener living spaces.

Environmental Impact

- Reduced emissions and fuel use in a setting where residents are directly exposed to maintenance activities.
- More stable soils due to reduced tire compaction and fewer mechanical passes.

Community Impact

- Because goats will be visible from many homes, the pilot can become a positive neighborhood feature, enhancing Austin Point’s identity as a nature-forward development.

- We believe that community sentiment data collected here will be extremely valuable when evaluating expansion to other residential areas.

Recommendation:

We recommend selecting Austin Point as a pilot site, with a focus on evaluating resident response and strengthening community engagement around sustainable maintenance practices. The community has shown strong interest in collaborating, and the site offers an ideal setting to understand how grazing functions in a residential environment where daily visibility and neighborhood identity play an important role. The insights gathered will help the district assess how grazing can be integrated into future residential areas and guide long-term program design.

Pilot #3 - Fort Bend County MUD No.130

Location Overview

The section of the MUD 130 drainage corridor selected for evaluation is long, straight, and relatively uniform, bordered on both sides by wide grassy buffers. The drainage system connects to several lakes and ponds within the district, which heightens the importance of environmentally responsible vegetation management to support water quality, reduce runoff-related impacts, and maintain the integrity of downstream aquatic areas. The terrain is generally stable and accessible, with consistent slopes that allow standard mowing equipment to operate efficiently. Vegetation is typical of a maintained drainage channel, with no dense shrub areas or irregular features that would complicate routine maintenance. Residential access to this portion of the corridor is limited. Overall, the site functions primarily as a utility corridor rather than a public-facing or recreational space.

Existing Maintenance Practices

The district currently employs a combination of herbicide application and mechanical mowing. Due to the corridor's simplicity and openness, we discovered that maintenance here is already relatively low-cost and efficient, with no major bottlenecks that targeted grazing would uniquely solve.

Pilot Design

While feasible, a pilot here offers limited strategic insight.

- Herd size: 8–15 goats grazing through two or three elongated zones.
- Minimal fencing adjustments due to long sightlines.
- Low requirement for signage or community communication.

Expected Outcomes and Recommendation

Operational Impact

- Limited upside, as the site already benefits from fast, low-cost mechanical maintenance.
- Grazing may actually increase per-acre cost relative to current practice.

Environmental Impact

- Some herbicide and fuel reductions are possible but small compared to higher-intensity sites.

Community Impact

- Very limited. Few residents would notice or interact with the goats, reducing narrative value.

Recommendation:

Given the comparatively low benefit and higher cost, we do not recommend including MUD 130 in the initial pilot phase. The site may be reconsidered later if the district wishes to experiment with targeted interventions on slopes or access-limited edges, but it is not a priority for a first demonstration.

Risks and Mitigation

Risks

Several risks may arise when implementing a goat-grazing pilot, including operational risks (delays due to bad weather, rough terrains, restricted access), budget risks (extensive fencing requirements, and costly transportation can exceed the expected cost, environmental risks (soil damage, and disruption to wildlife), and liability risks if goats escape their enclosure, damage property, or wander off to unsafe areas. Public concerts and complaints could arrise if there is a lack of coordination across departments.

Mitigation

The best way to mitigate these concerns is first to ensure that grazing is conducted under a strict schedule with safe temperatures. A robust portable fence should also be installed and inspected daily for any signs of damage to prevent goats from escaping the enclosure. Community members who live in proximity to the goat grazing area should also be notified before the project begins and receive regular updates to keep them informed. Finally, we need to ensure that goat contractors provide liability coverage and confirm that their documentation is current and valid, and that trained herders exclusively manage the goats. This would help minimize our risks and maximize our chances of a safe and successful pilot.

Conclusion

The findings from this project indicate that goat grazing is an effective and environmentally beneficial alternative to regular mowing across several drainage channels in Houston. We believe that the pilots offered at Willow Fork and Austin Point are excellent methods to reduce pollution, save money on repairs, strengthen community engagement, and gather meaningful data on goats' operational performance. In order to mitigate risks associated with this pilot, robust fencing, strict grazing schedule, having skilled workers in charge of operations, and being upfront and open with residents will be essential. After these procedures are implemented, we are confident that this approach will be an excellent method to reduce environmental harm and support Houston in achieving its significant ecological responsibility goals.

Appendix

- City of Houston Sampling Reports
  - Sampling Report (Link)
  - Literature Review (Link)
  - ***Only to be distributed internally***
- Houston Arboretum Research Materials
  - https://houstonarboretum.org/conservation/research/
- Review Materials
  - Impact on soil and vegetation recovery
  - Emission of mechanical vs natural vegetation control.
  - Rotational grazing in municipal infrastructures.
- Case Study Reviewed
  - Houston Public Works, previously used 150 goats on a 2 acre, 10 day project
  - Rock Springs, Wyoming managing nearly 10 acres with 300 goats.
  - Tuolumne Utilities District, California, employing rotational grazing.
  - Houston Arboretum, which maintains overgrown areas across 6+ acres in an annual program.
- Environmental Notes
  - Houston produces 150 million metric tons of greenhouse gases annually, mowing a single acre requires approximately six gallons of fossil fuel and produces 120 pounds of CO_2.
  - Goat grazing has also been shown to reduce reliance on chemical herbicides, which protect waterways, and lowers chemical runoffs into bodies of water.
- Site Selection Criteria
  - Accessibility with road and gate access
  - Terrain suitability

    - Visibility for community engagement
- Stormwater Sampling Report
    - An analysis conducted for Houston Public Works found that goats do not negatively impact water quality.

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