Gateways were determined by current circulation patterns. The soils inventory revealed that the best soil types for building development and wetlands on are adjacent or in close proximity to each other. This occurrence was taken advantage of and determined where clustered development would happen. The new clustered development will physically and characteristically connect to existing development. Wildlife crossings eliminate habitat fragmentation, connecting to large adjacent natural habitats. One of these habitats is the adjacent critical watershed area. While water quality isn’t addressed, hopes are that the connection of the habitats will begin improvement to the area. The high density areas are associated with the existing highly active areas and commercial development. These areas are also the most visible from the surrounding highway and toll road. They were placed here to catch the eye and attract people to the site. The analysis also resulted in a balance of separation between public and private areas. The existing watershed preserve acts as a natural boundary between these areas. The critical watershed area that overlaps the most eastern section of the site was developed into a major wetland mitigation area. This area has an existing wetland, however, it was in need of rehabilitation. Shooter’s Ditch, a channelized agricultural runoff ditch, flows into this area. The rehabilitated wetland intercepts the polluted runoff and cleanses it before it continues its journey into Coffee Creek. It became a major environmental education piece of the redevelopment. Finally, the preserve boundaries were expanded to incorporate more than just the stream corridor. This will help protect it from future development expansions.
site analysis

figure 4.9a - combined analysis

figure 4.9b - inventory & analysis layers
“Where ever you go, be conscious of rainwater returning to soil.” (Ferguson) A major theme from research, inventory, and analysis was water. It’s celebration and sustainable water management practices can be seen throughout all concepts. Another theme is dunes motif landscape areas. This establishes a sense of place, visually connecting to the Dunes. Separation between public and private areas were also a concern. However, residential areas are an important educational opportunity to integrate into the experience of the site as a whole. Integrating the design elements and program into the ecology of the site while making a minimal impact was explored through two concepts. From these two concepts a refined concept was developed, which was used to create the master plan.
The first concept looked at placing the resort next to the existing Water Plaza. This plaza is currently the main attraction of the site. It is highly visible from the highway and a major gathering area. Additionally, the existing pavilion is in close proximity to this area. However, placing the resort here sits heavy on the site. Views to the Water Plaza would be blocked, a view residents wanted to preserve. It was brought to attention by several Chesterton residents that they wanted the site to remain a natural place. This resort placement would also fail to do this. This concept also explored clustering the residential development so that it was more integrated into the preserve experience, however this interrupted the watershed preserve.

**positives**
- Isolated student area
- Community immersed in nature
- Separate welcome center from resort
- One main entrance

**negatives**
- Integrating community ruins experience and views within the preserve
- Ignored soils and existing environment
- Ignored southwest and northeast corners of the site
concept 2

The second concept looked at multiple gateways that cater to different users needs. For instance, someone entering the site on a bike will experience it different than someone in a vehicle. Residential development is clustered in a way that minimizes visual and experiential impact on the preserve.

figure 4.11 - concept 2

positives
- More environmentally sensitive
- Linked habitats
- Public/private separation
- Follows topography

negatives
- Isolated development
- Weak gateway
- Circulation disconnect
refined concept

The refined concept has a complete circulation loop. This small change drastically fixes linkages on site. New development builds and plays off of existing development. Three major gateways provide a variety of entry experiences. The resort area is broken into smaller clusters lessening the impact on the site, but still providing enough area to house many visitors. This concept also looks to off site connections that can feed the new community and vice versa.

This concept led to the final master plan which can be seen on page 67.

positives

- Minimal environmental impact
- Existing preserve experience is respected as much as possible
- Complete circulation
- Densities are evenly distributed
- Learning center is connected to existing gathering/educational experiences and opportunities

negatives

- Roads impose on previously undisturbed preserve areas
conceptual design

habitat

rehabilitation

research

habitat rehabilitation community

village

ARD

wildlife crossing

residential dunes motif

resort village

dense res.

habitat rehabilitation

learning center

dunes motif

gather

ARDB

residential wetland

community village

dense res.

habitat rehabilitation

resort

commercial district

beginning

audubon/arboretum golf course

figure 4.12 - refined concept
Coffee Creek serves as the introduction to the Indiana Dunes. What this means is that visitors and residents will be introduced to Dunes vegetation and ecosystems that can be found throughout the site. These are less sensitive to human impact than those found at the Dunes. Therefore, there is an opportunity for education and interaction.

What makes Coffee Creek unique? All runoff, rainwater, and wastewaster is stored, cleansed and used on site. It brings attention to the fact that pollution off site (Coffee Creek) affects everything downstream (Dunes).

This sustainable use of water meets the original master plan’s goals as well as Chesterton’s goals for the town.

The constructed treatment wetlands throughout the site help re-establish lost ones and create new wetland habitat that is unique to Northwest Indiana and the Dunes.

Three areas were chosen to further develop in detail. They were the learning center, ecoresort, and typical LID residential lots. It was determined that the learning center would have the most educational and immediate impact on the site and community and therefore will be discussed first and in the most design detail, followed by residential design and finally ecoresort design.
master plan

Chesterton’s *Town Comprehensive Plan 2010* states that “Chesterton will preserve and enhance the duneland environment”. The site is designed to do just that. Coffee Creek is designed to act as an introduction to the Dunes. Visitors, residents, and students learn about environmental sustainability of Coffee Creek on site and carry this knowledge with them to the Dunes, applying these methods and conservation efforts there. This type of ecotourism aims to set an example of how to respect and conserve areas that aren’t currently protected.

Wetlands are very important to dunes ecology and are celebrated, rehabilitated, and created throughout the site. The site is located where back dunes once were. Wetlands are prominent in these back dunes areas and thus are important to the site ecology as well.

Remnant fence rows from the previous agricultural use of the site were used to celebrate the land use history of the site. Keeping these fence rows intact also created “rooms” of different experiences and habitats. They were particularly used to “break up” the ecoresort, making rooms that cater to different users through different design programs.

Vehicular circulation was designed to leave cars on the edges of the site, allowing users to get immersed in nature and the experience the site offers. Additionally, this leaves much of the center of the site and sensitive creek habitats undisturbed. Existing and new roads were manipulated to make use of traffic calming elements.

Improved and expanded habitat areas make up for prairie areas that were used for development.

Transitions between the built and natural environments are evident throughout the site. One has to travel through a natural area to get to the next cluster of development. This method creates entry experiences to each cluster, provides habitat corridors, and preserves existing habitats as much as possible.

Village centers build off of existing commercial areas, providing amenities and services to the ecoresort and community.

figure 4.13

*Construction phases*
creek corridor & trail to Indiana Dunes
trail head
existing amphitheater
artful rain garden & treatment wetland
learning center
water plaza
shuttle stop
dunes motif entry
wedding facility
ecoresort
treatment wetland
resort village
existing commercial
existing preserve
existing marsh
dense residential
undisturbed prairie
prairie room
dense residential
artful rain garden & treatment wetland
limited disturbance lots
existing preserve
wetland park & research

figure 4.14 - master plan
learning center

The learning center builds off of the existing water plaza and Phillips pond area. The existing areas had elements of ARD that were expanded upon and used to develop the landscape narrative of the learning center.

One enters the site through a series of dunes motif mounds. These mounds abstract dunes formations as well as display dunes vegetation, educating visitors about the ecology of the Indiana Dunes.

The runnels celebrate the journey of water from roof to soil by creating a water trail and visible system throughout the site. These runnels travel through a series of mounds, telling the story of water getting cleansed, traveling through Coffee Creek and the Dunes and eventually reaching Lake Michigan. The real physical connection of Coffee Creek and the Dunes is shown at an interactive, accessible scale.

A boardwalk meanders through the learning center’s treatment wetland, making it’s cleansing process visible and interactive.

Outdoor classrooms are surrounded by a demonstration garden that educates visitors about sustainable stormwater management through rain gardens. This shows visitors something they can do to their own home.

A shuttle area provides transportation to and from Coffee Creek to the Indiana Dunes. The shuttle promotes sustainable travel as well as provides an opportunity to grow visitation to the site and Dunes.
The learning center of Coffee Creek will have the most immediate and greatest impact on the success of the redevelopment. Due to this, the learning center will be constructed first. The designer focused the most in depth and detailed design to this area because of this fact.

The learning center will provide a place to hold environmental education lessons and programs. The interior will have changing displays describing varying aspects of Coffee Creek and the Indiana Dunes. Educational programs will range from children’s lessons to those for adults about the importance of sustainability and conservation.

Visitors become aware of the stormwater system through ARD. Roof runoff pours from the corner scupper into a series of treatment basins, eventually filling the reflection pool.

Visitors are invited to explore the wetland by walking across the meandering boardwalk. Interpretive signage adds to the educational aspect of the experience.
Existing site elements of the water plaza are elegantly integrated into the new dunes plaza.

A water trail physically connects the building to the pond, telling the story of the journey of water from roof to wetland.

Subtle lighting is used throughout the plaza and adjacent trails throughout the marsh.

Areas around the marsh that are open from tree cover create the lighting limits. Limiting lighting to these open areas provides better safety for visitors and helps contain them in areas where they are visible to others at night.
design process

01

scupper

series of cleansing basins

cleansed roof runoff

scupper

native plants

signage

figure 4.19
learning center entrance
figure 4.20
learning center treatment wetland
figure 4.21
learning center dunes & water plaza

existing waterfall & runnel

existing water plaza

native plants

dunes motif & mounds

existing water plaza
existing water plaza area

noninvasive lighting

figure 4.22
water plaza at night
A dunes mounds & existing water plaza

B demonstration garden & outdoor classrooms
The boardwalk footing requires no excavation or concrete pouring, allowing for minimal impact on sensitive ecosystems. This footing design will be used on all new boardwalks throughout the site.
constructed treatment wetlands

The plan was designed according to height, color, and use in the wastewater treatment process. The majority of other wetlands throughout the site will be planted with specialized seed mixes. However, this one was designed to be more artistic, becoming another form of ARD. The treatment wetland follows the natural drainage of the site.

The native plants were chosen from JFNEW’s Native Plant Browser. JFNEW has completed numerous ecological restoration projects. Their nursery is stocked with plants native to the Great Lakes region. Plants were chosen from the Stormwater and Swale seed mixes, then narrowed down further according to light and soil requirements.

figure 4.25a - plant use

planting plan

- decorative
- stormwater
- swale
height
This diagram shows the heights of the plants. Taller plants were used to screen views in and around the wetland. Shorter plants were used around and under the boardwalk. These plants could tolerate partial shade as well.

color
The decorative and swale plant types are the most colorful. The diagram demonstrates how the planting becomes more colorful near the end of the treatment process. This is the ARD aspect - the cleaner the water, the more colorful the plants.
native stormwater treatment plants

### stormwater seed mix

<table>
<thead>
<tr>
<th>botanical name</th>
<th>common name</th>
<th>color</th>
<th>ht</th>
<th>bloom time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carex lunda</td>
<td>bottlebrush sedge</td>
<td>green</td>
<td>2'-3'</td>
<td>may-jun</td>
</tr>
<tr>
<td>Juncus effusus</td>
<td>common rush</td>
<td>green</td>
<td>1'-3'</td>
<td>jun</td>
</tr>
<tr>
<td>Juncus torreyi</td>
<td>torrey's rush</td>
<td>green</td>
<td>1'-2'</td>
<td>may-jul</td>
</tr>
<tr>
<td>Panicum virgatum</td>
<td>switch grass</td>
<td>green</td>
<td>3'-5'</td>
<td>jun-oct</td>
</tr>
<tr>
<td>Scirpus validus</td>
<td>great bulrush</td>
<td>green</td>
<td>4'-8'</td>
<td>may-aug</td>
</tr>
</tbody>
</table>

#### forbs

<table>
<thead>
<tr>
<th>botanical name</th>
<th>common name</th>
<th>color</th>
<th>ht</th>
<th>bloom time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asclepias incarnata</td>
<td>swamp milkweed</td>
<td>pink</td>
<td>3'-5'</td>
<td>jun-sep</td>
</tr>
<tr>
<td>Bidens spp.</td>
<td>bidens mix</td>
<td>yellow-orange</td>
<td>1'-4'</td>
<td>2'-5</td>
</tr>
<tr>
<td>Helinium autumnale</td>
<td>sneezeweed</td>
<td>yellow</td>
<td>3'-5'</td>
<td>jun-nov</td>
</tr>
<tr>
<td>Mimulus ringens</td>
<td>monkey flower</td>
<td>lavender</td>
<td>2'-4'</td>
<td>jun-sep</td>
</tr>
<tr>
<td>Rudbeckia subtomentosa</td>
<td>sweet black-eyed susan</td>
<td>yellow/brown</td>
<td>3'-5'</td>
<td>aug-sep</td>
</tr>
<tr>
<td>Sagittaria latifolia</td>
<td>common arrowhead</td>
<td>white</td>
<td>1'-4'</td>
<td>jun-oct</td>
</tr>
</tbody>
</table>

#### swale seed mix

<table>
<thead>
<tr>
<th>botanical name</th>
<th>common name</th>
<th>color</th>
<th>ht</th>
<th>bloom time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andropogon gerardii</td>
<td>big bluestem</td>
<td>green</td>
<td>4'-8'</td>
<td>jul-sep</td>
</tr>
</tbody>
</table>

#### forbs

<table>
<thead>
<tr>
<th>botanical name</th>
<th>common name</th>
<th>color</th>
<th>ht</th>
<th>bloom time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aster novae-angliae</td>
<td>new england aster</td>
<td>violet/yellow</td>
<td>3'-6'</td>
<td>jul-oct</td>
</tr>
<tr>
<td>Iris virginica</td>
<td>blue flag</td>
<td>blue/violet</td>
<td>2'-3'</td>
<td>may-jul</td>
</tr>
<tr>
<td>Liatris spicata</td>
<td>marsh blazing star</td>
<td>pink</td>
<td>3'-5'</td>
<td>jun-sep</td>
</tr>
<tr>
<td>Lobelia cardinalis</td>
<td>cardinal flower</td>
<td>red</td>
<td>2'-5'</td>
<td>jul-oct</td>
</tr>
<tr>
<td>Verbena hastata</td>
<td>blue vervain</td>
<td>violet</td>
<td>3'-6'</td>
<td>jun-sep</td>
</tr>
<tr>
<td>Zizia aurea</td>
<td>golden alexanders</td>
<td>yellow</td>
<td>1'-3'</td>
<td>apr-jun</td>
</tr>
</tbody>
</table>

### decorative

<table>
<thead>
<tr>
<th>botanical name</th>
<th>common name</th>
<th>color</th>
<th>ht</th>
<th>bloom time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eupatorium fistulosum</td>
<td>spotted joe-pye weed</td>
<td>white</td>
<td>4'-6'</td>
<td>aug-sept</td>
</tr>
<tr>
<td>Echinacea purpurea</td>
<td>purple coneflower</td>
<td>purple</td>
<td>3'-4'</td>
<td>jun-aug</td>
</tr>
<tr>
<td>Filipendula rubra</td>
<td>queen of the prairie</td>
<td>pink</td>
<td>4'-7'</td>
<td>jun-jul</td>
</tr>
<tr>
<td>Vernonia gigantea</td>
<td>smooth tall ironweed</td>
<td>purple</td>
<td>4'-9'</td>
<td>jul-oct</td>
</tr>
</tbody>
</table>

---

**figure 4.26** - plant list

Seed mixes will be used for all plants

**figure 4.27** - native plants featured species
According to France, most contaminants are effectively removed after passing through the first 3 treatment cells of a constructed treatment wetland. Additionally, a treatment distance of 60 feet to 120 feet allows for an effective time and travel distance to treat waste/grey water.

The learning center treatment wetland was designed according to these guidelines and therefore will function properly and effectively treat all waste/grey water from the learning center.
ARD

New runnels through the Dunes Plaza that connect to the existing ones in the Water Plaza are constructed as shown. The grate is optional and used in areas of high pedestrian traffic where a person might cross over the runnel. Even though the grate is used for safety purposes, it will still be artful. The edges around the runnel are of limestone. This material change highlights the runnel as well as warns one to pay attention for learning and for safety. The remaining paving areas around the runnels use permeable paving. The river rock lining the bottom of the stainless steel runnel, gives the impression of a creek bed even when the runnel is dry.
Plant materials are native plants to Coffee Creek and the Dunes. The plants pictured are native Dunes plants. They are used heavily in the dunes motif landscaping and mounds. They demonstrate the wide variety and odd combinations of species that are found on the Dunes.

Building materials were taken from existing infrastructure and elements. They include permeable paving and Indiana limestone. Different paving patterns and textures are used to differentiate between gathering areas, walking paths, streets, etc.
The residential lots were designed following modified guidelines from the original Coffee Creek Center Codebook.

Setting landscape standards for residents educates them about the standards’ purpose and importance of sustainable water use.

According to Wetland Design, a 3 bedroom house needs a 900 square foot treatment wetland to successfully treat the residence’s grey and waste water. Each residence will have a treatment wetland that functions individually but aesthetically will be combined into a “wetland alley”. These “wetland alleys” create linear parks and greenways throughout the neighborhoods.

landscape guidelines

- zero-lot line
- rain barrels
- not < 20% front = garden
- 5% of lot = non-permeable surface
- 20% of lot = traditional lawn
- not < 30% of front = rain garden
- driveway = permeable pavement
- remaining = garden/alternative lawn
figure 4.36a - residential lot detail section

figure 4.36b - residential lot detail plan

figure 4.37

systems diagram
The ecoresort was developed after ecotourism and ecolodge guidelines. These included having minimal impact on the environment, sustainable water management, furthering education, etc.

Existing topography was respected and utilized for drainage and views. Existing fence rows were kept intact, creating “rooms” for the ecoresort.

One enters the ecoresort through a series of dunes motif mounds. This entry experience immediately educates the visitor about the surrounding habitat and ecology. It connects the ecoresort to the dunes.

Different lodging types cater to different user groups and their preferences. The further from the road one travels, the more immersed in nature they become. The modular villas and cabins mold around nature.

The cabins are set apart from the main resort area to create a more environmental experience. In the off season, the cabins can house students that are on field trips. This separation from the main resort area allows them a more private setting.
figure 4.39 - ecoresort detail plan
Environmental education begins the moment you enter the ecoresort site. The signage is reminiscent of the national/state park signage. It uses native materials and plants. The plants can be found around the site and at the Dunes. Stormwater management is also evident at this level of design with permeable pavers and bioswales along the parking lot. Guiding the visitor through these systems educates them about the stormwater systems purpose and function. The dunes ecotone is planted according to foredune and backdune planting, bringing plant succession and the coexistence of peculiar plant pairings down to an accessible scale.
villas

The villas were designed to make a minimal impact on the land. Using boardwalks and raising the buildings off the ground limits the disturbance on the slope. This also reduces sediment runoff to Coffee Creek. Wildlife habitat is left intact as well. The villa is designed using indigenous materials and vernacular architecture. The roof is sloped to collect rainwater into rain barrels. This water can be treated and used as grey water in the villa.

cabins

The cabins are set apart from the main area of the ecoresort. This allows for a more rustic and natural accommodation for those looking to “rough it”. This sketch depicts the main fire pit/gathering area of the cabin area. This area can be used for campfire stories and/or environmental lessons. It encourages visitor interaction as well as provides night life and entertainment.
The wetland park educates visitors about treating water and runoff through natural processes. Shooter’s Ditch, an agricultural ditch, runs through this wetland. This wetland is a rehabilitated existing wetland. The ditch was naturalized from its original channelized form. The treatment wetland cleanses agricultural runoff. It is used as a tool to educate visitors, as well as demonstrate to farmers what they can do to improve the health of their farms and surrounding land.

Interpretive signage will be added to the existing and new watershed preserve, providing additional education. Major nodes, overlooks, or observation areas will use larger, primary signage, while secondary signage will support the remaining areas.
figure 4.46
road through the preserve

The road demonstrates nature sensitive design. The existing topography supports the road being raised off the ground. It has a Central-Park-like feel to it. The existing trails remain uninterrupted. Vehicular, bike, and pedestrian traffic work together. The materials of the supports and railings mimic those found in the existing Water Plaza.
“...to preserve, protect and restore the Indiana Dunes and all natural resources in Northwest Indiana’s Lake Michigan Watershed for an enhanced quality of life.”

- Save the Dunes Mission
conclusion
Five miles from the shores of Lake Michigan and
the popular Indiana Dunes State Park, Chesterton has, by
mere location, become a gateway to those destinations.
Coffee Creek, a partially developed attraction of a
watershed preserve with nature trails, natural attractions
and sparse residential and commercial development
located on the southeast corner of Chesterton, is poised
in perfect position for the development of an ecotourism
destination. The Coffee Creek Ecoresort Community
educates visitors about sustainable stormwater
management methods and their positive effects on the
environment. Through ecotourism and artful rainwater
design, visitors and local residents alike learn the value
of the Coffee Creek Watershed Preserve, connecting it
to the Indiana Dunes and demonstrating the respect
that should be given to both places. By connecting
to the Indiana Dunes, this new ecoresort community
further establishes Chesterton as the premier gateway
community to the Dunes. Including and involving
permanent residents fosters a sense of stewardship for
the land and adds to the ecotourism aspect of Coffee
Creek and the sustainable culture of the surrounding
area. The Coffee Creek Ecoresort Community takes its
place as yet another stunning attraction for domestic and
international visitors to Northwest Indiana.
appendix
systems diagrams

These diagrams reveal the different natural systems, such as topography and drainage, as well as circulation patterns. These systems and patterns greatly influenced design decisions, especially building placement. The goal was to design in a way that respected these natural patterns as much as possible. The diagrams show the existing topography, which was left almost entirely untouched. The design molded to nature and the earth instead of molding the earth to the design.

- **bike**
- **shuttle**
- **major pedestrian**
- **drainage**
- **stormwater management**
- **ARD**
- **educational spaces**
- **primary gathering space**
- **secondary gathering space**
definitions

_Artful Stormwater Management_: Sustainable stormwater management implemented as an art form in the landscape, celebrating sustainable stormwater management.

_Ecolodge_: Environmentally sound lodging facilities that follow the philosophy and principles of ecotourism – minimizing environmental impact with a focus on education about the environment it is part of.

_Ecoresort Community_: A planned community containing seasonal housing for visitors to Chesterton and Indiana Dunes State Park. The community will be programmed around ecotourism, containing an ecolodge and other amenities for ecotourism activities.

_Ecotourism_: A form of tourism that fosters responsible travel to natural areas that conserves and educates the people about the environment and improves the well-being of the local people.

_Gateway Community_: A town that is located next to a national park or other protected natural recreational area.

_Landmark_: Creating the prominence of Chesterton as a gateway to the Dunes by establishing the town as an excellent sustainable example to others.

_Passive Recreation_: Uses of land, such as hiking, biking, fishing, etc., that make minimal impact on environmentally sensitive areas. These areas require minimum development.

*Sustainable Stormwater Management_: Stormwater management methods that utilize natural infiltration to cleanse contaminants from the water before it reaches its destination.

*Sustainable Tourism_: A form of tourism that encourages responsible actions that make a low impact on the environment.

_Treatment Wetland_: A constructed wetland designed to cleanse waste water and grey water and finally infiltrate the clean water into the ground.

_Watershed Preserve_: Land protecting a designated watershed, which is an area where all water of that area drains to a common point.
assumptions

Development of the Gateway to the Dunes in Porter, Indiana will be completed before the redevelopment of Coffee Creek.

The Dunes Kankakee Trail will continue into Chesterton.

Attendance to Indiana Dunes State Park will continue to increase.

Chesterton, Indiana already has enough commercial services to support it as a gateway community.

delimitations

This research will not include sources of funding.

Stormwater management will be discussed in this project, however, not all planting plans and details will not be included.

Future economic/development growth around the perimeter of the site will be discussed, but designs for these areas will not be included.

The permanent resident community will be designed, however, architectural styles of the buildings will not.

Volumes of stormwater runoff will not be calculated.
Methodology

Methodology was used to research the types of opportunities for redevelopment of Coffee Creek that will create a landmark for Chesterton, Indiana, the role of a watershed preserve in recreation uses for a resort community, and the role of artful stormwater management in the design of a recreational resort community. Both historical and descriptive research methods were used to gather primary and secondary information for each of the sub-problems as well as design guidelines.

To determine the types of opportunities for redevelopment of Coffee Creek that create a landmark for Chesterton, Indiana, primary and secondary research methods were utilized. These were also categorized as historical and qualitative methods for this subproblem. Case studies of current redevelopment and improvement projects affecting Coffee Creek were analyzed to determine the relevancy of the new design of Coffee Creek. These case studies were found in local newspaper articles online. Nevers in “Dunes State Park Has Fabulous Year in 2009 Attendance Way Up” and Poparad in “30M Gateway to the Dunes Project Gets Underway in Town of Porter” provided important resources in the discussion of the feasibility of developing a resort community at Coffee Creek. They covered the ongoing economic revitalization of Chesterton and the growing importance of Indiana Dunes State Park. Additionally, “New urbanism slow to brew at Coffee Creek Center in Chesterton” by Erler discussed the failure of the initial new urbanism community development named Coffee Creek Center on the site. The case study of The Village in Burns Harbor, a similar development in a neighboring town, showed that there is a market in this region willing to live sustainably. Other sources included books and journal articles found in the Ball State Architecture Library, such as Preserving and Enhancing Communities: a Guide for Citizens, Planners, and Policymakers edited by Hamin, Geigis and Silka. The Landscape Architecture magazine article, “Return on Investment” by Kim Sorvig discussed Estes Park, Colorado and demonstrated how Estes Park established itself as the official gateway to Rocky Mountain National Park and how good landscape design boosts local economy. To further support design and redevelopment decisions the Coffee Creek Watershed Management Plan compiled by the Coffee Creek Watershed Conservancy and found online was reviewed. It revealed stormwater management/water quality goals of Coffee Creek. Additionally, future goals about using the site as an educational tool were also included. This finding was also used in discovering the role a watershed preserve has in a resort community and also the role of artful stormwater management in the design.

The role of a watershed preserve in a resort community was explored through secondary research methods. Qualitative techniques such as case studies were primarily used. This area of the research problem covered additional context of the design problem relating it to ecotourism. A case study of “Save the Dunes”, one of Indiana’s oldest environmental groups, was used to understand educational opportunities of the area. The Center for Sustainable Destinations and The International Ecotourism Society, found online, explained this tourism concept and provided resources useful to those interested in all aspects of it. Research
methodology

related to this subproblem also reviewed the community of Pelican Bay, the first of its type in environmental planning. Additional sources included journal articles and books found in the Ball State Architecture Library. The Landscape Architecture article “Back from the Beach” by Jost explores this past achievement by John Ormsbee Simonds. Additionally, the World Tourism Organization compiled the book Sustainable Development of Ecotourism: a Compilation of Good Practices, which compared and contrasted numerous ecotourism destinations around the world, finding similarities and differences/successes and failures among them. The information gathered from this research was used to gain a better understanding of the guiding principles and ecotourism and how they can be applied to the resort community’s design. These sources were also documented primarily through notes.

Information on the role of artful stormwater management in the design of a resort community was gathered through primary and secondary research methods. To gather information on artful stormwater management, journal articles found online and in the Ball State Architecture Library were used. Qualitative methods were mainly used, however, author Echols used quantitative and qualitative methods when determining the use and success of artful rainwater design. Echols and Pennypacker in “From Stormwater Management to Artful Rainwater Design” discovered how artful rainwater design, or ARD, influences the perceived value of a site and how it can be used as an educational tool, as well as other design implementations. Case studies on how communities incorporated sustainable stormwater management into design were also explored. Maplewood, Minnesota, is a successful example of how this strategy was implemented. Other key resources include books also found in the Ball State Architecture Library. Most important is Introduction to Stormwater: Concept, Purpose, Design by Ferguson. Like the title states, the book introduced all aspects of stormwater management. The advantages and disadvantages of each method were weighed in the book. The most relevant methods to the design are sustainable, using primarily infiltration techniques to replenish aquifers and clean pollutants from runoff. Wetland Design: Principles and Practices for Landscape Architects and Land-use Planners by R. L. France and Rain Gardens: Managing Water Sustainably in the Garden and Designed Landscape by Claydon and Dunnett were used to further explore the design and use of these particular sustainable stormwater methods and how to properly implement them into the site design.

Additional information that further guided the design was collected through primary and secondary research methods. Qualitative methods such as case studies were primarily used. The case studies provided design detail inspiration. Additional design guidelines were gathered from online and print journal articles. JFNEW and the National Park service provided guidance in choosing appropriate native plants for the site. Direct observation also guided plant and materials decisions. Chesterton’s Comprehensive Plan 2010 was used to determine ecological importance of the site as well as guide design to fulfill the town’s future goals.
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Original Coffee Creek Center master plan</td>
<td>15</td>
</tr>
<tr>
<td>1.2</td>
<td>Existing site</td>
<td>15</td>
</tr>
<tr>
<td>1.3</td>
<td>Estes Park Riverwalk, Colorado</td>
<td>16</td>
</tr>
<tr>
<td>1.4</td>
<td>Gateway to the Dunes Project, Porter, IN</td>
<td>16</td>
</tr>
<tr>
<td>1.5</td>
<td>Pelican Bay</td>
<td>19</td>
</tr>
<tr>
<td>1.6</td>
<td>Pelican Bay community plan</td>
<td>19</td>
</tr>
<tr>
<td>1.7</td>
<td>Beyond the Beach Discovery Trail</td>
<td>23</td>
</tr>
<tr>
<td>1.8</td>
<td>Maplewood, MN, private rain garden</td>
<td>26</td>
</tr>
<tr>
<td>1.9</td>
<td>ARD, Waterworks Garden</td>
<td>29</td>
</tr>
<tr>
<td>1.10</td>
<td>ARD, Pierce County Environmental</td>
<td>29</td>
</tr>
<tr>
<td>1.11</td>
<td>ARD, Cedar River Education Center</td>
<td>29</td>
</tr>
<tr>
<td>4.1</td>
<td>Vicinity map</td>
<td>44</td>
</tr>
<tr>
<td>4.2</td>
<td>Distance</td>
<td>44</td>
</tr>
<tr>
<td>4.3</td>
<td>Site context</td>
<td>45</td>
</tr>
<tr>
<td>4.4a</td>
<td>Existing site</td>
<td>46</td>
</tr>
<tr>
<td>4.4b</td>
<td>Existing features and conditions</td>
<td>47</td>
</tr>
<tr>
<td>4.5a</td>
<td>Land use layers</td>
<td>48</td>
</tr>
<tr>
<td>4.5b</td>
<td>Land use diagram</td>
<td>49</td>
</tr>
<tr>
<td>4.6</td>
<td>Soils</td>
<td>51</td>
</tr>
<tr>
<td>4.7a</td>
<td>Topography sections of entire site</td>
<td>52</td>
</tr>
<tr>
<td>4.7b</td>
<td>Topography &amp; major drainage ways</td>
<td>53</td>
</tr>
<tr>
<td>4.8</td>
<td>Qualitative inventory</td>
<td>55</td>
</tr>
<tr>
<td>4.9a</td>
<td>Combined analysis</td>
<td>57</td>
</tr>
<tr>
<td>4.9b</td>
<td>Inventory &amp; analysis layers</td>
<td>57</td>
</tr>
<tr>
<td>4.10</td>
<td>Concept 1</td>
<td>60</td>
</tr>
<tr>
<td>4.11</td>
<td>Concept 2</td>
<td>61</td>
</tr>
<tr>
<td>4.12</td>
<td>Refined concept</td>
<td>63</td>
</tr>
<tr>
<td>4.13</td>
<td>Construction phases</td>
<td>66</td>
</tr>
<tr>
<td>4.14</td>
<td>Master plan</td>
<td>67</td>
</tr>
<tr>
<td>4.15a</td>
<td>Systems layers</td>
<td>68</td>
</tr>
<tr>
<td>4.15b</td>
<td>Systems diagrams</td>
<td>68</td>
</tr>
<tr>
<td>4.16</td>
<td>Learning center detail plan</td>
<td>69</td>
</tr>
<tr>
<td>4.17</td>
<td>Learning center character images &amp; their locations</td>
<td>70</td>
</tr>
<tr>
<td>4.18</td>
<td>Precedent &amp; existing images</td>
<td>71</td>
</tr>
<tr>
<td>4.19</td>
<td>Learning center entrance</td>
<td>72</td>
</tr>
<tr>
<td>4.20</td>
<td>Learning center treatment wetland</td>
<td>73</td>
</tr>
<tr>
<td>4.21</td>
<td>Learning center dunes &amp; water plaza</td>
<td>74</td>
</tr>
<tr>
<td>4.22</td>
<td>Water plaza at night</td>
<td>75</td>
</tr>
<tr>
<td>4.23a</td>
<td>Dunes mounds &amp; existing water plaza</td>
<td>76</td>
</tr>
<tr>
<td>4.23b</td>
<td>Demonstration garden &amp; outdoor classrooms</td>
<td>76</td>
</tr>
<tr>
<td>4.23c</td>
<td>Section cuts</td>
<td>77</td>
</tr>
<tr>
<td>4.24a</td>
<td>Diamond pier</td>
<td>77</td>
</tr>
<tr>
<td>4.24b</td>
<td>Typical boardwalk footing</td>
<td>77</td>
</tr>
<tr>
<td>4.25a</td>
<td>Plant use</td>
<td>78</td>
</tr>
<tr>
<td>4.25b</td>
<td>Plant height</td>
<td>79</td>
</tr>
<tr>
<td>4.25c</td>
<td>Plant color</td>
<td>79</td>
</tr>
<tr>
<td>4.26</td>
<td>Plant list</td>
<td>80</td>
</tr>
<tr>
<td>4.27</td>
<td>Native plants featured species</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>lobelia: <a href="http://www.finegardening.com">www.finegardening.com</a></td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>ascelpias: <a href="http://www.wildflower.org">www.wildflower.org</a></td>
<td>80</td>
</tr>
</tbody>
</table>
echinacea: exploringhealth.wordpress.com  
rudbeckia: dragonflygardens.net  
filipendula: remarc.com  
iris: mirlab.org

figure 4.28 – drainage & cleansing basins  81
figure 4.29 – typical treatment wetland section  81
figure 4.30 – typical rainwater runnel detail  82
figure 4.31 – ARD, Cedar River Education Center  82
www.artfulrainwaterdesign.net
figure 4.32 – ARD, Waterworks Garden  82
www.flickr.com
figure 4.33 – native dunes plants  83
www.in.gov
www.nps.gov
figure 4.34 – building materials  83

figure 4.35 – residential “wetland alley” character  84
figure 4.36a – residential lot detail section  85
figure 4.36b – residential lot detail plan  85
figure 4.37 – systems diagram  85

figure 4.38a – systems layers  86
figure 4.38b – systems diagram  86
figure 4.39 – ecoresort detail plan  87
figure 4.40a – entry experience vignette locations  88
figure 4.40b – entry experience vignettes  88
figure 4.41 – villas vignette  89
figure 4.42 – cabins vignette  89

figure 4.43 – wetland park & typ. boardwalk  90
figure 4.44 – primary signage  90
figure 4.45 – secondary signage  90
figure 4.46 – road through the preserve  91
bibliography


