Southwest LRT Water Quality

May 2016

Southwest LRT Project Technical Report

Table of Contents

Attachments

This page intentionally blank.

1 Introduction

This technical report summarizes the public waters and surface water quality environmental analysis and supplements the Project Final Environmental Impact Statement (EIS). It supports the findings presented in Final EIS Section 3.9, Water Resources, specifically for public waters and surface water quality.

2 Regulatory Context

The regulatory environment for public waters and surface water quality includes federal, state, and local oversight and permitting requirements. The required permits vary depending on the feature, size of impact, location of impact, and other factors. Table 1 lists the permitting agencies and corresponding regulatory requirements related to public waters and surface water quality. The local jurisdictions associated with this Project include cities, watershed districts,[1] and watershed management organizations[2] (WMOs). See Exhibit 1 for city, watershed districts, and WMO boundaries along the proposed light rail alignment. The remainder of this section includes a summary of relevant laws and the associated federal, state, and local agencies and jurisdictions that have regulatory authority over public waters and surface water quality.

TABLE 1
Summary of Regulatory Agencies with Requirements Related to Public Waters and Surface Water Quality

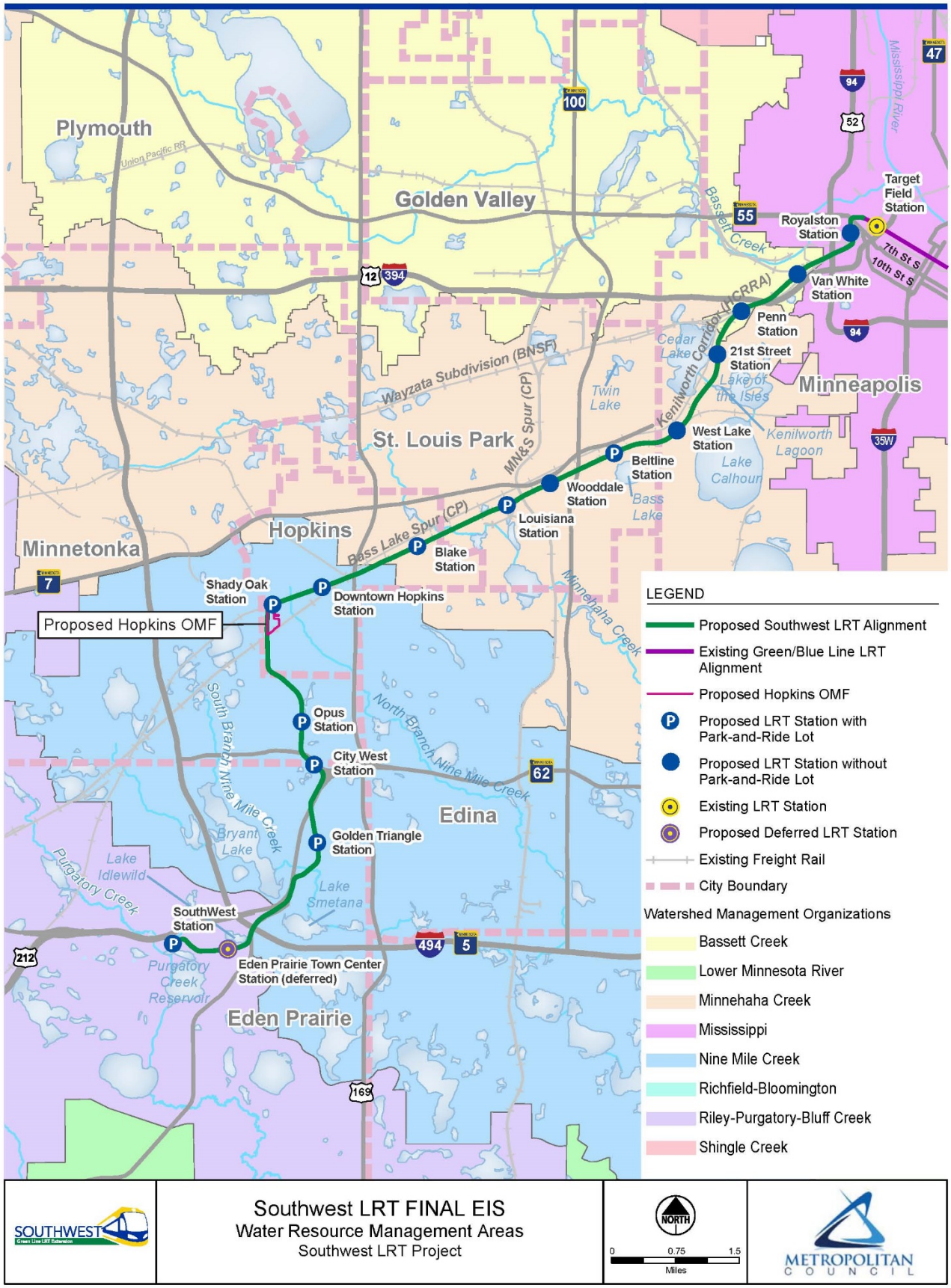
Regulatory Agency	Requirements
Federal	
EPA	Section 303(d) of CWA
State	
MPCA	Section 401 of CWA; MN Rules 7050 & 7090; MN Statute 103G.005 Section 402 of CWA, NPDES Permit Program
MnDNR	MN Rules 6115
MnDOT	Encroachment permits.
Local Municipalities, Watershed Management Organizations, and Watershed Districts	
City of Eden Prairie	Eden Prairie City Code
City of Minnetonka	Minnetonka Code of Ordinances
City of Hopkins	Hopkins City Code
City of St. Louis Park	St. Louis Park City Code
City of Minneapolis	Minneapolis Code of Ordinances
Riley Purgatory Bluff Creek Watershed District	Riley Purgatory Bluff Creek Watershed District Rules
Minnehaha Creek Watershed District	Minnehaha Creek Watershed District Regulatory Rules
Nine Mile Creek Watershed District	Nine Mile Creek Watershed District Rules
Bassett Creek Watershed Management Commission	Bassett Creek Watershed Management Plan
Mississippi Watershed Management Organization	Mississippi Watershed Management Organization Watershed Management Plan

EPA = Environmental Protection Agency; CWA = Clean Water Act; MPCA = Minnesota Pollution Control Agency; MN = Minnesota; NPDES = National Pollutant Discharge Elimination System; MnDNR = Minnesota Department of Natural Resources; MnDOT = Minnesota Department of Transportation.

[1] Watershed districts are voluntary units of government created through a local petition process, with broad authorities, including the ability to manage surface and groundwater (MnBWSR, 2015a).

[2] WMOs are mandatory organizations based on watershed boundaries governed by a board appointed by the member municipalities and townships, which only have the ability to manage surface water (MnBWSR, 2015b). Each WMO has its own regulatory requirements that are adopted and enforced by member cities.

EXHIBIT 1
Water Resource Management Areas



Under authority from EPA, MPCA implements federal water quality regulations and manages the list of impaired water bodies within the state, based on the CWA 303[d] list prepared by the EPA. Impaired waters do not meet the water quality standards set by states, territories, or authorized tribes because of elevated levels of pollution or other types of degradation. Along with MPCA, Minnesota Department of Water Resources (MnDNR) regulates public waters[3] and requires permits for work affecting the course, current, or cross-section of public waters. Local agencies also implement water quality requirements. WMOs and watershed districts have implemented stormwater management provisions in their jurisdictions to enforce compliance with the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit No. MNR040000, as well as the statewide NPDES Construction General Permit No. MN R100001.

3 Methodology

The surface water study area includes one mile on either side of the proposed light rail alignment. Within the surface water study area, public and impaired waters potentially affected by new runoff under the Project were identified. Existing information about surface water quality on the inventoried waters was obtained from the PWI published by the MnDNR. Stormwater impacts were calculated by quantifying the change in impervious surfaces within the Project's limits of disturbance and by assessing the Project's contribution to pollutants to surface water bodies. This analysis is based on the assumption that ballasted track is impervious, because the gradation of the subballast is similar to gravel and tends to impede runoff from infiltrating.[4] Direct evaluation of these stormwater impacts will be performed during Engineering in order to satisfy federal, state, and local stormwater management regulations discussed above in Section 2.

4 Affected Environment

The surface water study area lies within the Upper Mississippi and Minnesota River basins. The general topography is flat, with many lakes and meandering rivers and creeks, ultimately draining from southwest to northeast toward the Mississippi River. Existing public waters include reservoirs, lakes, rivers, channels, creeks, streams, and other water bodies listed in the MPCA PWI. Because of the generally flat topography and the prevalence of creeks, lakes, and other natural channels, the proposed light rail alignment will traverse many existing public water bodies along the corridor. The existing drainage infrastructure in the surface water study area consists of ditches for runoff conveyance, with limited storm sewers or culverts located at grade crossings or bridge structures. The MPCA Small MS4 Permit, Permit No. MNR040000, regulates these storm drainage systems. Table 2 describes the water bodies within the surface water study area.

Various land uses within the affected watersheds contribute pollutant loading to existing public waters, including municipal, industrial, agricultural, commercial, and residential land uses. Pollutant sources include both point sources and nonpoint sources.[5] As natural flows decrease seasonally, pollutant concentrations increase. Urban sources of water pollution include impervious surfaces (e.g., paved areas, parking lots, construction sites, rooftops) and pervious areas (e.g., landscaping). In contrast, rural sources include primarily agricultural fields and operations areas. From these sources, pollutants generally include

[3] Public waters include public watercourses and public water wetlands that meet the criteria set forth in Minnesota Statutes 103G.005, Subdivision 15, and that are identified on the Public Waters Inventory (PWI) maps and lists authorized by Minnesota Statutes 103G.201.

[4] Track ballast is material (often crushed stone) used to support the light rail ties and tracks and to facilitate drainage.

[5] Water pollution is the contamination of natural water bodies by industrial, municipal, construction, or other anthropogenic sources of chemical, physical, radioactive, or pathogenic microbial substances, including naturally occurring substances such as sediment. Point sources of water pollution are described by the CWA as "any discernible, confined, and discrete conveyance from which pollutants are or may be discharged." Non-point sources of water pollution affects a water body from sources such as polluted runoff from agricultural areas draining into a river, or wind-borne debris blowing out to sea.

sediments, oils and grease, hydrocarbons (e.g., fuels and solvents), heavy metals (e.g., mercury), organic compounds (perfluorooctane sulfonate [PFOS]), fertilizers and pesticides, pathogens (e.g., fecal coliform), nutrients, and trash/debris. Construction activities, such as grading that removes vegetation, exposes soil to erosion, or creates potentially erosive combinations of soil cover and slope, can contribute to accelerated erosion rates, which can result in runoff containing sediment that ultimately flows into surface waters.

Minnesota Administrative Rules 5070 et seq. establish beneficial uses and related water quality standards for public waters. The MPCA also identifies the state public waters impairments listed on the CWA 303(d) list. Currently, 12 of 14 water bodies within the surface water study area are impaired, which means these waters do not meet EPA water quality standards for one or more constituents. The beneficial use classes for these water bodies generally apply to the upstream tributary streams as well (per Minnesota Administrative Rules Section 7050.0470). Industrial, commercial, and agricultural activities, including mercury from resource extraction, contribute to the impairments. Various TMDLs are proposed or approved for water bodies within the surface water study area, as shown in Table 2. The list of pollutants of concern includes the following:

- Mercury
- Fecal coliform
- Polychlorinated biphenyls (PCBs)
- PFOS
- Nutrients (nitrogen and phosphorus)
- Chloride

Unlisted water bodies in the Minnesota Administrative Rules are assigned beneficial uses by law, as presented below in Table 3.

5 Environmental Consequences

5.1 Long-term Direct Impacts

Project-wide long-term direct impacts generally result from conversion of undeveloped land and new operations and maintenance during the life of the Project. The linear development of a light rail project could adversely affect public waters and surface water quality in a variety of ways. Generally these impacts can be categorized into hydrologic and water quality impacts.

Hydrologic impacts include:

- Alterations to the peak flow, time of concentration, and peak volume of runoff
- Impacts to directly receiving public waters and associated flooding conditions
- Reduced infiltration and groundwater recharge
- Decreases in downstream channel conveyance capacity

Surface water quality impacts typically include:

- Increased export of pollutants from impervious surfaces and compacted soils
- Decreased pollutant filtration
- Increased water temperatures as a result of riparian vegetation removal
- Export of pollutants from motor vehicles using park-and-ride lots, parking lots, and adjacent streets

These impacts to project vicinity public waters and surface water quality would be caused primarily by creation of impervious surfaces. Unmanaged, stormwater runoff from impervious surfaces would adversely affect public waters and surface water quality by collecting pollutants and transporting them downstream to public waters. Additionally, the change in land use to impervious land uses increases the total flow rate and volume of runoff, increasing erosion in downstream water bodies.

The light rail transit (LRT) alignment will traverse existing urbanized commercial, industrial, and residential areas. The Project will increase pollutant-generating impervious surfaces by approximately 39.9 acres, as shown in Table 4.[6]

TABLE 2
Surface Water Bodies within the Surface Waters Study Area

Water Body	Beneficial Use Classes[a]	TMDLs (Implementation Date)
Purgatory Creek and Reservoir	2B, 3C, 4A, 4B, 5, and 6	None[b]
Lake Idlewild	2B, 3C, 4A, 4B, 5, and 6	None[b]
Lake Smetana	2B, 3C, 4A, 4B, 5, and 6	Mercury in Fish Tissue (2008)
Bryant Lake	2B, 3C, 4A, 4B, 5, and 6	Mercury in Fish Tissue (2008) Nutrient/Eutrophication Biological Indicators (2018)
Nine Mile Creek	2B, 3C, 4A, 4B, 5, and 6	Chloride (2010) Fish Bioassessments (2028) Impaired Biota (TBD) Turbidity (TBD)
Minnehaha Creek	2B, 3C, 4A, 4B, 5, and 6	Aquatic Macroinvertebrate Bioassessments (2024) Chloride (2015) Fecal Coliform (to be determined [TBD]) Fish Bioassessments (2024) Dissolved Oxygen (2024)
Bass Lake	2B, 3C, 4A, 4B, 5, and 6	Mercury in Fish Tissue (2008) Excess Nutrients (2009) Nutrient/Eutrophication Biological Indicators (2017)
Lake Calhoun	2B, 3C, 4A, 4B, 5, and 6	Mercury In Fish Tissue (2025) PFOS in Fish Tissue (2022)
Twin Lake	2B, 3C, 4A, 4B, 5, and 6	Excess Nutrients (2007) Nutrient/Eutrophication Biological Indicators (2017)
Cedar Lake	2B, 3C, 4A, 4B, 5, and 6	Mercury in Fish Tissue (2008, 2025) Excess Nutrients (2012) Nutrient/Eutrophication Biological Indicators (2016)
Kenilworth Lagoon[c]	2B, 3C, 4A, 4B, 5, and 6	Mercury in Fish Tissue (2008) PFOS in Fish Tissue (2022)
Lake of the Isles	2B, 3C, 4A, 4B, 5, and 6	Mercury in Fish Tissue (2008) PFOS in Fish Tissue (2022)
Bassett Creek	2B, 3C, 4A, 4B, 5, and 6	Chloride (2015) Fecal Coliform (2015) Fish Bioassessments (2016)
Mississippi River (downstream of Bassett Creek)	1C, 2Bd, 3C	Mercury in Fish Tissue (2008) Fecal Coliform (2024) PCB in Fish Tissue (2025)

[a] Beneficial Use Classes are defined in Minnesota Administrative Rules Section 7050.0470 and listed in Table 3.

[b] The 2014 CWA 303(d) list does not include any impairments or TMDLs for this water body.

[c] The Kenilworth Lagoon is an unnamed creek that extends from the eastern portion of Cedar Lake to the Lake of the Isles Parkway West bridge. The Kenilworth Lagoon is considered impaired, and has been assigned the TMDLs associated with the Lake of the Isles, because the defined extent of the Kenilworth Lagoon overlays a portion of the PWI boundary for the Lake of the Isles.

TBD = to be determined

Sources: MPCA, 2014a; MPCA, 2014b; and MPCA, 2014c.

[6] If the Eden Prairie Town Center Station is not constructed by 2040, the total impervious area would be 199.7 acres, or approximately 0.33 acres less than the Project as completed with this station completely built.

TABLE 3
Beneficial Uses for Unlisted Minnesota Waters

Class	Beneficial Use
1C – Domestic Consumption	Waters that will meet both the primary (maximum contaminant levels) and secondary drinking water standards issued by the EPA, with treatment consisting of coagulation, sedimentation, filtration, storage, and chlorination.
2B – Aquatic Life and Recreation	Nonpotable. Can support cool- or warm-water sport or commercial fish and associated aquatic life and habitat. Suitable for recreation of all kinds, including bathing.
2Bd – Aquatic Life and Recreation	Protected as a source of drinking water. Can support cool- or warm-water sport or commercial fish and associated aquatic life and habitat. Suitable for recreation of all kinds, including bathing.
3C – Industrial Consumption	Suitable for industrial cooling and materials transport without a high degree of treatment required to avoid corrosion, scaling, or other unsatisfactory conditions.
4A – Agricultural and Wildlife	Suitable for irrigation without significant adverse effects upon crops or vegetation usually grown in the waters or area, including truck garden crops.
4B – Agricultural and Wildlife	Suitable for livestock and wildlife without inhibition or injurious effects.
5 – Aesthetics and Navigation	Suitable for aesthetic enjoyment of scenery, to avoid any interference with navigation or damaging effects on property.
6 – Other Uses	Includes those classified above and any or all other possible beneficial uses.

Source: Minnesota Rules 7050, et seq.

TABLE 4
Project Impacts to Pollutant-Generating Impervious Surface

Existing Impervious Areas	Proposed Impervious Areas	New Impervious Areas
160.1 acres	200.0 acres	39.9 acres

Source: *Civil West Water Resources Summary and Environmental Permitting Checklist with Amended Tables 1A and 2A* (see Attachment 1) and *Civil East Water Resources Final Environmental Impact Statement Summary* (see Attachment 2).

The new impervious surfaces related to the Project will represent a small overall increase in the total impervious surface area in each watershed. The amount of new impervious surface added will be low relative to the overall size of the watersheds, and because the Project will adhere to applicable stormwater management regulations, adverse impacts to public waters and surface water quality resulting from new impervious surfaces are unlikely to occur.

Of particular concern are the 303(d) listed "impaired water bodies" downstream of the Project. With respect to the pollutants of concern identified in Table 2, the Project will not contribute mercury (a heavy metal leached from mining operations), nor will it contribute PCBs or PFOS (two chlorinated hydrocarbons used in industrial processes). LRT operations are not expected to contribute fecal coliform or nutrients, because these pollutants are associated with residential and agricultural runoff.[7] Light rail operations are not expected to contribute chloride to surface water.

The Project will incorporate various design features to avoid and minimize stormwater runoff that has the potential to degrade water quality. These design features are discussed in the following subsections.

5.1.1 Impacts of Light Rail and Freight Rail Alignment

This section discusses water quality impacts from both light rail and freight rail track alignments because they have similar water quality impacts. The Project will cross five water bodies, including Nine Mile Creek (North Branch), Nine Mile Creek (South Branch), Minnehaha Creek, Kenilworth Lagoon, and Bassett Creek. The Minnesota Administrative Rules do not identify these water bodies as having specific water quality beneficial uses. Therefore, they are classified as "Unlisted Waters." As such, they are defined by the

[7] Fecal coliform and nutrients are associated with residential and agricultural runoff. Fecal coliform is a type of bacteria used as an indicator of poor water quality. Nutrients include nitrogen and phosphorus used in fertilizers.

Minnesota Administrative Rules to have multiple beneficial uses, including Classes 2B, 3C, 4A, 4B, 5, and 6. Table 3 describes each type of beneficial use.

- At the Nine Mile Creek (North Branch), the Project will cross the existing culvert under the Cedar Lake LRT Regional Trail, without affecting the creek.
- At the Nine Mile Creek (South Branch), the Project will cross the existing creek on a new bridge over the Creek and Flying Cloud Drive.
- At Minnehaha Creek, the Project will be built on new bridges crossing the channel, with abutments on the banks positioned behind the existing bridge abutments and no piers encroaching into the waterway. The design will maintain the existing hydraulic capacity, resulting in minimal rise in existing flood or high water elevations.
- At the Kenilworth Lagoon, where new bridge piers will be built in the waterway channel, the design for the crossing will maintain the existing hydraulic capacity, resulting in a minimal rise in existing flood or high water elevations. Crossings require support piers in water channels where necessary, or bridge abutments on banks.
- At Bassett Creek, the proposed LRT alignment will cross over an existing tunnel without affecting the creek.

Much of the proposed alignment will run parallel to existing transportation facilities such as local roads, freeways, and freight rail alignments. In some locations, freight rail alignment changes will be necessary to accommodate the light rail. Rail operations within the corridor will contribute pollutants in concentrations and amounts that are typical for transportation projects, including total suspended solids, metals, oils and grease, and debris. Consequently, while the total contaminant loads may increase from the Project, the character and concentration of pollutants in runoff will be the similar. The primary substances released into the environment during traditional rail operations are from braking (i.e., from abrasion between the steel wheels and tracks during braking). They include minor amounts of iron, copper, manganese, and chromium. Galvanized poles may also release zinc (Berkhardt, Rossi, and Boller, 2008 [see Appendix D of the Final EIS]). Most of the releases are as particulate matter.

5.1.2 Impacts of Light Rail Stations, Parking Lots, and Park-and-Ride Facilities

Light rail stations, parking lots, and park-and-ride facilities will require new paved surfaces that will contribute additional runoff to stormwater drainage systems. The impact on public waters caused by the increase in runoff will be minor because the station sites are in existing urbanized or semi-developed areas and the increase in pollutant-generating impervious surfaces will represent a small fraction of the watershed. These facilities will not affect the hydraulic capacity and connectivity of natural water bodies, because the Project will preserve existing drainage patterns to the extent possible prior to discharging to the local stormwater systems.

5.1.3 Impacts of the Hopkins Operations and Maintenance Facility

The proposed Hopkins Operations and Maintenance Facility (OMF) site will require fill into an unidentified ditch that connects two nearby wetlands. The Project will maintain the existing ditch and construct a new culvert between the two wetlands. The site design will reduce the amount of impervious surface in that area by approximately five acres. Stormwater will be collected and directed to stormwater treatment BMPs.

5.1.4 Impacts of Local Road Improvements

Construction of local roadway improvements will slightly increase impervious surface areas because of the lengthening of paved surfaces, compared to the existing at-grade facilities. General drainage patterns will be preserved. Stormwater will be collected at the toe of embankments and directed to stormwater treatment BMPs. Several rail-crossing modifications will require new paved access or frontage roads. In most cases, new roads will be in developed areas, and new storm drainage systems will capture and convey runoff to existing nearby storm drains.

The Project will relocate several intersections and build new local roadway infrastructure improvements at a number of project rail crossings. These new sources of road runoff from the new crossings, relocated highways, or frontage roads could affect water quality.

5.1.5 Project Design Features to Meet Stormwater Management Requirements

Much of the Project will be built within existing transportation corridors and commercial areas, resulting in substantial redevelopment of these areas. The various LGUs (cities and watershed districts) listed in Section 2 regulate stormwater management requirements along the LRT corridor. Current regulations require that stormwater from both developed and redeveloped areas be managed.

In compliance with these requirements, the Project will implement the following criteria for runoff rate and volume control:

- Conserve natural areas and minimize the extent of disturbed areas.
- Implement pollutant source reduction measures.
- Provide landscape and soil-based BMPs that promote infiltration and stormwater retention onsite.
- Develop a stormwater pollution protection plan (SWPPP) prior to construction.
- Deploy and maintain construction site BMPs during construction.
- Provide stormwater management features that control peak flow rates and volumes.

The Project will incorporate stormwater treatment BMPs to treat runoff and provide flow rate and volume control. All constructed stormwater BMPs will be located outside of natural wetlands and streams. LGUs have each expressed a preference for infiltration BMPs. The Project will implement these wherever feasible. The most suitable infiltration BMP is the trackside ditch, which will be built to parallel the LRT track wherever feasible, with soil amendments if needed to enhance the percolation rates. The Project will evaluate infiltration BMPs for use at other light rail facilities as well, including the stations, park-and-ride facilities, and parking lots. In reconstructed road areas that once drained directly into streams, new infiltration BMPs will be built downstream of these storm drains wherever feasible to provide detention and treatment of runoff prior to discharge.

However, the suitability of these BMPs is constrained by available space within the corridor right-of-way, soil conditions, proximity to groundwater, and physical limitations. For example, infiltration BMPs are precluded in areas with contaminated soils.[8] Where infiltration is not feasible within the corridor, the Project will evaluate and implement other BMPs based on the sequence of compliance alternatives prescribed by each watershed district's and WMO's stormwater management ordinance discussed in *Local and State Governing Agency Stormwater Requirements Summary* (located in *Surface Water Resources Evaluation Supporting Documentation Technical Memorandum* [see Appendix C of the Final EIS for instructions on how to access supporting documentation]).

The Project will also meet the requirements of federal and state permits for construction of storm drainage systems near public waters. The Project will obtain an Individual Section 404 Permit from the USACE and a CWA Section 401 Water Quality Certification from the MPCA. The permits will have additional conditions that further avoid water quality impacts. Furthermore, the Council will develop appropriate operations and maintenance plans for stations, parking lots, and park-and-ride facilities, which will address stormwater impacts and BMPs during operations, such as deicing during winter conditions.

The Project will include features to minimize or eliminate pollutant sources and to protect stormwater quality in downstream public waters, including the following site design features, where applicable:

- Trackside ditches will be designed to minimize erosive flow velocities.
- Flow diversions will be minimized.

[8] Known locations of existing contaminated soils include near Nine Mile Creek and Minnehaha Creek; near the Hopkins OMF; near the Shady Oak, Blake, Louisiana, and Beltline park-and-rides; and throughout the rail corridor in the east segment (see Section 3.14 of the Final EIS for additional information on hazardous and contaminated materials).

- Existing vegetation will be preserved as appropriate and applicable.
- Surface flow relief culverts will be used to convey runoff across (underneath) the alignment where needed (e.g., in locations where the proposed light rail alignment and the freight railway are not in close proximity).
- Flared end sections and energy dissipaters (e.g., rip rap) will be used to minimize erosion at culvert outlets.
- New areas of cut and fill will be minimized. Slope lengths and grades will be minimized and slopes rounded to minimize concentrated flows.
- Runoff from bridges, overpasses, underpasses, and aerial structures at river and creek crossings will be discharged to the ground surface in a non-erosive manner, discharged to stormwater BMPs, or discharged to adjacent drainage systems.
- The proposed tunnel under Highway 62 will have drainage systems to collect stormwater at the tunnel portals. Water collected at the tunnel portals will be predominantly stormwater but could also include melted ice from the light rail trains. Stormwater runoff approaching the tunnel portals will be collected and prevented from entering the tunnel with drains located in the base of the tunnel portals near the tunnel openings. The drains will have capacity for the runoff from the 100-year storm event. They will be connected to a pump station that will discharge the runoff to the proposed storm sewer system. The storm sewer discharges to an existing wetland downstream.
- The proposed tunnel within the Kenilworth Corridor will have drainage systems to collect stormwater at the tunnel portals. Water collected at the tunnel portals will be predominantly stormwater but could also include melted ice from the light rail trains. Stormwater runoff approaching the tunnel portals will be collected and prevented from entering the tunnel with drains located in the base of the tunnel portals near the tunnel openings. Pumps will push runoff through a pretreatment system to capture debris and sediments and through an underground infiltration chamber, which will allow the water to enter into the groundwater system.[9]
- New retained fill (i.e., soil behind a new retaining wall) will feature an engineered drain system behind the retaining walls and weep holes near the base of the retaining walls to prevent the buildup of stormwater in the embankment.
- The design will incorporate other site-specific design refinements (e.g., pier and abutment sizes and shapes), consistent with regulations, as the Project progresses beyond advanced design.

5.2 Long-term Indirect Impacts

Long-term indirect impacts will occur as commercial, transportation, and industrial activities in the Project's vicinity increase and create new point and non-point sources of water pollutants. Water quality impacts can include:

- Increased export of pollutants from impervious surfaces and compacted soil
- Decreased pollutant filtration
- Increased water temperatures as a result of riparian vegetation removal
- Export of pollutants from motor vehicles using park-and-ride lots and other associated infrastructure

[9] The infiltration chambers that are part of the light rail tunnel portal water management system will be sized to accommodate stormwater volumes associated with a 100-year storm event. Drains in the tunnel portals will be sized for volumes in excess of that level. Volumes of water in excess of the 100-year storm event will pass through the infiltration chambers and overflow into the existing storm sewer system and surface water bodies in the vicinity of the tunnel.

5.3 Short-term Impacts

Short-term impacts include increased rates and volumes of sediment-laden runoff during excavation, accidental spills and leaks from construction vehicles and equipment, and removal of riparian vegetation. Short-term sediment and erosion impacts to public waters and surface water quality will occur near stream crossings, where slopes are greater and construction activities occur closer to the public water, and where controls are more difficult to implement and maintain. The likelihood of spills affecting surface water bodies also is greatest in these areas.

Temporary construction grades will change localized drainage flows and volumes, especially at public water body crossings and stormwater discharge points. Because of its proximity to public water bodies, the Project will implement stormwater BMPs to avoid or minimize the discharge of pollutants such as trash, floating material, oils and greases, sediment, suspended material, chemical constituents (e.g., fuels and solvents), pH, and turbidity. The Project will also implement wildlife-friendly BMPs to avoid and minimize erosion and sedimentation resulting from grading and materials management activities (e.g., clearing and grubbing, excavation, handling, stockpiling, hauling, placing of fill). These BMPs will aid in minimizing stormwater exposure to bare soils, which are more likely to erode than vegetated areas that provide infiltration, retention, and dispersion.

Construction over public waters will require excavation within the water body. In still waters, such as Kenilworth Lagoon and other lakes and ponds, construction of piers and abutments could mobilize sediment and provide a direct path to surface water. In streams and creeks, construction may require flowing water to be rerouted temporarily around the construction site. Shoring and cofferdams could temporarily reduce channel capacity, increasing the risk of erosion, flooding, and degraded water quality.

Construction of the light rail stations, parking lots, and park-and-ride facilities will involve large areas of clearing and grubbing, demolition, stockpiling, and storage of construction materials (such as asphalt, cement, aggregate, soils, and other materials), which may contribute total suspended solids and other stormwater contaminants to runoff. The Hopkins OMF site has an unidentified ditch crossing that connects two nearby wetlands. The Project will result in temporary impacts to the existing wetlands during construction of the new facilities, including the LRT bridge and the new culvert.

To address these temporary impacts, construction will be subject to the requirements of the CGP and the Section 401 Water Quality Certification. In general, the CGP will inform construction-phase BMPs and monitoring, whereas the Section 401 Water Quality Certification will inform the selection and design of post-construction stormwater treatment rate and volume control features. The Project will develop a SWPPP prior to construction that will identify source control, and wildlife-friendly erosion and sediment control BMPs required for the Project. As a primarily linear project, the Project will deploy wildlife-friendly sediment and erosion control BMPs that focus on perimeter controls. These include silt fence, floating silt curtains, vegetative buffers, filter logs, temporary culvert and storm drain inlet protection, temporary seeding, and erosion control blankets. BMPs for in-stream construction in public waters include conventional construction techniques, such as cofferdams. These will be designed to minimize the increases in water surface elevations during the design flood event and as required by state or local agencies. Implementation and monitoring of the SWPPP will be the responsibility of the construction contractor who will keep records of BMP inspections and monitoring results and make them available to federal, state, and local officials upon request and for three years after the notice of termination (i.e., construction site closure).

This page intentionally blank.

Internal Memorandum

DATE: April 30, 2015

TO: Don Demers

FROM: Earth Evans

SUBJECT: FEIS Freeze 2 - West Segment Water Resources Summary and Environmental Permitting Checklist

The following memorandum provides a brief summary of the requested water resources information for the Final Environmental Impact Statement (FEIS) Freeze 2.

Impervious Area

The area totals were measured within the construction limits/rights-of-way of the west segment based on LRCI and Advanced Design base project configuration which includes updates to the Preliminary Engineering (PE) Plans. Impervious area is defined as a constructed hard surface that either prevents or retards the entry of runoff from the soil. Examples of impervious area include compacted subgrade below the tracks, paved roads, trails and rooftops.

The proposed new impervious and existing impervious surfaces are listed in the attached tables 1A and 1B for Riley Purgatory Bluff Creek Watershed District (RPBCWD) and tables 2A and 2B for Nine Mile Creek Watershed District (NMCWD). "New" impervious includes all proposed impervious that will be constructed with this project. "Existing" impervious includes all existing impervious that will be removed with this project. Impervious surfaces have been delineated by watershed district to facilitate sizing stormwater best management practices (BMPs) to meet their requirements. Additionally the delineation is further sub-divided by redevelopment and linear areas based on watershed district stormwater rule definitions.

Potential Storm Sewer Impact Assessment

We have coordinated with the Utility Design Team to develop a matrix of potential utility conflicts for the west segment.

RPBCWD Impervious Summary

Table 1A - RPBCWD Stations, Park and Rides

Redevelopment Areas [.]	Existing Impervious [ac]	Proposed Impervious [ac]	Net [ac]
SW Station	2.6	2.9	0.3
TPSS	0.3	0.3	0.0
Total	2.9	3.2	0.3

Table 1B - RPBCWD Linear Corridor

Linear Areas [.]	Existing Impervious [ac]	Proposed Impervious [ac]	Net [ac]
LRT from Station 2077+95 to 2136+05	-	4.1	4.1
Overlapping of Impervious or Tunnels	1.0	-	-1.0
Technology Drive and Prairie Center Drive	0.2	0.4	0.1
Voyager Bank Entrance	0.3	0.3	0.0
Singletree Ln Entrance	0.1	0.1	0.0
Town Center Station Roads	9.9	7.6	-2.3
Residence Inn Entrance	0.3	0.3	0.0
Total	11.8	12.8	1.1

NMCWD Impervious Summary

Table 2A - NMCWD Stations, Park and Rides and OMF

Redevelopment Areas [.]	Existing Impervious [ac]	Proposed Impervious [ac]	Net [ac]
Golden Triangle Station Parking lots	2.2	2.3	0.1
City West Station Parking Lots	0.1	2.5	2.4
Opus Station Parking Lots	0.9	0.9	0.0
OMF	14.3	10.9	-3.4
Shady Oak Park and Ride	11.2	6.6	-4.6
Total	28.8	23.2	-5.5

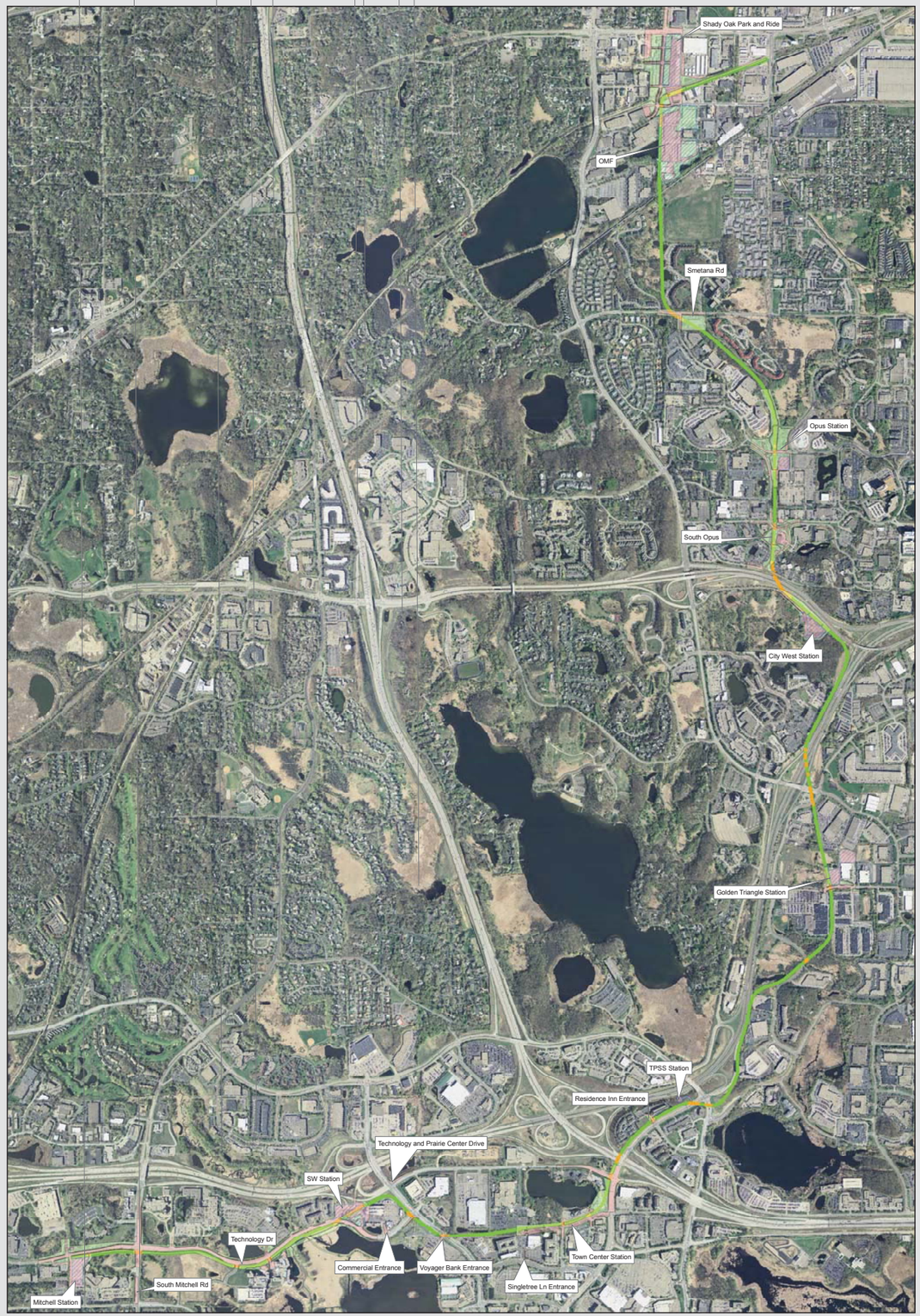
Table 2B - NMCWD Linear Corridor

Linear Areas [.]	Existing Impervious [ac]	Proposed Impervious [ac]	Net [ac]
LRT from Station 2136+05 to 2441+49	-	21.7	21.7
Overlapping of Impervious or Tunnels	1.0	-	-1.0
Additional Width at Stations	-	0.4	0.4
Golden Triangle Station Roads	2.6	2.3	-0.3
City West Station Roads	1.0	1.2	0.2
South Opus	5.3	4.5	-0.8
Opus Station Roads	2.9	3.2	0.3
Smetana Rd	3.2	1.4	-1.8
Shady Oak Park and Ride Roads	12.5	9.7	-2.8
Total	28.5	44.5	16.0

This page intentionally blank.

FEIS Linear and Redevelopment Pervious/Impervious Areas Map

Existing Conditions



Proposed Conditions

This page intentionally blank.

This page intentionally blank.

Internal Memorandum

DATE: April 30, 2015

TO: Mark Bishop

FROM: Brady Busselman

SUBJECT: ADC East Water Resources FEIS Summary

The following memorandum provides a brief summary of the water resources information for the Final Environmental Impact Statement. It should be noted that there is an ongoing evaluation of impacts to the project due to the recently updated floodplain near the Louisiana station.

Impervious Area

The area totals were measured within the construction limits/right-of-way of each Segment. Impervious area is defined as a constructed hard surface that either prevents or retards the entry of runoff into the soil. Examples of impervious area include subballast under tracks, paved surfaces, compacted gravel, and rooftops.

Location	**Existing Impervious Area (ACRE)**	**Proposed Impervious Area (ACRE)**	**Additional Impervious Area (ACRE)**
Segment E1	20.94	27.51	6.57
Segment E2	28.04	32.64	4.60
Segment E3	10.83	19.31	8.48
Segment E4	28.40	36.84	8.44
Project Total	**88.21**	**116.30**	**28.09**

This page intentionally blank.