



GREEN  
ACRES

TEAM  
01-01

# What's the goal?

## Engineers Goals

- Lower cost
- Less run-off
- Increased quality of run-off
- Less traditional pipe and pond infrastructure
- Mimic predevelopment hydrology

## Architect/LA's Goals

- Green/sustainable
- Great aesthetic value
- Higher property values
- Habitat creation
- New urban development
- Walkability



# WATERSHED

The site currently drains to both the Adams Creek and Haikey Creek watersheds, which in turn lead to the Verdigris and Arkansas rivers. This water carries with it pesticides, fertilizers, motor oil and antifreeze, chemicals and pet waste, as well as trash and litter from neighborhoods. These pollutants can kill fish and harm other animals and plants that live in our water, while also increasing the amount of treatment required to make the water drinkable.

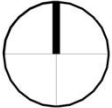
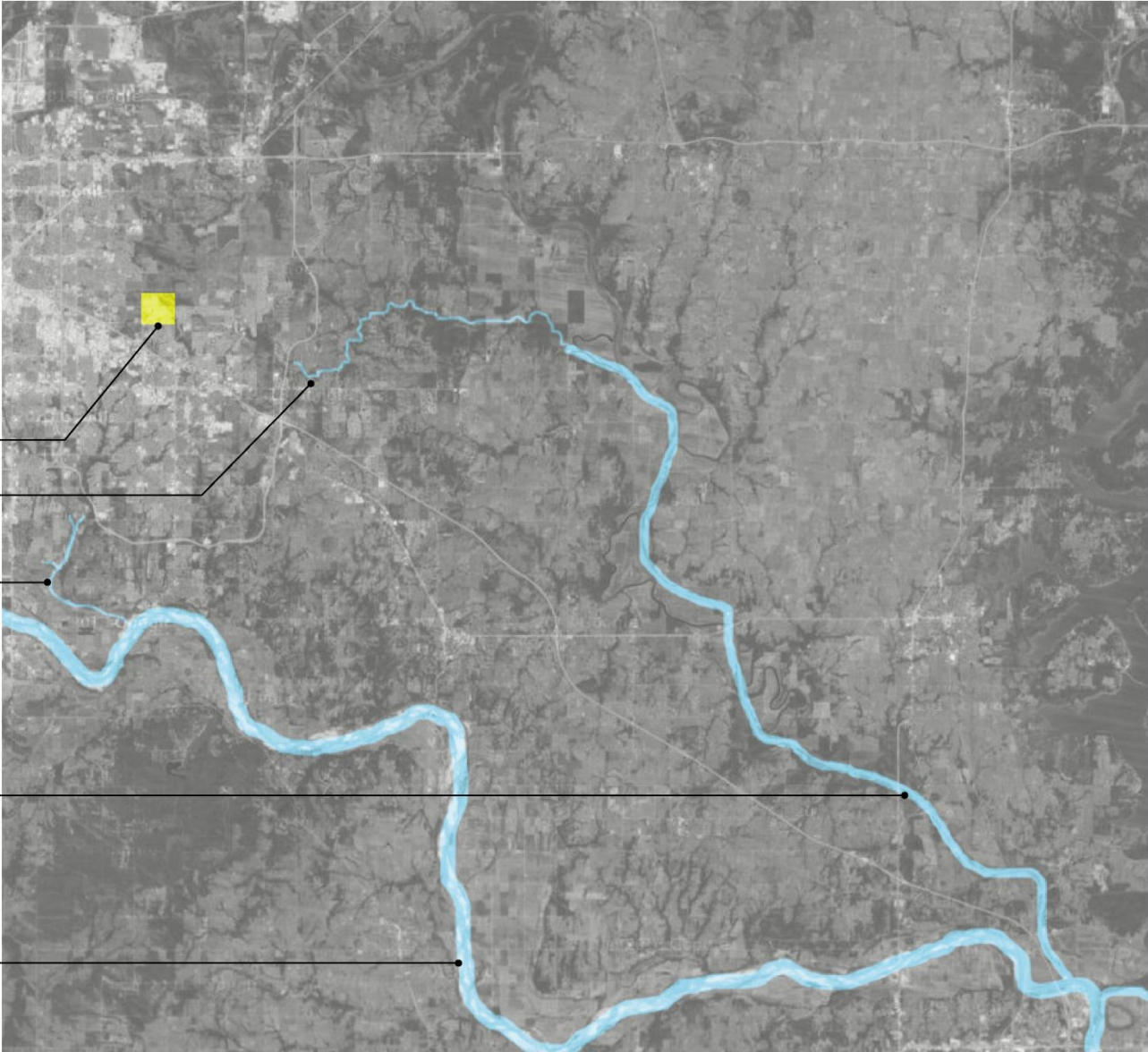
PROPOSED SITE

ADAMS CREEK

HAIKEY CREEK

VERDIGRIS RIVER

ARKANSAS RIVER



# BASELINE DESIGN





UNLESS someone like you  
cares a whole awful lot,  
nothing is going to get better.  
It's not.

—*The Lorax*

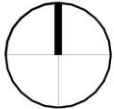


Wise words

# EXISTING VS. BASELINE

Instead of a human-dominated ecosystem where we level everything and create a generic subdivision, what if we kept the natural features of the site that make it unique and allow it to function naturally without pipes and ponds?

- EXISTING DRAINAGES
- EXISTING DRAINAGES
- EXISTING NATURAL FEATURES
- EXISTING DRAINAGES
- EXISTING WILDERNESS AREA
- EXISTING POND





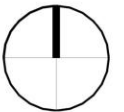
## EXISTING SITE

What if, as designers/planners/architects/engineers, our first thought was to keep the beautiful tree lined drainage areas that meander through the site? Could we create open spaces, trails and a beautiful landscape that adds value to the surrounding homes?

*"Communities designed to maximize open space and preserve mature vegetation are highly marketable and command higher lot prices."*

(Source: Municipal Guide to Low Impact Development, distributed by NAHB Research Center, <http://www.lowimpactdevelopment.org/lid%20>)

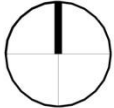
- EXISTING DRAINAGES
- EXISTING DRAINAGES
- EXISTING NATURAL FEATURES AND OPEN SPACE
- EXISTING DRAINAGES
- EXISTING WILDERNESS AREA
- EXISTING POND



# RESIDENTIAL POD 1

The Green Acres entry road location was based on a stand of existing trees near Elm Place south of the proposed entry, and allows adequate distance from the existing driveway entry for the Crown Ridge development. A wide boulevard with landscaping and a roundabout provide a welcoming entry and easy access to nearby amenities.

- ELM PLACE ENTRY
- EXISTING DRAINAGES
- ELM RIDGE DEVELOPMENT
- EXISTING DRAINAGES
- EXISTING WILDERNESS AREA
- EXISTING POND

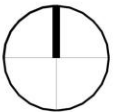




## RESIDENTIAL POD 2

Two natural drainages create a beautiful buffer for this portion of the site. These natural drainages will be modified and utilized as rain gardens to create welcoming locations for trails as well as multiple access points for children walking from Green Acres and the Crown Ridge development to school. A street connection was created with the adjacent neighborhood to the east to help with emergency access and the feeling of community connectivity. The large park space located near the center of the development along the main drainage/ rain garden will encourage outdoor recreation and provide shared spaces for all residents.

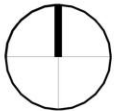
- ELM PLACE ENTRY
- NEW STREET CONNECTION
- EXISTING NATURAL DRAINAGES
- LARGE PARK AMENITY
- EXISTING NATURAL DRAINAGES
- EXISTING WILDERNESS AREA
- EXISTING POND



# RESIDENTIAL POD 3

Access by way of one of two bridges will create a unique feel for residents in this area. A meandering buffer and trail system around exterior lots provides the feeling of an extended yard as well as easy access to trails. Interior lots line a community park space and rain gardens providing amenities within sight of each lot.

- ELM PLACE ENTRY
- EXISTING NATURAL DRAINAGES
- EXISTING WILDERNESS AREA
- EXISTING NATURAL DRAINAGES
- COMMUNITY PARK
- NATURAL BUFFER ZONES
- EXISTING POND







GREEN  
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OPEN SPACE AMENITIES



## COMMERCIAL POD

The design of the commercial/mixed use area is based on the concept of a lifestyle center. Lifestyle centers typically look like strip shopping centers turned outside in. Instead of facing a sea of parking like typical shopping centers, storefronts about landscaped park-like pedestrian areas, with businesses facing each other across pedestrian walkways and a low volume two-lane "main street". The parking area contains the majority of the LID mechanisms and is sited along the natural drainage path toward the low point of the site. With the addition of 30,000 SF of office space above the first floor retail, the design reduces the building footprint, in turn allowing the land west of Elm Place to remain forested and untouched. The addition of office space creates a mixed use which helps minimize parking requirements.

PROPOSED COMMERCIAL POD

EXISTING NATURAL DRAINAGES

EXISTING NATURAL DRAINAGES

EXISTING WILDERNESS AREA

NATURAL BUFFER ZONES

EXISTING POND







GREEN  
ACRES

LIFESTYLE CENTERS

## GREEN ACRES

What if this different way of planning resulted in an increase of over 860,000 sf. of open space? An extensive system of trails provides multiple safe routes for kids to walk to school. Green Acres boasts an impressive 2.5 miles of trails with over 7,500 lf. of trail throughout the residential area with an additional 6,000 lf. of forest trail west of Elm Place.



- 860,721 SF More Open Space
- 2.5 Miles of Trail
- Preserved land west of Elm Place

EXISTING NATURAL DRAINAGES

AMENITY POCKET PARKS

EXISTING NATURAL DRAINAGES

EXISTING WILDERNESS AREA

NATURAL BUFFER ZONES

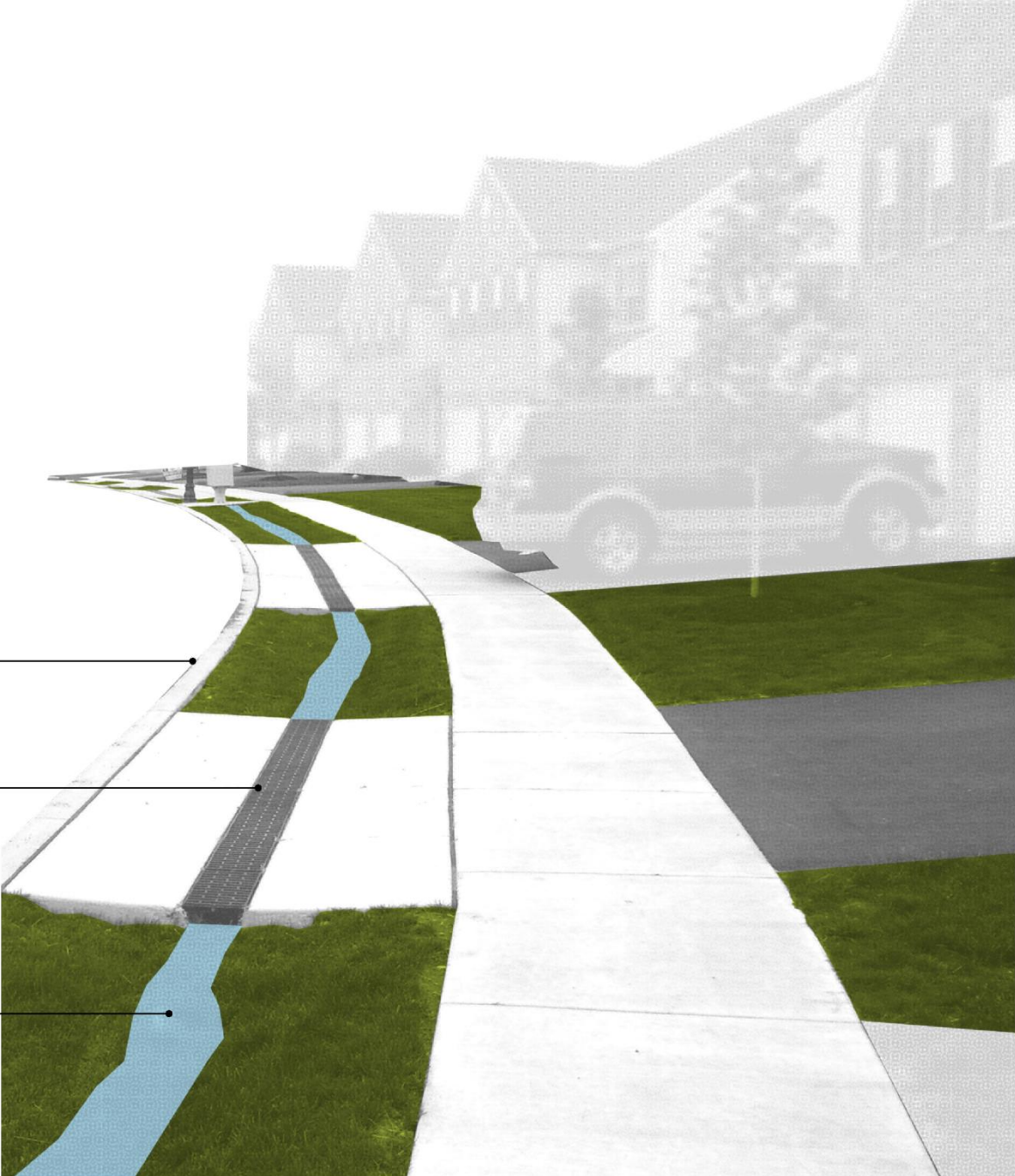
EXISTING POND





# FLUSH CURB STREET SYSTEM

Streets featuring flush curbs, grass swales and driveway culverts for stormwater conveyance have multiple benefits compared to traditional street design. By minimizing or even eliminating conventional drainage techniques (inlets, pipes, curb and gutter), low impact development techniques are able to improve water quality via filtration, help attenuate peak rates by slowing runoff through natural means as well as elongating flow paths and even encourage runoff volume reduction via infiltration. Such techniques also help to improve site aesthetics and reduce cost.



FLUSH CURB

DRIVEWAY CULVERTS BETWEEN GRASS SWALES

GRASS SWALES TO FILTRATE AND DIRECT WATER TO RAIN GARDENS

# RAIN GARDENS

Rain Gardens allow rainwater runoff from impervious urban areas such as roofs, driveways, walkways, parking lots and compacted lawn areas the opportunity to be absorbed. This reduces rain runoff by allowing storm water to soak into the ground (as opposed to flowing into storm drains and surface waters which can result in erosion, water pollution, flooding, and diminished groundwater). The rain gardens for Green Acres have been designed in accordance with our specific soils and climate. Rain gardens can cut down on the amount of pollution reaching creeks and streams by up to 30%.

RAINFALL ENTERS THE RAIN GARDEN AREA DIRECTLY AND SOAKS INTO THE SOIL

RAIN GARDEN AREAS ARE PLANTED WITH PLANTS THAT CAN GROW IN BOTH WET AND DRY CONDITIONS

RAINWATER RUNOFF FROM THE STREET ENTERS THE RAIN GARDEN AREA AT DESIGNATED "CURB CUTS" OR FLUSH CURB LOCATIONS

CURBS AS NECESSARY

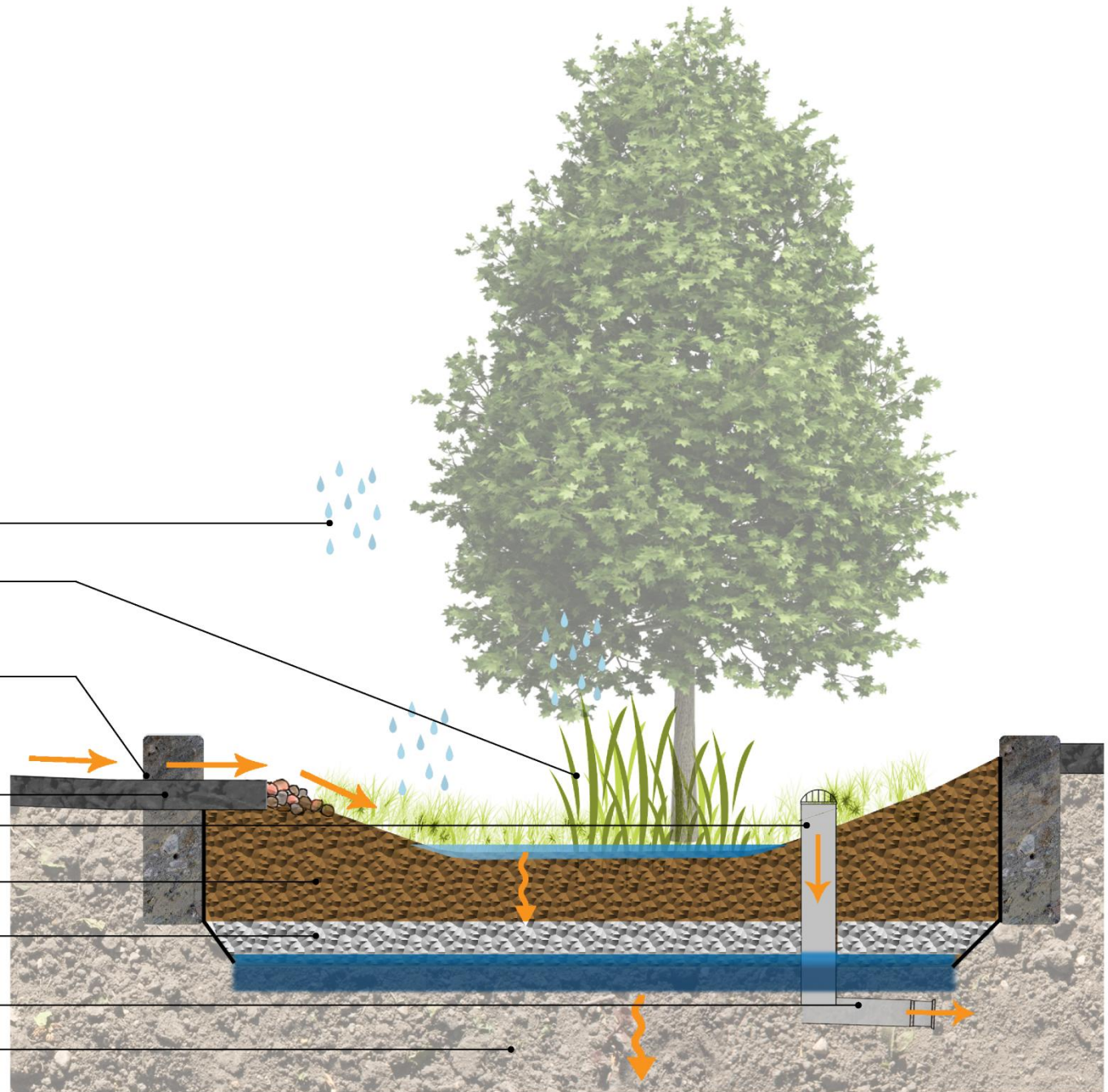
OVERFLOW GRATE IS DESIGNED FOR EXTREME RAIN EVENTS

SOIL COMPOST MIX (24-36")

AGGREGATE INFILTRATION BED (DEPTH VARIES)

OVERFLOW TO NEXT RAINGARDEN BASIN

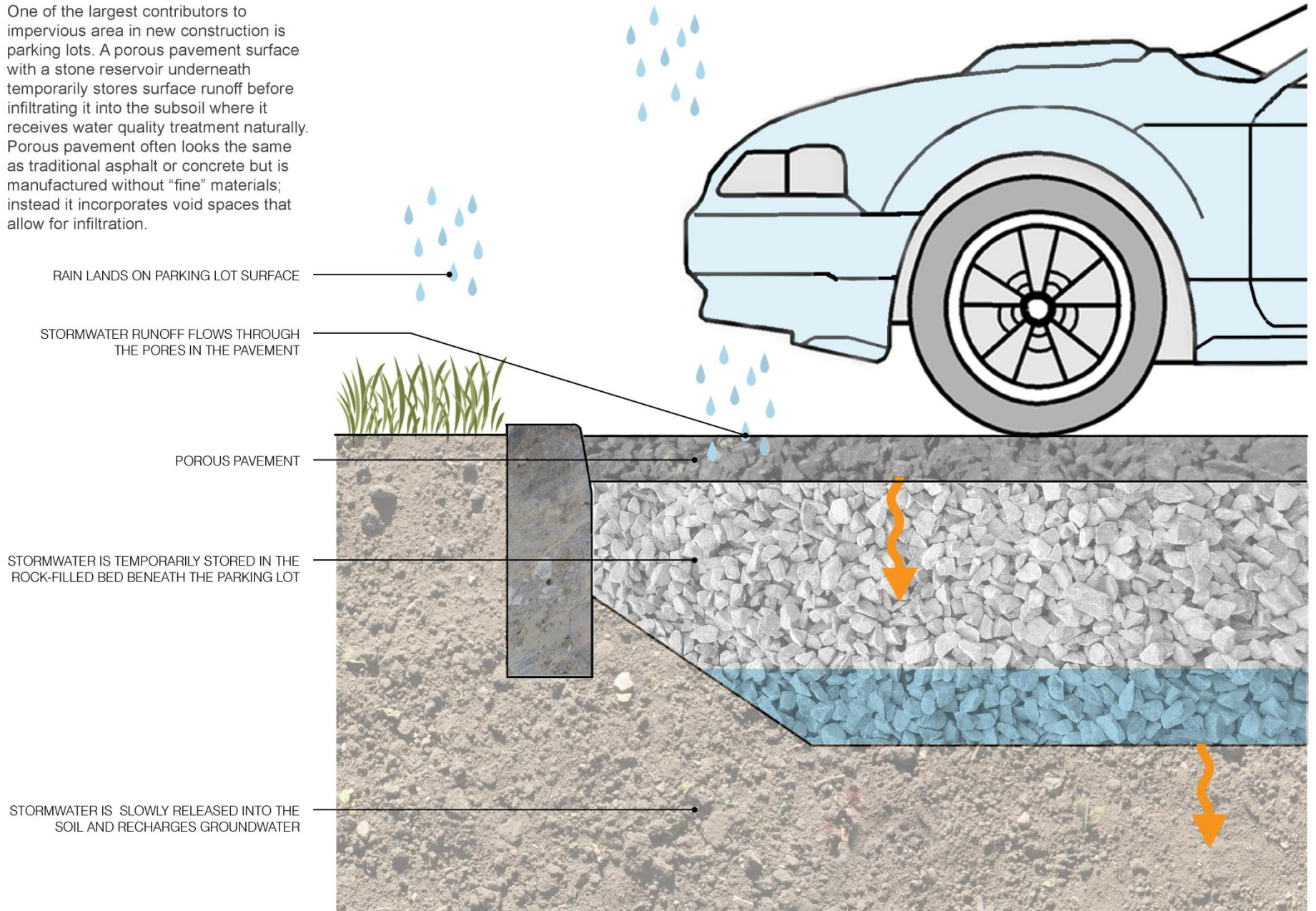
RAINGARDEN SYSTEM HELPS RE-CHARGE GROUND WATER





# POROUS PAVEMENT

One of the largest contributors to impervious area in new construction is parking lots. A porous pavement surface with a stone reservoir underneath temporarily stores surface runoff before infiltrating it into the subsoil where it receives water quality treatment naturally. Porous pavement often looks the same as traditional asphalt or concrete but is manufactured without "fine" materials; instead it incorporates void spaces that allow for infiltration.





## RESIDENTIAL POD 2

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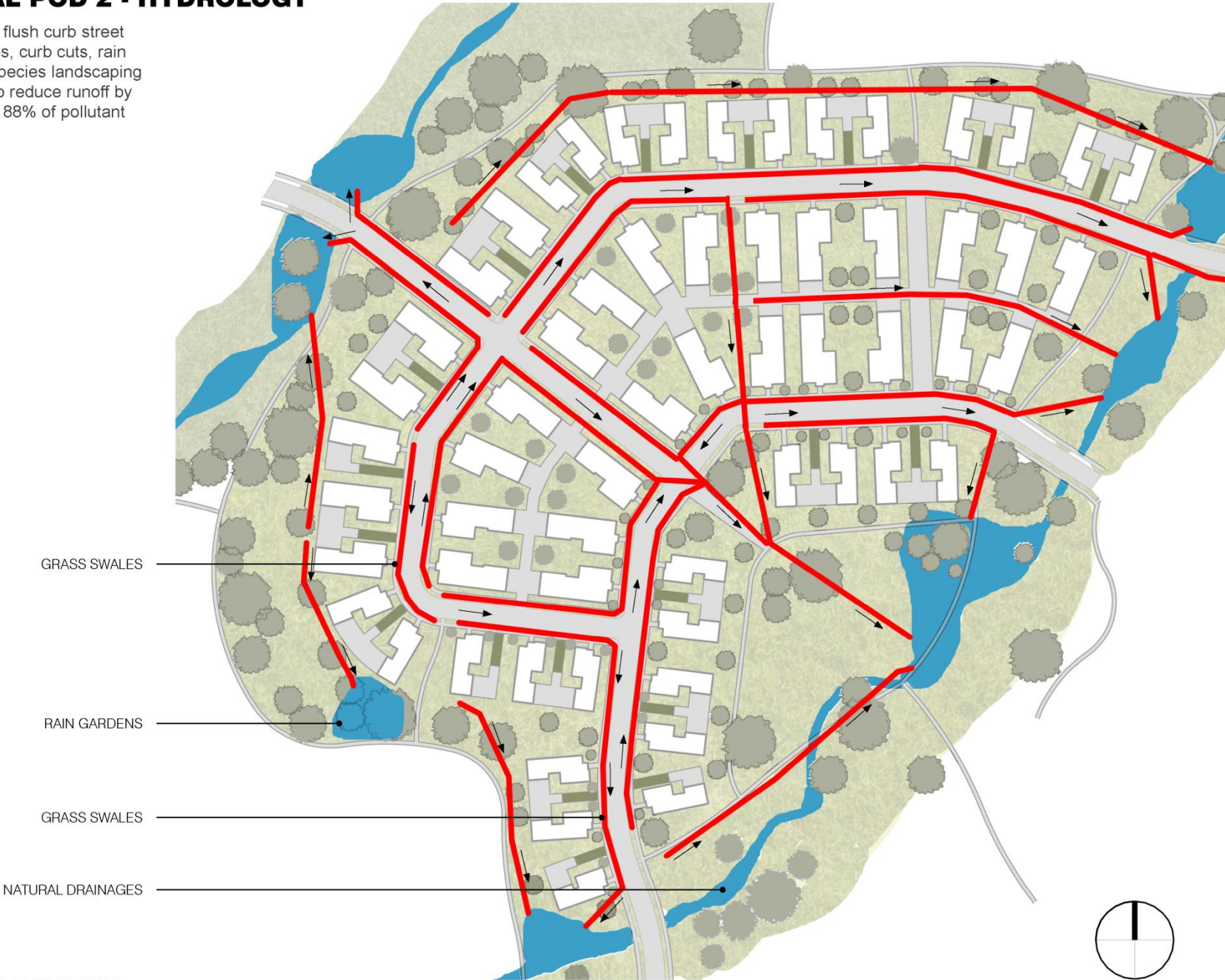
- NATURAL DRAINAGES
- SHARED DRIVEWAYS WITH REAR GARAGES
- SHARED ALLEY AND REAR ACCESS GARAGES
- FLUSH CURB STREET SYSTEM
- NATURAL BUFFER ZONE
- AMENITY OPEN SPACE
- EXTENSIVE TRAIL SYSTEM
- NATURAL DRAINAGES





# RESIDENTIAL POD 2 - HYDROLOGY

A simple approach of flush curb street systems, grass swales, curb cuts, rain gardens and native species landscaping allows Green Acres to reduce runoff by 30% and to eliminate 88% of pollutant runoff.



# Residential Summary

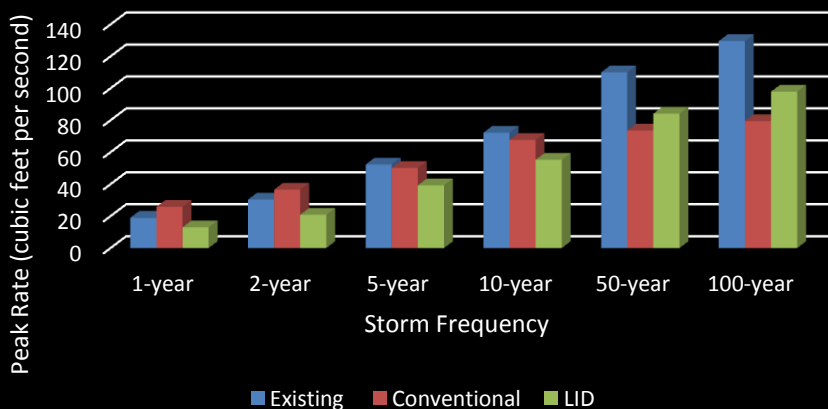
## Engineering

- No traditional infrastructure
- Minimal grading
- No curb and gutter

## Architecture

- 566,000 SF additional open space
- 79% of lots are amenity lots
- 32,000 SF less of hardscape and roadways
- 7,569 linear feet of trails
- Hidden garages
- Less driveway pavement
- Larger homes on smaller lots

Stormwater Run-off Peak Rate Comparison of Residential Area

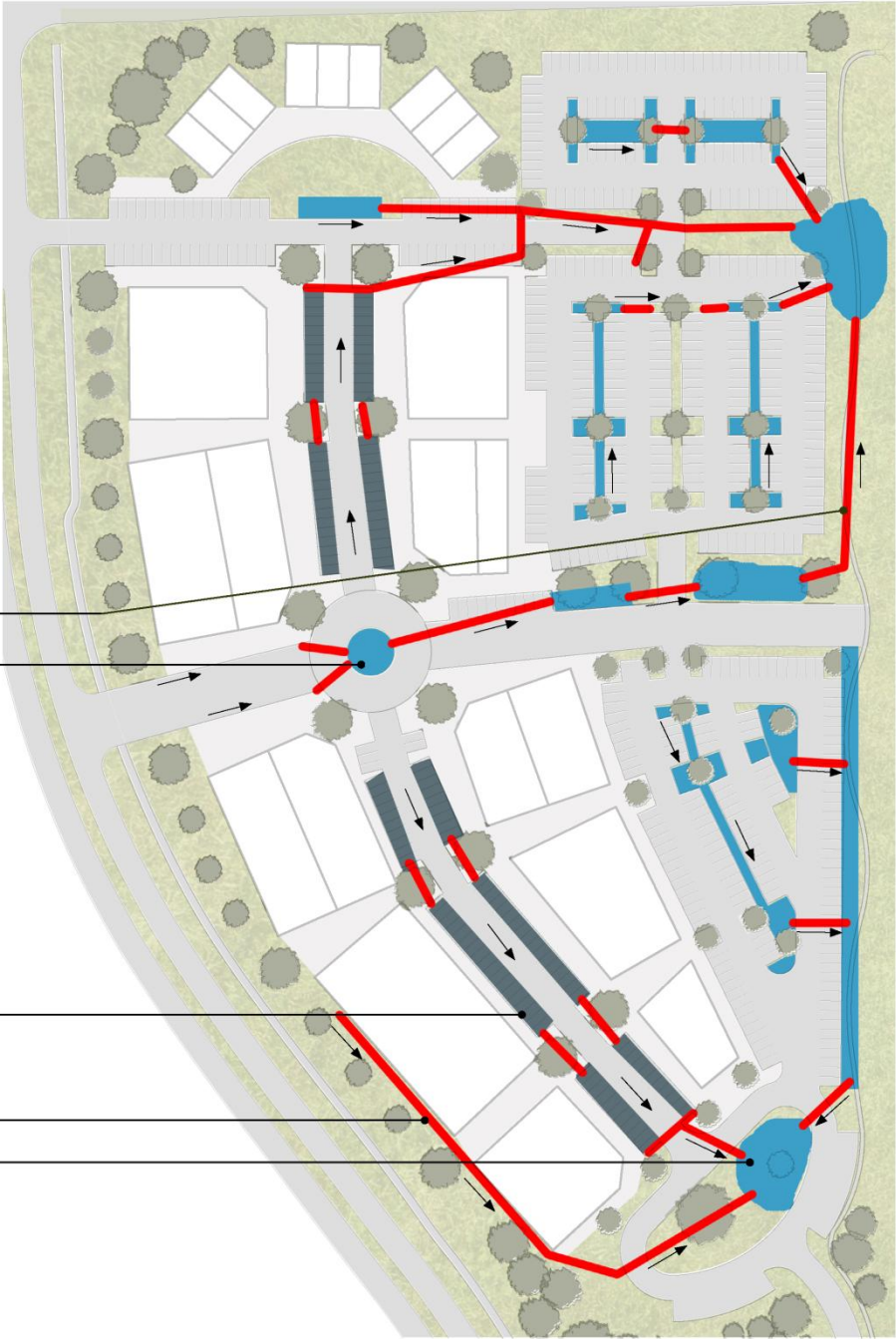




# COMMERCIAL POD - HYDROLOGY

A simple approach of flush curb street systems, porous pavement, grass swales, curb cuts, rain gardens and native species landscaping allows Green Acres to reduce runoff by 30% and to eliminate 88% of pollutant runoff.

- BIO SWALES
- RAIN GARDENS
- POROUS PAVEMENT
- BIO SWALES
- RAIN GARDENS



## COMMERCIAL POD

The design of the commercial/mixed use area is based on the concept of a lifestyle center. Lifestyle centers typically look like strip shopping centers turned outside in. Instead of facing a sea of parking like typical shopping centers, storefronts about landscaped park-like pedestrian areas, with businesses facing each other across pedestrian walkways and a low volume two-lane "main street". The parking area contains the majority of the LID mechanisms and is sited along the natural drainage path toward the low point of the site. With the addition of 30,000 SF of office space above the first floor retail, the design reduces the building footprint, in turn allowing the land west of Elm Place to remain forested and untouched. The addition of office space creates a mixed use which helps minimize parking requirements.

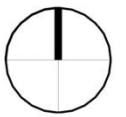


OFFICE SPACE ABOVE RETAIL

LIFESTYLE CENTER COMMERCIAL

EXTENSIVE TRAIL SYSTEM

NATURAL BUFFER ZONE



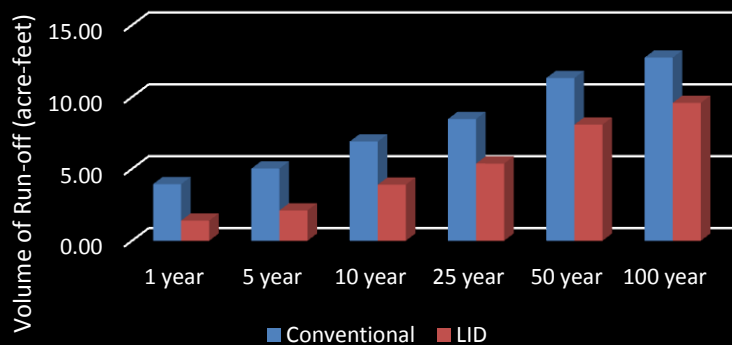


# Commercial Summary

## Engineering

- 33,000 SF of porous pavement
- No Detention Pond

Stormwater Run-off Volume Comparison  
for Commercial Development



24% to 58% volume reduction!

## Architecture

- 195,000 SF buildings in Lifestyle Center vs Big Box
- 170,000 SF of open space
- 200,000 SF less of hardscape and roadways
- 1,100 linear feet of trails

# What if no one maintains it?

ballard KOMO    

LATEST NEWS TRAFFIC CRIME PETS COMMUNITY SERVICE RESTAURANTS EVENTS

Home >

## Ballard's new green infrastructure has some neighbors seeing red

Submitted by *Michael Harthorn*, KOMO Communities Reporter Share:  

Tuesday, January 25th, 02:23pm



When Seattle Public Utilities began installing 10 blocks of rain gardens in Ballard in June, the typically green neighborhood – residents boast of having “Undriver Licenses” and are working to build a solar power-generating park – had visions of less storm water runoff in the streets and a healthier Puget Sound.

Courtesy Seattle Public Utility (SPU)



Image Source: Credit Valley Conservation



# K.I.S.S. Method

- Only 3 techniques that need maintenance
- Maintained by HOA or Property Owner
- All LID areas in public realm – easy to see
- No reliance on individual homeowners for success

# LANDSCAPING

The utilization of native plants that have evolved and adapted to the geography, hydrology and climate of the region are critical to the creation of a self-sustaining ecosystem. Plants native to Northeastern Oklahoma will be more robust because they have adapted to the local soil, conditions and weather patterns. Native plants typically have long roots which retain stormwater and reduce runoff. Seed mixes add seasonal colors with native plants such as Primrose, Blanketflower, Purple Coneflower, Purple Prairie Clover, Golden Wave Tickseed, Dahlberg Daisey, etc.







**LOW IMPACT DEVELOPMENT CERTIFICATION APPLICATION**

Date of Application: \_\_\_\_\_  
 Application Fee: \$50.00

Address or Site Plan: \_\_\_\_\_  
 Subdivision or Development: \_\_\_\_\_  
 New  Existing on file

**LOCATION**

Commercial  Residential  RESIDENTIAL  Silver  Bronze

**DEVELOPMENT TYPE**

COMMERCIAL  Silver  Platinum  Gold  Bronze

**PROPOSED LEVEL TYPE**

Gold

**IDENTIFICATION**

Applicant Name: \_\_\_\_\_  
 Address: \_\_\_\_\_ Email: \_\_\_\_\_  
 City/State/Zip: \_\_\_\_\_  
 Telephone: \_\_\_\_\_

Owner/Developer Name: \_\_\_\_\_  
 Address: \_\_\_\_\_ Email: \_\_\_\_\_  
 City/State/Zip: \_\_\_\_\_ Date: \_\_\_\_\_  
 Telephone: \_\_\_\_\_

Applicant Signature: \_\_\_\_\_  
 Approval will be based upon the Recommended Practices for Certification Manual.  
**DO NOT WRITE BELOW THIS LINE**

Condensed Level Type: \_\_\_\_\_  
 Reviewed by: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Date: \_\_\_\_\_

City of Broken Arrow  
Living Green Program  
 Low Impact Development  
 Recommended Practices for Certification  
 Manual

1



## compliance

100% design and planning stage compliance with The Broken Arrow Living Green LID Certification Manual.

## roadblocks

Amend codes to allow for:

- Porous pavement
- Small lot or zero lot developments.
- No incentives

## incentivize

- Fast track reviews
- Storm water fee credit
- Waive or reduce permitting fees
- Allow higher density development

# If you're still not convinced...

- 860,000 SF additional open space
- Costs \$300,000 less
- 88% reduction in pollutant loading
- No mass grading
- Mimics predevelopment hydrology
- Wildlife habitat creation
- Increased property values!





GREEN  
ACRES

OPEN SPACE AMENITIES