



LOW IMPACT DEVELOPMENT AT SEVEN LAKES – PHASE 2

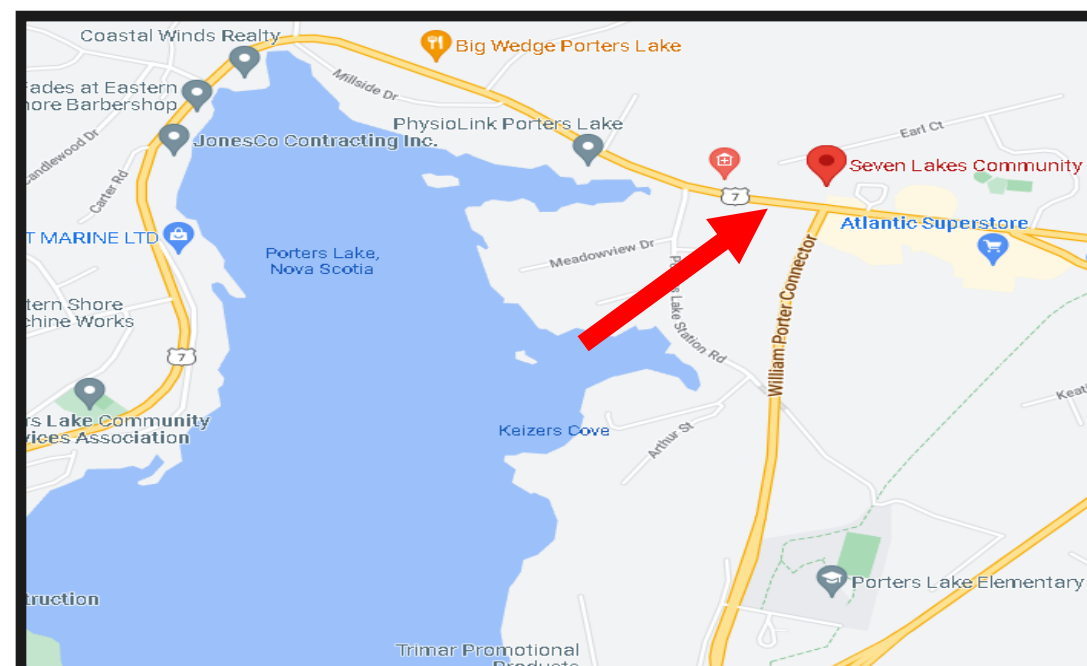
Introduction

Conservative and Low Impact Development (LID) aims to preserve the natural environment by using its natural features to collect and infiltrate water, promote groundwater recharge and prevent excess runoff and flash floods caused by urban development/impermeable surfaces.

Project Scope

The Seven Lakes community relies solely on groundwater withdrawn from on-site wells and features several lakes, streams, and protected wetlands. A water resource management plan consisting of proposing and evaluating LID techniques was developed to ensure the water supply is adequate over the lifespan of the development and prevent urban contaminants from polluting the natural green spaces.

Seven Lakes Community



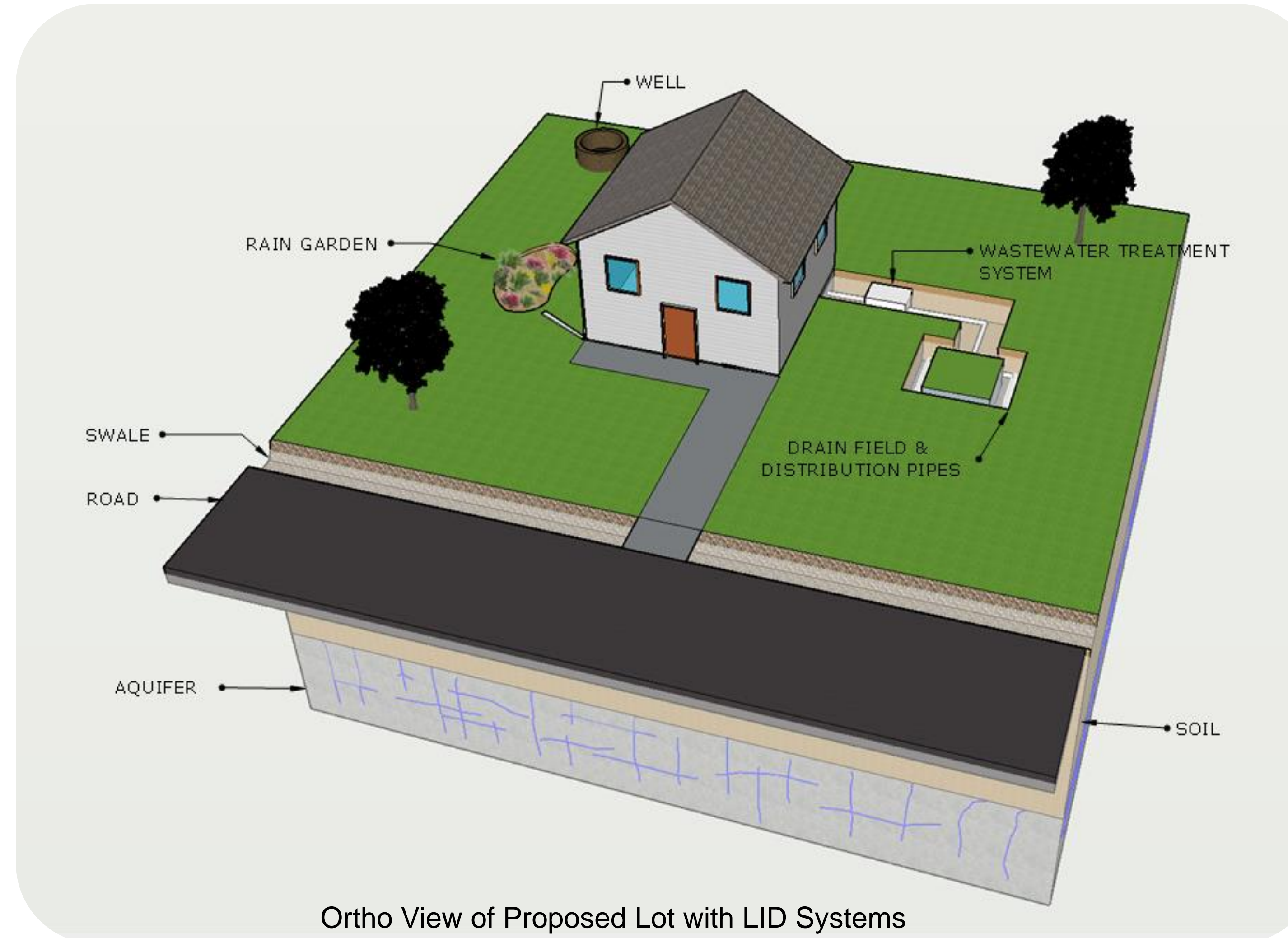
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Phase 2 Location

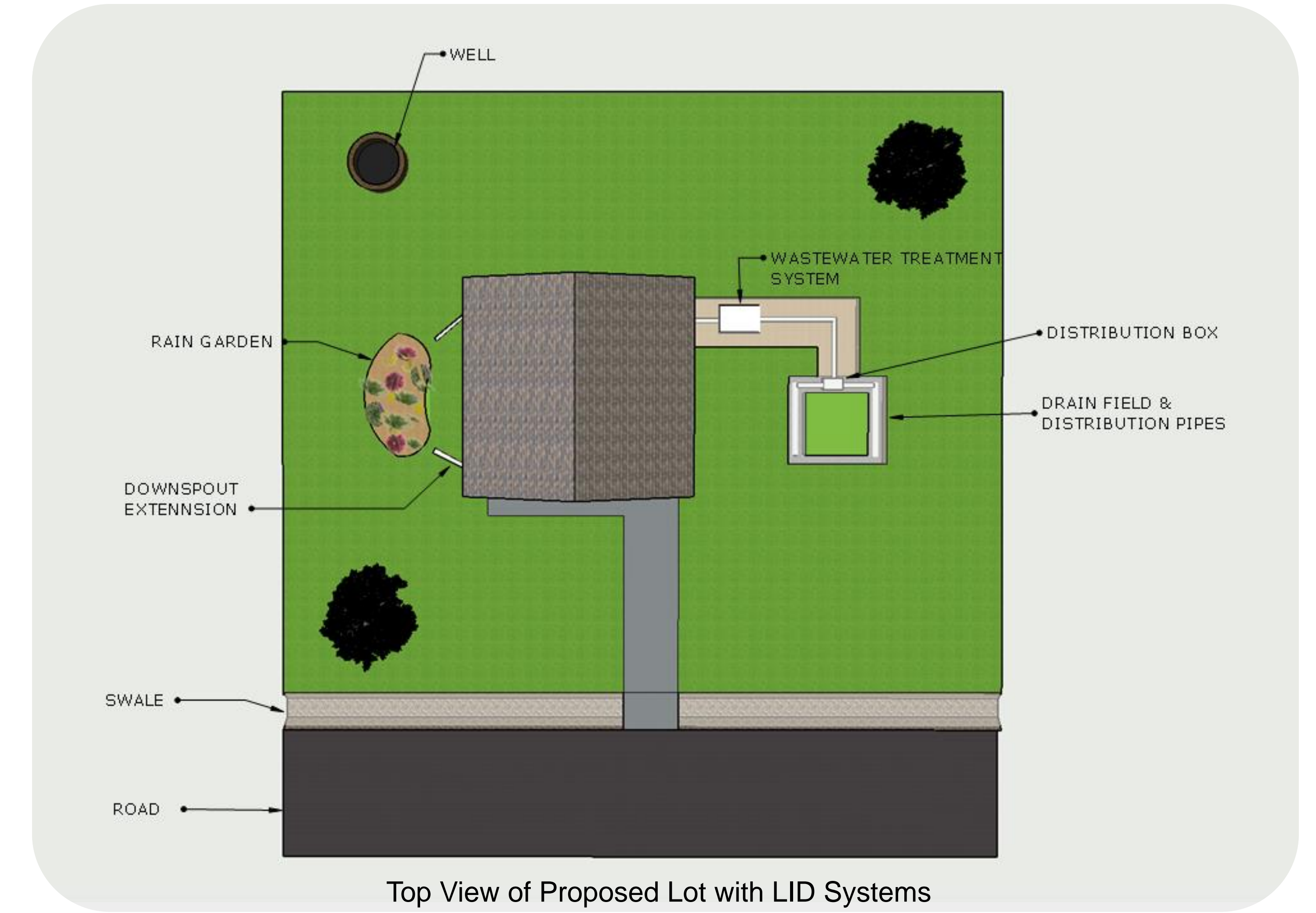


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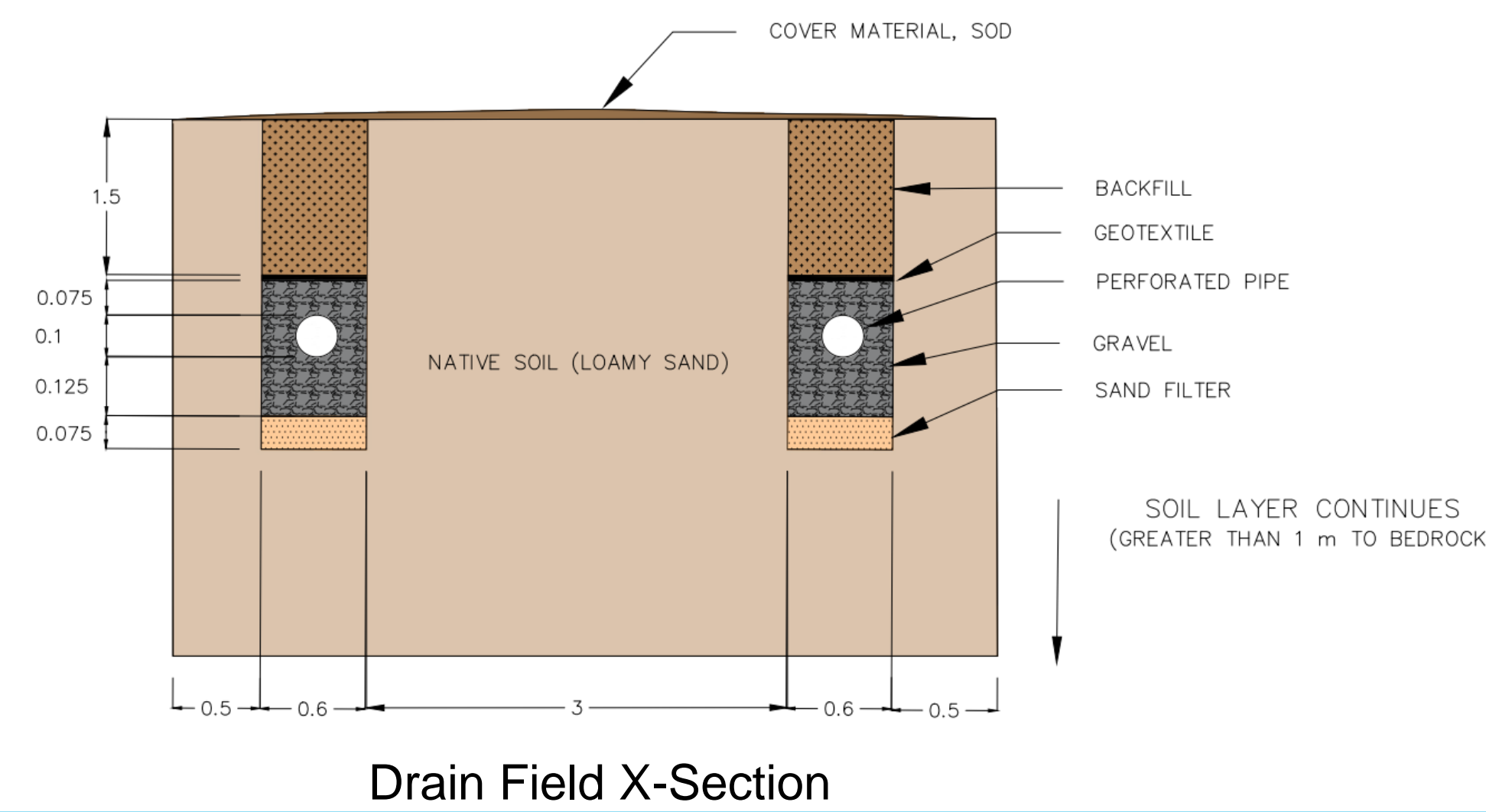
Details of Design



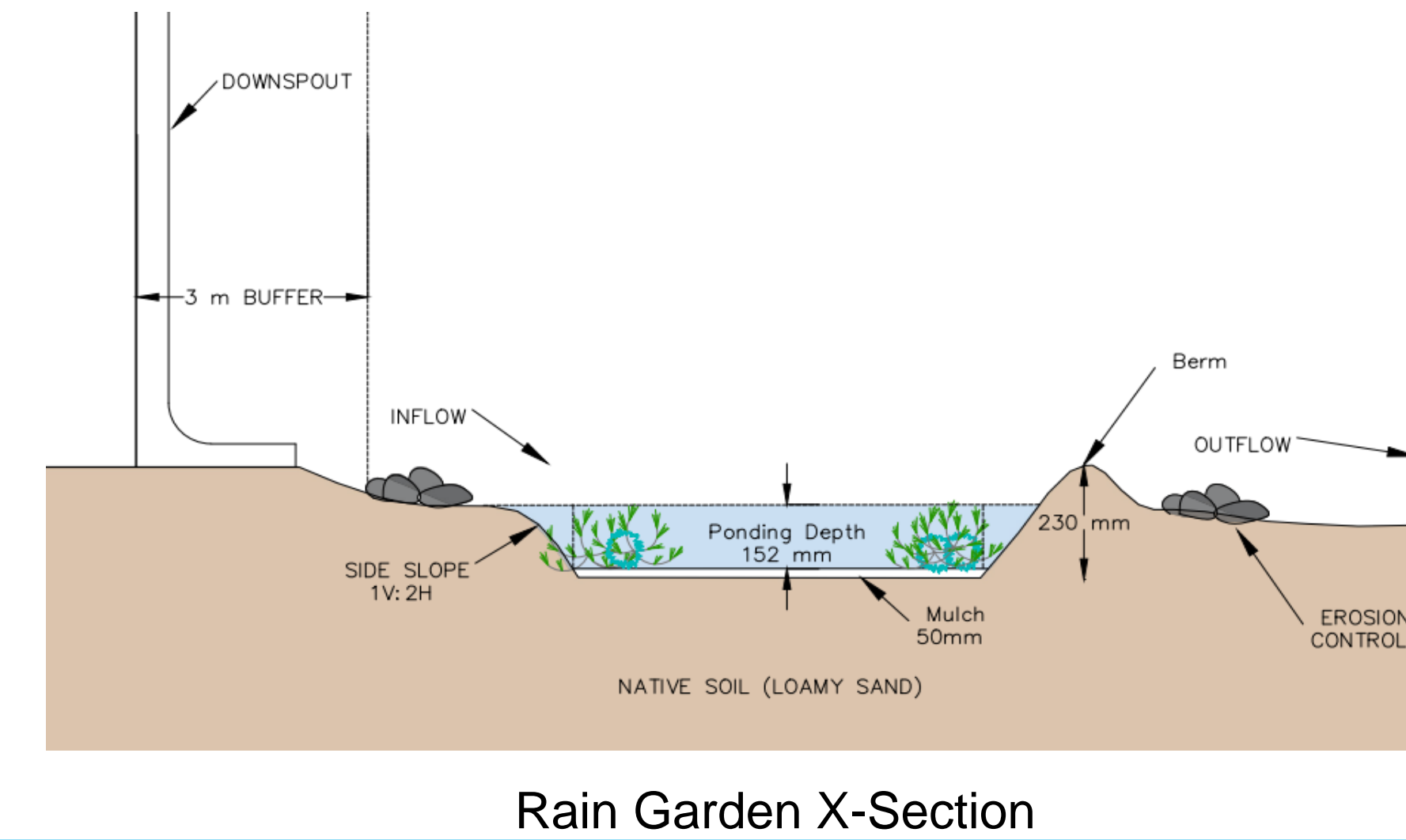
Ortho View of Proposed Lot with LID Systems



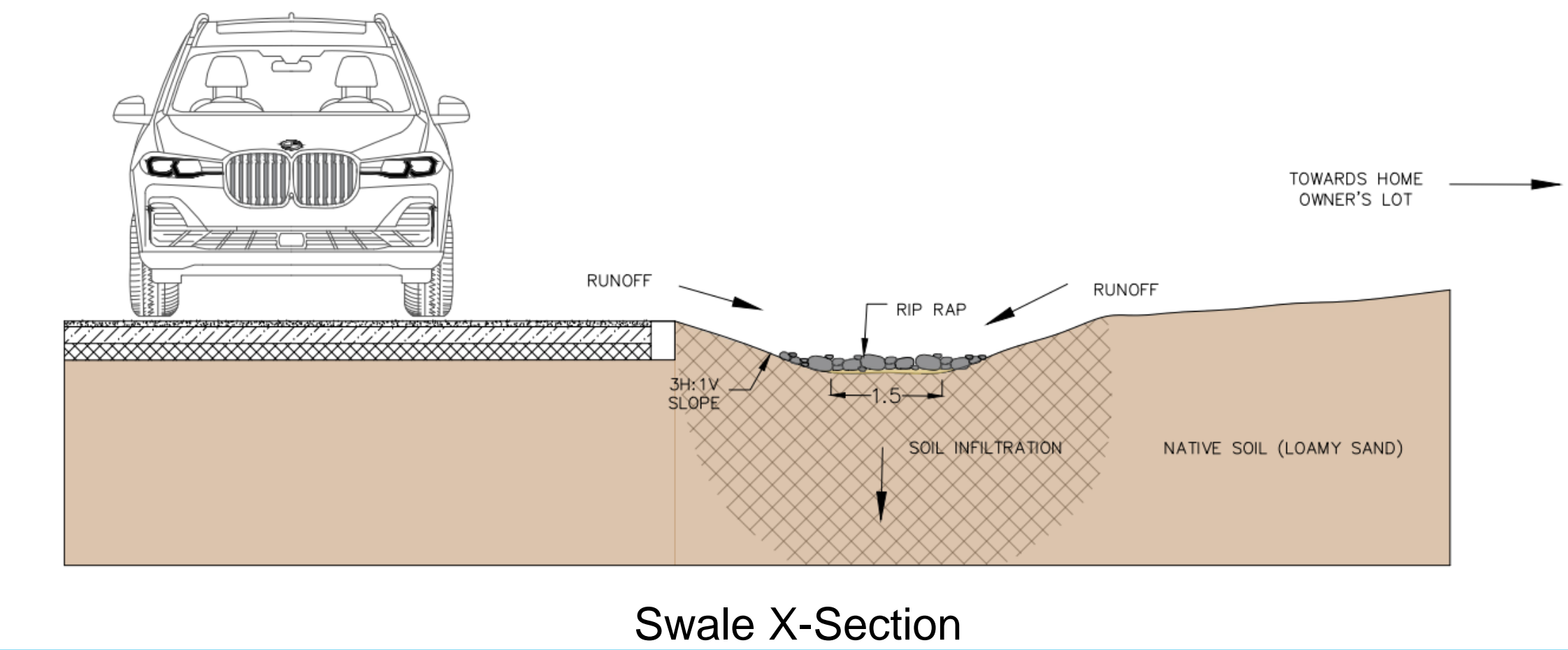
Top View of Proposed Lot with LID Systems



Drain Field X-Section



Rain Garden X-Section

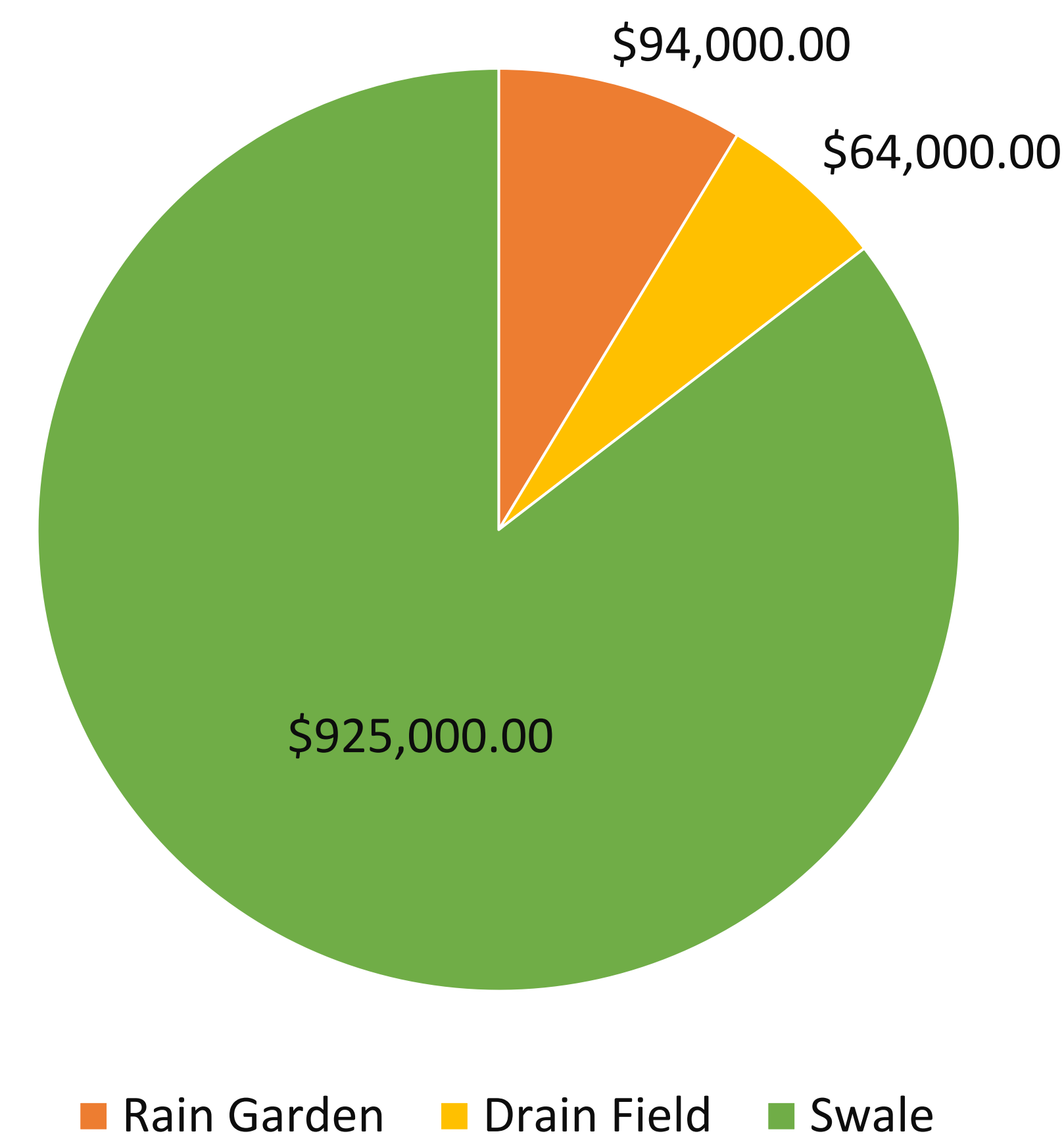


Swale X-Section

Design Process

- Define Project Constraints
- Site Investigation
- Introduce Potential Solutions
 - Stormwater Management
 - Permeable Pavement
 - Swale System
 - Rain Garden
 - Wastewater Management
 - Injection Well
 - Perforated Pipe System
- Determine Final Design Options
- Finalize Design Options
- Design Drawings
- Construction Considerations
- Produce Final Report

Cost Estimate



Conclusion and Recommendations

A decision matrix was used to determine the final design options, considering factors such as cost, groundwater recharge, level of maintenance, environmental impacts and aesthetics. It was concluded that the perforated pipes, rain garden and swale system were the best options to meet the water demand.

The design of the perforated pipe system considered the pipe's maximum flow capacity, drain field absorption capacity and other parameters according to Nova Scotia's technical guidelines. The design of the rain garden comprised of using rainfall distributions, maximum flows and infiltration capacities to determine its size, and the selection of plants. The swale system was designed according to peak flows, behavior of the watershed and determining maximum velocities to prevent erosion.

Acknowledgments

Thank you to Dr. Lauren Somers for continuous guidance, support and clarity throughout this project. We would also like to thank our industry contact, Brad Harnett, for providing clarity and supplemental information required for the completion of this project.

Key References

- Ecology Action Centre. (2016). *Stormwater Management Techniques: Site Assessments for Rain Gardens*.
- North Carolina Department of Agriculture & Consumer Services. (2013). *Community Conservation Assistance Program Design Manual*.
- Nova Scotia Environment and Labour. (2013). *On-site Sewage Disposal Systems Technical Guidelines*.
- Schaefer, L. (2019). *Stormwater Calculations*. NJDEP Division of Water Quality.
- Wisconsin Department of Natural Resources. (2018). *Rain Garden Technical Standard 1009*.