

# Minnesota United Soccer Stadium

Saint Paul, Minnesota  
Loucks Project No. 16028.0A

## Stormwater Management Plan

### Introduction

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The proposed Minnesota United (MNU) Soccer Stadium is located generally on the southern one-half of the superblock located in the northeast corner of Snelling Avenue and I-94. The existing super block is contained within four existing streets: Snelling Avenue on the West, University Avenue on the North, Pascal Street on the East, and St. Anthony Avenue on the South. The northern portion of the site is currently the RK Midway Shopping Center comprised of a strip mall, restaurant pads, and a liquor store. A majority of the southern portion of the site is owned by the Twin Cities Metropolitan Transit Area and was previously known as the "Bus Barn" site.

The proposed super block redevelopment has a phased Master Plan development that creates a grid street system with the stadium located in the middle portion of the southern one-half of the superblock. Surrounding the stadium on individual lots are a mixed use of commercial, residential, and retail uses. North of stadium are two large open green spaces. The Master Plan will be a phased plan and will construct a permanent parking lot on the east side of the stadium and two temporary parking lots west of the stadium until redevelopment of these lots occurs.

The Stormwater Management Plan (SMP) follows the phased Master Plan redevelopment. Except for the stadium, the development pattern for the super block needs to be flexible, allowing the market to drive any one of the lots to develop independent of the others. The SMP phased plan is also strictly tied to property ownership and existing leases contained in the RK Midway Shopping Center. The SMP cannot necessitate the removal of existing buildings and/or parking areas for a currently active shopping center with existing tenants until agreements between all the parties have been completed. Incorporating these realities of ownership, existing leases and an unknown pattern of development requires a SMP to be flexible in order to accommodate future scenarios. Therefore, three scenarios for a SMP have been identified. The three scenarios for the SMP are: the "Base Stormwater Management Plan," the "Comprehensive Stormwater Management Plan," and the "Phased Comprehensive Stormwater Plan"

The Base Stormwater Management Plan (Base Plan) is the SMP that can be built for the opening day of MNU, located on property that is controlled by the MNU, which is generally located south of the proposed Shields Avenue's northerly right of way. The Base Plan SMP meets the City and Capital Region Watershed District's (CRWD) stormwater runoff standards for water quality and water quantity for the stadium roof and field, public right of ways, plazas, and permeant parking areas. The temporary parking areas located west of the stadium will have sediment control measures, rain gardens, and surface water retention meeting the City of St. Paul's runoff rates. The Base Plan incorporates individual stormwater runoff treatment systems for runoff from roads and parking areas versus roofs, pitch (soccer field) and/or green spaces. In addition, the runoff from the north portion of stadium roof and the pitch will be collected in underground cisterns and reused for irrigation on vegetated areas within phase

one except the pitch. It is anticipated that future development parcels would provide their own stormwater treatment, on an individual site basis, which is the standard used by the City and Watershed on nearly all proposed developments. The Base Plan is not a Comprehensive Stormwater Plan for the 35 acre development, but will be designed and built to meet the SMP standards on MNU opening day. This Base Plan is the current design and anticipated stormwater management plan submitted to the City for approval on the project to begin construction in late summer or fall of 2016.

The Phased Comprehensive Stormwater Management Plan (Phased CSMP) is a modification to the Base Plan that installs an unused storm sewer piping system during the initial construction of the stadium which would allow the Base Plan infrastructure to redirect stormwater runoff, at a later time, into a future CMSP under the Great Lawn Area, as described in the paragraph below. The unused storm pipe will allow stormwater to be directed from the stadium, as well as future development lots, to a CSMP. The Phased CSMP would require the Great Lawn Area north of the stadium to be connected to the existing piping system in University Avenue along with requiring an easement for that storm piping system. The main difference between the Phased CSMP and the CSMP is that the Phased CSMP can happen in the future when development occurs and allows the Phase One construction to still meet city and watershed requirements in the interim. The Phased CSMP is a future alternative and allows adequate time to work on the funding and cost allocation for a CSMP, as described below, without jeopardizing the stadium project from being constructed.

The Comprehensive Stormwater Management Plan (CSMP) requires that the great lawn areas north of the stadium have been acquired, including the streets, along with the necessary public easements to access the existing storm water piping in University Avenue. An environmental investigation and Remediation Action Plan will need to be completed to understand the physical constraints that may or may not exist in these areas. The CSMP collects a majority of plazas, roofs, green spaces, and sidewalks (non-traffic areas) to underground chambers located under the great lawn areas. The stormwater chambers will be used for irrigation of the stadium green space, except the pitch as well as public and private green spaces in future developed lots. The CSMP would eliminate the need for a majority of the Base Plan's separate treatment facilities. Wes Saunders-Pearce, along with other City team members, is working on a City Accelerator program which evaluates various funding and financing measures for district stormwater infrastructure improvement costs, and how the long-term operation and management of the CMSP would be fair and equitably distributed between the public and private partnerships and consistent with the City's existing agreements with MNU, including the development agreements pursuant to which the stadium will be constructed.

The SMP's are restricted by the environmental conditions of the site. A Remediation Action Plan (RAP) has been prepared by Braun Intertec, and reviewed and approved by the MPCA. The RAP limits were identified as the property located south of the north right of way of proposed Shields Avenue. The RAP identified two areas of groundwater contamination within the RAP limits. The southeast corner of the site has contaminated perched groundwater at an elevation approximately three feet above the field elevation. A cut-off wall to contain the groundwater in that area is being designed by Braun Intertec and reviewed by the MPCA. The remainder of the site has groundwater contamination approximately ten feet below the field elevation. The MPCA has commented on restrictions of groundwater infiltration due to the site contaminations. The maps and comments are attached to this report.

## **Base Plan Methodology for Phase 1 Development**

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The stormwater calculations were made utilizing the stormwater-modeling program HydroCAD 10.00. Calculations were performed for the Atlas 14 24-hour 2-year, 10-year, and 100-year rainfall events of 2.82 inches, 4.22 inches, and 7.46 inches respectively. Soils information is assumed to be mostly D soils, based on soil boring information. Infiltration will be used to a limited degree based on MCPA approvals with filtration and other methods used to meet the remainder of the volume requirements.

The site is located within the Capital Region watershed district. The CRWD is requiring that the proposed discharge rates do not exceed the existing discharge rates for the site and volume reduction of 1.1" off the impervious or filtration of 2".

The City requires rate control (at a rate of 1.62 cfs/acre) and volume storage based on the site and impervious areas. The site will consist of both public and private areas, public areas are not held to the rate control.

## **Existing Conditions**

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The existing site is currently part of a retail area with multiple tenants and parking, leaving pavement and building covering most of the site. Another large section of the site is an old bus barn site with few structures but much contamination. The Phase one area which the stormwater treatment plan is being proposed for is mostly contained to the south half. The south half includes the "Bus Barn" and parking for the retail areas.

Phase one area has some existing storm sewer, mostly on the north end. The storm water is located in the RK Midway existing alleyway and parking lot to capture runoff within the and direct it to existing City storm sewer untreated. The remained of the site sheet drains directly to City storm sewer within the street.

## **Proposed Conditions**

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The proposed changes to the site consist of adding a soccer stadium with plazas, walkways and permanent and temporary parking lots. Public roads through the site will also be constructed.

The proposed modeled area consists of approximately 18.3 acres. Most of that area will be impervious surface in the form of buildings and streets except for the pitch. Many different stormwater treatment areas within the site are used to treat runoff to watershed standards. The field area within the stadium has a filtration section below it, sufficient enough to treat the runoff directed towards it.

Tree trenches located along the public streets will be used to treat runoff from the street and surrounding public promenade areas that drain to the street. Two large tree trenches within the east and west public promenades along the stadium take runoff from the adjacent roof of

the stadium. Limited promenade area drains to these trenches, as tree grates are the only access for sheet drain from the surface.

The runoff from the north section of the stadium roof is directed to an underground cistern. The filtered field water is also directed to an underground cistern. The cistern water will be used to irrigation green space and trees outside the stadium footprint.

The permanent parking area is proposed to have an underground sand filter to treat runoff. The temporary parking lots are designed with a pretreatment structure for sediment control and a raingarden with underdrain for more quality and rate control. The temporary systems are designed to meet City rate control and improve the quality of runoff.

The site contains contamination. The PCA allows for limited infiltration in approved areas only. Certain areas do not allow infiltration at all. The areas that have been approved for infiltration are modeled and designed with infiltration based on the D soils shown in soil borings. The City rate control of 1.64 cfs/acre is met for the parking lots, plazas and stadium areas. The public areas such as streets are not controlled to that rate but are treated in tree trenches and released at a slower rate.

**Table 1.1 – Existing Condition – Rates and Volumes**

Existing Conditions							
Subcatch	Area (Ac.)	2-YR Storm Event		10-YR Storm Event		100-YR Storm Event	
		Rate (CFS)	Volume (Ac-FT)	Rate (CFS)	Volume (Ac-FT)	Rate (CFS)	Volume (Ac-FT)
1S	4.49	9.87	0.65	17.21	1.134	31.06	2.304
2S	5.62	10.68	0.707	19.66	1.286	37.23	2.721
3S	3.43	10.13	0.709	15.61	1.106	25.51	2.03
4S	1.74	4.88	0.316	7.83	0.513	13.15	0.978
5S	3.01	9.09	0.649	13.86	0.999	22.47	1.811
<b>TOTAL</b>	<b>18.29</b>	<b>44.65</b>	<b>3.031</b>	<b>74.17</b>	<b>5.038</b>	<b>129.42</b>	<b>9.844</b>

**Table 1.2 – Proposed Condition – Rates and Volumes**

Proposed Conditions									
Subcatch	Area (Ac.)	2-YR Storm Event		10-YR Storm Event		6" Storm Event		100-YR Storm Event	
		Rate (CFS)	Volume (Ac-FT)	Rate (CFS)	Volume (Ac-FT)	Rate (CFS)	Volume (Ac-FT)	Rate (CFS)	Volume (Ac-FT)
2P	2.95	4.33	0.337	7.30	0.631	9.99	1.032	8.36	1.371
20P	2.95	0.00	0.000	0.00	0.000	0.15	0.870	0.50	2.337
3P	1.22	2.05	0.188	5.37	0.324	6.14	0.501	6.48	0.66
44P	1.26	3.73	0.243	5.39	0.388	5.64	0.574	5.72	0.727
40P	0.54	1.21	0.098	2.51	0.160	3.59	0.240	4.13	0.305
4P	2.11	6.09	0.401	7.31	0.644	7.61	0.955	7.74	1.210
400P	1.19	0.95	0.189	1.10	0.320	1.54	0.492	2.61	0.634
5P	2.05	0.95	0.371	2.24	0.604	3.23	0.904	8.43	1.151
6P	1.01	0.51	0.126	0.74	0.229	1.36	0.369	2.04	0.487
601P	0.60	1.11	0.079	1.97	0.142	2.37	0.226	2.14	0.296
7P	1.57	1.34	0.399	5.56	0.576	9.70	0.805	11.37	0.994
9P	0.84	2.26	0.146	3.69	0.240	5.42	0.363	5.89	0.464
10P	0.58	0.12	0.092	0.78	0.159	1.67	0.242	1.77	0.311
100P	1.92	1.24	0.380	2.63	0.602	3.09	0.884	3.20	1.116
401P	0.89	0.88	0.141	1.04	0.240	1.11	0.368	1.15	0.474
11P	0.76	0.00	0.000	0.00	0.000	0.09	0.059	0.57	0.151
12P	1.15	0.32	0.190	1.35	0.322	2.16	0.490	2.28	0.628
RC1	<b>2.85</b>	2.15	0.528	3.74	0.852	<b>4.30</b>	<b>1.268</b>	4.45	1.611
RC2	<b>6.70</b>	2.50	0.680	4.43	1.109	<b>7.50</b>	<b>2.530</b>	12.52	4.450
RC3	<b>1.24</b>	0.81	0.157	1.38	0.286	<b>2.04</b>	<b>0.458</b>	2.86	0.602
RC4	<b>1.97</b>	0.96	0.192	1.12	0.325	<b>1.56</b>	<b>0.558</b>	2.94	0.795
56R	4.62	7.58	0.691	10.79	1.130	12.18	1.753	12.85	2.310
64R	3.69	2.15	0.528	3.74	0.852	4.30	1.268	4.46	1.611
72R	9.494	3.92	0.868	9.31	1.434	13.59	3.032	18.64	5.098
<b>Total Site</b>	<b>19.04</b>	<b>14.46</b>	<b>2.24</b>	<b>25.22</b>	<b>3.70</b>	<b>32.11</b>	<b>6.51</b>	<b>38.81</b>	<b>9.62</b>

**Table 1.3 – City Rate Numbers**

Subcatch	Area (Ac.)	City Rate (CFS)	6" Storm Rate (CFS)
RC1	<b>2.85</b>	4.674	<b>4.30</b>
RC2	<b>6.70</b>	10.995	<b>7.50</b>
RC3	<b>1.24</b>	2.034	<b>2.04</b>
RC4	<b>1.97</b>	3.224	<b>1.56</b>

## CRWD Volume Control

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The Capital Region Watershed District has a volume requirement for reduction. The volume reduction is based on 1.1" storm event over the impervious surface area of the site. For the sites approximately 14.35 acres of impervious surface, that is a volume reduction of 57,288 cu.ft. Infiltration is used to the extent allowed on site by the PCA. The remained of volume is acquired through reuse and filtration with the appropriate value adjustments required by the watershed.

### Base Plan Volumes

Infiltration: 3,600 cu.ft.

Irrigation Reuse: 26,851 cu.ft.

Tree Trench Filtration: 31,400 cu.ft.

**Total Volume: 61,851 cu.ft.**

## Best Management Practices

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Best management practices (BMP's) will be implemented during construction per the project Stormwater Pollution Prevention Plan (SWPPP). The final SWPPP will be prepared as part of the construction documents as required and updated as the development occurs. Proposed BMP's will minimize erosion and manage sedimentation as required by the National Pollution Discharge Elimination System (NPDES). During construction, erosion control measures will include dust control, silt fencing, inlet protection, a temporary rock construction entrance, and a concrete wash-out area. Permanent BMP's will include filtration systems, and surface paving of disturbed areas.

## Conclusion

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The proposed Stormwater Management Plan for the MLS Soccer Stadium site, initial phase is designed to meet City of Saint Paul and Capital Region Watershed Districts storm water requirements. The plan provides an improved solution for the conveyance of stormwater from this site by reducing peak runoff rates to below existing conditions and improving quality of runoff.