



Minimizing Environmental Impact through Design:

Tools and techniques for low impact development

Cary, NC

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[Presentation Outline]

- LID through design
- Site assessment
- Design principles
- Design elements



[The LID Design Process]

- Site assessment
- Address environmental requirements (vegetation, soil, water, etc.)
- Design to maximize all opportunities
- Assess design impact
- Refine design
- Reassess
- Adopt BMPs
- Integrate BMPs



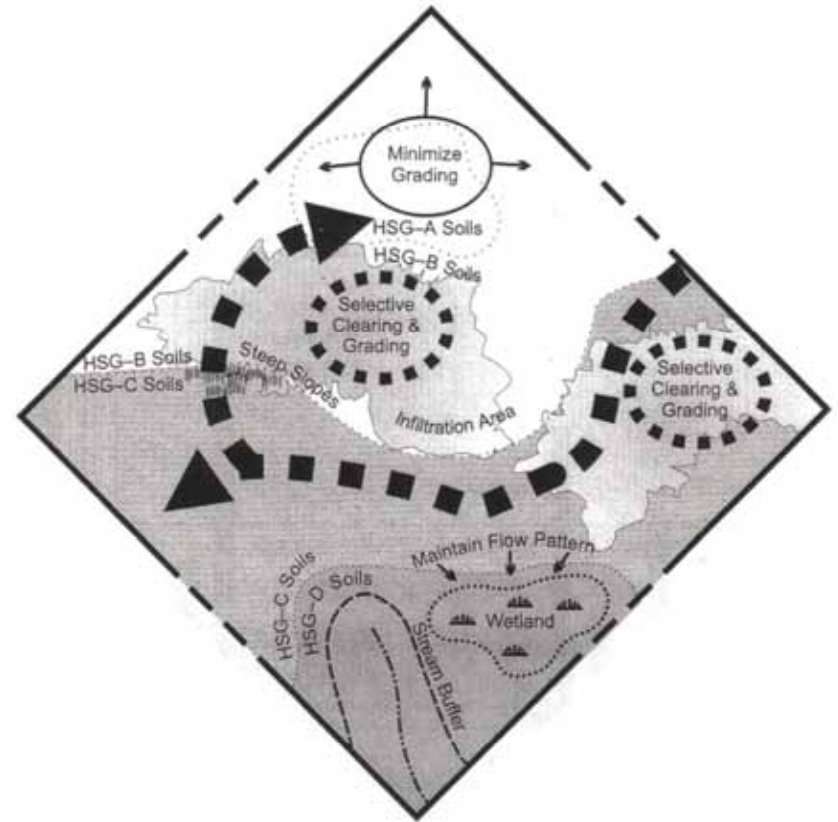
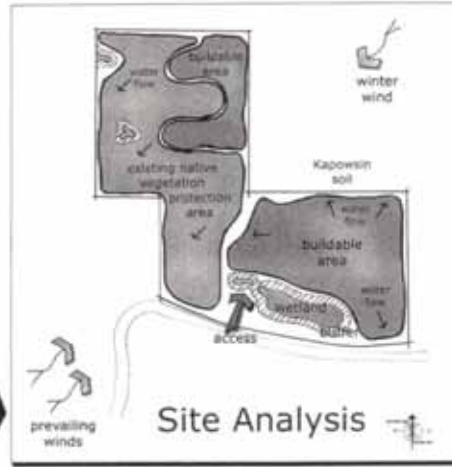
[Site Assessment]

- Involve range of professionals on the development team (building professional, LA, planner, engineer, etc.)
- Perform thorough site analysis to identify natural features and attributes
- Identify development opportunities and constraints

[Site Assessment]

- Address soils, water resources, vegetation, topography, microclimate, solar orientation, viewsheds and access (among others)
 - Topography – low and high points, ridgelines, swales, slopes
 - Hydrology – natural drainage patterns, surface and groundwater, wetlands, sensitive water resources, natural water features
 - Soils – porosity, depth to bedrock, groundwater table, hydric
 - Aesthetics – siting, human concerns
 - Natural features – views, water, treed areas

Site Analysis Process



Hinman, C. (2003). *Low impact development: technical guidance manual for Puget Sound*.

[Principles]

- Maintain natural drainage patterns
- Preserve existing vegetation
- Maintain existing topography
- Reduce clearing and grading
- Preserve permeable soils
- Reduce impervious areas

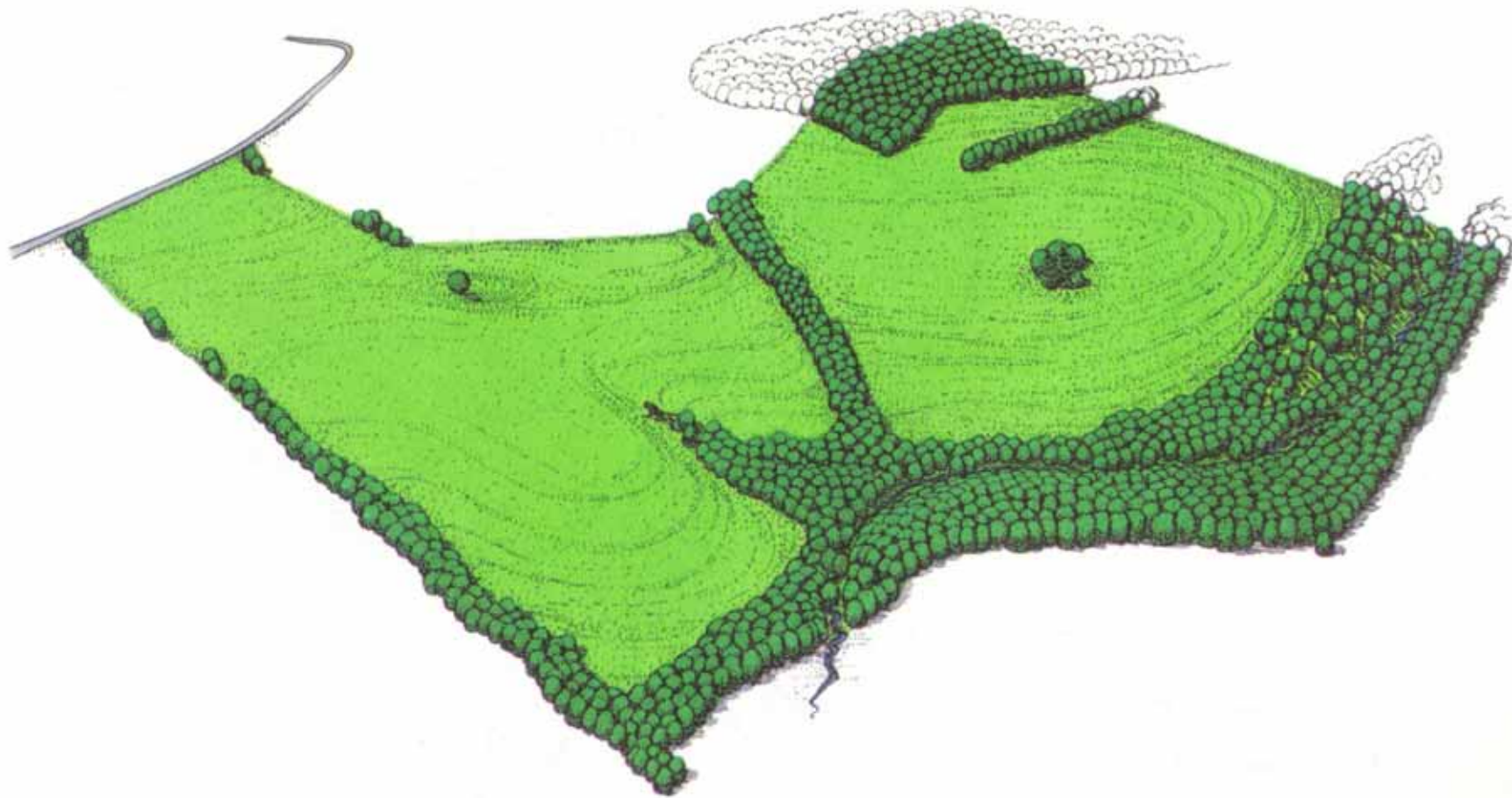


Figure 7A-1. Site A: Before Development

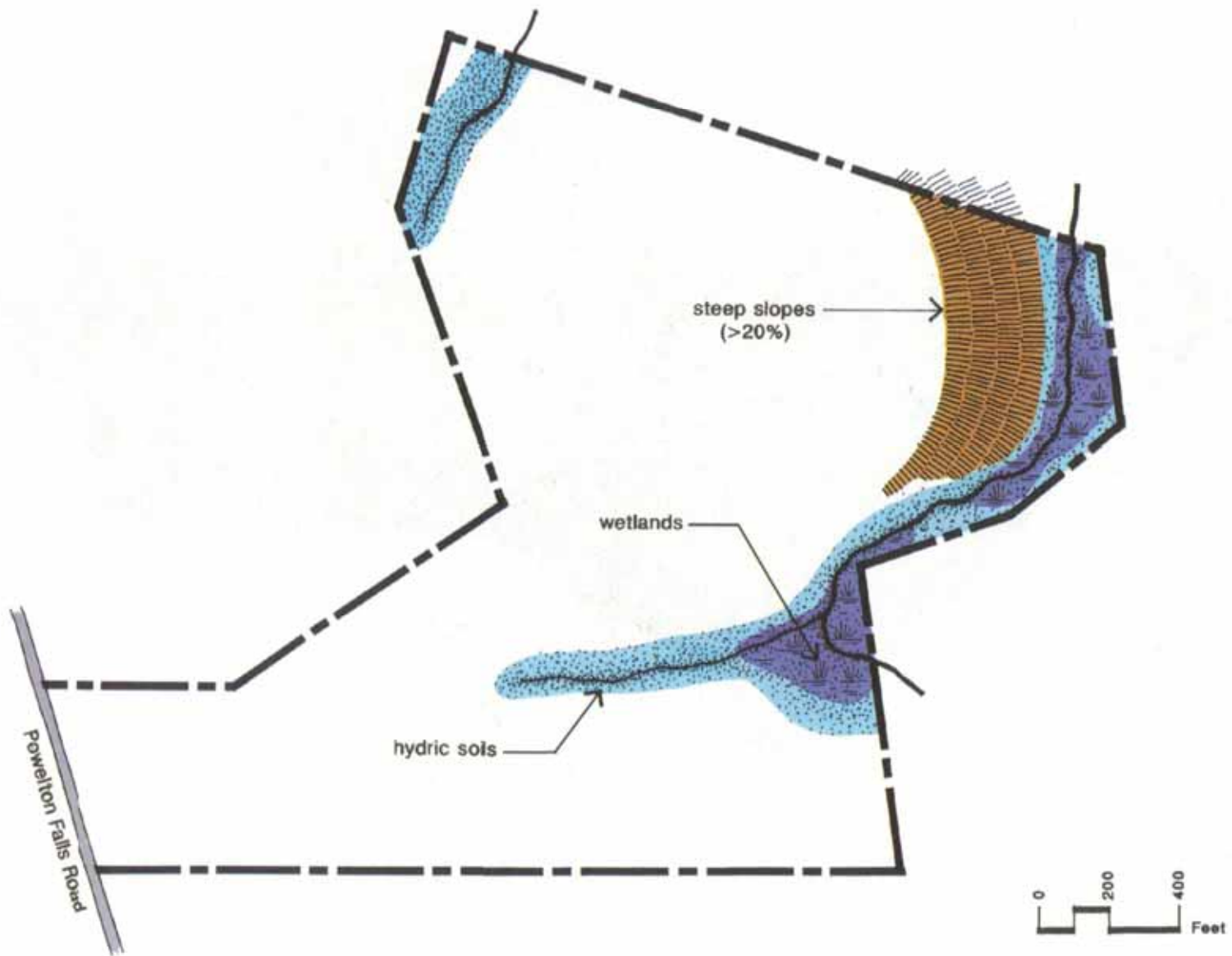


Figure 7A-4. Site A: Identifying Primary Conservation Areas



Figure 7A-5. Site A: Identifying Secondary Conservation Areas

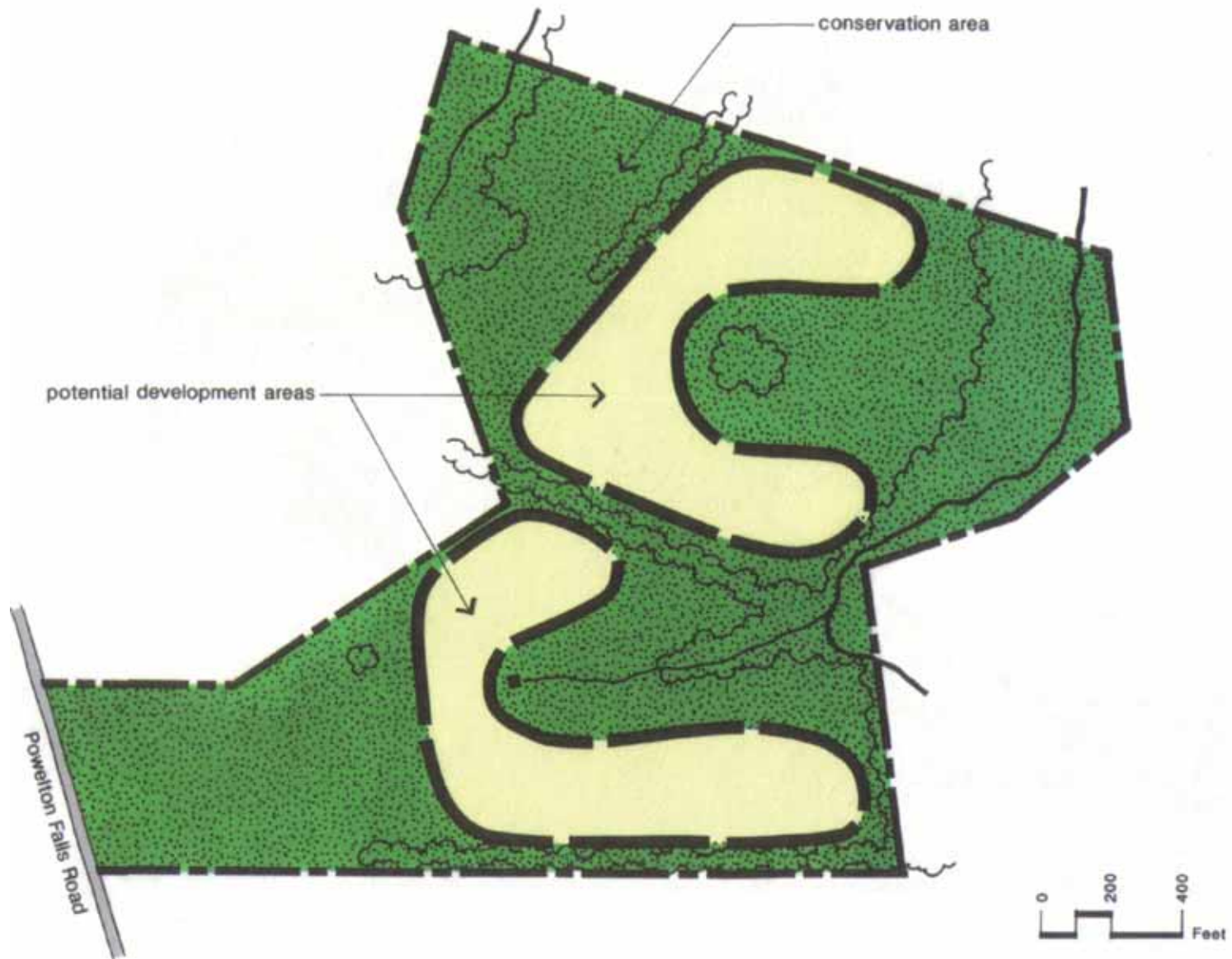


Figure 7A-6. Site A: Identifying Potential Development Areas

[Design Principles]

- Preserve existing vegetation
 - Identify and preserve not just individual trees but plant communities
 - Consider trees in relation to impervious areas and SWM areas
 - Revegetate when necessary



[Design Principles]

- Reduce clearing and grading
 - Minimize size of construction easements, storage areas etc.
 - Site lots and buildings to avoid difficult access
 - Work with natural grades

[Design Principles]

- Reduce impervious areas
 - Road width and length
 - Buildings
 - Sidewalks
 - Parking
 - Material choices
 - Efficient lot layouts



[Design Principles]

- Reduce impervious areas
 - Reduce footprint (variable floor elevations, pier construction, multifloor buildings, etc.)
- Phase construction

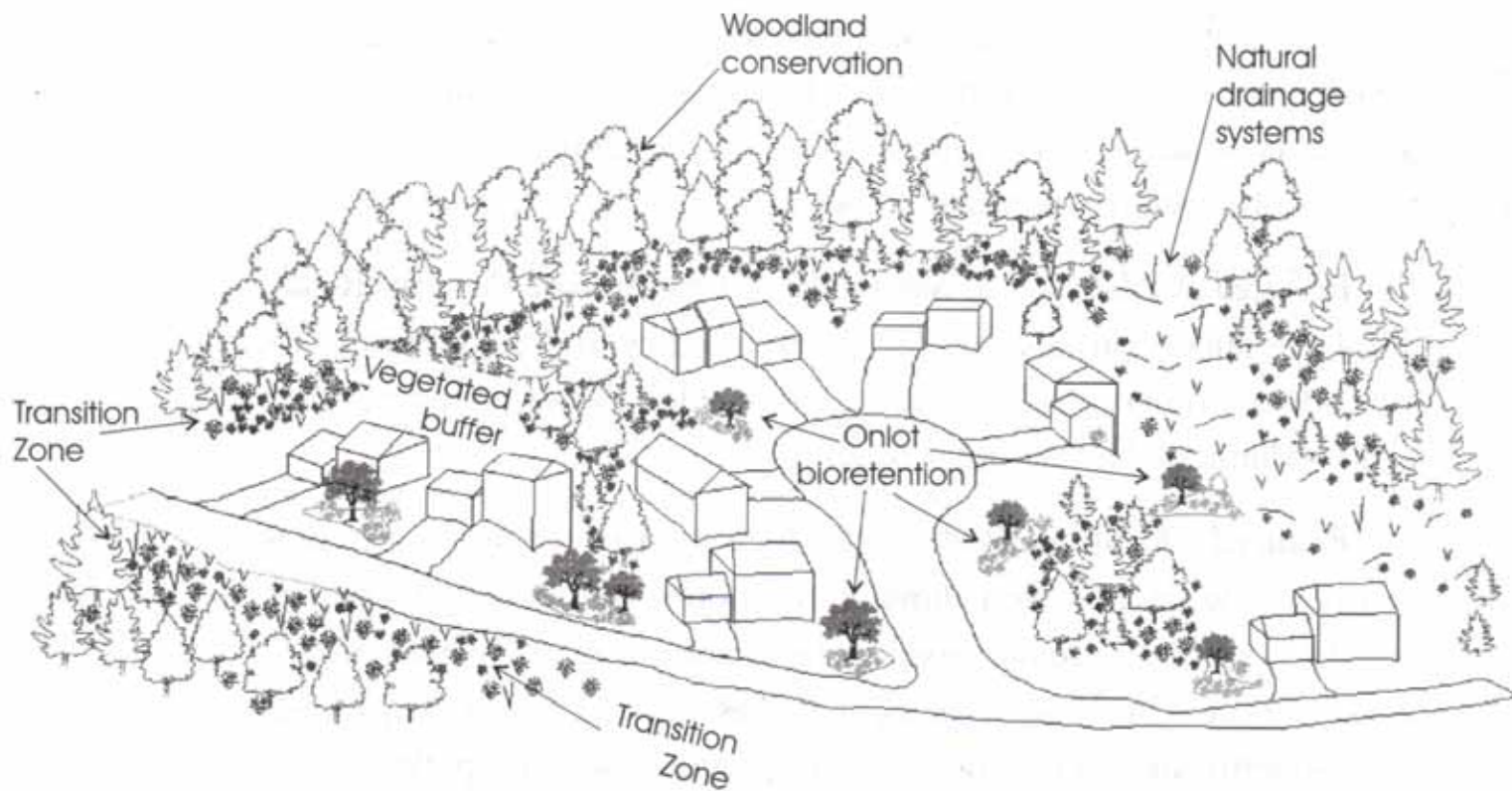


Design Principles

- Disconnect impervious areas
 - Design to buffer impervious areas with green spaces
 - Maximize opportunities for sheet flow
 - Drain to green spaces rather than pipes

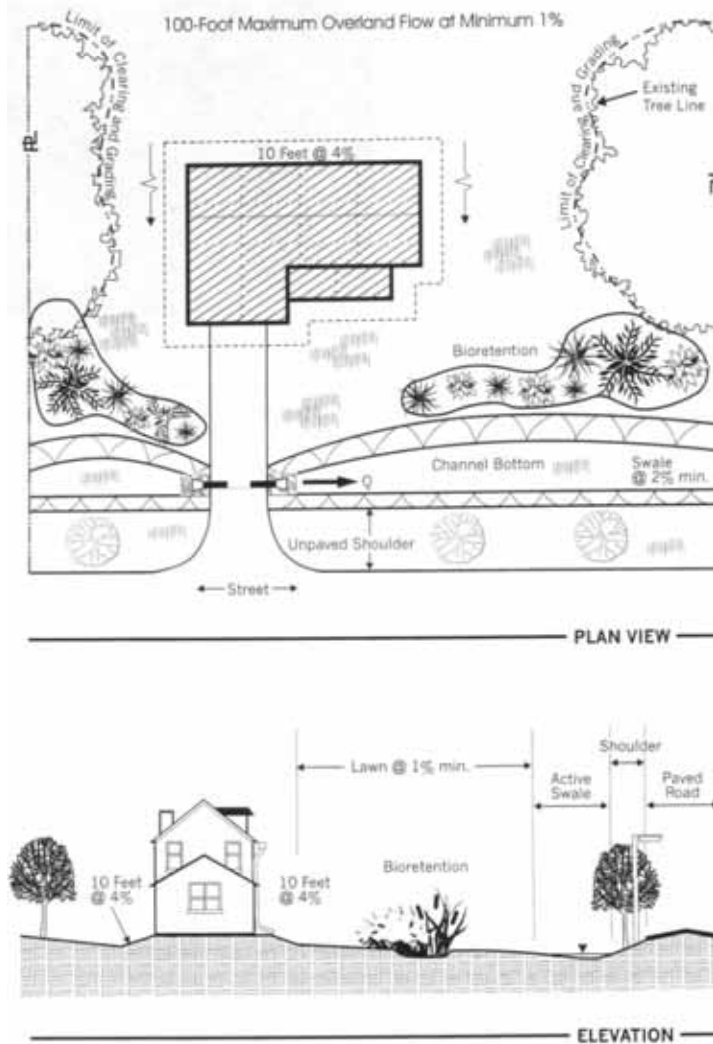


Design Principles - Lots



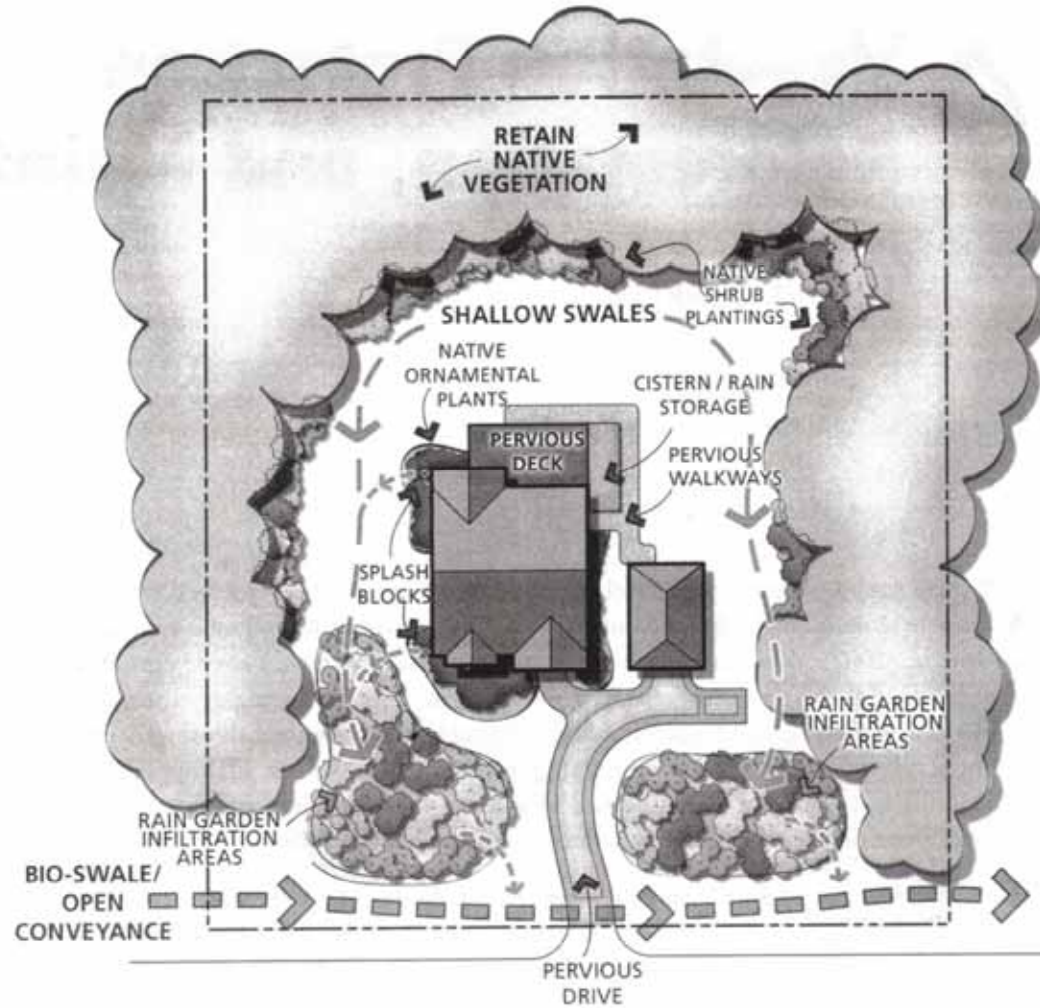
Prince George's County (2000). *Low impact development: an integrated design approach.*

Design Principles - Lots

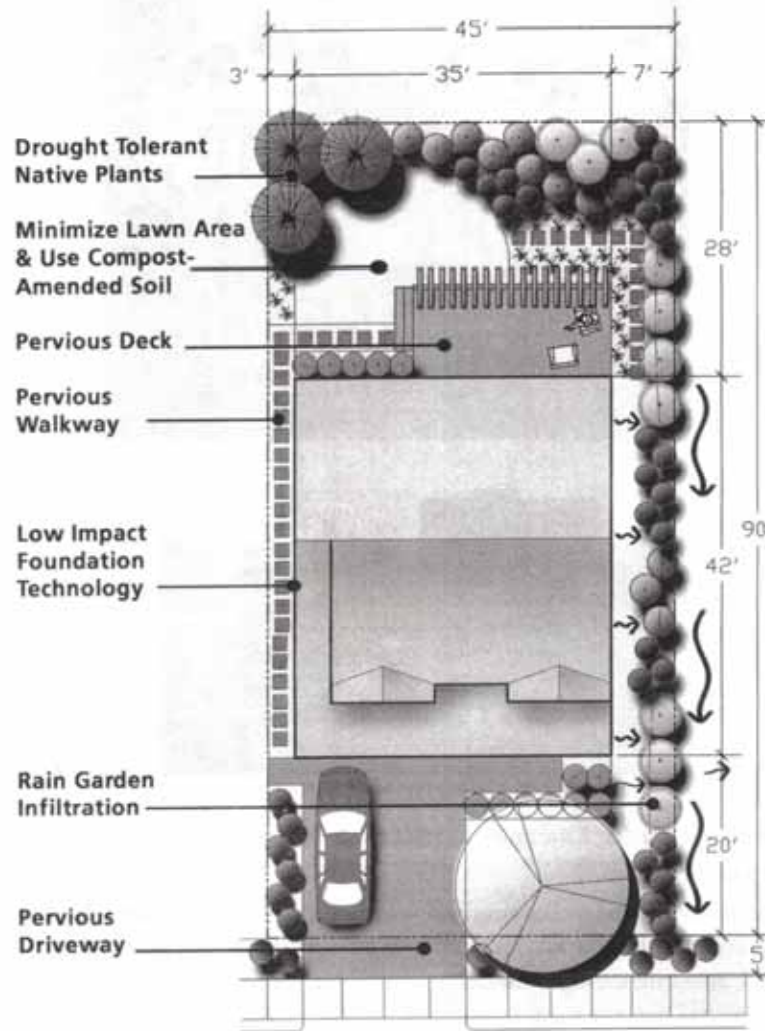


Prince George's County (2000): Low impact development: an integrated design approach.

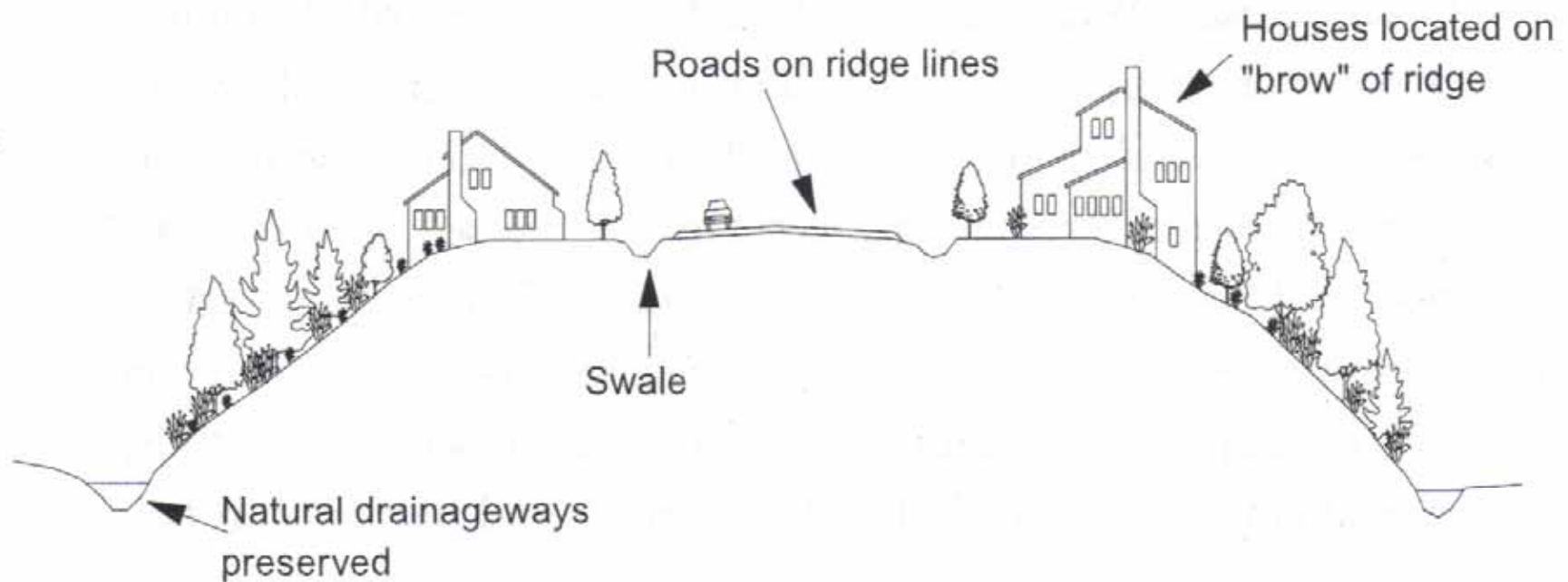
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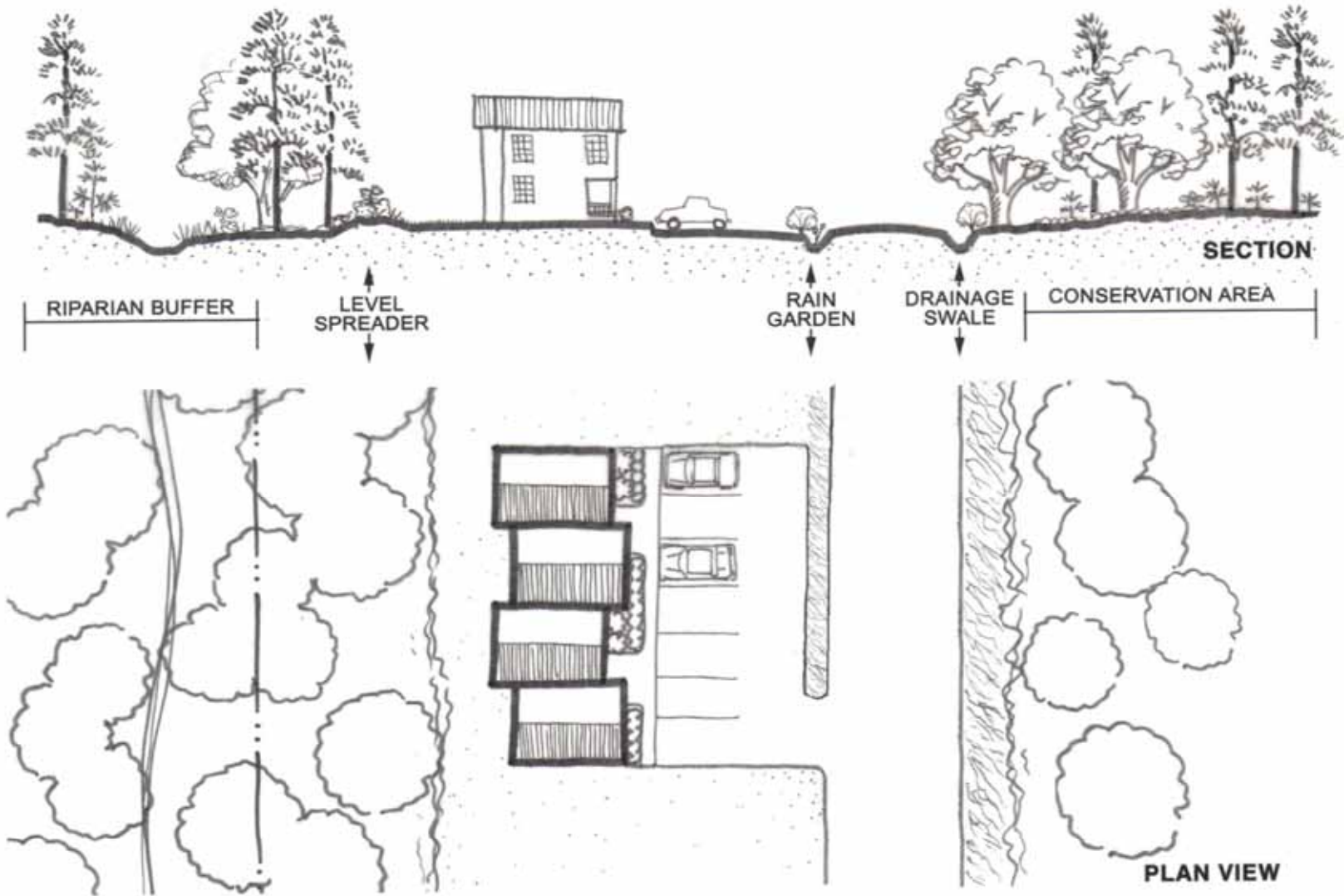


Design Principles - Roads



Prince George's County (2000). Low impact development: an integrated design approach.

INTEGRATED STORMWATER MANAGEMENT



[The Challenge]

- Large impervious areas
 - Building footprint
 - Parking lot
- Potential solutions
 - Green roofs
 - Cisterns
 - Bioswales



Concluding remarks

- Must be considered from the beginning of the design process
- Integrated approach is key:
 - Work with environmental context
 - Consciously reveal “invisible” systems
 - Education a must



