Dredge Spoil Site Master Plan Study

Storm Lake
Jump Right In!

February, 2022

ACKNOWLEDGMENTS

PREPARED FOR:

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Storm Lake, IA 50588

PREPARED BY:

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Matt Ricklefs - Council Member
Maggie Martinez - Council Member
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INTRODUCTION

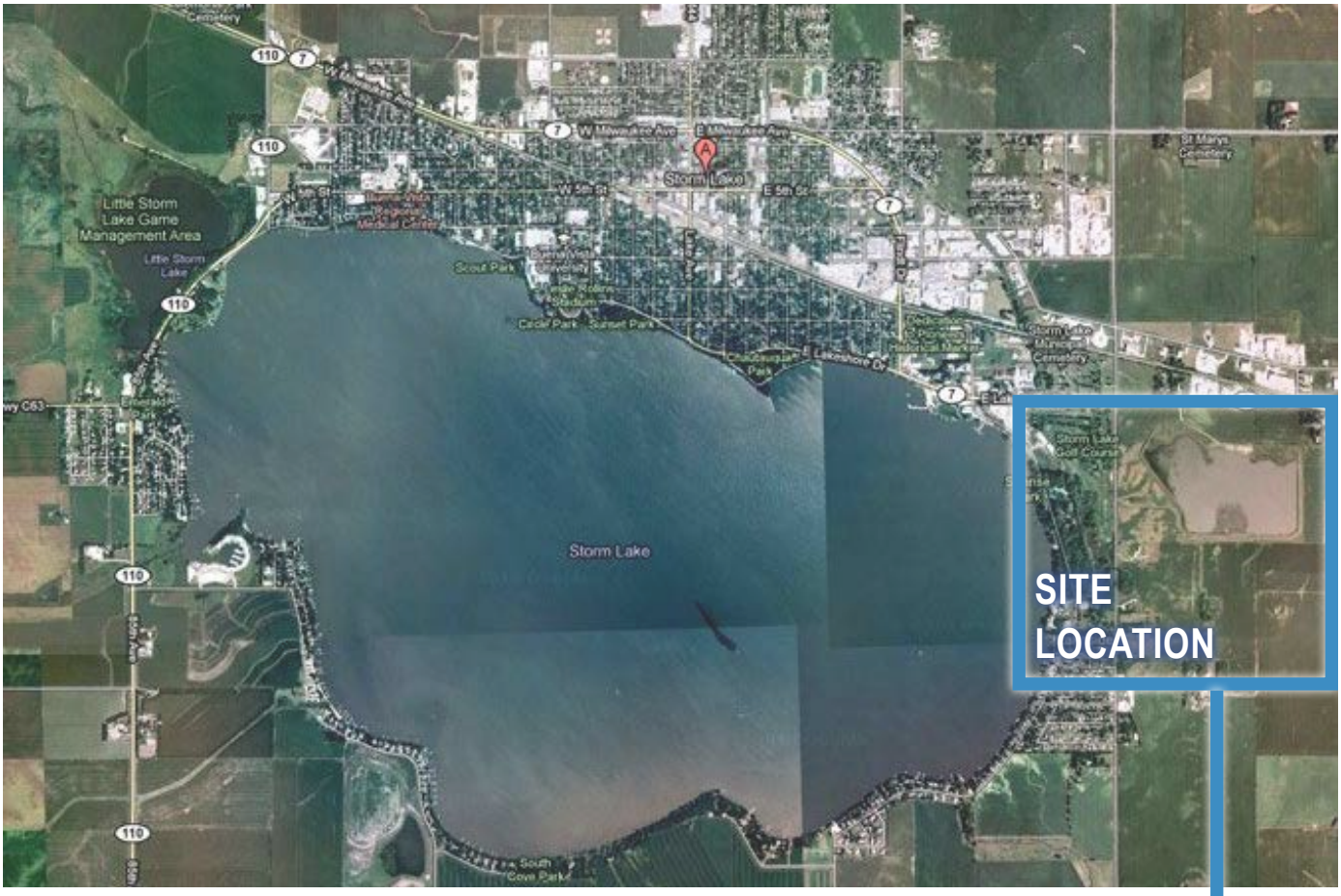
COMMUNITY OVERVIEW

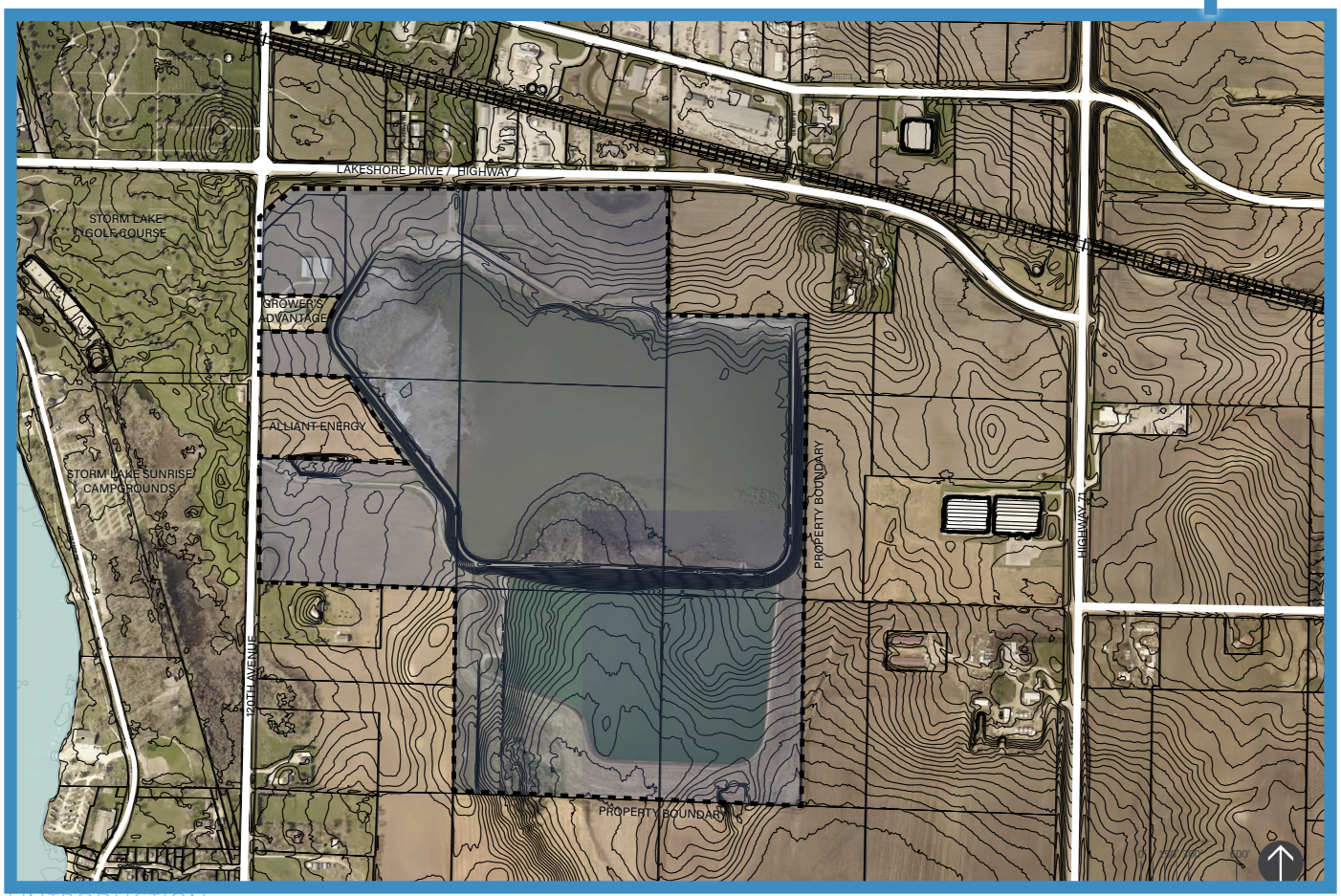
Storm Lake is a thriving community spanning over four square miles, with a population of 11,269 (according to 2020 estimates by Census.gov). The city's mission statement is **"Through teamwork create a welcoming environment that encourages economic growth, celebrates our unique blend of cultures, treasures our natural resources, and promotes recreational opportunities"**. It is this mission that has led to the desire to develop a recreation master plan for the Dredge Spoil Site, on the eastern edge of the City of Storm Lake. This site presents opportunities that achieve every aspect of the city's mission.

Over the years, the city has made improving the quality of life for its residents a priority. Updating city infrastructure, providing quality amenities, and improving / protecting its natural resources have been a focus of City Council members and administration staff. Partnering with the Iowa Department of Natural Resources (Iowa DNR) and community members to improve the water quality of Storm Lake is a multi-faceted approach to protecting the community's greatest natural resource.

Dating back to the mid-1990s, the vision of improving water quality and water clarity in the lake was formalized by the collaboration between the city, the Lake Improvement Commission, and the Iowa DNR. The partners developed a plan for removing sediment from the lake, installing fish control structures, and implementing water scrubbing devices to reduce sediment loading of the lake.

Looking Toward Storm Lake, Above the Golf Course


Little Storm Lake Game Management Area
Little Storm Lake
Storm Lake
W Milwaukee Ave
E Milwaukee Ave
W 5th St
E 5th St
Scout Park
Circle Park
Sunset Park
Lakeshore Dr
South Cove Park
SITE LOCATION


LAKESHORE DRIVE / HIGHWAY 7
STORM LAKE GOLF COURSE
GROWER'S ADVANTAGE
ALLIANT ENERGY
STORM LAKE SUNRISE CAMPGROUNDS
120TH AVENUE
PROPERTY BOUNDARY
PROPERTY BOUNDARY
HIGHWAY 71

SITE CONTEXT / ANALYSIS

Located in Buena Vista County, Storm Lake is the fourth largest glacial lake in Iowa spanning over 3200 acres. The Storm Lake watershed consists of 17,800 acres. With over 300,000 visits annually, nearby amenities such as a hotel and waterpark, golf course and campgrounds, Storm Lake is a significant source of tourism recreation revenue.

Initial dredging activities utilized a site on the south side of the lake until 2002. In 2003 a new dredge spoil site was established on the east side of the lake, in the corner of Highway 7 and Radio Road. Today, the property consists of 239 contiguous acres owned by the City of Storm Lake.

Dredging operations at the new site commenced in 2005. As of 2013, 6,205,000 cubic yards of sediment had been removed from Storm Lake. In the fall of 2013, additional storage was added to the south end of the dredge site and is now considered the 'lagoon' or 'pond' area of the site. Dredging was completed in fall 2017. A bathymetric survey revealed approximately 655,000 cubic yards of sediment was dredged over the period of 2016-2017. A complete history and more detailed information on the dredge site and activities can be found on the following website, https://bit.ly/DredgingHistory.

The dredge spoil site is a unique landscape with dramatic differences in topography and land cover. The western and northern extents of the site consist of row crops, in a rotation of corn and soybeans. At the time of this study, the fields consisted of standing corn.

Dredge Site Pond, Looking East

The northern portion of the dredge site today is a vegetated landscape, consisting largely of invasive forbs species, with dense stands of willows and cottonwoods that have established voluntarily. At the time of this evaluation, the northern portion of the site was primarily dry, with a small area of standing water near the southeast corner of the dike that forms the northern edge of the pond basin. With the completion of dredging operations in 2017, the southern basin of the site has been dewatering with the standing water level continuing to drop.

The banks of the south basin are quite steep and there is a significant slope transition from the western agricultural fields to the main dredge spoil areas of the site.

Northern Portion of Dredge Site, Looking West

GEOTECHNICAL EVALUATION

Understanding the structural capacity and consistency of the existing on-site soils are important to determining if the dredge site is suitable for development. While it is anticipated that only portions of the site are proposed for development of buildings, structures, and site paving construction, knowing the depth to ground water and sub-soil conditions will inform how the site will drain, support plant growth, support footings, and other related considerations.

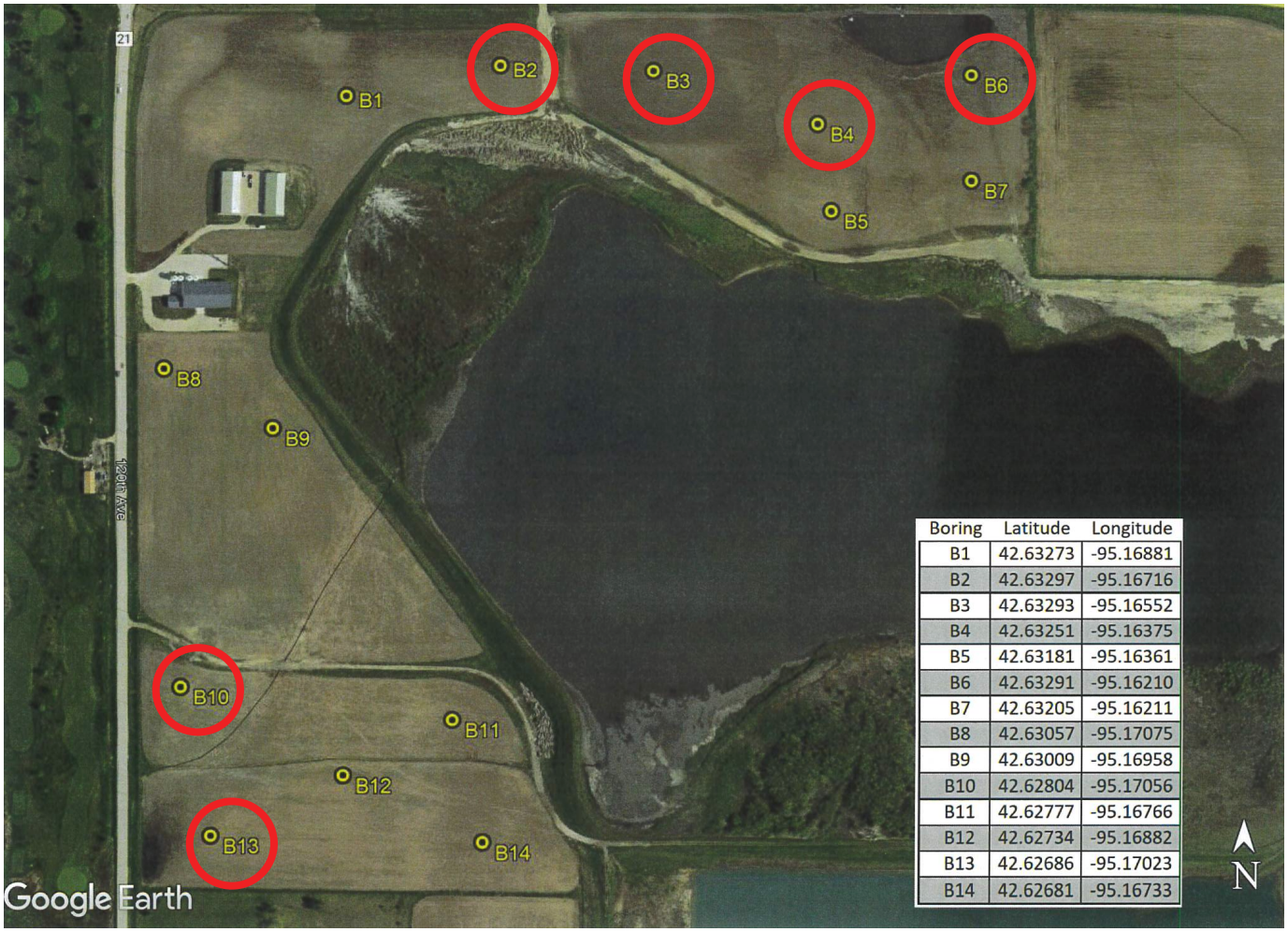
In the fall of 2021, a geotechnical investigation was performed by Certified Testing Services, Inc. A summary of the report findings is included below. The full contents of the report are included in the

appendix documents of this plan. The following summary includes excerpts from the geotechnical report, along with assumptions derived by Bolton & Menk regarding specific design/construction impacts and suggested considerations.

Geotechnical Report Summary

High Water Table:

Free water was encountered in Borings B2, B3, B4, B6, B7, B10, and B13 at depths ranging from 3 feet to 9 feet below the existing grade at the time of drilling.



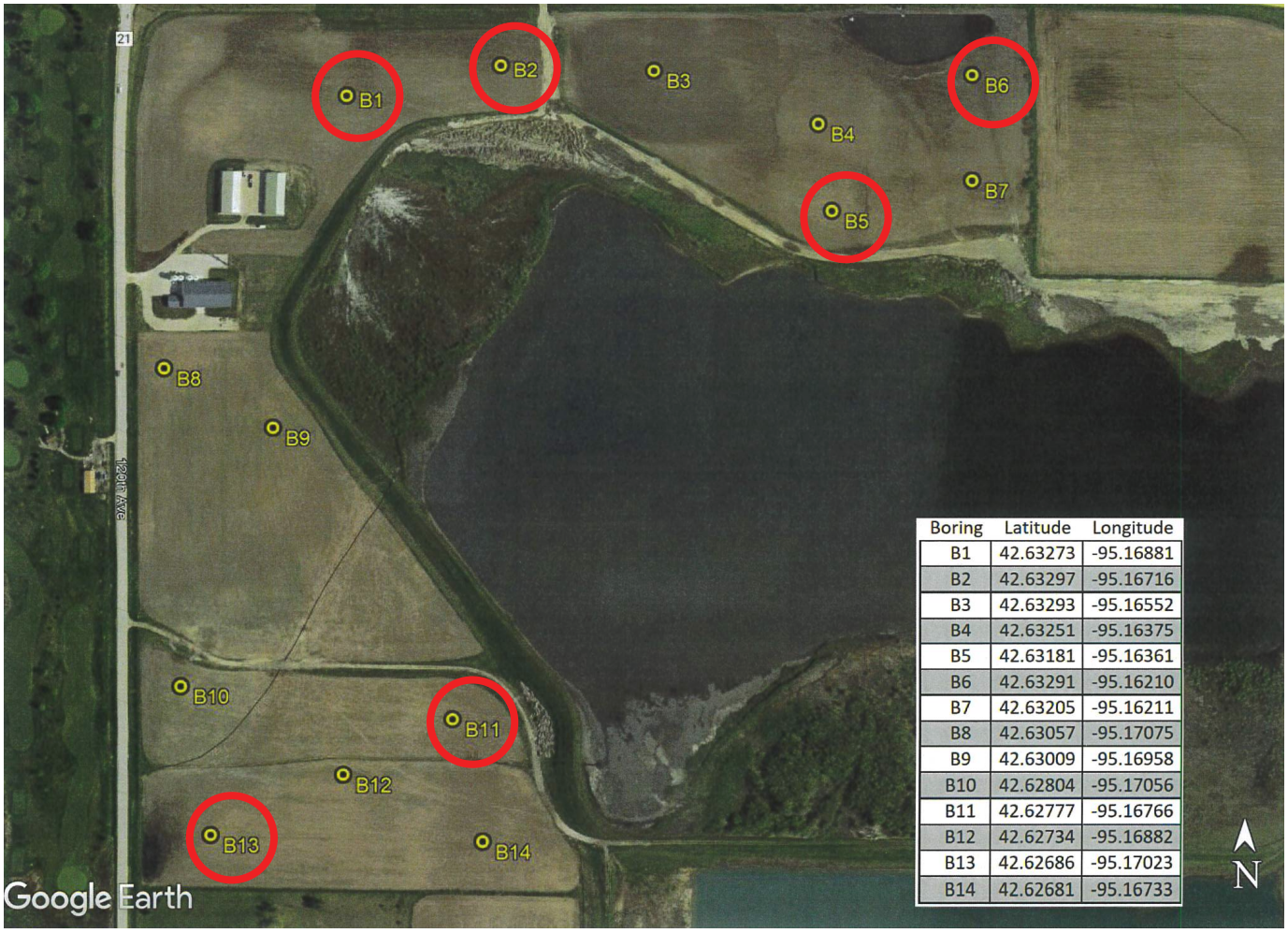
Boring	Latitude	Longitude
B1	42.63273	-95.16881
B2	42.63297	-95.16716
B3	42.63293	-95.16552
B4	42.63251	-95.16375
B5	42.63181	-95.16361
B6	42.63291	-95.16210
B7	42.63205	-95.16211
B8	42.63057	-95.17075
B9	42.63009	-95.16958
B10	42.62804	-95.17056
B11	42.62777	-95.16766
B12	42.62734	-95.16882
B13	42.62686	-95.17023
B14	42.62681	-95.16733

Soil Boring Locations Where High Water Level Was Encountered at Time of Drilling

Project/Site Impact: As seen from the aerial, areas of saturation are more prevalent along the northern area of the site. North of the spoil site extents, the site naturally drains to the north. Due to the high water table encountered at these boring locations, shallow detention areas and amenities with shallow excavation could be considered.

Building/Construction Concerns:

The **first concern** for potential buildings is the compressible materials that were encountered across the site, particularly in Borings B1, B2, B5, B6, B11, and B13.



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Compressible Material Was Encountered at Several Soil Boring Locations, Which May Require Soil Correction or Structural Fill to Support Construction

Some form of corrective action will be required below the foundations and floor slabs in order to minimize settlement.

The **second concern** is the fat clay materials that were encountered near the existing ground surface in Borings B6 and B14.

Replacing the fat clay material within two feet below the bottom of footings, floor slabs and pavement with new structural fill may reduce the amount of vertical movement.

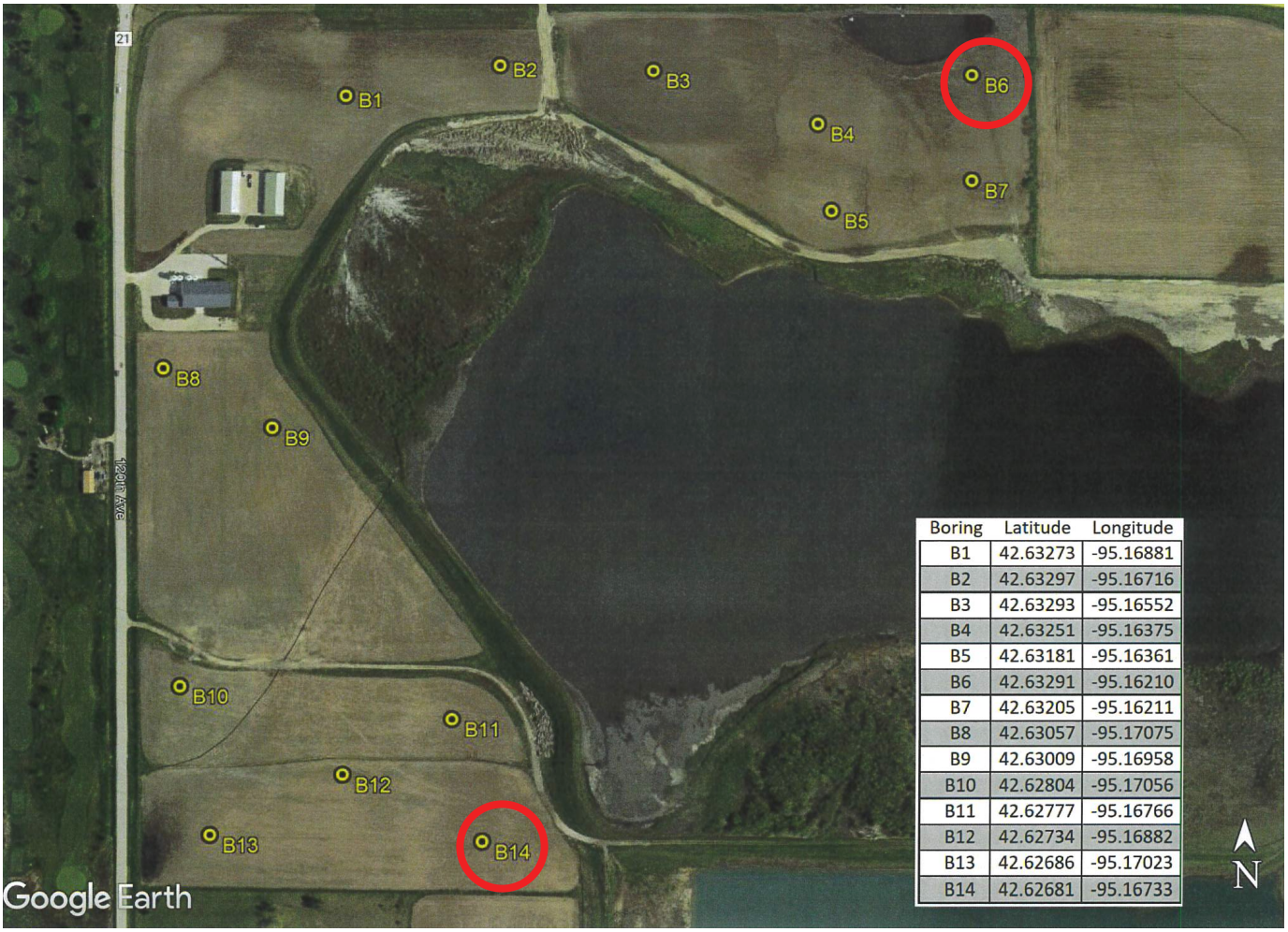
The **third concern** is for the potential for very moist to wet materials to be encountered in the construction areas, depending on the depth of cut/fill being required to bring the sites to grade.

CTS recommends that the design engineer include a bid item for stabilization in the bid documents.

The **fourth concern** is the potential for construction difficulties due to the high water table that was encountered in some of the borings at the time of drilling.

Sand materials were encountered and if sandy material is encountered in the excavations below the water table, sloughing of the sandy material will occur. In order to reduce the chance for sloughing to occur, CTS recommends that the sandy material be dewatered prior to excavating into the sandy material for construction safety. Excavating into the sandy material without dewatering first will cause sloughing that will increase construction costs and safety hazards to employees, particularly in trenches. Based on the materials encountered, it is CTS's opinion that drawdown wells will not work on this site.

Project/Site Impact: As previously stated, granular or structural fill will likely be required for a depth of two feet below foundations, floor slabs, and site pavements for the areas indicated above. Recreation fields or open space amenities may be more suitable in the areas where lower soil density is expected. Construction activities in the areas where very moist or wet material were encountered will require additional measures and may be complicated. Additional stabilization and dewatering may be required.



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Fat Clay Was Encountered at Boring Locations B6 and B14

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Vision 02

Image Credit: Prariehaven.com

VISION

PURPOSE OF THE STUDY

The purpose of the Dredge Spoil Site Feasibility Study is to explore the suitability of the dredge spoil site to be utilized as a recreation amenity for the City of Storm Lake. This study is meant to determine the appropriate mix of land use opportunities, location of amenities, and potential implementation costs of the proposed master plan. While evaluating the opportunities for the site, consideration for construction feasibility and life cycle costs are critical for the city to make informed decisions for developing the park and allocating the appropriate resources for maintaining the facility.

This study provides analysis of the existing site conditions and evaluates the suitability of various recreation amenities that have been considered for the dredge spoil site. The outcomes of the analysis and conceptual plan development provide planning level recommendations for the city to consider when evaluating the future of the site.

STAKEHOLDER INPUT

Parks, trails, and recreational amenities are critical to the wellbeing of all communities. Having a diverse offering of amenities and resources caters to the ever-changing recreation trends and diversity that is present in Storm Lake. Amenities should be accessible to all residents and appeal to users of different age groups and abilities.

Example of Mown Trails Winding Through the Prairie Landscape (Image not of Dredge Site)
Image Credit: Willistown.pa.us

Leading up to the execution of this plan, community members, city staff, and other stakeholders expressed an interest in the future of the project site. A mix of amenities and uses, both recreational and not, have been discussed over the years. Through discussions with the project stakeholders, the following list of possibilities served as the basis for consideration during site analysis and initial concept development:

- Event center
- Soccer/athletic fields
- Open-air shelter
- Exercise equipment
- Sports dome
- OHV (Off-road vehicle) park / trails
- Biking / hiking trails
- Gun range
- Educational amenities
- Overlook / seating areas
- Nature playscape
- Nature viewing
- Dog park
- Sledding hill
- Commercial development
- Pickleball / tennis facility
- Seasonal recreation
- Parking

The ability to fund improvements and commit to the implementation of the plan was a key concern of stakeholders, including City Council members. As a means to offset the construction costs, the idea of selling portions of the property for commercial development for reinvestment into the park amenities was introduced during early brainstorming sessions. This could provide an initial investment into the park improvements and help fund some of the site preparation and restoration efforts needed on site.

Example of Open-Air Shelter (Image not of Dredge Site)
Image Credit: Cedarforestproducts.com

Master Plan Outcomes 03

Image Credit: Bearfoottheory.com

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MASTER PLAN OUTCOMES

DESIGN PRINCIPLES

Preliminary concept development focused on defining appropriate land uses / activities for the park site. This was accomplished by developing the following design principles for the project:

Utilize / Compliment the Unique Qualities of the Site

- While the deposited dredging soils may not be suitable for many land uses, lower impact activities and nature focused amenities could be lower cost improvements that would complement the unique character of the site. Prairie restoration, trails, and viewing areas would create a unique opportunity for park visitors while taking advantage of the changing topography around the perimeter of the site.

Consider Access / Circulation to and Within the Site

- Recreation amenities will attract users/visitors of all ages. While the proximity of the site makes it an attractive addition to the City's park system, pedestrian access presents a challenge as the site is located at the outer edge of the city limits and flanked by two busier roadways. Planning for sidewalk/ trail connections across Highway 7 and Radio Road to connect to the lakeside trail along Sunrise Road should be studied further. Establishing this connection will allow safe and efficient connections for pedestrians/cyclists.
- Within the dredge site, the design should minimize the need for costly roads and lengthy access to amenities. Parking lots should have direct access to neighboring roads and avoid pedestrian / park user conflicts to the fullest extent possible.

Be Respectful of the Surroundings and Neighboring Land Uses

- This site resides at the entrance of the community for visitors traveling west on Highway 7. As such, amenities like an OHV park, shooting range, or similar should be avoided as these amenities tend to be higher impact and noisy, which is not necessarily what the community would want at its front door. This park should be a welcoming amenity for various age groups/abilities and consider different recreation styles. If implemented carefully, the park could be an attractive entrance to the community.

Not Compete with Similar Amenities in Storm Lake

- The vastness of this parcel presents seemingly endless recreation possibilities for the Storm Lake community. In evaluating what amenities should reside in the dredge site, the city should consider the offerings of the entirety of the existing park system. Amenities of the dredge spoil site shouldn't compete or duplicate existing community amenities. This park presents an opportunity to provide unique amenities and resources that may otherwise not be present or realistic at other city parks. Recreational activities should be attractive, inclusive for all, and provide equitable opportunities.

Example of Single Track Mountain Bike Trails (Image not of Dredge Site)

SUITABLE LAND USE / AMENITIES

A successful site plan for the dredge site will provide a diverse mix of recreational opportunities for the Storm Lake community while aligning to the project design principles stated above. Amenities should be right sized for the site, work well with the site conditions/constraints and the city must consider the life cycle costs and management of the facility when committing to the implementation of project elements. The proposed concept plan includes a mix of opportunities. **The following list includes suitable land uses and amenities proposed for the dredge spoil site:**

- Nature / conservation focused activities
- Nature viewing / birding
- Dog park
- Hiking / biking trails
- Prairie restoration
- Outdoor classrooms
- Open air shelters
- Restroom/concessions
- Disc golf
- Youth soccer / football
- Tennis / pickleball facility
- Natural playscape / playground
- Commercial development

While most of the proposed activities are typically enjoyed in the spring, summer and fall, the city should also consider promoting winter-use activities. The hiking and mountain bike trails present opportunities for winter hiking, snow-

shoeing, and cross-country skiing in the winter months. In early brainstorming sessions, a sledding hill was proposed as an opportunity for additional winter activities, to potentially utilize the existing side hills of the site. While the slopes may be conducive for this activity, the slope aspect is south and east facing. The hillside would likley not hold snow for extended periods in the winter. These areas also pose a public safety risk, due to the steep banks into the pond. The City should consider prohibiting sledding near the pond, due to the added risk of personal injury on the site.

Due to the changes in topography, soil type, vegetative cover, and presence of standing water, specific amenities are more suitable for specific areas of the site. The inventory, analysis, and geotechnical investigation help define certain “zones” within the park extents. Each zone includes certain land uses that fit well with the existing site conditions, based on what will be required for construction, operation, and maintenance of each proposed element.

Conceptual Land Use ‘Zones’

Commercial Development

As previously stated, a portion of the site could be suitable for commercial development. Existing commercial land use borders the west and north property boundaries. The creation of similarly sized commercial parcels would align with adjacent land uses and the sale of these parcels would contribute to the construction costs of proposed park amenities. Proximity of the commercial zone to neighboring commercial land use, as well as Radio Road and Highway 7, would provide efficient and practical utility and roadway access. This area also exists primarily as agricultural land and with minimal site/soil correction, this area best supports site development compared to other areas of the site.

Western Extents of the Dredge Site Looking North

Conceptual Land Use 'Zones' Diagram

Minimal Impact Area

This area is defined as the southern portion of the dredging site, currently the wet pond or lagoon. The pond is proposed to be left as is. Over time, the water level is anticipated to continue to lower through natural dewatering. In the future, consideration should be given for potentially removing or reducing the perimeter pond dike based on continued monitoring of the water level and site drainage patterns. Currently, these banks are quite steep and consideration should be given to limiting or closing off public access to the pond perimeter. Lessening the slope transition to the water's edge or pushing the side hills into the pond to a safer bench transition into the water would improve some of the site hazards.

Conservation / Nature-Based Recreation Area

The northern portion of the dredging site is proposed to consist of relatively low-impact development of both passive and active recreation activities that provide a strong connection to the natural resources on the site. At approximately ninety acres in size, the majority of this area will be converted to a restored prairie landscape. Single track mountain

Example of Constructed Wetland
Image Credit: Easterlake.org

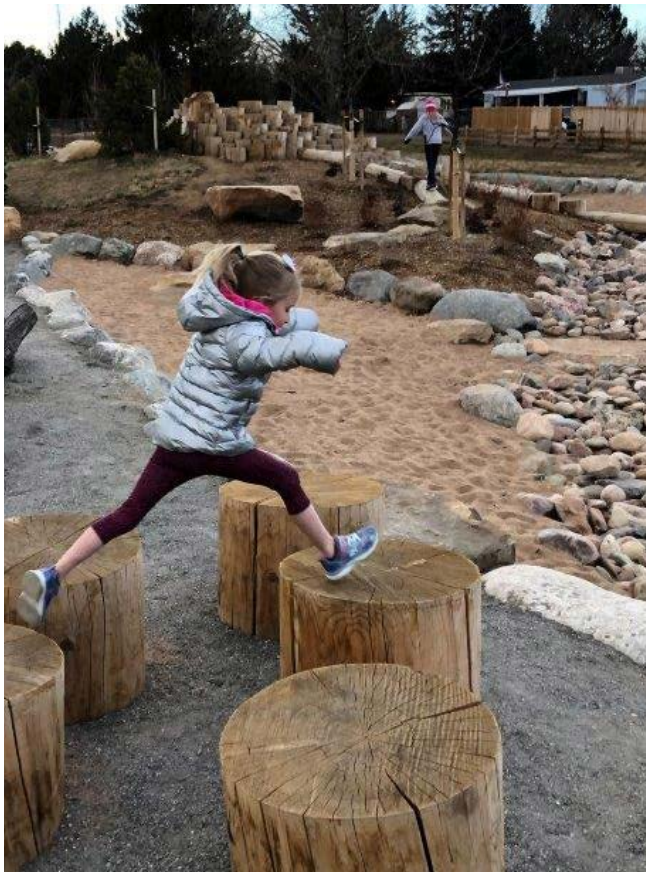
bike trails, hiking trails, and mown paths will wind through the site, providing access to miles of trails within the site.

The following includes a list of proposed amenities for this zone:

- Dog park
- Hiking / biking trails
- Prairie restoration
- Outdoor classrooms
- Open air shelter
- Restroom
- Natural playscape / playground
- Viewing areas / overlooks

Active Recreation Area

Upon consideration of existing active recreation within the city's park system, project stakeholders agreed that additional soccer fields and a pickleball/tennis facility would be appropriate for this site. Utilizing the existing agriculture land along the western extents of the site takes advantage of some of the flattest ground within the dredge site. In addition, the existing soils would support athletic fields better than other areas.



Example of Natural Playscape Character
Image Credit: Slidesandsunshine.com

Dredge Site Concept Master Plan (Refer to Appendix for Full Size Version of Figure)

PROJECT COSTS & IMPLEMENTATION

Development of the Dredge Site Master Plan is meant to be implemented in phases. How the plan is implemented will likely be driven by funding opportunities for specific components of the park. This is a complex site with a diverse offering of amenities and activities, opening the door for a variety of potential funding sources both public and private.

One of the initial steps in implementation of this plan, should be the pursuit of developing commercial parcels along the northern and western extents of the site. Preliminary analysis of similar real estate sales for comparable commercial development sites suggest that the identified parcels could generate a range of $ .28 - $ .37 / SF in real estate sales. With approximately 37 acres in commercial development on the site, this could generate potentially $440,000 - $592,000 in revenue to contribute, in part, to the park implementation.

Based on the Conceptual Park Master Plan included herein, the anticipated construction cost of the proposed improvements (based on February 2022 construction costs) is approximately $6,900,000, which accounts for a 15% construction contingency and 20% in design fees. This is a planning level budget estimate based on conceptual master planning for the park improvements. This estimate does not include costs associated with commercial development or infrastructure necessary to serve any commercial development. Before any project moves forward, a detailed topographic survey should be completed, followed by a thorough design process. Projects will require additional site investigations. Depending upon the type of project, additional soil boring and geotechnical analysis may be required.

When committing to project implementation, the city should consider both the construction cost and the life cycle / maintenance costs and operation of each facility. With nearly 140 acres of potential park development land, this is a substantial addition to the city's existing park system. From maintaining restored prairie, mowing/maintaining soccer fields, collecting trash and monitoring the park facilities, additional park staff will likely be required to successfully maintain the park.

The park master plan identified approximately 60 – 75 acres of prairie restoration. Based on the current vegetative cover, as well as the likelihood the existing dredge soil will contain a high amount of weed seed, it is anticipated that there will be considerable weed growth when the site is disturbed. Prior to any site preparation for the prairie areas, the city will need to eradicate the existing vegetation and implement a spray/till cycle for one full year to kill existing vegetation and cut down on the seed bank in the soil. Upon completion of the prairie restoration, the city should expect an intensive maintenance period of 3-5 years, consisting of periodic mowing and weed management. For the first 3-5 years, the city should budget $300 - $500 / acre for annual maintenance. After year 5, $200 / acre, then $100 / acre for continued annual maintenance.

Development of a maintenance plan for the athletic facilities, including the pickleball, tennis and soccer areas, will also be important to promoting longevity of these facilities. For natural grass fields, $10,000 - $17,000 / year should be budgeted for annual maintenance including turf and irrigation maintenance, as well as upkeep of field accessories.

Pickleball and tennis courts will require approximately $2,000 / court / year for annual maintenance. Ultimately, after about five years, the courts will need to be crack-sealed and re-colored at a cost of approximately $2,000 per court per year.

The following includes a breakdown of the estimated project costs, by each major component of the park master plan:

TOTAL ESTIMATED MASTER PLAN CAPITAL COST = $6,900,000

GENERAL SITE IMPROVEMENTS:

Parking Lots & Access Roads / Driveways = $1,600,000

- Road Pavement
- Parking Lots
- Misc. Storm Sewer
- Common Excavation
- Aggregate Base

Misc. Site Restoration = $750,000

- Trees (Small Caliper)
- Subdrainage/Storm Sewer
- Clearing and Grubbing
- Erosion / Sediment Control
- Misc. Landscape Improvements
- Lawn Areas (Seeding, Mulching, Fertilizer)
- Prairie Reconstruction (Grading, Preparation, Seeding)

CONSERVATION / NATURE-BASED RECREATION AREA:

Trails = $350,000

- Hiking Trail (Crushed Aggregate): 2.3 miles
- Biking Trail (Dirt Single Track): 2.2 miles
- Mown Trail (Minor Improvements): 1.8 miles

Dog Park = $450,000

- Dog Park Shelter
- Site Furnishings
- 6’ Vinyl Coated Chain Link Fence
- Fence/Access Gates

Shelter / Restroom Building = $690,000

- Shelter / Restroom Building - Furnish and Install
- Sanitary Sewer Service
- Water Service
- Plaza and Seating Area Concrete, 5”
- Concrete Pier Foundations, Shelter

Natural Play Area = $235,000

- Playground Equipment
- Playground Installation
- Engineered Wood Fiber Mulch
- Playground Concrete Edge Restraint (8” Width)
- Aggregate Base, Playground

Seating Areas / Overlooks / Outdoor Classroom Spaces = $70,000

ACTIVE RECREATION AREA:

Soccer Complex = $1,200,000

- Irrigation
- Common Excavation
- Subdrainage
- Site Furnishings/Accessories
- Athletic Mix (Seeding, Mulching, Fertilizer)
- Storage Building - Furnish and Install
- Water Service
- Misc. Electrical
- Topsoil Strip, Salvage, Respread

Pickleball Courts = $330,000

- Pickleball Court Concrete Edge Restraint
- Common Excavation
- Accessories
- Court Paving and Surface
- Aggregate Base
- 10’ Coated Chain Link Fence

Tennis Courts = $375,000

- Tennis Court Concrete Edge Restraint
- Common Excavation
- Accessories
- Court Paving and Surface
- Aggregate Base
- 10’ Coated Chain Link Fence

Concessions / Restroom Facility = $750,000

- Concessions / Restroom Building - Furnish and Install
- Sanitary Sewer Service
- Water Service
- Misc. Electrical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