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Stormwater | a product of waste


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Stormwater Service Charge Change (2019)

- All single family residential homes will pay a common monthly service charge

- Non-residential properties will be charged based upon total area and impervious area on the property

Stormwater Management Program

"The goal of the Storm Water Management Program is to protect the bodies of water that receive storm water from the City of Fargo. This is accomplished by minimizing the pollutants discharged from the municipal storm sewer system into the Red River."

"Maintenance crews are continually working to keep ***11,000 inlets, 9,000 manholes, 81 lift stations and 502 miles of storm sewer pipe operating as efficiently as possible****"*

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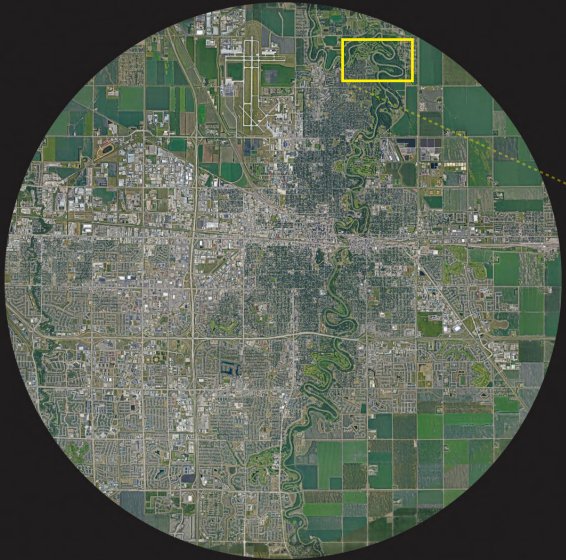
Storm Sewer Design & Construction

"Some components of the existing storm sewer system are more than 100 years old with the system being constructed of a variety of materials that includes ***Ductile iron, plastic, steel, cast iron, concrete, brick and vitrified clay.****"*

Site Location | Fargo, ND



City of Fargo

Early Settlement 1871

Population | 126,000

Fargo-Moorhead Area | 238,000

Bordered by the ***Red River***

North Fargo Residential Historic District

Established Residents 1920's

Red River of the North

North flowing | Ending in Lake Winnipeg

Origin | Meeting between Bois de Sioux and Ottertail River at Wahpeton, ND

550 Miles | 230 ft of change

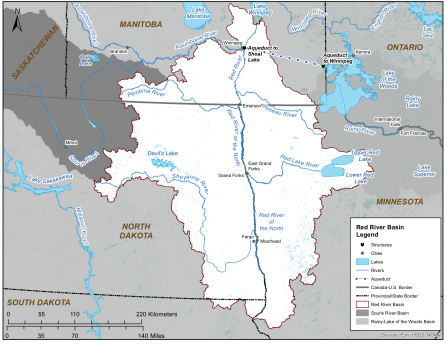
Red River Basin Rural Water System

175 Municipalities in the Red River Valley of North Dakota

12 rural water systems service 130 municipalities

Fargo - Moorhead

Grand Forks - East Grand Forks



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RED RIVER VALLEY WATER SUPPLY PROJECT

Serving the Water Supply Needs of Central North Dakota and the Red River Valley

City of Fargo Water Usage

- Primary Source | Red River
- Water Treatment Production Capabilities | production of 30 Million Gallons Daily
- Average Water Demands | 12 Million Gallons Daily
- Average Family of 4 | 400 Gallons/week , 146,000 Gallons/year

Red River Flow Rates

- 8,617 ft /s | 100 Gallons Daily

June 25, 2021 - July 27, 2021

- Red River flow rate slowed to 752 ft /s [8,685,600 gal/day]

Red River Valley Water Supply Project

- Distribute water from Missouri River in West-Central ND to Sheyenne River and Eastern ND

Relying on the River

Edgewood Golf Course

- North Fargo
- 18 hole par 71 | 6500 Yards
- Established mid 1920's
- Fargo Parks Operated
- 1 of 2 Fargo Parks 18 hole courses

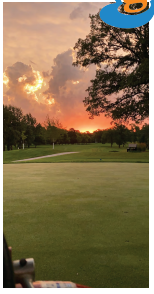
Parkland Style Course

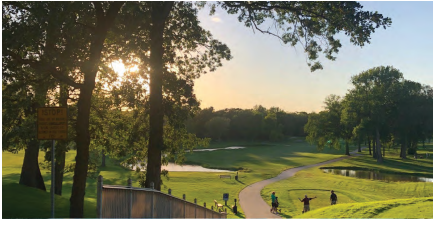
" Like a walk in the Park "

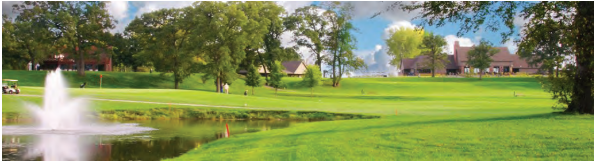
_ Found inland

- Tree Lined
- Small Greens | Pitched Back to Front
- Bunkers | Water Hazards
- Flat Fairways

fargo park DISTRICT







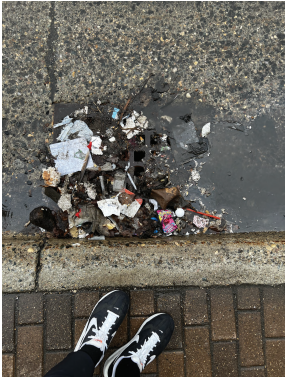

Google Earth

Red River Impact

Course Closure

Lasting Turf Damage

Civil Structures Damage



Selected Site

- 40 total acres
- South of Edgewood Golf Course
- Bordered by Red River and north Fargo neighborhoods
- Former Cardinal Muench Seminary

Edgewood Estates (est. 2014)

- Houston Engineering
- Current Site Conditions
- 59 Single-Family Lots
- Fargo Parks Golf Practice Facility
- Retention Pond

Based on Production

Maximize Stormwater Capture

Reduce Ecological Impact

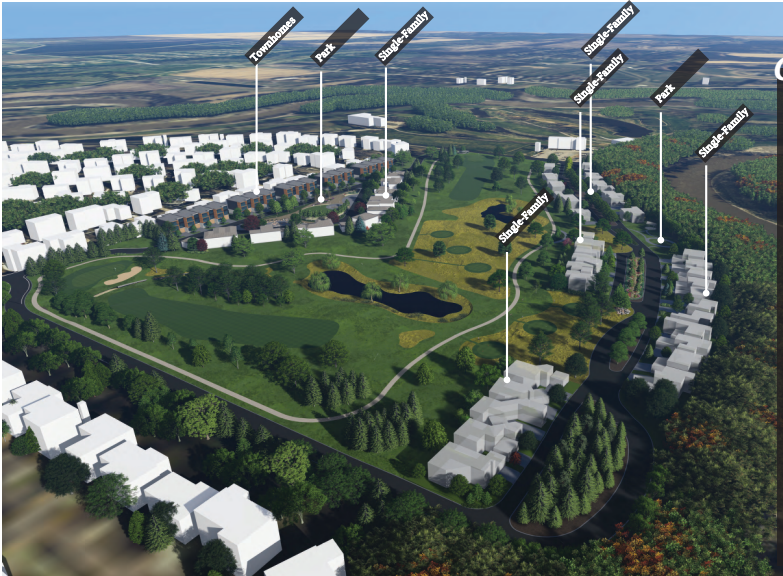
Provide Housing Diversity

Uphold Edgewood Golf Experience

The Preserve | Master Plan

1. Single-Family Homes
2. Townhomes
3. Interactive Wetland Community Park
4. Tee Boxes
5. Retention Ponds
6. Hole #10
7. Hole #11

Use of tree lined golf holes and residential landscape plantings strategically uphold the 100 year old Parkland style of golf exemplified on the main 18 hole layout of Edgewood Golf Course while concealing and protecting the homes from daily golf

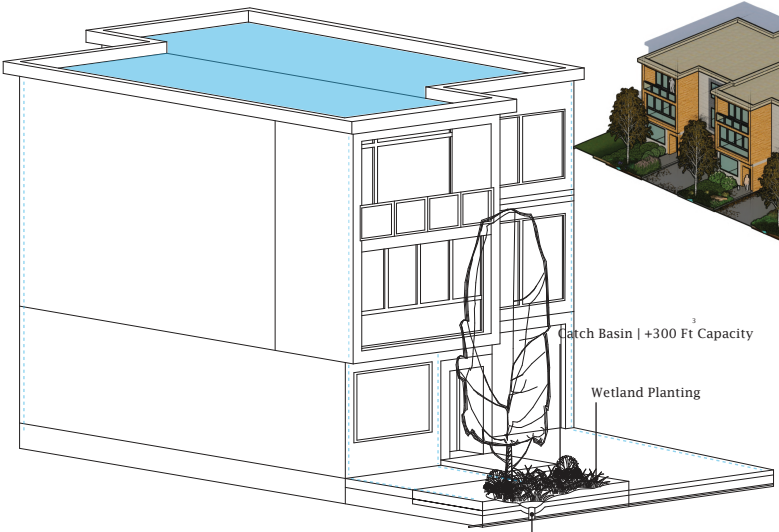


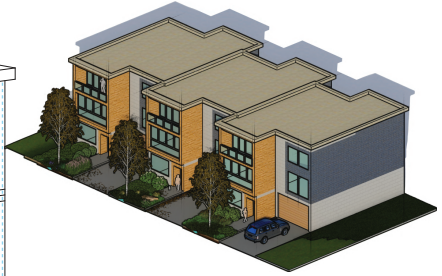
Community

- 56 total housing opportunities
- 39 Single-Familly Lots
  | 16 Border Red River
  | 23 Border Golf Course
- 17 Townhomes
- Low Traffic Streets
- 2 Public Parks
- Stormwater Measurements
- Watershed directed to planted medians & golf course

Townhome Design

- 3 Storey Design
- 2,000ft^2 footprint
- Unique Rain Garden
- Views of Community Park & Golf Course





1,240 ft of runoff

21,080 ft total

7,026 ft³ stored

Watershed Plan

Runoff will disperse from hardscape to

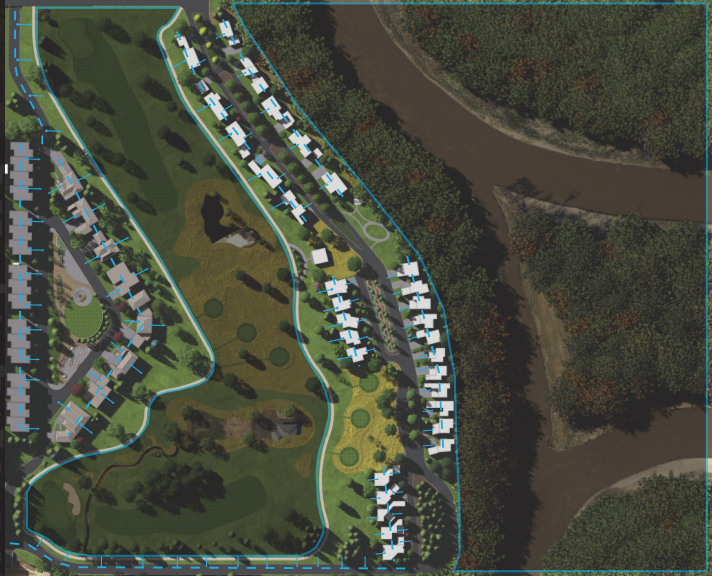
| Planted Medians

| Woodland River Bank

| Golf Course

| Storm Sewer

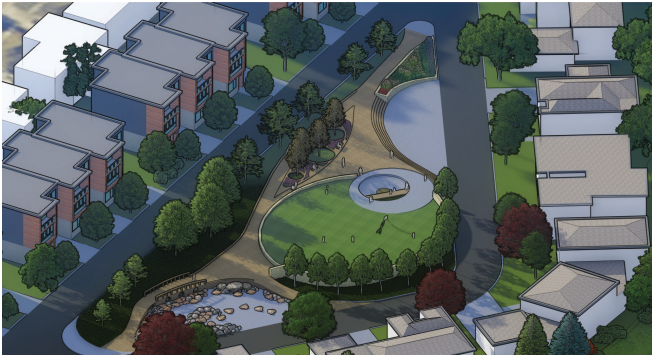
| Community Wetland Park

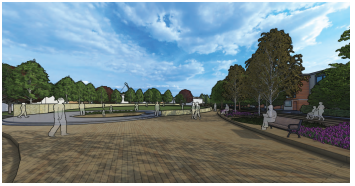


Interactive Wetland Community Park

Stormwater Runoff Display through interaction with multiple surfaces |
Community Gathering Space |
Public Education |


Townhomes
1
2
3
4
5
6
1 Overgrown Natural Wetland Planting
2 Elevated Boardwalk Platform
3 Interactive Rock Formations
4 Pitched Lawn
5 Interactive Multisurface Catch Basin
6 Park Plaza





Excess runoff destination

Varying rates of runoff through multiple surfaces

Display stormwater interaction through common urban landscape materials

Pitched lawn mimics golf course subsurface construction

Changing landscapes with storm events

Flexible event space

Reoccurring Planting Palette

Use of wetland landsape plantings will be repeated throughout the site in both the golf course layout and landscape design elements strategically placed within the residential landscape

Tree and shrub selections are based on their ability to withstand high water levels, golf course friendly characteristics, and family variety

Flowering perennial selections are found native to the region and are able to withstand wet conditions

A variety of prairie grasses and wetland grasses will filter surface chemical runoff used in regular golf course maintenance and exemplify a natural North Dakota Landscape

Edgewood Golf Course

| ***120.4*** total acres

| ***31.2*** acres of play surfaces

- Greens
- Tee box
- Fairways
- Practice areas

810,000 gal/week needed for irrigation maintenance
| 108,281 ft^3/week

Retention ponds & regular flooding on hole 6 and hole 7

New Course Layout

Relocate 2 holes from Edgewood's main course into development of *The Preserve*

Cart path encompasses the interior of the housing layout

New addition golf holes work in accordance with the 2 original holes removed from the main 18-hole layout

Course Elements

Maintain *Parkland Style* course design with flat playable surfaces, tree lined fairways, sloped greens, and built in hazards

Utilize natural golden prairie grasses to reflect a North Dakota Plains landscape & filter runoff through to the edges of the retention ponds

Hole #10 | Par 4 330

Dogleg Right | right side of fairway bordered by mass planting of oak trees

Approach shot hit over collection creek into green that is shallow and sloped back to front

Green is guarded by a front greenside bunker that distributes stormwater into creek

Tee box orientation positioned to vary yardage and angle taken from tee shot

Water hazard is inline of tee shot from the blue tees

Hole #11 | Par 4 351 yards

Straight line from tee to green | Narrow tree lined fairway

Pot bunker guards the front of the green that is draped and offers a front & back landing zone

Tee box orientation offers varying yardage and tee shot angle

Water hazard visible short of the beginning of the fairway on the right

Hole #10 Tee Box

Tee boxes are elevated and set within native prairie grass planting

Within the prairie planting, catch basins will capture naturally filtered excess runoff and distribute the rain water to the heavily grass planted pond edges to be filtered once more and stored for irrigation use.

Partial runoff from the bordering residential streets will be captured into the native grass area

Hole #11 Tee Box

Tee boxes are elevated and set within native prairie grass planting

Within the prairie planting, catch basins will capture naturally filtered excess runoff and distribute the rain water to the heavily grass planted pond edges to be filtered once more and stored for irrigation use.

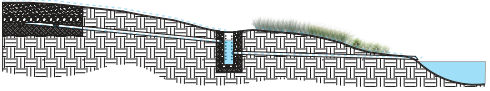
Excess runoff from storm events as well as regular irrigation will be captured through subsurface drainage and carried to the nearest irrigation retention pond

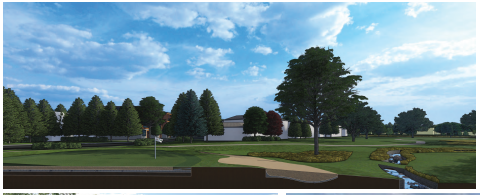
Golf Course Construction

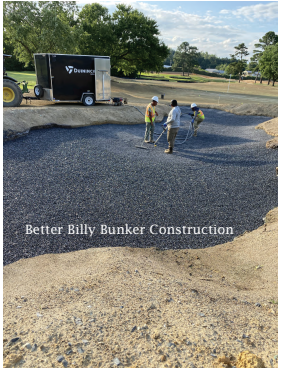
Built to drain quickly from playable surfaces | Fairways, Tees, Greens

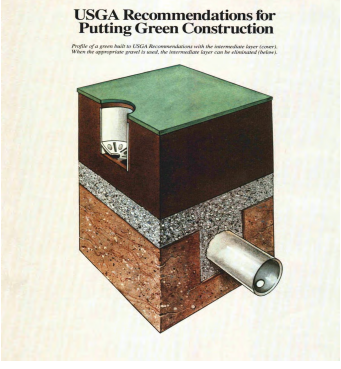
Sub-surface draining collected from Tee boxes, Greens and Bunkers

Overall course topography disperses runoff into collection areas






Better Billy Bunker Construction


USGA Recommendations for
Putting Green Construction
Profile of a green built to USGA Recommendations with the intermediate layer (cover).
When the appropriate gravel is used, the intermediate layer can be eliminated (below).

Constructed Retention Ponds

Hole #10 Pond | 22,030 ft^2 steady water level
| 110,150 ft^3 water capacity
| 46,767 ft^2 fluctuation area
| 374,136 ft^3 max capacity

Hole #11 Pond | 11,335 ft^2 steady water level
| 56,675 ft^3 water capacity
| 35,032 ft^2 fluctuation area
| 350,320 ft^3 max capacity

| 116,825 ft^3 of storage at steady water levels
| 724,456 ft^3 of storage at max capacity

Secondary Pump House included on site to regulate water levels in retention ponds

Irrigation will be channeled through Secondary Pump Station and will allow the 2 golf holes to be self sufficient on their own irrigation schedule

Main Course Changes & Implementation

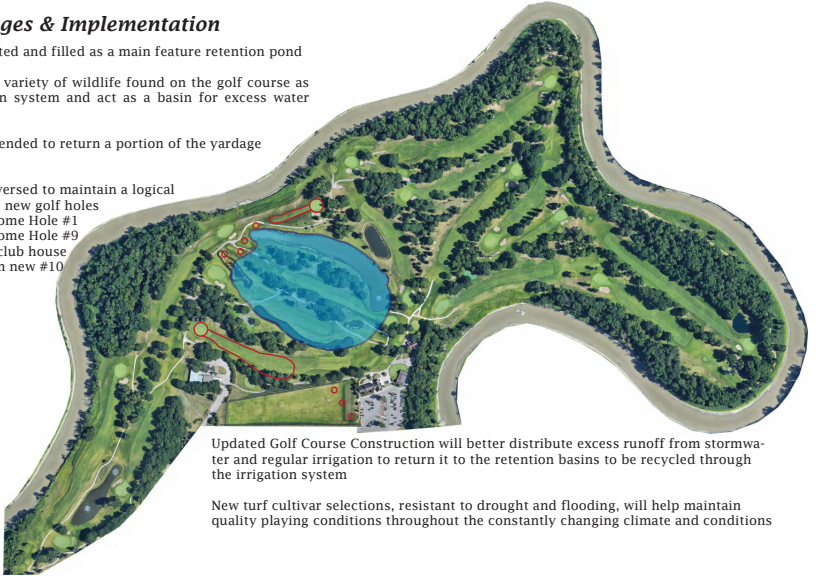
Holes #6 & #7 can be excavated and filled as a main feature retention pond

This pond could inhabit the variety of wildlife found on the golf course as well as supply the irrigation system and act as a basin for excess water during higher water levels

The par 3 hole #8 can be extended to return a portion of the yardage lost in the hole relocation

The course layout will be reversed to maintain a logical flow with the addition of the new golf holes

- Current Hole #10 will become Hole #1
- Current Hole #18 will become Hole #9 and return golfers to the club house before being the back 9 on new #10



Updated Golf Course Construction will better distribute excess runoff from stormwater and regular irrigation to return it to the retention basins to be recycled through the irrigation system

New turf cultivar selections, resistant to drought and flooding, will help maintain quality playing conditions throughout the constantly changing climate and conditions

Stormwater Runoff Calculations | *Calculated for a 25 year storm event with a duration of 60 min.*

Baseline | Edgewood Estates

Site Materials | Average Grass, Pavement, Roof Conditions, Dense Woodland, Pond, Manicured Grass
Maximum Time of Concentration | 36 min

Maximum Stormwater Storage Requirements | 121,965 Cubic Feet

Current site sheds stormwater from hardscapes to the street where water enters the storm sewer and is dispersed either into the on site retention pond or carried into the red river

The Preserve at Edgewood Golf Course

Site Materials | Average Grass, Pavement, Roof Conditions, Dense Woodland, Pond, Manicured Grass
Maximum Time of Concentration | 27 Minutes
Max Inflow Rate | 42.4 cubic feet / second
Max Outflow Rate | 38.53 cubic feet / second

Maximum Stormwater Storage Requirements | 13,896 Cubic Feet

Reduction of Runoff

Self Sufficiency

Controlled Capture

Turf Resilience

Consistent Irrigation Practice

Reduction of Excess Harmful Runoff

Stormwater | a natural resource to be Preserved