Memorandum

SRF No. 12290.00

To: Michelle Jordan, RPBCWD
Terry Jeffery, RPBCWD
Claire Bleser, RPBCWD

From: Leah Gifford, PE
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Date: April 3, 2019

Subject: St. Hubert's Catholic School Opportunity Projects

Summary

SRF Consulting Group was retained by Riley Purgatory Bluff Creek Watershed District (RPBCWD) to study the St Hubert's Catholic School site and determine possible stormwater Best Management Practices (BMPs) on the property that could be considered for RPBCWD Opportunity Project funding. The Memorandum and supporting Appendices are intended to communicate the conceptual design options, approximate costs, and benefits to the RPBCWD Board of Managers and the St. Hubert's Parish Council and community.

Stakeholder Meeting

On February 25th, 2019, representatives from St. Hubert's, RPBCWD, and SRF met to discuss potential project ideas. The group included the school's Principal, Operations Manager, and Science Teacher/Project Advocate, RPBCWD's Community Outreach Coordinator, and a Landscape Architect and Water Resource Engineer from SRF. The goals identified for the site were to consider projects that would reduce runoff volume and rates, improve water quality, ecological biodiversity, educational opportunities and aesthetics of the property. Also considered were the maintenance commitments, cost and safety issues.

For the meeting SRF prepared a map of potential locations, a presentation of options and example photos, and a table showing the different BMPs with information on the quantitative water quality benefits, water volume and rates, educational potential and aesthetics, as well as maintenance and price ranges.

The group ruled out several projects and determined which projects to continue exploring. Those include:

- Tree trenches along the center median of the parking lot,
- Playground improvements with roof drain fixes and underground stormwater storage,
- Storm sewer inlet and gully repair, pavement reduction and rain garden at the southeast end of the parking lot and soccer field drainage fix with native plantings, and
- Prairie Restoration with stormwater "sinks" in the newly acquired lot west of the school.

Final Conceptual Best Management Practices

Project Area 1: Tree Trenches

Site Considerations

Trees were formerly located in various areas around the parking lot and medians. Most of the trees were removed over time due to poor health. Two trees remain on the ends of the large central median and appear to be swamp white oaks (*Quercus bicolor*). Along the median, there are two light posts, one at the north end and one at the south end, as well as two basketball hoops on the south end. The currently undeveloped property just west of the median was recently purchased by St. Hubert's Catholic Church. The school staff mentioned that visibility is important from one side of the parking lot to the other, because the parking lot nearest the building is used during recess.

Conceptual Design

SRF reviewed the curb line grade differences and current width of the median and assumed a simple soil and aggregate section with one drain tile line will be appropriate and cost effective for the site. Runoff from the north and west side of the median will be captured at three locations: the north facing curb line, midway along the median on the west side, and the southwest corner where there is currently a storm sewer inlet. The storm sewer inlet will be moved to be in-line with the existing storm sewer, placed within the median. Two flagstone walking paths will cut through the median at a location that is visible and convenient to pedestrians. Seating on benches or large boulders next to the paths could be provided for students or campus visitors. Educational signage could also be located at these nodes. The recommended vegetation in the tree trenches would be native grasses, flowers, and small shrubs that allowed sight lines to be maintained. Plantings could be arranged in more formal or less formal arrangements, depending on the aesthetic goals of the Church and School.

The proposed design incorporates visible, educational features so the components of the tree trenches can be observed. For example, the median will have short swales and dome drain overflows, so water can be seen accumulating. Runoff from parking lots should be "pre-treated" for large solids removal before flowing into the tree trenches. SRF has chosen the Rain Guardian Bunkers as a good preliminary option. The bunker will collect water from the parking lot and will allow seepage through a filter or will flow overtop, capturing sediment from the parking lot on the inside. On dry days the trapped sediment can be seen, allowing for easy maintenance access and educational benefits. See Appendix A for a Site Map with Tree Trench locations, Appendix B for a Cost and Benefits Matrix, and Appendix C for Tree Trench figures.

Benefits and Maintenance

Benefits of this type of improvement are numerous and shared. The tree trenches would improve water quality, rate control, volume control, biodiversity, aesthetics and shade cover, and would

provide educational opportunities. Maintenance would be required for the new vegetation in the median and cleaning out the pretreatment bunkers, which includes sweeping and disposing of the collected sediment and hosing off the filter. Since turf grass is removed, the need for regular mowing in the median would be eliminated.

Project Area 2: Playground Improvements with Stormwater Storage

Site Considerations

St. Hubert's Catholic School plans to upgrade the existing playground in the near future and they are planning to replace the loose rubber mulch with artificial turf as a surface material. School officials identified several problem areas that could be fixed in coordination with the playground work, such as vegetation that does not survive well because of student traffic near the entrance, and vegetation along the retaining wall. The roof drain beside the entrance empties onto the sidewalk, creating a walking hazard, and contributes to erosion and difficultly establishing vegetation. The group discussed the opportunity to include the playground renovation with the site stormwater BMP improvements.

Conceptual Design

Artificial turf, which is being considered for a new surfacing material, is an impervious material, and thus contributes runoff to the watershed. The proposed design would incorporate rainwater storage underneath the playground. The site is not conducive to infiltration practices sue to the clayey soils and location of wellhead protection areas. The roof drain at the entrance could be re-routed under the sidewalk to the system, eliminating the current problem with erosion. Another roof drain that currently drains straight to the storm sewer under the existing playground could be routed to the rainwater storage system. There is an opportunity to incorporate rainwater storage for reuse under the playground. One idea considered is an interactive feature such as a hand or peddle pump that could route water to a drip irrigation hose.

Some proposed ideas for the playground improvements would allow for more site amenities and gathering areas in the new design for students, such as large stones, benches, or seat walls. The school staff said that gathering areas are especially needed for middle school-aged students. Also, attractive, site appropriate vegetation could be incorporated into the design. See Appendix A for a Site Map with Playground Area and Appendix B for a Cost and Benefits Matrix.

Benefits and Maintenance

Benefits of this type of improvement are runoff rate control, some biodiversity with improved plantings, aesthetics, and improved student play spaces. Underground storage, especially if combined with an interactive feature, would provide educational opportunities. Maintenance will include occasional cleanout of the underground storage and upkeep of the vegetation.

Project Area 3: South Parking Lot and Recreation Improvements: Inlet and Gully Repair, Reduced Pavement, Rain Garden, Soccer Field Drainage, and Native Vegetation

Site Considerations

The storm sewer inlet on the southeast corner of the parking lot is in need of repair. The inlet and curb are not graded correctly and likely under designed. This has resulted in water overflowing the inlet and forming a gully down the steep slope south of the parking lot. School officials mentioned that this paved area is not heavily used during recess and they were open to considering options to remove some of the pavement in this area. There is a memorial tree along the south curb line near the inlet that needs to be protected. Another area of concern is pooling water in the soccer field along the south side of the school's parking lot.

Conceptual Design

The group discussed ways to improve the south side of the property. This included fixing the southern curb line and storm sewer inlet, fixing the eroded gully and slope, removing some pavement area, and adding a rain garden and gathering area. Also, the design could incorporate improving drainage alongside the soccer field where ponding is occurring and planting of native prairie grasses and wildflowers along the hillside to increase water infiltration into the soil and uptake by plants.

The proposed rain garden would be located in the area where the inlet is now. The overflow would drain into the sewer (not down the slope) and would have native deep-rooted vegetation planted. A Rain Guardian Bunker would also be included for pretreatment of the runoff. See Appendix A for a Site Map with the South Parking Lot and Recreation Improvements and Appendix B for a Cost and Benefits Matrix.

Benefits and Maintenance

Benefits of these improvements are water quality, volume control, rate control, reduced sediment load downstream of gully, biodiversity in native plants and rain gardens, aesthetics, maintenance fixes, and improved playability of soccer field. The rain garden and native plantings would have educational opportunities and reduced pavement could provide space for gathering areas. Maintenance would be minimal for the inlet, gully, reduced pavement and drain tile and would be limited to removing trash and mowing. The rain garden will need vegetation maintenance several times a year and the pretreatment Bunker will collect sediment from the parking lot and will need to be cleaned out and the filter will need to be hosed off. The native vegetation requires three years to become fully established. During the first 3 growing seasons, weeding and mowing are used to reduce competition for the native plants. After that, maintenance is reduced.

Project Area 4: West Parcel Prairie Restoration with Stormwater "Sinks"

Site Considerations

St. Hubert Church recently acquired the property west of the school. The meeting attendees did not know of immediate plans for the property.

Conceptual Design

If this area will not be used for 6 years or more, then native vegetation is recommended in the interim. A "curb cut" could be made at the north end of the parking lot to allow for some parking lot drainage to be routed to the vegetation instead of straight to storm sewer. Also included in the design are two shallow stormwater "sinks," these are 1-foot deep depressions that can hold water and allow for slow intake into the soil. See Appendix A for a Site Map with the West Parcel Prairie Restoration and Appendix B for a Cost and Benefits Matrix.

Benefits and Maintenance

Benefits of these improvements are water quality, volume control, rate control, biodiversity in native plants, aesthetics, and educational opportunities. The native vegetation requires three years to become fully established. During the first 3 growing seasons, weeding and mowing are used to reduce competition for the native plants. After that, maintenance is reduced.

Conclusion

This memorandum and the supporting Appendices represent a conceptual level design of the project areas. Any and all feedback and additional background information regarding the design is appreciated. Next steps would be for the St. Hubert's Catholic Church and School and RPBCWD to consider these projects and determine whether to move forward with further design. The groups should discuss funding contributions and project schedules, as applicable.

Appendices

A) Concept Plan Layout
B) Project Benefit Matrix and Cost Estimations
C) Tree Trench Concept Design

APPENDIX A: CONCEPT PLAN LAYOUT

St. Hubert Catholic School Opportunity Projects

APRIL 3, 2019

ST. HUBERT CATHOLIC SCHOOL

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

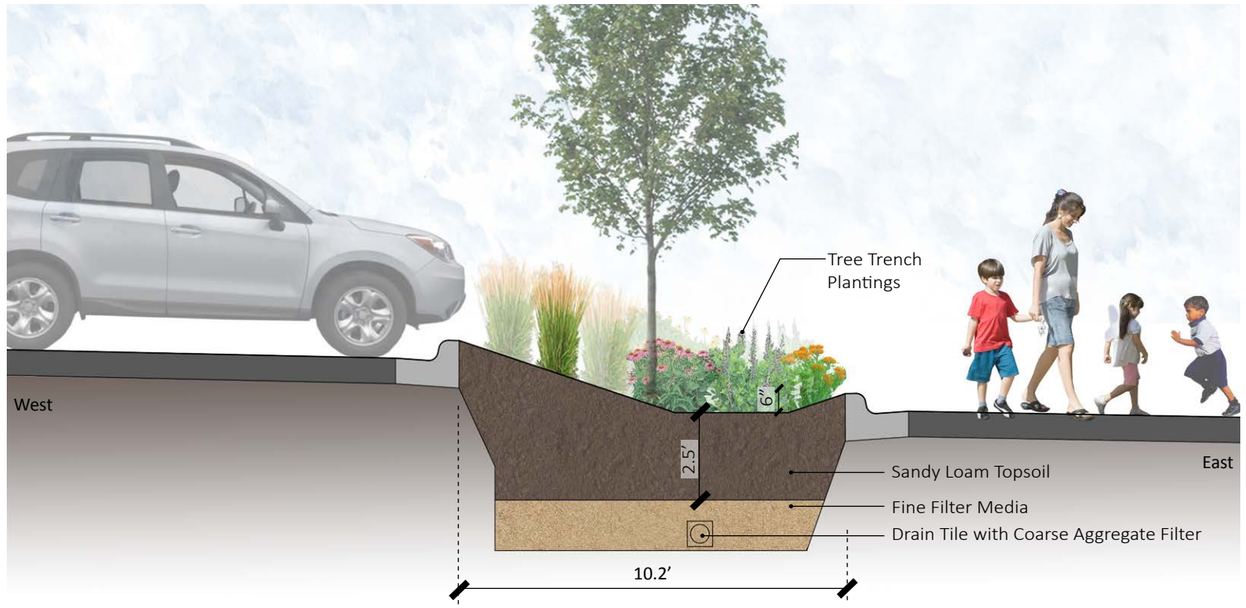
SRF Consulting Group, Inc.

APPENDIX B: ST. HUBERT –PROJECT BENEFITS MATRIX AND COST ESTIMATION

PROJECT AREA	SITE SPECIFIC OPTIONS	VOLUME	RATE	QUALITY	EDUCATIONAL	AESTHETICS	ECOLOGICAL BENEFITS	ADDITIONAL BENEFITS	MAINTENANCE	CONSTRUCTION COST
(1) Tree Trenches	• Recessed swales with weirs and drains • Trees and grasses or flowers along trench • Replace turf grass with wood chip or other ground cover • Pretreatment using Rain Guardian Bunkers	●	◐	●	●	●	◐	• Improved air quality. • Enhances tree canopy. • Pavement shading reduces thermal impacts. • Improves campus aesthetic with more greenery and foliage. • Opportunity for seating area in median.	2 x per year for routine maintenance once established (pruning, mulching, weeding)[2]; Every 5 years for inspection & maintenance of stormwater performance.[3]	$70,000-$90,000
(2) Playground	• Artificial Turf or Wood Fiber surface • Stormwater storage below ground • Possible to add interactive features to use water in storage: Hand Pump, Peddle or Seesaw Control • Create seating, planting, rain gardens, trees or other site features integrated with play area.	○	●	◐	◐ to ●	●	○	• Creates unique sense of place and opportunities for creative and innovative design. • Opportunities for education and interaction with stormwater treatment features. • Makes stormwater infrastructure highly visible to the public, near the building.	Underground system needs inspected/cleaned 1-2 x per year, adjust as needed (roof water tends to be cleaner than pavement runoff, maintenance would likely be less).[4] If engineered wood fiber surfacing used, requires replenishment every 2 years.	Playground resurfacing (Does not include cost of play equipment): $30,000-$40,000 Underground storage (60’ x 50’ x 3.5’ plastic open bottom arches, sized to reduce 100 year storm): $50,000-$70,000
(3a) South Parking Lot: Inlet and Gully Repair, Pavement Removal and Rain Garden	• South Corner of parking lot storm sewer inlet overflows to gully. • Replace pavement with gathering areas and rain garden. • Pretreatment using Rain Guardian Bunkers	●	●	●	◐	●	◐	• Improved functionality of storm sewer. • Reduced erosion. • Reduced thermal impacts due to removed pavement.	Rain gardens 1-2 x per year, adjust as needed.[4]	Inlet Gully repair: $10,000-$15,000 Pavement Reduction and Gathering Place: $10,000-$15,000 Rain Garden: $10,000-$15,000
(3b) South Parking Lot: Soccer Fields Drain Tile and Native Grasses	• Place drain tile trench in swale beside field, connect to storm sewer • Plant native grasses on slopes	◐	○	◐	◐	●	●	• Reduced erosion and flooding. • Enhanced aesthetics.	Native vegetation take several years to establish. 3-4 x per year[2] for routine maintenance; Every 2-3 years aeration/mulching/burn.[5]	$9,000-$12,000
(4) West Parcel Prairie Restoration	• Located in open area across from parking lot.	◐	◐	◐	●	●	●	• Improved habitat, air quality, urban micro-climates. • Reduced thermal impacts. • Improves water quality and reduces erosion. • Promotes education about the natural heritage and a desire to protect and restore natural resources.	Native vegetation take several years to establish. 3-4 x per year[2] for routine maintenance; Every 2-3 years aeration/mulching/burn.[5]	Native plantings: $7,000-$8,000 Stormwater routing: $8,000-$12,000

● Most Desirable ◐ Moderately Desirable ○ Least Desirable

[1] If infiltration allowed – N/A in this matrix
[2] MPCA 2017. Stormwater Maintenance Manual
[3] MS4 permit requires BMPs to be inspected at least once every five years
[4] NVRC 2007. Maintaining Stormwater Systems
[5] LRPB 2009. Stormwater Maintenance BMP Resource Guide



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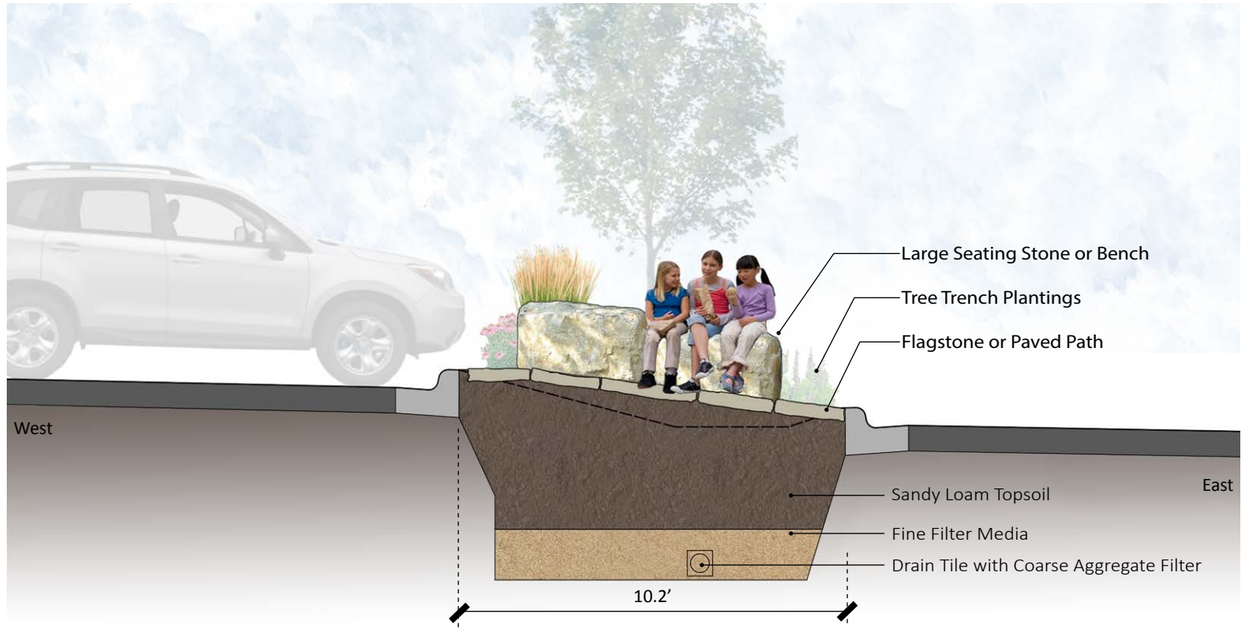
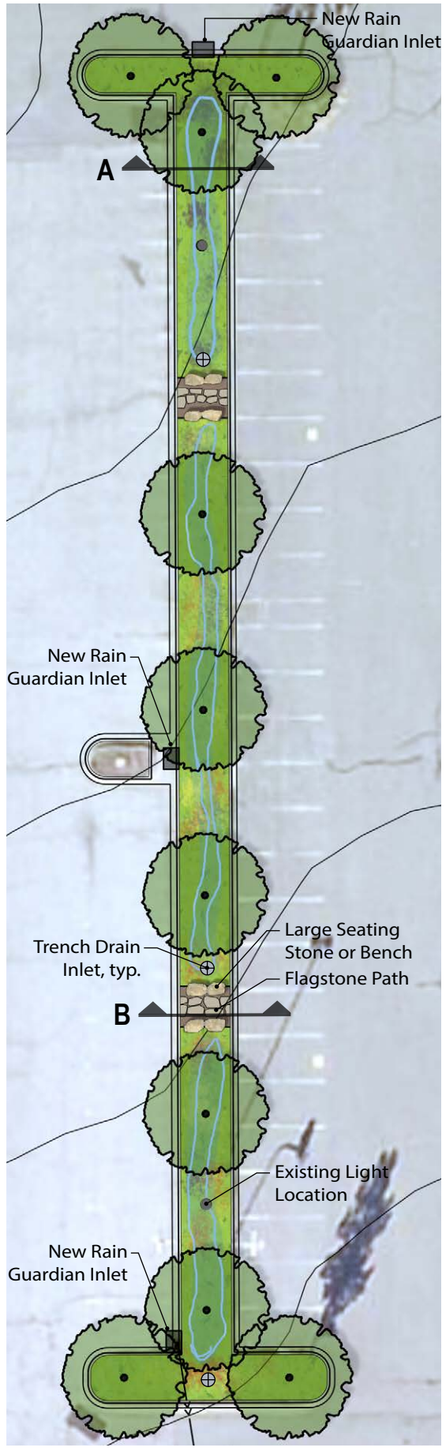


CROSS-SECTION B



TREE TRENCH CONCEPT ELARGEMENT PLAN

EXISTING PARKING LOT MEDIAN

EXAMPLE OF RAIN GUARDIAN INLET STRUCTURE