# Appendix F
# Supporting Technical Reports

## F.7 Modified Phase I Environmental Site Assessment

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# Modified Phase I Environmental Site Assessment

Metro Blue Line Extension Light Rail Transit Project
Minneapolis, Golden Valley, Robbinsdale, Crystal, and Brooklyn Park, Minnesota
Metropolitan Council Contract Number: 14P232

*Prepared For*

## Metropolitan Council
## And
## Minnesota Department of Transportation


Project B1502383
October 22, 2015
Braun Intertec Corporation

**BRAUN INTERTEC**
The Science You Build On.

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October 22, 2015

Project B1502383

Kathryn O'Brien
Metropolitan Council
Blue Line Extension Project Office
5514 West Broadway Avenue, Suite 200
Crystal, MN 55428

Re: Modified Phase I Environmental Site Assessment
Metro Blue Line Extension Light Rail Transit (BLRT) Project
Minneapolis, Golden Valley, Robbinsdale, Crystal, and Brooklyn Park, Minnesota
Metropolitan Council Contract Number: 14P232

Dear Ms. O'Brien:

In accordance with Metropolitan Council Contract 14P232, Braun Intertec Corporation conducted a Modified Phase I Environmental Site Assessment (ESA) of the above-referenced site (Corridor). The objective of the Modified Phase I ESA was to serve as a screening tool to identify, to the extent possible, existing sources of contamination (based on present or former uses) at locations that could impact future construction of the Corridor.

The Modified Phase I ESA was prepared on behalf of and for use by Metropolitan Council and the Minnesota Department of Transportation (MnDOT). No other party has a right to rely on the contents of the Modified Phase I ESA without written authorization by Braun Intertec. Please refer to the attached report for the scope, methods, and conclusions of this assessment.

Braun Intertec appreciates the opportunity to provide professional services to you for this project. If you have any questions regarding this letter or the attached report, please contact Joseph Foline at 952.995.2484 or Jaclyn Dylla at 952.995.2490.

Sincerely,

BRAUN INTERTEC CORPORATION

Jennifer B. Wolff, PG, CPG
Senior Scientist

Jaclyn E. Dylla, CHMM
Principal – Senior Scientist

Attachment:
Modified Phase I Environmental Site Assessment Report

cc: James L. DeLuca, Minnesota Department of Transportation

AA/EOE

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## Executive Summary

Braun Intertec received authorization from the Metropolitan Council (Met Council) to conduct a Modified Phase I Environmental Site Assessment (ESA) for the planned Metro Blue Line Extension Light Rail Transit (LRT) Project along the locally preferred alternative (LPA) from Target Field Station located in Minneapolis, Minnesota north to the Oak Grove Parkway Park and Ride facility in Brooklyn Park, Minnesota, and including an Operation and Maintenance Facility (OMF) located north of the Oak Grove Parkway Park and Ride facility (Corridor). For the purposes of this report, the Corridor includes the LPA, the OMF site, and the area within 500 feet of the LPA and OMF site. The Corridor is located in the cities of Minneapolis, Golden Valley, Robbinsdale, Crystal, and Brooklyn Park, in Hennepin County, Minnesota, a distance of approximately 13 miles.

This Modified Phase I ESA was divided into six segments based on municipality:

- Segment M, located within the City of Minneapolis, a distance of approximately 2 miles
- Segment GV, located within the City of Golden Valley, a distance of approximately 1.4 miles
- Segment R, located within the City of Robbinsdale, a distance of approximately 2.6 miles
- Segment C, located within the City of Crystal, a distance of approximately 1.9 miles
- Segment BP2, located within the City of Brooklyn Park, a distance of approximately 2.6 miles
- Segment BP1, located within the City of Brooklyn Park, a distance of approximately 2.4 miles

Please refer to the Corridor Location Map attached as Figure 1 and the Project Corridor Feature Maps attached as Figure 2 for a depiction of the Corridor location, as well as the locations of the above-listed segments.

The Modified Phase I ESA was completed in anticipation of preliminary design and future construction activities and included the area within 500 feet of the proposed centerline of the Corridor. The Modified Phase I ESA was completed in conformance with the scope of services outlined by Metropolitan Council Contract Number 14P232, as well as the United States Environmental Protection Agency (USEPA) All Appropriate Inquiry and ASTM 1527-13, as modified by the Minnesota Department of Transportation (MnDOT) for transportation projects. The modified approach includes ranking identified parcels within the Corridor as having a low, medium, or high potential for contamination. The objective of the Modified Phase I ESA was to serve as a screening tool to identify, to the extent possible, existing sources of contamination (based on present or former uses) at locations that could impact future construction of the Corridor.

At the time of this assessment, the majority of the Corridor was developed with residential and commercial parcels.

Specifically, the M (Minneapolis) Segment has been developed since the 1880s, with residential and park areas on the west end and commercial development on the east end. In the GV, R, C, and BP2 Segments, the Corridor follows an existing BNSF railroad track, which has been present since the 1880s. The remainder of the GV (Golden Valley) Segment has been residential and park areas since the 1930s, with additional development in the 1960s and 1970s. The R (Robbinsdale) Segment was mixed residential and farmland until the 1960s when the commercial district in the central portion of the segment and additional residences replaced the farmland. The C (Crystal) Segment includes the Crystal Airport in the central portion of the segment, with commercial and residential in the remainder of the segment. This area was developed in the 1950s and 1960s. The Corridor follows the railroad until the central portion of the BP2 Segment, when the Corridor trends to the east. The BP2 and BP1 (Brooklyn Park) Segments were cultivated farmland until the 1950s and 1960s when the areas were converted to commercial with some residential areas. The northern end of the Corridor, in the BP1 Segment, has some formerly cultivated areas, which are currently undeveloped.

Braun Intertec evaluated all parcels in the Corridor to determine if they met the ranking criteria established by MnDOT as having a low, medium, or high potential for contamination. Parcels summaries were prepared for parcels that were determined to have a low, medium, or high potential for contamination. A parcel summary table of these ranked parcels and the corresponding parcel summaries are included in Appendices A and E, respectively. Corridor Sketches depicting the locations of the ranked parcels with a low, medium, or high potential for contamination are included as Figure 2. The parcel summaries provide an overview of the regulatory and historical review of the information attached as Appendices G through J.

Some parcels were evaluated but were determined not to have a low, medium, or high potential for contamination. These additional parcels are summarized in Appendix F. Parcel summaries for these additional parcels were not prepared and these parcels are not further discussed in this report.

Based on Braun Intertec's assessment, 271 parcels were identified within the Corridor as having a low, medium, or high potential for contamination. More specifically, 47 parcels were identified within the M Segment, 9 parcels were identified within the GV Segment, 67 parcels were identified in the R Segment, 63 parcels were identified in the C Segment, 54 parcels were identified in the BP2 Segment, and 31 parcels were identified in the BP1 Segment.

The following is a discussion of the parcel ranking criteria and the corresponding parcels identified within each segment of the Corridor with a low, medium, or high potential for contamination.

*Low Potential for Contamination Parcels* include parcels that are hazardous waste generators (HWGS), light industrial facilities, and possibly some parcels where site reconnaissance showed poor housekeeping or soil disturbance, etc. Braun Intertec identified 112 *Low Potential for Contamination Parcels* within the Corridor. Specifically, 9 parcels were identified within the M segment, 3 parcels were identified in the GV segment, 37 parcels were identified in the R segment, 20 parcels were identified in the C segment, 24 parcels were identified in the BP2 Segment, and 19 parcels were identified in the BP1 Segment. The specific parcels identified are included in the Parcel Summary Table in Appendix A and on the Parcel Summary Table – Low Potential for Contamination Sites in Appendix B.

*Medium Potential for Contamination Parcels* include parcels with closed leaking underground or aboveground storage tanks (LUASTs), all parcels with underground or aboveground storage tanks (UASTs), all parcels with historic or current vehicle and/or auto body repair activities and petroleum use or storage, and unintentional hazardous materials release (HMIRSR05) sites. Braun Intertec identified 135 *Medium Potential for Contamination Parcels* within the Corridor. Specifically, 28 parcels were identified within the M segment, 6 parcels were identified in the GV segment, 23 parcels were identified within the R segment, 41 parcels were identified within the C segment, 26 parcels were identified within the BP2 Segment, and 11 parcels were identified within the BP1 Segment. The specific parcels identified are included in the Parcel Summary Table in Appendix A and on the Parcel Summary Table – Medium Potential for Contamination Sites in Appendix C.

*High Potential for Contamination Parcels* include all active and inactive Voluntary Investigation and Cleanup Program (VIC), Minnesota Environmental Response and Liability Act (MERLA) sites, all heavy industry sites, all active and inactive dumpsites, all Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) sites, and all active LUAST sites. Braun Intertec identified 24 *High Potential for Contamination Parcels* within the Corridor. Specifically, 10 parcels were identified within the M segment, 7 parcels were identified within the R segment, 2 parcels were identified within the C segment, 4 parcels were identified within the BP2 Segment, and 1 parcel was identified within the BP1 Segment. The specific parcels identified are included in the Parcel Summary Table in Appendix A and on the Parcel Summary Table – High Potential for Contamination Sites in Appendix D.

The following table provides a summary of the ranked sites by segment:

**Table 1. Parcels with Low, Medium, or High Potential for contamination by segment**

| Segment | # of Parcels with Low potential | # Parcels with Medium potential | # Parcels with High potential | Totals |
|---|---|---|---|---|
| M | 9 | 28 | 10 | **47** |
| GV | 3 | 6 | 0 | **9** |
| R | 37 | 23 | 7 | **67** |
| C | 20 | 41 | 2 | **63** |
| BP 2 | 24 | 26 | 4 | **54** |
| BP-1 | 19 | 11 | 1 | **31** |
| **TOTAL** | **112** | **135** | **24** | **271** |

## Additional Considerations

Based on a review of historical information, many properties within the Corridor were farmsteads prior to the 1930s or have been residences since the 1880s. Fuel oil tanks or other hazardous materials may be present within these parcels. In those cases where the historical information confirmed the presence of tanks or other contaminants, the parcel was assigned a parcel number and was ranked in accordance with the MnDOT definitions of having a low, medium, or high potential for contamination. For those parcels where the historical information did not confirm tanks or hazardous materials were present, the parcels were not assigned a parcel number and were not ranked. These additional parcels are summarized on the table in Appendix F.

Drilling Investigation activities, including the collection and analysis of soil and groundwater samples, are recommended along the Corridor where a medium or high potential for contamination is both adjacent to or in close proximity to the Corridor or where significant amounts of fill materials will be excavated during future construction.

# A. Introduction

## A.1. Purpose

Braun Intertec received authorization from the Metropolitan Council (Met Council) to conduct a Modified Phase I Environmental Site Assessment (ESA) for the planned Metro Blue Line Extension Light Rail Transit (LRT) Project along the locally preferred alternative (LPA) from Target Field Station located in Minneapolis, Minnesota north to the Oak Grove Parkway Park and Ride facility in Brooklyn Park, Minnesota, and including an Operation and Maintenance Facility (OMF) located north of the Oak Grove Parkway Park and Ride facility (Corridor). For the purposes of this report, the Corridor includes the LPA, the OMF site, and the area within 500 feet of the LPA and OMF site. The Corridor is located in the cities of Minneapolis, Golden Valley, Robbinsdale, Crystal, and Brooklyn Park, in Hennepin County, Minnesota, a distance of approximately 13 miles.

This Modified Phase I ESA divided into six segments based on municipality:

- Segment M, located within the City of Minneapolis, a distance of approximately 2 miles
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- Segment R, located within the City of Robbinsdale, a distance of approximately 2.6 miles
- Segment C, located within the City of Crystal, a distance of approximately 1.9 miles
- Segment BP2, located within the City of Brooklyn Park, a distance of approximately 2.6 miles
- Segment BP1, located within the City of Brooklyn Park, a distance of approximately 2.4 miles

The Modified Phase I ESA was completed in conformance with the United States Environmental Protection Agency (USEPA) All Appropriate Inquiry and ASTM 1527-13, as modified by the Minnesota Department of Transportation (MnDOT) for transportation projects, including ranking identified parcels within the Corridor as having a low, medium, or high potential for contamination. The objective of the Modified Phase I ESA was to serve as a screening tool to identify, to the extent possible, existing sources of contamination (based on present or former uses) at locations that could impact future construction of the Corridor.

The Modified Phase I ESA was prepared on behalf of and for the use by Met Council and MnDOT in accordance with Contract number 14P232 between Met Council and Braun Intertec. No other party has a right to rely on the contents of the Modified Phase I ESA without written authorization by Braun Intertec. All authorized parties are entitled to rely on the attached report according to Braun Intertec's contract with Met Council, and under the same terms, conditions and circumstances.

## A.2. Scope of Services

Services provided for this assessment included:

- Prepared a description of the Corridor location and current uses of properties within the Corridor.
- Prepared a general description of the topography, soils, geology, and groundwater flow direction at the Corridor.
- Reviewed reasonably ascertainable and practically reviewable regulatory information published by state and federal agencies, health, and/or environmental agencies.
- Determined the location/boundaries of any Wellhead Protection Areas that exist in the vicinity of the Corridor.
- Reviewed Minnesota Pollution Control Agency (MPCA) or Minnesota Department of Agriculture (MDA) files to obtain additional information about the magnitude and extent of known contamination and the regulatory status of parcels in the Corridor.
- Reviewed the history of the Corridor, including aerial photographs, directories, and other readily available Corridor development data.
- Conducted a reconnaissance of the Corridor, which included, at a minimum, drive- and walk-by reviews.
- Interviewed local government officials or agencies having jurisdiction over hazardous waste disposal or other environmental matters in the area of the Corridor.
- Ranked all identified parcels within the Corridor as having low, medium, or high potential for contamination based on criteria established by MnDOT.

## A.3. General Definitions

The following are definitions of terms used in this report:

- Corridor: The area and parcels located within 500 feet of the Metro Blue Line Extension LRT project northbound track centerline. This includes parcels that are only partially located within 500 feet of the proposed boundaries.
- Light Rail Line (LRT): The proposed light rail line alignment subject to this Modified Phase I ESA.
- Parcel: A property, or portion of a property, located within the Corridor that has been evaluated.
- Site: A parcel or group of parcels that were collectively investigated or documented within a regulatory listing.
- Facility: A building, business, or land use located on the parcel.
- Right-of-Way: The land adjacent to the Corridor, which may be acquired by the Met Council/MnDOT to facilitate project construction. Public right-of-way is land adjacent to currently publicly owned roadways.

## A.4. Corridor Ranking Definitions

As indicated, identified parcels within the Corridor were ranked as having a low, medium, and high potential for contamination to the project area using criteria established by MnDOT. Braun Intertec amended the definitions to ensure consistency with ranking and include situations not originally covered by the MnDOT criteria. The rankings, defined by MnDOT and amended by Braun Intertec, are as follows:

*Low Potential for Contamination Parcels* include parcels that are hazardous waste generators, light industrial facilities, and possibly some parcels where site reconnaissance showed poor housekeeping or soil disturbance, etc.

*Medium Potential for Contamination Parcels* include parcels with closed leaking underground storage tanks (LUASTs), all parcels with underground or aboveground storage tanks (UASTs), all parcels with historic or current vehicle and/or auto body repair activities and petroleum use or storage, and unintentional hazardous materials release sites.

*High Potential for Contamination Parcels* include all active and inactive Voluntary Investigation and Cleanup Program (VIC) sites, all active Petroleum Brownfields Program (PBP) sites, Minnesota Environmental Response and Liability Act (MERLA) sites, all heavy industry sites, all active and inactive dumpsites, all Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) sites, and all active LUAST sites.

Please refer to Appendix A for a Parcel Summary Table for parcels which were identified within the Corridor as having a low, medium, or high potential for contamination. Parcels that did not meet the criteria as having a low, medium, or high potential for contamination are summarized in the Additional Parcel Summary Table in Appendix F.

## B. General Corridor Description and Location

The total length of the Corridor is approximately 13 miles. The length of each segment is as follows:

- Segment M: approximately 2 miles
- Segment GV: approximately 1.4 miles
- Segment R: approximately 2.6 miles
- Segment C: approximately 1.9 miles
- Segment BP2: approximately 2.6 miles
- Segment BP1: approximately 2.4 miles

The Corridor is a proposed LRT project that will provide for transit improvements in the northwest area of the Twin Cities. The Metro Blue Line Extension LRT project will include up to 11 new stations, three of which will include new or renovated park and ride lots. Traction Power Substations (TPSS) are proposed to be located along the Corridor on limited-access sites. The TPSS buildings are the sites in which the alternating current (AC) of the power grid is converted by rotary transformers into the voltage and direct current (DC) that is required by the electric trains. The current is routed to the trains via a utility duct bank that connects to the overhead catenary (contact) systems poles.

To facilitate construction, the project may include the acquisition of new right of way and parcels for park and rides. For the purposes of this report, the Modified Phase I ESA study area included the area within 500 feet of the proposed alignment of the Corridor. Please refer to the Corridor Location Map and Project Corridor Features, attached as Figures 1 and 2, for a depiction of the Corridor location.

At the time of this assessment, the majority of the Corridor was developed with residential and commercial parcels.

Specifically, the M (Minneapolis) Segment has been developed since the 1880s, with residential, park areas on the west end, and commercial development on the east end. In the GV, R, C, and BP2 Segments, the Corridor follows an existing BNSF railroad track, which has been present since the 1880s. The remainder of the GV (Golden Valley) Segment has been residential and park areas since the 1930s, with additional development in the 1960s and 1970s. The R (Robbinsdale) Segment was mixed residential and farmland until the 1960s when the commercial district in the central portion of the segment and additional residences replaced the farmland. The C (Crystal) Segment includes the Crystal Airport in the central portion of the segment, with commercial and residential in the remainder of the segment. This area was developed in the 1950s and 1960s. The Corridor follows the railroad until the central portion of the BP2 Segment, when the Corridor trends to the east. The BP2 and BP1 (Brooklyn Park) Segments were cultivated farmland until the 1950s and 1960s when the areas were converted to commercial with some residential areas. The northern end of the Corridor, in the BP1 Segment, has some formerly cultivated areas, which are currently undeveloped.

# C. Records Review

## C.1. Physical Setting Information

### C.1.a. Topography

The Corridor is located on the Anoka, Coon Rapids, Minneapolis North, Minneapolis South, and Osseo the United States Geological Survey (USGS) 7.5-minute topographic map series.

According to the USGS 7.5-minute topographic map series, the elevation along the Corridor is generally level, ranging from to 840 – 850 feet above mean sea level (amsl) at the south/east end (in Segments GV and M) to 880 – 900 feet amsl along the north end (in Segments BP1, BP2, C, and R).

### C.1.b. Geology and Hydrogeology by Segment

**M Segment**

- The unconsolidated sediment beneath the Corridor in the M Segment starts with Pleistocene age middle-terrace deposits, which consist of sand, gravelly sand, and loamy sand with thin deposits of silt, loam, or organic sediment on top, and transitions to postglacial lacustrine deposits, which consist of sand, loamy sand, and loam with local organic-rich layers, and then

upper-terrace deposits, which consist of sand, gravelly sand and loamy sand (Meyer and Hobbs, 1989). The west or north end of the M Segment contains Pleistocene age loamy till deposits, which are loam in texture with a few beds and lenses of stratified sediment, underlain by Superior lobe stratified sediment or till and are generally at a depth of more than 50 feet, including small areas of thick, fine, loamy colluvium sediment, and also by postglacial organic deposits. The organic deposits have largely been drained and filled (Meyer and Hobbs, 1989).

- The uppermost bedrock unit beneath the east/south end of the M Segment is the Middle Ordovician, St. Peter Sandstone (Olsen and Bloomgren, 1989). The St. Peter Sandstone is described as a fine- to medium-grained, friable quartz sandstone in the upper half to two thirds of the unit. The lower part of the St. Peter Sandstone contains multicolored beds of mudstone, siltstone and shale with interbedded, very coarse sandstone. The central portion of the M Segment is the Lower Ordovician, Prairie du Chien Group (Olsen and Bloomgren, 1989). The Prairie du Chien Group is described as Dolostone that varies greatly in thickness because its top is a major erosional surface. The lower part of the section is less sandy except within 10 to 15 feet of the base. The west or north end of the M Segment is underlain by the Middle Ordovician, Platteville and Glenwood Formation (Olsen and Bloomgren, 1989). The Platteville Formation is described as fine-grained limestone containing thin shale partings near the top and base, underlain by green, sandy shale of the Glenwood Formation, which is very thin.

- In general, the depth to bedrock beneath the M Segment ranges from approximately 51 to 100 feet below the land surface. A southwest-northeast trending bedrock valley is present along the south and east end of the M Segment.

- According to published geologic information, the depth to groundwater beneath the M Segment ranges from approximately 10 to 20 feet below land surface. The regional groundwater flow direction beneath the segment is to the east toward the Mississippi River.

**GV Segment**

- The unconsolidated sediment beneath the GV Segment of the Corridor is postglacial organic deposits at the south end, transitioning to Pleistocene age till of mixed composition deposits, which are complexly intermixed yellowish brown to gray and reddish brown to reddish gray in color, loam to sandy loam. Reddish colored till or stratified sediment are commonly within 20

feet of the surface. Locally, this deposit includes small areas of thick reddish brown-colored till and thick loamy to sandy colluvium. Lenses of stratified sediment, primarily sand and gravel, are common (Meyer and Hobbs, 1989).

- The uppermost bedrock unit beneath the GV Segment is the Platteville and Glenwood Formation along the south end of the GV Segment, replaced by the St. Peter Sandstone in the north end. Bedrock descriptions are provided in the M Segment geology discussion above.

- In general, the depth to bedrock beneath the GV Segment ranges from approximately 101 to 200 feet below the land surface, with the depth along the majority of the Segment between 151 and 200 feet below land surface.

- According to published geologic information, the depth to groundwater beneath the GV Segment ranges from approximately 10 to 20 feet below land surface. The regional groundwater flow direction beneath the segment is to the east toward the Mississippi River.

**R Segment**

- The unconsolidated sediment beneath the R Segment of the Corridor is Pleistocene age till on the south end, and then Pleistocene age sandy till deposits that consist of loam to sandy loam and are commonly capped by and interbedded with thin deposits of silty to gravely stratified sediment. This deposit includes small areas of thick loamy to sandy colluviums in the central area, followed by the Pleistocene age upper-terrace deposits.

- The uppermost bedrock beneath the R Segment is the St. Peter Sandstone. Bedrock descriptions are provided in the M Segment geology discussion above.

- In general, the depth to bedrock beneath the R Segment ranges from approximately 101 to 200 feet below the land surface, with the depth along the majority of the segment between 151 and 200 feet below land surface.

- According to published geologic information, the depth to groundwater beneath the R Segment ranges from approximately 30 to 60 feet below land surface. The regional groundwater flow direction beneath the segment is to the east toward the Mississippi River.

**C Segment**

- The unconsolidated sediment beneath the C Segment is Pleistocene age upper-terrace deposits (Meyer and Hobbs, 1989). A description of the Pleistocene age upper-terrace deposits is provided in the M Segment geology discussion above.

- The uppermost bedrock beneath the C Segment is the St. Peter Sandstone. Bedrock descriptions are provided in the M Segment geology discussion above.

- In general, the depth to bedrock beneath the C Segment ranges from approximately 51 to 200 feet below the land surface, with the depth along the majority of the segment between 151 and 200 feet below land surface.

- According to published geologic information, the depth to groundwater beneath the C Segment ranges from approximately 30 to 60 feet below land surface. The regional groundwater flow direction beneath the segment is to the east toward the Mississippi River.

**BP2 Segment**

- The unconsolidated sediment beneath the BP2 Segment is Pleistocene age upper-terrace deposits (Meyer and Hobbs, 1989). A description of the Pleistocene age upper-terrace deposits is provided in the M Segment geology discussion above.

- The uppermost bedrock unit beneath the BP2 Segment is the St. Peter Sandstone at the south end, replaced by the Prairie du Chien Group in the central portion; the northern portion is underlain by the Upper Cambrian, Jordan Sandstone (Olsen and Bloomgren, 1989). A description of the St. Peter Sandstone and the Prairie du Chien Group is provided in the M Segment geology discussed above. The Jordan Sandstone is described as quartzose sandstone that is carbonate cemented in the upper 10 to 15 feet of the deposit. The middle part of the deposit is coarse grained, and the basal 10 to 20 feet is finer grained and may contain minor amounts of shale.

- In general, the depth to bedrock beneath the BP2 Segment ranges from approximately 51 to 150 feet below the land surface, with the depth along the majority of the Corridor between 101 and 150 feet below land surface.

- According to published geologic information, the depth to groundwater beneath the BP2 Segment ranges from approximately 20 to 60 feet below land surface. The regional groundwater flow direction beneath the segment is to the east/southeast toward the Mississippi River.

**BP1 Segment**

- The unconsolidated sediment beneath the BP1 Segment is Pleistocene age upper-terrace deposits (Meyer and Hobbs, 1989). A description of the Pleistocene age upper-terrace deposits is provided in the M Segment geology discussion above.

- The uppermost bedrock unit beneath the BP1 Segment is the Jordan Sandstone on the south end, which is replaced in the north by the Upper Cambrian, St. Lawrence and Franconia Formations (Olsen and Bloomgren, 1989). The St. Lawrence Formation consists of dolomitic siltstone and shale in eastern Hennepin County. The fine-grained, glauconitic sandstone and shale of the Franconia becomes dolomitic in western Hennepin County, where the two units are distinguishable only by the higher glauconite content of the Franconia. Fine- to medium-grained quartzose sandstone with minor amounts of white or light-colored shale forms the upper part of the Franconia in parts of the north and west.

- In general, the depth to bedrock beneath the BP1 Segment ranges from approximately 101 to 200 feet below land surface, with the depth along the majority of the Corridor between 151 and 200 feet below land surface. An east-west trending bedrock valley crosses the BP1 Segment in the northern portion.

- According to published geologic information, the depth to groundwater beneath the BP1 Segment ranges from approximately 20 to 40 feet below land surface. The regional groundwater flow direction beneath the segment is to the east/southeast toward the Mississippi River.

The groundwater flow was identified in some parcel summaries through review of available data, but was the Corridor-specific groundwater flow direction was not determined through direct measurement during this Modified Phase I ESA. Additional field investigation, beyond the Scope of Services of this Modified Phase I ESA, would be required to determine this information.

## C.2. Regulatory Information

Braun Intertec obtained regulatory information pertaining to the Corridor and surrounding area from GeoSearch. The GeoSearch report is a compilation of records of facilities that are included on current federal and state environmental regulatory databases. The databases were searched to a distance of one-quarter mile from the Corridor. Braun Intertec reviewed the GeoSearch report to identify records that indicate known or potential environmental hazards within the Corridor and/or surrounding area and to evaluate the likelihood for those hazards to impact the Corridor. Information obtained from the GeoSearch report was used to determine which facilities are located within the Corridor and have known or potential contamination associated with current and/or past uses. The GeoSearch report also includes a description, source reference, and date of acquisition.

In addition to the information obtained from the GeoSearch report, Braun Intertec reviewed select files at the MPCA. Pertinent information obtained from GeoSearch or the MPCA file review is included in the parcel summaries in Appendix E. Copies of the GeoSearch report and information reviewed as part of the MPCA file review are included as Appendices G and H, respectively.

### C.2.a. Corridor

Parcels along the Corridor are listed on the following federal and/or state databases in the GeoSearch report:

**Table 2: Regulatory Database Summary**

| Database Name | Parcel Numbers Identified |
|---|---|
| Resource Conservation and Recovery Act (RCRA) Hazardous Waste Generators (RCRAGR05) | 1, 2, 3, 7, 10, 11, 14, 15, 16, 18, 26, 28, 43, 46, 68, 72,75, 76, 81, 82, 83, 86, 93, 109, 110, 111, 116, 117, 122, 123, 133, 134, 135, 138, 139, 140, 141, 142, 143, 144, 148, 149, 151, 152, 155, 157, 159, 162, 163, 173, 174, 181, 182, 185, 188, 193, 195, 196, 197, 199, 202, 209, 210, 212, 214, 225, 226, 227, 232, 236, 241, 243, 250, 251, 257, 258, 259 |
| Facility Registry System (FRS) | 1, 2, 3, 5, 6, 7, 8, 10, 12, 13, 14, 16, 17, 18, 21, 23, 24, 26, 28, 31, 43, 53, 62, 65, 68, 72, 75, 76, 78, 81, 83, 93, 97, 104, 110, 111, 114, 116, 117, 122, 123, 125, 127, 131, 132, 133, 134, 138, 139, 140, 141, 142, 143, 144, 148, 149, 150, 151, 152, 153, 154, 155, 157, 158, 159, 162, 163, 172, 172, 173, 174, 179, 181, 182, 185, 188, 191, 195, 196, 197, 199, 201, 209, 210, 212, 214, 225, 230, 232, 233, 236, 237, 243, 247, 250, 253, 257 |

| Database Name | Parcel Numbers Identified |
|---|---|
| RCRA No Longer Regulated Facility (NLRRCRAG) | 1, 2, 5, 6, 8, 11, 12, 13, 17, 21, 23, 41, 75, 97, 132, 148, 151, 155, 171, 179, 181, 205, 207, 230, 233, 237 |
| Hazardous Waste Generator Site (HWGS) | 1, 2, 3, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 21, 23, 24, 26, 28, 43, 46, 62, 68, 72, 75, 76, 78, 81, 82, 83, 86, 87, 93, 97, 109, 110, 111, 116, 117, 122, 123, 125, 127, 131, 132, 133, 134, 135, 138, 139, 140, 141, 142, 143, 144, 148, 149, 150, 151, 152, 153, 155, 157, 158, 159, 162, 163, 166, 171, 172, 173, 179, 181, 182, 185, 193, 195, 196, 197, 199, 201, 202, 205, 207, 208?, 209, 210, 212, 214, 225, 226, 227, 230, 232, 236, 237, 241, 243, 246, 247, 250, 258, 259, 260 |
| Registered Storage Tanks (UAST) | 1, 2, 3, 5, 6, 7, 8, 10, 11, 12, 13, 15, 16, 17, 21, 22, 23, 30, 32, 46, 53, 66, 68, 72, 75, 76, 84, 90, 102, 105, 109, 110, 111, 123, 125, 126, 139, 142, 153, 156, 157, 160, 162, 163, 166, 169, 171, 174, 179, 181, 189, 192, 193, 195, 196, 197, 199, 201, 202, 205, 207, 208, 210, 214, 230, 237, 241, 243, 256, 257, 258, 260 |
| Spills Listings (PCASPILLS) | 1, 2, 3, 6, 10, 16, 17, 21, 26, 29, 38, 39, 40, 42, 49, 50, 56, 58, 60, 64, 69, 70, 78, 101, 110, 111, 126, 129, 136, 149, 155, 156, 162, 173, 181, 191, 194, 195, 196, 199, 209, 211, 214, 231, 239, 240, 242, 243, 255, 256, 257 |
| Tier II Facility Listing (TIERII) | 3, 7, 10, 16, 78, 72, 105, 125, 209, 214, 247, 257 |
| Water Discharge Permit (WDP) | 1, 3, 5, 6, 7, 8, 10, 15, 17, 20, 21, 26, 75, 123, 126, 149, 157, 179, 181, 195, 196, 199, 202, 209, 212, 241, 256, 257, 260 |
| National Pollutant Discharge Elimination System (NPDESR05) | 257 |
| Permit Compliance System (PCSR05) | 3, 257 |
| Registered Leaking Storage Tanks (LUAST) | 1, 2, 3, 5, 6, 7, 10, 11, 2, 13, 16, 17, 21, 25, 30, 31, 32, 38, 46, 66, 74, 75, 76, 96, 109, 110, 111, 123, 125, 126, 156, 160, 169, 174, 181, 189, 195, 196, 197, 199, 201, 202, 205, 207, 208, 210, 241, 243, 258, 260 |
| Petroleum Brownfields Program (PBF) | 2, 3, 5, 8, 75, 162, 172, 195, 196, 219, 258, 260, |
| Voluntary Investigation and Cleanup Program (VIC) | 1, 2, 3, 5, 7, 8, 12, 17, 21, 47, 59, 75, 76, 88, 90, 107, 172, 190, 192, 195, 196, 258, |
| Site Response Section (SRS) | 1, 2, 3, 7, 8, 17, 21, 59, 75, 192, 195, 196, 258 |
| Industrial Stormwater Permit | 250, 251, 259, 260 |
| Construction Stormwater Permit | 132, 244, 251, 269, 251 |
| Registered drycleaning facilities (CLEANERS) | 76, 109, 243 |

| Database Name | Parcel Numbers Identified |
|---|---|
| Biennial Reporting System (BRS) | 13, 225 |
| Permitted Air Facilities (AIRS) | 2, 3, 7, 16, 138, 141, 142, 151, 154, 193, 251, 260 |
| Aerometric Information Retrieval System/Air Facility Subsystem (AIRSAFS) | 1, 10, 17, 138, 141, 142, 148, 151, 154 |
| Integrated Compliance Information System (ICIS) | 1, 3, 105 |
| Institutional Controls (IC) | 7, 59 |
| Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) | 3, 76, |
| CERCLIS NO Further Response Actions Planned (NFRAP) | 3, 76, |
| State Superfund Site (SF) | 76 |
| Unpermitted Dumps (UNPERMDUMPS) | 58 |
| State Assessment Site (SAS) | 7, 8, 58, |
| MDA Spills (AGSpills) | 46, 58, 198 |
| Toxic Release Inventory (TRI) | 7 |
| Open Solid Waste Facilities (SWF) | 3 |
| Emergency Response Notification System (ERNS) | 52 |

Sites 1 – 47 are located within the M Segment, 48 – 56 are within the GV Segment, 57 – 123 are within the R Segment, 124 – 186 are within the C Segment, 187 – 240 are within the BP2 Segment, and 241 – 271 are within the BP1 Segment.

Pertinent information obtained from GeoSearch report is included in the parcel summaries in Appendix E.

Sites identified in the GeoSearch report that were determined to be located within or partially within the Corridor are presented in the table above.

Of these sites, Braun Intertec requested to review the MPCA files for 84 LUAST/PBF listings and 50 VIC/SRS listings that were identified in the GeoSearch report and were determined by Braun Intertec to be located within or partially within the Corridor. Supplemental environmental information was obtained from the MPCA Tank and Leak and/or VIC databases. Due to the volume of information obtained from the current assessment of MPCA file reviews, it was deemed impractical to include hard copies of the information as appendices to the bound hard copy of this report. However, this information is provided as Appendix H in the pdf version of this report included on the attached CD. Select diagrams and tables referencing the MPCA files subsurface investigations are included under the regulatory review narrative in the parcel summaries included as Appendix E.

### C.2.b. Adjoining Properties

We reviewed the GeoSearch report for properties that adjoin the Corridor and are located within the approximate minimum search distances on the standard environmental records sources as specified in the ASTM Standard that may indicate a release or likely release of hazardous substances and/or petroleum products that may impact the Corridor. Based on factors that include regulatory status, distance from the Corridor, and/or location relative to the regional groundwater flow direction, as referenced in Section C.1., no facilities are identified in the GeoSearch report that warrant further consideration as potential for contamination.

### C.2.c. Unmapped Sites

The GeoSearch report did not identify any "orphan" sites, which, because of poor or inadequate address information could not be mapped by GeoSearch.

## C.3. Additional Government Records

### C.3.a. Interviews

Braun Intertec made inquiry to the following individuals to obtain knowledge or records of historical and current land-use information regarding the Corridor and surrounding area:

- Gilbert Gabanski, Hennepin County Public Works, Environment and Energy Department, Land and Water, Contaminated Lands Unit
- Jim DeLuca, MnDOT Office of Environmental Stewardship
- John Crelly, Fire Chief, City of Golden Valley
- Mark Fairchild, Fire Chief, City of Robbinsdale
- Shelby Wolf, Deputy Fire Marshal, City of Crystal
- Kenneth Prillaman, Fire Chief, City of Brooklyn Park

Section D of this report provides the discussion of the results of Braun Intertec inquiry and presents any applicable information obtained.

### C.3.b. Met Council

Braun Intertec obtained information regarding the project location and proposed construction plans from Met Council.

### C.3.c. Minnesota County Well Index

The Minnesota Geological Survey (MGS) maintains the Minnesota County Well Index (MCWI), which is a limited database of water well records. The MCWI was accessed through the Minnesota Department of Health (MDH) website. Several private wells were identified within the Corridor. The locations of the wells are indicated on Figure 2.

Braun Intertec also accessed the MCWI to determine the location/boundaries of any Wellhead Protection Areas (WPA) that exist within the Corridor. According to the MCWI, four WPAs that intersect the Corridor were identified. The locations of these WPAs are shown on the sheet index in Figure 2.

### C.3.d. State Regulatory Web Pages

Braun Intertec accessed MPCA's Aboveground/Underground Storage Tank Site Search web page, MDA's "What's In My Neighborhood" Agricultural Interactive Mapping web page, MPCA's Petroleum Remediation Program "What's In My Neighborhood" web page, and MPCA's "What's In My Neighborhood" web pages for information regarding the potential for sites located within the Corridor to be of environmental concern that were not identified in the GeoSearch report. The additional facilities identified that were not included in the GeoSearch report are included in the parcel summaries in Appendix E.

## C.4. Historical-Use Information

The objective of the historical-use information review was to develop a history of the previous uses of properties located within the Corridor in order to help evaluate the likelihood of past uses having led to environmental issues that may affect the Corridor. Braun Intertec consulted only those historical sources that were readily available, practically reviewable, and likely to be useful to develop a history of previous uses of the Corridor and surrounding area within the time and cost constraints of this Modified Phase I ESA.

### C.4.a. Aerial Photographs

Braun Intertec retained Historic Information Gatherers (HIG) to obtain aerial photographs for the Corridor and surrounding areas. Braun Intertec obtained aerial photographs from HIG for years 1937, 1947, 1956, 1960-62 (partial), 1966-67, 1970-71, 1978, 1984, 1987, 1994, 1997, 200, 2004, 2009, and 2012. Information obtained for low, medium, and high potential for contamination parcels from the aerial photographs review are included in the parcel summaries in Appendix E. Copies of the aerial photographs are attached in Appendix I.

### C.4.b. City Directory Information

Braun Intertec retained HIG to obtain city directory information for streets within the Corridor. HIG provided city directories for approximate five-year intervals between the years 1930 and 2012. Braun Intertec reviewed the city directories to assist in identifying properties by name alone that could impact the Corridor. Information obtained for low, medium, and high potential for contamination parcels from the city directory review are included in the parcel summaries in Appendix E.

### C.4.c. Fire Insurance Maps

Braun Intertec retained HIG to obtain historical fire insurance maps within the Corridor. Fire insurance maps were produced by private fire insurance companies and indicated uses of properties at specific dates. The information noted on the maps commonly includes uses of individual structures, locations of fuel and/or chemical storage tanks, and storage of other toxic substances. Maps were provided for the years 1885, 1892, 1904, 1912, 1914, 1924, 1929, 1930, 1940, 1950, 1952, and 1963. Each map may not provide coverage for the entire Corridor. Information obtained for low, medium, and high potential for contamination parcels from the review of the fire insurance maps are included in the parcel summaries in Appendix E. Copies of fire insurance maps are attached as Appendix J.

### C.4.d. Historical Topographic Maps

The USGS topographic maps for the Corridor were reviewed for the years 1896, 1901, 1902, 1952, 1954, 1955, 1967, 1972, 1977, 1980, 1993, and 2013. Each map may not provide coverage for the entire Corridor. Information obtained for low, medium, and high potential for contamination parcels from review of the topographic maps are included in the parcel summaries in Appendix E. Copies of historical topographic maps are included in Appendix K.

### C.4.e. Hennepin County Information

The Hennepin County Property Information website provides information on Hennepin County properties including but not limited to taxes due (tax statement), current and prior year taxes, assessment values, tax parcel description, and sales information. Property Identification Numbers (PINs) and other property information obtained for low, medium, and high potential for contamination parcels from review of the topographic maps are included in the parcel summaries in Appendix E. A list of the PINs for low, medium, and high potential for contamination parcels is included in Appendix L.

## D. Interviews

Braun Intertec made inquiry to the following local government officials to obtain knowledge or records of historical and current land-use information regarding the Corridor and surrounding area:

- Gilbert Gabanski, Hennepin County Public Works, Environment and Energy Department, Land and Water, Contaminated Lands Unit
- Jim DeLuca, MnDOT Office of Environmental Stewardship
- John Crelly, Fire Chief, City of Golden Valley
- Mark Fairchild, Fire Chief, City of Robbinsdale
- Shelby Wolf, Deputy Fire Marshal, City of Crystal
- Kenneth Prillaman, Fire Chief, City of Brooklyn Park

No additional environmental concerns within the Corridor were identified during the interviews that were not already addressed in the GeoSearch report and included in this report for Sections B, C, and D.

## E. Corridor Reconnaissance

Braun Intertec environmental professional Kelly Brown conducted reconnaissance of the Corridor on May 8, 21 and 27, June 22 and 24, and July 9, 2015. General observations were made along the length of the Corridor from public areas such as roads, sidewalks, retail/commercial buildings, and other publicly accessible areas. Observations of the facilities included, but were not limited to:

- Occupant/property use
- Type of structure
- Evidence of water wells and/or septic systems
- Evidence of storage tanks
- Evidence of use and/or storage of hazardous substances and/or petroleum products
- Evidence of spills or releases of hazardous substances and/or petroleum products
- Evidence of dumping, landfilling, or non-native fill

Specific observations of the parcels with a low, medium, and high potential for contamination parcels within the Corridor are included in Appendix E.

## F. Current and Historical Corridor Land-Use

At the time of this assessment, the Corridor passed through primarily residential and commercial areas of Minneapolis, Golden Valley, Robbinsdale, Crystal, and Brooklyn Park.

Specifically, the M (Minneapolis) Segment has been developed since the 1880s, with residential and park areas on the west end, and commercial development on the east end. In the GV, R, C, and BP2 Segments, the Corridor follows an existing BNSF railroad track, which has been present since the 1880s. The remainder of the GV (Golden Valley) Segment has been residential and park areas since the 1930s, with additional development in the 1960s and 1970s. The R (Robbinsdale) Segment was mixed residential and farmland until the 1960s when the commercial district in the central portion of the segment and additional residences replaced the farmland. The C (Crystal) Segment includes the Crystal Airport in the central portion of the segment, with commercial and residential in the remainder of the segment. This area was developed in the 1950s and 1960s. The Corridor follows the railroad until the

central portion of the BP2 Segment, when the Corridor trends to the east. The BP2 and BP1 (Brooklyn Park) Segments were cultivated farmland until the 1950s and 1960s when the areas were converted to commercial with some residential areas. The northern end of the Corridor, in the BP1 Segment, has some formerly cultivated areas, which are currently undeveloped.

## G. MnDOT Contamination Potential Ranking

As indicated, identified parcels within the Corridor were ranked/classified as having a low, medium, or high potential for contamination to the Corridor using criteria established by MnDOT, as amended and discussed in Section A.4. The remaining parcels, which were evaluated but did not meet the ranking criteria, are summarized in Appendix F, but are not otherwise included within this report. The rankings, defined by MnDOT, and amended for this project, and the number of parcels identified within each criterion is discussed in the following sections. A complete listing of these parcels is provided in Appendix A.

*Low Potential for Contamination Parcels* include parcels that are hazardous waste generators (HWGS), light industrial facilities, and possibly some parcels where site reconnaissance showed poor housekeeping or soil disturbance, etc.

*Medium Potential for Contamination Parcels* include parcels with closed leaking underground or aboveground storage tanks (LUASTs), all parcels with underground or aboveground storage tanks (UASTs), all parcels with historic or current vehicle and/or auto body repair activities and petroleum use or storage, and unintentional hazardous materials release sites.

*High Potential for Contamination Parcels* include all active and inactive Voluntary Investigation and Cleanup Program (VIC), all active Petroleum Brownfields Program (PBP) sites, Minnesota Environmental Response and Liability Act (MERLA) sites, all heavy industry sites, all active and inactive dumpsites, all Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) sites, and all active LUAST sites.

Based on Braun Intertec's assessment, 271 parcels were identified within the Corridor as having a low, medium, or high potential for contamination. More specifically, 47 parcels were identified within the M Segment, 9 parcels were identified within the GV Segment, 67 parcels were identified in the R Segment, 63 parcels were identified in the C Segment, 54 parcels were identified in the BP2 Segment, and 31 parcels were identified in the BP1 Segment. The following table provides a summary of the ranked sites by segment:

**Table 1. Parcels with Low, Medium, or High Potential for contamination by segment**

| Segment | # of Parcels with Low potential | # Parcels with Medium potential | # Parcels with High potential | Totals |
|---|---|---|---|---|
| M | 9 | 28 | 10 | **47** |
| GV | 3 | 6 | 0 | **9** |
| R | 37 | 23 | 7 | **67** |
| C | 20 | 41 | 2 | **63** |
| BP 2 | 24 | 26 | 4 | **54** |
| BP-1 | 19 | 11 | 1 | **31** |
| **TOTAL** | **112** | **135** | **24** | **271** |

## G.1. Parcels with Low Potential for Contamination

Braun Intertec identified 112 parcels with *Low Potential for Contamination* within the Corridor, as shown on Table 1 above. Specifically, 9 parcels were identified within the M segment, 3 parcels were identified in the GV segment, 37 parcels were identified in the R segment, 20 parcels were identified in the C segment, 24 parcels were identified in the BP2 Segment, and 19 parcels were identified in the BP1 Segment. The specific parcels identified are included in the Parcel Summary Table in Appendix A and on the Parcel Summary Table – Low Potential for Contamination Sites in Appendix B.

## G.2. Parcels with Medium Potential for Contamination

Braun Intertec identified 135 parcels with *Medium Potential for Contamination* within the Corridor, as shown on Table 1 above. Specifically, 28 parcels were identified within the M segment, 6 parcels were identified in the GV segment, 23 parcels were identified within the R segment, 41 parcels were identified within the C segment, 26 parcels were identified within the BP2 Segment, and 11 parcels were identified within the BP1 Segment. The specific parcels identified are included in the Parcel Summary Table in Appendix A and on the Parcel Summary Table – Medium Potential for Contamination Sites in Appendix C.

## G.3. Parcels with High Potential for Contamination

Braun Intertec identified 24 parcels with *High Potential for Contamination* within the Corridor, as shown on Table 1 above. Specifically, 10 parcels were identified within the M segment, seven parcels were identified within the R segment, two parcels were identified within the C segment, four parcels were identified within the BP2 Segment, and one parcel was identified within the BP1 Segment. The specific parcels identified are included in the Parcel Summary Table in Appendix A and on the Parcel Summary Table – High Potential for Contamination Sites in Appendix D.

# H. Limitations and Data Gaps

This assessment was conducted in conformance with the USEPA All Appropriate Inquiry and ASTM 1527-13, as modified by MnDOT. The conclusions presented in this report are based on inquiries with public officials, available literature cited in this report, conditions noted at the time of the reconnaissance, and Braun Intertec's interpretation of the information obtained as part of this Modified Phase I ESA. Braun Intertec's conclusions are limited to the specific project and properties described in this report and by the accuracy and completeness of information provided by others.

An environmental site assessment cannot wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property. Performance of this practice is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions in connection with a property within reasonable limits of time and cost.

Braun Intertec's visual observations of portions of the Corridor were limited to public road right-of-ways, sidewalks, commercial/retail properties, and other areas that are accessible to the public. None of the buildings on the Corridor were inspected by Braun Intertec, as it was not within the scope of this Modified Phase I ESA. Contaminant sources and/or hazardous materials and substances may exist within the buildings in the Corridor or on areas of the parcels that were not visible from public areas.

Braun Intertec's review of historical sources was limited to those which were reasonably ascertainable and which were likely to be useful, accurate, or complete in terms of identifying obvious past uses and activities in the Corridor. In addition, Braun Intertec reviewed only as many historical sources that were needed to meet this objective.

No data gaps were identified during the Modified Phase I ESA process, with the exception that Braun Intertec did not interview property owners located within the Corridor.

The identified data gaps did not affect the environmental professional's ability to render opinions regarding conditions indicative of a release or threatened release. Information requested during the Modified Phase I ESA and received after issuance of the report will be forwarded to all parties relying on this report. An addendum will be provided if the information received alters the findings of the report.

# I. Additional Considerations

Based on a review of historical information, many properties within the Corridor were farmsteads prior to the 1930s or have been residences since the 1880s. Fuel oil tanks or other hazardous materials may be present within these parcels. In those cases where the historical information confirmed the presence

of tanks or other contaminants, the parcel was assigned a parcel number and was ranked in accordance with the MnDOT definitions of having a low, medium, or high potential for contamination. For those parcels where the historical information did not confirm tanks or hazardous materials were present, the parcels were not assigned a parcel number and were not ranked. These additional parcels are summarized on the table in Appendix F.

## J. Recommendations

Drilling Investigation activities, including the collection and analysis of soil and groundwater samples, are recommended along the Corridor where a medium or high potential for contamination is both adjacent to or in close proximity to the Corridor or where significant amounts of fill materials will be excavated during future construction.

## K. References

References are listed in Appendix M.

## L. Statement and Qualifications

We have the specific qualifications based on education, training, and experience to assess a property of the nature, history and setting of the subject area. The Modified Phase I ESA was conducted in general conformance with the USEPA All Appropriate Inquiry and ASTM 1527-13, as modified by MnDOT for transportation projects.

BRAUN INTERTEC CORPORATION

Jennifer B. Wolff, PG, CPG
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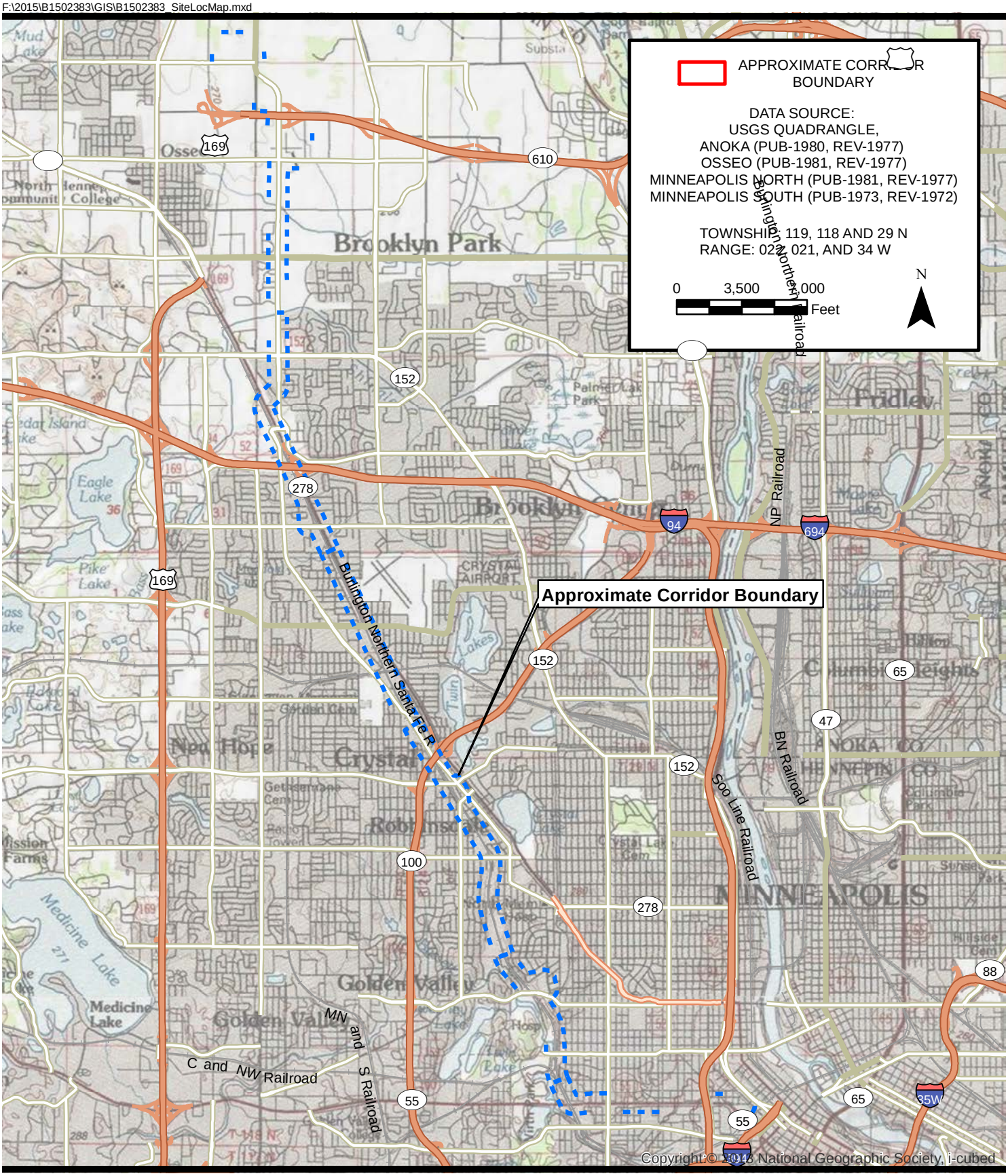
Principal – in-Charge

# Figures

F:\2015\B1502383\GIS\B1502383_SiteLocMap.mxd




Sheet: 1 of 1

Fig. 1

Project No: B1502383

Drawing No. B1502383_SiteLocMap

| | |
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| Scale: | 1 in = 7,000 ft |
| Drawn By: | CMF |
| Date Drawn: | 08/31/2015 |
| Checked By: | JW |
| Last Modified: | 8/31/15 |

# CORRIDOR LOCATION MAP

Phase I Environmental Site Assessment
Metro Blue Line Extension LRT Project
Hennepin County, Minnesota


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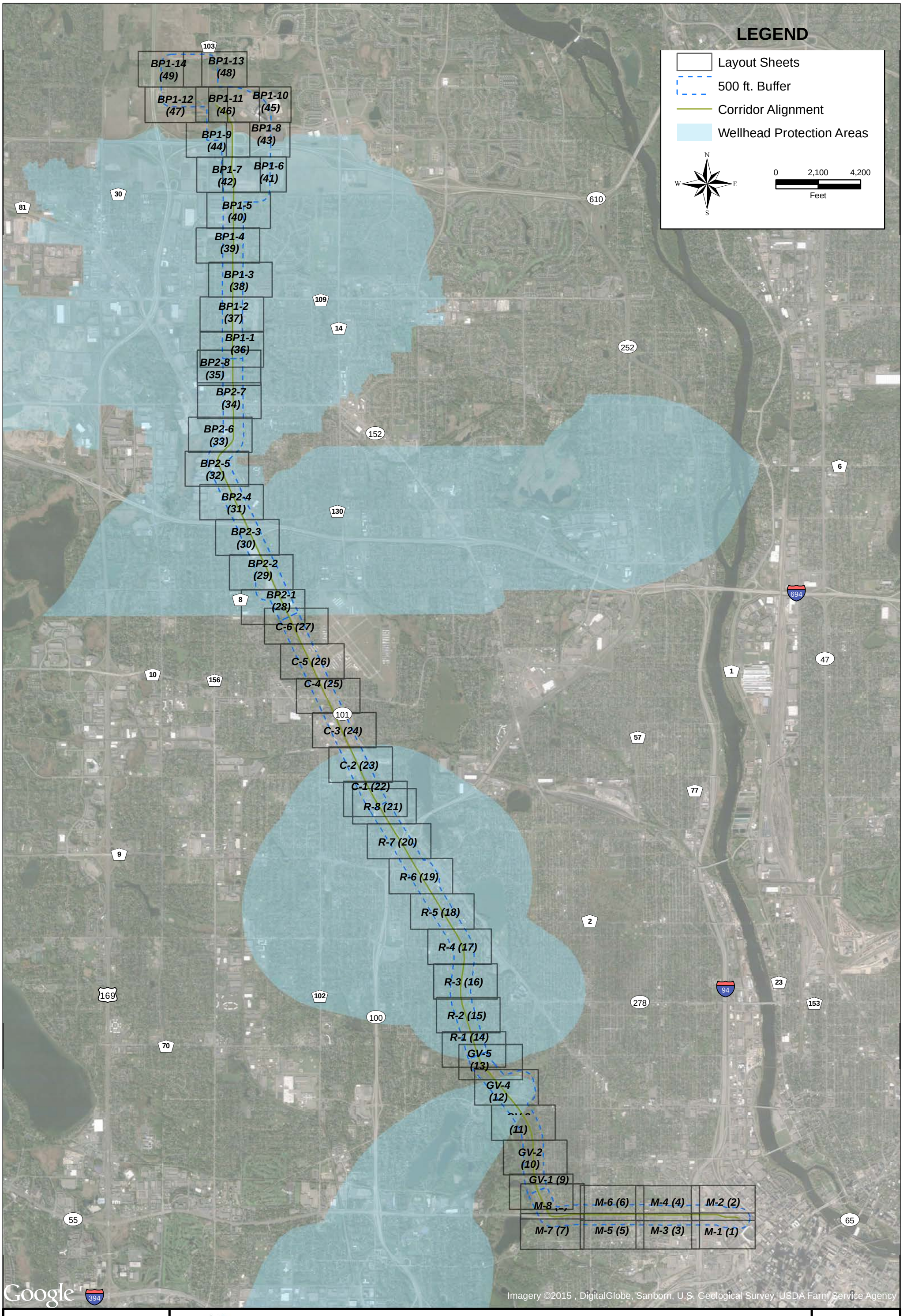


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| Project No. | B1502383 |
| Drawing No. | B1502383_SheetLayout.mxd |
| Scale: | 1 " = 4,200 ' |
| Drawn By: | CMF |
| Date Drawn: | 08/31/2015 |
| Checked By: | JW |
| Last Modified: | 08/31/15 |

# PROJECT CORRIDOR FEATURES

Sheet Overview - Phase I Environmental Site Assessment
Metro Blue Line Extension LRT Project
Hennepin County, Minnesota

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**Figure 2**

**The following detailed figures are not included in this version of the Modified Phase I ESA report due to volume.**

They are available for viewing at the Blue Line Extension Project Office at 5514 West Broadway Ave, Suite 200, Crystal, MN 55428. Or, can be requested by contacting Robin Caufman at (651) 602-1457**.**

Figures of “Project Corridor Features” for the following segments:
Minneapolis
Golden Valley
Robbinsdale
Crystal
Brooklyn Park 1
Brooklyn Park 2

# Appendix A

# Parcel Summary Table

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| M | 1 | 2-M, sheet 1 | Ford Center | High | ASTs, closed LUST, closed spill, inactive VIC, hazardous waste generator |
| M | 2 | 2-M, sheets 1 & 2 | Be The Match | High | AST, closed LUST, closed spill, active VIC, active PBF, hazardous waste generator |
| M | 3 | 2-M, sheet 1 | Hennepin County Energy Recovery Center and Caribou Coffee | High | Past filling stations and auto repair facilities, ASTs, USTs, closed LUST, closed spill, inactive VIC, inactive PBP, inactive CERCLIS, hazardous waste generator |
| M | 4 | 2-M, sheet 2 | Fulton Brewing | Low | Past and current commercial uses |
| M | 5 | 2-M, sheet 2 | Parcel Under Construction | High | ASTs, USTs, closed LUST, active VIC, active PBP, hazardous waste generator |
| M | 6 | 2-M, sheets 1 & 2 | Holiday Gasoline Station/Convenience Store | Medium | Past and current auto repair and filling station, USTs, closed LUST, closed spill, hazardous waste generator |
| M | 7 | 2-M, sheet 2 | Weather Rite | High | Past and commercial uses including machine shop, metal manufacturing, waste (garbage) management, and automotive repair and junkyard, USTs, closed LUST, inactive VIC, active SAS, hazardous waste generator |
| M | 8 | 2-M, sheet 2 | Junction Flats | High | Past auto repair and junkyard, ASTs, USTs, active VIC, inactive PBP, active SR, hazardous waste generator |
| M | 9 | 2-M, sheet 1 | Mary My Hope Children's Center | Medium | Past commercial uses including auto repair activities |
| M | 10 | 2-M, sheets 1 & 2 | Metro Transit Garage and Offices | Medium | Past and current auto repair activities, ASTs, USTs, closed LUST, closed spill, hazardous waste generator |
| M | 11 | 2-M, sheet 1 | City of Minneapolis Department of Public Works Royalston Maintenance Facility | Medium | Past coal yard, ASTs, USTs, closed LUST, hazardous waste generator |
| M | 12 | 2-M, sheet 1 | Sharing and Caring Hands | High | Past auto repair and filling stations, UST, closed LUST, inactive VIC, hazardous waste generator |
| M | 13 | 2-M, sheet 1 | Commercial Buildings | Medium | USTs, closed LUST, hazardous waste generator |
| M | 14 | 2-M, sheet 2 | Wells Fargo Bank | Medium | Storage tanks, hazardous waste generator |
| M | 15 | 2-M, sheet 1 | Commercial Building | Medium | ASTs, hazardous waste generator |
| M | 16 | 2-M, sheet 1 | G&K Services | Medium | ASTs, USTs, closed LUST, closed spill site, hazardous waste generator |
| M | 17 | 2-M, sheet 2 | Velocity Express | High | ASTs, USTs, closed LUST, closed spill site, active VIC, hazardous waste generator |
| M | 18 | 2-M, sheet 2 | Commercial Building | Low | Hazardous waste generator |
| M | 19 | 2-M, sheet 2 | Velocity Express | Low | Past and current commercial uses |
| M | 20 | 2-M, sheet 3 | Heritage Park | Medium | Former filling station |
| M | 21 | 2-M, sheet 4 | Heritage Park II | High | Past commercial uses, USTs, closed LUST, closed spill, inactive VIC, hazardous waste generator |
| M | 22 | 2-M, sheet 3 | Apartment Building | Medium | AST, USTs |
| M | 23 | 2-M, sheet 3 | Commercial Buildings | Medium | Past filling station, USTs, hazardous waste generator |
| M | 24 | 2-M, sheet 3 | Commercial Building | Medium | Past dry cleaner, automotive service training school, hazardous waste generator |
| M | 25 | 2-M, sheet 4 | Hennepin County Sumner Library | Medium | Closed LUST site |
| M | 26 | 2-M, sheet 3 | Undeveloped Parcel | Medium | Past filling station, closed spill site, hazardous waste generator |
| M | 27 | 2-M, sheet 4 | Harvest Preparatory School and A.M.W. Church | Medium | Past commercial uses including filling stations |

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| M | 28 | 2-M, sheet 4 | Donal Fraser Early Childhood Family Development Center | Low | Past commercial uses, hazardous waste generator |
| M | 29 | 2-M, sheet 3 | Olson Townhomes | Medium | Closed spill site |
| M | 30 | 2-M, sheet 3 | Park Plaza Apartments II | Medium | UST and closed LUST |
| M | 31 | 2-M, sheet 4 | Seed Academy/Harvest Prep School | Medium | Past and current commercial uses including auto repair, closed LUST |
| M | 32 | 2-M, sheet 3 | Park Plaza Apartments | Medium | Past commercial uses including a filling station, UST, closed LUST |
| M | 33 | 2-M, sheet 4 | Kingdom of Jehovah's Witnesses | Low | Past and current use as a church |
| M | 34 | 2-M, sheet 4 | Residential Duplex | Medium | Past filling station |
| M | 35 | 2-M, sheet 5 | Harrison Park | Medium | Past commercial uses including filling stations |
| M | 36 | 2-M, sheet 6 | Zion Baptist Church | Low | Past and current commercial use |
| M | 37 | 2-M, sheet 6 | La Crèche Early Childhood Center | Low | Past and current commercial uses including manufacturing |
| M | 38 | 2-M, sheet 5 | Bruns Residence | Medium | Closed spill site, closed LUST |
| M | 39 | 2-M, sheet 5 | Tompkins Residence | Medium | Closed spill site |
| M | 40 | 2-M, sheet 5 | Skoug Residence | Medium | Closed spill site |
| M | 41 | 2-M, sheet 6 | Baur Residence | Low | Hazardous waste generator |
| M | 42 | 2-M, sheet 6 | Hoang Residence | Medium | Closed spill site |
| M | 43 | 2-M, sheet 7 | Moen Property | Low | Hazardous waste generator |
| M | 44 | 2-M, sheets 7 & 8 | Former Railroad Area | Medium | Former commercial buildings and railroad tracks |
| M | 45 | 2-M, sheet 7 | Railroad Right of Way | Medium | Past and current railroad use |
| M | 46 | 2-M, sheets 7-8 | Theodore Wirth Park Golf Course | Medium | Past and current use as golf course, ASTs, USTs, closed LUST, closed MDA spill, hazardous waste generator |
| M | 47 | 2-M, sheet 8 | Undeveloped Parcels | High | Inactive VIC site |
| GV | 48 | 2-GV, sheets 1-5 | Railroad Right of Way | Medium | Past and current railroad use |
| GV | 49 | 2-GV, sheet 1 | Wilson Residence | Medium | Closed spill site |
| GV | 50 | 2-GV, Sheet 2 | Krawczyk Residence | Medium | Closed spill site |
| GV | 51 | 2-GV, sheet 2 | The Family Partnership | Low | Past and current commercial use for offices |
| GV | 52 | 2-GV, sheets 2 & 3 | Runion Residence | Low | Identified on ERNS |
| GV | 53 | 2-GV, sheet 4 | St. Margaret Mary Catholic Church | Medium | Past and current use as a church, USTs, and ground disturbance and fill of unknown origin |
| GV | 54 | 2-GV, sheet 4 | Golden Valley Fire Station | Low | Current use as a fire station |
| GV | 55 | 2-GV, sheets 4 and 5 | Mary Hills Nature Area | Medium | Possible past dumping or fill activities |
| GV | 56 | 2-GV, Sheet 5 | Single Family Residences | Medium | Closed spill site |
| R | 57 | 2-R, sheets 1-8 | Railroad Right of Way | Medium | Past and current railroad use |
| R | 58 | 2-R, sheets 1-4 | Walter Sochacki Community Park | High | Unpermitted dump site, active Sate Assessment site, closed spill site |
| R | 59 | 2-R, sheet 2 | South Halifax park | High | Inactive VIC site, inactive SRS site, restrictive covenant |
| R | 60 | 2-R, sheet 3 | Bratsch Residence | Medium | Closed spill site |
| R | 61 | 2-R, sheet 3 | Xcel Energy Indiana Substation | Medium | Current use as an electric substation |
| R | 62 | 2-R, sheet 3 | Markeson Residence | Low | Non-generator of hazardous waste |
| R | 63 | 2-R, sheet 4 | Lee Square | Low | Past use as a school |
| R | 64 | 2-R, sheet 4 | Gray Residence | Medium | Closed spill site |
| R | 65 | 2-R, sheet 4 | Lee Park | Low | Past use as a school |
| R | 66 | 2-R, sheets 4 & 5 | Windsor Court | Medium | USTs, closed LUST |
| R | 67 | 2-R, sheet 5 | Bridgeway Apartments | Low | Past commercial uses |
| R | 68 | 2-R, sheet 5 | Undeveloped Land | Medium | Past bus garage, USTs, hazardous waste generator |
| R | 69 | 2-R, sheet 5 | Beard Residence | Medium | Closed spill site |
| R | 70 | 2-R, sheet 5 | Kasprick Residence | Medium | Closed spill site |
| R | 71 | 2-R, sheets 5 & 6 | Park | Low | Past and current use as park with swimming pool |

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| R | 72 | 2-R, sheet 6 | Sacred Heart Catholic Church & School | Medium | USTs, hazardous waste generator |
| R | 73 | 2-R, sheet 6 | P&D Mechanical Contractor | Low | Past and current commercial uses |
| R | 74 | 2-R, sheet 6 | Parking Lot | Medium | Past commercial uses, closed LUST |
| R | 75 | 2-R, sheet 6 | Walgreens | High | Past commercial uses include filling station and auto repair facilities, ASTs, USTs, closed LUST, PBP site, inactive VIC site, hazardous waste generator |
| R | 76 | 2-R, sheet 6 | Broadway Court Apartments | High | Former gasoline station and dry cleaner, USTs, closed LUST, inactive VIC, inactive CERCLIS, inactive Superfund, hazardous waste generator |
| R | 77 | 2-R, sheet 6 | Robin Hotel | Low | Past and current commercial use |
| R | 78 | 2-R, sheet 6 | Robbinsdale Police and Fire Department and Water Filtration Plant #1 | Medium | Hazardous waste generator, closed spill site |
| R | 79 | 2-R, sheet 6 | Papa John's Pizza/Payday | Low | Past and current commercial uses (mainly retail) |
| R | 80 | 2-R, sheet 6 | Commercial Building | Low | Past and current commercial uses (mainly retail) |
| R | 81 | 2-R, sheet 6 | Lions Gym & Wellness Center | Low | Hazardous waste generator |
| R | 82 | 2-R, sheet 6 | Minnesota Dental Group | Low | Current commercial use, hazardous waste generator |
| R | 83 | 2-R, sheet 6 | Strait Stuff Screen Printing | Low | Hazardous waste generator |
| R | 84 | 2-R, sheet 6 | Pawn America | Medium | Past commercial uses including filling station, USTs |
| R | 85 | 2-R, sheet 6 | Chestnut Café | Medium | Past and current commercial uses including dry cleaning |
| R | 86 | 2-R, sheet 6 | Robbinsdale Marine | Medium | Past and current commercial use as boat sales and service, hazardous waste generator |
| R | 87 | 2-R, sheet 6 | Hirshfields/Ace Hardware | Low | Past and current commercial use (retail hardware), hazardous waste generator |
| R | 88 | 2-R, sheet 6 | Wuollet Bakery & Espresso | High | Past and current commercial uses, former dry cleaner, inactive VIC site |
| R | 89 | 2-R, sheet 6 | Home Options | Low | Past and current commercial uses |
| R | 90 | 2-R, sheet 6 | Hubbard Market Place | High | Past auto repair activities, USTs, inactive VIC |
| R | 91 | 2-R, sheet 6 | Parking Lot | Low | Past commercial uses (retail and restaurants) |
| R | 92 | 2-R, sheet 6 | Outdoor Patio | Low | Past commercial uses |
| R | 93 | 2-R, sheet 6 | Commercial Building | Low | Hazardous waste generator |
| R | 94 | 2-R, sheet 6 | Canton Garden Restaurant | Low | Past and current commercial uses |
| R | 95 | 2-R, sheet 6 | McDonalds | Low | Past commercial uses including a car wash |
| R | 96 | 2-R, sheet 6 | Retail Commercial Building | Medium | Past and current commercial uses (mainly retail), closed LUST |
| R | 97 | 2-R, sheet 6 | Golden Age Design | Low | Hazardous waste generator |
| R | 98 | 2-R, sheet 6 | Parking Lot | Low | Past commercial uses |
| R | 99 | 2-R, sheet 6 | Hackenmueller's Meat Market | Low | Past and current commercial uses |
| R | 100 | 2-R, sheet 6 | Commercial Building | Low | Past and current commercial uses |
| R | 101 | 2-R, sheet 6 | Northside Oriental | Medium | Past auto repair activities, closed spill site |
| R | 102 | 2-R, sheet 6 | Nonna Rosa's | Medium | Past commercial use include dry cleaner, USTs |
| R | 103 | 2-R, sheet 6 | Commercial Building | Low | Past and current commercial uses |
| R | 104 | 2-R, sheet 6 | EMI Audio | Low | Past and current commercial uses |
| R | 105 | 2-R, sheet 6 | Commercial Building | Medium | Past and current commercial uses, UST |
| R | 106 | 2-R, sheet 6 | Tailor Shop | Medium | Past cleaners |
| R | 107 | 2-R, sheet 6 | The Steinhauser Group | High | Past dry cleaner, inactive VIC site |
| R | 108 | 2-R, sheet 6 | Robbinsdale Gallery of Art/Historical Museum/Library | Low | Past and current commercial uses |

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| R | 109 | 2-R, sheet 6 | Pilgrim Cleaners | Medium | Past commercial uses including gasoline station, current dry cleaner, USTs, closed LUST, hazardous waste generator |
| R | 110 | 2-R, sheet 6 | Sipe's Shell | Medium | Past and current use as a gasoline station, UST, closed LUST, spill site, hazardous waste generator |
| R | 111 | 2-R, sheet 6 | BP Gas Station | Medium | Past and current use as a gasoline station, USTs, closed LUST, spill site, hazardous waste generator |
| R | 112 | 2-R, sheet 6 | Commercial Building | Low | Past and current commercial uses |
| R | 113 | 2-R, sheet 6 | Commercial Building | Low | Past and current commercial uses |
| R | 114 | 2-R, sheet 6 | Metro Building Companies | Low | Past and current commercial uses |
| R | 115 | 2-R, sheet 6 | Sawhorse Designers & Builders | Low | Past and current commercial uses |
| R | 116 | 2-R, sheet 6 | Chirocenter Robbinsdale Chiropractic | Low | Hazardous waste generator |
| R | 117 | 2-R, sheet 6 | A Gentle Dental Center | Low | Hazardous waste generator |
| R | 118 | 2-R, sheet 6 | Redeemer Evangelical Lutheran Church | Low | Past and current use as a church |
| R | 119 | 2-R, sheet 6 | TCF Bank | Low | Past and current commercial use |
| R | 120 | 2-R, sheet 6 | Washburn & McReavy Robbinsdale Chapel | Low | Past and current use as a funeral center |
| R | 121 | 2-R, sheet 6 | Robbinsdale Masonic Center | Low | Past and current commercial use |
| R | 122 | 2-R, sheet 8 | Osterhus Bibles, Books & Gifts | Low | Hazardous waste generator |
| R | 123 | 2-R, sheet 8 | City of Robbinsdale Municipal Shop | Medium | AST, UST, closed LUST, hazardous waste generator |
| C | 124 | 2-C, sheets 1-6 | Railroad Right of Way | Medium | Past and current railroad use |
| C | 125 | 2-C, sheet 1 | Century Link | Medium | ASTs, USTs, closed LUST, hazardous waste generator. |
| C | 126 | 2-C, sheet 1 | Blind Installation & Repair | Medium | USTs, closed LUST |
| C | 127 | 2-C, sheet 1 | Commercial Building | Low | Hazardous waste generator |
| C | 128 | 2-C, sheet 1 | Steve O's Bar & Grill | Low | Past and current commercial use |
| C | 129 | 2-C, sheet 1 | Full Proof Ministry and Thomas Tool & Supply | Medium | Closed spill site |
| C | 130 | 2-C, sheets 1 & 2 | Crystal Wine & Spirits | Low | Past and current commercial use |
| C | 131 | 2-C, sheets 1 & 2 | O'Reilly Auto Parts | Low | Hazardous waste generator |
| C | 132 | 2-C, sheet 2 | Crystal Public Works Facility | Low | Hazardous waste generator |
| C | 133 | 2-C, sheet 2 | Doyle's Bowling & Lounge | Low | Hazardous waste generator |
| C | 134 | 2-C, sheet 2 | Fun Services | Medium | Past commercial uses including a machine shop, hazardous waste generator |
| C | 135 | 2-C, sheet 2 | Washburn-McReavy Funeral Chapel | Low | Hazardous waste generator |
| C | 136 | 2-C, sheet 2 | Stormwater pond | Medium | Former auto repair activities, closed spill site |
| C | 137 | 2-C, sheet 2 | Tim's Tree Service | Low | Past and current commercial use |
| C | 138 | 2-C, sheet 2 | Crystal Collision Center and Car Wash | Medium | Auto repair activities, hazardous waste generator |
| C | 139 | 2-C, sheet 2 | Kilmer Electric | Medium | Auto repair activities, AST, UST, hazardous waste generator |
| C | 140 | 2-C, sheet 2 | Auto Plus Auto Parts | Medium | Automotive machine shop and other possible auto repair activities, hazardous waste generator |
| C | 141 | 2-C, sheet 2 | Midwest Motor Craft | Medium | Auto repair activities, hazardous waste generator |
| C | 142 | 2-C, sheet 2 | North Suburban Towing and Thomas Auto Body & Collision | Medium | Auto repair activities, ASTs, hazardous waste generator |

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| C | 143 | 2-C, sheet 3 | Bill's Economy Glass | Medium | Past and current commercial uses including machine shop and manufacturing, hazardous waste generator |
| C | 144 | 2-C, sheet 3 | Multi-Tenant Commercial Building | Medium | Auto repair activities, hazardous waste generator |
| C | 145 | 2-C, sheets 2 & 3 | Vacant Parcel | Low | Historical ground disturbance areas |
| C | 146 | 2-C, sheets 2 & 3 | The Phone Guys/S&S Communications | Low | Past and current commercial uses |
| C | 147 | 2-C, sheets 2 & 3 | Golden Valley Heating & Air | Medium | Past and current commercial uses including manufacturing |
| C | 148 | 2-C, sheet 3 | BGD Companies | Medium | Past use as foundry, hazardous waste generator |
| C | 149 | 2-C, sheet 3 | Vacant Parcel | Medium | Past foundry and auto repair activities, closed spill site, hazardous waste generator |
| C | 150 | 2-C, sheet 3 | All American Storage | Medium | Past and current commercial uses including machine shops and manufacturing, hazardous waste generator |
| C | 151 | 2-C, sheet 3 | Collision Masters | Medium | Auto repair activities, past use as a tool manufacturer, hazardous waste generator |
| C | 152 | 2-C, sheet 3 | Standard Water Control Systems | Medium | Metal fabrication operations, hazardous waste generator |
| C | 153 | 2-C, sheet 3 | Skip's Auto Repair | Medium | Auto repair activities, AST, hazardous waste generator |
| C | 154 | 2-C, sheet 3 | CBF by Pierre | Low | Air permit site |
| C | 155 | 2-C, sheet 3 | Miller Diversified Machining | Medium | Auto repair activities, closed spill site, hazardous waste generator |
| C | 156 | 2-C, sheet 3 | Creative Partnership/Rise | Medium | UST, close LUST, close spill site |
| C | 157 | 2-C, sheet 3 | Curbside Waste | Medium | ASTs, USTs, waste services, hazardous waste generator. |
| C | 158 | 2-C, sheet 3 | Industrial Stainless Supply Inc. | Medium | Machine shop and manufacturing, potential dump or fill site, hazardous waste generator |
| C | 159 | 2-C, sheet 3 | Beaver Machine | Medium | Potential dump or fill site, machine shop use, hazardous waste generator |
| C | 160 | 2-C, sheet 3 | Holiday | Medium | Gasoline station, USTs, closed LUST |
| C | 161 | 2-C, sheet 3 | Car Hop | Medium | Former gasoline station |
| C | 162 | 2-C, sheet 3 | Commercial Building | High | USTs, closed spill site, active PBP site, hazardous waste generator, machine shops |
| C | 163 | 2-C, sheets 3 & 4 | Crystal Business Commons | Medium | Automotive, AST, hazardous waste generator |
| C | 164 | 2-C, sheet 3 | Max It Pawn Shop | Low | Past and current commercial uses |
| C | 165 | 2-C, sheet 3 | Steen Engineering and Douglas Storage | Medium | Past commercial uses including repair activities and past outdoor storage of unknown materials |
| C | 166 | 2-C, sheet 3 | U-Haul Center | Medium | USTs, hazardous waste generator |
| C | 167 | 2-C, sheets 3 & 4 | Cedarwood Apartments | Medium | Past commercial uses including repair facility |
| C | 168 | 2-C, sheets 3 & 4 | The Schrader Building | Medium | Past and current commercial uses including auto sales and outdoor storage |
| C | 169 | 2-C, sheet 4 | Undeveloped Land | Medium | former gasoline station, UST, closed LUST |
| C | 170 | 2-C, sheet 4 | Becker Park and Crystal Arts and Activity Center | Medium | Former gasoline station |
| C | 171 | 2-C, sheet 4 | Undeveloped Land | Medium | AST, hazardous waste generator |
| C | 172 | 2-C, sheet 4 | Cell Tower and Undeveloped Land | High | Former gasoline station and auto repair, inactive VIC site, inactive PBP site, hazardous waste generator |
| C | 173 | 2-C, sheet 4 | Bass Lake Center | Medium | Closed spill site, hazardous waste generator |
| C | 174 | 2-C, sheet 4 | Undeveloped Land | Medium | Gasoline station, USTs, closed LUST, hazardous waste generator |
| C | 175 | 2-C, sheet 4 | Multi-Tenant Commercial Buildings | Low | Past and current commercial (mainly retail) uses |
| C | 176 | 2-C, sheet 4 | Parking Lot | Medium | Former gasoline station |
| C | 177 | 2-C, sheet 4 | Retail Stores | Low | Past and current commercial uses |

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| C | 178 | 2-C, sheet 4 | Cities Auto | Low | Current commercial uses |
| C | 179 | 2-C, sheet 4 | Crystal Medical Center | Medium | AST, hazardous waste generator |
| C | 180 | 2-C, sheets 4 & 5 | Undeveloped Land | Low | Past commercial uses |
| C | 181 | 2-C, sheets 5 & 6 | Crystal Airport | Medium | ASTs, USTs, closed LUST, closed spill site, hazardous waste generator |
| C | 182 | 2-C, sheet 5 | Moy Residence | Low | Hazardous waste generator |
| C | 183 | 2-C, sheets 5 & 6 | North Star Inn & Suites | Low | Past and current commercial uses |
| C | 184 | 2-C, sheet 6 | Rostamo's Bar | Low | Past and current commercial (restaurant and bar) uses |
| C | 185 | 2-C, sheet 6 | Jack's Auto Sales | Medium | Auto repair activities, hazardous waste generator |
| C | 186 | 2-C, sheet 6 | Premier Motors | Low | Past and current commercial uses |
| BP2 | 187 | 2-BP2, sheets 1-6 | Railroad Right of Way | Medium | Past and current railroad use |
| BP2 | 188 | 2-BP2, sheet 1 | Minneapolis LU539 Pipefitters | Low | Hazardous waste generator |
| BP2 | 189 | 2-BP2, sheet 1 | The Waterford | Medium | USTs, closed LUSTs |
| BP2 | 190 | 2-BP2, sheet 1 | Former Latzke Iron Works | High | Inactive VIC site |
| BP2 | 191 | 2-BP2, sheet 1 | Multi-Tenant Commercial Building | Medium | Closed spill site, hazardous waste generator |
| BP2 | 192 | 2-BP2, sheet 1 | Waterford Senior Townhomes | High | ASTs, USTs, inactive VIC |
| BP2 | 193 | 2-BP2, sheet 1 | Stormwater Pond and Undeveloped Land | Medium | USTs, hazardous waste generator |
| BP2 | 194 | 2-BP2, sheet 2 | The Groves Apartments | Medium | Closed spill site |
| BP2 | 195 | 2-BP2, sheet 2 | Stormwater Pond | High | USTs, closed LUST, closed spill site, active PBP, active VIC, hazardous waste generator, exterminating company |
| BP2 | 196 | 2-BP2, sheet 2 | Metro Transit Bottineau & 63rd Park & Ride | High | ASTs, USTs, closed LUST, closed PBP, inactive VIC, hazardous waste generator |
| BP2 | 197 | 2-BP2, sheet 2 | TN Transportation and Automotive | Medium | Auto repair facilities, ASTs, USTs, closed LUST, hazardous waste generator |
| BP2 | 198 | 2-BP2, sheet 2 | Nguyen Residence | Medium | Closed AgSpill |
| BP2 | 199 | 2-BP2, sheets 2 & 3 | O'Reilly Auto Parts | Medium | ASTs, USTs, closed LUST, closed spill site, hazardous waste generator |
| BP2 | 200 | 2-BP2, sheet 3 | OMCM Marketing Solutions | Low | Current commercial use |
| BP2 | 201 | 2-BP2, sheet 4 | Broadway Rentals | Medium | USTs, ASTs, closed LUST, hazardous waste generator |
| BP2 | 202 | 2-BP2, sheet 4 | Carmax | Medium | USTs, ASTs, closed LUST, hazardous waste generator |
| BP2 | 203 | 2-BP2, sheet 4 | Lights on Broadway | Low | Past and current commercial uses |
| BP2 | 204 | 2-BP2, sheet 4 | Wagner's Drive In | Low | Past and current commercial uses |
| BP2 | 205 | | Interstate North Business Center | Medium | USTs, closed LUST, hazardous waste generator |
| BP2 | 206 | 2-BP2, sheet 4 | All American Recreation | Low | Past and current commercial uses |
| BP2 | 207 | 2-BP2, sheet 4 | U-Haul | Medium | Former gasoline station, USTs, closed LUST, hazardous waste generator |
| BP2 | 208 | 2-BP2, sheet 4 | Wendy's | Medium | Former gasoline station, USTs, closed LUST, hazardous waste generator |
| BP2 | 209 | 2-BP2, sheets 4 & 5 | Americold Distribution | Medium | Closed spill site, hazardous waste generator |
| BP2 | 210 | 2-BP2, sheet 5 | Mister Carwash | Medium | Former gasoline station, USTs, closed LUST, hazardous waste generator |
| BP2 | 211 | 2-BP2, sheet 5 | Consignment Central | Medium | Former motorcycle sales and service, closed spill site |
| BP2 | 212 | 2-BP2, sheet 5 | North American Gear & Forge | Medium | Past and current commercial uses including machine shop, hazardous waste generator |
| BP2 | 213 | 2-BP2, sheet 5 | Prince of Peace Lutheran Church | Low | Past residential and commercial uses |

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| BP2 | 214 | 2-BP2, sheet 5 | Penske | Medium | UST, AST, closed spill site, hazardous waste generator |
| BP2 | 215 | 2-BP2, sheet 5 | Mayer Electric | Low | Past and current commercial uses |
| BP2 | 216 | 2-BP2, sheet 5 | Lots Survey Company | Low | Past and current commercial uses |
| BP2 | 217 | 2-BP2, sheet 5 | Distinguished Landscape | Low | Past and current commercial uses |
| BP2 | 218 | 2-BP2, sheet 5 | Brooklyn Park West Fire Station | Low | Current commercial uses |
| BP2 | 219 | 2-BP2, sheet 5 | American Furniture Market | Medium | Inactive PBP site |
| BP2 | 220 | 2-BP2, sheet 5 | Modern Dental Studio | Medium | Former filling/service station |
| BP2 | 221 | 2-BP2, sheets 5 & 6 | Public Storage | Low | Current commercial uses |
| BP2 | 222 | 2-BP2, sheet 6 | Sisaket Plaza | Low | Past and current commercial uses |
| BP2 | 223 | 2-BP2, sheet 6 | Broadway Party & Tent Rental | Low | Past and current commercial uses |
| BP2 | 224 | 2-BP2, sheet 6 | Magic Carpets Flooring Center | Low | Past and current commercial uses |
| BP2 | 225 | 2-BP2, sheet 6 | Target | Low | Current commercial use, hazardous waste generator |
| BP2 | 226 | 2-BP2, sheet 6 | Funk Animal Hospital | Low | Hazardous waste generator |
| BP2 | 227 | 2-BP2, sheets 6 & 7 | Cub Foods | Low | Past and current commercial uses, hazardous waste generator |
| BP2 | 228 | 2-BP2, sheet 6 | US Bank | Low | Current commercial uses |
| BP2 | 229 | 2-BP2, sheets 6 & 7 | McDonalds | Low | Current commercial uses |
| BP2 | 230 | 2-BP2, sheet 7 | Buerkle Acura | Medium | ASTs, USTs, hazardous waste generator. |
| BP2 | 231 | 2-BP2, sheet 7 | Popeye's | Medium | Closed spill site |
| BP2 | 232 | 2-BP2, sheet 7 | Wells Fargo Bank | Low | Past and current commercial uses, hazardous waste generator |
| BP2 | 233 | 2-BP2, sheet 7 | Northwind Plaza | Medium | Former dry cleaner |
| BP2 | 234 | 2-BP2, sheet 7 | Baker's Square | Low | Current commercial uses |
| BP2 | 235 | 2-BP2, sheet 7 | Arby's | Low | Current commercial uses |
| BP2 | 236 | 2-BP2, sheet 7 | CVS Pharmacy 4597 | Low | Hazardous waste generator |
| BP2 | 237 | 2-BP2, sheet 7 | Park Square | Medium | UST, hazardous waste generator, past use as a possible dry cleaners |
| BP2 | 238 | 2-BP2, sheet 8 | Brooklyn Park Evangelical Free Church | Low | Past residential and agricultural use, current church use |
| BP2 | 239 | 2-BP2, sheet 8 | Residential Dwelling | Medium | Closed spill site |
| BP2 | 240 | 2-BP2, sheet 8 | Prusinowski Residence | Medium | Closed spill site |
| BP1 | 241 | 2-BP1, sheets 1 & 2 | North Hennepin Community College | Medium | ASTs, USTs, closed LUST, hazardous waste generator |
| BP1 | 242 | 2-BP1, sheet 2 | Ronning Residence | Medium | Closed spill site |
| BP1 | 243 | 2-BP1, sheet 2 | Broadway Square | Medium | Former gasoline station and drycleaner, USTs, closed LUST, closed spill, hazardous waste generator |
| BP1 | 244 | 2-BP1, sheet 3 | Hennepin County Library | Low | Soil disturbance |
| BP1 | 245 | 2-BP1, sheet 4 | Berean Baptist Church | Low | Church and residential uses |
| BP1 | 246 | 2-BP1, sheets 4 & 5 | Commercial Building | Low | Hazardous waste generator, on-site generator |
| BP1 | 247 | 2-BP1, sheet 5 | Commercial Building | Low | Hazardous waste generator |
| BP1 | 248 | 2-BP1, sheet 5 | Crosstown North Business Center | Low | Current commercial uses |
| BP1 | 249 | 2-BP1, sheet 5 | Commercial Building | Low | Past and current unknown uses of parcel |
| BP1 | 250 | 2-BP1, sheet 5 | Crosstown North Business Center | Low | Hazardous waste generator |
| BP1 | 251 | 2-BP1, sheet 7 | Liberty Carton and Star Exhibits | Low | Hazardous waste generator |
| BP1 | 252 | 2-BP1, sheet 6 | Commercial Building | Low | Current commercial uses |
| BP1 | 253 | 2-BP1, sheet 6 | Biotest Laboratories | Low | Hazardous waste generator |
| BP1 | 254 | 2-BP1, sheet 6 | Undeveloped Land | Low | Past construction staging area |
| BP1 | 255 | 2-BP1, sheet 6 | Northwest EMC | Medium | Closed spill site |
| BP1 | 256 | 2-BP1, sheet 6 | Holiday | Medium | gasoline station, USTs, closed spill site |

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| BP1 | 257 | 2-BP1, sheets 6 & 8 | Baxter Healthcare | Medium | ASTs, closed spill site, hazardous waste generator |
| BP1 | 258 | 2-BP1, sheet 6 | Undeveloped Land | High | USTs, closed LUST, PBP site, VIC site, hazardous waste generator |
| BP1 | 259 | 2-BP1, sheets 7 & 9 | Olympus Surgical Technologies America | Low | Hazardous waste generator |
| BP1 | 260 | 2-BP1, sheets 9, 11 & 12 | Target Corporation | Medium | USTs, closed LUST, PBP site, hazardous waste generator |
| BP1 | 261 | 2-BP1, sheets 8, 9 & 11 | Undeveloped Land | Low | Former farmstead |
| BP1 | 262 | 2-BP1, sheets 8 & 11 | Undeveloped Land | Low | Past farmstead and commercial uses |
| BP1 | 263 | 2-BP1, sheets 8 & 11 | Undeveloped Land | Medium | Former farmstead and greenhouse/nursery |
| BP1 | 264 | 2-BP1, sheet 11 | Undeveloped Land | Medium | Former multi-building residence |
| BP1 | 265 | 2-BP1, sheet 10 | Undeveloped Land | Low | Former residence |
| BP1 | 266 | 2-BP1, sheet 10 | Undeveloped Land | Low | Former residence |
| BP1 | 267 | 2-BP1, sheet 10 | Undeveloped Land | Low | Former residence |
| BP1 | 268 | 2-BP1, sheet 14 | Three Rivers Park District Rush Creek Regional Trail | Low | Former farmstead |
| BP1 | 269 | 2-BP1, sheet 10 | Grace Fellowship Church | Medium | AST |
| BP1 | 270 | 2-BP1, sheet 14 | Undeveloped Land | Low | Former farmstead |
| BP1 | 271 | 2-BP1, sheets 13 & 14 | Three Rivers Park District Rush Creek Regional Trail | Medium | Former farmstead |

# Appendix B

# Parcel Summary Table – Low Potential for Contamination Sites

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| M | 4 | 2-M, sheet 2 | Fulton Brewing | Low | Past and current commercial uses |
| M | 18 | 2-M, sheet 2 | Commercial Building | Low | Hazardous waste generator |
| M | 19 | 2-M, sheet 2 | Velocity Express | Low | Past and current commercial uses |
| M | 28 | 2-M, sheet 4 | Donal Fraser Early Childhood Family Development Center | Low | Past commercial uses, hazardous waste generator |
| M | 33 | 2-M, sheet 4 | Kingdom of Jehovah's Witnesses | Low | Past and current use as a church |
| M | 36 | 2-M, sheet 6 | Zion Baptist Church | Low | Past and current commercial use |
| M | 37 | 2-M, sheet 6 | La Crèche Early Childhood Center | Low | Past and current commercial uses including manufacturing |
| M | 41 | 2-M, sheet 6 | Baur Residence | Low | Hazardous waste generator |
| M | 43 | 2-M, sheet 7 | Moen Property | Low | Hazardous waste generator |
| GV | 51 | 2-GV, sheet 2 | The Family Partnership | Low | Past and current commercial use for offices |
| GV | 52 | 2-GV, sheets 2 & 3 | Runion Residence | Low | Identified on ERNS |
| GV | 54 | 2-GV, sheet 4 | Golden Valley Fire Station | Low | Current use as a fire station |
| R | 62 | 2-R, sheet 3 | Markeson Residence | Low | Non-generator of hazardous waste |
| R | 63 | 2-R, sheet 4 | Lee Square | Low | Past use as a school |
| R | 65 | 2-R, sheet 4 | Lee Park | Low | Past use as a school |
| R | 67 | 2-R, sheet 5 | Bridgeway Apartments | Low | Past commercial uses |
| R | 71 | 2-R, sheets 5 & 6 | Park | Low | Past and current use as park with swimming pool |
| R | 73 | 2-R, sheet 6 | P&D Mechanical Contractor | Low | Past and current commercial uses |
| R | 77 | 2-R, sheet 6 | Robin Hotel | Low | Past and current commercial use |
| R | 79 | 2-R, sheet 6 | Papa John's Pizza/Payday | Low | Past and current commercial uses (mainly retail) |
| R | 80 | 2-R, sheet 6 | Commercial Building | Low | Past and current commercial uses (mainly retail) |
| R | 81 | 2-R, sheet 6 | Lions Gym & Wellness Center | Low | Hazardous waste generator |
| R | 82 | 2-R, sheet 6 | Minnesota Dental Group | Low | Current commercial use, hazardous waste generator |
| R | 83 | 2-R, sheet 6 | Strait Stuff Screen Printing | Low | Hazardous waste generator |
| R | 87 | 2-R, sheet 6 | Hirshfields/Ace Hardware | Low | Past and current commercial use (retail hardware), hazardous waste generator |
| R | 89 | 2-R, sheet 6 | Home Options | Low | Past and current commercial uses |
| R | 91 | 2-R, sheet 6 | Parking Lot | Low | Past commercial uses (retail and restaurants) |
| R | 92 | 2-R, sheet 6 | Outdoor Patio | Low | Past commercial uses |
| R | 93 | 2-R, sheet 6 | Commercial Building | Low | Hazardous waste generator |
| R | 94 | 2-R, sheet 6 | Canton Garden Restaurant | Low | Past and current commercial uses |
| R | 95 | 2-R, sheet 6 | McDonalds | Low | Past commercial uses including a car wash |
| R | 97 | 2-R, sheet 6 | Golden Age Design | Low | Hazardous waste generator |
| R | 98 | 2-R, sheet 6 | Parking Lot | Low | Past commercial uses |
| R | 99 | 2-R, sheet 6 | Hackenmueller's Meat Market | Low | Past and current commercial uses |
| R | 100 | 2-R, sheet 6 | Commercial Building | Low | Past and current commercial uses |
| R | 103 | 2-R, sheet 6 | Commercial Building | Low | Past and current commercial uses |
| R | 104 | 2-R, sheet 6 | EMI Audio | Low | Past and current commercial uses |
| R | 108 | 2-R, sheet 6 | Robbinsdale Gallery of Art/Historical Museum/Library | Low | Past and current commercial uses |
| R | 112 | 2-R, sheet 6 | Commercial Building | Low | Past and current commercial uses |
| R | 113 | 2-R, sheet 6 | Commercial Building | Low | Past and current commercial uses |
| R | 114 | 2-R, sheet 6 | Metro Building Companies | Low | Past and current commercial uses |
| R | 115 | 2-R, sheet 6 | Sawhorse Designers & Builders | Low | Past and current commercial uses |
| R | 116 | 2-R, sheet 6 | Chirocenter Robbinsdale Chiropractic | Low | Hazardous waste generator |
| R | 117 | 2-R, sheet 6 | A Gentle Dental Center | Low | Hazardous waste generator |

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| R | 118 | 2-R, sheet 6 | Redeemer Evangelical Lutheran Church | Low | Past and current use as a church |
| R | 119 | 2-R, sheet 6 | TCF Bank | Low | Past and current commercial use |
| R | 120 | 2-R, sheet 6 | Washburn & McReavy Robbinsdale Chapel | Low | Past and current use as a funeral center |
| R | 121 | 2-R, sheet 6 | Robbinsdale Masonic Center | Low | Past and current commercial use |
| R | 122 | 2-R, sheet 8 | Osterhus Bibles, Books & Gifts | Low | Hazardous waste generator |
| C | 127 | 2-C, sheet 1 | Commercial Building | Low | Hazardous waste generator |
| C | 128 | 2-C, sheet 1 | Steve O's Bar & Grill | Low | Past and current commercial use |
| C | 130 | 2-C, sheets 1 & 2 | Crystal Wine & Spirits | Low | Past and current commercial use |
| C | 131 | 2-C, sheets 1 & 2 | O'Reilly Auto Parts | Low | Hazardous waste generator |
| C | 132 | 2-C, sheet 2 | Crystal Public Works Facility | Low | Hazardous waste generator |
| C | 133 | 2-C, sheet 2 | Doyle's Bowling & Lounge | Low | Hazardous waste generator |
| C | 135 | 2-C, sheet 2 | Washburn-McReavy Funeral Chapel | Low | Hazardous waste generator |
| C | 137 | 2-C, sheet 2 | Tim's Tree Service | Low | Past and current commercial use |
| C | 145 | 2-C, sheets 2 & 3 | Vacant Parcel | Low | Historical ground disturbance areas |
| C | 146 | 2-C, sheets 2 & 3 | The Phone Guys/S&S Communications | Low | Past and current commercial uses |
| C | 154 | 2-C, sheet 3 | CBF by Pierre | Low | Air permit site |
| C | 164 | 2-C, sheet 3 | Max It Pawn Shop | Low | Past and current commercial uses |
| C | 175 | 2-C, sheet 4 | Multi-Tenant Commercial Buildings | Low | Past and current commercial (mainly retail) uses |
| C | 177 | 2-C, sheet 4 | Retail Stores | Low | Past and current commercial uses |
| C | 178 | 2-C, sheet 4 | Cities Auto | Low | Current commercial uses |
| C | 180 | 2-C, sheets 4 & 5 | Undeveloped Land | Low | Past commercial uses |
| C | 182 | 2-C, sheet 5 | Moy Residence | Low | Hazardous waste generator |
| C | 183 | 2-C, sheets 5 & 6 | North Star Inn & Suites | Low | Past and current commercial uses |
| C | 184 | 2-C, sheet 6 | Rostamo's Bar | Low | Past and current commercial (restaurant and bar) uses |
| C | 186 | 2-C, sheet 6 | Premier Motors | Low | Past and current commercial uses |
| BP2 | 188 | 2-BP2, sheet 1 | Minneapolis LU539 Pipefitters | Low | Hazardous waste generator |
| BP2 | 200 | 2-BP2, sheet 3 | OMCM Marketing Solutions | Low | Current commercial use |
| BP2 | 203 | 2-BP2, sheet 4 | Lights on Broadway | Low | Past and current commercial uses |
| BP2 | 204 | 2-BP2, sheet 4 | Wagner's Drive In | Low | Past and current commercial uses |
| BP2 | 206 | 2-BP2, sheet 4 | All American Recreation | Low | Past and current commercial uses |
| BP2 | 213 | 2-BP2, sheet 5 | Prince of Peace Lutheran Church | Low | Past residential and commercial uses |
| BP2 | 215 | 2-BP2, sheet 5 | Mayer Electric | Low | Past and current commercial uses |
| BP2 | 216 | 2-BP2, sheet 5 | Lots Survey Company | Low | Past and current commercial uses |
| BP2 | 217 | 2-BP2, sheet 5 | Distinguished Landscape | Low | Past and current commercial uses |
| BP2 | 218 | 2-BP2, sheet 5 | Brooklyn Park West Fire Station | Low | Current commercial uses |
| BP2 | 221 | 2-BP2, sheets 5 & 6 | Public Storage | Low | Current commercial uses |
| BP2 | 222 | 2-BP2, sheet 6 | Sisaket Plaza | Low | Past and current commercial uses |
| BP2 | 223 | 2-BP2, sheet 6 | Broadway Party & Tent Rental | Low | Past and current commercial uses |
| BP2 | 224 | 2-BP2, sheet 6 | Magic Carpets Flooring Center | Low | Past and current commercial uses |
| BP2 | 225 | 2-BP2, sheet 6 | Target | Low | Current commercial use, hazardous waste generator |
| BP2 | 226 | 2-BP2, sheet 6 | Funk Animal Hospital | Low | Hazardous waste generator |
| BP2 | 227 | 2-BP2, sheets 6 & 7 | Cub Foods | Low | Past and current commercial uses, hazardous waste generator |
| BP2 | 228 | 2-BP2, sheet 6 | US Bank | Low | Current commercial uses |

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| BP2 | 229 | 2-BP2, sheets 6 & 7 | McDonalds | Low | Current commercial uses |
| BP2 | 232 | 2-BP2, sheet 7 | Wells Fargo Bank | Low | Past and current commercial uses, hazardous waste generator |
| BP2 | 234 | 2-BP2, sheet 7 | Baker's Square | Low | Current commercial uses |
| BP2 | 235 | 2-BP2, sheet 7 | Arby's | Low | Current commercial uses |
| BP2 | 236 | 2-BP2, sheet 7 | CVS Pharmacy 4597 | Low | Hazardous waste generator |
| BP2 | 238 | 2-BP2, sheet 8 | Brooklyn Park Evangelical Free Church | Low | Past residential and agricultural use, current church use |
| BP1 | 244 | 2-BP1, sheet 3 | Hennepin County Library | Low | Soil disturbance |
| BP1 | 245 | 2-BP1, sheet 4 | Berean Baptist Church | Low | Church and residential uses |
| BP1 | 246 | 2-BP1, sheets 4 & 5 | Commercial Building | Low | Hazardous waste generator, on-site generator |
| BP1 | 247 | 2-BP1, sheet 5 | Commercial Building | Low | Hazardous waste generator |
| BP1 | 248 | 2-BP1, sheet 5 | Crosstown North Business Center | Low | Current commercial uses |
| BP1 | 249 | 2-BP1, sheet 5 | Commercial Building | Low | Past and current unknown uses of parcel |
| BP1 | 250 | 2-BP1, sheet 5 | Crosstown North Business Center | Low | Hazardous waste generator |
| BP1 | 251 | 2-BP1, sheet 7 | Liberty Carton and Star Exhibits | Low | Hazardous waste generator |
| BP1 | 252 | 2-BP1, sheet 6 | Commercial Building | Low | Current commercial uses |
| BP1 | 253 | 2-BP1, sheet 6 | Biotest Laboratories | Low | Hazardous waste generator |
| BP1 | 254 | 2-BP1, sheet 6 | Undeveloped Land | Low | Past construction staging area |
| BP1 | 259 | 2-BP1, sheets 7 & 9 | Olympus Surgical Technologies America | Low | Hazardous waste generator |
| BP1 | 261 | 2-BP1, sheets 8, 9 & 11 | Undeveloped Land | Low | Former farmstead |
| BP1 | 262 | 2-BP1, sheets 8 & 11 | Undeveloped Land | Low | Past farmstead and commercial uses |
| BP1 | 265 | 2-BP1, sheet 10 | Undeveloped Land | Low | Former residence |
| BP1 | 266 | 2-BP1, sheet 10 | Undeveloped Land | Low | Former residence |
| BP1 | 267 | 2-BP1, sheet 10 | Undeveloped Land | Low | Former residence |
| BP1 | 268 | 2-BP1, sheet 14 | Three Rivers Park District Rush Creek Regional Trail | Low | Former farmstead |
| BP1 | 270 | 2-BP1, sheet 14 | Undeveloped Land | Low | Former farmstead |

# Appendix C

# Parcel Summary Table – Medium Potential for Contamination Sites

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| M | 6 | 2-M, sheets 1 & 2 | Holiday Gasoline Station/Convenience Store | Medium | Past and current auto repair and filling station, USTs, closed LUST, closed spill, hazardous waste generator |
| M | 9 | 2-M, sheet 1 | Mary My Hope Children's Center | Medium | Past commercial uses including auto repair activities |
| M | 10 | 2-M, sheets 1 & 2 | Metro Transit Garage and Offices | Medium | Past and current auto repair activities, ASTs, USTs, closed LUST, closed spill, hazardous waste generator |
| M | 11 | 2-M, sheet 1 | City of Minneapolis Department of Public Works Royalston Maintenance Facility | Medium | Past coal yard, ASTs, USTs, closed LUST, hazardous waste generator |
| M | 13 | 2-M, sheet 1 | Commercial Buildings | Medium | USTs, closed LUST, hazardous waste generator |
| M | 14 | 2-M, sheet 2 | Wells Fargo Bank | Medium | Storage tanks, hazardous waste generator |
| M | 15 | 2-M, sheet 1 | Commercial Building | Medium | ASTs, hazardous waste generator |
| M | 16 | 2-M, sheet 1 | G&K Services | Medium | ASTs, USTs, closed LUST, closed spill site, hazardous waste generator |
| M | 20 | 2-M, sheet 3 | Heritage Park | Medium | Former filling station |
| M | 22 | 2-M, sheet 3 | Apartment Building | Medium | AST, USTs |
| M | 23 | 2-M, sheet 3 | Commercial Buildings | Medium | Past filling station, USTs, hazardous waste generator |
| M | 24 | 2-M, sheet 3 | Commercial Building | Medium | Past dry cleaner, automotive service training school, hazardous waste generator |
| M | 25 | 2-M, sheet 4 | Hennepin County Sumner Library | Medium | Closed LUST site |
| M | 26 | 2-M, sheet 3 | Undeveloped Parcel | Medium | Past filling station, closed spill site, hazardous waste generator |
| M | 27 | 2-M, sheet 4 | Harvest Preparatory School and A.M.W. Church | Medium | Past commercial uses including filling stations |
| M | 29 | 2-M, sheet 3 | Olson Townhomes | Medium | Closed spill site |
| M | 30 | 2-M, sheet 3 | Park Plaza Apartments II | Medium | UST and closed LUST |
| M | 31 | 2-M, sheet 4 | Seed Academy/Harvest Prep School | Medium | Past and current commercial uses including auto repair, closed LUST |
| M | 32 | 2-M, sheet 3 | Park Plaza Apartments | Medium | Past commercial uses including a filling station, UST, closed LUST |
| M | 34 | 2-M, sheet 4 | Residential Duplex | Medium | Past filling station |
| M | 35 | 2-M, sheet 5 | Harrison Park | Medium | Past commercial uses including filling stations |
| M | 38 | 2-M, sheet 5 | Bruns Residence | Medium | Closed spill site, closed LUST |
| M | 39 | 2-M, sheet 5 | Tompkins Residence | Medium | Closed spill site |
| M | 40 | 2-M, sheet 5 | Skoug Residence | Medium | Closed spill site |
| M | 42 | 2-M, sheet 6 | Hoang Residence | Medium | Closed spill site |
| M | 44 | 2-M, sheets 7 & 8 | Former Railroad Area | Medium | Former commercial buildings and railroad tracks |
| M | 45 | 2-M, sheet 7 | Railroad Right of Way | Medium | Past and current railroad use |
| M | 46 | 2-M, sheets 7-8 | Theodore Wirth Park Golf Course | Medium | Past and current use as golf course, ASTs, USTs, closed LUST, closed MDA spill, hazardous waste generator |
| GV | 48 | 2-GV, sheets 1-5 | Railroad Right of Way | Medium | Past and current railroad use |
| GV | 49 | 2-GV, sheet 1 | Wilson Residence | Medium | Closed spill site |
| GV | 50 | 2-GV, Sheet 2 | Krawczyk Residence | Medium | Closed spill site |
| GV | 53 | 2-GV, sheet 4 | St. Margaret Mary Catholic Church | Medium | Past and current use as a church, USTs, and ground disturbance and fill of unknown origin |
| GV | 55 | 2-GV, sheets 4 and 5 | Mary Hills Nature Area | Medium | Possible past dumping or fill activities |
| GV | 56 | 2-GV, Sheet 5 | Single Family Residences | Medium | Closed spill site |
| R | 57 | 2-R, sheets 1-8 | Railroad Right of Way | Medium | Past and current railroad use |
| R | 60 | 2-R, sheet 3 | Bratsch Residence | Medium | Closed spill site |
| R | 61 | 2-R, sheet 3 | Xcel Energy Indiana Substation | Medium | Current use as an electric substation |
| R | 64 | 2-R, sheet 4 | Gray Residence | Medium | Closed spill site |

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| R | 66 | 2-R, sheets 4 & 5 | Windsor Court | Medium | USTs, closed LUST |
| R | 68 | 2-R, sheet 5 | Undeveloped Land | Medium | Past bus garage, USTs, hazardous waste generator |
| R | 69 | 2-R, sheet 5 | Beard Residence | Medium | Closed spill site |
| R | 70 | 2-R, sheet 5 | Kasprick Residence | Medium | Closed spill site |
| R | 72 | 2-R, sheet 6 | Sacred Heart Catholic Church & School | Medium | USTs, hazardous waste generator |
| R | 74 | 2-R, sheet 6 | Parking Lot | Medium | Past commercial uses, closed LUST |
| R | 78 | 2-R, sheet 6 | Robbinsdale Police and Fire Department and Water Filtration Plant #1 | Medium | Hazardous waste generator, closed spill site |
| R | 84 | 2-R, sheet 6 | Pawn America | Medium | Past commercial uses including filling station, USTs |
| R | 85 | 2-R, sheet 6 | Chestnut Café | Medium | Past and current commercial uses including dry cleaning |
| R | 86 | 2-R, sheet 6 | Robbinsdale Marine | Medium | Past and current commercial use as boat sales and service, hazardous waste generator |
| R | 96 | 2-R, sheet 6 | Retail Commercial Building | Medium | Past and current commercial uses (mainly retail), closed LUST |
| R | 101 | 2-R, sheet 6 | Northside Oriental | Medium | Past auto repair activities, closed spill site |
| R | 102 | 2-R, sheet 6 | Nonna Rosa's | Medium | Past commercial use include dry cleaner, USTs |
| R | 105 | 2-R, sheet 6 | Commercial Building | Medium | Past and current commercial uses, UST |
| R | 106 | 2-R, sheet 6 | Tailor Shop | Medium | Past cleaners |
| R | 109 | 2-R, sheet 6 | Pilgrim Cleaners | Medium | Past commercial uses including gasoline station, current dry cleaner, USTs, closed LUST, hazardous waste generator |
| R | 110 | 2-R, sheet 6 | Sipe's Shell | Medium | Past and current use as a gasoline station, UST, closed LUST, spill site, hazardous waste generator |
| R | 111 | 2-R, sheet 6 | BP Gas Station | Medium | Past and current use as a gasoline station, USTs, closed LUST, spill site, hazardous waste generator |
| R | 123 | 2-R, sheet 8 | City of Robbinsdale Municipal Shop | Medium | AST, UST, closed LUST, hazardous waste generator |
| C | 124 | 2-C, sheets 1-6 | Railroad Right of Way | Medium | Past and current railroad use |
| C | 125 | 2-C, sheet 1 | Century Link | Medium | ASTs, USTs, closed LUST, hazardous waste generator. |
| C | 126 | 2-C, sheet 1 | Blind Installation & Repair | Medium | USTs, closed LUST |
| C | 129 | 2-C, sheet 1 | Full Proof Ministry and Thomas Tool & Supply | Medium | Closed spill site |
| C | 134 | 2-C, sheet 2 | Fun Services | Medium | Past commercial uses including a machine shop, hazardous waste generator |
| C | 136 | 2-C, sheet 2 | Stormwater pond | Medium | Former auto repair activities, closed spill site |
| C | 138 | 2-C, sheet 2 | Crystal Collision Center and Car Wash | Medium | Auto repair activities, hazardous waste generator |
| C | 139 | 2-C, sheet 2 | Kilmer Electric | Medium | Auto repair activities, AST, UST, hazardous waste generator |
| C | 140 | 2-C, sheet 2 | Auto Plus Auto Parts | Medium | Automotive machine shop and other possible auto repair activities, hazardous waste generator |
| C | 141 | 2-C, sheet 2 | Midwest Motor Craft | Medium | Auto repair activities, hazardous waste generator |
| C | 142 | 2-C, sheet 2 | North Suburban Towing and Thomas Auto Body & Collision | Medium | Auto repair activities, ASTs, hazardous waste generator |
| C | 143 | 2-C, sheet 3 | Bill's Economy Glass | Medium | Past and current commercial uses including machine shop and manufacturing, hazardous waste generator |

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| C | 144 | 2-C, sheet 3 | Multi-Tenant Commercial Building | Medium | Auto repair activities, hazardous waste generator |
| C | 147 | 2-C, sheets 2 & 3 | Golden Valley Heating & Air | Medium | Past and current commercial uses including manufacturing |
| C | 148 | 2-C, sheet 3 | BGD Companies | Medium | Past use as foundry, hazardous waste generator |
| C | 149 | 2-C, sheet 3 | Vacant Parcel | Medium | Past foundry and auto repair activities, closed spill site, hazardous waste generator |
| C | 150 | 2-C, sheet 3 | All American Storage | Medium | Past and current commercial uses including machine shops and manufacturing, hazardous waste generator |
| C | 151 | 2-C, sheet 3 | Collision Masters | Medium | Auto repair activities, past use as a tool manufacturer, hazardous waste generator |
| C | 152 | 2-C, sheet 3 | Standard Water Control Systems | Medium | Metal fabrication operations, hazardous waste generator |
| C | 153 | 2-C, sheet 3 | Skip's Auto Repair | Medium | Auto repair activities, AST, hazardous waste generator |
| C | 155 | 2-C, sheet 3 | Miller Diversified Machining | Medium | Auto repair activities, closed spill site, hazardous waste generator |
| C | 156 | 2-C, sheet 3 | Creative Partnership/Rise | Medium | UST, close LUST, close spill site |
| C | 157 | 2-C, sheet 3 | Curbside Waste | Medium | ASTs, USTs, waste services, hazardous waste generator. |
| C | 158 | 2-C, sheet 3 | Industrial Stainless Supply Inc. | Medium | Machine shop and manufacturing, potential dump or fill site, hazardous waste generator |
| C | 159 | 2-C, sheet 3 | Beaver Machine | Medium | Potential dump or fill site, machine shop use, hazardous waste generator |
| C | 160 | 2-C, sheet 3 | Holiday | Medium | Gasoline station, USTs, closed LUST |
| C | 161 | 2-C, sheet 3 | Car Hop | Medium | Former gasoline station |
| C | 163 | 2-C, sheets 3 & 4 | Crystal Business Commons | Medium | Automotive, AST, hazardous waste generator |
| C | 165 | 2-C, sheet 3 | Steen Engineering and Douglas Storage | Medium | Past commercial uses including repair activities and past outdoor storage of unknown materials |
| C | 166 | 2-C, sheet 3 | U-Haul Center | Medium | USTs, hazardous waste generator |
| C | 167 | 2-C, sheets 3 & 4 | Cedarwood Apartments | Medium | Past commercial uses including repair facility |
| C | 168 | 2-C, sheets 3 & 4 | The Schrader Building | Medium | Past and current commercial uses including auto sales and outdoor storage |
| C | 169 | 2-C, sheet 4 | Undeveloped Land | Medium | former gasoline station, UST, closed LUST |
| C | 170 | 2-C, sheet 4 | Becker Park and Crystal Arts and Activity Center | Medium | Former gasoline station |
| C | 171 | 2-C, sheet 4 | Undeveloped Land | Medium | AST, hazardous waste generator |
| C | 173 | 2-C, sheet 4 | Bass Lake Center | Medium | Closed spill site, hazardous waste generator |
| C | 174 | 2-C, sheet 4 | Undeveloped Land | Medium | Gasoline station, USTs, closed LUST, hazardous waste generator |
| C | 176 | 2-C, sheet 4 | Parking Lot | Medium | Former gasoline station |
| C | 179 | 2-C, sheet 4 | Crystal Medical Center | Medium | AST, hazardous waste generator |
| C | 181 | 2-C, sheets 5 & 6 | Crystal Airport | Medium | ASTs, USTs, closed LUST, closed spill site, hazardous waste generator |
| C | 185 | 2-C, sheet 6 | Jack's Auto Sales | Medium | Auto repair activities, hazardous waste generator |
| BP2 | 187 | 2-BP2, sheets 1-6 | Railroad Right of Way | Medium | Past and current railroad use |
| BP2 | 189 | 2-BP2, sheet 1 | The Waterford | Medium | USTs, closed LUSTs |
| BP2 | 191 | 2-BP2, sheet 1 | Multi-Tenant Commercial Building | Medium | Closed spill site, hazardous waste generator |
| BP2 | 193 | 2-BP2, sheet 1 | Stormwater Pond and Undeveloped Land | Medium | USTs, hazardous waste generator |
| BP2 | 194 | 2-BP2, sheet 2 | The Groves Apartments | Medium | Closed spill site |
| BP2 | 197 | 2-BP2, sheet 2 | TN Transportation and Automotive | Medium | Auto repair facilities, ASTs, USTs, closed LUST, hazardous waste generator |
| BP2 | 198 | 2-BP2, sheet 2 | Nguyen Residence | Medium | Closed AgSpill |

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| BP2 | 199 | 2-BP2, sheets 2 & 3 | O'Reilly Auto Parts | Medium | ASTs, USTs, closed LUST, closed spill site, hazardous waste generator |
| BP2 | 201 | 2-BP2, sheet 4 | Broadway Rentals | Medium | USTs, ASTs, closed LUST, hazardous waste generator |
| BP2 | 202 | 2-BP2, sheet 4 | Carmax | Medium | USTs, ASTs, closed LUST, hazardous waste generator |
| BP2 | 205 | | Interstate North Business Center | Medium | USTs, closed LUST, hazardous waste generator |
| BP2 | 207 | 2-BP2, sheet 4 | U-Haul | Medium | Former gasoline station, USTs, closed LUST, hazardous waste generator |
| BP2 | 208 | 2-BP2, sheet 4 | Wendy's | Medium | Former gasoline station, USTs, closed LUST, hazardous waste generator |
| BP2 | 209 | 2-BP2, sheets 4 & 5 | Americold Distribution | Medium | Closed spill site, hazardous waste generator |
| BP2 | 210 | 2-BP2, sheet 5 | Mister Carwash | Medium | Former gasoline station, USTs, closed LUST, hazardous waste generator |
| BP2 | 211 | 2-BP2, sheet 5 | Consignment Central | Medium | Former motorcycle sales and service, closed spill site |
| BP2 | 212 | 2-BP2, sheet 5 | North American Gear & Forge | Medium | Past and current commercial uses including machine shop, hazardous waste generator |
| BP2 | 214 | 2-BP2, sheet 5 | Penske | Medium | UST, AST, closed spill site, hazardous waste generator |
| BP2 | 219 | 2-BP2, sheet 5 | American Furniture Market | Medium | Inactive PBP site |
| BP2 | 220 | 2-BP2, sheet 5 | Modern Dental Studio | Medium | Former filling/service station |
| BP2 | 230 | 2-BP2, sheet 7 | Buerkle Acura | Medium | ASTs, USTs, hazardous waste generator. |
| BP2 | 231 | 2-BP2, sheet 7 | Popeye's | Medium | Closed spill site |
| BP2 | 233 | 2-BP2, sheet 7 | Northwind Plaza | Medium | Former dry cleaner |
| BP2 | 237 | 2-BP2, sheet 7 | Park Square | Medium | UST, hazardous waste generator, past use as a possible dry cleaners |
| BP2 | 239 | 2-BP2, sheet 8 | Residential Dwelling | Medium | Closed spill site |
| BP2 | 240 | 2-BP2, sheet 8 | Prusinowski Residence | Medium | Closed spill site |
| BP1 | 241 | 2-BP1, sheets 1 & 2 | North Hennepin Community College | Medium | ASTs, USTs, closed LUST, hazardous waste generator |
| BP1 | 242 | 2-BP1, sheet 2 | Ronning Residence | Medium | Closed spill site |
| BP1 | 243 | 2-BP1, sheet 2 | Broadway Square | Medium | Former gasoline station and drycleaner, USTs, closed LUST, closed spill, hazardous waste generator |
| BP1 | 255 | 2-BP1, sheet 6 | Northwest EMC | Medium | Closed spill site |
| BP1 | 256 | 2-BP1, sheet 6 | Holiday | Medium | gasoline station, USTs, closed spill site |
| BP1 | 257 | 2-BP1, sheets 6 & 8 | Baxter Healthcare | Medium | ASTs, closed spill site, hazardous waste generator |
| BP1 | 260 | 2-BP1, sheets 9, 11 & 12 | Target Corporation | Medium | USTs, closed LUST, PBP site, hazardous waste generator |
| BP1 | 263 | 2-BP1, sheets 8 & 11 | Undeveloped Land | Medium | Former farmstead and greenhouse/nursery |
| BP1 | 264 | 2-BP1, sheet 11 | Undeveloped Land | Medium | Former multi-building residence |
| BP1 | 269 | 2-BP1, sheet 10 | Grace Fellowship Church | Medium | AST |
| BP1 | 271 | 2-BP1, sheets 13 & 14 | Three Rivers Park District Rush Creek Regional Trail | Medium | Former farmstead |

# Appendix D

# Parcel Summary Table – High Potential for Contamination Sites

| Segment | Parcel | Figure Number | Name | Rank | Rationale |
|---|---|---|---|---|---|
| M | 1 | 2-M, sheet 1 | Ford Center | High | ASTs, closed LUST, closed spill, inactive VIC, hazardous waste generator |
| M | 2 | 2-M, sheets 1 & 2 | Be The Match | High | AST, closed LUST, closed spill, active VIC, active PBF, hazardous waste generator |
| M | 3 | 2-M, sheet 1 | Hennepin County Energy Recovery Center and Caribou Coffee | High | Past filling stations and auto repair facilities, ASTs, USTs, closed LUST, closed spill, inactive VIC, inactive PBP, inactive CERCLIS, hazardous waste generator |
| M | 5 | 2-M, sheet 2 | Parcel Under Construction | High | ASTs, USTs, closed LUST, active VIC, active PBP, hazardous waste generator |
| M | 7 | 2-M, sheet 2 | Weather Rite | High | Past and commercial uses including machine shop, metal manufacturing, waste (garbage) management, and automotive repair and junkyard, USTs, closed LUST, inactive VIC, active SAS, hazardous waste generator |
| M | 8 | 2-M, sheet 2 | Junction Flats | High | Past auto repair and junkyard, ASTs, USTs, active VIC, inactive PBP, active SR, hazardous waste generator |
| M | 12 | 2-M, sheet 1 | Sharing and Caring Hands | High | Past auto repair and filling stations, UST, closed LUST, inactive VIC, hazardous waste generator |
| M | 17 | 2-M, sheet 2 | Velocity Express | High | ASTs, USTs, closed LUST, closed spill site, active VIC, hazardous waste generator |
| M | 21 | 2-M, sheet 4 | Heritage Park II | High | Past commercial uses, USTs, closed LUST, closed spill, inactive VIC, hazardous waste generator |
| M | 47 | 2-M, sheet 8 | Undeveloped Parcels | High | Inactive VIC site |
| R | 58 | 2-R, sheets 1-4 | Walter Sochacki Community Park | High | Unpermitted dump site, active Sate Assessment site, closed spill site |
| R | 59 | 2-R, sheet 2 | South Halifax park | High | Inactive VIC site, inactive SRS site, restrictive covenant |
| R | 75 | 2-R, sheet 6 | Walgreens | High | Past commercial uses include filling station and auto repair facilities, ASTs, USTs, closed LUST, PBP site, inactive VIC site, hazardous waste generator |
| R | 76 | 2-R, sheet 6 | Broadway Court Apartments | High | Former gasoline station and dry cleaner, USTs, closed LUST, inactive VIC, inactive CERCLIS, inactive Superfund, hazardous waste generator |
| R | 88 | 2-R, sheet 6 | Wuollet Bakery & Espresso | High | Past and current commercial uses, former dry cleaner, inactive VIC site |
| R | 90 | 2-R, sheet 6 | Hubbard Market Place | High | Past auto repair activities, USTs, inactive VIC |
| R | 107 | 2-R, sheet 6 | The Steinhauser Group | High | Past dry cleaner, inactive VIC site |
| C | 162 | 2-C, sheet 3 | Commercial Building | High | USTs, closed spill site, active PBP site, hazardous waste generator, machine shops |
| C | 172 | 2-C, sheet 4 | Cell Tower and Undeveloped Land | High | Former gasoline station and auto repair, inactive VIC site, inactive PBP site, hazardous waste generator |
| BP2 | 190 | 2-BP2, sheet 1 | Former Latzke Iron Works | High | Inactive VIC site |
| BP2 | 192 | 2-BP2, sheet 1 | Waterford Senior Townhomes | High | ASTs, USTs, inactive VIC |
| BP2 | 195 | 2-BP2, sheet 2 | Stormwater Pond | High | USTs, closed LUST, closed spill site, active PBP, active VIC, hazardous waste generator, exterminating company |
| BP2 | 196 | 2-BP2, sheet 2 | Metro Transit Bottineau & 63rd Park & Ride | High | ASTs, USTs, closed LUST, closed PBP, inactive VIC, hazardous waste generator |
| BP1 | 258 | 2-BP1, sheet 6 | Undeveloped Land | High | USTs, closed LUST, PBP site, VIC site, hazardous waste generator |

**The following appendices are not included in this version of the Modified Phase I ESA report due to volume.**

They are available for viewing at the Blue Line Extension Project Office at 5514 West Broadway Ave, Suite 200, Crystal, MN 55428. Or, can be requested by contacting Robin Caufman at (651) 602-1457**.**

Appendix E: Parcel Summaries
Appendix F: Additional Parcel Summary Table (on CD)
Appendix G: GeoSearch Regulatory Report (on CD)
Appendix H: MPCA File Review Information (on CD)
Appendix I: Aerial Photographs (on CD)
Appendix J: Fire Insurance Maps (on CD)
Appendix K: Topographic Maps (on CD)

# Appendix L

# Parcel Summary Table with PIN Information

| *Segment* | *Parcel* | PIN | Site Name | Building Number | Street Name | City | Ranking |
|---|---|---|---|---|---|---|---|
| *M* | *1* | 053-2202924420035 | Ford Center | 420 | 5TH ST N | MINNEAPOLIS | High |
| *M* | *2* | 053-2202924240100 | Be The Match | 524 | 5TH ST N | MINNEAPOLIS | High |
| *M* | *3* | 053-2202924310067 | Hennepin County Energy Recovery Center and Caribou Coffee | 505 | 6TH AVE N | MINNEAPOLIS | High |
| *M* | *3* | 053-2202924310068 | Hennepin County Energy Recovery Center and Caribou Coffee | 435 | 5TH ST N | MINNEAPOLIS | High |
| *M* | *4* | 053-2202924240027 | Fulton Brewing | 414 | 6TH AVE N | MINNEAPOLIS | Low |
| *M* | *5* | 053-2202924240098 | Parcel Under Construction | 600 | 5TH ST N | MINNEAPOLIS | High |
| *M* | *6* | 053-2202924240005 | Holiday Gasoline Station/Convenience Store | 601 | 5TH ST N | MINNEAPOLIS | Medium |
| *M* | *6* | 053-2202924240008 | Holiday Gasoline Station/Convenience Store | 508 | 6TH AVE N | MINNEAPOLIS | Medium |
| *M* | *7* | 053-2202924240031 | Weather Rite | 616 | 5TH ST N | MINNEAPOLIS | High |
| *M* | *7* | 053-2202924240032 | Weather Rite | 620 | 5TH ST N | MINNEAPOLIS | High |
| *M* | *8* | 053-2202924240099 | Junction Flats | 643 | 5TH ST N | MINNEAPOLIS | High |
| *M* | *9* | 053-2202924310047 | Mary My Hope Children's Center | 425 | 7TH ST N | MINNEAPOLIS | Medium |
| *M* | *9* | 053-2202924310050 | Mary My Hope Children's Center | 401 | 7TH ST N | MINNEAPOLIS | Medium |
| *M* | *10* | 053-2202924230140 | Metro Transit Garage and Offices | 560 | 6TH AVE N | MINNEAPOLIS | Medium |
| *M* | *11* | 053-2202924310036 | City of Minneapolis Department of Public Works Royalston Maintenance Facility | 661 | 5TH AVE N | MINNEAPOLIS | Medium |
| *M* | *12* | 053-2202924310011 | Sharing and Caring Hands | 525 | 7TH ST N | MINNEAPOLIS | High |
| *M* | *13* | 053-2202924320024 | Commercial Buildings | 415 | ROYALSTON AVE N | MINNEAPOLIS | Medium |
| *M* | *13* | 053-2202924320025 | Commercial Buildings | 501 | ROYALSTON AVE N | MINNEAPOLIS | Medium |
| *M* | *14* | 053-2202924230135 | Wells Fargo Bank | 615 | 7TH ST N | MINNEAPOLIS | Medium |
| *M* | *15* | 053-2202924320004 | Commercial Building | 434 | LAKESIDE AVE | MINNEAPOLIS | Medium |
| *M* | *16* | 053-2202924320002 | G&K Services | 621 | OLSON MEMORIAL HWY | MINNEAPOLIS | Medium |
| *M* | *17* | 053-2202924230131 | Velocity Express | 620 | OLSON MEMORIAL HWY | MINNEAPOLIS | High |
| *M* | *18* | 053-2202924230033 | Commercial Building | 618 | 7TH AVE N | MINNEAPOLIS | Low |
| *M* | *18* | 053-2202924230034 | Commercial Building | 701 | 7TH ST N | MINNEAPOLIS | Low |
| *M* | *19* | 053-2202924230032 | Velocity Express | 622 | 7TH AVE N | MINNEAPOLIS | Low |
| *M* | *19* | 053-2202924230143 | Velocity Express | 634 | 7TH AVE N | MINNEAPOLIS | Low |
| *M* | *19* | 053-2202924230144 | Velocity Express | 638 | 7TH AVE N | MINNEAPOLIS | Low |
| *M* | *20* | 053-2102924410034 | Heritage Park | 1004 | 5TH AVE N | MINNEAPOLIS | Medium |
| *M* | *20* | 053-2102924410033 | Heritage Park | 851 | OLSON MEMORIAL HWY | MINNEAPOLIS | Medium |
| *M* | *21* | 053-2102924140069 | Heritage Park II | 652 | BRYANT AVE N | MINNEAPOLIS | High |
| *M* | *21* | 053-2102924130025 | Heritage Park II | 740 | EMERSON AVE N | MINNEAPOLIS | High |
| *M* | *21* | 053-2102924140068 | Heritage Park II | 651 | BRYANT AVE N | MINNEAPOLIS | High |
| *M* | *21* | 053-2102924140095 | Heritage Park II | 636 | VAN WHITE MEM BLVD | MINNEAPOLIS | High |
| *M* | *21* | 053-2102924140098 | Heritage Park II | 832 | GERTRUDE BROWN PL | MINNEAPOLIS | High |
| *M* | *21* | 053-2102924140099 | Heritage Park II | 710 | BRYANT AVE N | MINNEAPOLIS | High |
| *M* | *21* | 053-2102924140100 | Heritage Park II | 712 | BRYANT AVE N | MINNEAPOLIS | High |
| *M* | *21* | 053-2102924140101 | Heritage Park II | 714 | BRYANT AVE N | MINNEAPOLIS | High |
| *M* | *21* | 053-2102924140102 | Heritage Park II | 716 | BRYANT AVE N | MINNEAPOLIS | High |
| *M* | *22* | 053-2102924410032 | Apartment Building | 800 | 5TH AVE N | MINNEAPOLIS | Medium |
| *M* | *23* | 053-2102924410022 | Commercial Buildings | 901 | OLSON MEMORIAL HWY | MINNEAPOLIS | Medium |
| *M* | *24* | 053-2102924410023 | Commercial Building | 921 | OLSON MEMORIAL HWY | MINNEAPOLIS | Medium |
| *M* | *24* | 053-2102924420022 | Commercial Building | 1101 | OLSON MEMORIAL HWY | MINNEAPOLIS | Medium |
| *M* | *25* | 053-2102924130014 | Hennepin County Sumner Library | 611 | VAN WHITE MEM BLVD | MINNEAPOLIS | Medium |
| *M* | *26* | 053-2102924420020 | Undeveloped Parcel | 501 | GIRARD TER | MINNEAPOLIS | Medium |
| *M* | *27* | 053-2102924130006 | Harvest Preparatory School and Wayman A.M.W. Church | 1200 | OLSON MEMORIAL HWY | MINNEAPOLIS | Medium |
| *M* | *27* | 053-2102924130010 | Harvest Preparatory School and Wayman A.M.W. Church | 1221 | 7TH AVE N | MINNEAPOLIS | Medium |
| *M* | *28* | 053-2102924130004 | Donald Fraser Early Childhood Family Development Center | 700 | HUMBOLDT AVE N | MINNEAPOLIS | Low |

| *Segment* | *Parcel* | PIN | Site Name | Building Number | Street Name | City | Ranking |
|---|---|---|---|---|---|---|---|
| *M* | *29* | 053-2102924420021 | Olson Townhomes | 461 | GIRARD TER | MINNEAPOLIS | Medium |
| *M* | *30* | 053-2102924420009 | Park Plaza Apartments II | 1315 | OLSON MEMORIAL HWY | MINNEAPOLIS | Medium |
| *M* | *31* | 053-2102924130011 | Seed Academy/Harvest Prep School | 1300 | OLSON MEMORIAL HWY | MINNEAPOLIS | Medium |
| *M* | *31* | 053-2102924240131 | Seed Academy/Harvest Prep School | 609 | HUMBOLDT AVE N | MINNEAPOLIS | Medium |
| *M* | *32* | 053-2102924310003 | Park Plaza Apartments | 525 | HUMBOLDT AVE N | MINNEAPOLIS | Medium |
| *M* | *33* | 053-2102924240125 | Kingdom of Jehovah's Witnesses | 701 | HUMBOLDT AVE N | MINNEAPOLIS | Low |
| *M* | *34* | 053-2102924240200 | Residential Duplex | 613 | ELWOOD AVE N | MINNEAPOLIS | Medium |
| *M* | *35* | 053-2102924310085 | Harrison Park | 1518 | 5TH AVE N | MINNEAPOLIS | Medium |
| *M* | *36* | 053-2102924240122 | Zion Baptist Church | 621 | ELWOOD AVE N | MINNEAPOLIS | Low |
| *M* | *37* | 053-2102924230252 | La Creche Early Childhood Center | 1800 | OLSON MEMORIAL HWY | MINNEAPOLIS | Low |
| *M* | *38* | 053-2102924320224 | Bruns Residence | 512 | NEWTON AVE N | MINNEAPOLIS | Medium |
| *M* | *39* | 053-2102924320019 | Tompkins Residence | 518 | NEWTON AVE N | MINNEAPOLIS | Medium |
| *M* | *40* | 053-2102924320027 | Skoug Residence | 527 | NEWTON AVE N | MINNEAPOLIS | Medium |
| *M* | *41* | 053-2102924230058 | Baur Residence | 624 | OLIVER AVE N | MINNEAPOLIS | Low |
| *M* | *42* | 053-2102924230060 | Hoang Residence | 706 | OLIVER AVE N | MINNEAPOLIS | Medium |
| *M* | *43* | 053-2002924410099 | Moen Residence | 507 | SHERIDAN AVE N | MINNEAPOLIS | Low |
| *M* | *44* | 053-2002924220006 | Former Railroad Area | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *M* | *44* | 053-2002924130045 | Former Railroad Area | 700 | XERXES AVE N | MINNEAPOLIS | Medium |
| *M* | *44* | 053-2002924130138 | Former Railroad Area | 600 | XERXES AVE N | MINNEAPOLIS | Medium |
| *M* | *45* | 053-2002924420003 | Railroad Right of Way | 300 | UPTON AVE N | MINNEAPOLIS | Medium |
| *M* | *45* | 053-2002924440072 | Railroad Right of Way | 2615 | GLENWOOD AVE N | MINNEAPOLIS | Medium |
| *M* | *45* | 053-2002924130002 | Railroad Right of Way | 2901 | 8TH AVE N | MINNEAPOLIS | Medium |
| *M* | *46* | 053-1702924340006 | Theodore Wirth Park Golf Course | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *M* | *46* | 053-1702924310001 | Theodore Wirth Park Golf Course | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *M* | *46* | 053-1702924320001 | Theodore Wirth Park Golf Course | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *M* | *46* | 053-1702924330001 | Theodore Wirth Park Golf Course | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *M* | *46* | 053-1702924340008 | Theodore Wirth Park Golf Course | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *M* | *46* | 053-1702924230005 | Theodore Wirth Park Golf Course | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *M* | *46* | 053-1702924240002 | Theodore Wirth Park Golf Course | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *M* | *46* | 053-1702924240003 | Theodore Wirth Park Golf Course | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *M* | *46* | 053-2002924230002 | Theodore Wirth Park Golf Course | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *M* | *46* | 053-2002924330003 | Theodore Wirth Park Golf Course | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *M* | *46* | 053-2002924420010 | Theodore Wirth Park Golf Course | 2500 | GLENWOOD AVE N | MINNEAPOLIS | Medium |
| *M* | *47* | 053-2002924130041 | Undeveloped Parcels | 827 | WASHBURN AVE N | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130042 | Undeveloped Parcels | 821 | WASHBURN AVE N | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130043 | Undeveloped Parcels | 815 | WASHBURN AVE N | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130044 | Undeveloped Parcels | 801 | WASHBURN AVE N | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130122 | Undeveloped Parcels | 2901 | OAK PARK AVE | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130123 | Undeveloped Parcels | 2905 | OAK PARK AVE | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130124 | Undeveloped Parcels | 2909 | OAK PARK AVE | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130125 | Undeveloped Parcels | 2913 | OAK PARK AVE | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130126 | Undeveloped Parcels | 2917 | OAK PARK AVE | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130127 | Undeveloped Parcels | 2921 | OAK PARK AVE | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130128 | Undeveloped Parcels | 913 | WASHBURN AVE N | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130129 | Undeveloped Parcels | 909 | WASHBURN AVE N | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130130 | Undeveloped Parcels | 905 | WASHBURN AVE N | MINNEAPOLIS | High |
| *M* | *47* | 053-2002924130131 | Undeveloped Parcels | 901 | WASHBURN AVE N | MINNEAPOLIS | High |
| *M* | *48* | 053-1702924340010 | Railroad Right of Way | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *GV* | *48* | 053-2002924210004 | Railroad Right of Way | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *GV* | *48* | 053-1702924340009 | Railroad Right of Way | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *GV* | *48* | 053-1802924110008 | Railroad Right of Way | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *GV* | *49* | 053-2002924120116 | Wilson Residence | 1020 | WASHBURN AVE N | MINNEAPOLIS | Medium |
| *GV* | *50* | 053-2002924120128 | Krawczyk Residence | 1223 | WASHBURN AVE N | MINNEAPOLIS | Medium |

| *Segment* | *Parcel* | PIN | Site Name | Building Number | Street Name | City | Ranking |
|---|---|---|---|---|---|---|---|
| *GV* | *51* | 053-1702924340004 | The Family Partnership | 1501 | XERXES AVE N | GOLDEN VALLEY | Low |
| *GV* | *51* | 053-1702924340005 | The Family Partnership | 1501 | XERXES AVE N | GOLDEN VALLEY | Low |
| *GV* | *52* | 053-1702924430011 | Runion Residence | 1508 | XERXES AVE N | MINNEAPOLIS | Low |
| *GV* | *53* | 053-1702924240001 | St Margaret Mary Catholic Church | 2225 | ZENITH AVE N | GOLDEN VALLEY | Medium |
| *GV* | *53* | 053-1702924210002 | St Margaret Mary Catholic Church | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *GV* | *54* | 053-1702924230020 | Golden Valley Fire Station #3 | 3700 | GOLDEN VALLEY RD | GOLDEN VALLEY | Low |
| *GV* | *55* | 053-1802924110050 | Mary Hills Nature Area | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *GV* | *55* | 053-1702924230004 | Mary Hills Nature Area | 28 | ADDRESS UNASSIGNED | GOLDEN VALLEY | Medium |
| *GV* | *56* | 053-1702924220057 | Single-Family Residence | 2537 | MCNAIR DR | GOLDEN VALLEY | Medium |
| *GV* | *56* | 053-1702924220076 | Single-Family Residence | 2500 | BYRD AVE N | GOLDEN VALLEY | Medium |
| *GV* | *56* | 053-1702924220077 | Single-Family Residence | 2508 | BYRD AVE N | GOLDEN VALLEY | Medium |
| *GV* | *56* | 053-1702924220078 | Single-Family Residence | 2520 | BYRD AVE N | GOLDEN VALLEY | Medium |
| *GV* | *56* | 053-1702924220079 | Single-Family Residence | 2528 | BYRD AVE N | GOLDEN VALLEY | Medium |
| *R* | *57* | 053-0702924110174 | Railroad Right of Way | 44 | ADDRESS UNASSIGNED | ROBBINSDALE | Medium |
| *R* | *57* | 053-1611821120026 | Railroad Right of Way | 44 | ADDRESS UNASSIGNED | ROBBINSDALE | Medium |
| *R* | *57* | 053-0602924210110 | Railroad Right of Way | 44 | ADDRESS UNASSIGNED | ROBBINSDALE | Medium |
| *R* | *57* | 053-0602924240141 | Railroad Right of Way | 44 | ADDRESS UNASSIGNED | ROBBINSDALE | Medium |
| *R* | *57* | 053-0911821430086 | Railroad Right of Way | 44 | ADDRESS UNASSIGNED | ROBBINSDALE | Medium |
| *R* | *58* | 053-0702924120184 | Walter Sochacki Community Park | 3449 | JUNE AVE N | CRYSTAL | High |
| *R* | *58* | 053-0702924120185 | Walter Sochacki Community Park | 3445 | JUNE AVE N | CRYSTAL | High |
| *R* | *58* | 053-0702924120186 | Walter Sochacki Community Park | 3441 | JUNE AVE N | CRYSTAL | High |
| *R* | *58* | 053-0702924120187 | Walter Sochacki Community Park | 3437 | JUNE AVE N | CRYSTAL | High |
| *R* | *58* | 053-0702924120014 | Walter Sochacki Community Park | 3501 | JUNE AVE N | CRYSTAL | High |
| *R* | *58* | 053-0702924120182 | Walter Sochacki Community Park | 3457 | JUNE AVE N | CRYSTAL | High |
| *R* | *58* | 053-0702924120183 | Walter Sochacki Community Park | 3453 | JUNE AVE N | CRYSTAL | High |
| *R* | *58* | 053-0702924110009 | Walter Sochacki Community Park | 3516 | JUNE AVE N | ROBBINSDALE | High |
| *R* | *58* | 053-0702924110186 | Walter Sochacki Community Park | 3500 | JUNE AVE N | ROBBINSDALE | High |
| *R* | *58* | 053-0702924410063 | Walter Sochacki Community Park | 3500 | JUNE AVE N | ROBBINSDALE | High |
| *R* | *59* | 053-0702924410046 | South Halifax Park | 44 | ADDRESS UNASSIGNED | ROBBINSDALE | High |
| *R* | *59* | 053-0702924410064 | South Halifax Park | 3101 | HALIFAX AVE N | ROBBINSDALE | High |
| *R* | *60* | 053-0702924140145 | Bratsch Residence | 3235 | INDIANA AVE N | ROBBINSDALE | Medium |
| *R* | *61* | 053-0702924140174 | Xcel Energy Indiana Substation | 3333 | INDIANA AVE N | ROBBINSDALE | Medium |
| *R* | *62* | 053-0702924140037 | Markeson Residence | 3308 | INDIANA AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430111 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430112 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430113 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430114 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430115 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430116 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430117 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430118 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430119 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430120 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430121 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430122 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430123 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430124 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430125 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430126 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |

| *Segment* | *Parcel* | PIN | Site Name | Building Number | Street Name | City | Ranking |
|---|---|---|---|---|---|---|---|
| *R* | *63* | 053-0602924430127 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430128 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430129 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430130 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430131 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430132 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430133 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430134 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430135 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430136 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430137 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430138 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430139 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430140 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430141 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430142 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430143 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430144 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430145 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430146 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430147 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430148 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430149 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430150 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430151 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430152 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430153 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430154 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430155 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430156 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430157 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430158 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430159 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430160 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430161 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430162 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430163 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430164 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430165 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430166 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430167 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430168 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430169 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430170 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430171 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430172 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430173 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430174 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430175 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430176 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430177 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430178 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430179 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430180 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430181 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430182 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430183 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430184 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430185 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430186 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430187 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430188 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430189 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430190 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430191 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430192 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430193 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430194 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430195 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430196 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430197 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430198 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |

| *Segment* | *Parcel* | PIN | Site Name | Building Number | Street Name | City | Ranking |
|---|---|---|---|---|---|---|---|
| *R* | *63* | 053-0602924430199 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430200 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430201 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430202 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430203 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430204 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430205 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430206 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430207 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430208 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430209 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430210 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430211 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430212 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430213 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430214 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430215 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430216 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430217 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430218 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430219 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430220 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430221 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430222 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430223 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430224 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430225 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430226 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430227 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430228 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430229 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430230 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430231 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430232 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *63* | 053-0602924430233 | Lee Square | 4400 | 36TH AVE N | ROBBINSDALE | Low |
| *R* | *64* | 053-0602924440111 | Gray Residence | 3618 | INDIANA AVE N | ROBBINSDALE | Medium |
| *R* | *65* | 053-0602924430109 | Lee Park | 3648 | LEE AVE N | ROBBINSDALE | Low |
| *R* | *66* | 053-0602924440013 | Windsor Court | 4024 | 37TH AVE N | ROBBINSDALE | Medium |
| *R* | *66* | 053-0602924440014 | Windsor Court | 3737 | HUBBARD AVE N | ROBBINSDALE | Medium |
| *R* | *67* | 053-0602924440015 | Bridgeway Apartments | 3755 | HUBBARD AVE N | ROBBINSDALE | Low |
| *R* | *68* | 053-0602924430106 | Undeveloped Land | 3760 | LEE AVE N | ROBBINSDALE | Medium |
| *R* | *69* | 053-0602924420031 | Beard Residence | 3965 | HUBBARD AVE N | ROBBINSDALE | Medium |
| *R* | *70* | 053-0602924420040 | Kasprick Residence | 4029 | HUBBARD AVE N | ROBBINSDALE | Medium |
| *R* | *71* | 053-0602924240059 | Park | 4001 | NOBLE AVE N | ROBBINSDALE | Low |
| *R* | *72* | 053-0602924130031 | Sacred Heart Catholic Church & School | 4087 | WEST BROADWAY | ROBBINSDALE | Medium |
| *R* | *72* | 053-0602924130032 | Sacred Heart Catholic Church & School | 4099 | HUBBARD AVE N | ROBBINSDALE | Medium |
| *R* | *72* | 053-0602924130033 | Sacred Heart Catholic Church & School | 4095 | HUBBARD AVE N | ROBBINSDALE | Medium |
| *R* | *72* | 053-0602924130034 | Sacred Heart Catholic Church & School | 4089 | HUBBARD AVE N | ROBBINSDALE | Medium |
| *R* | *73* | 053-0602924130030 | P&D Mechanical Contractor | 4089 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *74* | 053-0602924240133 | Parking Lot | 4125 | RAILROAD AVE N | ROBBINSDALE | Medium |
| *R* | *75* | 053-0602924130146 | Walgreens | 4100 | WEST BROADWAY | ROBBINSDALE | High |
| *R* | *76* | 053-0602924130139 | Broadway Court Apartments | 4600 | 41ST AVE N | ROBBINSDALE | High |
| *R* | *77* | 053-0602924130029 | Robin Hotel | 4628 | 41ST AVE N | ROBBINSDALE | Low |
| *R* | *78* | 053-0602924130009 | Robbinsdale Police and Fire Department and Water Filtration Plan #1 | 4127 | HUBBARD AVE N | ROBBINSDALE | Medium |
| *R* | *78* | 053-0602924130010 | Robbinsdale Police and Fire Department and Water Filtration Plant #1 | 4101 | HUBBARD AVE N | ROBBINSDALE | Medium |
| *R* | *78* | 053-0602924130011 | Robbinsdale Police and Fire Department and Water Filtration Plant #1 | 4101 | HUBBARD AVE N | ROBBINSDALE | Medium |

| *Segment* | *Parcel* | PIN | Site Name | Building Number | Street Name | City | Ranking |
|---|---|---|---|---|---|---|---|
| *R* | *79* | 053-0602924130003 | Papa John's Pizza/Payday | 4121 | LAKELAND AVE N | ROBBINSDALE | Low |
| *R* | *80* | 053-0602924130147 | Commercial Building | 4124 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *81* | 053-0602924130021 | Lions Gym & Wellness Center | 4123 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *82* | 053-0602924130106 | Minnesota Dental Group | 4125 | LAKELAND AVE N | ROBBINSDALE | Low |
| *R* | *83* | 053-0602924130019 | Strait Stuff Screen Printing | 4129 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *83* | 053-0602924130020 | Strait Stuff Screen Printing | 4127 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *84* | 053-0602924130119 | Pawn America | 4132 | WEST BROADWAY | ROBBINSDALE | Medium |
| *R* | *85* | 053-0602924130017 | Chestnut Café | 4131 | WEST BROADWAY | ROBBINSDALE | Medium |
| *R* | *85* | 053-0602924130144 | Chestnut Café | 4135 | WEST BROADWAY | ROBBINSDALE | Medium |
| *R* | *86* | 053-0602924130101 | Robbinsdale Marine | 4139 | LAKELAND AVE N | ROBBINSDALE | Medium |
| *R* | *86* | 053-0602924130102 | Robbinsdale Marine | 4137 | LAKELAND AVE N | ROBBINSDALE | Medium |
| *R* | *87* | 053-0602924130109 | Hirshfields/Ace Hardware | 4140 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *87* | 053-0602924130110 | Hirshfields/Ace Hardware | 4142 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *88* | 053-0602924130111 | Wuollet Bakery & Espresso | 4609 | 41 1/2 AVE N | ROBBINSDALE | High |
| *R* | *89* | 053-0602924130143 | Home Options | 4140 | HUBBARD AVE N | ROBBINSDALE | Low |
| *R* | *90* | 053-0602924240015 | Hubbard Market Place | 4139 | HUBBARD AVE N | ROBBINSDALE | High |
| *R* | *90* | 053-0602924240135 | Hubbard Market Place | 4145 | HUBBARD AVE N | ROBBINSDALE | High |
| *R* | *91* | 053-0602924120122 | Parking lot | 4611 | 42ND AVE N | ROBBINSDALE | Low |
| *R* | *91* | 053-0602924130135 | Parking lot | 4165 | LAKELAND AVE N | ROBBINSDALE | Low |
| *R* | *91* | 053-0602924130138 | Parking lot | 4148 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *91* | 053-0602924130141 | Parking lot | 4170 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *92* | 053-0602924130014 | Outdoor Patio | 4151 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *93* | 053-0602924240137 | Commercial Building | 4614 | 41 1/2 AVE N | ROBBINSDALE | Low |
| *R* | *94* | 053-0602924130013 | Canton Garden Restaurant | 4153 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *95* | 053-0602924120116 | McDonalds | 4601 | LAKE DR | ROBBINSDALE | Low |
| *R* | *96* | 053-0602924130137 | Retail Commercial Building | 4150 | WEST BROADWAY | ROBBINSDALE | Medium |
| *R* | *97* | 053-0602924240017 | Golden Age Design | 4157 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *98* | 053-0602924240136 | Parking Lot | 4155 | HUBBARD AVE N | ROBBINSDALE | Low |
| *R* | *99* | 053-0602924240018 | Hackenmueller's Meat Market | 4159 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *100* | 053-0602924240016 | Commercial Building | 4165 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *101* | 053-0602924240012 | Northside Oriental | 4165 | HUBBARD AVE N | ROBBINSDALE | Medium |
| *R* | *101* | 053-0602924240013 | Northside Oriental | 4719 | 42ND AVE N | ROBBINSDALE | Medium |
| *R* | *102* | 053-0602924130140 | Nonna Rosa's | 4168 | WEST BROADWAY | ROBBINSDALE | Medium |
| *R* | *102* | 053-0602924130142 | Nonna Rosa's | 4160 | WEST BROADWAY | ROBBINSDALE | Medium |
| *R* | *103* | 053-0602924240008 | Commercial Building | 4175 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *104* | 053-0602924240010 | EMI Audio | 4719 | 42ND AVE N | ROBBINSDALE | Low |
| *R* | *105* | 053-0602924120121 | Commercial Building | 4180 | WEST BROADWAY | ROBBINSDALE | Medium |
| *R* | *106* | 053-0602924240007 | Tailor Shop | 4179 | WEST BROADWAY | ROBBINSDALE | Medium |
| *R* | *107* | 053-0602924240140 | The Steinhauser Group | 4707 | 42ND AVE N | ROBBINSDALE | High |
| *R* | *108* | 053-0602924240139 | Robbinsdale Gallery of Art/Historical Museum/Library | 4915 | 42ND AVE N | ROBBINSDALE | Low |
| *R* | *109* | 053-0602924120032 | Pilgrim Cleaners | 4606 | LAKE DR | ROBBINSDALE | Medium |
| *R* | *110* | 053-0602924210113 | Sipe's Shell | 4200 | WEST BROADWAY | ROBBINSDALE | Medium |
| *R* | *111* | 053-0602924210036 | BP Gas Station | 4205 | WEST BROADWAY | ROBBINSDALE | Medium |
| *R* | *112* | 053-0602924210037 | Commercial Building | 4716 | 42ND AVE N | ROBBINSDALE | Low |
| *R* | *113* | 053-0602924210038 | Commercial Building | 4718 | 42ND AVE N | ROBBINSDALE | Low |
| *R* | *114* | 053-0602924210032 | Metro Building Companies | 44 | ADDRESS UNASSIGNED | ROBBINSDALE | Low |
| *R* | *114* | 053-0602924210114 | Metro Building Companies | 4738 | 42ND AVE N | ROBBINSDALE | Low |
| *R* | *115* | 053-0602924210041 | Sawhorse Designers & Builders | 4740 | 42ND AVE N | ROBBINSDALE | Low |
| *R* | *115* | 053-0602924210042 | Sawhorse Designers & Builders | 4740 | 42ND AVE N | ROBBINSDALE | Low |
| *R* | *115* | 053-0602924210120 | Sawhorse Designers & Builders | 4750 | 42ND AVE N | ROBBINSDALE | Low |
| *R* | *116* | 053-0602924210070 | Chirocenter Robbinsdale Chiropractic | 4926 | 42ND AVE N | ROBBINSDALE | Low |

| *Segment* | *Parcel* | PIN | Site Name | Building Number | Street Name | City | Ranking |
|---|---|---|---|---|---|---|---|
| *R* | *117* | 053-0602924210069 | A Gentle Dental Center | 4930 | 42ND AVE N | ROBBINSDALE | Low |
| *R* | *118* | 053-0602924220003 | Redeemer Evangelical Lutheran Church | 4201 | REGENT AVE N | ROBBINSDALE | Low |
| *R* | *118* | 053-0602924220002 | Redeemer Evangelical Lutheran Church | 4233 | REGENT AVE N | ROBBINSDALE | Low |
| *R* | *119* | 053-0602924210112 | TCF Bank | 4222 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *120* | 053-0602924210118 | Washburn & McReavy Robbinsdale Chapel | 4239 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *121* | 053-0602924210102 | Robbinsdale Masonic Center | 4228 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *122* | 053-0911821430017 | Osterhus Bibles, Books & Gifts | 4500 | WEST BROADWAY | ROBBINSDALE | Low |
| *R* | *123* | 053-0911821430001 | City of Robbinsdale Municipal Shop | 4601 | TOLEDO AVE N | ROBBINSDALE | Medium |
| *C* | *124* | 053-0511821140069 | Railroad Right of Way | 54 | ADDRESS UNASSIGNED | CRYSTAL | Medium |
| *C* | *124* | 053-0911821240022 | Railroad Right of Way | 54 | ADDRESS UNASSIGNED | CRYSTAL | Medium |
| *C* | *124* | 053-0411821330035 | Railroad Right of Way | 54 | ADDRESS UNASSIGNED | CRYSTAL | Medium |
| *C* | *124* | 053-0911821310125 | Railroad Right of Way | 54 | ADDRESS UNASSIGNED | CRYSTAL | Medium |
| *R* | *125* | 053-0911821310009 | Century Link | 4700 | WELCOME AVE N | CRYSTAL | Medium |
| *R* | *126* | 053-0911821420066 | Blind Installation & Repair | 5421 | LAKESIDE AVE N | CRYSTAL | Medium |
| *R* | *127* | 053-0911821310027 | Commercial Building | 4801 | WELCOME AVE N | CRYSTAL | Low |
| *R* | *127* | 053-0911821310028 | Commercial Building | 4801 | WELCOME AVE N | CRYSTAL | Low |
| *R* | *128* | 053-0911821310007 | Steve O's Bar & Grill | 4900 | WEST BROADWAY | CRYSTAL | Low |
| *R* | *129* | 053-0911821310121 | Full Proof Ministry and Thomas Tool & Supply | 4835 | WEST BROADWAY | CRYSTAL | Medium |
| *C* | *130* | 053-0911821310006 | Crystal Wine & Spirits | 4920 | WEST BROADWAY | CRYSTAL | Low |
| *C* | *131* | 053-0911821310126 | O'Reilly Auto Parts | 4905 | WEST BROADWAY | CRYSTAL | Low |
| *C* | *132* | 053-0911821240066 | Crystal Public Works Facility | 5001 | WEST BROADWAY | CRYSTAL | Low |
| *C* | *133* | 053-0911821240057 | Doyle's Bowling & Lounge | 5000 | WEST BROADWAY | CRYSTAL | Low |
| *C* | *134* | 053-0911821240056 | Fun Services | 5617 | CORVALLIS AVE N | CRYSTAL | Medium |
| *C* | *135* | 053-0911821230005 | Washburn-McReavy Funeral Chapel | 5125 | WEST BROADWAY | CRYSTAL | Low |
| *C* | *136* | 053-0911821240025 | Stormwater Pond | 5101 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *137* | 053-0911821240003 | Tim's Tree Service | 5612 | CORVALLIS AVE N | CRYSTAL | Low |
| *C* | *138* | 053-0911821240065 | Crystal Collision Center and Car Wash | 5108 | WEST BROADWAY | CRYSTAL | Medium |
| *C* | *139* | 053-0911821240001 | Kilmer Electric | 54 | ADDRESS UNASSIGNED | CRYSTAL | Medium |
| *C* | *139* | 053-0911821240002 | Kilmer Electric | 5141 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *140* | 053-0911821240024 | Auto Plus Auto Parts | 5140 | WEST BROADWAY | CRYSTAL | Medium |
| *C* | *141* | 053-0911821240023 | Midwest Motor Craft | 5160 | WEST BROADWAY | CRYSTAL | Medium |
| *C* | *142* | 053-0911821220008 | North Suburban Towing and Thomas Auto Body & Collision | 5170 | WEST BROADWAY | CRYSTAL | Medium |
| *C* | *143* | 053-0911821210009 | Bill's Economy Glass | 5201 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *144* | 053-0911821210010 | Multi-Tenant Commercial Building | 5221 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *145* | 053-0911821220041 | Vacant Parcel | 5128 | HANSON CT N | CRYSTAL | Low |
| *C* | *146* | 053-0911821220040 | The Phone Guys/S&S Communications | 5124 | HANSON CT N | CRYSTAL | Low |
| *C* | *147* | 053-0911821220039 | Golden Valley Heating & Air | 5182 | WEST BROADWAY | CRYSTAL | Medium |
| *C* | *148* | 053-0911821210004 | BGD Companies | 5323 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *149* | 053-0911821220021 | Vacant Parcel | 5208 | HANSON CT N | CRYSTAL | Medium |
| *C* | *150* | 053-0911821220046 | All American Storage | 5217 | HANSON CT N | CRYSTAL | Medium |
| *C* | *150* | 053-0911821220010 | All American Storage | 5225 | HANSON CT N | CRYSTAL | Medium |
| *C* | *151* | 053-0911821220028 | Collision Masters | 5115 | HANSON CT N | CRYSTAL | Low |
| *C* | *152* | 053-0911821210006 | Standard Water Control Systems | 5333 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *153* | 053-0911821210060 | Skip's Auto Repair | 5343 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *154* | 053-0911821220019 | CBF by Pierre | 5224 | HANSON CT N | CRYSTAL | Low |
| *C* | *155* | 053-0911821220009 | Miller Diversified Machining | 5241 | HANSON CT N | CRYSTAL | Medium |
| *C* | *156* | 053-0911821220056 | Creative Partnership/Rise | 5353 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *157* | 053-0911821220017 | Curbside Waste | 5240 | HANSON CT N | CRYSTAL | Medium |
| *C* | *157* | 053-0911821220018 | Curbside Waste | 5232 | HANSON CT N | CRYSTAL | Medium |

| *Segment* | *Parcel* | PIN | Site Name | Building Number | Street Name | City | Ranking |
|---|---|---|---|---|---|---|---|
| *C* | *158* | 053-0911821220058 | Industrial Stainless Supply Inc | 5265 | HANSON CT N | CRYSTAL | Medium |
| *C* | *159* | 053-0911821220022 | Beaver Machine | 5273 | HANSON CT N | CRYSTAL | Medium |
| *C* | *160* | 053-0411821340061 | Holiday | 5402 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *160* | 053-0411821340062 | Holiday | 5410 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *160* | 053-0411821340063 | Holiday | 5410 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *161* | 053-0411821330042 | Car Hop | 5417 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *162* | 053-0411821330032 | Commercial Building | 5400 | DOUGLAS DR N | CRYSTAL | High |
| *C* | *162* | 053-0411821330022 | Commercial Building | 5431 | LAKELAND AVE N | CRYSTAL | High |
| *C* | *162* | 053-0411821330023 | Commercial Building | 5425 | LAKELAND AVE N | CRYSTAL | High |
| *C* | *163* | 053-0411821330043 | Crystal Business Commons | 5500 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *164* | 053-0411821330004 | Max It Pawn Shop | 5445 | LAKELAND AVE N | CRYSTAL | Low |
| *C* | *165* | 053-0411821330039 | Steen Engineering and Douglas Storage | 5430 | DOUGLAS DR N | CRYSTAL | Low |
| *C* | *166* | 053-0411821330005 | U-Haul Center | 5465 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *167* | 053-0411821330040 | Cedarwoods Apartments | 5450 | DOUGLAS DR N | CRYSTAL | Medium |
| *C* | *168* | 053-0411821330001 | The Schrader Building | 5501 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *169* | 053-0411821330010 | Undeveloped Land | 5521 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *170* | 053-0411821330041 | Becker Park and Crystal Arts and Activity Center | 6225 | 56TH AVE N | CRYSTAL | Medium |
| *C* | *171* | 053-0411821330009 | Undeveloped Land | 5531 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *172* | 053-0411821330006 | Cell Tower and Undeveloped Land | 5561 | LAKELAND AVE N | CRYSTAL | High |
| *C* | *172* | 053-0411821330007 | Cell Tower and Undeveloped Land | 5551 | LAKELAND AVE N | CRYSTAL | High |
| | *173* | 053-0411821320112 | Bass Lake Center | 6000 | 56TH AVE N | CRYSTAL | Medium |
| *C* | *174* | 053-0411821320109 | Undeveloped Land | 5602 | LAKELAND AVE N | CRYSTAL | Medium |
| *C* | *175* | 053-0411821320105 | Multi-Tenant Commercial Buildings | 6200 | 56TH AVE N | CRYSTAL | Low |
| *C* | *175* | 053-0411821320106 | Multi-Tenant Commercial Buildings | 6230 | 56TH AVE N | CRYSTAL | Low |
| *C* | *175* | 053-0411821320107 | Multi-Tenant Commercial Buildings | 6230 | 56TH AVE N | CRYSTAL | Low |
| *C* | *176* | 053-0511821410108 | Parking Lot | 6306 | 56TH AVE N | CRYSTAL | Medium |
| *C* | *177* | 053-0511821410106 | Retail Stores | 6320 | 56TH AVE N | CRYSTAL | Low |
| *C* | *177* | 053-0511821410107 | Retail Stores | 6316 | 56TH AVE N | CRYSTAL | Low |
| *C* | *178* | 053-0411821320103 | Cities Auto | 5630 | LAKELAND AVE N | CRYSTAL | Low |
| | *179* | 053-0411821320113 | Crystal Medical Center | 5700 | BOTTINEAU BLVD | CRYSTAL | Medium |
| *C* | *180* | 053-0411821320025 | Undeveloped Land | 5736 | LAKELAND AVE N | CRYSTAL | Low |
| *C* | *181* | 053-0511821140001 | Crystal Airport | 54 | ADDRESS UNASSIGNED | CRYSTAL | Medium |
| *C* | *181* | 053-0411821110001 | Crystal Airport | 5800 | CRYSTAL AIRPORT RD | CRYSTAL | Medium |
| *C* | *182* | 053-0511821140040 | Moy Residence | 6519 | DUDLEY AVE N | CRYSTAL | Low |
| *C* | *183* | 053-0511821110098 | North Star Inn & Suites | 6000 | LAKELAND AVE N | CRYSTAL | Low |
| *C* | *184* | 053-0511821110096 | Rostamo's Bar | 6014 | LAKELAND AVE N | CRYSTAL | Low |
| *C* | *185* | 053-0511821110104 | Jack's Auto Sales | 6043 | FLORIDA AVE N | CRYSTAL | Low |
| *C* | *185* | 053-0511821110037 | Jack's Auto Sales | 6030 | LAKELAND AVE N | CRYSTAL | Low |
| *C* | *186* | 053-0511821110071 | Premier Motors | 6048 | LAKELAND AVE N | CRYSTAL | Low |
| *C* | *186* | 053-0511821110087 | Premier Motors | 6058 | LAKELAND AVE N | CRYSTAL | Low |
| *BP2* | *187* | 053-3211921210001 | Railroad Right of Way | 48 | ADDRESS UNASSIGNED | BROOKLYN PARK | Medium |
| *BP2* | *187* | 053-3211921240020 | Railroad Right of Way | 48 | ADDRESS UNASSIGNED | BROOKLYN PARK | Medium |
| *BP2* | *187* | 053-3211921420049 | Railroad Right of Way | 48 | ADDRESS UNASSIGNED | BROOKLYN PARK | Medium |
| *BP2* | *187* | 053-2911921230015 | Railroad Right of Way | 48 | ADDRESS UNASSIGNED | BROOKLYN PARK | Medium |
| *BP2* | *188* | 053-3211921440081 | Minneapolis LU539 Pipefitters | 6200 | LAKELAND AVE N | BROOKLYN PARK | Low |
| *BP2* | *189* | 053-3211921430015 | The Waterford | 7000 | 62ND AVE N | BROOKLYN PARK | Medium |
| *BP2* | *190* | 053-3211921440077 | Former Latzke Iron Works | 6224 | LAKELAND AVE N | BROOKLYN PARK | High |
| *BP2* | *191* | 053-3211921430029 | Multi-Tenant Commercial Building | 6248 | LAKELAND AVE N | BROOKLYN PARK | Medium |
| *BP2* | *192* | 053-3211921430030 | Waterford Senior Townhomes | 6280 | LOUISIANA CT N | BROOKLYN PARK | High |
| *BP2* | *193* | 053-3211921430007 | Stormwater Pond and Undeveloped Land | 48 | ADDRESS UNASSIGNED | BROOKLYN PARK | Medium |
| *BP2* | *193* | 053-3211921430027 | Stormwater Pond and Undeveloped Land | 6280 | LAKELAND AVE N | BROOKLYN PARK | Medium |
| *BP2* | *193* | 053-3211921430028 | Stormwater Pond and Undeveloped Land | 6260 | LAKELAND AVE N | BROOKLYN PARK | Medium |

| *Segment* | *Parcel* | PIN | Site Name | Building Number | Street Name | City | Ranking |
|---|---|---|---|---|---|---|---|
| *BP2* | *193* | 053-3211921430001 | Stormwater Pond and Undeveloped Land | 6288 | LAKELAND AVE N | BROOKLYN PARK | Medium |
| *BP2* | *193* | 053-3211921430002 | Stormwater Pond and Undeveloped Land | 6725 | 63RD AVE N | BROOKLYN PARK | Medium |
| *BP2* | *193* | 053-3211921430003 | Stormwater Pond and Undeveloped Land | 6721 | 63RD AVE N | BROOKLYN PARK | Medium |
| *BP2* | *193* | 053-3211921430025 | Stormwater Pond and Undeveloped Land | 6701 | 63RD AVE N | BROOKLYN PARK | Medium |
| *BP2* | *193* | 053-3211921430026 | Stormwater Pond and Undeveloped Land | 6705 | 63RD AVE N | BROOKLYN PARK | Medium |
| *BP2* | *194* | 053-3211921420054 | The Groves Apartments | 6800 | 63RD AVE N | BROOKLYN PARK | Medium |
| *BP2* | *195* | 053-3211921420002 | Stormwater Pond | 6300 | LAKELAND AVE N | BROOKLYN PARK | High |
| *BP2* | *195* | 053-3211921420003 | Stormwater Pond | 6308 | LAKELAND AVE N | BROOKLYN PARK | High |
| *BP2* | *195* | 053-3211921420006 | Stormwater Pond | 6332 | LAKELAND AVE N | BROOKLYN PARK | High |
| *BP2* | *195* | 053-3211921420053 | Stormwater Pond | 6324 | LAKELAND AVE N | BROOKLYN PARK | High |
| *BP2* | *196* | 053-3211921420012 | Metro Transit Bottineau & 63rd Park & Ride | 7000 | 63RD AVE N | BROOKLYN PARK | High |
| *BP2* | *197* | 053-3211921420007 | TN Transportation and Automotive | 6400 | LAKELAND AVE N | BROOKLYN PARK | Medium |
| *BP2* | *198* | 053-3211921420009 | Nguyen Residence | 6416 | LAKELAND AVE N | BROOKLYN PARK | Medium |
| *BP2* | *199* | 053-3211921240024 | O'Reilly Auto Parts | 6600 | WEST BROADWAY | BROOKLYN PARK | Medium |
| *BP2* | *200* | 053-3211921210004 | OMCM Marketing Solutions | 6748 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP2* | *201* | 053-3211921210003 | Broadway Rentals | 6800 | WEST BROADWAY | BROOKLYN PARK | Medium |
| *BP2* | *202* | 053-2911921340004 | Carmax | 6900 | LAKELAND AVE N | BROOKLYN PARK | Medium |
| *BP2* | *203* | 053-3211921210002 | Lights on Broadway | 6900 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP2* | *204* | 053-2911921340005 | Wagner's Drive In | 7000 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP2* | *205* | 053-2911921330005 | Interstate North Business Center | 6965 | WEST BROADWAY | BROOKLYN PARK | Medium |
| *BP2* | *205* | 053-2911921330006 | Interstate North Business Center | 6973 | WEST BROADWAY | BROOKLYN PARK | Medium |
| *BP2* | *205* | 053-2911921330007 | Interstate North Business Center | 7040 | WINNETKA AVE N | BROOKLYN PARK | Medium |
| *BP2* | *205* | 053-2911921330008 | Interstate North Business Center | 7044 | WINNETKA AVE N | BROOKLYN PARK | Medium |
| *BP2* | *206* | 053-2911921340003 | All American Recreation | 6948 | LAKELAND AVE N | BROOKLYN PARK | Low |
| *BP2* | *207* | 053-2911921340051 | U-Haul | 7007 | LAKELAND AVE N | BROOKLYN PARK | Medium |
| *BP2* | *208* | 053-2911921340048 | Wendy's | 7445 | 71ST AVE N | BROOKLYN PARK | Medium |
| *BP2* | *209* | 053-2911921320016 | Americold Distribution | 7130 | WINNETKA AVE N | BROOKLYN PARK | Medium |
| *BP2* | *210* | 053-2911921310290 | Mister Carwash | 7100 | WEST BROADWAY | BROOKLYN PARK | Medium |
| *BP2* | *211* | 053-2911921320019 | Consignment Central | 7111 | WEST BROADWAY | BROOKLYN PARK | Medium |
| *BP2* | *212* | 053-2911921320020 | North American Gear & Forge | 7204 | WINNETKA AVE N | BROOKLYN PARK | Medium |
| *BP2* | *213* | 053-2911921320003 | Prince of Peace Lutheran Church | 7517 | 73RD AVE N | BROOKLYN PARK | Low |
| *BP2* | *213* | 053-2911921320022 | Prince of Peace Lutheran Church | 7217 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP2* | *214* | 053-2911921320021 | Penske | 7214 | WINNETKA AVE N | BROOKLYN PARK | Medium |
| *BP2* | *215* | 053-2911921320015 | Mayer Electric | 7224 | WINNETKA AVE N | BROOKLYN PARK | Low |
| *BP2* | *216* | 053-2911921320004 | Lots Survey Company | 7601 | 73RD AVE N | BROOKLYN PARK | Low |
| *BP2* | *217* | 053-2911921320005 | Distinguished Landscape | 7609 | 73RD AVE N | BROOKLYN PARK | Low |
| *BP2* | *218* | 053-2911921230019 | Brooklyn Park West Fire Station | 7301 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP2* | *219* | 053-2911921230009 | American Furniture Market | 7308 | LAKELAND AVE N | BROOKLYN PARK | Medium |
| *BP2* | *220* | 053-2911921230010 | Modern Dental Studio | 7300 | LAKELAND AVE N | BROOKLYN PARK | Medium |
| *BP2* | *221* | 053-3011921140006 | Public Storage | 7800 | 73RD AVE N | BROOKLYN PARK | Low |
| *BP2* | *222* | 053-2911921230008 | Sisaket Plaza | 7316 | LAKELAND AVE N | BROOKLYN PARK | Low |
| *BP2* | *223* | 053-2911921230007 | Broadway Party & Tent Rental | 7409 | JOLLY LA N | BROOKLYN PARK | Low |
| *BP2* | *224* | 053-2911921230006 | Magic Carpets Flooring Center | 7400 | LAKELAND AVE N | BROOKLYN PARK | Low |
| *BP2* | *225* | 053-2911921220024 | Target | 7535 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP2* | *226* | 053-2911921230004 | Funk Animal Hospital | 7425 | JOLLY LA N | BROOKLYN PARK | Low |
| *BP2* | *227* | 053-2911921220023 | Cub Foods | 7555 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP2* | *228* | 053-2911921210106 | US Bank | 7600 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP2* | *229* | 053-2911921220022 | McDonald's | 7685 | WEST BROADWAY | BROOKLYN PARK | Low |

| *Segment* | *Parcel* | PIN | Site Name | Building Number | Street Name | City | Ranking |
|---|---|---|---|---|---|---|---|
| *BP2* | *230* | 053-2911921210096 | Buerkle Acura | 7925 | BROOKLYN BLVD | BROOKLYN PARK | Medium |
| *BP2* | *231* | 053-2911921220012 | Popeye's | 8025 | BROOKLYN BLVD | BROOKLYN PARK | Medium |
| *BP2* | *232* | 053-2911921220011 | Wells Fargo Bank | 8041 | BROOKLYN BLVD | BROOKLYN PARK | Low |
| *BP2* | *233* | 053-2011921340002 | Northwind Plaza | 7944 | BROOKLYN BLVD | BROOKLYN PARK | Medium |
| *BP2* | *233* | 053-2011921340079 | Northwind Plaza | 7944 | BROOKLYN BLVD | BROOKLYN PARK | Medium |
| *BP2* | *234* | 053-2011921330005 | Baker's Square | 8000 | BROOKLYN BLVD | BROOKLYN PARK | Low |
| *BP2* | *235* | 053-2011921330004 | Arby's | 8016 | BROOKLYN BLVD | BROOKLYN PARK | Low |
| *BP2* | *236* | 053-2011921340080 | CVS Pharmacy 4597 | 7996 | BROOKLYN BLVD | BROOKLYN PARK | Low |
| *BP2* | *237* | 053-2011921330006 | Park Square | 8020 | BROOKLYN BLVD | BROOKLYN PARK | Medium |
| *BP2* | *238* | 053-2011921320010 | Brooklyn Park Evangelical Free Church | 7901 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP2* | *239* | 053-2011921310089 | Residential Dwelling | 7325 | 79TH AVE N | BROOKLYN PARK | Medium |
| *BP1* | *240* | 053-2011921310005 | Prusinowski Residence | 7325 | CANDLEWOOD DR N | BROOKLYN PARK | Medium |
| *BP1* | *241* | 053-2011921210001 | North Hennepin Community College | 7411 | 85TH AVE N | BROOKLYN PARK | Medium |
| *BP1* | *242* | 053-2011921220068 | Ronning Residence | 8441 | RHODE ISLAND DR N | BROOKLYN PARK | Medium |
| *BP1* | *243* | 053-2011921220096 | Broadway Square | 8401 | WEST BROADWAY | BROOKLYN PARK | Medium |
| *BP1* | *244* | 053-1711921340052 | Hennepin County Library | 8500 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP1* | *245* | 053-1711921320205 | Berean Baptist Church | 8825 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP1* | *246* | 053-1711921230011 | Commercial Building | 7601 | SETZLER PKWY N | BROOKLYN PARK | Low |
| *BP1* | *247* | 053-1711921230006 | Commercial Building | 7500 | SETZLER PKWY N | BROOKLYN PARK | Low |
| *BP1* | *248* | 053-1711921220012 | Crosstown North Business Center | 9100 | WYOMING AVE N | BROOKLYN PARK | Low |
| *BP1* | *249* | 053-1711921210081 | Commercial Building | 9200 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP1* | *250* | 053-1711921220010 | Crosstown North Business Center | 9201 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP1* | *251* | 053-0811921430002 | Liberty Carton and Star Exhibits | 6900 | 93RD AVE N | BROOKLYN PARK | Low |
| *BP1* | *252* | 053-0811921340007 | Commercial Building | 7200 | 93RD AVE N | BROOKLYN PARK | Low |
| *BP1* | *253* | 053-0811921330024 | Biotest Laboratories | 9303 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP1* | *254* | 053-0811921340004 | Undeveloped Land | 9301 | LOUISIANA AVE N | BROOKLYN PARK | Low |
| *BP1* | *254* | 053-0811921310003 | Undeveloped Land | 48 | ADDRESS UNASSIGNED | BROOKLYN PARK | Low |
| *BP1* | *254* | 053-0811921310005 | Undeveloped Land | 48 | ADDRESS UNASSIGNED | BROOKLYN PARK | Low |
| *BP1* | *254* | 053-0811921340001 | Undeveloped Land | 48 | ADDRESS UNASSIGNED | BROOKLYN PARK | Low |
| *BP1* | *254* | 053-0811921340005 | Undeveloped Land | 48 | ADDRESS PENDING | BROOKLYN PARK | Low |
| *BP1* | *254* | 053-0811921310010 | Undeveloped Land | 9400 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP1* | *254* | 053-0811921340008 | Undeveloped Land | 9350 | WEST BROADWAY | BROOKLYN PARK | Low |
| *BP1* | *255* | 053-0811921330023 | Northwest EMC | 9349 | WEST BROADWAY | BROOKLYN PARK | Medium |
| *BP1* | *256* | 053-0811921330012 | Holiday | 9399 | WEST BROADWAY | BROOKLYN PARK | Medium |
| *BP1* | *257* | 053-0811921320004 | Baxter Healthcare | 9450 | WINNETKA AVE N | BROOKLYN PARK | Medium |
| *BP1* | *257* | 053-0811921330020 | Baxter Healthcare | 48 | ADDRESS UNASSIGNED | BROOKLYN PARK | Medium |
| *BP1* | *258* | 053-0811921330018 | Undeveloped Land | 9400 | WINNETKA AVE N | BROOKLYN PARK | High |
| *BP1* | *259* | 053-0811921420003 | Olympus Surgical Technologies America | 9600 | LOUISIANA AVE N | BROOKLYN PARK | Low |
| *BP1* | *260* | 053-0811921130004 | Target Corporation | 6901 | OAK GROVE PKWY N | BROOKLYN PARK | Medium |
| *BP1* | *260* | 053-0811921120006 | Target Corporation | 7000 | TARGET PKWY N | BROOKLYN PARK | Medium |
| *BP1* | *260* | 053-0811921210005 | Target Corporation | 7010 | TARGET PKWY N | BROOKLYN PARK | Medium |
| *BP-1* | *260* | 053-0811921130003 | Target Corporation | 6801 | OAK GROVE PKWY N | BROOKLYN PARK | Medium |
| *BP1* | *261* | 053-0811921240004 | Undeveloped Land | 48 | ADDRESS UNASSIGNED | BROOKLYN PARK | Low |
| *BP1* | *262* | 053-0811921230004 | Undeveloped Land | 9730 | WINNETKA AVE N | BROOKLYN PARK | Low |
| *BP1* | *263* | 053-0811921230002 | Undeveloped Land | 9800 | WINNETKA AVE N | BROOKLYN PARK | Medium |
| *BP1* | *264* | 053-0811921220001 | Undeveloped Land | 10032 | WINNETKA AVE N | BROOKLYN PARK | Medium |
| *BP1* | *265* | 053-0711921110004 | Undeveloped Land | 8005 | 101ST AVE N | BROOKLYN PARK | Low |
| *BP1* | *266* | 053-0711921110003 | Undeveloped Land | 8201 | 101ST AVE N | BROOKLYN PARK | Low |
| *BP1* | *267* | 053-0711921110002 | Undeveloped Land | 8249 | 101ST AVE N | BROOKLYN PARK | Low |
| *BP1* | *268* | 053-0511921340001 | Three Rivers Park District Rush Creek Regional Trail | 48 | ADDRESS UNASSIGNED | BROOKLYN PARK | Low |
| *BP1* | *269* | 053-0711921120004 | Grace Fellowship Church | 8601 | 101ST AVE N | BROOKLYN PARK | Medium |
| *BP1* | *270* | 053-0611921440001 | Undeveloped Land | 10225 | WINNETKA AVE N | BROOKLYN PARK | Low |
| *BP1* | *271* | 053-0611921430006 | Three Rivers Park District Rush Creek Regional Trail | 48 | ADDRESS UNASSIGNED | BROOKLYN PARK | Medium |

# Appendix M

# References

Bloomgren et al., “Depth to bedrock and bedrock topography,” *Geologic Atlas - Hennepin County, Minnesota,* County Atlas Series, Atlas C-4, Plate 4, Scale 1:100,000, Balban, N. H., ed., University of Minnesota - Minnesota Geological Survey, 1989.

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Kanivetsky, R., “Bedrock Hydrogeology,” *Geologic Atlas - Hennepin County, Minnesota,* County Atlas Series, Atlas C-4, Plate 6, Scale 1:150,000, Balban, N. H., ed., University of Minnesota - Minnesota Geological Survey, 1989b.

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Olsen et al., “Bedrock Geology,” *Geologic Atlas - Hennepin County, Minnesota,* County Atlas Series, Atlas C-4, Plate 2, Scale 1:100,000, Balban, N. H., ed., University of Minnesota - Minnesota Geological Survey, 1989.

# Appendix F
# Supporting Technical Reports

## F.8 Noise and Vibration Technical Report

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# Noise and Vibration Technical Report

May 2016

Blue Line Extension Project Technical Report

METROPOLITAN COUNCIL

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# Executive Summary

This Noise and Vibration Technical Report has been prepared as a supplement to the Final Environmental Impact Statement (EIS) document, to provide additional information on the noise and vibration impact assessment for the proposed METRO Blue Line Light Rail Transit (BLRT) Extension project. The technical report contains detailed information regarding the criteria, methodology, noise and vibration measurements, impact assessment results, and proposed mitigation measures. Additional information regarding the measurements and other technical data is found in the appendices to this report. Supplemental information regarding proposed BLRT Extension project specific information is also contained in the Draft EIS Noise and Vibration Technical Report, which is referenced where appropriate.

The results of the noise and vibration assessment for the proposed BLRT Extension project indicate that with the proposed mitigation measures, most residential noise impacts which meet the threshold for mitigation will be eliminated, and all vibration impacts will be eliminated from the proposed BLRT Extension project. The majority of the noise impacts from the proposed BLRT Extension project will be eliminated through the use of Quiet Zones or wayside devices. The vibration impacts from the proposed BLRT Extension project are localized to three areas and will be mitigated through conventional mitigation measures. **Section 1** of the report provides a summary of the impacts and mitigation measures for the proposed BLRT Extension project.

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## Tables



## Figures

## Appendixes

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# 1 Introduction and Summary

Cross-Spectrum Acoustics, Inc. (CSA) conducted a noise and vibration impact assessment for the proposed METRO Blue Line Light Rail Transit (BLRT) Extension project. Noise and vibration have been assessed in accordance with guidelines specified in the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment* guidance manual (FTA, 2006). The assessment was carried out in support of the Final Environmental Impact Statement (Final EIS). The objective of the assessment was to document the noise and vibration impacts at sensitive locations and identify mitigation measures as a part of the proposed BLRT Extension project.

A summary of the assessment results are described below in **Section 1**. **Section 2** provides a discussion of the regulatory context, including noise and vibration basics and details regarding the noise and vibration criteria used to assess impact. **Section 3** describes the methodology used to assess noise and vibration impact. **Section 4** discusses the existing conditions, including a description of the noise and vibration sensitive land uses and the measurements conducted to determine the existing noise and vibration conditions. **Section 5** includes the results of the noise and vibration impact assessment. Mitigation measures are discussed in **Section 6**. A**ppendices A and B** contain detailed information on the supplemental noise measurements conducted for the Final EIS. **Appendices C and D** contain figures showing the location of noise and vibration impacts, respectively. Where appropriate, references are made to the *Bottineau Transitway Draft EIS Noise and Vibration Technical Report* (December 2012).

Based on the screening distances provided in Chapters 4 and 9 of the FTA guidance manual *Transit Noise and Vibration Impact Assessment* (May 2006), the noise and vibration study area for the proposed BLRT Extension project was typically within 300 feet of the proposed BLRT Extension project except for areas near shared Federal Railroad Administration (FRA) grade crossings, where land uses within 800 feet were identified. This extended distance takes into account the light rail transit (LRT) horn sounding required at these crossings.

## 1.1 Noise

Prior to mitigation, there would be 366 moderate and 618 severe noise impacts at residential and institutional locations along the proposed BLRT Extension project. The majority of the noise impacts are due to the sounding of LRT horns at at-grade crossings, primarily those shared with existing freight operations. The remaining noise impacts are due primarily to the proximity of sensitive receptors to the proposed alignment.

Mitigation measures, as detailed in **Section 6**, will eliminate most residential noise impacts with meet the threshold for mitigation, based on FTA criteria, at locations throughout the proposed BLRT Extension project corridor. The primary mitigation measure will be the implementation of Quiet Zones at the shared at-grade crossings. This will eliminate the LRT horn sounding and will have the added benefit of eliminating the freight horns as well. Other mitigation measures may include wayside horns, wayside noise barriers, and sound insulation improvements. Details regarding specific mitigation measures are contained in **Section 6**.

## 1.2 Vibration

Prior to mitigation, there would be 28 residential vibration impacts at various locations along the proposed BLRT Extension project. Mitigation measures, as detailed in **Section 6**, will eliminate all vibration impacts at locations throughout the proposed BLRT Extension project corridor. The primary mitigation measure will be the use of ballast mats or equivalent mitigation measures. Details regarding specific mitigation measures are contained in **Section 6**.

# 2 Regulatory Context

## 2.1 Noise

### 2.1.1 Noise Basics

Sound is defined as small changes in air pressure above and below the standard atmospheric pressure and noise is usually considered to be unwanted sounds. The three parameters that define noise include:

- **Level:** The level of sound is the magnitude of air pressure change above and below atmospheric pressure, and is expressed in decibels (dB). Typical sounds fall within a range between 0 dB (the lower limits of human hearing) and 120 dB (the highest sound levels experienced in the environment). A 3-dB change in sound level is perceived as a barely noticeable change outdoors and a 10-dB change in sound level is perceived as a doubling (or halving) of the sound level.
- **Frequency:** The frequency (pitch or tone) of sound is the rate of air pressure changes and is expressed in cycles per second, or Hertz (Hz). Human ears can detect a wide range of frequencies from around 20 Hz to 20,000 Hz; however, human hearing is not effective at high and low frequencies, and the A-weighting system (dBA) is used to correlate with human response to noise. The A-weighted sound level has been widely adopted by acousticians as the most appropriate descriptor for environmental noise.
- **Time Pattern:** Because environmental noise is constantly changing, it is common to condense all of this information into a single number, called the "equivalent" sound level ($L_{eq}$). The $L_{eq}$ represents the changing sound level over a period of time, typically 1 hour or 24-hours in transit noise assessments. For LRT and freight rail projects, the Day-Night Sound Level ($L_{dn}$) is the common noise descriptor used, and has been adopted by most agencies as the best way to describe how people respond to noise in their environment. $L_{dn}$ is a 24-hour cumulative A-weighted noise level that includes all noises that happen within a day, with a 10 dB penalty for nighttime noise (10 p.m. to 7 a.m.). This nighttime penalty means that any noise events at night are equivalent to ten similar events during the day. Typical $L_{dn}$ values for various transit and freight operations are shown in **Figure 2-1**.

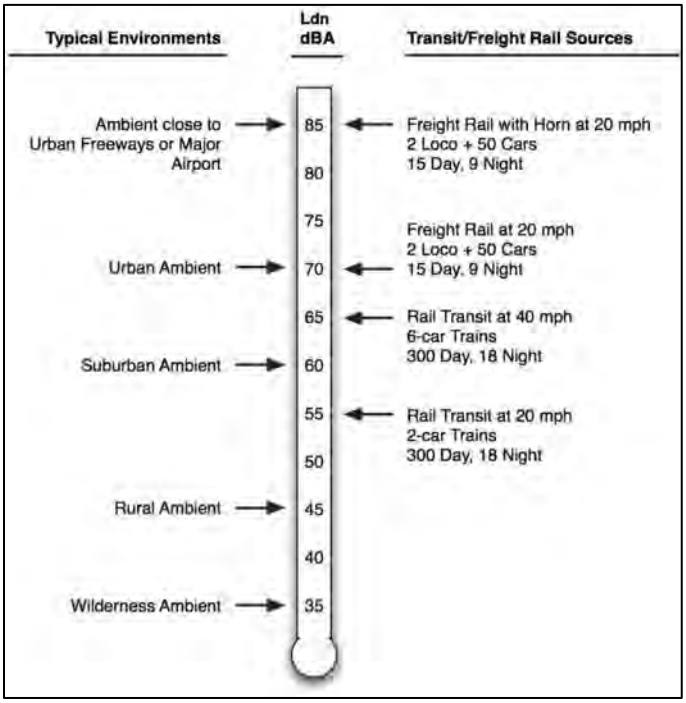
## 2.1.2 Noise Impact Criteria

### 2.1.2.1 FTA Transit Noise Criteria

The noise impact criteria used for the proposed BLRT Extension project are based on the information contained in Chapter 3 of the FTA noise and vibration guidance manual.[1] The FTA noise impact criteria are based on well-documented research on community response to noise and are based on both the existing level of noise and the change in noise exposure due to a project. The FTA noise criteria compare the proposed BLRT Extension project noise with the existing noise (not the No-Build noise).

The FTA noise criteria are based on the land use category of the sensitive receptor, and use $L_{dn}$ for locations where people sleep (Category 2) and $L_{eq}$ for locations with daytime and/or evening use (Category 1 or 3), as shown in **Table 2-1**.

**Figure 2-1. Cumulative Noise Levels from LRT and Freight Rail**




Source: CSA, 2015

[1] US Federal Transit Administration, "Transit Noise and Vibration Impact Assessment." Report FTA-VA-90-1003-06, May 2006.

The noise impact criteria are defined by the two curves shown in **Figure 2-2**, which allow increasing project noise as existing noise levels increase, up to a point at which impact is determined based on project noise alone. The FTA noise impact criteria include three levels of impact, as shown in **Figure 2-2**. The three levels of impact include:

- **No Impact:** In this range, the proposed BLRT Extension project is considered to have no impact since, on average the introduction of the proposed BLRT Extension project would result in an insignificant increase in the number of people highly annoyed by the proposed BLRT Extension project noise.
- **Moderate Impact:** At the moderate impact range, changes in the cumulative noise level are noticeable to most people, but may not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other proposed BLRT Extension project–specific factors must be considered to determine the magnitude of the impact and the need for mitigation, such as the existing noise level, predicted level of increase over existing noise levels and the types and numbers of noise-sensitive land uses affected.
- **Severe Impact:** At the severe impact range, a significant percentage of people would be highly annoyed by the proposed BLRT Extension project noise. Severe noise impacts are considered to be "significant" under the National Environmental Policy Act, and should be avoided if possible. Noise mitigation should be applied for severe impacts where feasible.

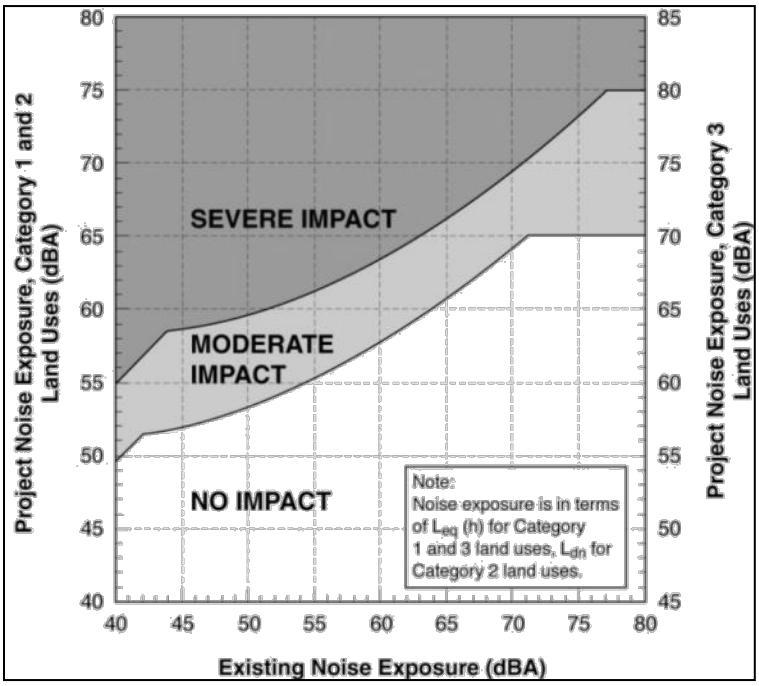
### Table 2-1. Land Use Categories and Metrics for Transit Noise Impact Criteria

| Land Use Category | Noise Metric (dBA) | Description of Land Use Category |
|---|---|---|
| 1 | Outdoor $L_{eq}(h)$ [1] | Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls. |
| 2 | Outdoor $L_{dn}$ | Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance. |
| 3 | Outdoor $L_{eq}(h)$ [1] | Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included. |

Source: FTA, 2006

[1] $L_{eq}$ for the noisiest hour of transit-related activity during hours of noise sensitivity.

**Figure 2-2. FTA Noise Impact Criteria**




Source: FTA, 2006

### 2.1.2.2 Cultural Resources

Under FTA guidance, historic sites are designated as noise sensitive depending on the land use of the site, not their designation as historic. Sites of national significance with considerable outdoor use required for site interpretation would be in Category 1.[2] Historic sites that are currently used as residences would be in Category 2. Historic buildings with indoor use of an interpretive nature involving meditation and study would be in Category 3. These include museums, significant birthplaces and buildings in which significant historical events occurred.

Most downtown areas have buildings which are historically significant because they represent a particular architectural style or are prime examples of the work of a historically significant designer. If the buildings or structures are used for commercial or industrial purposes and are located in busy commercial areas, they are not considered noise sensitive and the impact criteria do not apply.

Similarly, historical transportation structures, such as terminals and railroad depots, are not considered noise sensitive land uses. These buildings or structures may however be afforded special protection under Section 4(f) of the Department of Transportation (DOT) Act and Section 106 of the National Historic Preservation Act.

In the Section 106 process protecting historic and cultural properties, noise may or may not be considered an "adverse effect" depending on the individual circumstances and whether or not the

[2] Transit Noise and Vibration Impact Assessment, Chapter 3 (FTA, 2006)

use is noise sensitive, because, as previously noted, historic and cultural properties are only noise sensitive based on how they are used. The regulatory processes stemming from these statutes require coordination and consultation with agencies and organizations having jurisdiction over these resources. Their views on the proposed BLRT Extension project's impact on protected resources are given careful consideration by FTA and the proposed BLRT Extension project sponsor, and their recommendations may influence the decision to adopt noise reduction measures.[3]

#### 2.1.2.3 Minnesota Pollution Control Agency Noise Standards

The Minnesota Pollution Control Agency (MPCA) has an established set of Noise Standards (Minnesota Rules, Chapter 7030), which provide limits on environmental noise using the $L_{10}$ and $L_{50}$ descriptors, which represent the noise level exceeded 10 percent (6 minutes) and 50 percent (30 minutes) of the time during an hour, respectively. The standards include both daytime and nighttime limits for three different categories of land use or noise area classification, with residential lands included in noise area classification 1. Classifications 2 and 3 are generally for commercial and industrial land uses, respectively. The standards are shown in **Table 2-2**.

**Table 2-2. MPCA Noise Standards**

| Noise Area Classification | Daytime | | Nighttime | |
|---|---|---|---|---|
| | $L_{10}$ (dBA) | $L_{50}$ (dBA) | $L_{10}$ (dBA) | $L_{50}$ (dBA) |
| 1 | 65 | 60 | 55 | 50 |
| 2 | 70 | 65 | 70 | 65 |
| 3 | 80 | 75 | 80 | 75 |

Source: Minnesota Rules, Chapter 7030, Noise Pollution

Because of the time limit component of the MPCA noise standards, the proposed BLRT Extension project would not exceed the standards under the proposed operating conditions. Light rail vehicles would pass by a location for approximately 10 seconds 12 times an hour (based on the operating assumptions of 10 minute headways in each direction) for a total of 120 seconds, or 2 minutes. Because the duration of exposure to LRT noise does not exceed the $L_{10}$ (6 minutes) and $L_{50}$ (30 minutes) time components, there is no potential for the proposed BLRT Extension project to exceed MPCA thresholds. Because the proposed BLRT Extension project would not exceed the MPCA thresholds, the FTA noise impact criteria described previously are more protective than the MPCA standards and have been used to assess and mitigate noise impacts identified within this Final EIS.

[3] For historic or cultural resources, the following two circumstances in assessing impacts and mitigation measures: (1) The noise sensitivity of the property. While Table 1 gives a comprehensive list of noise sensitive land uses, there can be differences in noise sensitivity depending on individual circumstances. For example, a historic park or recreational area could vary in its sensitivity to noise depending on the type of use of the park (active versus passive recreation) and the settings in which it is located. (2) Special protection provided by law. Section 106 of the National Historic Preservation Act and Section 4(f) of the DOT Act (which protects historic sites, as well as publicly owned parks, recreation areas, wildlife, and waterfowl refuges) come into play frequently during the environmental review of transit projects. See pages 3-12 and 3-13 of the FTA Transit Noise and Vibration Impact Assessment for additional information on considerations given to resources that have special protection provided by law.

Information regarding the existing noise levels, which are not included in the MPCA assessment, in the proposed BLRT Extension project corridor and any exceedances of the MPCA standards is described in **Section 4.1.2**.

#### 2.1.2.4 FTA Construction Noise Criteria

FTA's construction noise criteria, summarized in **Table 2-3**, were used for the short-term noise impact analysis. The FTA construction noise criteria provide adequate protection for short-term noise impacts and allow for reasonable mitigation measures to be applied to the proposed BLRT Extension project. Additionally, MPCA noise criteria were evaluated for the proposed BLRT Extension project, and the Metropolitan Council (Council) will work with local jurisdictions to ensure that reasonable measures are taken to limit construction noise.

**Table 2-3. FTA Construction Noise Criteria**

| | 8-hour $L_{eq}$, dBA | | Noise Exposure, dBA |
|---|---|---|---|
| Land Use | Day | Night | 30-day Average |
| Residential | 80 | 70 | 75 |
| Commercial | 85 | 85 | 80 |
| Industrial | 90 | 90 | 85 |

Source: FTA, 2006

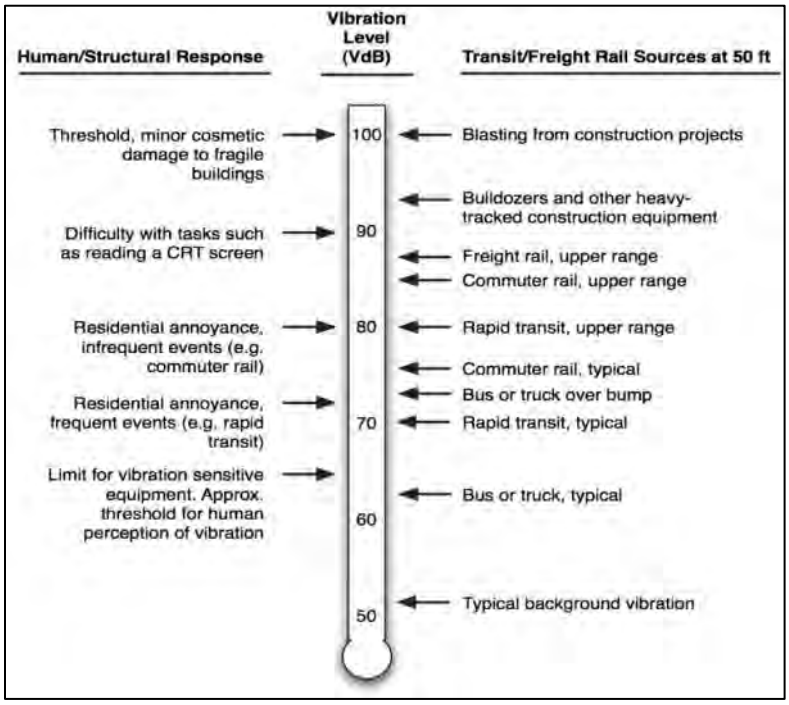
## 2.2 Vibration

Ground-borne vibration is the motion of the ground transmitted into a building that can be described in terms of displacement, velocity, or acceleration. Vibration velocity is used in transit and freight rail and is defined by the following:

- **Level:** Vibration is expressed in terms of vibration velocity level, using vibration decibels (VdB), with a reference of 1 micro-inch per second. The level of vibration represents how much the ground is moving. The threshold of human perception to transit and freight rail vibration is approximately 65 VdB and annoyance begins to occur for frequent events at vibration levels over 70 VdB.
- **Frequency:** Vibration frequency is expressed in Hertz (Hz). Human response to vibration is typically from about 6 Hz to 200 Hz.
- **Time Pattern:** Environmental vibration changes all the time and human response is roughly correlated to the number of vibration events during the day. The more events that occur, the more sensitive humans are to the vibration.

**Figure 2-3** shows typical ground-borne vibration levels for transit and freight projects as well as the corresponding human and structural responses to vibration.

**Figure 2-3. Vibration Levels from LRT and Freight Rail**




Source: CSA, 2015

## 2.2.1 Vibration Impact Criteria

### 2.2.1.1 FTA Transit Vibration Criteria

The vibration impact criteria used for the proposed BLRT Extension project are based on the information contained in Chapter 8 of the FTA noise and vibration guidance manual. The criteria for a general vibration assessment are based on land use and train frequency, as shown in **Table 2-4**. Some buildings, such as concert halls, recording studios and theaters, can have a higher sensitivity to vibration (or ground-borne noise) but do not fit into the three categories listed in **Table 2-4**. Because of the sensitivity of these buildings, special attention is paid to these buildings during the environmental assessment of a project. **Table 2-5** shows the FTA criteria for acceptable levels of vibration for several types of special buildings.

**Tables 2-4 and 2-5** include additional criteria for ground-borne noise, which is a low-frequency noise that is radiated from the motion of room surfaces, such as walls and ceilings in buildings due to ground-borne vibration. Ground-borne noise is defined in terms of dBA, which emphasizes middle and high frequencies, which are more audible to human ears. The criteria for ground-borne noise are much lower than for airborne noise to account for the low-frequency character of ground-borne noise; however, because airborne noise typically masks ground-borne noise for above

ground (at-grade or elevated) transit systems, ground-borne noise is only assessed for operations in tunnels, where airborne noise is not a factor, or at locations such as recording studios, which are well insulated from airborne noise.

### Table 2-4. Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for General Assessment

| Land Use Category | Ground-Borne Vibration Impact Levels (VdB re 1 micro-inch/sec) | | | Ground-Borne Noise Impact Levels (dBA re 20 micro-Pascals) | | |
|---|---|---|---|---|---|---|
| | Frequent Events[1] | Occasional Events[2] | Infrequent Events[3] | Frequent Events[1] | Occasional Events[2] | Infrequent Events[3] |
| Category 1: Buildings where vibration would interfere with interior operations. | 65[4] | 65[4] | 65[4] | N/A[5] | N/A[5] | N/A[5] |
| Category 2: Residences and buildings where people normally sleep. | 72 | 75 | 80 | 35 | 38 | 43 |
| Category 3: Institutional land uses with primarily daytime use. | 75 | 78 | 83 | 40 | 43 | 48 |

Source: FTA, 2006

[1] "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.

[2] "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.

[3] "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.

[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

[5] Vibration-sensitive equipment is generally not sensitive to ground-borne noise.

### Table 2-5. Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for Special Buildings

| Type of Building or Room | Ground-Borne Vibration Impact Levels (VdB re 1 micro-inch/sec) | | Ground-Borne Noise Impact Levels (dBA re 20 micro Pascals) | |
|---|---|---|---|---|
| | Frequent Events[1] | Occasional or Infrequent Events[2] | Frequent Events[1] | Occasional or Infrequent Events[2] |
| Concert halls | 65 | 65 | 25 | 25 |
| TV studios | 65 | 65 | 25 | 25 |
| Recording studios | 65 | 65 | 25 | 25 |
| Auditoriums | 72 | 80 | 30 | 38 |
| Theaters | 72 | 80 | 35 | 43 |

Source: FTA, 2006

[1] "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

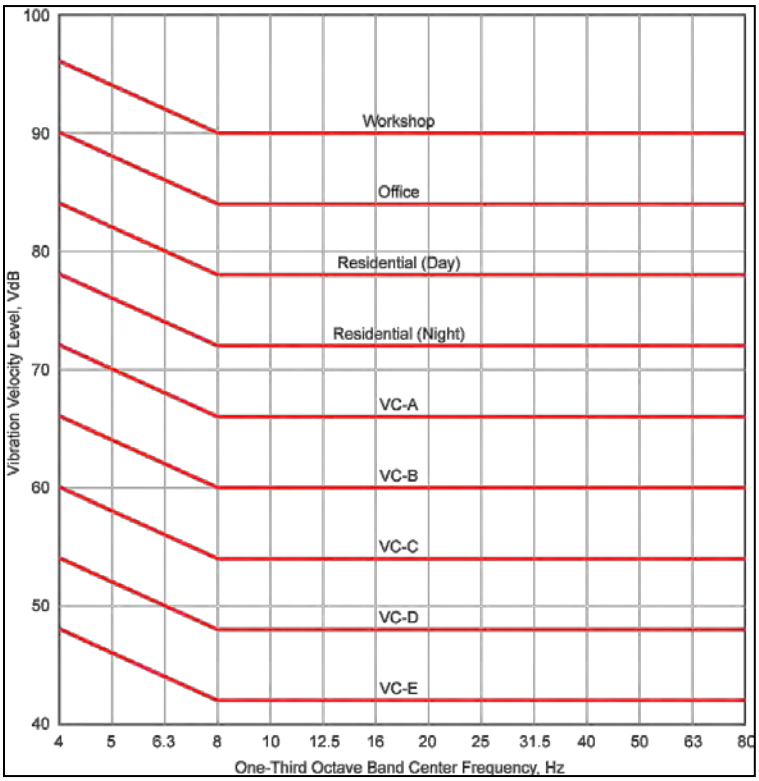
[2] "Occasional or Infrequent Events" is defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.

If the building will rarely be occupied when the trains are operating, there is no need to consider impact. As an example, consider locating a commuter rail line next to a concert hall. If no commuter trains would operate after 7 p.m., it should be rare that the trains interfere with the use of the hall.

The criteria for a detailed vibration assessment are shown in **Figure 2-4** and descriptions of the curves are shown in **Table 2-6**. The curves in **Figure 2-4** are applied to the projected vibration spectrum for the proposed BLRT Extension project. If the vibration level at any one frequency exceeds the criteria, there would be impact. Conversely, if the entire proposed vibration spectrum of the proposed BLRT Extension project is below the curve, there would be no impact.

For the proposed BLRT Extension project, the general vibration assessment criteria will be used at special buildings. The detailed vibration assessment criteria will be used to assess LRT ground-borne vibration.

## Figure 2-4. Detailed Vibration Criteria




Source: FTA, 2006

### Table 2-6. Interpretation of Vibration Criteria for Detailed Analysis

| Criterion Curve (see Figure 2-4) | Max Level (VdB)[1] | Description of Use |
|---|---|---|
| Workshop | 90 | Distinctly feelable vibration. Appropriate to workshops and non-sensitive areas. |
| Office | 84 | Feelable vibration. Appropriate to offices and non-sensitive areas. |
| Residential Day | 78 | Barely feelable vibration. Adequate for computer equipment and low-power optical microscopes (up to 20×). |
| Residential Night, Operating Rooms | 72 | Vibration not feelable, but ground-borne noise may be audible inside quiet rooms. Suitable for medium-power optical microscopes (100×) and other equipment of low sensitivity. |
| VC-A | 66 | Adequate for medium- to high-power optical microscopes (400×), microbalances, optical balances, and similar specialized equipment. |
| VC-B | 60 | Adequate for high-power optical microscopes (1,000×), inspection and lithography equipment to 3 micron line widths. |
| VC-C | 54 | Appropriate for most lithography and inspection equipment to 1 micron detail size. |
| VC-D | 48 | Suitable in most instances for the most demanding equipment, including electron microscopes operating to the limits of their capability. |
| VC-E | 42 | The most demanding criterion for extremely vibration-sensitive equipment. |

Source: FTA, 2006

[1] As measured in 1/3-octave bands of frequency over the frequency range 8 to 80 Hz.

#### 2.2.1.2 Cultural Resources

Under FTA guidance, historic sites are designated as vibration sensitive depending on the land use of the site, not their designation as historic. Historical sites that are currently used as residences will be in Category 2. Historic buildings with indoor use of an interpretive nature involving meditation and study will be in Category 3. These include museums, significant birthplaces, and buildings in which significant historical events occurred. One difference between noise and vibration is that outdoor land uses are not considered vibration sensitive. Only indoor land uses are considered vibration sensitive.

Most downtown areas have buildings which are historically significant because they represent a particular architectural style or are prime examples of the work of a historically significant designer. If the buildings or structures are used for commercial or industrial purposes and are located in busy commercial areas, they are not considered vibration sensitive and the impact criteria do not apply.

Similarly, historical transportation structures, such as terminals and railroad depots, are not considered vibration-sensitive land uses. These buildings or structures may however be afforded special protection under Section 4(f) of the DOT Act and Section 106 of the National Historic Preservation Act.

In the Section 106 process protecting historic and cultural properties, vibration may or may not be considered an “adverse effect” depending on the individual circumstances and whether or not the

use is vibration sensitive, because, as previously noted, historic and cultural properties are only vibration sensitive based on how they are used. The regulatory processes stemming from these statutes require coordination and consultation with agencies and organizations having jurisdiction over these resources. Their views on the project's impact on protected resources are given careful consideration by FTA and the project sponsor, and their recommendations may influence the decision to adopt vibration reduction measures.

#### 2.2.1.3 FTA Construction Vibration Criteria

In addition to the vibration criteria for human annoyance and interference with equipment and spaces described above, there are also vibration criteria for damage from construction activities. Typical transit operations do not have the potential for damage, so only certain construction activities are assessed for damage.

The thresholds for damage to structures are typically several orders of magnitude above the thresholds for human response to vibration. **Table 2-7** shows the FTA criteria for vibration damage to structures. This is based on the structure and construction type (and not a designation as historic). **Table 2-7** includes criteria in both VdB and peak particle velocity (PPV).

**Table 2-7. FTA Vibration Damage Criteria from Construction**

| Building Category | PPV (in/sec) | Approximate Lv[1] |
|---|---|---|
| I. Reinforced-concrete, steel or timber (no plaster) | 0.5 | 102 |
| II. Engineered concrete and masonry (no plaster) | 0.3 | 98 |
| III. Non-engineered timber and masonry buildings | 0.2 | 94 |
| IV. Buildings extremely susceptible to vibration damage | 0.12 | 90 |

Source: FTA, 2006

[1] RMS velocity in VdB re 1 micro-inch/second

# 3 Impact Assessment Methodology

## 3.1 Noise

This section describes the methodology for assessing the potential impact from the proposed BLRT Extension project.

Projected noise levels for the Final EIS Detailed Noise Analysis are based on noise measurements of the METRO Blue Line vehicles, which were conducted for the Central Corridor project, and the operating characteristics and current design of the proposed BLRT Extension project. Specific inputs used in the noise impact assessment include the following:

- Light rail train speeds would generally range from 20 miles per hour (mph) to 65 mph for revenue operations, except for entry and exit from station areas. Light rail train speeds are based on modeled speed profiles in both directions (i.e., inbound and outbound) that reflect train operating characteristics, track geometry, and station locations.
- Light rail trains would comprise three rail cars during hours of operation.
- The operating hours and headways[4] would be as follows:
  - Early morning hours (12:15 a.m. to 2:00 a.m.): 60-minute headways
  - Morning hours (4:00 a.m. to 5:30 a.m.): 30-minute headways
  - Early peak morning operating hours (5:30 a.m. to 6:30 a.m.) 15-minute headways
  - Peak operating hours (6:30 a.m. to 9:00 p.m.): 10-minute headways
  - Evening hours (9:00 p.m. to 10:15 p.m.): 20-minute headways
  - Late evening hours (10:15 p.m. to 12:15 a.m.): 30-minute headways
- The reference noise levels are shown in **Table 3-1**.

[4] Headways are the average time between transit vehicles operating in the same direction by a common point over a given period of time (e.g., four inbound light rail trains passing by a station within 1 hour will result in a 15-minute headway).

### Table 3-1. Blue Line Reference Noise Levels

| Noise Source | Sound Exposure Level,[1] 50 feet (dBA) |
|---|---|
| LRT on embedded track | 84 |
| LRT on ballast-and-tie track | 81 |
| Crossing bells | 76[2] |
| LRT bells | 86/87[3] |
| LRT horn | 109/115[4] |

Source: CSA, 2015

[1] The sound exposure level (SEL) is the cumulative noise from a single event, taking into account both the level and duration of the sound.

[2] The maximum noise level from crossing bells is 77 dBA at 10 feet. Crossing bells will be sounded for 20 seconds for each light rail vehicle at an at-grade crossing.

[3] The maximum noise level from LRT bells is 80 dBA at 50 feet. LRT bells will be sounded 3 times when entering and exiting stations (86 dBA SEL) and will be sounded for 5 seconds at each non-FRA at-grade crossing (8 dBA SEL).

[4] The maximum noise level from LRT horns is 96 dBA at 100 feet. LRT horns will be sounded for 5 seconds at certain higher speed at-grade crossings (109 dBA SEL) and for 15 seconds at all FRA at-grade crossings (115 dBA SEL).

- Locations of elevated structures, crossovers and embedded track were identified based on plan and profile maps provided by the engineering team.
- Crossovers increase the noise levels by up to 6 dB for nearby sensitive receptors due to the gap in the track.
- Elevated structures increase the noise levels by 4 dB for nearby sensitive receptors due to structure-borne noise.
- Anticipated use of bells and horns at each at-grade crossing and station was determined by Metro Transit Operations and proposed BLRT Extension project staff based on the following considerations:
  - Light rail vehicle bells will be sounded three times when entering and exiting station platforms
  - Light rail vehicle horns or bells will be sounded at at-grade crossings – horn or bell usage will be determined by Metro Transit Operations and will be based on a variety of factors, including train speeds at the crossing, type of crossing warning devices, at-grade crossing and adjacent roadway geometry, proximity to a freight rail crossing under the jurisdiction of FRA (the light rail vehicle horn or bell will be sounded for 5 seconds at non-FRA crossings; the light rail vehicle horn or bell will be sounded long, long, short, long for 15 seconds at FRA crossings) and other relevant factors
  - Grade crossing bells will be used at at-grade crossings for 20 seconds for each light rail train where there will be flashing lights and gates at the crossing.

- Light rail bells or horns will be sounded in the following manner for locations with stations directly adjacent to at-grade crossings:
  - For the side opposite the station, vehicles will sound their horns or bells in accordance with the procedures above for a grade crossing. No additional sounding will occur upon entering the station.
  - For the side with the station, vehicles will sound their bells in accordance with the procedure above upon entering the station. The vehicle will then sound either the horn or bell upon exiting the station until the front of the vehicle passes through the far side of the crossing.

## 3.2 Vibration

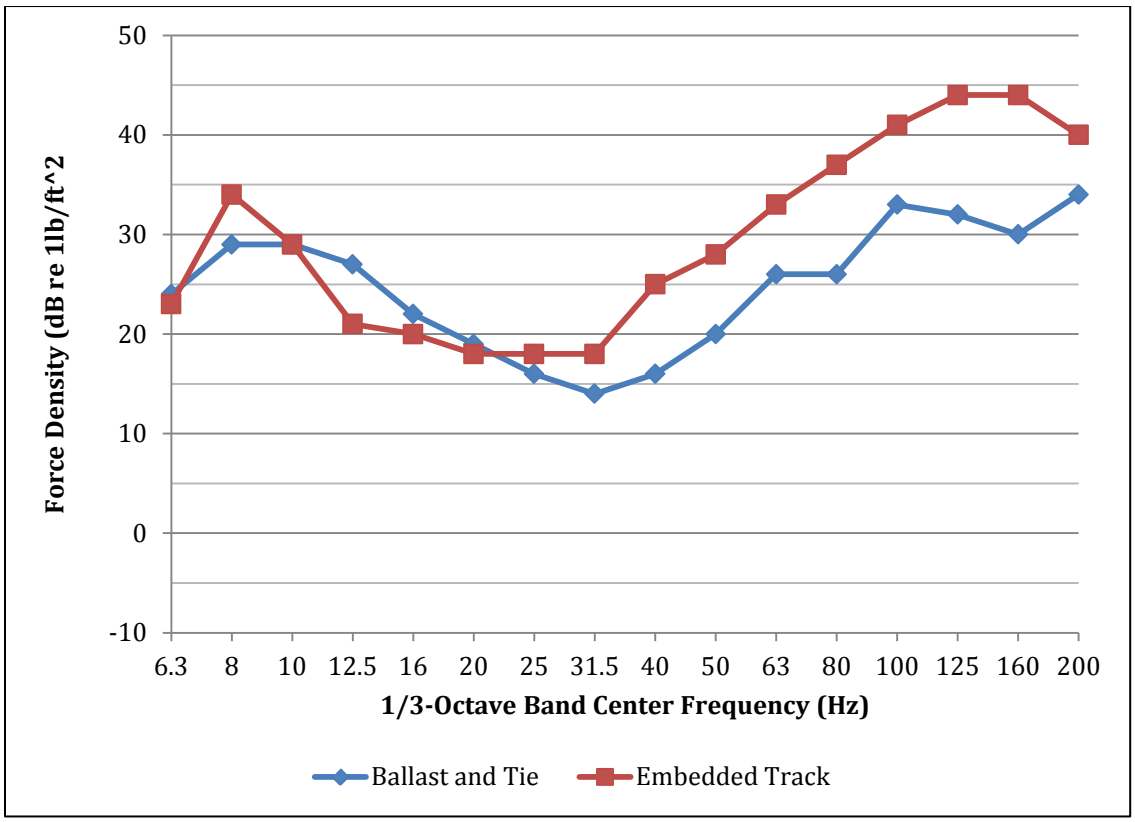
This section describes the methodology for assessing the potential impact from the proposed BLRT Extension project. Specific inputs used in the vibration impact assessment include the following:

- Projected LRT operating speeds would range from approximately 20 mph to 65 mph for LRT revenue operations, except for entry and exit from station areas. Light rail train speeds are based on modeled speed profiles in both directions (i.e., inbound and outbound) that reflect train operating characteristics, track geometry, and station locations.
- All light rail trains would consist of three cars during hours of operation.
- The operating hours and headways are described in **Section 3.1**, which would result in "frequent" events, as defined in the vibration criteria section.
- Locations of elevated structures, crossovers, and embedded track were identified based on plan and profile maps provided by the engineering team.
- Crossovers increase the vibration levels by up to 10 dB for nearby sensitive receptors due to the gap in the track.
- Elevated structures decrease the vibration levels by 10 dB for nearby sensitive receptors.
- Future vibration levels from LRT operations were based on a combination of the force density (vehicle) and propagation (soil) data at sensitive locations. The procedure for projecting future vibration levels is to measure the vibration propagation characteristics of the soil (line source transfer mobility [LSTM]) and combine that information with the vehicle information independent of the soil (force density [FD]). The formula for calculating the future vibration levels is:

  Lv = FD + LSTM

  Where: Lv is the projected train vibration level, FD is the vehicle force density, and LSTM is the line source transfer mobility at a site.
- Vehicle force density levels were based on measurements conducted for the Central Corridor LRT project (ATS Consulting, 2008) for both ballast-and-tie and embedded track. Representative force density spectra for both ballast-and-tie and embedded track are shown in **Figure 3-1**.
- Vibration propagation measurements were conducted at representative locations throughout the proposed BLRT Extension project vicinity during the Draft EIS.

## Figure 3-1. Force Density Levels at 40 mph




Source: ATS, 2008

# 4 Affected Environment

## 4.1 Noise

### 4.1.1 Noise Sensitive Land Use

Noise-sensitive land use for the Final EIS was identified based on aerial photography, proposed BLRT Extension project drawings, and a site survey. Based on the information from these sources, the noise-sensitive land use, from south to north by city is as follows.

#### 4.1.1.1 Minneapolis

The noise-sensitive land uses for the City of Minneapolis includes Mary's Place, Summit Academy, Sumner Branch Library, Wayman African Methodist Episcopal (AME) Church, Seed Academy, Zion Baptist Church, La Creche Early Childhood Center and a mixture of single-family and multi-family residences. The dominant noise sources are traffic on Olson Memorial Highway (Trunk Highway [TH] 55) and local street traffic for areas off Olson Memorial Highway.

#### 4.1.1.2 Golden Valley

The noise-sensitive land uses for the City of Golden Valley includes Theodore Wirth Park, The Chalet at Theodore Wirth Park, The Family Partnership, Saint Margaret Mary Church, Loveworks Academy and primarily single-family residences with some multi-family residences as well. The dominant noise source is traffic on local streets.

#### 4.1.1.3 Robbinsdale

The noise-sensitive land uses for the City of Robbinsdale includes Bethel World Outreach Church, Elim Lutheran Church, Sacred Heart Catholic Church and School, Robbinsdale Library Branch, Washburn McReavy Funeral Home, a Masonic Lodge, Redeemer Lutheran Church and a mixture of single-family and multi-family residences. The dominant noise sources are occasional freight trains and traffic on local streets.

#### 4.1.1.4 Crystal

The noise-sensitive land uses for the City of Crystal includes Crystal Medical Center, Little Folks Daycare and a mixture of single-family and multi-family residences. The dominant noise sources are occasional freight trains, traffic on Bottineau Boulevard (County Road 81) and flight operations at Crystal Airport.

#### 4.1.1.5 Brooklyn Park

The noise-sensitive land uses for the City of Brooklyn Park includes Brooklyn Crystal Cemetery, Prince of Peace Lutheran Church, Brooklyn Park Evangelical Free Church, North Hennepin Community College, Step by Step Montessori School, Berean Baptist Church, Ebenezer Community Church and a mixture of single-family and multi-family residences. The dominant noise sources are occasional freight trains, and traffic on Bottineau Boulevard and West Broadway Avenue (County State-Aid Highway 103).

## 4.1.2 Existing Noise Measurements

### 4.1.2.1 Noise Measurement Procedures and Equipment

In order to supplement the existing noise measurements conducted during the Draft EIS, a series of noise measurements were conducted during May 2015 at nine locations along the proposed BLRT Extension project corridor to refine the existing noise levels and to respond to comments received on the Draft EIS.

Because the thresholds for impact in the FTA noise criteria are based on the existing noise levels, measuring the existing noise and characterizing noise levels at sensitive locations along the corridor is an important step in the impact assessment. The noise measurements included both long-term (24-hour) and short-term (1-hour) monitoring of the A-weighted sound level at noise-sensitive locations near the proposed BLRT Extension project.

The additional noise measurements conducted during the Final EIS were performed with NTi Audio model XL2 noise monitors that conform to American National Standard Institute (ANSI) standards for Type 1 (precision) sound measurement equipment. Calibrations, traceable to the National Institute of Standards and Technology (NIST) were conducted before and after each measurement. The noise monitors were set to continuously monitor and record multiple noise level metrics, as well as obtain audio recordings during the measurement periods.

### 4.1.2.2 Noise Measurement Locations and Results

**Table 4-1** summarizes the results of the existing noise measurement program and **Figure 4-1** shows the location of the 21 long-term noise monitoring sites (LT) and eight short-term noise monitoring sites (ST) for the proposed BLRT Extension project. The long-term noise measurements were used to characterize the existing noise at residential locations because the FTA assessment methodology uses $L_{dn}$ (24-hour noise descriptor) for all residential locations, and the short-term noise measurements were used to characterize the existing noise at non-residential locations because the FTA assessment methodology uses $L_{eq}$ (1-hour noise descriptor) for all non-residential locations.

At each site, the measurement was conducted at the approximate set back of the building or buildings relative to the proposed BLRT Extension project location. The results of the existing noise measurements program are used to determine the existing noise levels for all the noise-sensitive locations. The noise measurement results at each Final EIS site (which are identified by letters) are described below. See the Draft EIS Noise and Vibration Technical Report for information regarding the Draft EIS noise measurement results (which are identified by numbers).

Detailed information regarding the Final EIS noise measurement results are contained in **Appendix A** and photographs of noise measurement sites are contained in **Appendix B**.

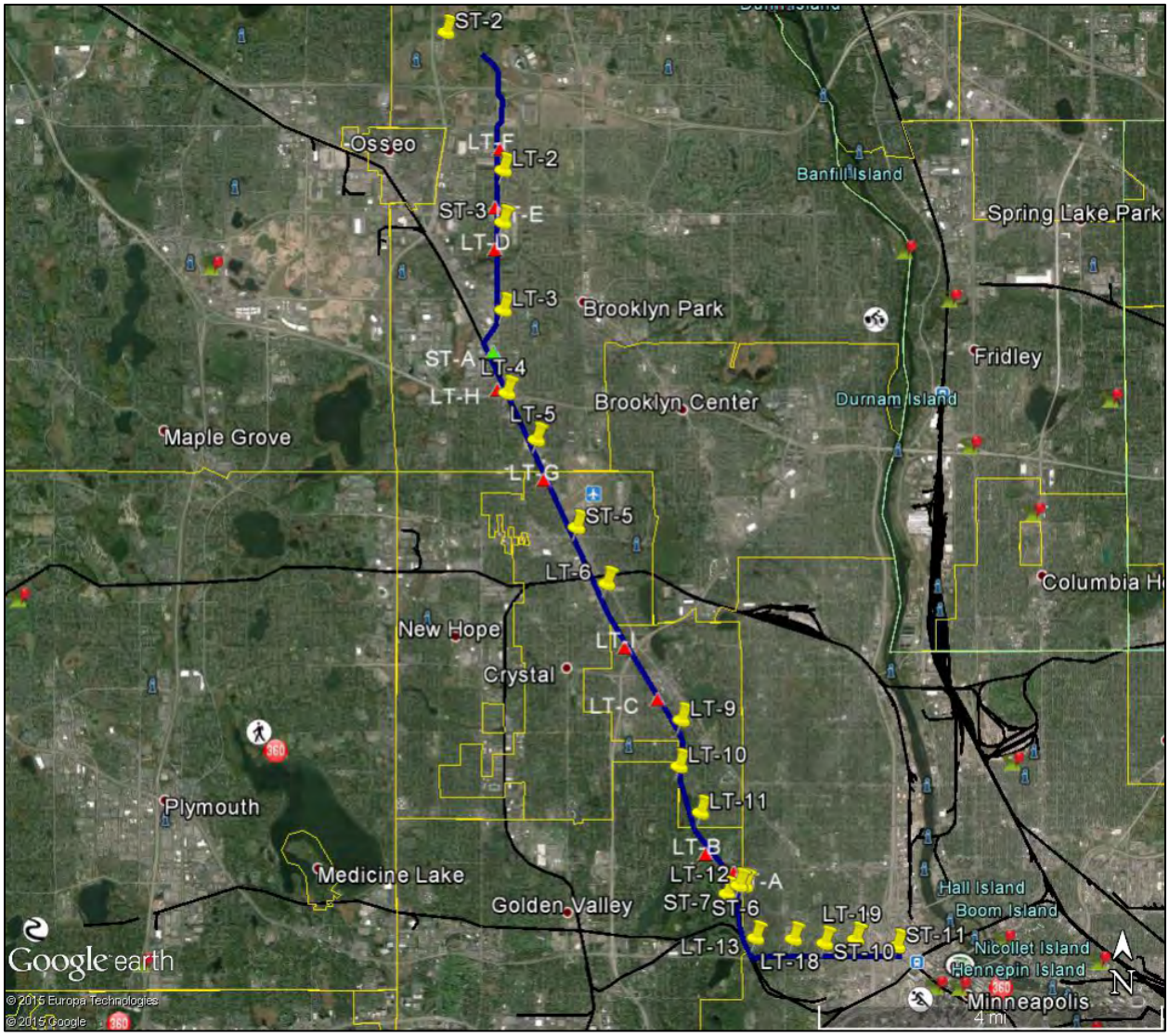
## Table 4-1. Summary of Existing Noise Level Measurements

| Site No. | City | Measurement Location | DEIS/ FEIS | Measurement Start | | Meas. Dur. (hr) | Noise Level (dBA)[1] | |
|---|---|---|---|---|---|---|---|---|
| | | | | Date | Time | | $L_{dn}$ | $L_{eq}$ |
| ST-11 | Minneapolis | Mary My Hope Children's Center | DEIS | 5/17/12 | 16:09 | 1 | 65 | 67 |
| LT-19 | Minneapolis | 1000 Olson Memorial Highway Heritage Park | DEIS | 5/15/12 | 18:00 | 24 | 65 | 61 |
| ST-10 | Minneapolis | Harrison Education Center | DEIS | 5/15/12 | 16:07 | 1 | 60 | 62 |
| LT-18 | Minneapolis | 611 Oliver Avenue North | DEIS | 5/17/12 | 12:00 | 24 | 62 | 59 |
| LT-13 | Minneapolis | 623 Vincent Avenue North | DEIS | 5/16/12 | 17:00 | 24 | 56 | 50 |
| ST-6 | Golden Valley | Theodore Wirth Regional Park | DEIS | 5/18/12 | 10:01 | 1 | 47 | 49 |
| ST-7 | Golden Valley | The Chalet at Theodore Wirth Regional Park | DEIS | 5/18/12 | 11:20 | 1 | 53 | 55 |
| LT-12 | Golden Valley | 1501 Xerxes Avenue North | DEIS | 7/14/11 | 16:00 | 24 | 55 | 50 |
| LT-A | Golden Valley | 1821 York Avenue | FEIS | 5/11/15 | 16:00 | 24 | 54 | 47 |
| LT-B | Golden Valley | 2145 Bonnie Lane | FEIS | 5/11/15 | 16:00 | 24 | 53 | 50 |
| LT-11 | Robbinsdale | 3912 26th Avenue North | DEIS | 7/13/11 | 16:00 | 24 | 50 | 45 |
| LT-10 | Golden Valley | 3230 Kyle Avenue North | DEIS | 5/5/12 | 14:00 | 24 | 51 | 45 |
| LT-9 | Robbinsdale | 4400 36th Avenue North | DEIS | 5/15/12 | 15:00 | 24 | 54 | 48 |
| LT-C | Robbinsdale | 3954 Noble Avenue | FEIS | 5/11/15 | 17:00 | 24 | 55 | 52 |
| LT-I | Robbinsdale | 4416 Toledo Avenue North | FEIS | 5/13/15 | 18:00 | 24 | 61 | 59 |
| LT-6 | Crystal | 5001 Welcome Avenue North | DEIS | 7/14/11 | 15:00 | 24 | 54 | 48 |
| ST-5 | Crystal | Becker Park | DEIS | 5/17/12 | 13:51 | 1 | 54 | 56 |
| LT-G | Crystal | 6102 Hampshire Avenue North | FEIS | 5/13/15 | 16:00 | 24 | 62 | 61 |
| LT-5 | Brooklyn Park | 6288 Louisiana Court North | DEIS | 5/14/12 | 12:00 | 24 | 63 | 58 |
| LT-4 | Brooklyn Park | 6648 West Broadway Avenue | DEIS | 5/15/12 | 13:00 | 24 | 61 | 61 |
| LT-H | Brooklyn Park | 7501 Myers Avenue | FEIS | 5/13/15 | 16:00 | 24 | 69 | 68 |
| ST-A | Brooklyn Park | Prince of Peace Lutheran Church | FEIS | 5/12/15 | 08:38 | 1 | 60 | 62 |
| LT-3 | Brooklyn Park | 7428 75th Circle North | DEIS | 5/14/12 | 13:00 | 24 | 60 | 55 |
| LT-D | Brooklyn Park | 8220 Quebec Court North | FEIS | 5/12/15 | 14:00 | 24 | 65 | 62 |
| ST-3 | Brooklyn Park | North Hennepin Community College | DEIS | 5/14/12 | 15:33 | 1 | 58 | 60 |
| LT-E | Brooklyn Park | 8558 S. Maplebrook Circle | FEIS | 5/12/15 | 17:00 | 24 | 65 | 62 |
| LT-2 | Brooklyn Park | 8745 Oregon Avenue North | DEIS | 7/14/11 | 10:00 | 24 | 66 | 62 |
| LT-F | Brooklyn Park | 9125 Nevada Court | FEIS | 5/12/15 | 18:00 | 24 | 57 | 51 |
| ST-2 | Brooklyn Park | Grace Fellowship Church | DEIS | 5/14/12 | 17:00 | 1 | 55 | 57 |

Sources: CSA, 2015; HMMH, 2012

[1] $L_{dn}$ is used for Category 2 (residential) land use and $L_{eq}$ is used for Category 3 (institutional) land use.

## Figure 4-1. Existing Noise Measurement Locations




Sources: CSA, 2015; HMMH, 2012

### Golden Valley

**Site LT-A – 1821 York Avenue:** The $L_{dn}$ measured at this location was 54 dBA. The dominant noise source was traffic on local streets and distant aircraft. Noise levels were measured for 24 hours in the backyard of the residence.

**Site LT-B – 2145 Bonnie Lane:** The $L_{dn}$ measured at this location was 53 dBA. The dominant noise source was traffic on local streets and distant aircraft. Noise levels were measured for 24 hours in the front yard of the residence.

### Robbinsdale

**Site LT-C – 3954 Noble Avenue:** The $L_{dn}$ measured at this location was 55 dBA. The dominant noise source was traffic on local streets, freight operations and distant aircraft. Noise levels were measured for 24 hours in the back yard of the residence.

**Site LT-I – 4416 Toledo Avenue North:** The $L_{dn}$ measured at this location was 61 dBA. The dominant noise source was traffic on Highway 100. Other sources of noise included traffic on local streets, freight operations and distant aircraft. Noise levels were measured for 24 hours in the back yard of the residence.

### Crystal

**Site LT-G – 6102 Hampshire Avenue North:** The $L_{dn}$ measured at this location was 62 dBA. The dominant noise source was traffic on Bottineau Boulevard. Other sources of noise included traffic on local streets, freight operations and aircraft operations at Crystal Airport. Noise levels were measured for 24 hours in the back yard of the residence.

### Brooklyn Park

**Site LT-H – 7501 Myers Avenue:** The $L_{dn}$ measured at this location was 62 dBA. The dominant noise source was traffic on Bottineau Boulevard and Interstate 94. Other sources of noise included traffic on local streets and freight operations. Noise levels were measured for 24 hours in the front yard of the residence.

**Site ST-A – Prince of Peace Lutheran Church:** The $L_{eq}$ measured at this location was 62 dBA. The dominant noise source was traffic on Bottineau Boulevard. Noise levels were measured for 1 hour in the parking lot of the church.

**Site LT-D – 8220 Quebec Court North:** The $L_{dn}$ measured at this location was 65 dBA. The dominant noise source was traffic on West Broadway. Noise levels were measured for 24 hours in the back yard of the residence.

**Site LT-E – 8558 S. Maplebrook Circle:** The $L_{dn}$ measured at this location was 65 dBA. The dominant noise source was traffic on West Broadway. Noise levels were measured for 24 hours in the front yard of the residence.

**Site LT-F – 9125 Nevada Court:** The $L_{dn}$ measured at this location was 57 dBA. The dominant noise source was traffic on West Broadway. Noise levels were measured for 24 hours in the back yard of the residence.

#### 4.1.2.3 MPCA Noise Standards Analysis

Using the noise measurement data gathered during the Draft and Final EIS at the long-term noise measurement sites described above, an analysis was also conducted using the MPCA $L_{10}$ and $L_{50}$ noise standards. At each location where a long-term noise measurement was conducted, the maximum $L_{10}$ and $L_{50}$ over a 24-hour period were calculated.

The results, shown in **Table 4-2**, show that at most locations along the proposed BLRT Extension project corridor, the $L_{10}$ and $L_{50}$ standards are already being exceeded by existing noise sources. Most of the exceedances are due to exempt noise sources, such as roadway noise and aircraft overflights. The higher existing $L_{10}$ and $L_{50}$ noise levels are at locations close to major roadways along the proposed BLRT Extension project corridor. At locations further from roadways, the $L_{10}$ and $L_{50}$ noise levels are lower.

### Table 4-2. Summary of Existing $L_{10}$ and $L_{50}$ Noise Levels at Long-Term Noise Measurement Locations

| Site No. | City | Measurement Location | Draft EIS/ Final EIS | Max $L_{10}$ (dBA)[1] | Max $L_{50}$ (dBA)[1] |
|---|---|---|---|---|---|
| LT-19 | Minneapolis | 1000 Olson Memorial Highway Heritage Park | Draft EIS | 65 | 59 |
| LT-18 | Minneapolis | 611 Oliver Avenue North | Draft EIS | 68 | 63 |
| LT-13 | Minneapolis | 623 Vincent Avenue North | Draft EIS | 51 | 46 |
| LT-12 | Golden Valley | 1501 Xerxes Avenue North | Draft EIS | 65 | 63 |
| LT-A | Golden Valley | 1821 York Avenue | Final EIS | 57 | 51 |
| LT-B | Golden Valley | 2145 Bonnie Lane | Final EIS | 54 | 51 |
| LT-11 | Robbinsdale | 3912 26th Avenue North | Draft EIS | 65 | 53 |
| LT-10 | Golden Valley | 3230 Kyle Avenue North | Draft EIS | 61 | 55 |
| LT-9 | Robbinsdale | 4400 36th Avenue North | Draft EIS | 65 | 60 |
| LT-C | Robbinsdale | 3954 Noble Avenue | Final EIS | 56 | 52 |
| LT-I | Robbinsdale | 4416 Toledo Avenue North | Final EIS | 63 | 61 |
| LT-6 | Crystal | 5001 Welcome Avenue North | Draft EIS | 69 | 60 |
| LT-G | Crystal | 6102 Hampshire Avenue North | Final EIS | 65 | 62 |
| LT-5 | Brooklyn Park | 6288 Louisiana Court North | Draft EIS | 67 | 59 |
| LT-4 | Brooklyn Park | 6648 West Broadway Avenue | Draft EIS | 70 | 65 |
| LT-H | Brooklyn Park | 7501 Myers Avenue | Final EIS | 71 | 67 |
| LT-3 | Brooklyn Park | 7428 75th Circle North | Draft EIS | 56 | 50 |
| LT-D | Brooklyn Park | 8220 Quebec Court North | Final EIS | 68 | 62 |
| LT-E | Brooklyn Park | 8558 S. Maplebrook Circle | Final EIS | 66 | 61 |
| LT-2 | Brooklyn Park | 8745 Oregon Avenue North | Draft EIS | 71 | 64 |
| LT-F | Brooklyn Park | 9125 Nevada Court | Final EIS | 60 | 55 |

Sources: CSA, 2015; HMMH, 2012

[1] The $L_{10}$ descriptor represents noise levels exceeded 10 percent (6 minutes) of the time during an hour (60 minutes). This standard includes both daytime and nighttime limits.

[2] The $L_{50}$ descriptor represents noise levels exceeded 50 percent (30 minutes) of the time during an hour (60 minutes). This standard includes both daytime and nighttime limits.

## 4.2 Vibration

### 4.2.1 Vibration Sensitive Land Use

Vibration-sensitive land use for the Final EIS was identified based on aerial photography, proposed BLRT Extension project drawings, and a site survey. Based on the information from these sources, the vibration-sensitive land use, from south to north by city is as follows.

#### 4.2.1.1 Minneapolis

The vibration-sensitive land uses for the City of Minneapolis include Mary's Place, Summit Academy, Sumner Branch Library, Wayman AME Church, Seed Academy, Zion Baptist Church, La Creche Early Childhood Center and a mixture of single-family and multi-family residences.

#### 4.2.1.2 Golden Valley

The vibration-sensitive land uses for the City of Golden Valley include The Chalet at Theodore Wirth Regional Park, The Family Partnership, Saint Margaret Mary Church, Loveworks Academy and primarily single-family residences with some multi-family residences as well.

#### 4.2.1.3 Robbinsdale

The vibration-sensitive land uses for the City of Robbinsdale include Bethel World Outreach Church, Elim Lutheran Church, Sacred Heart Catholic Church and School, Robbinsdale Library Branch, Washburn McReavy Funeral Home, a Masonic Lodge, Redeemer Lutheran Church and a mixture of single-family and multi-family residences.

#### 4.2.1.4 Crystal

The vibration-sensitive land uses for the City of Crystal include Crystal Medical Center, Little Folks Daycare and a mixture of single-family and multi-family residences.

#### 4.2.1.5 Brooklyn Park

The vibration-sensitive land uses for the City of Brooklyn Park include Prince of Peace Lutheran Church, Brooklyn Park Evangelical Free Church, North Hennepin Community College, Step by Step Montessori School, Berean Baptist Church, Ebenezer Community Church and a mixture of single-family and multi-family residences.

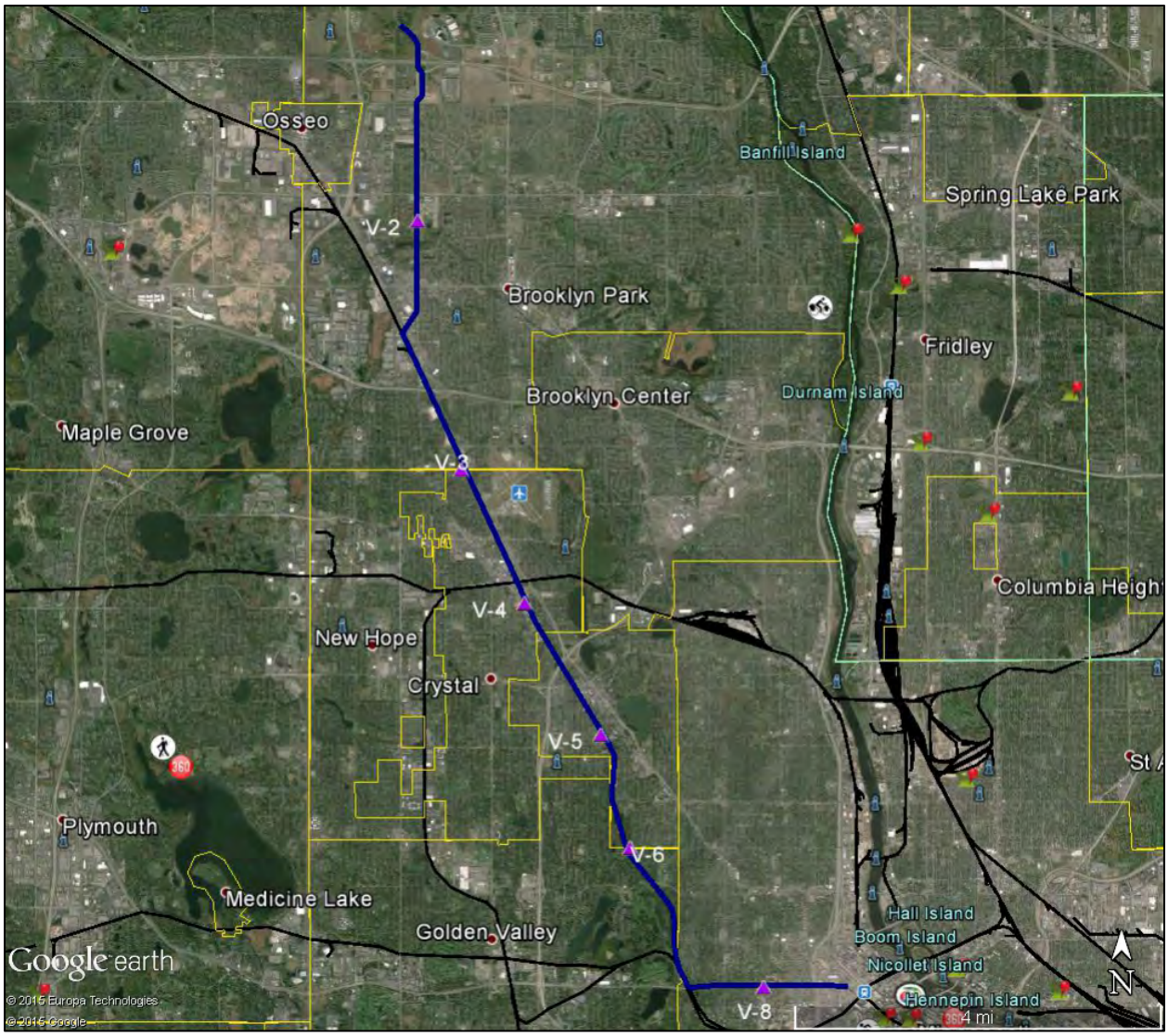
### 4.2.2 Existing Vibration Measurements

The existing vibration measurements for the proposed BLRT Extension project were conducted during the Draft EIS phase of the proposed BLRT Extension project. Specific information regarding instrumentation, procedures, analysis methods and measurement locations are available in the Draft EIS Noise and Vibration Technical Report. Detailed information regarding the vibration propagation measurement results are contained in the appendices of the Draft EIS Noise and Vibration Technical Report.

The vibration measurements conducted for the Draft EIS were used to characterize the response of the soil at locations within the proposed BLRT Extension project corridor. At each site, vibration propagation tests were conducted by impacting the ground with an instrumented weight and measuring the response of the soil and/or building foundations at various distances (LSTM). The results of the vibration propagation tests were combined with the force density (vehicle input force) to project vibration levels from LRT operations at locations along the proposed BLRT Extension project corridor.

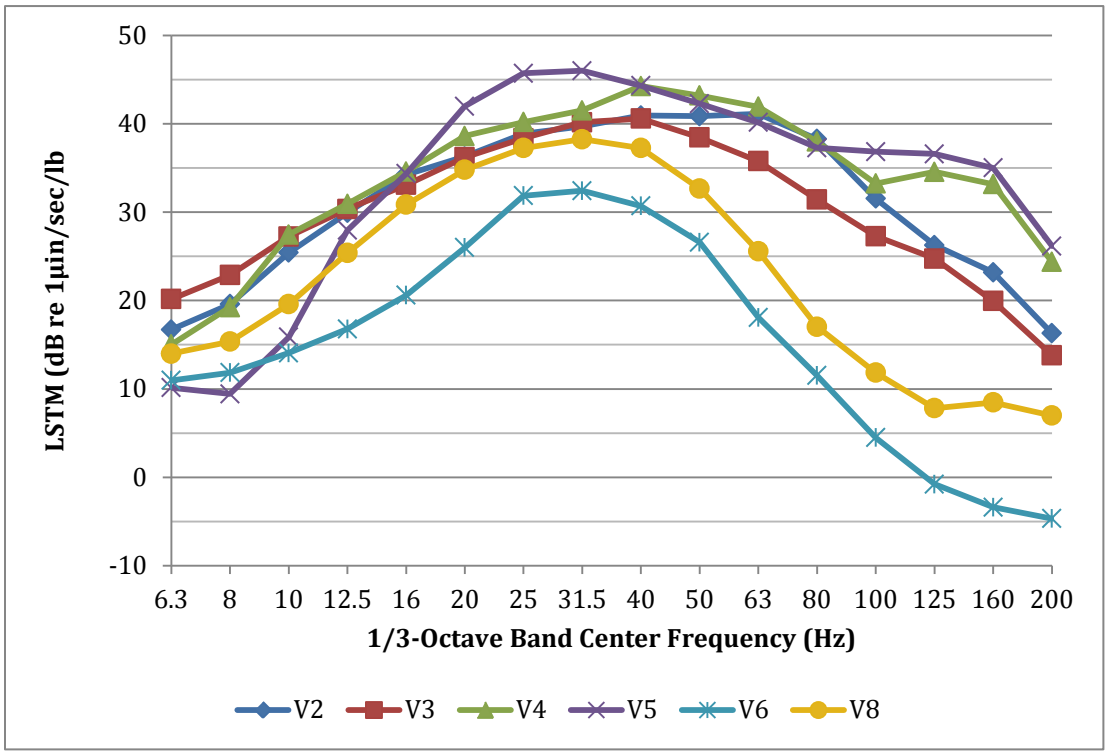
The locations of the six vibration measurement sites used in the Final EIS are shown in **Figure 4-2**. The results of the LSTM tests for the Final EIS are shown in **Figure 4-3**. **Figures 4-4 and 4-5** show the projected vibration levels (combining the force density and transfer mobility data) for the proposed BLRT Extension project for ballast-and-tie and embedded track, respectively.

## Figure 4-2. Vibration Propagation Measurement Locations



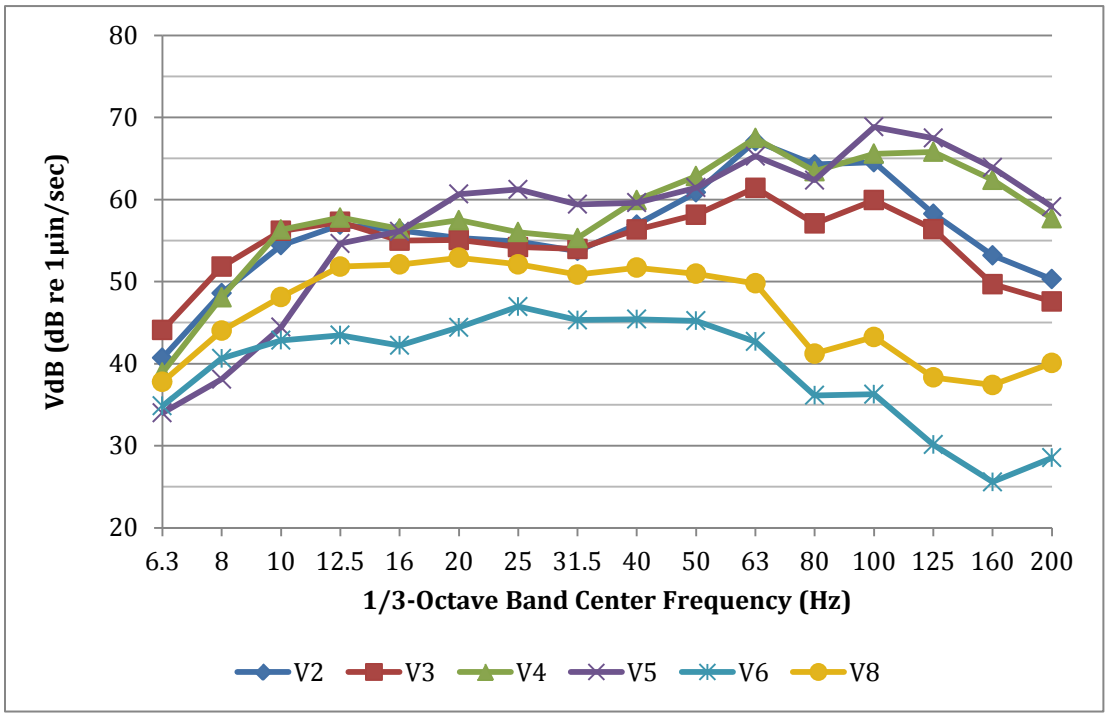

Sources: CSA, 2015; HMMH, 2012

**Figure 4-3. Line Source Transfer Mobility Results at 50 feet**



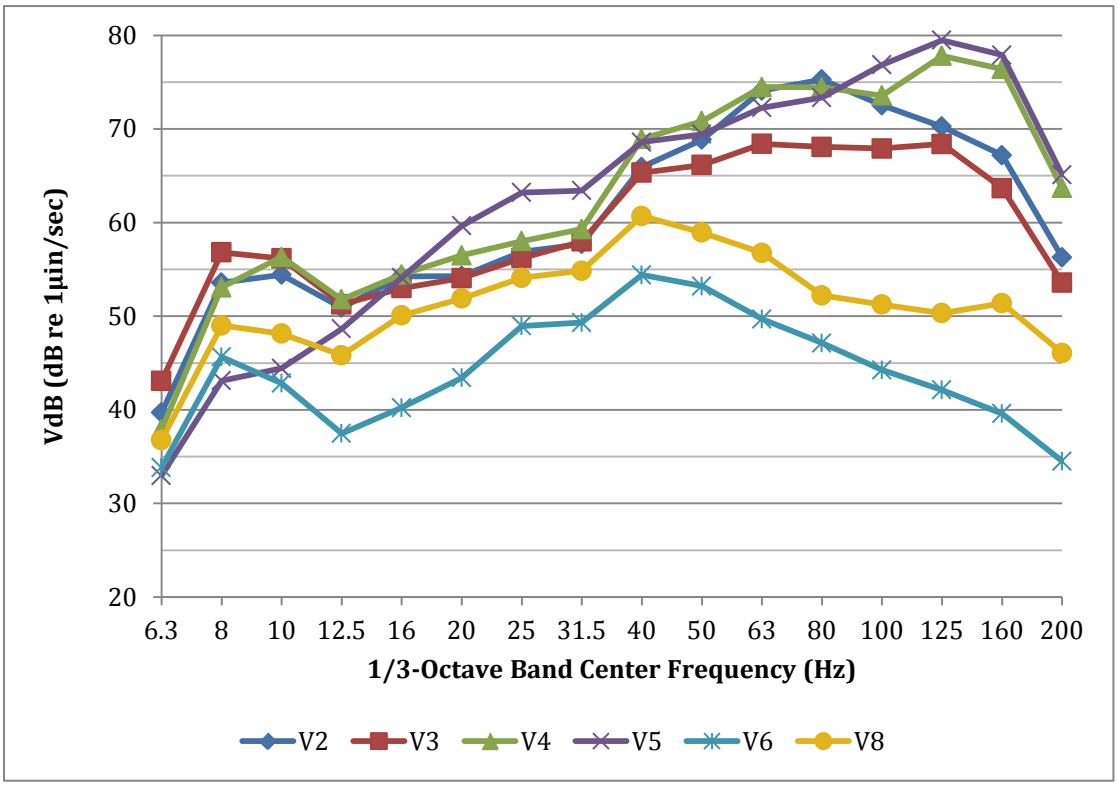

Sources: CSA, 2015; HMMH, 2012; ATS, 2008

**Figure 4-4. Vibration Levels at 50 feet, Ballast and Tie Track**




Sources: CSA, 2015; HMMH, 2012; ATS, 2008

**Figure 4-5. Vibration Levels at 50 feet, Embedded Track**




Sources: CSA, 2015; HMMH, 2012; ATS, 2008

# 5 Environmental Consequences

## 5.1 Noise

The FTA guidance manual on noise and vibration (FTA, 2006) is the primary source for the noise methodology. Noise impact has been evaluated using the Detailed Noise Assessment methodology contained in Chapter 6 of the FTA guidance manual (FTA, 2006). The noise assessment included the following steps:

- Identified noise-sensitive land uses in the proposed BLRT Extension project corridor using aerial photography, GIS data and field surveys, typically within 300 feet of the alignment.
- Measured the existing noise levels in the proposed BLRT Extension project corridor at sensitive receptors (see **Section 4.1 – Affected Environment**).
- Projected proposed BLRT Extension project noise levels from transit operations, using proposed BLRT Extension project drawings provided by the engineering team, and information on speeds, headways, track type, vehicle type, and at-grade-crossing operations.
- Assessed the impact from transit by comparing the proposed BLRT Extension project noise with the existing noise using the FTA noise impact criteria in Chapter 3 of the FTA guidance manual (FTA, 2006).
- Recommended mitigation at locations where proposed BLRT Extension project noise levels exceed the impact criteria.

### 5.1.1 Proposed BLRT Extension Project Noise

This section describes the noise impacts for the proposed BLRT Extension project. The results of the Detailed Noise Analysis are presented in **Tables 5-1 and 5-2** for residential and institutional (e.g., churches and schools) land uses, respectively.

The results include a tabulation of location information for each sensitive receptor group, the existing noise levels, the projections of future noise levels, the impact criteria, and whether there would be noise impacts. The tables also show the total number of moderate and severe noise impacts for each location, without mitigation measures. Because the proposed BLRT Extension project would never exceed the MPCA standards, the FTA criteria are more protective in assessing impacts from the proposed BLRT Extension project.

As shown in **Table 5-1**, the proposed BLRT Extension project would result in 366 moderate noise impacts and 618 severe noise impacts for residential land uses with the inclusion of LRT horns (see **Appendix C** for locations of impacts). The impacts represent the number of impacted units (including those in multi-family buildings), not the number of buildings. The majority of the noise impacts are related to LRT horn sounding at FRA-shared at-grade crossings in the proposed BLRT Extension project corridor. With the implementation of Quiet Zones[5] at all FRA-shared at-grade

[5] Quiet Zones are locations, at least one-half mile in length, where the routine sounding of horns has been eliminated because of safety improvements at at-grade crossings, including modifications to the streets, raised median barriers, four quadrant gates, and other improvements designed and implemented as a part of the proposed BLRT Extension

crossings, the proposed BLRT Extension project would result in 176 moderate noise impacts and 120 severe noise impacts, as shown in **Table 5-1**. A summary of each location that would experience noise impacts follows. However, if any of the municipalities decide not to apply to FRA for Quiet Zones, this decrease in moderate and severe noise impacts would not be achieved and residual noise impacts would not be mitigated.

### Table 5-1. Summary of Noise Impacts for Residential Land Use – LRT With and Without Quiet Zones

| Location | City | Side of Track | Near Track Dist. (ft) | Speed (mph) | Exist Noise Level $L_{dn}$ (dBA) | Proposed BLRT Extension Project Noise Levels- $L_{dn}$, (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Proposed BLRT Extension Project | FTA Criteria | | Mod | Sev |
| | | | | | | | Mod | Sev | | |
| Interstate High-way 94 (I-94) to Humboldt Ave N | Minneapolis | NB | 95 | 20 | 65 | 62 | 61 | 66 | 16 | 0 |
| I-94 to Humboldt Ave N | Minneapolis | SB | 130 | 40 | 65 | 55 | 61 | 66 | 0 | 0 |
| Humboldt Ave N to Penn Ave N | Minneapolis | NB | 100 | 40 | 62 | 62 | 59 | 64 | 9 | 0 |
| Humboldt Ave N to Penn Ave N | Minneapolis | SB | 190 | 40 | 62 | 57 | 59 | 64 | 0 | 0 |
| Penn Ave N to Upton Ave N | Minneapolis | NB | 145 | 35 | 56 | 54 | 56 | 62 | 0 | 0 |
| Penn Ave N to BNSF Railway (BNSF) freight tracks | Minneapolis | SB | 160 | 40 | 56 | 53 | 56 | 62 | 0 | 0 |
| Olson Mem Hwy to Oak Park Ave N | Minneapolis | NB | 35 | 35 | 56 | 61 | 56 | 62 | 1 | 0 |
| Oak Park Ave N to Plymouth Ave N | Minneapolis | NB | 60 | 55 | 55 | 61 | 55 | 61 | 3 | 0 |
| Plymouth Ave N to 16th Ave N | Golden Valley | NB | 220 | 20 | 55 | 56 | 55 | 61 | 9 | 0 |
| 16th Ave N to Golden Valley Rd | Golden Valley | NB | 30 | 45 | 54 | 64 | 55 | 61 | 1 | 0 |
| Golden Valley Rd to 26th Ave N | Golden Valley | NB | 80 | 55 | 50 | 65 | 53 | 60 | 9 | 14 |
| 26th Ave N to 31½ Ave N | Robbinsdale | NB | 90 | 55 | 50 | 59 | 53 | 60 | 3 | 0 |
| 31½ Ave N to 34th Ave N | Robbinsdale | NB | 20 | 55 | 50 | 70 | 53 | 60 | 4 | 12 |

project and consistent with Quiet Zone readiness. Horns are sounded in emergency situations at these locations. Municipalities must apply to FRA for approval of Quiet Zones. If the municipality fails to apply for a Quiet Zone or FRA fails to approve the Quiet Zone, the proposed BLRT Extension project may result in residual noise impacts.

## Table 5-1. Summary of Noise Impacts for Residential Land Use – LRT With and Without Quiet Zones

| Location | City | Side of Track | Near Track Dist. (ft) | Speed (mph) | Exist Noise Level $L_{dn}$ (dBA) | Proposed BLRT Extension Project Noise Levels- $L_{dn}$, (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Proposed BLRT Extension Project | FTA Criteria | | Mod | Sev |
| | | | | | | | Mod | Sev | | |
| 34th Ave N to 36th Ave N | Robbinsdale | NB | 60 | 55 | 54 | 62 | 55 | 61 | 20 | 5 |
| 34th Ave N to 36th Ave N | Robbinsdale | SB | 140 | 55 | 54 | 56 | 55 | 61 | 1 | 0 |
| 36th Ave N to 38th Ave N | Robbinsdale | NB | 40 | 55 | 54 | 91 | 55 | 61 | 8 | 27 |
| 36th Ave N to 38th Ave N | Robbinsdale | SB | 295 | 55 | 54 | 68 | 55 | 61 | 15 (4) | 7 (0) |
| 38th Ave N to 40½ Ave N | Robbinsdale | NB | 35 | 55 | 55 | 92 | 55 | 61 | 22 (3) | 66 (20) |
| 38th Ave N to 40th Ave N | Robbinsdale | SB | 70 | 45 | 55 | 87 | 55 | 61 | 37 (20) | 68 (5) |
| 40½ Ave N to 42nd Ave N | Robbinsdale | NB | 65 | 45 | 55 | 87 | 55 | 61 | 0 (5) | 57 (2) |
| 40th Ave N to 42nd Ave N | Robbinsdale | SB | 130 | 30 | 55 | 78 | 55 | 61 | 34 (13) | 40 (2) |
| 42nd Ave N to MN-100 | Robbinsdale | NB | 115 | 30 | 61 | 78 | 59 | 64 | 9 (2) | 28 (0) |
| 42nd Ave N to MN-100 | Robbinsdale | SB | 100 | 40 | 61 | 81 | 59 | 64 | 14 (2) | 10 (1) |
| MN-100 to 47th Ave N | Robbinsdale | NB | 95 | 55 | 61 | 84 | 59 | 64 | 12 (10) | 20 (1) |
| MN-100 to 47th Ave N | Robbinsdale | SB | 80 | 55 | 61 | 82 | 59 | 64 | 19 (8) | 39 (0) |
| 47th Ave N to Canadian Pacific Railway (CP) rail crossing | Crystal | NB | 35 | 55 | 54 | 94 | 55 | 61 | 35 (11) | 93 (31) |
| 47th Ave N to CP rail crossing | Crystal | SB | 120 | 55 | 54 | 81 | 55 | 61 | 26 (0) | 24 (0) |
| CP rail crossing to 56th Ave N | Crystal | NB | 795 | 55 | 62 | 58 | 59 | 64 | 0 (0) | 0 (0) |
| CP rail crossing to 56th Ave N | Crystal | SB | 80 | 25 | 62 | 52 | 59 | 64 | 0 (0) | 0 (0) |
| 56th Ave N to 60th Ave N | Crystal | NB | 440 | 20 | 62 | 63 | 59 | 64 | 5 (0) | 0 (0) |
| 56th Ave N to 60th Ave N | Crystal | SB | 160 | 35 | 62 | 76 | 59 | 64 | 4 (0) | 2 (0) |
| 60th Ave N to 63rd Ave N | Crystal | NB | 200 | 35 | 63 | 73 | 60 | 65 | 1 (0) | 1 (0) |

## Table 5-1. Summary of Noise Impacts for Residential Land Use – LRT With and Without Quiet Zones

| Location | City | Side of Track | Near Track Dist. (ft) | Speed (mph) | Exist Noise Level $L_{dn}$ (dBA) | Proposed BLRT Extension Project Noise Levels- $L_{dn}$, (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Proposed BLRT Extension Project | FTA Criteria | | Mod | Sev |
| | | | | | | | Mod | Sev | | |
| 60th Ave N to 63rd Ave N | Crystal | SB | 125 | 40 | 63 | 77 | 60 | 65 | 24 (0) | 84 (0) |
| 63rd Ave N to Interstate Highway 694 (I-694) | Brooklyn Park | NB | 315 | 25 | 63 | 68 | 60 | 65 | 1 (0) | 18 (0) |
| 63rd Ave N to I-694 | Brooklyn Park | SB | 140 | 35 | 63 | 52 | 60 | 65 | 0 (0) | 0 (0) |
| I-694 to 73rd Ave N | Brooklyn Park | NB | 700 | 40 | 60 | 59 | 58 | 63 | 8 (0) | 0 (0) |
| I-694 to 73rd Ave N | Brooklyn Park | SB | 170 | 55 | 69 | 74 | 64 | 69 | 2 (0) | 3 (0) |
| 73rd Ave N to Brooklyn Blvd | Brooklyn Park | NB | 80 | 35 | 60 | 59 | 58 | 63 | 4 | 0 |
| Brooklyn Blvd to Shingle Creek | Brooklyn Park | NB | 85 | 45 | 65 | 59 | 61 | 66 | 0 | 0 |
| Shingle Creek to 85th Ave N | Brooklyn Park | SB | 70 | 40 | 65 | 65 | 61 | 66 | 5 | 0 |
| 85th Ave N to 89th Ave N | Brooklyn Park | NB | 85 | 45 | 66 | 58 | 61 | 67 | 0 | 0 |
| 85th Ave N to 89th Ave N | Brooklyn Park | SB | 90 | 45 | 66 | 59 | 61 | 67 | 0 | 0 |
| 89th Ave N to 93rd Ave N | Brooklyn Park | NB | 120 | 45 | 57 | 57 | 56 | 62 | 5 | 0 |
| | | | | | | | | **Total** | **366 (176)** | **618 (120)** |

Source: CSA, 2015

The "Type and # of Impacts" column identifies whether the LRT noise level exceeds FTA's moderate or severe noise impact criteria thresholds, which are found under the "Proposed BLRT Extension project Noise Levels" column. It also reports the number of units that experience a moderate or severe noise impact. The numbers in parentheses represent the number of impacts remaining after implementation of Quiet Zones.

Predicted noise levels for each location are highest for each location. Projected noise levels at other receptors within each location are lower.

The reported noise levels are rounded to the nearest decibel.

Mod = moderate; Sev = severe.

- **I-94 to Humboldt Avenue North, Minneapolis.** There are sixteen multi-family residences located on the northbound side of the proposed alignment along the Olson Memorial Highway projected to have moderate noise impacts, without noise mitigation. The noise impacts at this location would be due to the sounding of bells at grade crossings.
- **Humboldt Avenue North to Penn Avenue North, Minneapolis**. There are nine single- and multi-family residences located on the northbound side of the proposed alignment along the Olson Memorial Highway projected to have moderate noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks to the residences and the sounding of bells at grade crossings.
- **Olson Memorial Highway to Oak Park Avenue North, Minneapolis**. There is one single-family residence located on the northbound side of the proposed alignment at 8th Avenue and Washburn Avenue projected to have moderate noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks to the residence.
- **Oak Park Avenue North to Plymouth Avenue North, Minneapolis**. There are three single-family residences located on the northbound side of the proposed alignment at Xerxes Avenue and Oak Park Avenue projected to have moderate noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks to the residences.
- **Plymouth Avenue North to 16th Avenue North, Golden Valley**. There are nine single-family residences located on the northbound side of the proposed alignment along Xerxes Avenue projected to have moderate noise impacts, without noise mitigation. The noise impacts at this location would be due to noise from the Plymouth Avenue Station.
- **16th Avenue North to Golden Valley Road, Golden Valley**. There is one single-family residence located on the northbound side of the proposed alignment along York Avenue projected to have moderate noise impact, without noise mitigation. The noise impact at this location would be due to the proximity of the tracks to the residence.
- **Golden Valley Road to 26th Avenue North, Golden Valley**. There are 23 single-family residences located on the northbound side of the proposed alignment along Kewanee Way projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks to the residences and the presence of a crossover.
- **26th Avenue North to 31½ Avenue North, Robbinsdale**. There are three single- and multi-family residences located on the northbound side of the proposed alignment just north of Kewanee Way projected to have moderate noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks to the residences.
- **31½ Avenue North to 34th Avenue North, Robbinsdale**. There are sixteen single- and multi-family residences located on the northbound side of the proposed alignment along Indiana Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks to the residences.

- **34th Avenue North to 36th Avenue North, Robbinsdale**. There are 25 single-family residences located on the northbound side of the proposed alignment between 34th Avenue and 36th Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks to the residences.
- **34th Avenue North to 36th Avenue North, Robbinsdale**. There is one single-family residence located on the southbound side of the proposed alignment between 34th Avenue and 36th Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impact at this location would be due to the proximity of the tracks to the residence.
- **36th Avenue North to 38th Avenue North, Robbinsdale.** There are 35 single- and multi-family residences located on the northbound side of the proposed alignment al between 36th Avenue and 38th Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks at the southern portion of this area and the sounding of horns at grade crossings in the northern portion of this area.
- **36th Avenue North to 38th Avenue North, Robbinsdale**. There are 22 single-family residences located on the southbound side of the proposed alignment al between 36th Avenue and 38th Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks at the southern portion of this area and the sounding of horns at grade crossings in the northern portion of this area.
- **38th Avenue North to 40½ Avenue North, Robbinsdale**. There are 88 single-family residences located on the northbound side of the proposed alignment al between 38th Avenue and 40½ Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks and the sounding of horns at grade crossings.
- **38th Avenue North to 40th Avenue North, Robbinsdale**. There are 105 single- and multi-family residences located on the southbound side of the proposed alignment al between 38th Avenue and 40½ Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks and the sounding of horns at grade crossings.
- **40½ Avenue North to 42nd Avenue North, Robbinsdale**. There are 57single- and multi-family residences located on the northbound side of the proposed alignment between 40½ Avenue and 42nd Avenue projected to have severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks and the sounding of horns at grade crossings.
- **40th Avenue North to 42nd Avenue North, Robbinsdale**. There are 74 single- and multi-family residences located on the southbound side of the proposed alignment between 40½ Avenue and 42nd Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks and the sounding of horns at grade crossings.

- **42nd Avenue North to MN-100, Robbinsdale**. There are 37 single- and multi-family residences located on the northbound side of the proposed alignment between 42nd Avenue and MN-100 projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks and the sounding of horns at grade crossings.
- **42nd Avenue North to MN-100, Robbinsdale**. There are 24 single- and multi-family residences located on the southbound side of the proposed alignment between 42nd Avenue and MN-100 projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks and the sounding of horns at grade crossings.
- **MN-100 to 47th Avenue North, Robbinsdale**. There are 32 single-family residences located on the northbound side of the proposed alignment between MN-100 and 47th Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks and the sounding of horns at grade crossings.
- **MN-100 to 47th Avenue North, Robbinsdale**. There are 58 single- and multi-family residences located on the southbound side of the proposed alignment between MN-100 and 47th Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks and the sounding of horns at grade crossings.
- **47th Avenue North to CP Rail Crossing, Crystal**. There are 128 single- and multi-family residences located on the northbound side of the proposed alignment between 47th Avenue and the freight track crossing projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks and the sounding of horns at grade crossings.
- **47th Avenue North to CP Rail Crossing, Crystal**. There are 50 single- and multi-family residences located on the southbound side of the proposed alignment between 47th Avenue and the freight track crossing projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks and the sounding of horns at grade crossings.
- **56th Avenue North to 60th Avenue North, Crystal**. There are five single-family residences located on the northbound side of the proposed alignment between 56th Avenue and 60th Avenue projected to have moderate noise impacts, without noise mitigation. The noise impacts at this location would be due to the sounding of horns at the Bass Lake Road grade crossing.
- **56th Avenue North to 60th Avenue North, Crystal**. There are six single-family residences located on the northbound side of the proposed alignment between 56th Avenue and 60th Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the sounding of horns at the Bass Lake Road grade crossing.

- **60th Avenue North to 63rd Avenue North, Crystal**. There is one single-family residence and a motel located on the northbound side of the proposed alignment between 60th Avenue and 63rd Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the sounding of horns at the 63rd Avenue grade crossing.
- **60th Avenue North to 63rd Avenue North, Crystal**. There are 108 multi-family residences located on the southbound side of the proposed alignment between 60th Avenue and 63rd Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the sounding of horns at the 63rd Avenue grade crossing.
- **63rd Avenue North to I-694, Brooklyn Park**. There are nineteen single- and multi-family residences located on the northbound side of the proposed alignment between 63rd Avenue and I-694 projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the sounding of horns at the 63rd Avenue grade crossing.
- **I-694 to 73rd Avenue North, Brooklyn Park**. There are eight multi-family residences located on the northbound side of the proposed alignment between I-694 and 73rd Avenue projected to have moderate noise impacts, without noise mitigation. The noise impacts at this location would be due to the sounding of horns at the West Broadway grade crossing.
- **I-694 to 73rd Avenue North, Brooklyn Park**. There are five single- and multi-family residences located on the southbound side of the proposed alignment between I-694 and 73rd Avenue projected to have moderate and severe noise impacts, without noise mitigation. The noise impacts at this location would be due to the sounding of horns at the West Broadway grade crossing.
- **73rd Avenue North to Brooklyn Blvd, Brooklyn Park**. There are four multi-family residences located on the northbound side of the proposed alignment to the south of 76th Avenue projected to have moderate noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks and sounding of bells at the 76th Avenue grade crossing.
- **Shingle Creek to 85th Avenue North, Brooklyn Park**. There are five single-family residences located on the southbound side of the proposed alignment across from the North Hennepin Community College projected to have moderate noise impacts, without noise mitigation. The noise impacts at this location would be due to the presence of a crossover and noise from the nearby station.
- **89th Avenue North to 93rd Avenue North, Brooklyn Park**. There are five single-family residences located on the northbound side of the proposed alignment near Seltzer Parkway projected to have moderate noise impacts, without noise mitigation. The noise impacts at this location would be due to the proximity of the tracks and the sounding of bells at the Seltzer Parkway grade crossing.

As shown in **Table 5-2**, the proposed BLRT Extension project would result in one moderate noise impact and five severe noise impacts for institutional land uses (see **Appendix C** for locations of impacts). All of the noise impacts are related to LRT horn sounding at FRA-shared at-grade crossings in the proposed BLRT Extension project corridor. There would be no remaining impacts at institutional locations with the implementation of Quiet Zones. A summary of each institutional location that would experience noise impacts follows.

### Table 5-2. Summary of Noise Impacts for Institutional Land Use - LRT

| Location | City | Side of Track | Near Track Dist. (ft) | Speed (mph) | Exist Noise Level $L_{eq}$ (dBA) | Proposed BLRT Extension Project Noise Levels – $L_{eq}$ (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Proposed BLRT Extension Project | FTA Criteria | | Mod | Sev |
| | | | | | | | Mod | Sev | | |
| Sumner Library | Minneapolis | NB | 110 | 20 | 62 | 50 | 64 | 70 | 0 | 0 |
| Wayman AME Church | Minneapolis | NB | 135 | 30 | 62 | 47 | 64 | 70 | 0 | 0 |
| Seed Academy | Minneapolis | NB | 135 | 40 | 62 | 52 | 64 | 70 | 0 | 0 |
| Summit Academy | Minneapolis | SB | 225 | 20 | 62 | 54 | 64 | 70 | 0 | 0 |
| Zion Baptist Church | Minneapolis | NB | 185 | 40 | 62 | 55 | 64 | 70 | 0 | 0 |
| Le Creche Early Childhood Center | Minneapolis | NB | 135 | 40 | 62 | 52 | 64 | 70 | 0 | 0 |
| The Family Partnership | Golden Valley | NB | 55 | 35 | 50 | 54 | 58 | 65 | 0 | 0 |
| Theodore Wirth Regional Park[1] | Golden Valley | SB | 230 | 35 | 49 | 44 | 53 | 59 | 0 | 0 |
| The Chalet[1] | Golden Valley | SB | 925 | 20 | 55 | 31 | 56 | 61 | 0 | 0 |
| Bethel World Outreach | Robbinsdale | NB | 520 | 55 | 52 | 52 | 59 | 65 | 0 | 0 |
| Elim Lutheran Church | Robbinsdale | NB | 800 | 50 | 52 | 46 | 59 | 65 | 0 | 0 |
| Sacred Heart Church | Robbinsdale | NB | 300 | 35 | 52 | 68 | 59 | 65 | 0 | 1 |
| Robbins Gallery | Robbinsdale | SB | 110 | 20 | 52 | 77 | 59 | 65 | 0 | 1 |
| Washburn McReavy Funeral Home | Crystal | NB | 255 | 25 | 52 | 67 | 59 | 65 | 0 | 1 |
| Masonic Lodge | Robbinsdale | NB | 455 | 30 | 59 | 56 | 62 | 68 | 0 | 0 |
| Redeemer Lutheran Church | Robbinsdale | SB | 505 | 40 | 59 | 54 | 62 | 68 | 0 | 0 |
| Glen Haven Memorial Gardens | Crystal | SB | 610 | 55 | 48 | 58 | 58 | 64 | 1 | 0 |
| Crystal Medical Center | Crystal | NB | 180 | 30 | 61 | 71 | 63 | 69 | 0 | 1 |

## Table 5-2. Summary of Noise Impacts for Institutional Land Use - LRT

| Location | City | Side of Track | Near Track Dist. (ft) | Speed (mph) | Exist Noise Level $L_{eq}$ (dBA) | Proposed BLRT Extension Project Noise Levels – $L_{eq}$ (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Proposed BLRT Extension Project | FTA Criteria | | Mod | Sev |
| | | | | | | | Mod | Sev | | |
| Little Folks Daycare | Crystal | SB | 85 | 25 | 56 | 80 | 61 | 66 | 0 | 1 |
| Brooklyn Crystal Cemetery | Brooklyn Park | NB | 385 | 35 | 55 | 52 | 60 | 66 | 0 | 0 |
| Prince of Peace Lutheran Church | Brooklyn Park | NB | 385 | 35 | 62 | 63 | 64 | 70 | 0 | 0 |
| Brooklyn Park Evangelical Free Church | Brooklyn Park | SB | 145 | 45 | 60 | 51 | 63 | 68 | 0 | 0 |
| North Hennepin Community College | Brooklyn Park | NB | 75 | 20 | 60 | 61 | 63 | 68 | 0 | 0 |
| Step by Step Montessori School | Brooklyn Park | SB | 285 | 25 | 60 | 51 | 63 | 68 | 0 | 0 |
| Berean Baptist Church | Brooklyn Park | SB | 80 | 45 | 62 | 55 | 64 | 70 | 0 | 0 |
| Ebenezer Community Church | Brooklyn Park | NB | 135 | 20 | 51 | 58 | 59 | 65 | 0 | 0 |
| | | | | | | | | **Total** | **1** | **5** |

Source: CSA, 2015

[1] These receptors were assessed as land use category 1 receptors. All other institutional receptors were assessed as land use category 3 receptors.

The reported noise levels are rounded to the nearest decibel.

Mod = moderate; Sev = severe.

- **Sacred Heart Church.** The Sacred Heart Church is projected to have severe noise impact, without noise mitigation. The noise impact at this location is due to the sounding of the LRT horn at grade crossings in the shared freight corridor.
- **Robbins Gallery.** The Robbins Gallery is projected to have severe noise impact, without noise mitigation. The noise impact at this location is due to the sounding of the LRT horn at grade crossings in the shared freight corridor.
- **Washburn McReavy Funeral Home.** The Washburn McReavy Funeral Home is projected to have severe noise impact, without noise mitigation. The noise impact at this location is due to the sounding of the LRT horn at grade crossings in the shared freight corridor.
- **Glen Haven Memorial Garden.** The Glen Haven Memorial Garden is projected to have moderate noise impact, without noise mitigation. The noise impact at this location is due to the sounding of the LRT horn at grade crossings in the shared freight corridor.
- **Crystal Medical Center.** The Crystal Medical Center is projected to have severe noise impact, without noise mitigation. The noise impact at this location is due to the sounding of the LRT horn at grade crossings in the shared freight corridor.
- **Little Folks Daycare.** The Little Folks Daycare is projected to have severe noise impact, without noise mitigation. The noise impact at this location is due to the sounding of the LRT horn at grade crossings in the shared freight corridor.

### 5.1.2 Cultural Resources

Based on data provided by the Minnesota Department of Transportation (MnDOT) Cultural Resources Unit (CRU) of listed and eligible historic properties within the proposed BLRT Extension project vicinity, an assessment of the historic and cultural resources was conducted for the proposed BLRT Extension project. The assessment was conducted to determine the noise sensitivity of the resources along the proposed BLRT Extension project corridor. For each resource site, a determination was made regarding the noise sensitivity of the use and the FTA category it would fall under based on FTA guidance.

The result of the assessment, which is summarized in **Table 5-3**, shows that there would be noise impacts at the West Broadway Avenue Residential Historic District, Former Hennepin County Library, Robbinsdale Branch, Sacred Heart Catholic Church and Homewood Residential Historic District. However, with Quiet Zones, only five residences within the two residential historic districts would have moderate noise impacts remaining. Each of these locations was assessed for impact as a part of the noise assessment detailed in **Section 5.1.1**.

## Table 5-3. Summary of Historic and Cultural Resources Noise Assessment

| Inventory # | Property Name | City | FTA Noise Cat.[1] | Notes |
|---|---|---|---|---|
| HE-CRC-199 | Minneapolis & Pacific Railway Historic District (Soo Line) | Crystal | N/A | Not noise sensitive. |
| HE-RBC-264 | Jones-Osterhus Barn | Robbinsdale | N/A | Not noise sensitive. |
| HE-RBC-158 | West Broadway Avenue Residential Historic District | Robbinsdale | 2 | Severe noise impacts. Two moderate noise impacts remaining with Quiet Zone. |
| HE-RBC-024 | Former Hennepin County Library, Robbinsdale Branch | Robbinsdale | 3 | Severe noise impact. No impact with Quiet Zone. |
| HE-RBC-286 | Robbinsdale Waterworks | Robbinsdale | N/A | Not noise sensitive. |
| HE-RBC-1462 | Sacred Heart Catholic Church | Robbinsdale | 3 | Severe noise impact. No impact with Quiet Zone. |
| XX-PRK-001 | Grand Rounds Historic District – Theodore Wirth Park Segment | Golden Valley, Minneapolis | 3, N/A | No noise impacts. |
| HE-GVC-0050 | Bridge No. L9327 | Golden Valley | N/A | Not noise sensitive. |
| HE-MPC-12101 | Homewood Residential Historic District | Minneapolis | 2 | Three moderate noise impacts at southwestern corner of the district. |
| HE-MPC-9013 | Floyd B. Olson Memorial Statue | Minneapolis | N/A | Not noise sensitive. |
| HE-MPC-7553 | Labor Lyceum | Minneapolis | 3 | No noise impacts. |
| HE-MPC-8290 | Wayman AME Church | Minneapolis | 3 | No noise impacts. |
| HE-MPC-8081 | Sumner Branch Library | Minneapolis | 3 | No noise impacts. |
| HE-MPC-8125 | Northwestern Knitting Company Factory | Minneapolis | 2 | No noise impacts. |
| HE-MPC-0441 | Minneapolis Warehouse Historic District | Minneapolis | 2 | No noise impacts. |
| XX-RRD-010 (district) | St. Paul, Minneapolis & Manitoba (StPM&M)/Great Northern (GN) Railway Historic District | Minneapolis | N/A | Not noise sensitive. |
| Including HE-RRD-002; HE-BPC-0084; HE-CRC-0238; HE-RBC-0304; HE-MPC-16389 | Osseo Branch of the StPM&M/GN Railway Historic District | Minneapolis, Golden Valley, Robbinsdale, Crystal, Brooklyn Park | N/A | Not noise sensitive. |

Source: CSA, 2015

[1] N/A - Not included in any of the FTA noise-sensitive categories. Not noise sensitive.

### 5.1.3 Stations

The major noise source at stations, other than LRT operations, is the sounding of the LRT bells as the trains enter and exit the stations. The noise from the LRT bells has been captured in the proposed BLRT Extension project noise assessment detailed above.

### 5.1.4 Operations and Maintenance Facility

The operations and maintenance facility (OMF) is located more than 1,000 feet from any noise-sensitive receptors and therefore no noise impact is projected.

### 5.1.5 Construction Noise

This section describes the short-term (construction-phase) noise impacts of the proposed BLRT Extension project.

Construction noise levels are subject to local noise ordinances and noise rules administered by MPCA (Minnesota Rules, Chapter 7030). MPCA administers these noise rules to establish maximum allowable noise levels; where applicable, MPCA procedures allow for the issuance of noise variances. To address both the applicable local noise ordinances and the MPCA noise rules, the Council will develop a Noise Control Plan. The Noise Control Plan will contain information regarding when advanced notice of construction activities will be provided to affected communities. The Noise Control Plan will also contain other stipulations to help avoid or minimize construction noise impacts. For example, the Noise Control Plan will require that construction equipment used by contractors be properly muffled and in proper working order. Most of the construction will consist of site preparation and laying new tracks, which should occur primarily during daytime hours, except when required and allowable within local noise ordinance procedures.

Construction noise varies greatly depending on the type of construction activities, equipment used, staging of the construction process, the layout of the construction site, and the distance to sensitive receptors. Elevated noise levels during construction are, to a degree, unavoidable for this type of project, and short-term noise during construction of the proposed BLRT Extension project can be intrusive to residents near the construction sites. For most construction equipment, diesel engines are typically the dominant noise source. For other activities, such as impact pile driving and jackhammering, noise generated by the actual process dominates. The contractor will provide specific information on equipment and methods as a part of the Noise Control Plan for construction of the proposed BLRT Extension project. The contractor will also indicate whether or not the proposed BLRT Extension project would pursue a noise variance in any municipality along the proposed BLRT Extension project corridor. The Council will review noise variance requests prior to submittal to MPCA for approval.

Advanced notice will be provided to affected communities of any planned abnormally loud construction activities. In general, construction would occur within daytime hours. However, night construction may sometimes be required, for example to minimize traffic impacts or to improve safety. If nighttime construction is deemed necessary, during the proposed BLRT Extension

project's final design and construction stages, a nighttime construction mitigation plan will be developed.

**Table 5-4** shows noise levels of typical construction equipment from the FTA guidance manual, in terms of the maximum levels at 50 feet. Construction noise predictions at noise-sensitive locations depends on the amount of noise during each construction phase, the duration of the noise, and the distance from the construction activities to the sensitive receptor. Conducting a construction noise impact assessment requires knowledge of the equipment likely to be used, the duration of its use, and the way it will be used by a contractor. The $L_{eq}$ for a particular set of assumptions is estimated using typical noise levels from **Table 5-4**.

**Table 5-4. Typical Construction Noise Levels**

| Equipment Type | Typical Noise Level (dBA) 50 ft |
|---|---|
| Backhoe | 80 |
| Compactor | 82 |
| Concrete mixer | 85 |
| Concrete pump | 82 |
| Crane, derrick | 88 |
| Crane, mobile | 83 |
| Dozer | 85 |
| Grader | 85 |
| Loader | 85 |
| Paver | 89 |
| Pump | 76 |
| Roller | 74 |
| Truck | 88 |

Source: FTA, 2006

**Table 5-5** provides an example of a construction noise projection for typical at-grade track construction. Using these assumptions, an 8-hour $L_{eq}$ of 88 dBA would be projected at a distance of 50 feet from the construction site.

Using the criteria in **Section 2.1.2** and the example for at-grade construction in **Table 5-4**, screening distances for at-grade track construction noise impact can be determined. For residential land use, the potential for short-term at-grade track construction noise (**Table 5-5**) impact could extend to approximately 120 feet from the proposed BLRT Extension project corridor; however, if nighttime construction is conducted, the potential for short-term noise impact from at-grade construction could extend to approximately 380 feet from the proposed BLRT Extension project corridor.

See **Section 6.1.2** for more information regarding the approach to mitigating construction noise.

### Table 5-5. Typical Construction Scenario, At-Grade Track Construction

| Equipment Type | Typical Noise Level (dBA) 50 ft | Equipment Utilization Factor (%) | $L_{eq}$ (dBA) |
|---|---|---|---|
| Grader | 85 | 50 | 82 |
| Backhoe | 80 | 40 | 76 |
| Compactor | 82 | 20 | 75 |
| Loader | 85 | 20 | 78 |
| Roller | 74 | 20 | 67 |
| Truck | 88 | 40 | 84 |
| Crane, mobile | 83 | 20 | 76 |
| | | **Total 8-hour workday $L_{eq}$ at 50 ft** | **88** |

Source: CSA, 2015

## 5.2 Vibration

The FTA guidance manual on noise and vibration (FTA, 2006) is the primary source for the vibration methodology. The Final EIS uses a Detailed Vibration Assessment methodology, as described in Chapter 11 of the FTA guidance manual (FTA, 2006).

The vibration assessment steps employed included the following:

- Identified vibration-sensitive land uses in the proposed BLRT Extension project corridor using aerial photography, GIS data, and field surveys, typically within 300 feet of the alignment.
- Measured vibration-propagation characteristics of the soil in the proposed BLRT Extension project corridor at sensitive receptors (see **Section 4.2.2 – Affected Environment**).
- Projected proposed BLRT Extension project vibration levels from transit operations, using proposed BLRT Extension project drawings provided by the engineering team, and information on speeds, headways, track type, and vehicle vibration characteristics.
- Assessed the impact from transit by comparing the proposed BLRT Extension project vibration with the FTA vibration impact criteria in Chapter 8 of the FTA guidance manual (FTA, 2006).
- Recommended mitigation at locations where proposed BLRT Extension project vibration levels exceed the impact criteria.

### 5.2.1 Proposed BLRT Extension Project Vibration

This section describes the vibration impacts for the proposed BLRT Extension project. The proposed BLRT Extension project team conducted a Detailed Vibration Analysis and summaries of the analysis results are presented in **Tables 5-6 and 5-7** for residential and institutional (e.g., churches and schools) land uses, respectively.

The results include a tabulation of location information for each sensitive receptor group, the projections of future vibration levels, the impact criteria, and whether there would be vibration

impacts. The tables also show the total number vibration impacts for each location, without mitigation measures.

As shown in **Table 5-6**, the proposed BLRT Extension project would result in 28 vibration impacts for residential land uses (see **Appendix D** for locations of impacts). A summary of each residential location that would experience vibration impacts follows.

### Table 5-6. Summary of Vibration Impacts for Residential Land Use

| Location | City | Side of Track | Near Track Dist. (ft) | Speed (mph) | Proposed BLRT Extension Project Vibration Levels (VdB) | | # of Impacts |
|---|---|---|---|---|---|---|---|
| | | | | | Proposed BLRT Extension Project | FTA Impact Criterion | |
| I-94 to Humboldt Ave N | Minneapolis | NB | 205 | 30 | 54 | 72 | 0 |
| I-94 to Humboldt Ave N | Minneapolis | SB | 170 | 30 | 55 | 72 | 0 |
| Humboldt Ave N to Penn Ave N | Minneapolis | NB | 100 | 40 | 58 | 72 | 0 |
| Humboldt Ave N to Penn Ave N | Minneapolis | SB | 190 | 40 | 55 | 72 | 0 |
| Penn Ave N to Upton Ave N | Minneapolis | NB | 110 | 35 | 48 | 72 | 0 |
| Penn Ave N to BNSF freight tracks | Minneapolis | SB | 155 | 40 | 46 | 72 | 0 |
| Olson Mem Hwy to Oak Park Ave N | Minneapolis | NB | 35 | 35 | 58 | 72 | 0 |
| Oak Park Ave N to Plymouth Ave N | Minneapolis | NB | 60 | 55 | 49 | 72 | 0 |
| Plymouth Ave N to 16th Ave N | Golden Valley | NB | 265 | 45 | 43 | 72 | 0 |
| 16th Ave N to Golden Valley Rd | Golden Valley | NB | 30 | 45 | 55 | 72 | 0 |
| Golden Valley Rd to 26th Ave N | Golden Valley | NB | 80 | 55 | 56 | 72 | 0 |
| 26th Ave N to 31½ Ave N | Robbinsdale | NB | 90 | 55 | 45 | 72 | 0 |
| 31½ Ave N to 34th Ave N | Robbinsdale | NB | 20 | 55 | 66 | 72 | 0 |
| 34th Ave N to 36th Ave N | Robbinsdale | NB | 60 | 55 | 67 | 72 | 0 |
| 34th Ave N to 36th Ave N | Robbinsdale | SB | 140 | 55 | 54 | 72 | 0 |
| 36th Ave N to 38th Ave N | Robbinsdale | NB | 35 | 55 | 77 | 72 | 26 |
| 36th Ave N to 38th Ave N | Robbinsdale | SB | 75 | 55 | 63 | 72 | 0 |
| 38th Ave N to 40½ Ave N | Robbinsdale | NB | 35 | 55 | 76 | 72 | 1 |
| 38th Ave N to 40th Ave N | Robbinsdale | SB | 70 | 45 | 64 | 72 | 0 |
| 40½ Ave N to 42nd Ave N | Robbinsdale | NB | 90 | 45 | 60 | 72 | 0 |
| 40th Ave N to 42nd Ave N | Robbinsdale | SB | 130 | 30 | 57 | 72 | 0 |
| 42nd Ave N to MN-100 | Robbinsdale | NB | 90 | 50 | 61 | 72 | 0 |
| 42nd Ave N to MN-100 | Robbinsdale | SB | 70 | 40 | 61 | 72 | 0 |
| MN-100 to 47th Ave N | Robbinsdale | NB | 120 | 55 | 68 | 72 | 0 |
| MN-100 to 47th Ave N | Robbinsdale | SB | 80 | 55 | 62 | 72 | 0 |
| 47th Ave N to CP rail crossing | Crystal | NB | 35 | 55 | 72 | 72 | 1 |
| 47th Ave N to CP rail crossing | Crystal | SB | 120 | 55 | 58 | 72 | 0 |
| CP rail crossing to 56th Ave N | Crystal | NB | 735 | 40 | 55 | 72 | 0 |
| CP rail crossing to 56th Ave N | Crystal | SB | 80 | 25 | 57 | 72 | 0 |

### Table 5-6. Summary of Vibration Impacts for Residential Land Use

| Location | City | Side of Track | Near Track Dist. (ft) | Speed (mph) | Proposed BLRT Extension Project Vibration Levels (VdB) | | # of Impacts |
|---|---|---|---|---|---|---|---|
| | | | | | Proposed BLRT Extension Project | FTA Impact Criterion | |
| 56th Ave N to 60th Ave N | Crystal | NB | 695 | 30 | 51 | 72 | 0 |
| 56th Ave N to 60th Ave N | Crystal | SB | 165 | 55 | 55 | 72 | 0 |
| 60th Ave N to 63rd Ave N | Crystal | NB | 180 | 55 | 55 | 72 | 0 |
| 60th Ave N to 63rd Ave N | Crystal | SB | 135 | 55 | 56 | 72 | 0 |
| 63rd Ave N to I-694 | Brooklyn Park | NB | 280 | 55 | 54 | 72 | 0 |
| 63rd Ave N to I-694 | Brooklyn Park | SB | 140 | 35 | 53 | 72 | 0 |
| I-694 to 73rd Ave N | Brooklyn Park | NB | 735 | 55 | 51 | 72 | 0 |
| I-694 to 73rd Ave N | Brooklyn Park | SB | 170 | 55 | 63 | 72 | 0 |
| 73rd Ave N to Brooklyn Blvd | Brooklyn Park | NB | 75 | 35 | 57 | 72 | 0 |
| Brooklyn Blvd to Shingle Creek | Brooklyn Park | NB | 80 | 45 | 60 | 72 | 0 |
| Shingle Creek to 85th Ave N | Brooklyn Park | SB | 70 | 40 | 71 | 72 | 0 |
| 85th Ave N to 89th Ave N | Brooklyn Park | NB | 85 | 45 | 59 | 72 | 0 |
| 89th Ave N to 93rd Ave N | Brooklyn Park | NB | 70 | 45 | 62 | 72 | 0 |
| | | | | | | **Total** | **28** |

Source: CSA, 2015
The vibration levels for each location are the highest levels projected for that location. Vibration projections at other receptors within each location would be lower. The threshold of human perception to LRT vibration is approximately 65 VdB or less, and annoyance begins to occur for frequent events at vibration levels over 70 VdB.

- **36th Avenue North to 38th Avenue North.** The vibration impacts at this location include the Windsor Court Apartments and a duplex to the north of the apartments. The residences are located to the east of the alignment. The impacts at this location are due to the speed of the LRT and the proximity of the residences to the proposed LRT alignment.
- **38th Avenue North to 40½ Avenue North.** The vibration impacts at this location include one single-family residence located to the east of the alignment. The impacts at this location are due to the speed of the LRT and the proximity of the residence to the proposed LRT alignment.
- **47th Avenue North to CP Rail Crossing.** The vibration impacts at this location include one single-family residence located to the east of the alignment. The impacts at this location are due to the speed of the LRT and the proximity of the residence to the proposed LRT alignment.

As shown in **Table 5-7**, the proposed BLRT Extension project would result in no vibration impacts for institutional land uses.

## Table 5-7. Summary of Vibration Impacts for Institutional Land Use

| Location | City | Side of Track | Near Track Dist. (ft) | Speed (mph) | Proposed BLRT Extension Project Vibration Levels (VdB) | | # of Impacts |
|---|---|---|---|---|---|---|---|
| | | | | | Proposed BLRT Extension Project | FTA Impact Criterion | |
| Sumner Library | Minneapolis | NB | 110 | 20 | 45 | 78 | 0 |
| Wayman AME Church | Minneapolis | NB | 135 | 30 | 46 | 78 | 0 |
| Seed Academy | Minneapolis | NB | 135 | 40 | 47 | 78 | 0 |
| Summit Academy | Minneapolis | SB | 225 | 20 | 41 | 78 | 0 |
| Zion Baptist Church | Minneapolis | NB | 185 | 40 | 55 | 78 | 0 |
| Le Creche Early Childhood Center | Minneapolis | NB | 135 | 40 | 47 | 78 | 0 |
| The Family Partnership | Golden Valley | NB | 55 | 35 | 46 | 78 | 0 |
| The Chalet | Golden Valley | SB | 925 | 20 | 38 | 78 | 0 |
| Bethel World Outreach | Robbinsdale | NB | 520 | 55 | 51 | 78 | 0 |
| Elim Lutheran Church | Robbinsdale | NB | 800 | 50 | 51 | 78 | 0 |
| Sacred Heart Church | Robbinsdale | NB | 300 | 35 | 53 | 78 | 0 |
| Robbins Gallery | Robbinsdale | SB | 110 | 20 | 53 | 78 | 0 |
| Washburn McReavy Funeral Home | Crystal | NB | 255 | 25 | 51 | 78 | 0 |
| Masonic Lodge | Robbinsdale | NB | 455 | 30 | 51 | 78 | 0 |
| Redeemer Lutheran Church | Robbinsdale | SB | 505 | 40 | 55 | 78 | 0 |
| Crystal Medical Center | Crystal | NB | 180 | 30 | 51 | 78 | 0 |
| Little Folks Daycare | Crystal | SB | 85 | 25 | 53 | 78 | 0 |
| Prince of Peace Lutheran Church | Brooklyn Park | NB | 385 | 35 | 39 | 78 | 0 |
| Brooklyn Park Evangelical Free Church | Brooklyn Park | SB | 145 | 45 | 52 | 78 | 0 |
| North Hennepin Community College | Brooklyn Park | NB | 75 | 20 | 56 | 78 | 0 |
| Step by Step Montessori School | Brooklyn Park | SB | 285 | 25 | 47 | 78 | 0 |
| Berean Baptist Church | Brooklyn Park | SB | 80 | 45 | 60 | 78 | 0 |
| Ebenezer Community Church | Brooklyn Park | NB | 135 | 20 | 49 | 78 | 0 |

Source: CSA, 2015

The vibration levels for each location are the highest levels projected for that location. Vibration projections at other receptors within each location would be lower. The threshold of human perception to LRT vibration is approximately 65 VdB or less, and annoyance begins to occur for frequent events at vibration levels over 70 VdB.

### 5.2.2 Cultural Resources

Based on data provided by MnDOT CRU of listed and eligible historic properties within the proposed BLRT Extension project vicinity, an assessment of the historic and cultural resources was conducted for the proposed BLRT Extension project. The assessment was conducted to determine the vibration sensitivity of the resources along the proposed BLRT Extension project corridor. For each resource site, a determination was made regarding the vibration sensitivity of the use and the FTA category it would fall under based on FTA guidance. The result of the assessment, which is summarized in **Table 5-8**, is that there are no vibration impacts at any historic or cultural resources along the proposed BLRT Extension project corridor.

In addition to the operational (long-term) assessment described above, an assessment for the potential for vibration-related construction (short-term) impacts also was conducted. The criteria for construction vibration impacts to damage buildings are based on the building category and fragility of the building, not its designation or use as a historic resource. In most cases, vibration generated by construction activities does approach levels high enough to cause damage, even for fragile buildings. The exceptions to this can be for activities such as vibratory rolling and impact pile driving. At distances within approximately 50 feet, these activities have the potential for damage to the most sensitive structures. Based on the list of the structures in **Table 5-7**, they would either not be included in the most stringent category or would not be close enough for there to be any potential for damage. Therefore additional assessment is not warranted.

### 5.2.3 Stations

There is no additional vibration associated with stations, and no vibration assessment for stations has been conducted.

### 5.2.4 Operations and Maintenance Facility

The operations and maintenance facility (OMF) is located more than 1,000 feet from any vibration-sensitive receptors and therefore no vibration impact is projected.

## Table 5-8. Summary of Historic and Cultural Resources Vibration Assessment

| Inventory # | Property Name | City | FTA Noise Cat.[1] | Notes |
|---|---|---|---|---|
| HE-CRC-199 | Minneapolis & Pacific Railway Historic District (Soo Line) | Crystal | N/A | Not vibration sensitive. |
| HE-RBC-264 | Jones-Osterhus Barn | Robbinsdale | N/A | Not vibration sensitive. |
| HE-RBC-158 | West Broadway Avenue Residential Historic District | Robbinsdale | 2 | No vibration impact. |
| HE-RBC-024 | Former Hennepin County Library, Robbinsdale Branch | Robbinsdale | 3 | No vibration impact. |
| HE-RBC-286 | Robbinsdale Waterworks | Robbinsdale | N/A | Not vibration sensitive. |
| HE-RBC-1462 | Sacred Heart Catholic Church | Robbinsdale | 3 | No vibration impact. |
| XX-PRK-001 | Grand Rounds Historic District – Theodore Wirth Park Segment | Golden Valley, Minneapolis | N/A | Not vibration sensitive. |
| HE-GVC-0050 | Bridge No. L9327 | Golden Valley | N/A | Not vibration sensitive. |
| HE-MPC-12101 | Homewood Residential Historic District | Minneapolis | 2 | No vibration impact. |
| HE-MPC-9013 | Floyd B. Olson Memorial Statue | Minneapolis | N/A | Not vibration sensitive. |
| HE-MPC-7553 | Labor Lyceum | Minneapolis | 3 | No vibration impact. |
| HE-MPC-8290 | Wayman AME Church | Minneapolis | 3 | No vibration impact. |
| HE-MPC-8081 | Sumner Branch Library | Minneapolis | 3 | No vibration impact. |
| HE-MPC-8125 | Northwestern Knitting Company Factory | Minneapolis | 2 | No vibration impact. |
| HE-MPC-0441 | Minneapolis Warehouse Historic District | Minneapolis | 2 | No vibration impact. |
| XX-RRD-010 (district) | St. Paul, Minneapolis & Manitoba (StPM&M)/Great Northern (GN) Railway Historic District | Minneapolis | N/A | Not vibration sensitive. |
| Including HE-RRD-002; HE-BPC-0084; HE-CRC-0238; HE-RBC-0304; HE-MPC-16389 | Osseo Branch of the StPM&M/GN Railway Historic District | Minneapolis, Golden Valley, Robbinsdale, Crystal, Brooklyn Park | N/A | Not vibration sensitive. |

Source: CSA, 2015

[1] N/A - Not included in any of the FTA vibration-sensitive categories. Not vibration sensitive.

### 5.2.5 Construction Vibration

Unlike typical LRT operations, there is the potential for damage to nearby structures at close distances due to construction vibration from activities such as pile driving, hoe rams, vibratory compaction and loaded trucks. Most limits on construction vibration are based on reducing the potential for damage to nearby structures. Although construction vibrations are only temporary, it is still reasonable to assess the potential for human annoyance and damage.

Since most of the buildings in the study area are typical engineered concrete and masonry or reinforced concrete, steel or timber construction, a vibration criterion of 98 VdB has been used to asses potential damage impact and 72 VdB has been used to assess potential vibration annoyance from construction activities. Vibration source levels at 25 feet and the distances to potential residential annoyance and potential damage are shown in **Table 5-9**. With the exception of impact pile driving, the potential for damage is limited to within 20 feet of construction activities. For impact pile driving, the distance for the potential for damage is up to 40 feet.

Because the exact location of construction equipment is important in projecting vibration levels, a more detailed assessment of potential vibration damage will be performed during final design when more accurate equipment locations are known. It is important to note that this assessment does not address potential damage to structures due to soil settlement or displacement due to construction activities. A summary of geological conditions and soils is found in Section 5.4 of the Final EIS. Section 4.3 of the Final EIS addresses issues related to potential displacement of residents and businesses resulting from the proposed BLRT Extension project.

**Table 5-9. Summary of Potential Construction Vibration Impacts**

| Equipment | Vibration Level at 25 ft (VdB) | Distance to Potential Damage (98 VdB), ft | Distance to Potential Annoyance (72 VdB), ft |
|---|---|---|---|
| Impact pile driving | 104 | 40 | 300 |
| Push piling | 84 | 8 | 62 |
| Hoe ram | 87 | 10 | 80 |
| Caisson drilling | 87 | 10 | 80 |
| Loaded trucks | 86 | 10 | 75 |
| Clam shovel | 94 | 20 | 135 |
| Vibratory roller | 94 | 20 | 135 |

Source: CSA, 2015

# 6 Mitigation Measures

## 6.1 Noise

FTA guidance states that severe noise impacts should be mitigated unless there are no feasible or practical means to do so (FTA, 2006). For moderate impacts, discretion should be used, and proposed BLRT Extension project–specific factors should be included in the consideration of mitigation. The proposed BLRT Extension project–specific factors can include both the existing noise levels and the projected increase in noise levels; the types and number of noise-sensitive land uses with impacts; existing sound insulation of buildings; and the cost-effectiveness of providing noise mitigation. The Council has adopted a mitigation approach that details which moderate impacts will qualify for mitigation. This approach is detailed in **Section 6.1.1** below.

### 6.1.1 Metro Transit Noise Mitigation Approach

#### 6.1.1.1 Noise Mitigation Thresholds (Part A)

Per FTA guidance, noise mitigation will be provided for all "Severe" impacts that meet the criteria for reasonableness, feasibility, and cost-effectiveness, as defined under Part B below.

At the "Moderate" impact level, FTA guidance requires the proposed BLRT Extension project sponsor to consider mitigation based on a number of factors, as defined in the FTA guidance manual. For the proposed BLRT Extension project, noise mitigation will be provided for all "Moderate" impacts, caused by the proposed BLRT Extension project, that meet the criteria for reasonableness, feasibility, and cost-effectiveness, as defined under Part B below, and at locations where the proposed BLRT Extension project has a "Moderate" impact and one of the following thresholds are exceeded:

1. Location(s) where the existing noise levels without the proposed BLRT Extension project are already 65 dBA $L_{dn}$ or greater (see Exhibit 2.1-1).[6]
2. Location(s) where there is an increase of 3 dB or more in the $L_{dn}$ over the existing level due to the proposed BLRT Extension project.[7]
3. The predicted increase in the $L_{dn}$ over the existing level is less than 3 dB, the location is adjacent to an area with either "Severe Impact" or "Moderate Impact" with an increase in the $L_{dn}$ of 3 dB or greater, and the inclusion of the adjacent properties will provide a logical and equitable terminus to the mitigation.

[6] A noise level of 65 dBA or greater is considered a "normally unacceptable" noise environment by the US Department of Housing and Urban Development. This threshold is also used by the Federal Aviation Administration for compatible land use.

[7] An increase in noise of 3 dB is generally considered the threshold for a noticeable change in noise in an outdoor setting and falls roughly at the midpoint of the "Moderate" impact range. This is a common threshold used in transit agency noise mitigation policies for an increase requiring mitigation.

#### 6.1.1.2 Noise Mitigation Criteria (Part B)

Criteria for reasonableness, feasibility, and cost-effectiveness as included in FTA guidance are described below.

1. **Reasonableness:** For noise mitigation to be considered reasonable, it must provide at least a 5-dB reduction in proposed BLRT Extension project noise.[8]
2. **Feasibility:**
   - For noise mitigation to be considered feasible it must be practical from engineering, operations, and safety standpoints.
   - Other proposed BLRT Extension project factors may need to be considered in determining feasibility of mitigation. These could include community input, visual impacts and other proposed BLRT Extension project features that might limit mitigation.
3. **Cost-Effectiveness:** For noise mitigation to be considered cost-effective, the cost per benefited should be approximately what it would cost to build a 10-foot-high noise wall.

### 6.1.2 Noise Mitigation Methods

Several options exist for providing noise mitigation at the source, path or receiver. The most common noise mitigation measures are described below.

#### 6.1.2.1 Source

**Resilient or Damped Wheels:** Using either resilient or damped wheels can achieve approximately a 2-dB reduction in wheel/rail noise from transit vehicles on typical track sections.

**Track Dampers:** Using damping materials on tracks can achieve an approximately 1–3-dB reduction in noise radiated from the tracks on typical track sections.

**Vehicle Design:** Certain design features of transit vehicles can provide some shielding and/or absorption of the noise generated by the vehicle. Acoustical absorption under the car can provide up to a 5-dB reduction in wheel/rail noise and propulsion-system noise on rapid transit trains. Similarly, vehicle skirts (which the existing Metro Transit vehicles have) over the wheels can provide up to 5 dB of reduction in noise.

**Special Trackwork:** Gaps in the rails at crossovers and turnouts generates around 6 dB of increased noise for locations close to the track. If crossover are located in sensitive areas and cannot be moved, one approach is to use special trackwork, such as spring-rail, moveable point, or flange bearing frogs to eliminate the gap in the rail at the crossover.

**Quiet Zones:** Quiet Zones are locations, as least one-half mile in length, where the sounding of horns has been eliminated because of safety improvements at at-grade crossings, including modifications

[8] 5 dB is a typical minimum reduction used by many agencies for mitigation to be considered an effective and reasonable mitigation measure.

to the streets, raised median barriers, four quadrant gates, and other improvements. Horns will only be sounded in emergency situations at these locations.

**Wayside Devices:** Wayside devices are mounted at the at-grade-crossing, directed down the roadway instead of mounted on the vehicle. The wayside devices are directive and provide warning to motorists and pedestrians at the at-grade crossing while limiting the noise exposure to areas adjacent to the crossing.

#### 6.1.2.2 Path

**Noise Barriers:** This is the most common approach to reducing noise impacts from transit and rail projects. For noise barriers to be effective, they must break the line-of-sight between the source of the noise and the receiver. Additionally, the barrier must be made of a material that has a minimum surface density of 4 pounds/square foot and not have any gaps or holes that could degrade the performance of the barrier. Noise barriers can be made of virtually any material that meets these requirements, and can typically provide between 5 and 10 dB of reduction, depending on the design of the barrier. Proposed BLRT Extension project features, such as retaining walls or crash walls can act as effective noise barriers.

**Berms:** Berms are another approach to mitigating noise at the path. Berms work in much the same way as barriers, and need to block the line of sight between the source and the receiver to be effective. Berms can also provide between 5 and 10 dB of reduction, but are not commonly used in transit applications due to the space requirements (a berm typically must be twice as wide as it is tall).

#### 6.1.2.3 Receiver

**Sound Insulation:** In locations where noise barriers are not feasible or practical, for multi-story buildings, or at locations where there is no exterior use, sound insulation of buildings can be an effective approach to noise mitigation. While it does not provide mitigation for exterior use, it can be very effective for indoor uses and provide between 5 and 10 dB of reduction. Sound insulation typically focuses on improvements to windows and doors, sealing any gaps or holes and providing central ventilation and air conditioning so that windows can remain closed. The criterion for indoor noise levels is 45 dBA $L_{dn}$.

### 6.1.3 Proposed BLRT Extension Project Noise Mitigation

The results in **Table 6-1** indicate that most residential noise impacts which meet the threshold for mitigation will be eliminated, based on FTA criteria, with the proposed mitigation measures. Quiet Zones, which allow for the use of LRT bells instead of horns at at-grade crossings, will eliminate most noise impacts. Additionally, the Quiet Zones will have the additional benefit of eliminating the existing freight horns as well. Additional mitigation measures required after implementation of Quiet Zones are shown in **Table 6-1**. More detailed descriptions of the noise mitigation measures are provided below.

## Table 6-1. Summary of Residential Noise Mitigation Measures

| Location | City | Side of Track | Type and # of Impacts without Mitigation[1] | | Noise Level Increase[2] (dB) | Proposed Mitigation Measure[3] | Residual Impacts with Mitigation | |
|---|---|---|---|---|---|---|---|---|
| | | | Mod | Sev | | | Mod | Sev |
| I-94 to Humboldt Ave N | Minneapolis | NB | 16 | 0 | 0 to 1.8 | None[4] | N/A | N/A |
| Humboldt Ave N to Penn Ave N | Minneapolis | NB | 9 | 0 | 0 to 2.9 | None[4] | N/A | N/A |
| Olson Mem Hwy to Oak Park Ave N | Minneapolis | NB | 1 | 0 | 0.1 to 5.8 | Interior testing to determine mitigation measure[5] | 0 | 0 |
| Oak Park Ave N to Plymouth Ave N | Minneapolis | NB | 3 | 0 | 1.3 to 6.8 | Interior testing to determine mitigation measure[5] | 0 | 0 |
| Plymouth Ave N to 16th Ave N | Golden Valley | NB | 9 | 0 | 0.1 to 5.6 | Interior testing to determine mitigation measure[5] | 0 | 0 |
| 16th Ave N to Golden Valley Rd | Golden Valley | NB | 1 | 0 | 0.2 to 3.5 | Interior testing to determine mitigation measure[5] | 0 | 0 |
| Golden Valley Rd to 26th Ave N | Golden Valley | NB | 9 | 14 | 0.9 to 15.2 | Noise barrier E-2: 10 feet tall, 2,540 feet long | 1 | 1 |
| 26th Ave N to 31½ Ave N | Robbinsdale | NB | 3 | 0 | 3.8 to 9.6 | Noise barrier E-2: 10 feet tall, 2,540 feet long | 0 | 0 |
| 31½ Ave N to 34th Ave N | Robbinsdale | NB | 4 | 12 | 1.8 to 19.4 | Noise barrier E-3: 10 feet tall, 1,200 feet long | 4 | 1 |
| 34th Ave N to 36th Ave N | Robbinsdale | NB | 20 | 5 | 0.7 to 8.3 | Noise barrier E-4: 8 feet tall, 1,325 feet long | 0 | 0 |
| 34th Ave N to 36th Ave N | Robbinsdale | SB | 1 | 0 | 2.7 to 4.1 | Interior testing to determine mitigation measure[5] | 0 | 0 |
| 36th Ave N to 38th Ave N | Robbinsdale | NB | 8 | 27 | 0.9 to 16.7 | Noise barrier E-6: 8 feet tall, 3,110 feet long | 0 | 0 |
| 36th Ave N to 38th Ave N | Robbinsdale | SB | 4 | 0 | 0.1 to 9.0 | Noise barrier W-5: 6 feet tall, 650 feet long | 0 | 0 |
| 38th Ave N to 40½ Ave N | Robbinsdale | NB | 3 | 20 | 0 to 16.6 | Noise barrier E-6: 8 feet tall, 3,110 feet long | 0 | 0 |

## Table 6-1. Summary of Residential Noise Mitigation Measures

| Location | City | Side of Track | Type and # of Impacts without Mitigation[1] | | Noise Level Increase[2] (dB) | Proposed Mitigation Measure[3] | Residual Impacts with Mitigation | |
|---|---|---|---|---|---|---|---|---|
| | | | Mod | Sev | | | Mod | Sev |
| 38th Ave N to 40th Ave N | Robbinsdale | SB | 20 | 5 | 0 to 11.1 | Noise barrier W-7: 6 feet tall, 1,850 feet long and interior testing to determine mitigation measure | 0 | 0 |
| 40½ Ave N to 42nd Ave N | Robbinsdale | NB | 5 | 2 | 0.1 to 11.6 | Wayside device and noise barrier E-6: 8 feet tall, 3,110 feet long | 0 | 0 |
| 40th Ave N to 42nd Ave N | Robbinsdale | SB | 13 | 2 | 0 to 7.3 | Wayside device and interior testing to determine mitigation measure[5] | 0 | 0 |
| 42nd Ave N to MN-100 | Robbinsdale | NB | 2 | 0 | 0 to 3.4 | Interior testing to determine mitigation measure[5] | 0 | 0 |
| 42nd Ave N to MN-100 | Robbinsdale | SB | 2 | 1 | 0 to 4.6 | Wayside device | 0 | 0 |
| MN-100 to 47th Ave N | Robbinsdale | NB | 10 | 1 | 0.1 to 5.0 | Wayside device and noise barrier E-10: 10 feet tall, 1,300 feet long and interior testing to determine mitigation measure | 0 | 0 |
| MN-100 to 47th Ave N | Robbinsdale | SB | 8 | 0 | 0 to 3.6 | Wayside device and interior testing to determine mitigation measure[5] | 0 | 0 |
| 47th Ave N to freight tracks | Crystal | NB | 11 | 31 | 0 to 18.5 | Wayside device, noise barrier E-10: 10 feet tall, 1,300 feet long, noise barrier E-11: 10 feet tall, 1,100 feet long, and interior testing to determine mitigation measure | 0 | 0 |
| 47th Ave N to freight tracks | Crystal | SB | 0 | 0 | 0.1 to 1.8 | None required | 0 | 0 |
| 56th Ave N to 60th Ave N | Crystal | NB | 0 | 0 | 0 to 0.4 | None required | 0 | 0 |
| 56th Ave N to 60th Ave N | Crystal | SB | 0 | 0 | 0 to 4.6 | None required | 0 | 0 |

## Table 6-1. Summary of Residential Noise Mitigation Measures

| Location | City | Side of Track | Type and # of Impacts without Mitigation[1] | | Noise Level Increase[2] (dB) | Proposed Mitigation Measure[3] | Residual Impacts with Mitigation | |
|---|---|---|---|---|---|---|---|---|
| | | | Mod | Sev | | | Mod | Sev |
| 60th Ave N to 63rd Ave N | Crystal | NB | 0 | 0 | 0 to 0.7 | None required | 0 | 0 |
| 60th Ave N to 63rd Ave N | Crystal | SB | 0 | 0 | 0 to 1.1 | None required | 0 | 0 |
| 63rd Ave N to I-694 | Brooklyn Park | NB | 0 | 0 | 0 to 0.3 | None required | 0 | 0 |
| I-694 to 73rd Ave N | Brooklyn Park | NB | 0 | 0 | 0 to 0.6 | None required | 0 | 0 |
| I-694 to 73rd Ave N | Brooklyn Park | SB | 0 | 0 | 0 to 0.7 | None required | 0 | 0 |
| 73rd Ave N to Brooklyn Blvd | Brooklyn Park | NB | 4 | 0 | 0 to 2.4 | None[4] | N/A | N/A |
| Shingle Creek to 85th Ave N | Brooklyn Park | SB | 5 | 0 (0) | 0 to 2.9 | None[4] | N/A | N/A |
| 89th Ave N to 93rd Ave N | Brooklyn Park | NB | 5 | 0 (0) | 0.3 to 0.8 | None[4] | N/A | N/A |

Source: CSA, 2015

N/A = not applicable

[1] The number of impacts without mitigation reflects the implementation of Quiet Zones. Quiet Zones are locations, at least one-half mile in length, where the routine sounding of horns has been eliminated because of safety improvements at at-grade crossings, including modifications to the streets, raised median barriers, four quadrant gates, and other improvements designed and implemented by the proposed BLRT Extension project and consistent with Quiet Zone readiness. Horns are sounded in emergency situations at these locations. Municipalities must apply to FRA for approval of Quiet Zones.

[2] The reported noise level increases are the range of increases in noise levels (without mitigation) due to the proposed BLRT Extension project for each location.

[3] If the proposed noise mitigation does not meet the reasonableness criteria as defined in the Regional Transitways Guidelines (March 2016) (see **Appendix F** of the Final EIS), or if the property owner(s) does not approve sound insulation, the proposed BLRT Extension project will result in additional residual noise impacts.

[4] The moderate impacts at these locations do not meet the threshold for mitigation as defined by the Regional Transitways Guidelines (March 2016) (see **Appendix F** of the Final EIS).

[5] The Council has determined that a noise barrier at these locations would not meet the reasonableness criteria for noise mitigation as defined in the Regional Transitways Guidelines (March 2016); specifically, a noise barrier at these locations does not meet cost-effectiveness criteria. As such, no noise barrier will be constructed to mitigate impacts to these residences. Final determination of mitigation measures for these residences will be assessed with on-site testing to determine if the residences meet the interior noise level criteria. Based on the results, the Council will identify the noise mitigation to be implemented for these residences during Engineering and once on-site measurements are completed. If an exceedance of interior noise level is identified at these locations, the Council will work with property owners on applicable mitigation. This could include implementation of sound insulation, which would still require approval by the property owner(s).

- **Olson Memorial Highway to Oak Park Avenue North, Minneapolis**. The potential mitigation measure at this location would include on-site testing to determine if the residences meet the interior noise level criteria.
- **Oak Park Avenue North to Plymouth Avenue North, Minneapolis**. The potential mitigation measure at this location would include on-site testing to determine if the residences meet the interior noise level criteria.

- **Plymouth Avenue North to 16th Avenue North, Golden Valley**. The potential mitigation measure at this location would include on-site testing to determine if the residences meet the interior noise level criteria.
- **16th Avenue North to Golden Valley Road, Golden Valley**. The potential mitigation measure at this location would include on-site testing to determine if the residences meet the interior noise level criteria.
- **Golden Valley Road to 26th Avenue North, Golden Valley**. The potential mitigation measure at this location would include a 10-foot-high, 2,540-foot-long noise barrier.
- **26th Avenue North to 31½ Avenue North, Robbinsdale**. The potential mitigation measure at this location would include a 10-foot-high, 2,540-foot-long noise barrier.
- **31½ Avenue North to 34th Avenue North, Robbinsdale**. The potential mitigation measure at this location would include a 10-foot-high, 1,200-foot-long noise barrier.
- **34th Avenue North to 36th Avenue North (NB), Robbinsdale**. The potential mitigation measure at this location would include an 8-foot-high, 1,325-foot-long noise barrier.
- **34th Avenue North to 36th Avenue North (SB), Robbinsdale**. The potential mitigation measure at this location would include on-site testing to determine if the residences meet the interior noise level criteria.
- **36th Avenue North to 38th Avenue North (NB), Robbinsdale.** The potential mitigation measure at this location would include an 8-foot-high, 3,110-foot-long noise barrier.
- **36th Avenue North to 38th Avenue North (SB), Robbinsdale**. The potential mitigation measure at this location would include a 6-foot-high, 650-foot-long noise barrier.
- **38th Avenue North to 40½ Avenue North, Robbinsdale**. The potential mitigation measure at this location would include an 8-foot-high, 3,110-foot-long noise barrier.
- **38th Avenue North to 40th Avenue North, Robbinsdale**. The potential mitigation measures at this location would include a 6-foot-high, 1,850-foot-long noise barrier and on-site testing to determine if the residences meet the interior noise level criteria.
- **40½ Avenue North to 42nd Avenue North, Robbinsdale**. The potential mitigation measures at this location would include a wayside device and an 8-foot-high, 3,110-foot-long noise barrier.
- **40th Avenue North to 42nd Avenue North, Robbinsdale**. The potential mitigation measures at this location would include a wayside device and on-site testing to determine if the residences meet the interior noise level criteria.
- **42nd Avenue North to MN-100 (NB), Robbinsdale**. The potential mitigation measure at this location would include on-site testing to determine if the residences meet the interior noise level criteria.
- **42nd Avenue North to MN-100 (SB), Robbinsdale**. The potential mitigation measure at this location would include a wayside device.

- **MN-100 to 47th Avenue North, Robbinsdale (NB)**. The potential mitigation measures at this location would include a wayside device, a 10-foot-high, 1,300-foot-long noise barrier, and on-site testing to determine if the residences meet the interior noise level criteria.
- **MN-100 to 47th Avenue North, Robbinsdale (SB)**. The potential mitigation measures at this location would include a wayside device and on-site testing to determine if the residences meet the interior noise level criteria.
- **47th Avenue North to CP Rail Crossing, Crystal**. The potential mitigation measures at this location would include a wayside device, a 10-foot-high, 1,300-foot-long noise barrier, and a 10-foot-high, 1,100-foot-long noise barrier and on-site testing to determine if the residences meet the interior noise level criteria.

The results of the noise assessment indicate that residential noise impacts at two locations (Golden Valley Road to 26th Avenue North and 31½ Avenue North to 34th Avenue North) are not mitigated, and that residual noise impacts would remain at these locations after mitigation. The results also indicate that all institutional noise impacts will be eliminated with the proposed mitigation measures. At all institutional locations, Quiet Zones, which allow for the use of LRT bells instead of horns at at-grade crossings, will eliminate the noise impacts. Additionally, the Quiet Zones will have the additional benefit of eliminating the existing freight horns as well. However, if the municipality fails to apply to FRA for Quiet Zone or if FRA fails to approve the Quiet Zone, the proposed BLRT Extension project would result in residual noise impacts at the associated locations.

### 6.1.4 Construction Noise Mitigation

The primary means of mitigating noise from construction activities is to require the contractors to prepare a detailed Noise Control Plan. A noise control engineer or acoustician will work with the contractor to prepare a Noise Control Plan in conjunction with the contractor's specific equipment and methods of construction. Key elements of a Plan include:

- Contractor's specific equipment types
- Schedule and methods of construction
- Maximum noise limits for each piece of equipment with certification testing
- Prohibitions on certain types of equipment and processes during the nighttime hours without local agency coordination and approved variances
- Identification of specific sensitive sites where near construction sites
- Methods for projecting construction noise levels
- Implementation of noise control measures where appropriate
- Methods for responding to community complaints

## 6.2 Vibration

Vibration and ground-borne noise impacts that exceed the FTA criteria are considered significant and should be mitigated unless there are no feasible or practical means to do so. Vibration mitigation is primarily applied at the source, generally the track structure, and is dependent on the frequency content of the vibration and any resonances of the materials. The most common vibration mitigation measures are described below.

### 6.2.1 Vibration Mitigation Methods

**Ballast Mats:** A ballast mat is a pad made of rubber or other material placed underneath the ballast and mounted on top of an asphalt or concrete base. Ballast mats provide a modest reduction in vibration levels at frequencies above 40 Hz.

**Tire Derived Aggregate:** Tire Derived Aggregate, or shredded tires, consists of a layer of tire shreds wrapped in geotechnical fabric placed underneath the ballast and placed on hard packed ground. This is a low-cost, but still unproven mitigation option that provides a reduction in vibration levels at frequencies above 25 Hz.

**Resilient Rail Fasteners:** Resilient fasteners are typically used on direct fixation track on aerial structures or in tunnels. They include a resilient component in the fastener to provide vibration isolation. Resilient rail fasteners provide a reduction in vibration at frequencies above 40 Hz.

**Resiliently Supported Concrete Ties:** Resiliently supported concrete ties, or undertie pads, consist of a rubber pad mounted on the bottom of a concrete tie. The pads provide vibration isolation at frequencies above 25 Hz.

**Floating Slabs:** Floating slabs consist of thick concrete slabs mounted on rubber or steel springs pads on a concrete foundation. Floating slabs can provide vibration isolation at very low frequencies, but are expensive to build and maintain.

**Special Trackwork:** Gaps in the rails at crossovers and turnouts generates around 10 dB of increased vibration for locations close to the track. If crossovers are located in sensitive areas and cannot be moved, one approach is to use special trackwork, such as spring-rail, moveable point, or flange bearing frogs to eliminate the gap in the rail at the crossover.

### 6.2.2 Proposed BLRT Extension Project Vibration Mitigation

The results in **Table 6-2** indicate that all residential vibration impacts will be eliminated with the proposed mitigation measures (there are no projected institutional vibration impacts). Ballast mats or the equivalent will eliminate the vibration impacts at all locations. Detailed descriptions of the noise mitigation measures are provided below.

**Table 6-2. Summary of Residential Vibration Mitigation Measures**

| Location | City | # of Impacts without Mitigation | Proposed Mitigation Measure | Residual Impacts with Mitigation |
|---|---|---|---|---|
| 6th Ave N to 38th Ave N | Robbinsdale | 26 | 700-foot ballast mat | 0 |
| 38th Ave N to 40½ Ave N | Robbinsdale | 1 | 300-foot ballast mat | 0 |
| 47th Ave N to CP rail crossing | Crystal | 1 | 300-foot ballast mat | 0 |
| | **Total** | **28** | **1,300-foot ballast mat** | **0** |

Source: CSA, 2015

- **36th Avenue North to 38th Avenue North.** The proposed mitigation at this location would be a ballast mat 700 feet in length under both tracks from Station 2246+50 to Station 2253+50. The ballast mat should be designed to provide at least 5 dB of reduction in vibration levels at 100 Hz and higher.
- **38th Avenue North to 40½ Avenue North.** The proposed mitigation at this location would be a ballast mat 300 feet in length under both tracks from Station 2260+00 to Station 2263+00. The ballast mat should be designed to provide at least 5 dB of reduction in vibration levels at 100 Hz and higher.
- **47th Avenue North to CP Rail Crossing.** The proposed mitigation at this location would be a ballast mat 300 feet in length under both tracks from Station 2335+50 to Station 2338+50. The ballast mat should be designed to provide at least 5 dB of reduction in vibration levels at 100 Hz and higher.

### 6.2.3 Construction Vibration Mitigation

The most effective methods for minimizing the impact from construction vibration is to limit the use of high-vibration activities such as impact pile driving and vibratory rolling and to include vibration limits in the construction specifications. To mitigate potential vibration impact from construction activities, the following measures will be applied where feasible:

- **Limit Construction Hours:** Prohibit high-vibration activities at night.
- **Construction Specifications:** Include limits on vibration in the construction specifications, especially at locations where high-vibration activities such as impact pile driving may occur.
- **Alternative Construction Methods:** Minimize the use of impact and vibratory equipment, where possible and appropriate. Use low vibration alternatives, such as push piling or pre-drilled holes for piling.
- **Truck Routes:** Use truck haul routes that minimize exposure to sensitive receptors and minimizes damage to roadway surfaces, where appropriate.
- **Pre-Construction Survey:** Perform pre-construction surveys to document the existing conditions of all structures in the vicinity of sites where high-vibration construction activities will be performed.
- **Vibration Monitoring:** If a construction activity has the potential to exceed the damage criteria at any building, the contractor is required to conduct for vibration monitoring and, if the vibration exceeds the limit, the activity must be modified or terminated.

# 7 References


Federal Transit Administration (FTA), 2006, *Transit Noise and Vibration Impact Assessment* guidance manual (FTA, 2006)

Vibration Measurements and Predictions for Central Corridor LRT Project, ATS Consulting, 2008

Bottineau Transitway Draft EIS, Noise and Vibration Technical Report, HMMH, 2012.

West Broadway Avenue Reconstruction Project Environmental Assessment Worksheet, Hennepin County, 2015

# Appendix A. Noise Measurement Data

**Figure A-1. Long-Term Noise Measurement Data – Site LT-A**

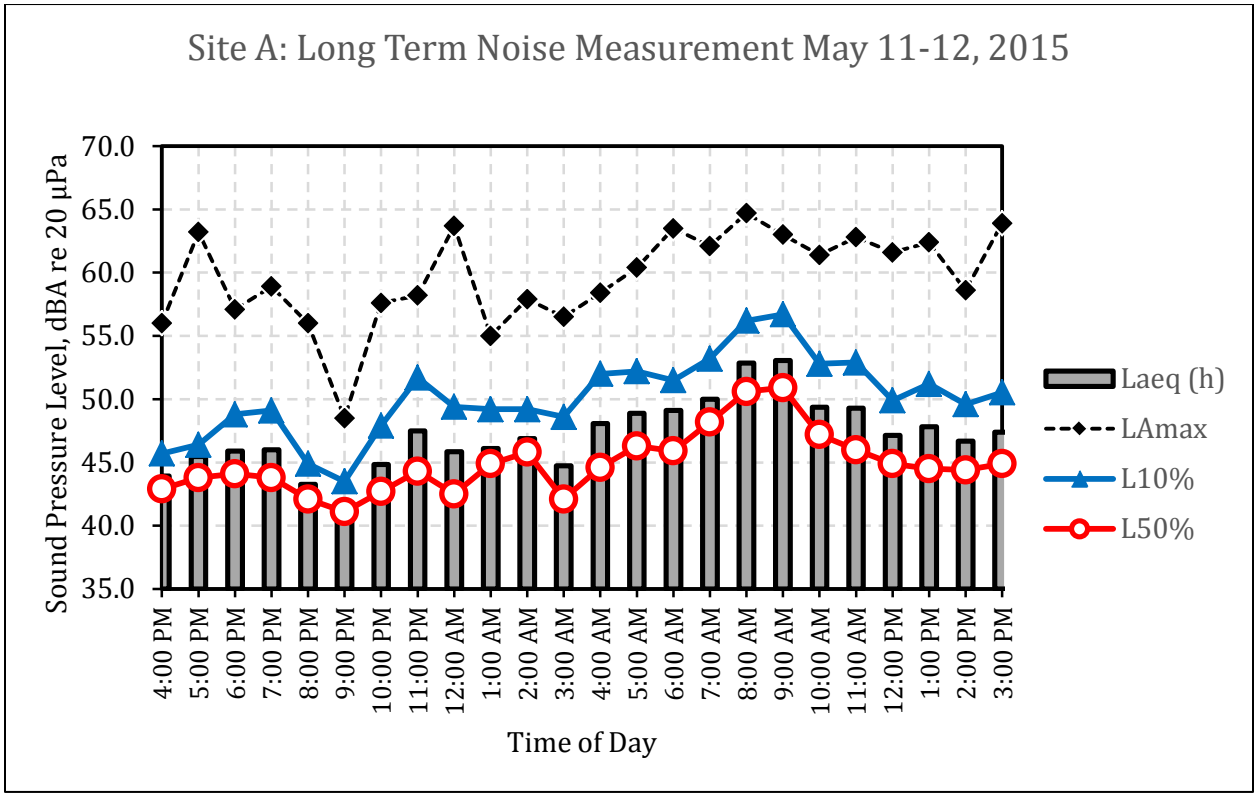


**Figure A-2. Long-Term Noise Measurement Data – Site LT-B**

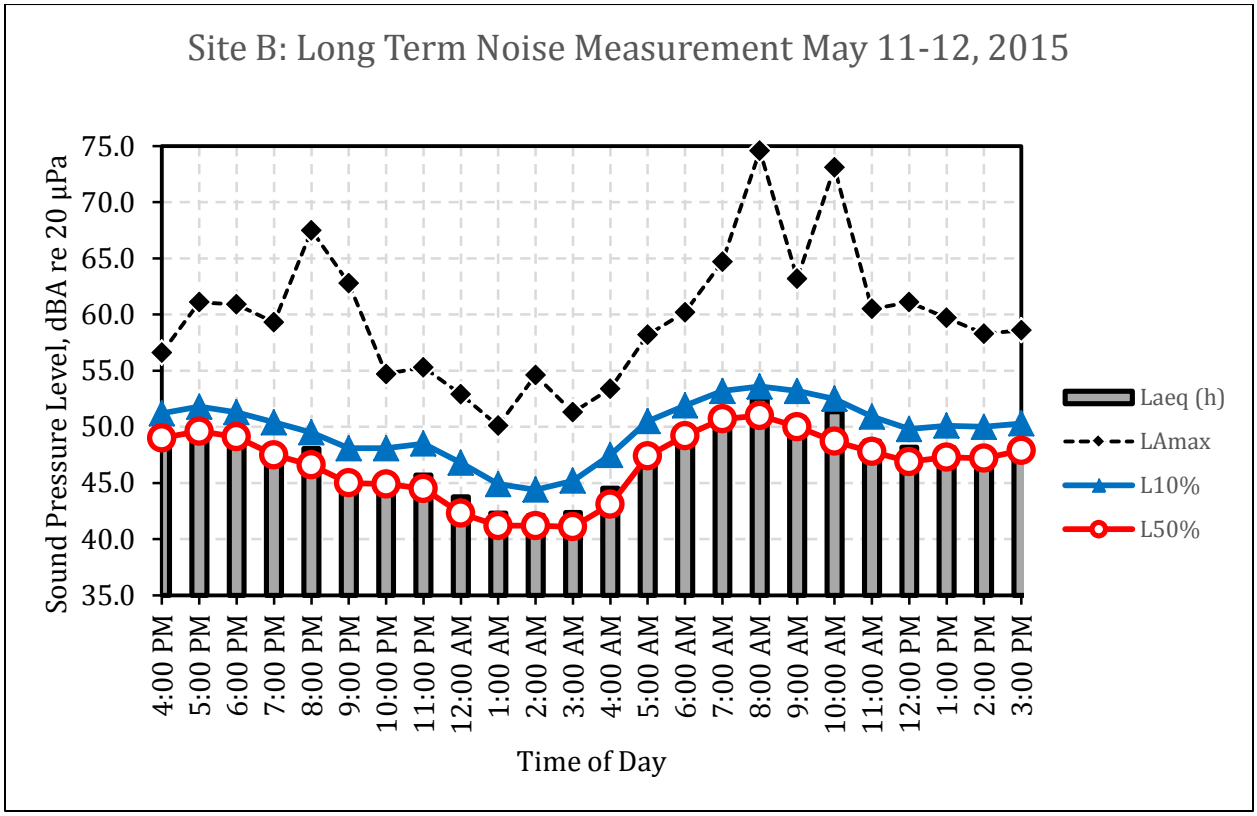


**Figure A-3. Long-Term Noise Measurement Data – Site LT-C**

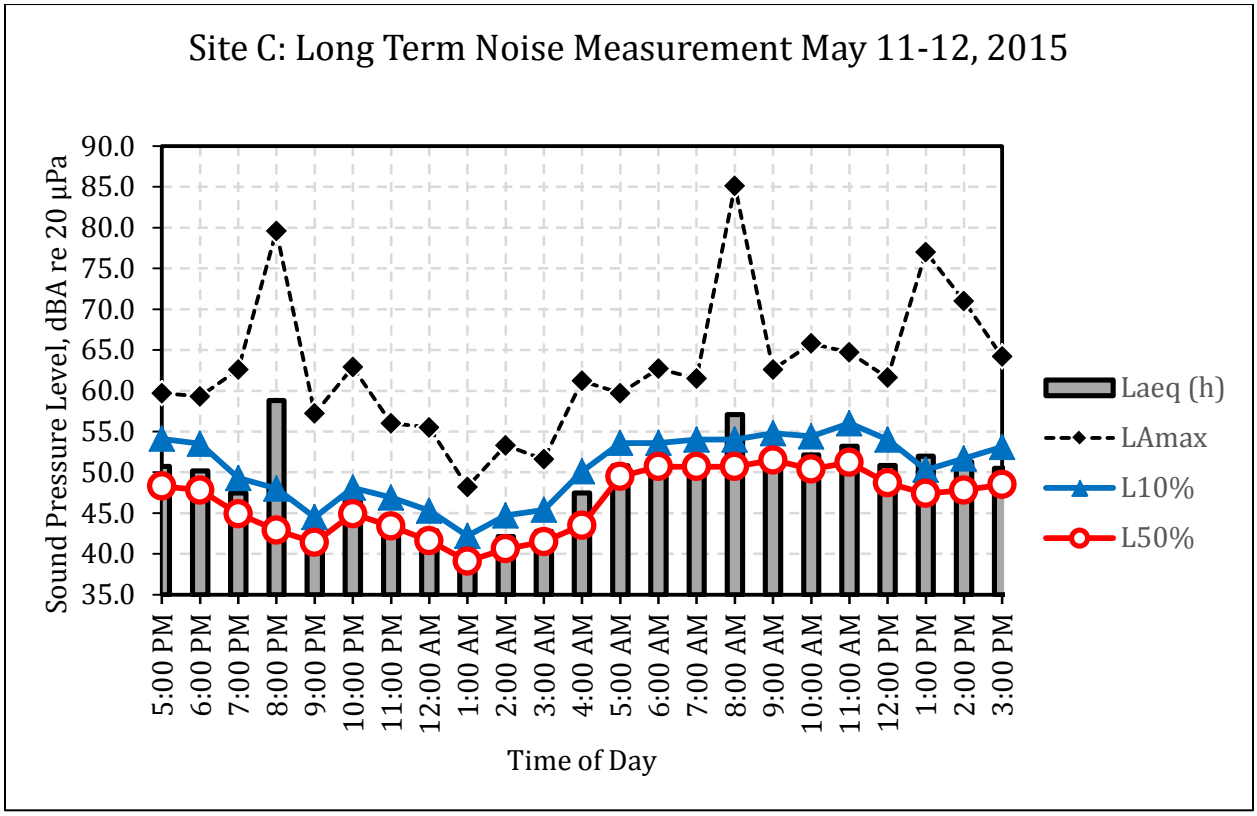


**Figure A-4. Long-Term Noise Measurement Data – Site LT-D**

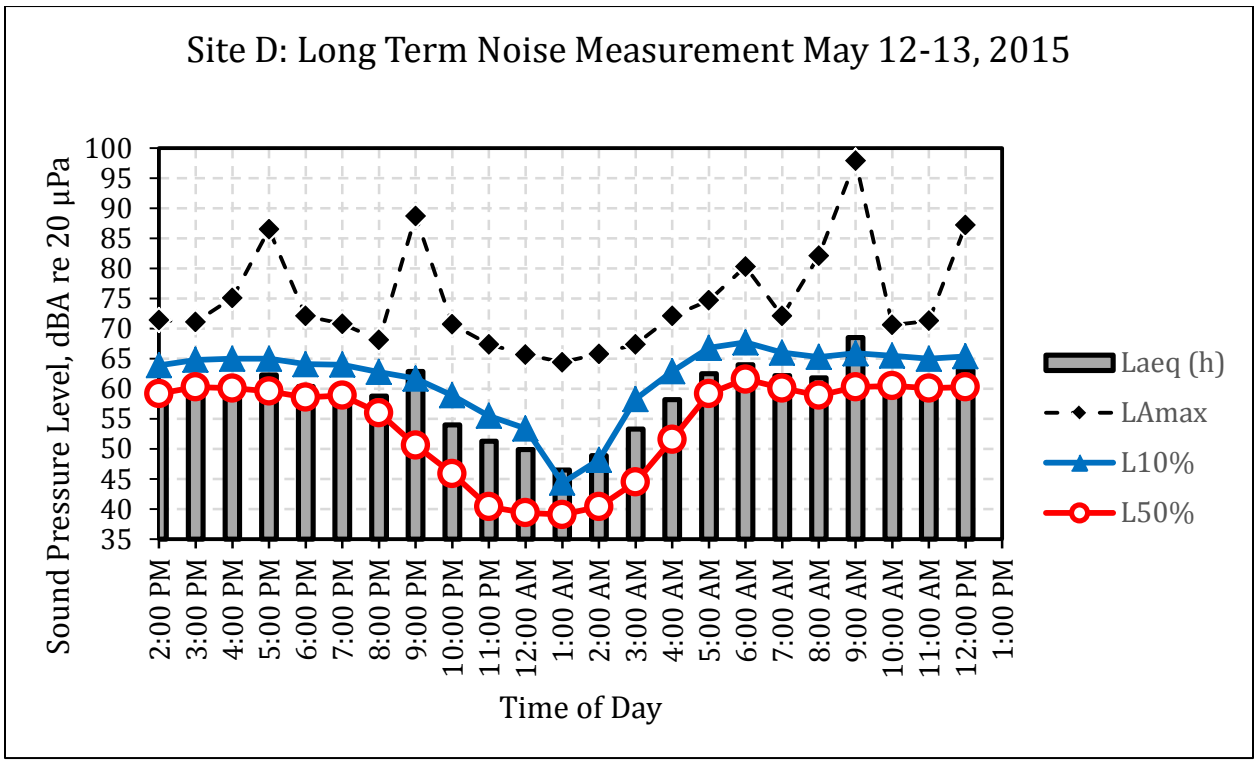


**Figure A-5. Long-Term Noise Measurement Data – Site LT-E**

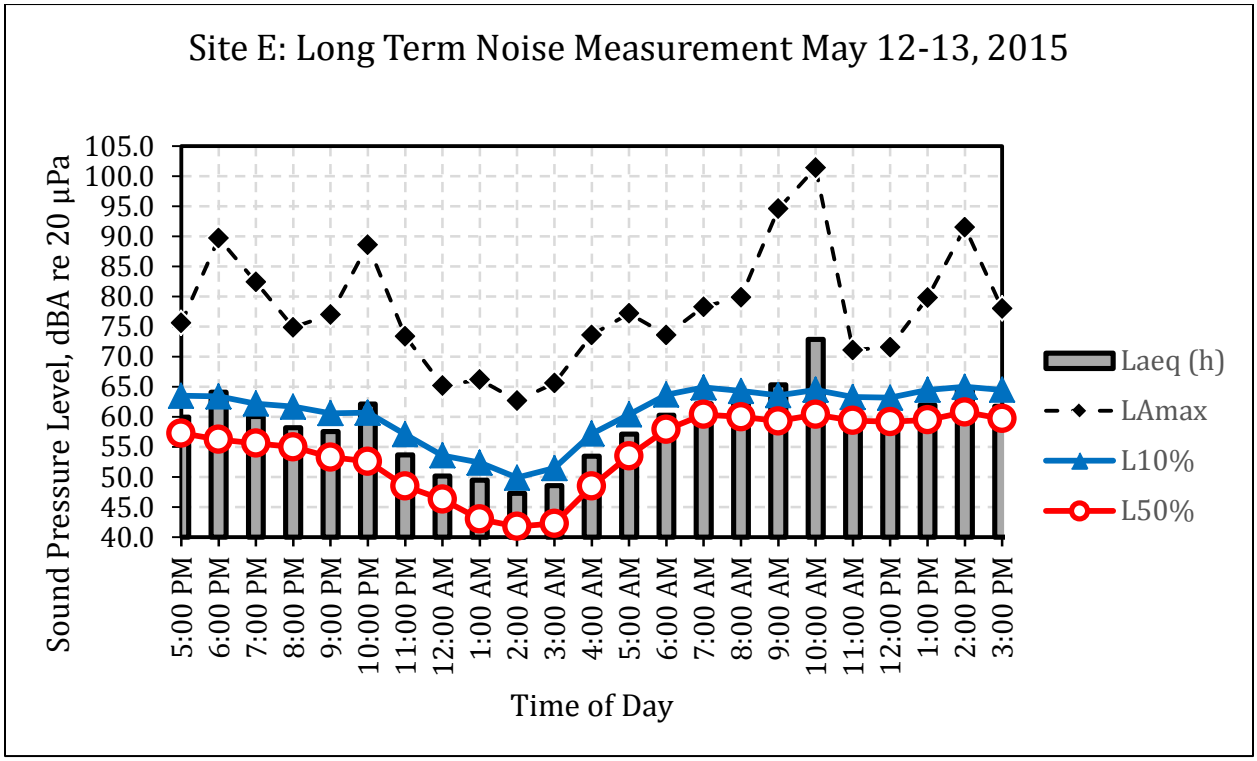


**Figure A-6. Long-Term Noise Measurement Data – Site LT-F**

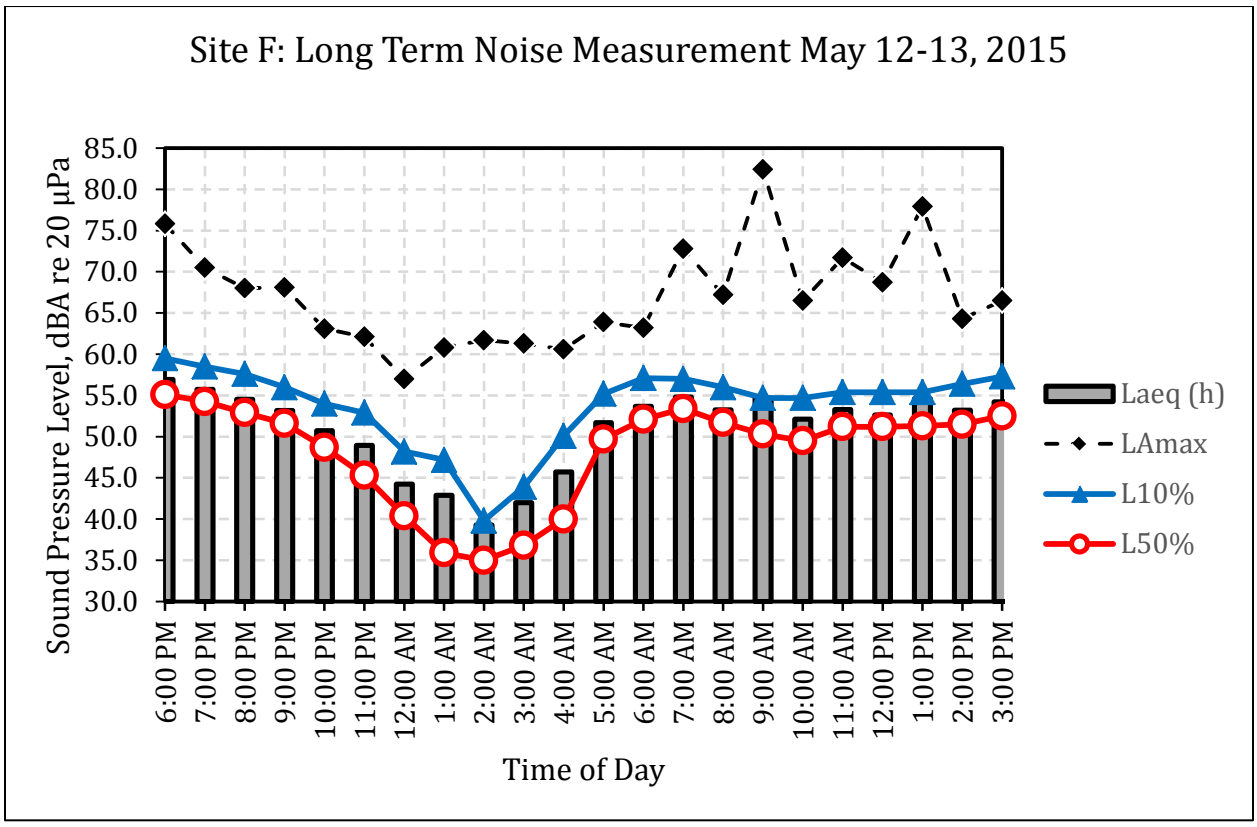


**Figure A-7. Long-Term Noise Measurement Data – Site LT-G**

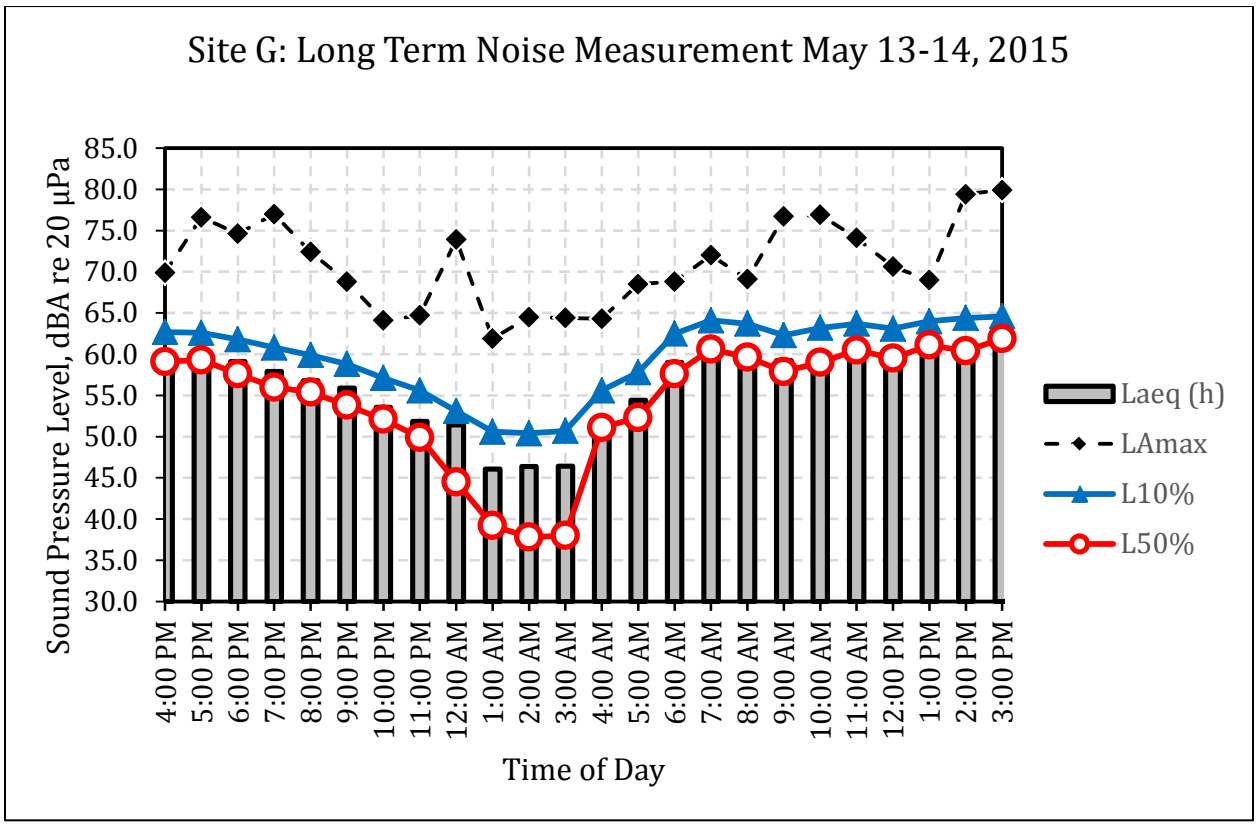


**Figure A-8. Long-Term Noise Measurement Data – Site LT-H**

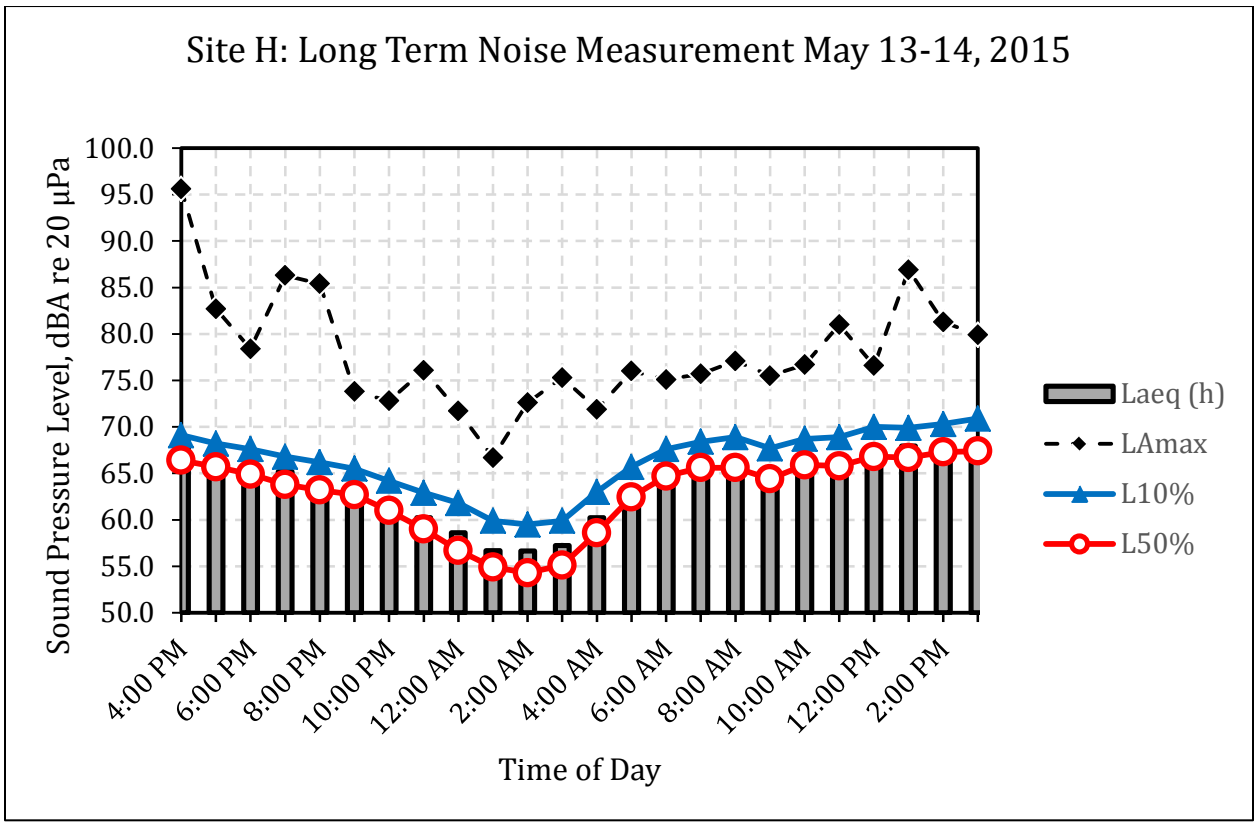
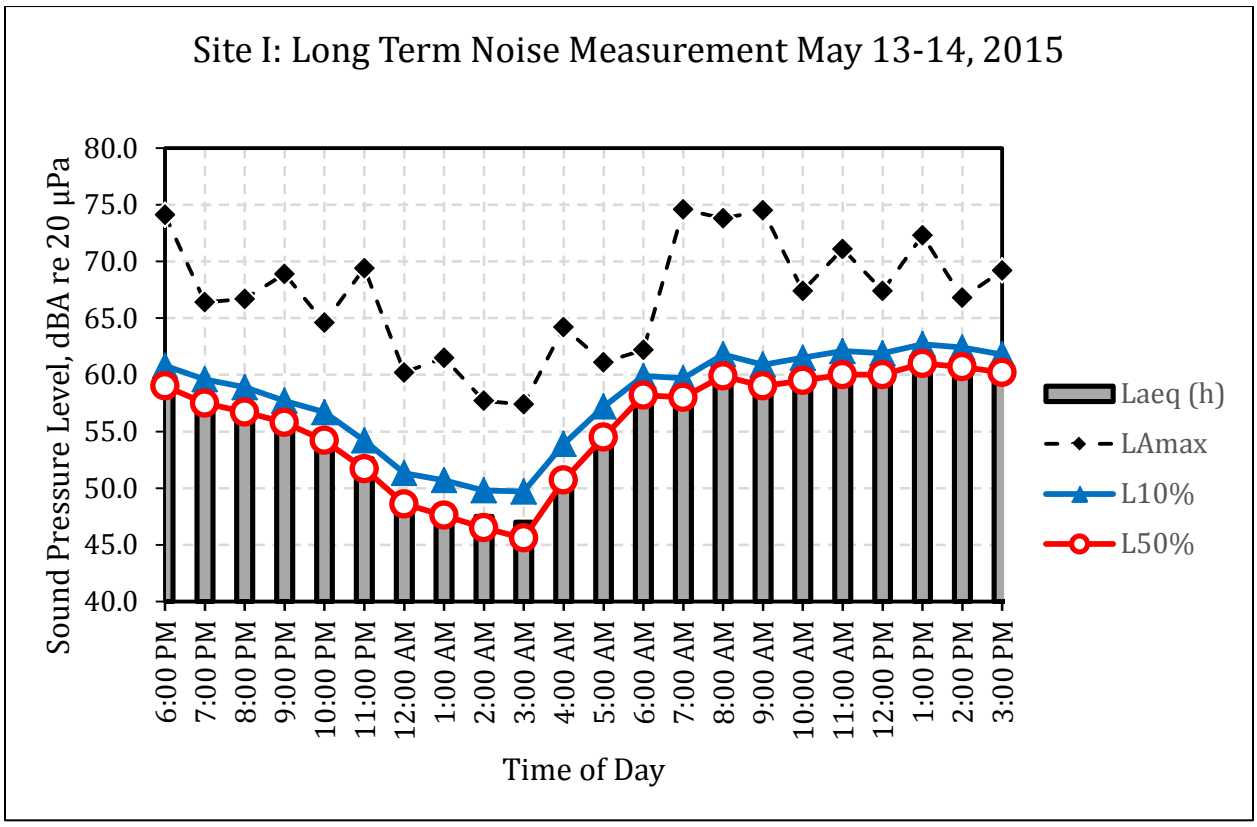


**Figure A-9. Long-Term Noise Measurement Data – Site LT-I**



# Appendix B. Noise Measurement Site Photographs

## Figure B-10. Noise Measurement Site LT-A – 1821 York Avenue

**Figure B-11. Noise Measurement Site LT-B – 2145 Bonnie Lane**

**Figure B-12. Noise Measurement Site LT-C – 3954 Noble Avenue**

## Figure B-13. Noise Measurement Site LT-D – 8820 Quebec Court North

**Figure B-14. Noise Measurement Site LT-E – 8558 S. Maplebrook Circle**

**Figure B-15. Noise Measurement Site LT-F – 9125 Nevada Court**

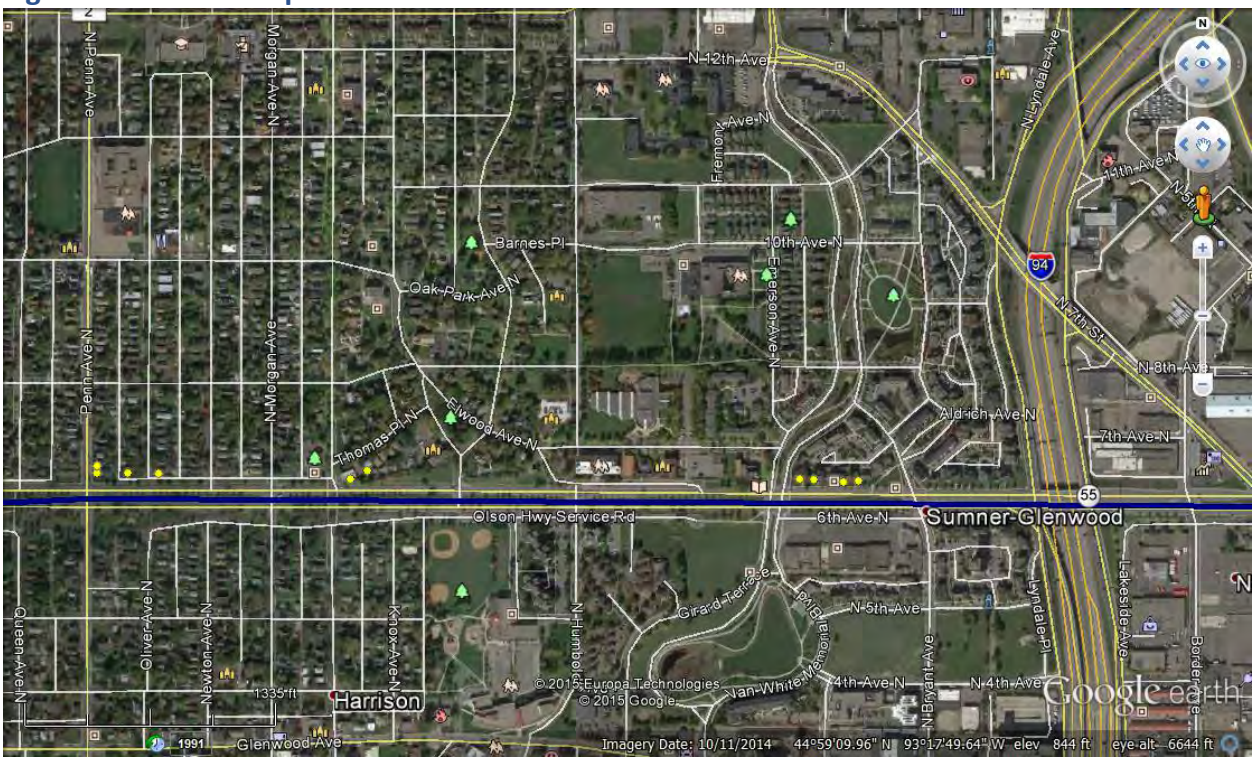
**Figure B-16. Noise Measurement Site LT-G – 6102 Hampshire Avenue North**

**Figure B-17. Noise Measurement Site LT-H – 7501 Myers Avenue**

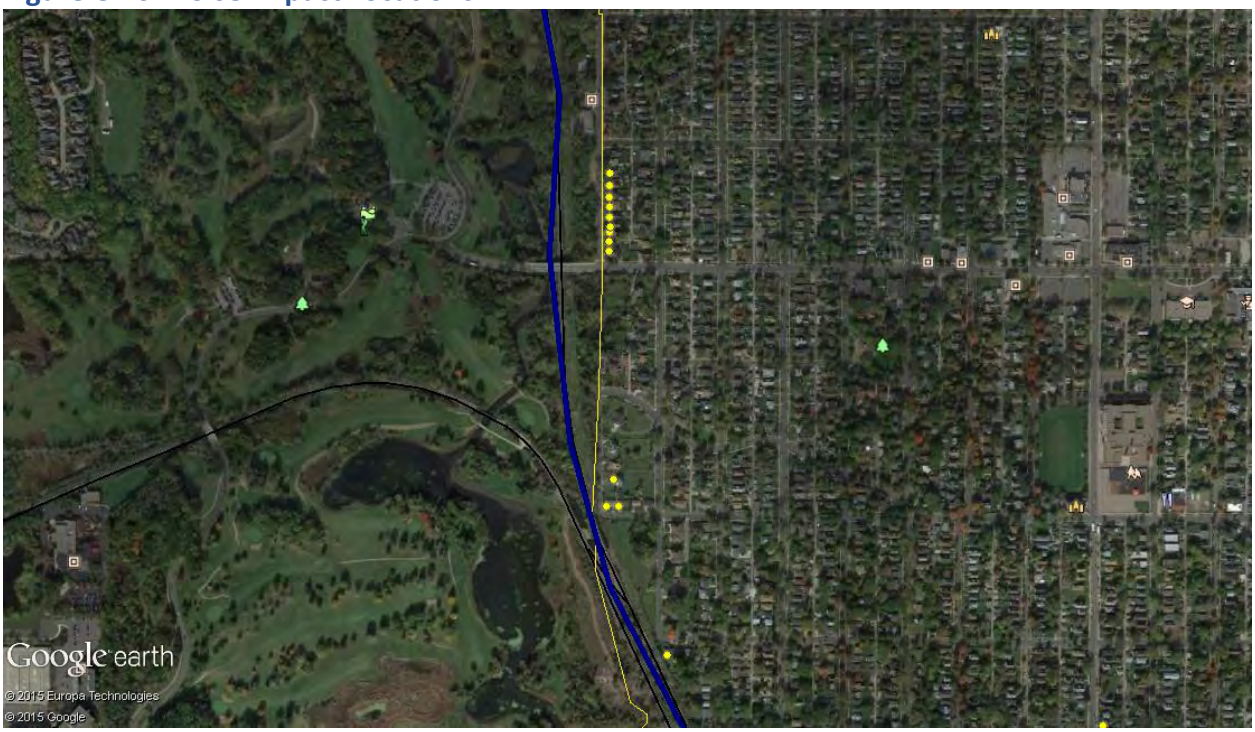
## Figure B-18. Noise Measurement Site LT-I – 4416 Toledo Avenue North

# Appendix C. Noise Impact Location Exhibits

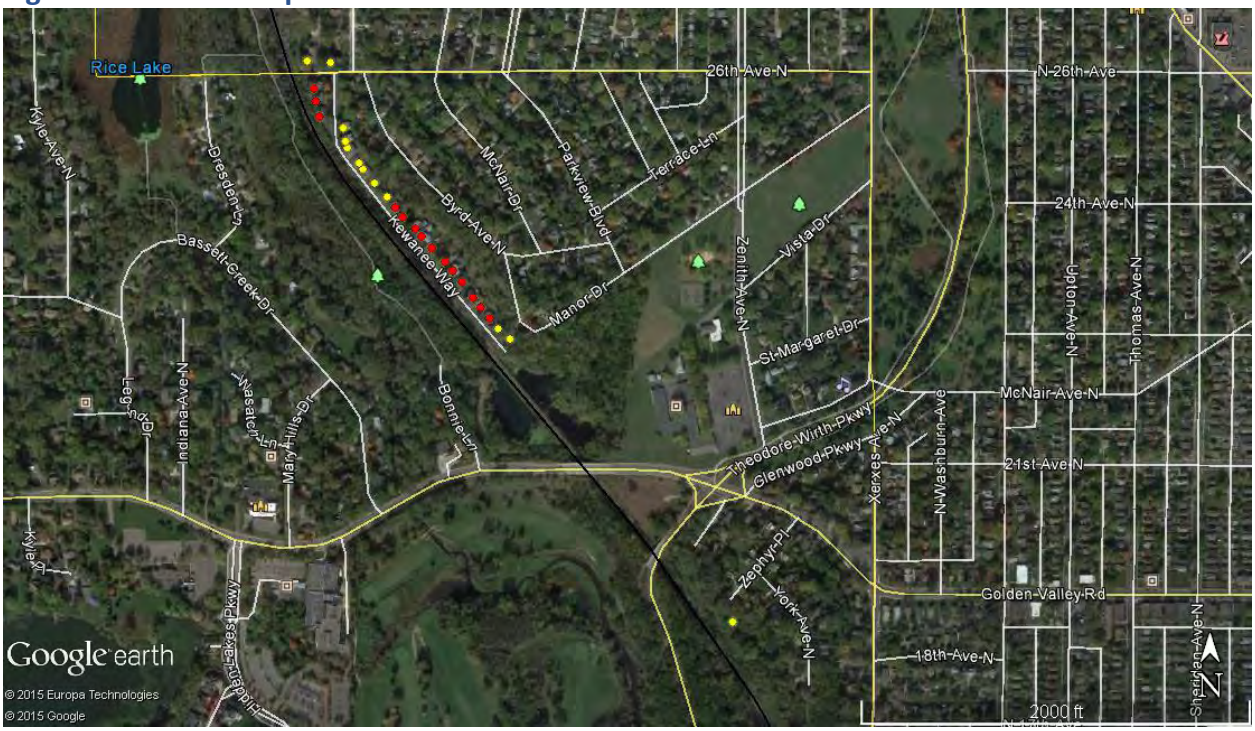
## Figure C-19. Noise Impact Locations – LRT



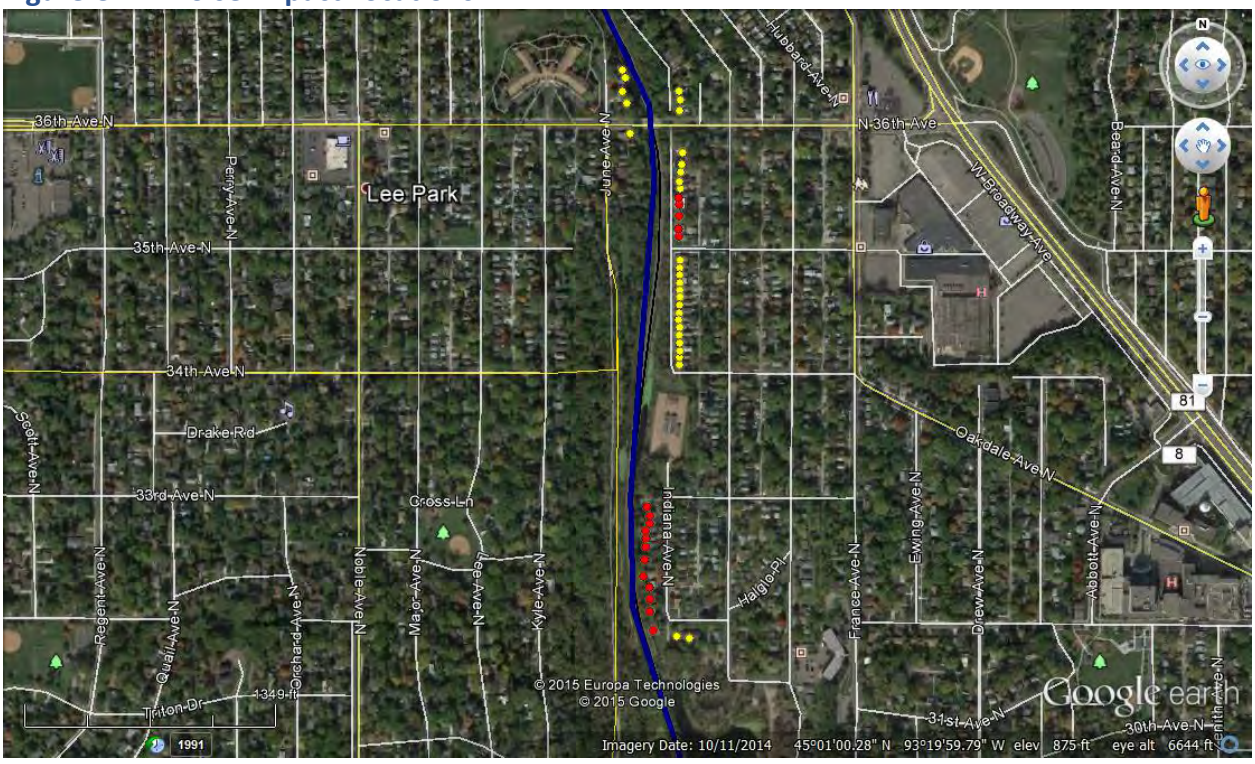

## Figure C-20. Noise Impact Locations – LRT



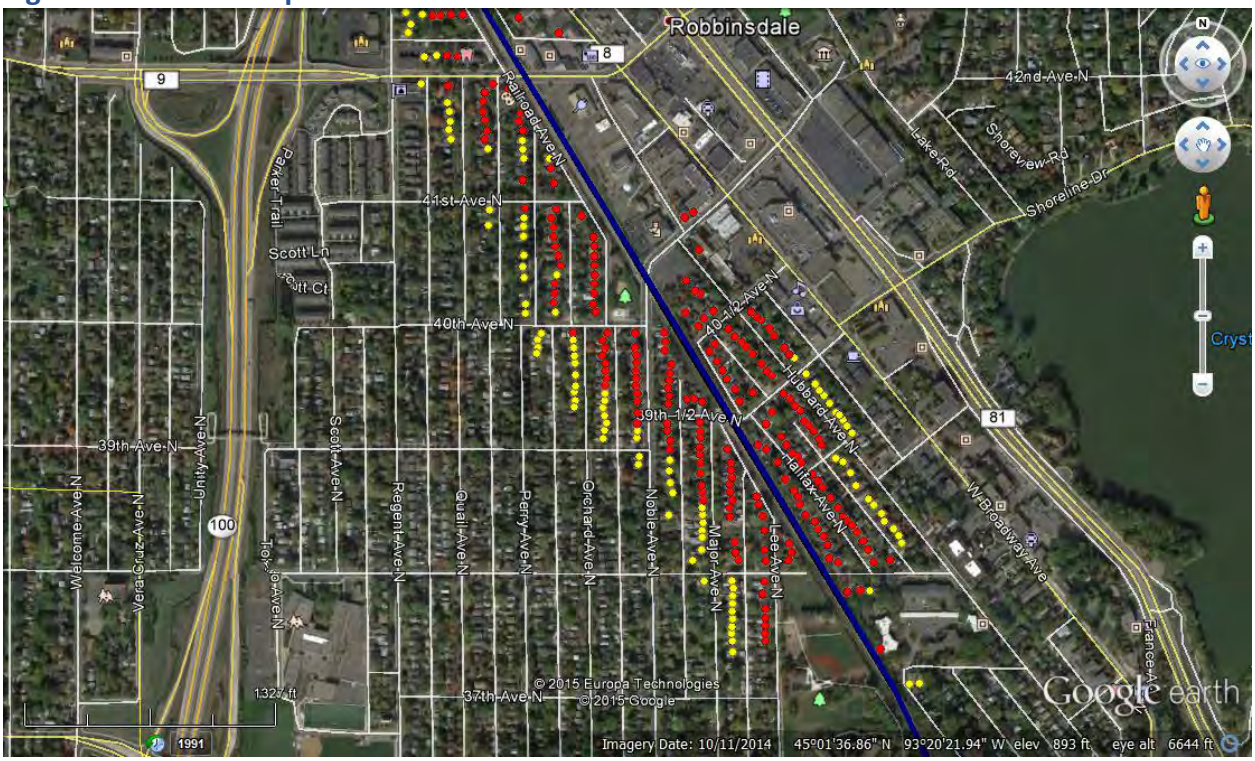
## Figure C-21. Noise Impact Locations – LRT



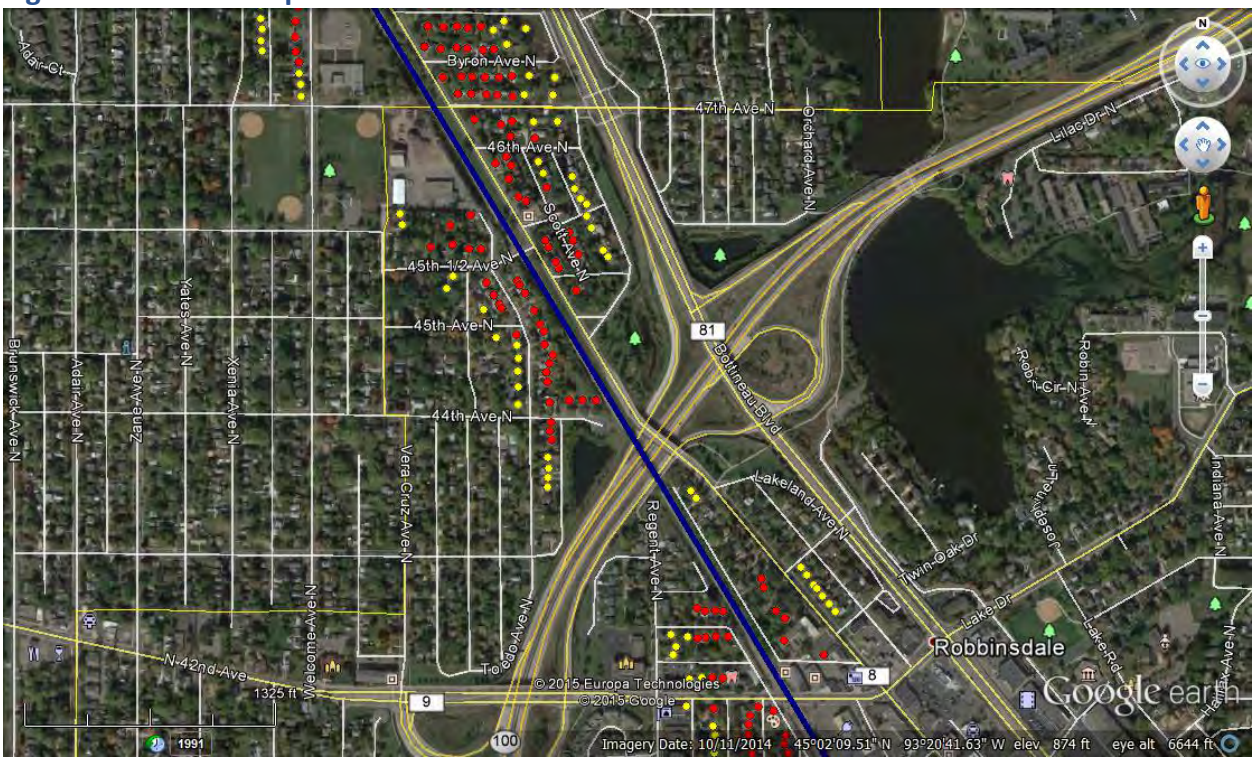

## Figure C-22. Noise Impact Locations – LRT



## Figure C-23. Noise Impact Locations – LRT

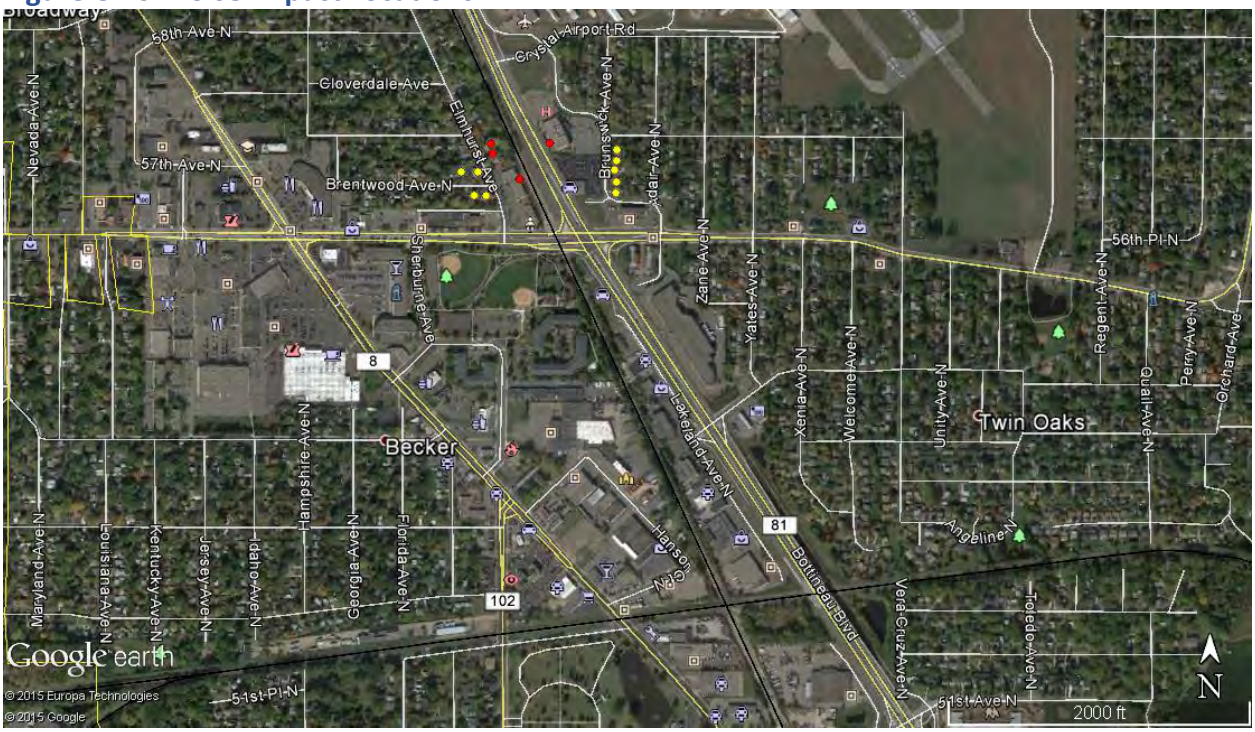



## Figure C-24. Noise Impact Locations – LRT

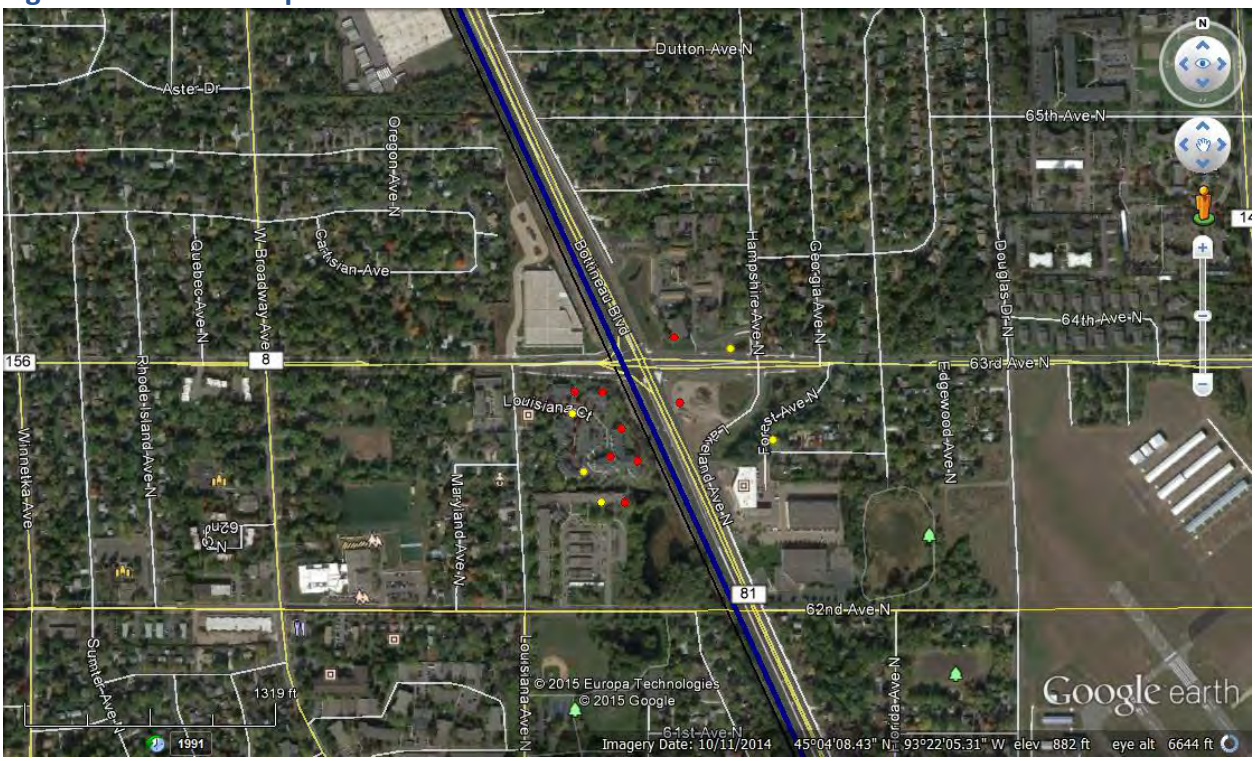


## Figure C-25. Noise Impact Locations – LRT


## Figure C-26. Noise Impact Locations – LRT

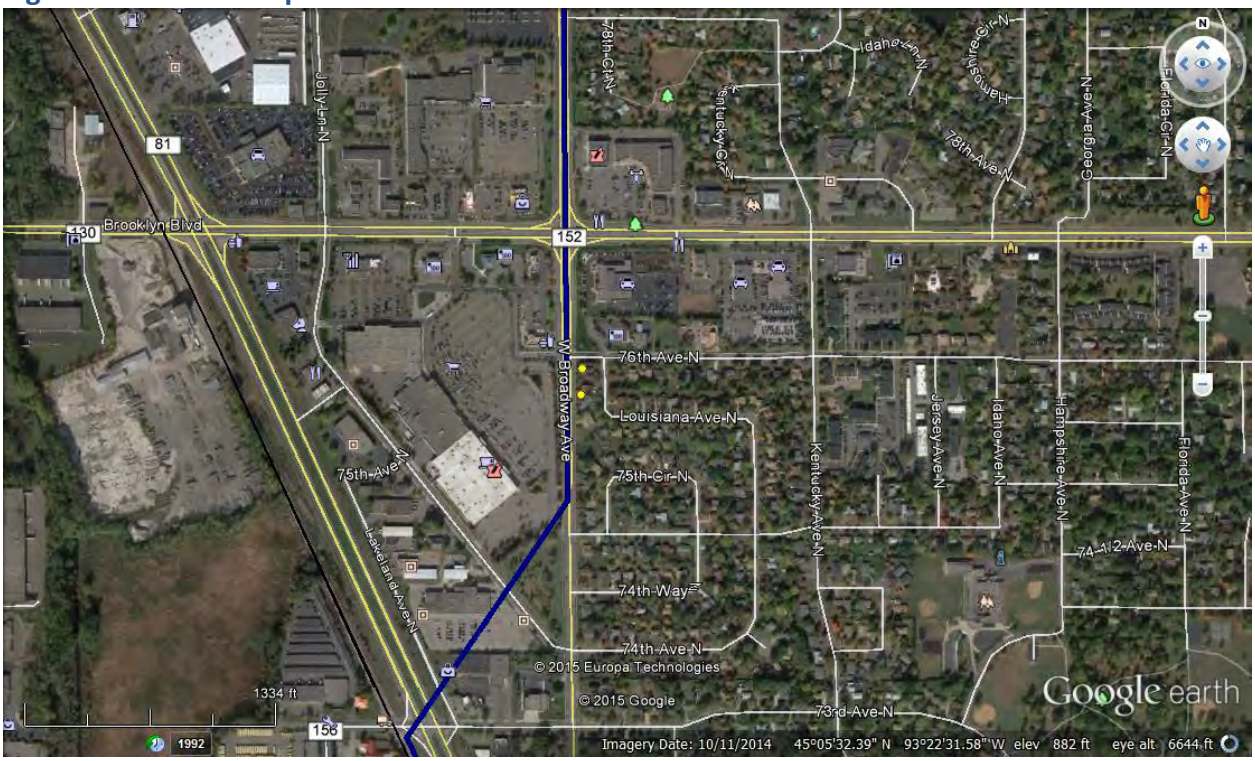


## Figure C-27. Noise Impact Locations – LRT

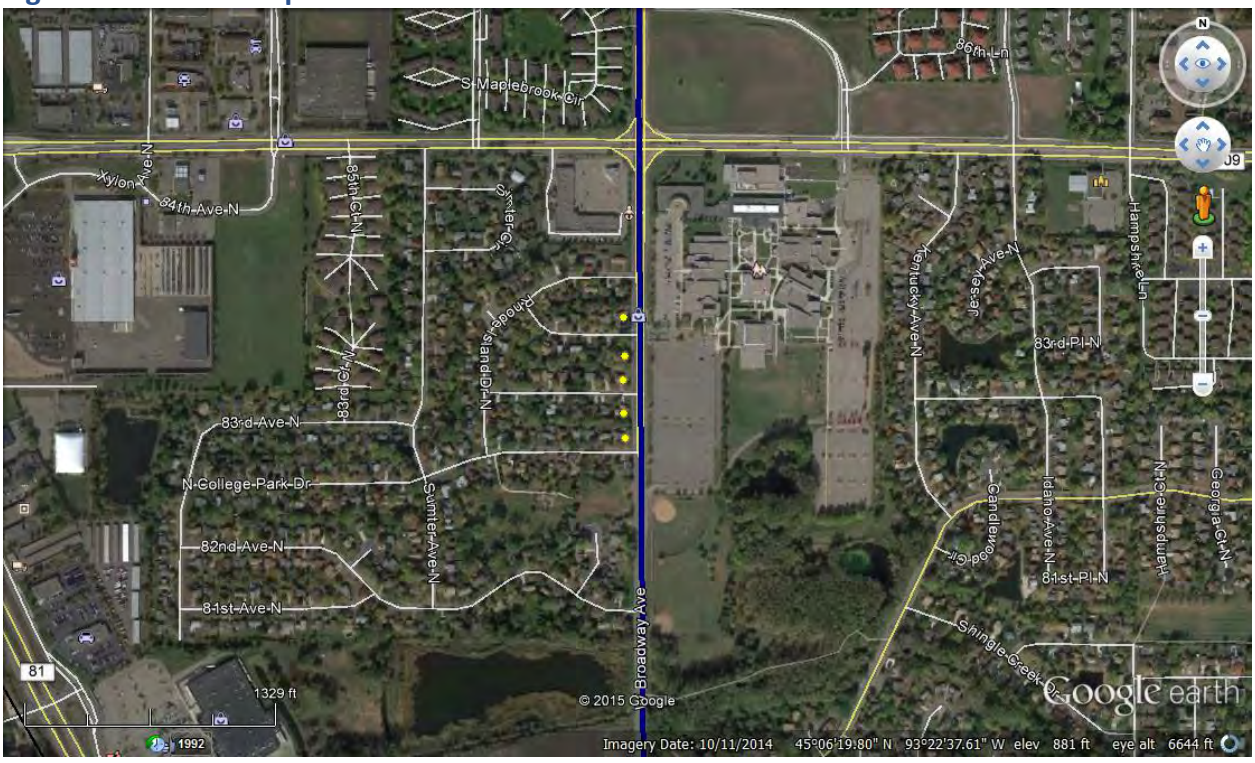



## Figure C-28. Noise Impact Locations – LRT

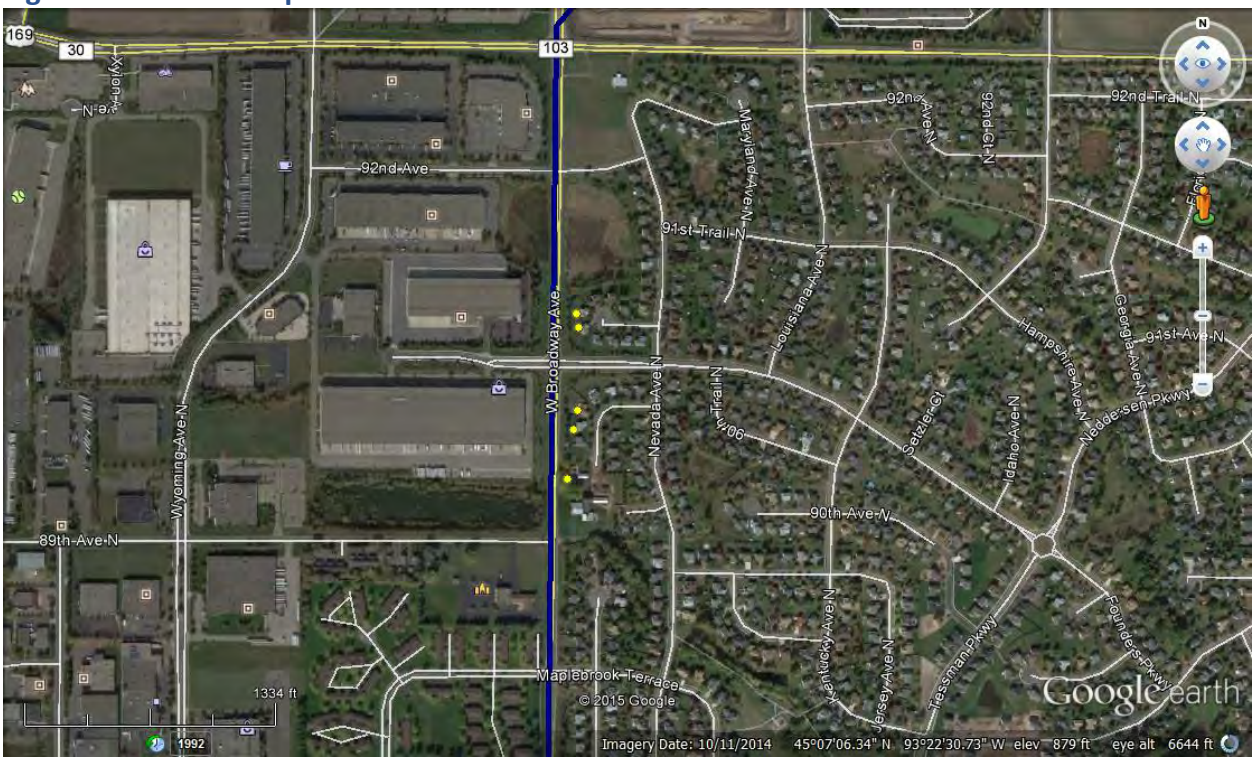
## Figure C-29. Noise Impact Locations – LRT



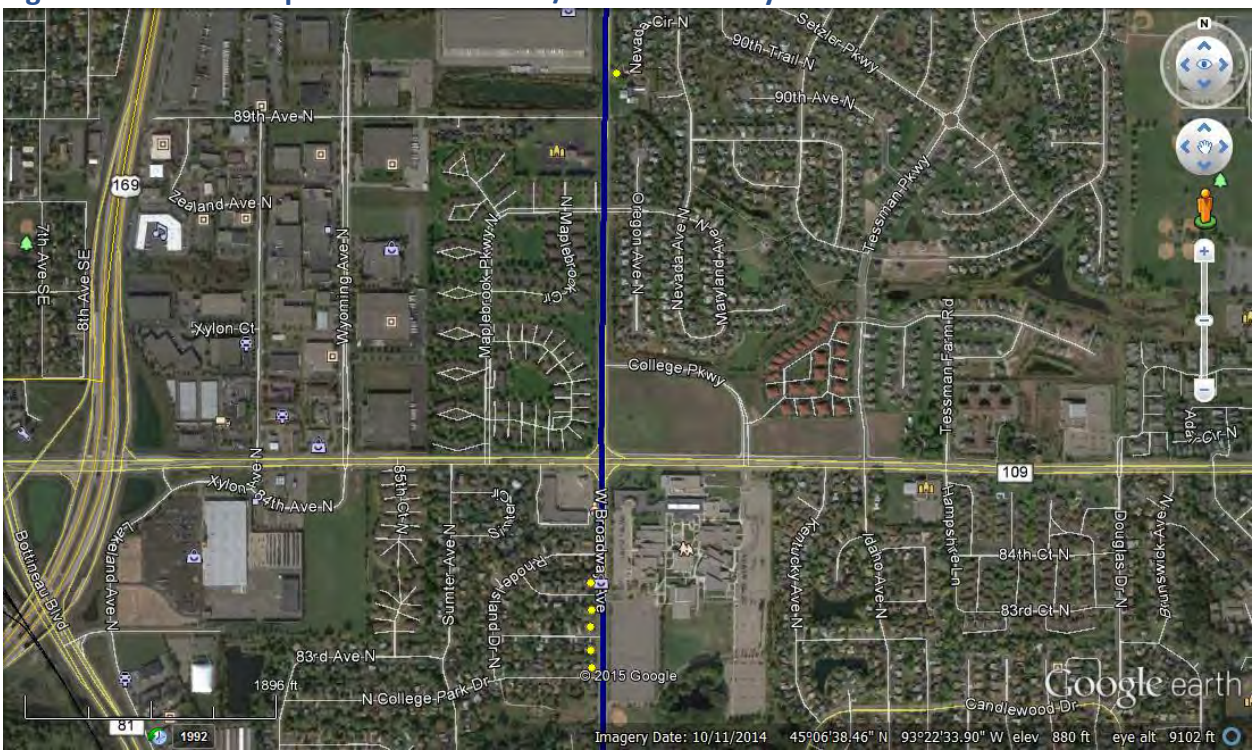

## Figure C-30. Noise Impact Locations – LRT



## Figure C-31. Noise Impact Locations – LRT

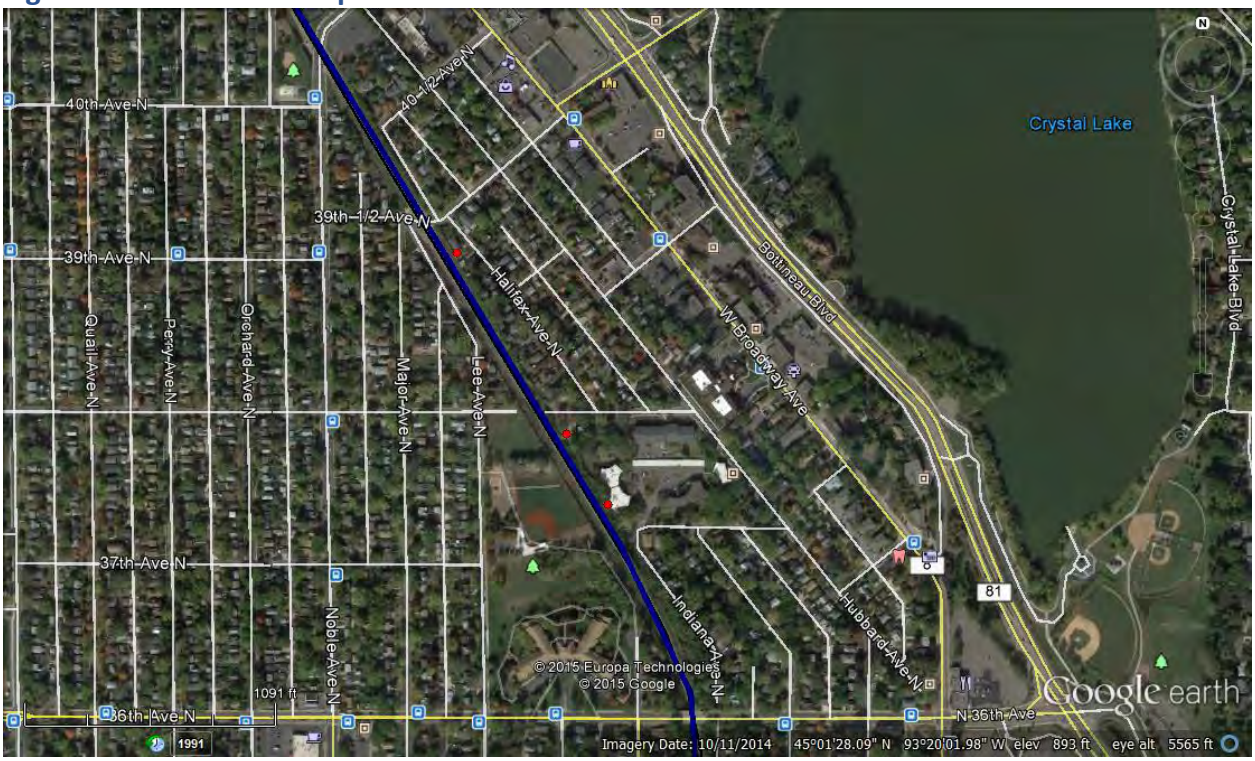



## Figure C-32. Noise Impact Locations – LRT/West Broadway Avenue Cumulative

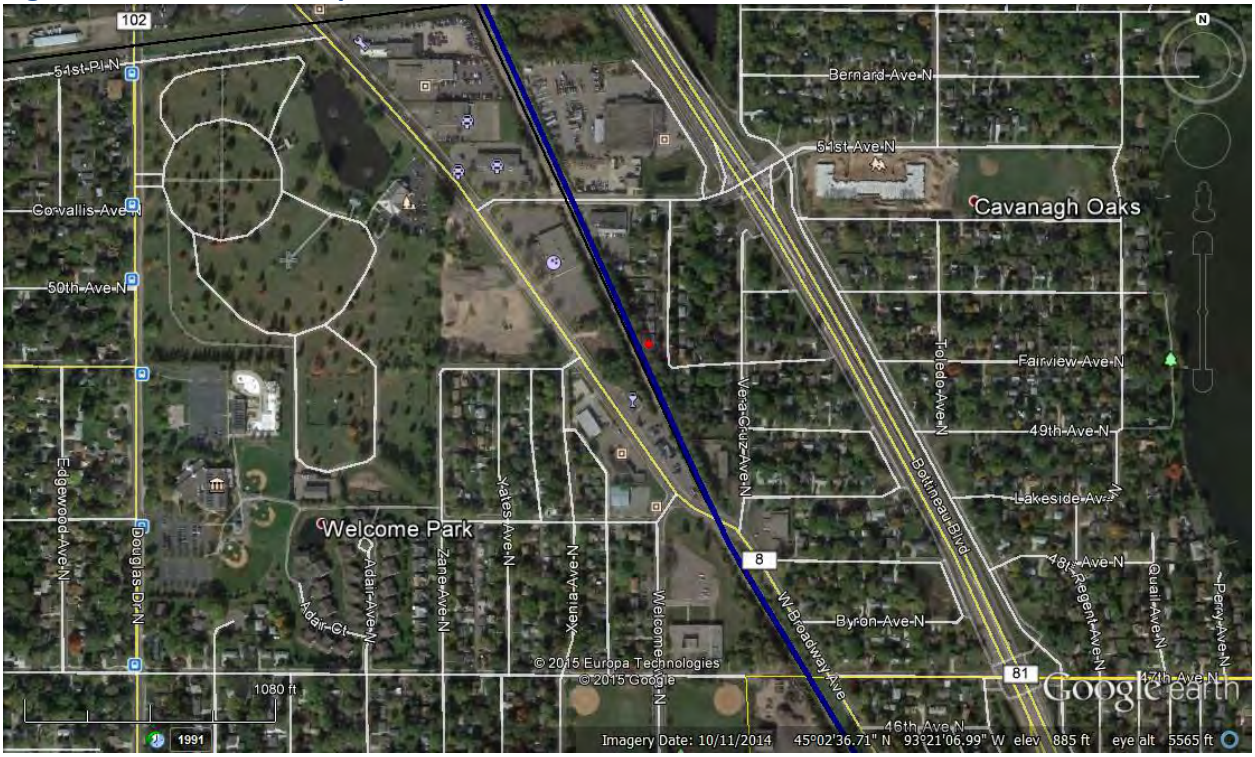


# Appendix D. Vibration Impact Location Exhibits

## Figure D-33. Vibration Impact Locations




## Figure D-34. Vibration Impact Locations



# Appendix F
# Supporting Technical Reports

## F.9 Biological Environment Technical Report

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# Biological Environment Technical Report

May 2016

Blue Line Extension Project Technical Report

METROPOLITAN COUNCIL

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# Executive Summary

This technical report summarizes the biological environment within the proposed METRO Blue Line Light Rail Transit (BLRT) Extension project area. The intent of this technical report is to support and augment the Final Environmental Impact Statement (Final EIS) being prepared for the proposed BLRT Extension project. Federally listed or monitored species potentially within the proposed BLRT Extension project corridor included the northern long-eared bat (*Myotis septentrionalis*; Federally Threatened) and the bald eagle (*Haliaeetus leucocephalus*; de-listed but on the "Watchlist"). State-listed species potentially within the proposed BLRT Extension project corridor include Blanding's turtle (*Emydoidea blandingii*; State Threatened). Several swallows nests were identified under proposed BLRT Extension project area bridges, though the numbers of nests are very low. Swallows are under the purview of the Migratory Bird Treaty Act. Habitats throughout the proposed BLRT Extension project area are generally highly disturbed. As a result of disturbance, a variety of noxious weed species have infested undeveloped habitats throughout the proposed BLRT Extension project area.

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# Contents

## Tables



## Figures

# 1 Introduction

## 1.1 Report Purpose

The purpose of this technical report is to augment the Final Environmental Impact Statement (Final EIS) that was prepared for the proposed METRO Blue Line Light Rail Transit (BLRT) Extension project. This technical report:

- Summarizes biological resources in and near the proposed BLRT Extension project area
- Discusses the potential for impacts to biological resources as a result of the proposed BLRT Extension project and the regulatory context associated with them
- Discusses measures to avoid, minimize and mitigate for potential impacts to biological resources within the proposed BLRT Extension project area

This report discusses both aquatic and terrestrial biological resources within the proposed BLRT Extension project area. Additional information concerning related aquatic resources in the proposed BLRT Extension project area is included in the Water Resources Technical Report (SEH, 2015).

## 1.2 Project Limits

The proposed BLRT Extension project includes a corridor from the Target Field Station in the City of Minneapolis that extends westward along Olson Memorial Highway (Trunk Highway [TH] 55) to the BNSF Railway (BNSF) rail corridor, then north and west along the BNSF rail corridor to approximately 73rd Avenue in the City of Brooklyn Park, then northeastward to West Broadway Avenue (County State-Aid Highway 103), then north to an area just north of TH 610. A portion of the alignment is within the separate West Broadway Avenue Reconstruction project which is being developed by Hennepin County. Biological resources within the West Broadway Avenue Reconstruction segment are described in the Environmental Assessment Worksheet (EAW) prepared for that Hennepin County project.

**Figure 1** on page 17 provides a general location map for the proposed BLRT Extension project area. **Figure 2** starting on page 21 is a 24-page mapbook of the proposed BLRT Extension project area showing aerial imagery and notable terrestrial habitats within and near the proposed BLRT Extension project area.

# 2 Affected Environment and Environmental Consequences

**Section 2.1** – **Affected Environment** discusses biological resources that have been documented, historically or recently, within or near the proposed BLRT Extension project area. In this section, each notable species or feature is assessed as to whether there is some potential for impact as a result of the proposed BLRT Extension project. Those species or features that have a negligible potential for impact as a result of the proposed BLRT Extension project are not discussed further, while those species or features for which impacts may potentially occur are discussed further (**Section 2.2** – **Environmental Consequences**).

## 2.1 Affected Environment

Generally, the proposed BLRT Extension project area is characterized as fully urbanized land use from downtown Minneapolis west and north to TH 610, and urbanizing rural land use north of TH 610. Land north of TH 610 is a mosaic of agricultural fields, abandoned old agricultural fields, scattered forest patches, a manicured corporate campus, and limited development.

The portion of the proposed BLRT Extension project area from Theodore Wirth Regional Park (TWRP) eastward into downtown Minneapolis is highly urbanized with no natural habitat types present.

The large central portion of the proposed BLRT Extension project area from Olson Memorial Highway to approximately 36th Avenue North (cities of Minneapolis, Golden Valley, and Robbinsdale) is characterized by abundant parkland with a mosaic of forested habitat types and aquatic resources.

The portion of the proposed BLRT Extension project area that lies between approximately 36th Avenue North and TH 610 (cities of Robbinsdale, Crystal, and Brooklyn Park) is highly urbanized residential and industrial land with sparse open lands. Undeveloped property tends to be heavily disturbed, vacant land, or utilized for stormwater treatment.

The proposed BLRT Extension project area north of TH 610 lies at the southern edge of the Anoka Sand Plain. As such, existing plant communities are underlain by thick deposits of sand. The extent of wetlands within the Anoka Sand Plain has been diminishing over time as a result of sinking water tables.

### 2.1.1 Federally Listed Species (Endangered Species Act)

#### 2.1.1.1 Regulatory Context

Rare species are regulated at the federal level by the US Fish and Wildlife Service (USFWS) under the Endangered Species Act and several related laws. The Endangered Species Act classifies species as Endangered, Threatened, or as Watchlist; “Endangered” meaning a species is in danger of extinction throughout all or a significant portion of its range, “Threatened” meaning a species is likely to become endangered within the foreseeable future and “Watchlist” meaning species that are rigorously monitored prior to listing or after de-listing.

Potential impacts to federally listed species require coordination with USFWS in a process known as Section 7 Endangered Species Act consultation. The end result of the Section 7 Endangered Species Act consultation is a determination of:

- **No Effect.** No impacts positive or negative on the subject species.
- **May Affect, Not Likely to Adversely Affect.** Any potential impacts are either beneficial, insignificant, or discountable.
- **May Affect, Likely to Adversely Affect.** Any potential impacts would be negative and beyond an insignificant or discountable level.

#### 2.1.1.2 Potential Documented Species

**Northern Long-Eared Bat (*Myotis septentrionalis*).** The northern long-eared bat (NLEB) has a biogeographical range that includes all counties in Minnesota. The NLEB was listed as Federally Threatened in May 2015. The NLEB typically winters in large groups within caves (hibernacula) and migrates to forested areas for the spring, summer, and early fall. Known hibernacula are not present within the proposed BLRT Extension project area; however, several are known along the Mississippi River in the vicinity of the Twin Cities (USFWS, 2015). Known hibernacula would not be impacted as a result of the proposed BLRT Extension project. Pregnant female NLEB congregate in maternity colonies, often under the bark or in cavities of maternity roost trees. The NLEB then disperses to other forested areas to forage before migrating back to the hibernacula in the fall (USFWS, 2015a). There are no documented maternity roost trees in Hennepin County (NHIS, 2015). Typical summer foraging habitat (non maternity colonies) for the NLEB consists of larger forested area and forest remnants. Summer habitat may consist of any of approximately 35 tree species of a size 3 inches diameter at breast height (DBH) or larger.

Summer habitat (forest remnants) for the NLEB is present throughout portions of the proposed BLRT Extension project area. Some tree clearing and grubbing would be required for the proposed BLRT Extension project; therefore, it is discussed further in **Section 2.2 – Environmental Consequences**.

**Bald Eagle (*Haliaeetus leucocephalus*).** Some forested habitat adjacent to aquatic resources could be suitable for bald eagle nesting in and near the proposed BLRT Extension project. There are no nests currently known within the immediate vicinity of the proposed BLRT Extension project area; however, a single nest has been documented approximately 1 mile east of the proposed BLRT Extension project area. Bald eagle nest locations change over time; therefore, the bald eagle is discussed further in **Section 2.2 – Environmental Consequences**.

**Dwarf Trout Lily (*Erythronium propullans*).** Based on field data collection throughout the spring and summer of 2015, habitat for the dwarf trout lily is not likely present in the proposed BLRT Extension project area. However, this documented population of dwarf trout lilies was transplanted to the Eloise Butler Wildflower Sanctuary (part of TWRP about ½ to ¾ mile southwest of the proposed BLRT Extension project) early in the 20th century from a population in southern Minnesota. The dwarf trout lily typically requires rich maple basswood forest and relatively undisturbed elm and cottonwood dominated floodplain forests. Forests throughout the proposed

BLRT Extension project area are highly disturbed and not suitable habitat for this rare plant species.

**Table 1** summarizes federally listed species discussed in this technical report (NHIS, 2015).

**Table 1. Summary of Federally Listed Species Documented near the Proposed BLRT Extension Project Area**

| Species | Federal Status | Notes |
|---|---|---|
| Northern long-eared bat (*Myotis septenrtionalis*) | Threatened | Listed per the Endangered Species Act in May 2015. Forested areas throughout Minnesota potentially used for summer roosting habitat. |
| Bald eagle (*Haliaeetus leucocephalus*) | Watchlist | De-listed from the federal list of threatened and endangered species; population still monitored. Documented nest east of the proposed BLRT Extension project. |
| Dwarf trout lily (*Erythronium propullans*) | Endangered | Re-discovered in 2005 in TWRP in the Eloise Butler Wildflower Garden well to the southwest of the proposed BLRT Extension project area (south of Olson Memorial Highway). |

Source: Natural Heritage Information System database search (Licensing Agreement 722_2014)

## 2.1.2 Migratory Bird Treaty Act

### 2.1.2.1 Regulatory Context

The Migratory Bird Treaty Act (MBTA) was enacted in 1918 as a means of protecting migratory bird populations from over-harvesting. USFWS oversees and enforces the MBTA. USFWS issues depredation permits for destruction of active nests of species covered under the MBTA. A depredation permit is not needed for destruction of nests that are not active. The Minnesota Department of Natural Resources (DNR) also has permit authority over the destruction of active bird nests.

### 2.1.2.2 Potential Documented Species

A large number of migratory bird species are covered under the MBTA. These species may pass through or nest in or near the proposed BLRT Extension project area as part of their seasonal migrations. Some species may nest in vegetated habitats and others, like the Barn Swallow and Cliff Swallow, have adapted to building mud nests under bridges and on other human-made structures.

Bridges and structures were examined during the summer of 2015 for the presence of barn and cliff swallows and nests. Several empty and occupied nests were observed on the underside of proposed BLRT Extension project area bridges; however, the number of nests was low. **Table 2** summarizes swallow nest locations and characteristics.

**Table 2. Summary of Observed Swallow Nests within the Proposed BLRT Extension Project Area**

| Location | Nests Observed | Notes |
|---|---|---|
| Golden Valley Road Bridge | 2 nests | Observed on June 10, 2015. No swallows were present. |
| Theodore Wirth Parkway Bridge | 0 nests | Observed on June 10, 2015. No nests or swallows were observed. |
| Plymouth Avenue Bridge | 1 nest | Observed on June 10, 2015. Swallow observed sitting on electrical conduit next to nest. |
| 36th Avenue Bridge | 0 nests | Observed on June 10, 2015. No swallows observed. |

Source: Metropolitan Council (Council) Field Observations (2015)

## 2.1.3 State-Listed Species and Other Element Occurrences

### 2.1.3.1 Regulatory Context

Minnesota's Endangered Species Statute (Minnesota Statutes, Section 84.0895) requires DNR to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern. The resulting List of Endangered, Threatened, and Special Concern Species is codified as Minnesota Rules, Chapter 6134. The Endangered Species Statute also authorizes DNR to adopt rules that regulate treatment of species designated as endangered and threatened. These regulations are codified as Minnesota Rules, Parts 6212.1800 to 6212.2300.

Data concerning rare species and element occurrences derive from the Natural Heritage Information System (NHIS, 2015) and are summarized below per rules restricting the public disclosure of exact locations of rare species and features.

### 2.1.3.2 Potential Documented Species

The following species have been historically documented within approximately a 1 mile buffer of the proposed BLRT Extension project.

**Long-Bearded Hawkweed (*Heiraceum longipilum*).** Long-bearded hawkweed may be present in dry old field habitat north of TH 610, it is not State-listed; therefore, it is not discussed further in **Section 2.2 – Environmental Consequences**.

**Water Willow (*Decodon verticillatus*).** Water willow is not likely present in the proposed BLRT Extension project area and it is not a State-listed species; therefore, it is not discussed further in **Section 2.2**.

**Valerian (*Valerian edulis* var. *ciliata*).** The valerian, last observed in 1891 near but outside the proposed BLRT Extension project area, is not likely present; therefore, it will not be discussed further in **Section 2.2**.

**Least Darter (*Etheostoma microperca*).** The least darter is not likely present in the proposed BLRT Extension project area and it is not a State-listed species; therefore, it is not discussed further in **Section 2.2**.

**Hooded Warbler (*Setophaga citrina*).** The hooded warbler may be present in the proposed BLRT Extension project area; however, it is not a State-listed species; therefore, it is not discussed further in **Section 2.2**.

**Bullfrog (*Lithobates catesbeiana*).** The bullfrog is may be present in the proposed BLRT Extension project area; however, it is not a State-listed species; therefore, it is not discussed further in **Section 2.2**.

**Peregrine Falcon (*Falco peregrinus*).** The peregrine falcon is not likely present in the proposed BLRT Extension project area; therefore, it is not discussed further in **Section 2.2**.

**Blanding's Turtle (*Emydoidea blandingii*).** The Blanding's turtle is potentially present in the proposed BLRT Extension project area; therefore, it is discussed further in **Section 2.2**.

**Table 3** summarizes status and documented observations of species listed as State Endangered, State Threatened, or state Special Concern (NHIS, 2015).

### Table 3. Summary of State-Endangered, State-Threatened and State Special Concern Species Documented Near the Proposed BLRT Extension Project

| Species | State Status | Notes |
|---|---|---|
| Long-bearded hawkweed (*Hieracium longipilum*) | Not-listed (State Watchlist) | Known from two dry prairie/old field locations north and east of the northern terminus of the proposed BLRT Extension project area. |
| Water willow (*Decodon verticillatus*) | Special Concern | Observed in the 1940s and 1950s in two lakes in the City of Robbinsdale outside (east) of the proposed BLRT Extension project area. |
| Valerian (*Valeriana edulis* var. *ciliata*) | Threatened | Last observed in 1891 outside (southwest) of the proposed BLRT Extension project area. |
| Least darter (*Etheostoma microperca*) | Special Concern | Observed in 1931 in a lake in the City of Robbinsdale outside (east) of the proposed BLRT Extension project area. |
| Hooded warbler (*Setophaga citrina*) | Special Concern | Observed during breeding season in 1979 in TWRP. |
| Bullfrog (*Lithobates catesbeianus*) | Not-listed (State Watchlist) | Observed in 2003, 2008, and 2011 in a shallow pond connected to Bassett Creek. |
| Peregrine falcon (*Falco peregrinus*) | Special Concern | Observed nesting in 2000, 2003 and 2011 in downtown Minneapolis on several skyscraper buildings. |
| Blanding's turtle (*Emydoidea blandingii*) | Threatened | A dead female Blanding's turtle was observed in 2000 on Olson Memorial Highway near TWRP. |

Source: Natural Heritage Information System database search (Licensing Agreement # LA722_2014)

### 2.1.3.3 Documented Other Element Occurrences

**Colonial Waterbird Nesting Areas.** Colonial Waterbird Nesting Areas are not currently present in the proposed BLRT Extension project area; however, rookery locations do change over time and therefore locations will be monitored. Locations of colonial waterbird nesting areas are not discussed further in **Section 2.2 – Environmental Consequences**. Occupied rookeries, typically occupied by Great Blue Herons and Double-Crested Cormorants, are usually quite obvious. Rookery locations will be monitored over the course of planning and construction of the proposed BLRT Extension project.

**Tamarack Swamp (Southern) Type.** The Tamarack Swamp identified in the Natural Heritage database is not located within the proposed BLRT Extension project area; therefore, it is not discussed further in **Section 2.2**.

**Table 4** summarizes rare features that have documented near the proposed BLRT Extension project area.

**Table 4. Summary of Rare Features Documented near the Proposed BLRT Extension Project Area**

| Element Occurrence | State Status | Notes |
|---|---|---|
| Colonial Waterbird Nesting Area | Tracked by DNR Natural Heritage Program | Two locations observed in 1997, 1998 and 2010 outside (east and west) of the proposed BLRT Extension project area. |
| Tamarack Swamp (Southern) Type | Tracked by DNR Natural Heritage Program | Observed in 1998 within TWRP outside (southwest) of the proposed BLRT Extension project area. |

Source: Natural Heritage Information System, 2015 (Licensing Agreement # LA 722_2014)

## 2.1.4 Noxious Weeds

The Minnesota and Federal Noxious and Prohibited Weed List (updated May 15, 2014) (DNR, 2014) was reviewed to determine the status of invasive species encountered during spring and summer (2015) fieldwork by SEH within the proposed BLRT Extension project area and associated facilities.

The urbanized and highly disturbed nature of much of the proposed BLRT Extension project area provides abundant suitable habitat for infestations of noxious and invasive plant species.

**Table 5** summarizes common noxious plant species, their status, and general locations observed during fieldwork.

## Table 5. Noxious Plant Species Observed within the Proposed BLRT Extension Project Area

| Plant Species | Noxious Status[1] | Notes |
|---|---|---|
| Garlic mustard (*Alliaria petiolata*) | RN | Ubiquitous in forested plant communities throughout the proposed BLRT Extension study area. |
| Spotted knapweed (*Centaurea stoebe* ssp. *micranthos*) | SN | Common on railroad ballast and adjacent dry ditches. |
| Canada thistle (*Cirsium arvense*) | SN | Common throughout the proposed BLRT Extension project area. |
| Leafy spurge (*Euphorbia esula*) | SN | Common on railroad ballast and adjacent dry ditches. |
| Wild parsnip (*Pastinaca sativa*) | SN | Common on disturbed embankments throughout the proposed BLRT Extension project area. |
| Japanese knotweed (*Polygonum cuspidatum*) | SN | Observed in highly disturbed forest. |
| European buckthorn (*Rhamnus cathartica*) | RN | Ubiquitous in the herbaceous, shrub and tree strata of forested areas throughout the proposed BLRT Extension project area and associated facilities. |
| Poison ivy (*Toxicodendron radicans*) | SN | Common in vegetated areas throughout the proposed BLRT Extension project area and associated facilities. |

Source: The Minnesota and Federal Noxious and Prohibited Weed List (May 15, 2015, update) and field observations.

[1] RN = Restricted Noxious Weed, SN = State Noxious Weed

### 2.1.5 Notable Terrestrial and Aquatic Habitats within and near the Proposed BLRT Extension Project Area

Wildlife species that inhabit fallow land, terrestrial or aquatic, within and near the proposed BLRT Extension project area are generalist species adapted to urbanized conditions. These species are generally more tolerant of human presence and activities, including traffic (pedestrian, rail, and vehicular), and have demonstrated by their presence that they adapt readily to the human environment. **Table 6** and text below describe notable terrestrial and aquatic habitats, respectively.

The notable terrestrial habitats within and near the proposed BLRT Extension project area are relatively large forested areas in an urbanized setting. As such they provide feeding, loafing and resting habitat for generalist species adapted to urbanized conditions. Common generalist wildlife species that thrive in such urbanized terrestrial habitat include white-tailed deer, rabbit, coyote, red fox, raccoon, opossum, grey squirrel, chipmunk, wild turkey, red-tailed hawk, and a variety of common songbirds and migration stopover habitat for neo-tropical migratory songbird species. Additionally, notable terrestrial habitats within and near the proposed BLRT Extension project area may provide summer roosting habitat for the NLEB, a Federally Threatened species. The total acreage of notable terrestrial habitats in and near the proposed BLRT Extension project is approximately 269 acres.

Notable terrestrial habitats (i.e., large contiguous forest complexes) within and near the proposed BLRT Extension project area were identified with a combination of Minnesota Land Cover Classification System (MLCCS) and field data collection. MLCCS forest polygons were identified within approximately ¼ mile of the proposed BLRT Extension project. These polygons were compared to recent aerial photography to identify areas where forest had been cleared after the MLCCS data were gathered. The MLCCS polygons were trimmed accordingly. Areas of large contiguously forested areas were classified as notable terrestrial habitats (see **Table 6**).

The notable aquatic habitats identified in the proposed BLRT Extension project area provide refuge for a variety of frogs and toads, turtles, snakes, waterfowl and songbird species. The total acreage of notable aquatic habitat in and near the proposed BLRT Extension project area is approximately 49 acres. Notable aquatic habitats within and near the proposed BLRT Extension project area were identified through fieldwork conducted in the spring and summer of 2015.

MLCCS data did not identify any natural habitat within the proposed BLRT Extension project area of greater than a D letter grade. The majority of the habitat quality was given a grade of NN or NA as the habitat is considered non-native, altered, or disturbed. Field data collection during 2015 verified the disturbed nature of habitats within and near the proposed BLRT Extension project area.

## Table 6. Notable Terrestrial and Aquatic Habitats within and near the Proposed BLRT Extension Project Area

| Notable Habitat ID | Location | Total Size (ac) |
|---|---|---|
| 101st Avenue North Complex (**Terrestrial**) | Northwest quadrant of Highway 169 and 101st Avenue North | 16.8 |
| Target Corp #1 Complex (**Terrestrial**) | North of TH 610 and east of Winnetka Avenue East | 20.4 |
| Target Corp #2 Complex (**Terrestrial**) | Adjacent to intersection of Winnetka Avenue North and West Broadway Avenue | 23.2 |
| Shingle Creek Complex (near the proposed BLRT Extension project) (**Terrestrial**) | Adjacent to Shingle Creek near the proposed BLRT Extension project | 20.7 |
| North Rice Pond – Sochacki Park Complex (**Terrestrial**) | West side of BNSF tracks from ~35th Avenue North to Golden Valley Road | 57.5 |
| Grimes Pond Complex (**Terrestrial**) | East side of BNSF tracks just south of Grimes Pond | 11.9 |
| Saint Mary Margaret – MPRB Complex (**Terrestrial**) | East side of BNSF tracks just north of Golden Valley Road | 6.9 |
| Theodore Wirth Complex (**Terrestrial**) | Both side of BNSF tracks from Golden Valley Road south to Olson Memorial Highway | 62.1 |
| Olson Memorial Highway Complex **(Terrestrial)** | South side of Olson Memorial Highway on both sides of existing BNSF tracks | 24.7 |
| Xerxes Complex (**Terrestrial**) | South side of Olson Memorial Highway near Glenwood Avenue and Xerxes Avenue North | 24.9 |
| North and South Rice Ponds (**Aquatic**) | Cities of Robbinsdale and Golden Valley on west side of existing BNSF tracks | 24.72 |
| Grimes Pond (**Aquatic**) | City of Robbinsdale on the east side of existing BNSF tracks | 7.41 |
| Golden Valley Road Ponds (**Aquatic**) | North side of Golden Valley Road on both sides of the existing BNSF tracks | 5.08 |
| TWRP (Bassett Creek and backwater) (**Aquatic**) | North and south of the Plymouth Avenue Bridge on the west side of the existing BNSF tracks | 11.85 |

Source: MLCCS and field data collection (Council, 2015)

## 2.2 Environmental Consequences

### 2.2.1 Federally Listed Species

Species that are federally listed or on the Federal "Watchlist" that could potentially be affected by the proposed BLRT Extension project include the NLEB (Federally Threatened) and the bald eagle (on the federal "Watchlist").

#### 2.2.1.1 Measures to Avoid and Minimize Impacts

**Northern Long-Eared Bat (*Myotis septentrionalis*).** Potential impacts to the NLEB can be minimized by avoiding tree clearing and grubbing. For forested areas 15 acres or larger that cannot be avoided, tree clearing would be restricted between April 1 and October 1 as prescribed in the Interim 4(d) Guidelines developed for the NLEB (USFWS, 2015c). The proposed BLRT Extension project team is working closely with USFWS in order to assure that potential impacts to the NLEB are minimized to the extent practicable.

**Bald Eagle (*Haliaeetus leucocephalus*).** Though the bald eagle has been de-listed from the ESA, it is still protected under several other federal laws. Bald eagle nest locations change over time and there is the potential for bald eagles to nest in and near the proposed BLRT Extension project area. Bald eagles are particularly vulnerable during the nesting season which extends from late January to late July. The non-nesting season is from August to mid-January. Nest locations will be monitored throughout the planning and construction phases of the proposed BLRT Extension project. If new bald eagle nests are observed in close proximity to the construction limits of the proposed BLRT Extension project during the planning and construction phases of the proposed BLRT Extension project, USFWS will be consulted to determine appropriate actions or restrictions that may apply.

#### 2.2.1.2 Unavoidable Impacts

**Northern Long-Eared Bat.** Based on its analysis of proposed tree clearing in the proposed BLRT Extension project area and adherence to the Final "4(d) Rule," USFWS has concurred with the Federal Transit Administration's (FTA) determination that the proposed BLRT Extension project merits a determination of "may affect, Incidental Take Not Prohibited" with respect to the NLEB.

**Bald Eagle.** With ongoing nest reconnaissance and adherence to acceptable permit provisions and seasonal work windows, the proposed action is not likely to negatively impact the bald eagle.

## 2.2.2 Migratory Bird Treaty Act

### 2.2.2.1 Measures to Avoid and Minimize Impacts

Generally, USFWS and DNR require seasonal work windows in order to comply with the MBTA and the DNR General Permit 2004 – 0001 provisions. The following measures are acceptable to USFWS and DNR:

- Bridge work may be performed (started and finished) outside of the nesting season (i.e., before May 15 or after September 1). No permit would be required for this activity.
- Bridge work may begin after May 15 and nest completion can be prevented by removing the nests (at least three times per week) as they are being built, or through the use of barriers to prevent nest establishment from occurring. The success of this measure depends on the number of nests on a bridge, and the ability to restrict access. If the bridge contains only a few nests, the birds should be easily deterred from nesting. Removal of unfinished nests is acceptable to USFWS, which considers this to be non-lethal harassment. No permits would be required for this activity.

Very few swallow nests were observed on bridge structures within the proposed BLRT Extension project area. Therefore, it should be feasible to remove existing nests or exclude new nest establishment during a seasonal period when they are inactive. During construction of the proposed BLRT Extension project, nest building should be prevented on the underside of bridge structures by removing nests as they are built, if needed.

### 2.2.2.2 Unavoidable Impacts

With the implementation of acceptable measures to minimize (**Section 2.2.2.1**) there would be no impacts resulting from the proposed BLRT Extension project to species covered under the MBTA.

## 2.2.3 State-Listed Species and Other Element Occurrences

### 2.2.3.1 Measures to Avoid and Minimize Impacts

DNR has issued guidelines on measures to minimize potential impacts to Blanding's turtle. These measures include provisions such as seasonal work windows, installation and removal of silt fences, and educational materials to use at the construction site to inform the contractor and workers what the look for, and how to handle occurrences.

### 2.2.3.2 Unavoidable Impacts

**Blanding's Turtle.** The Blanding's turtle may be present within the proposed BLRT Extension project area. With adherence to the DNR guidelines concerning minimization of impacts to Blanding's turtle, we conclude that potential impacts to this species would likely be negligible.

**Other Element Occurrences.** The proposed subject project would not impact any rare plant communities or animal aggregation areas (i.e., colonial waterbird nesting areas) that have been inventoried by DNR.

### 2.2.4 Noxious Weeds

Given the urban and highly disturbed nature of the proposed BLRT Extension LRT project area, noxious weeds are ubiquitous. Some measures, such as spot spraying with appropriate herbicides, can be taken to control invasive species within construction areas and staging areas. A vegetation management plan will be developed to include measures like these to control noxious weeds along the proposed BLRT Extension project. However, permanent eradication of invasive or noxious weeds within the proposed BLRT Extension project area will not be feasible.

### 2.2.5 Notable Terrestrial and Aquatic Habitats within the Proposed BLRT Extension Project Area

#### 2.2.5.1 Measures to Avoid and Minimize Impacts

Complete avoidance of impacts to notable terrestrial and aquatic habitats within the proposed BLRT Extension project area was not feasible. Several opportunities to minimize impacts are under consideration in the design process, summarized as follows:

- **Rail bridge across Golden Valley Ponds.** The proposed BLRT Extension project will use a bridge to cross Golden Valley Ponds, an identified notable aquatic resource. The alternative design would have used a continuous embankment of fill which would have caused considerably more impacts to this aquatic resource.
- **Rail bridge across Grimes Pond.** The proposed BLRT Extension project will use a bridge to cross Grimes Pond, an identified notable aquatic resource. The alternative design would have used a continuous embankment of fill which would have had considerably more impacts to this aquatic resource.
- **Pre-treatment storm BMPs.** Several BMPs, such as infiltration, retention and detention will be part of the proposed BLRT Extension project and associated facilities. These BMPs will serve to improve the water quality of downslope or downstream aquatic resources.
- **Design of on-site mitigation areas that would minimize impacts to forested areas and existing aquatic resources.** Several on-site mitigation areas have been identified that would require negligible tree clearing and would restore aquatic habitat that has been lost as a result of fill or diminished hydrology.

#### 2.2.5.2 Unavoidable Impacts

Notable terrestrial habitats (i.e., large contiguous forest complexes) identified within and near the proposed BLRT Extension project area may provide suitable summer roosting habitat for the NLEB as well as foraging and resting habitat for a variety of generalist wildlife species. Notable aquatic habitats identified within and near the proposed BLRT Extension project area provide refuge for a variety of frogs and toads, turtles, waterfowl, and songbirds. **Table 7** summarizes total size and potential impacts to Forest Complexes within and near the proposed BLRT Extension project area.

In addition to impacts to notable terrestrial habitat summarized in **Table 7**, 194 acres of numerous small forest remnants (76 forest patches) are present within approximately ¼ mile of the proposed

BLRT Extension project. Of these remnants, approximately 17 acres would be impacted by the proposed BLRT Extension project.

### Table 7. Notable Terrestrial and Aquatic Habitat Impacts within the Proposed BLRT Extension Project Area

| | Location | Total Size (ac) | Total Impacts (ac) |
|---|---|---|---|
| **Terrestrial Habitats** | | | |
| 101st Avenue North Complex | Northwest quadrant of Highway 169 and 101st Avenue North | 16.8 | 0.0 |
| Target Corp #1 Complex | North of TH 610 and east of Winnetka Avenue East | 20.4 | 0.51 |
| Target Corp #2 Complex | Adjacent to intersection of Winnetka Avenue North and West Broadway Avenue | 23.2 | 4.70 |
| Shingle Creek Complex | Adjacent to Shingle Creek near the Blue Line LRT Extension project alignment | 20.7 | Part of West Broadway Avenue |
| North Rice Pond – Sochacki Park Complex | West side of BNSF tracks from ~35th Avenue North to Golden Valley Road | 57.5 | 3.30 |
| Grimes Pond Complex | East side of BNSF tracks just south of Grimes Pond | 11.9 | 0.06 |
| Saint Mary Margaret – MPRB Complex | East side of BNSF tracks just north of Golden Valley Road | 6.9 | 0.29 |
| Theodore Wirth Complex | Both side of BNSF tracks from Golden Valley Road south to Olson Memorial Highway | 62.1 | 8.69 |
| Olson Memorial Highway Complex | South side of Olson Memorial Highway on both sides of existing BNSF tracks | 24.7 | 0.38 |
| Xerxes Complex | South side of Olson Memorial Highway near Glenwood Avenue and Xerxes Avenue North | 24.9 | 0.00 |
| | **Total notable terrestrial habitat and potential impacts** | 269 | 17.93 |
| **Aquatic Habitats** | | | |
| North and South Rice Ponds | Cities of Robbinsdale and Golden Valley on west side of existing BNSF tracks | 24.72 | 0.01 |
| Grimes Pond | City of Robbinsdale on the east side of existing BNSF tracks | 7.41 | 1.63 |
| Golden Valley Road Ponds | North side of Golden Valley Road on both sides of the existing BNSF tracks | 5.08 | 0.90 |
| TWRP (Bassett Creek and backwater) | North and south of the Plymouth Avenue Bridge on the west side of the existing BNSF tracks | 11.85 | 1.79 |
| | **Total notable aquatic habitat and potential impacts** | **49.06** | **4.33** |

Source: MLCCS Dataset and recent aerial photography

### 2.2.5.3 Mitigation for Unavoidable Impacts

Mitigation for unavoidable impacts to aquatic habitat will be accomplished through a combination of on-site wetland mitigation and purchase of suitable wetland credits from an established wetland mitigation bank.

Mitigation for unavoidable impacts to notable terrestrial habitat will be accomplished through some tree plantings in and around TWRP and a few selected areas throughout the proposed BLRT Extension project area.

Where effective and feasible, suitable wildlife crossings will be accommodated within proposed culverts to allow some wildlife species to cross from one side of the proposed BLRT Extension project and freight rail tracks to the other.

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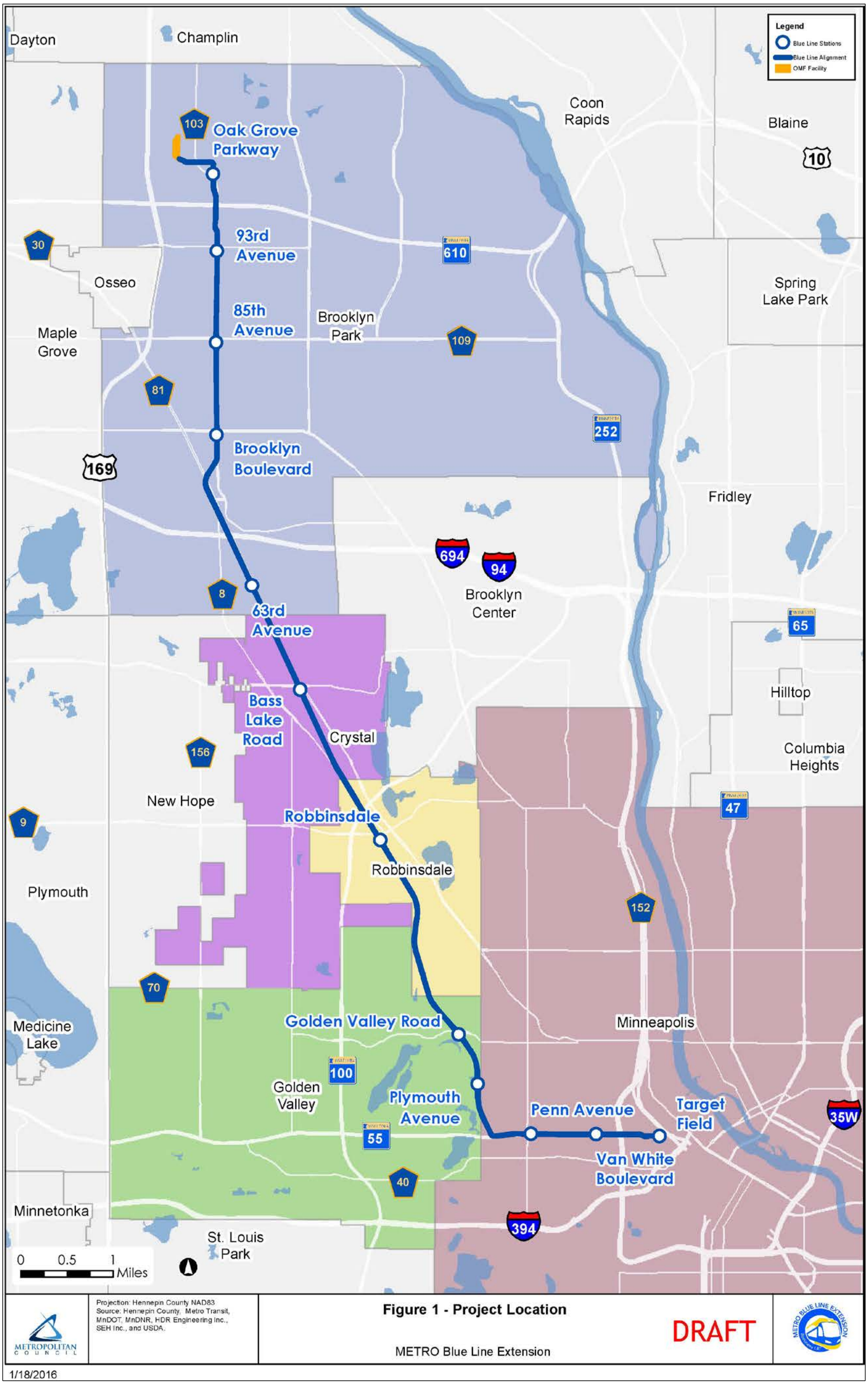
**Figure 1. General Location Map of the Proposed BLRT Extension Project**



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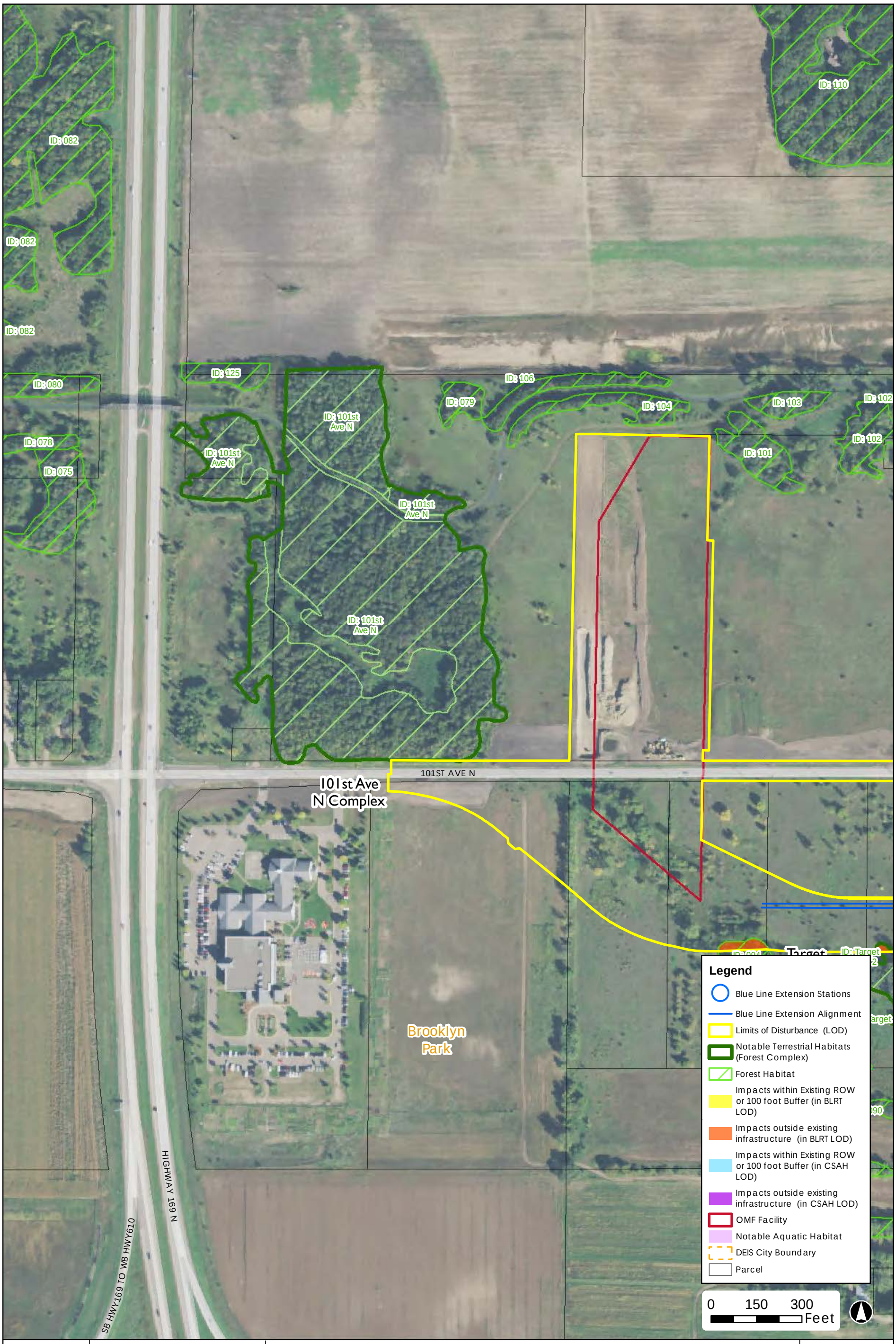


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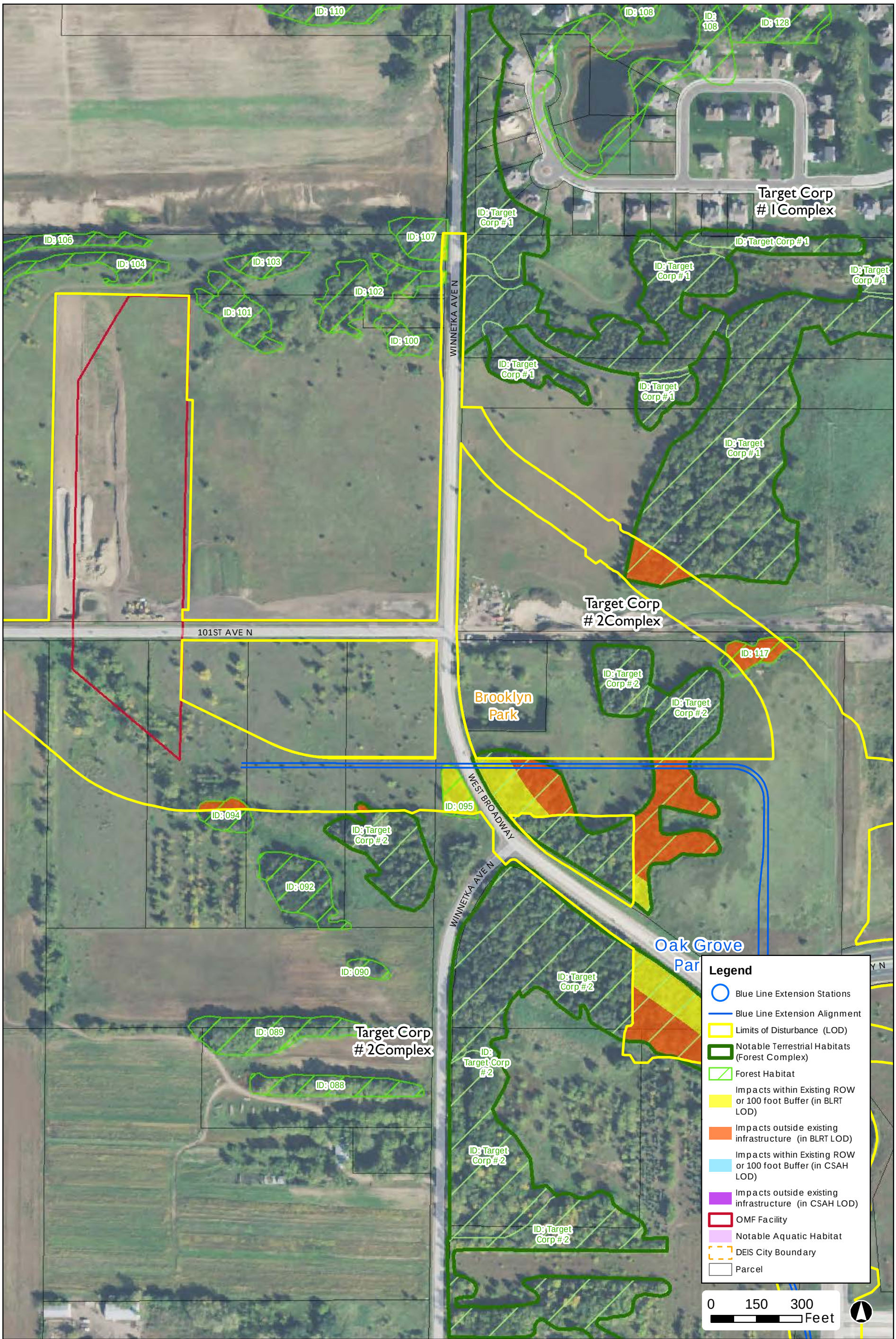


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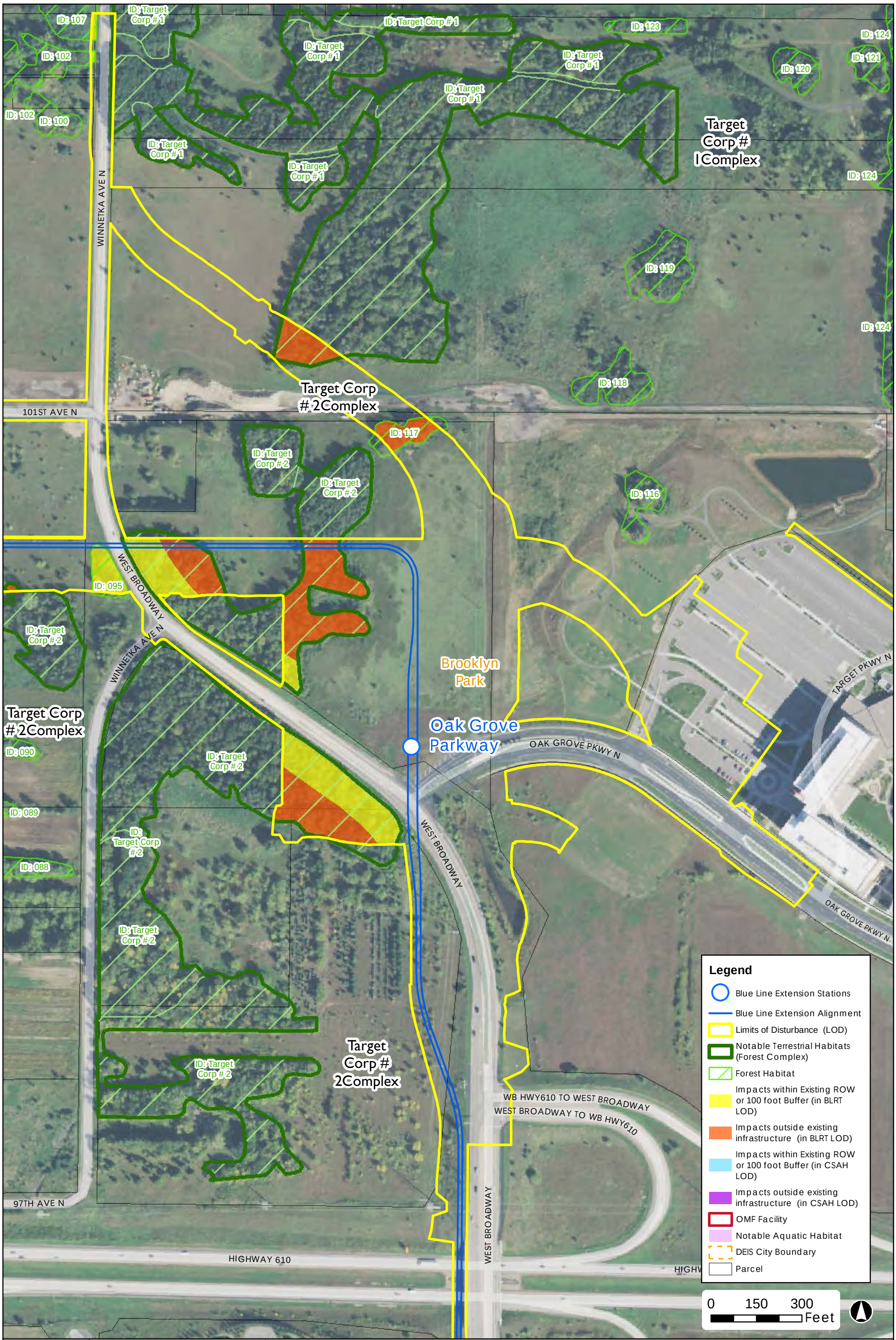


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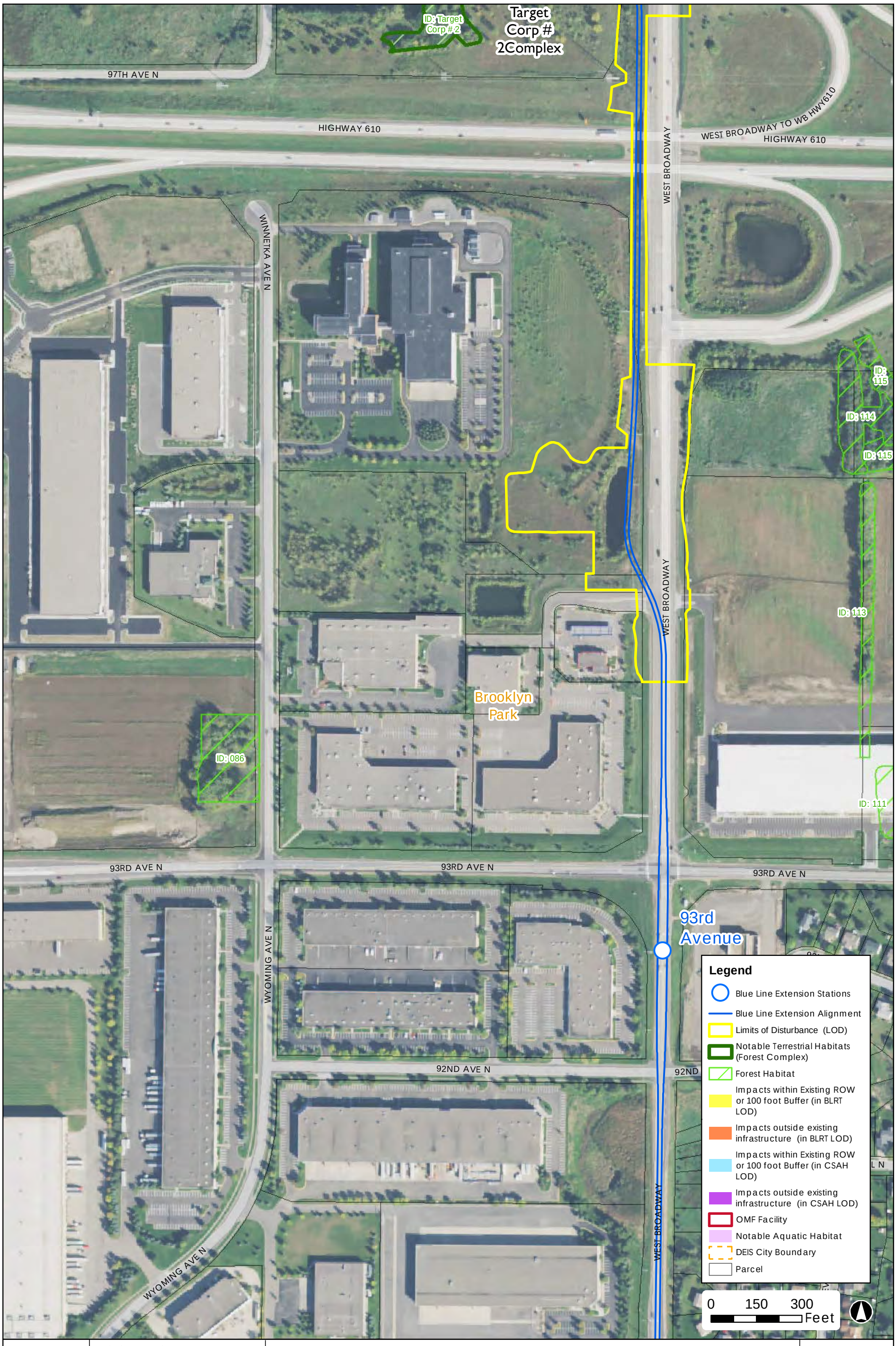


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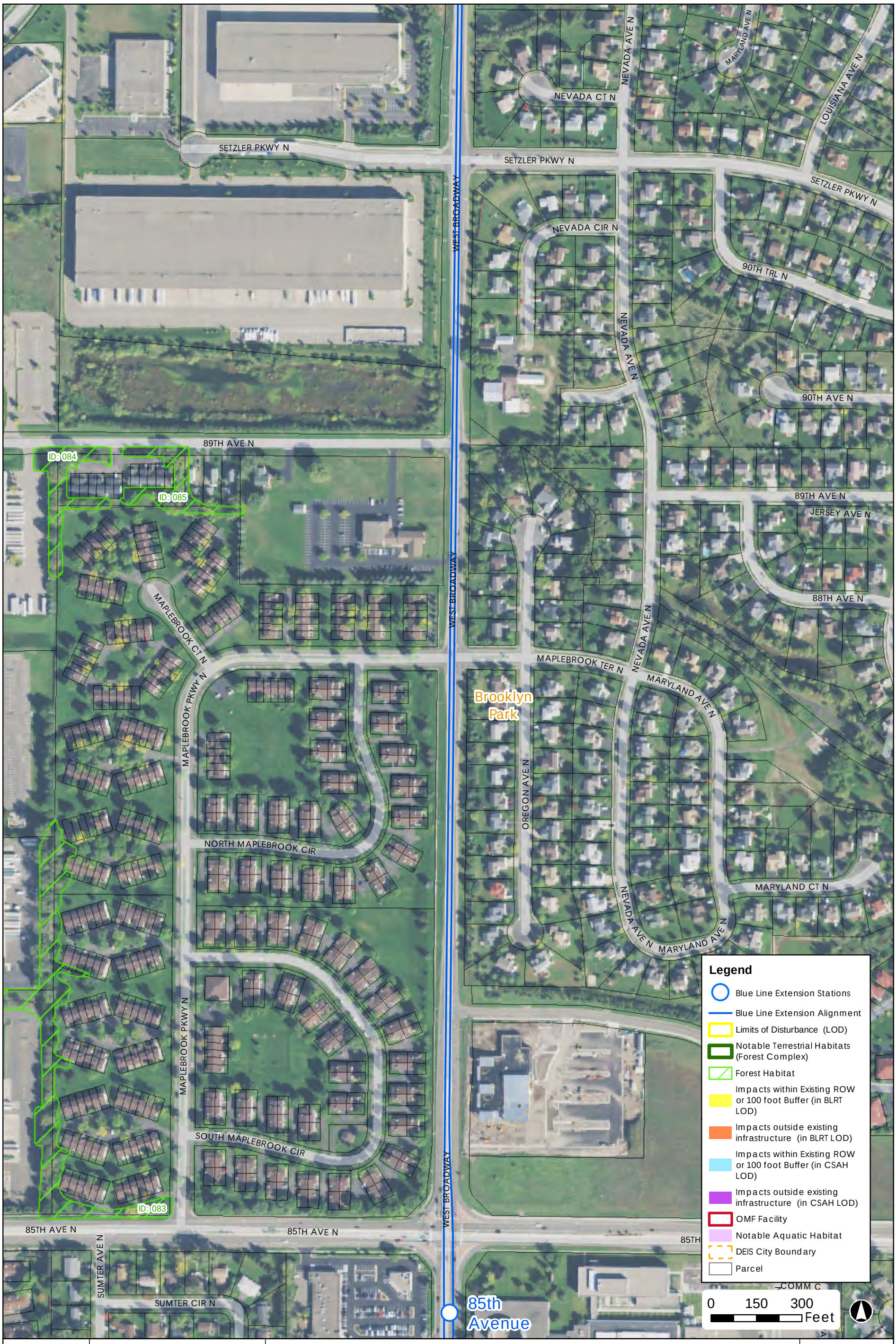


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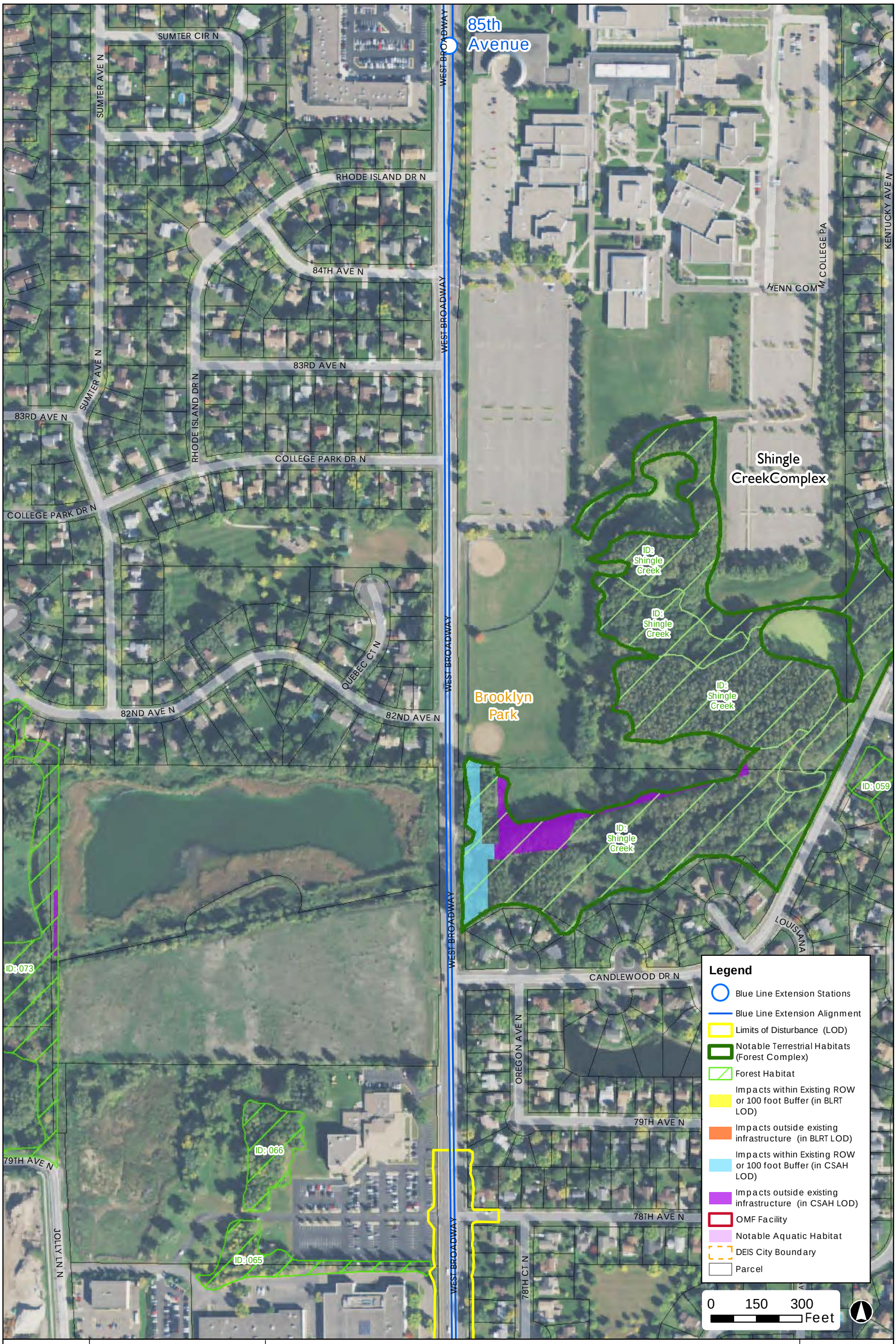


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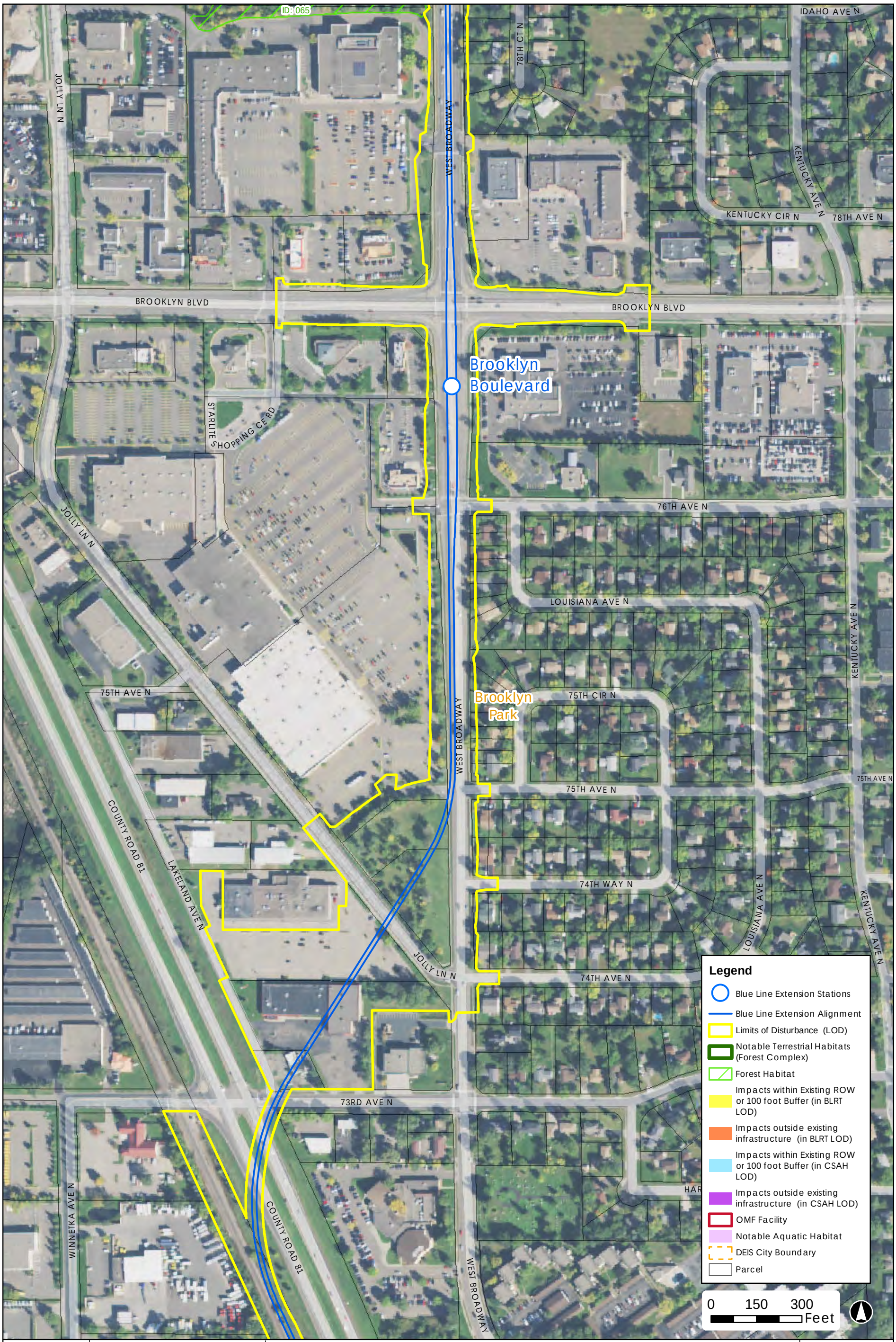


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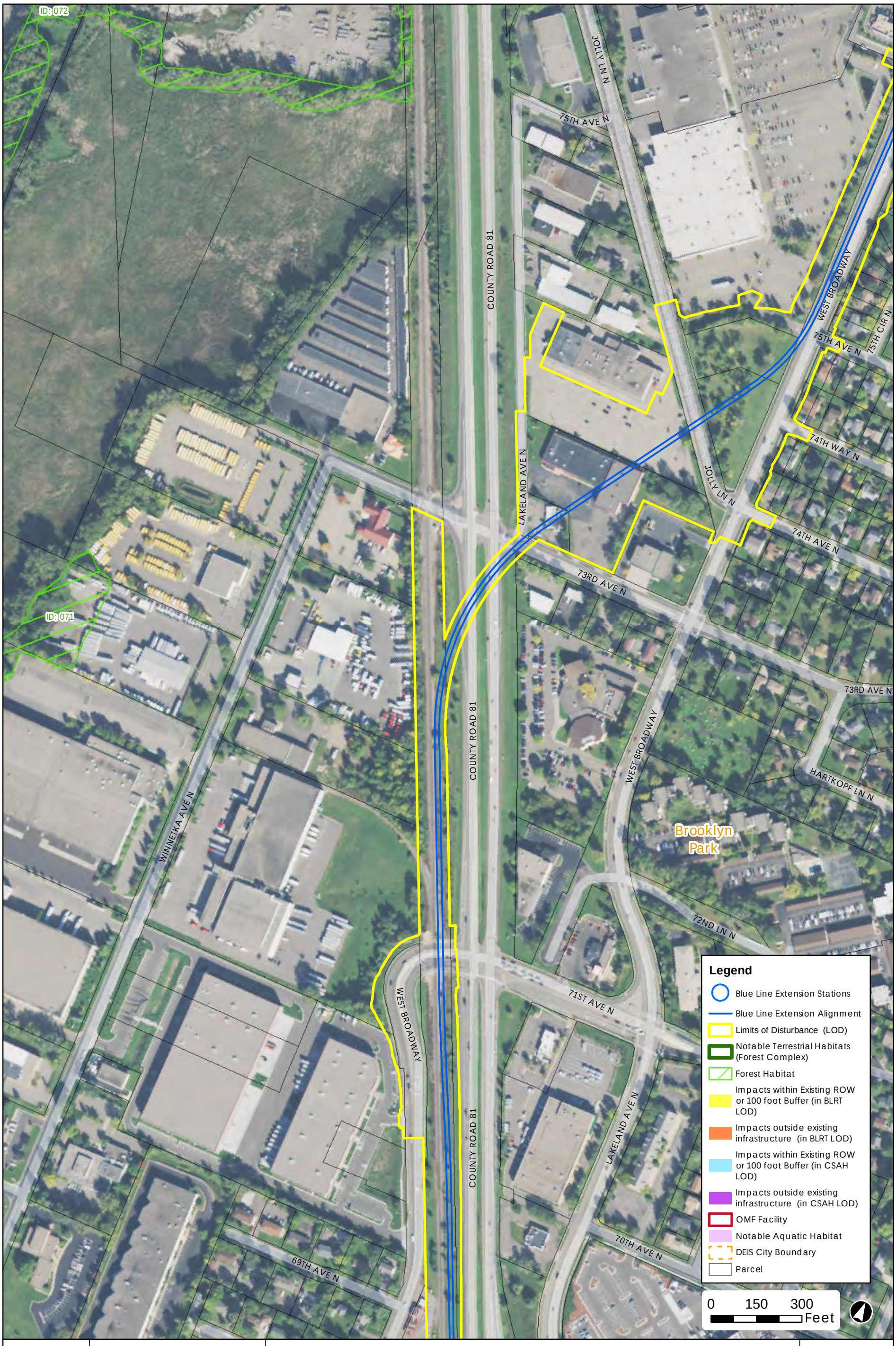


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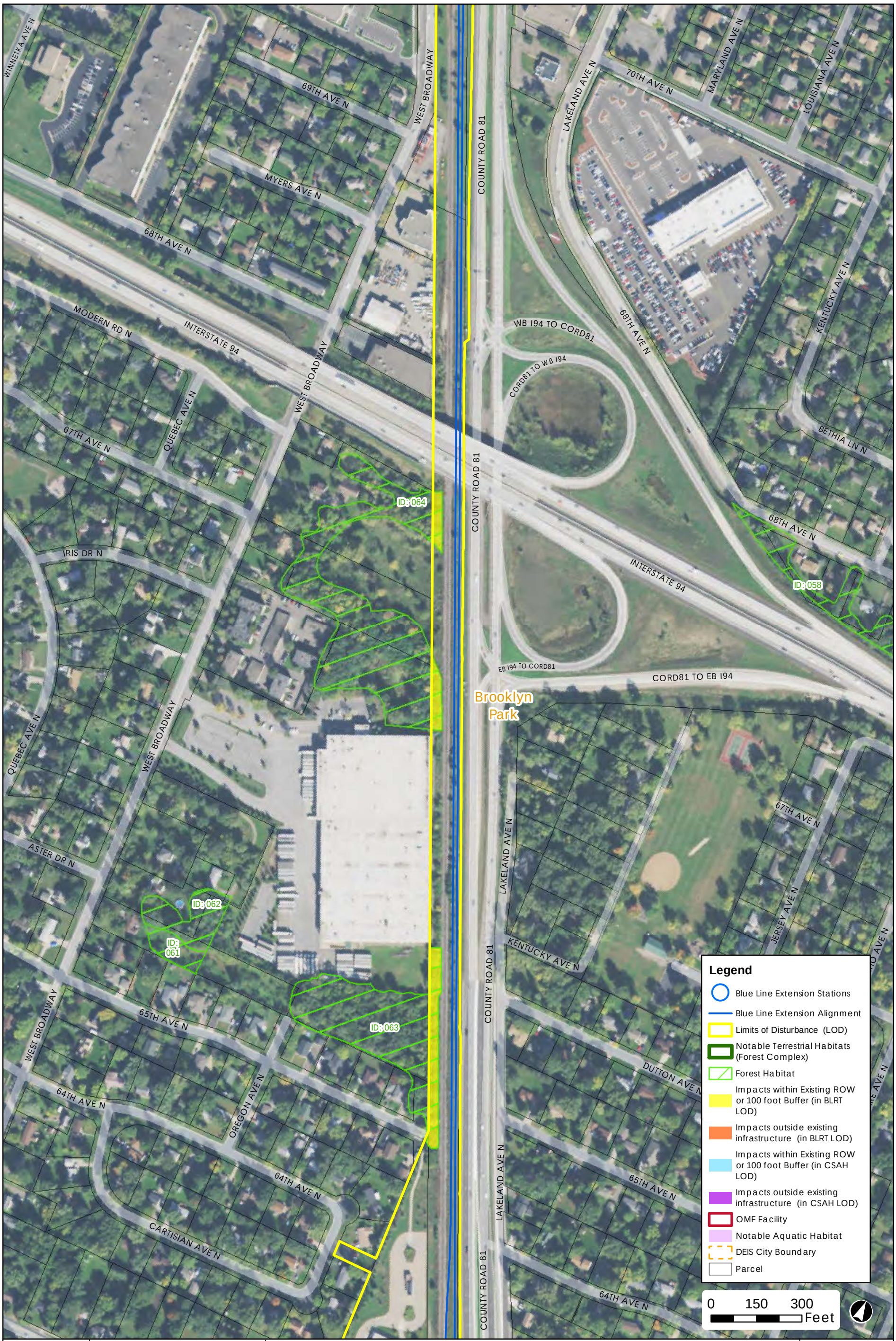


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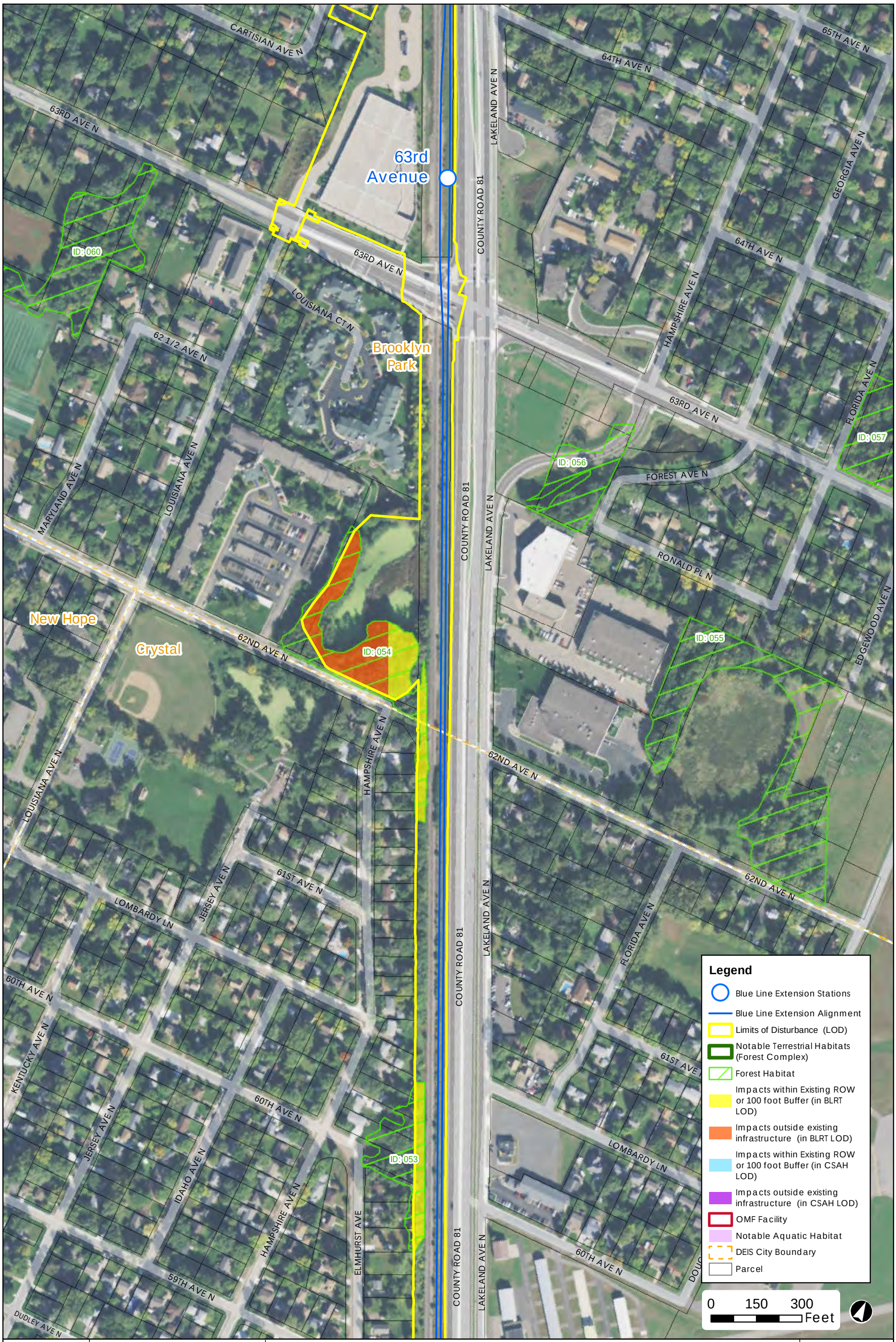


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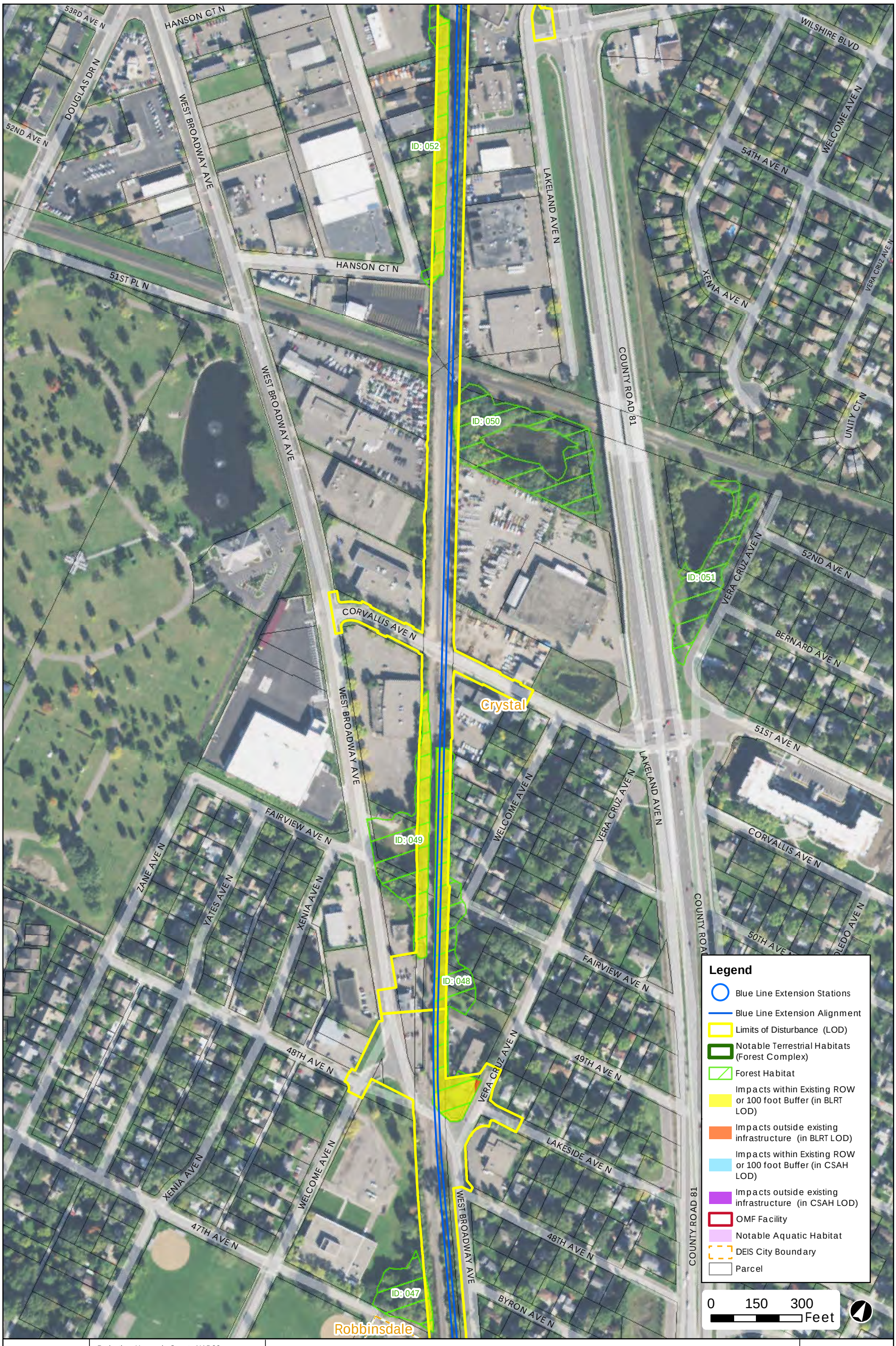


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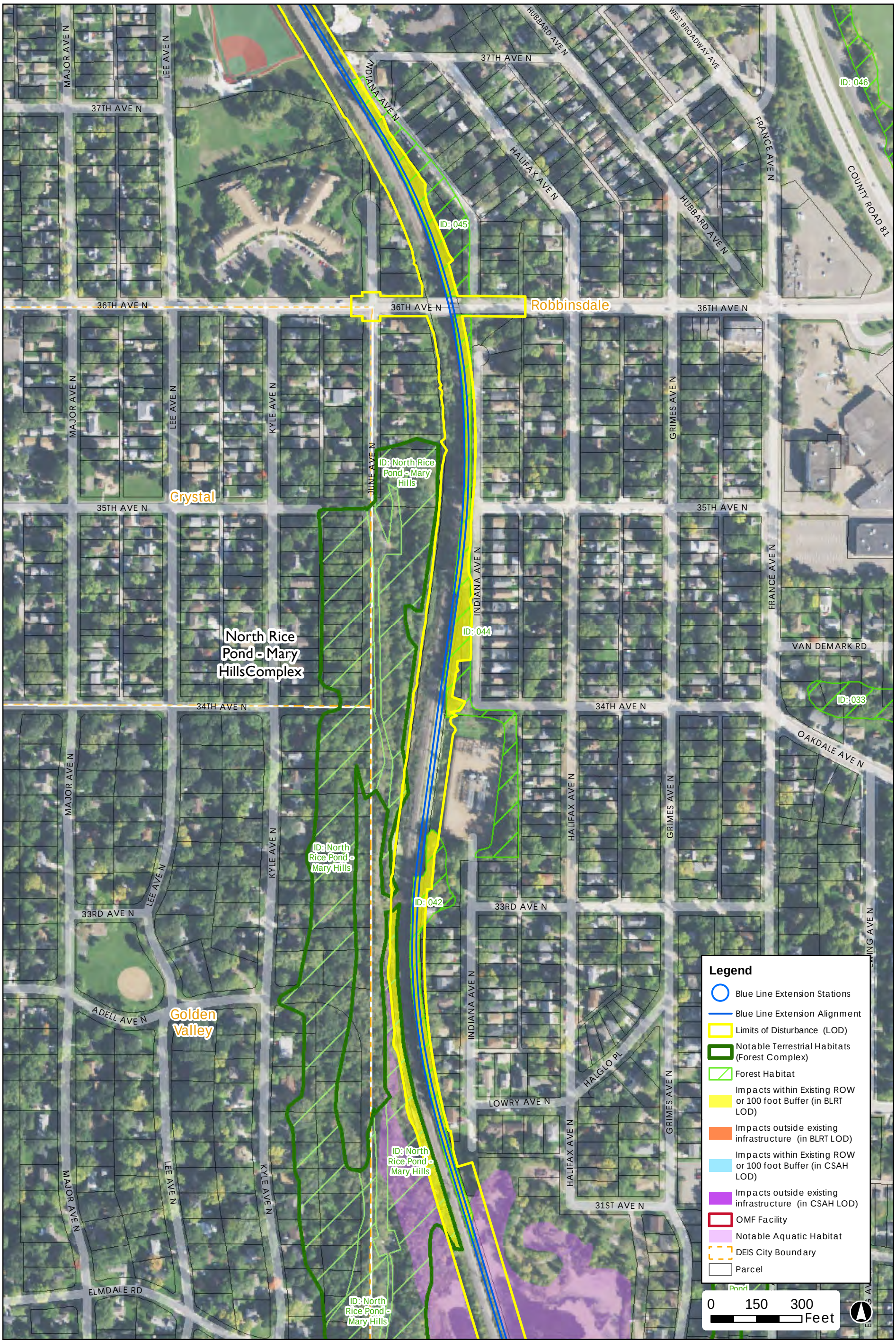


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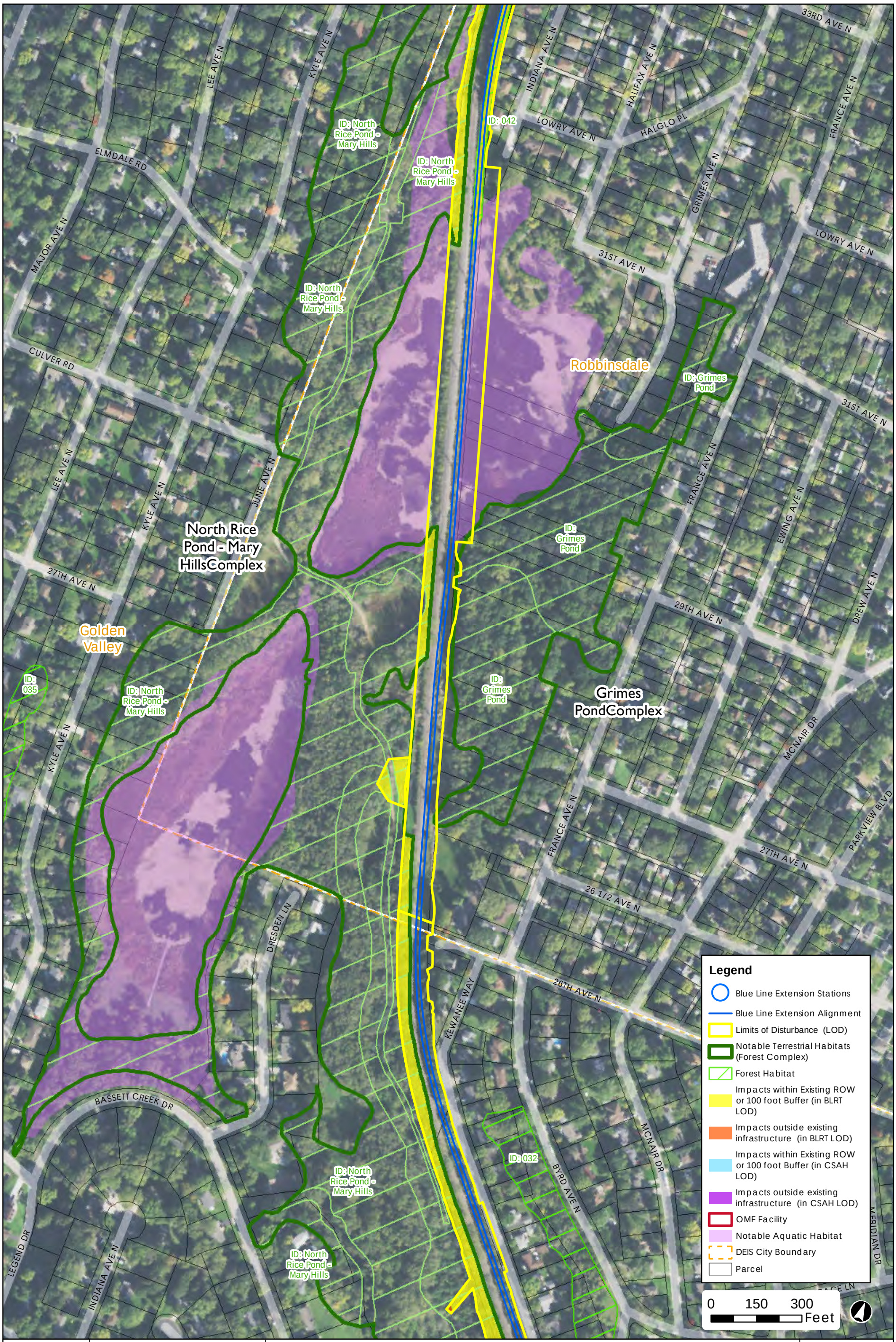


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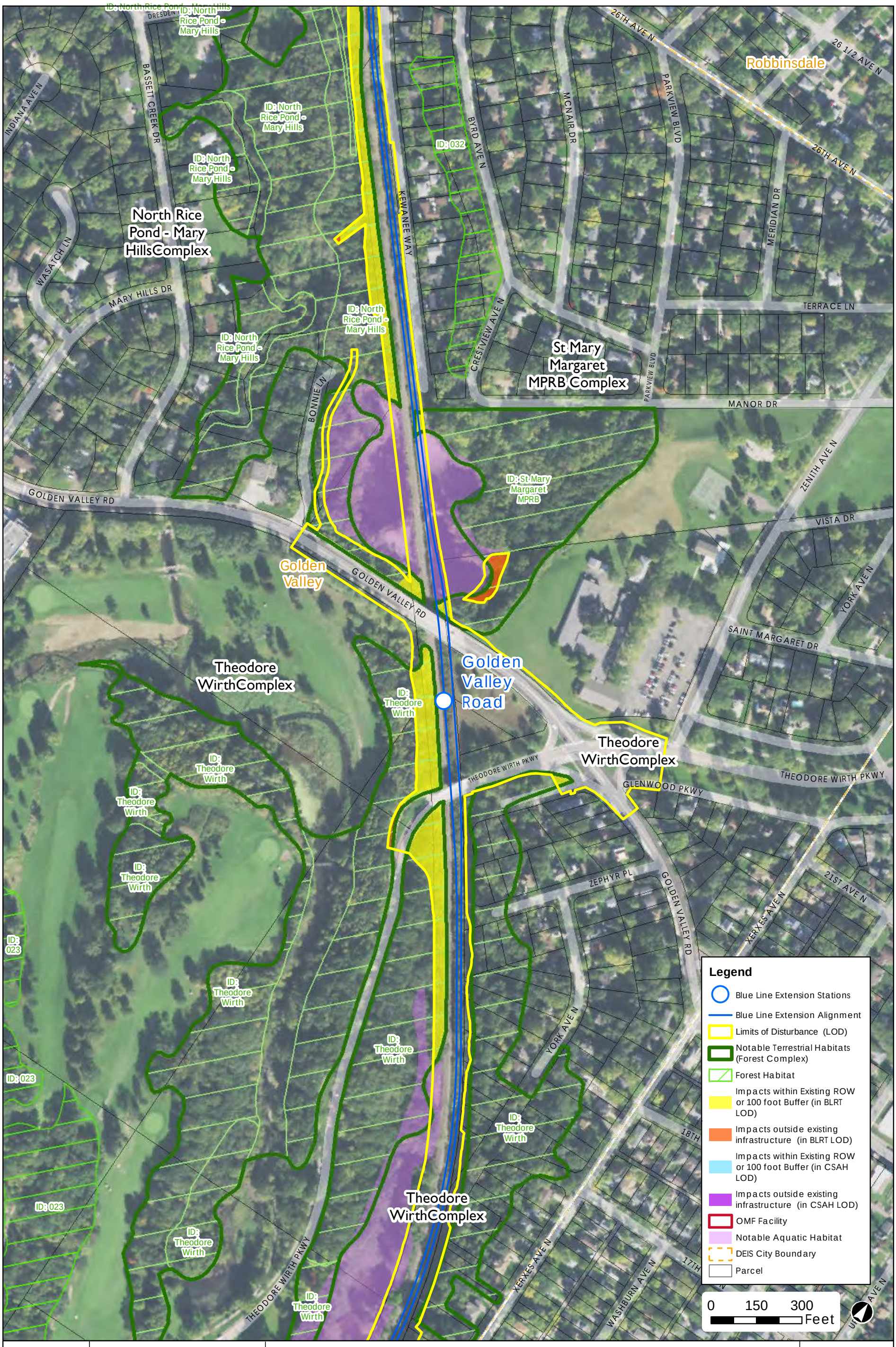


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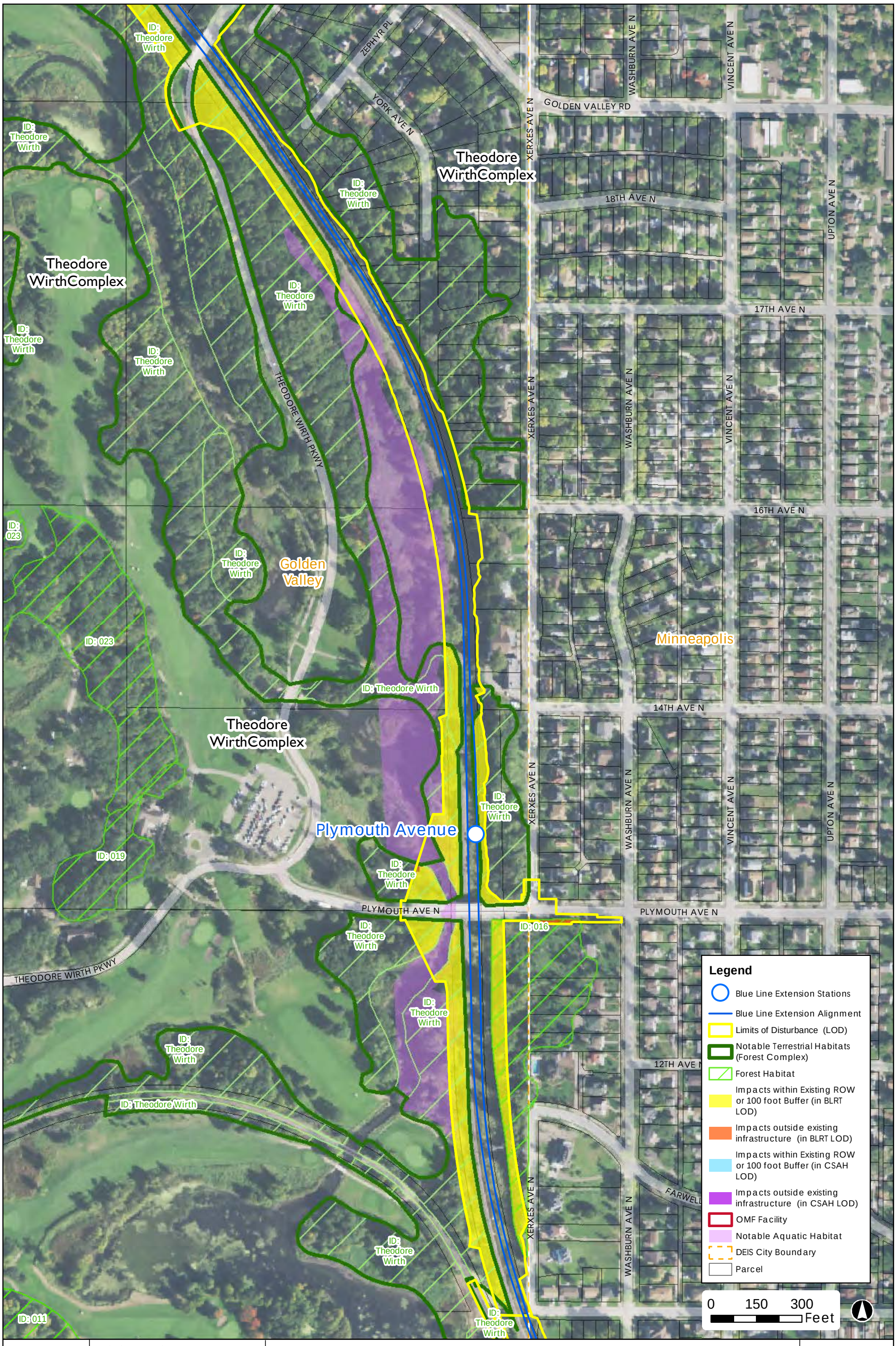


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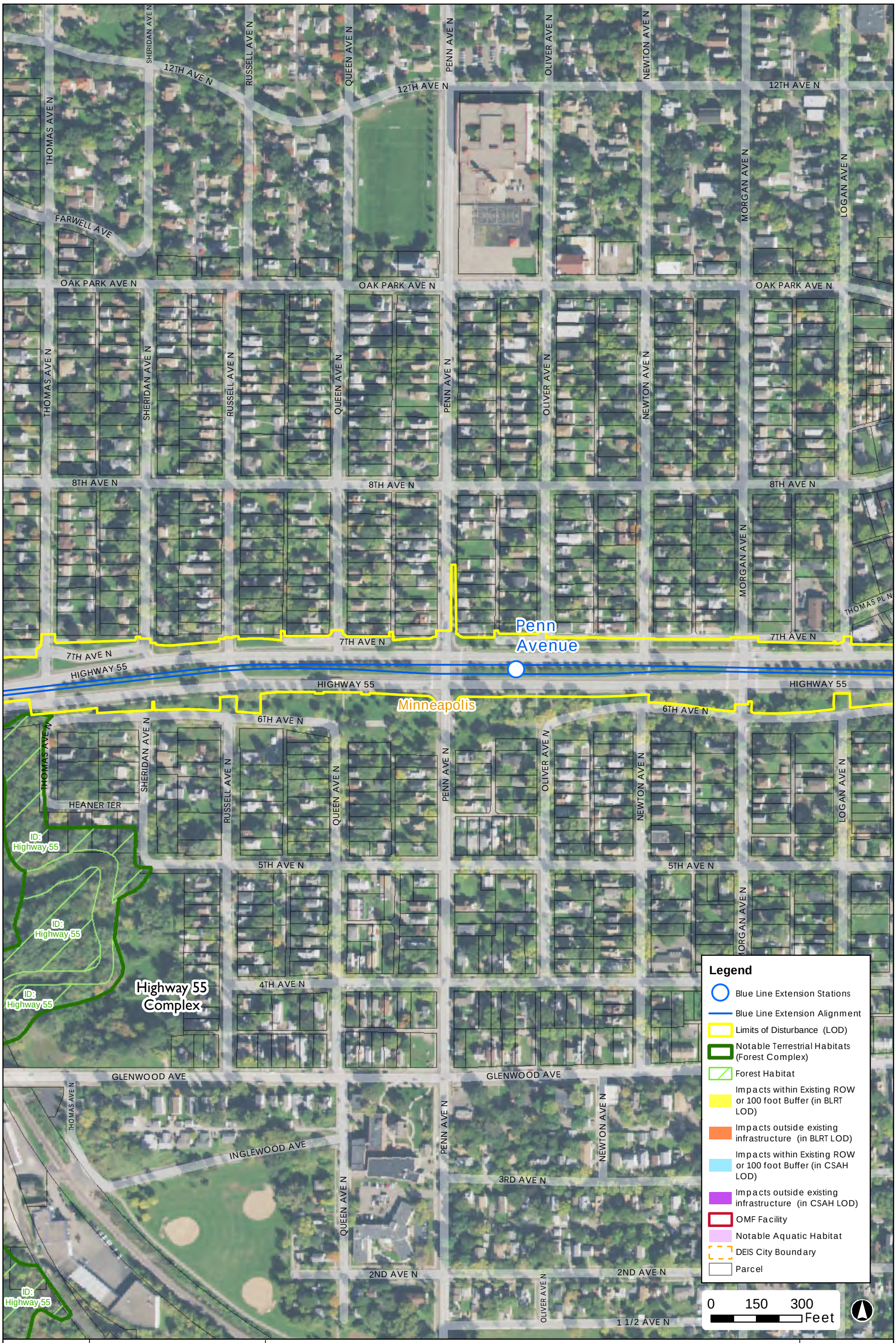


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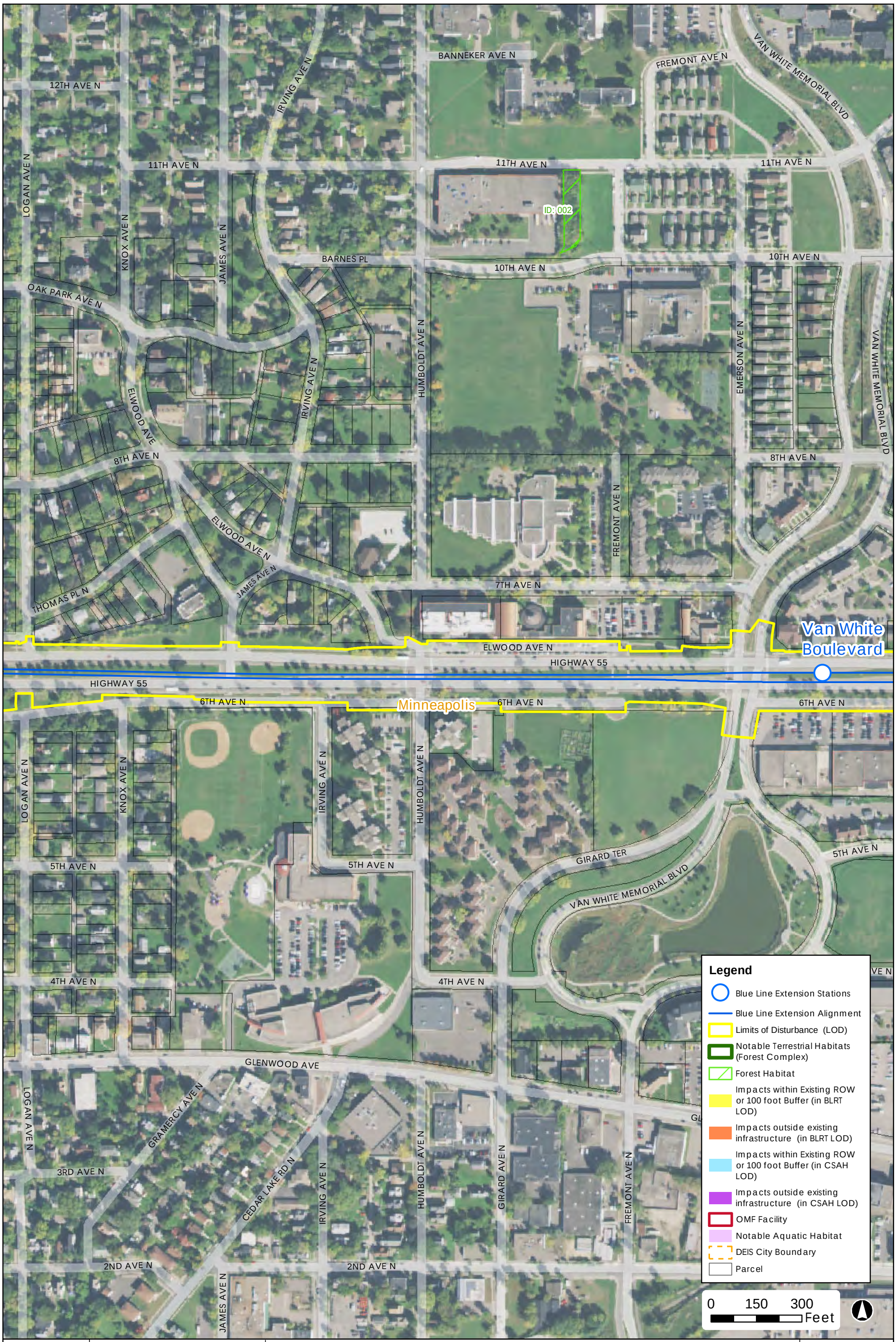


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# Appendix F
# Supporting Technical Reports

## F.10 Preliminary Stormwater Management Plan

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| | |
|---|---|
| **To:** | Nick Landwer<br>Director of Design and Engineering, Blue Line LRT Extension Project |
| **From:** | Lisa Goddard, PE, LEED AP<br>Water Resources Sub-Task Lead, SRF Consulting Group |
| **Date:** | January 6, 2016 |
| **Subject:** | Preliminary Stormwater Management Plan |

# 1.0 Introduction

## 1.1 Project Location

The METRO Blue Line LRT Extension (BLRT) project will extend light rail passenger service from the Target Field Station in Minneapolis to Oak Grove Parkway/101st Avenue N in Brooklyn Park. The project corridor is approximately 13 miles and runs through the cities of Minneapolis, Golden Valley, Robbinsdale, Crystal, and Brooklyn Park. The project has been divided into six segments corresponding with municipal boundaries where possible, which have been labeled according to city. The portion within Brooklyn Park has been further divided into two segments: Brooklyn Park 1, which is the northernmost segment, and Brooklyn Park 2.

Roughly eight miles of the proposed project will be constructed within the existing BNSF Railway corridor. This includes portions of the Golden Valley, Robbinsdale, Crystal and Brooklyn Park segments. Most of the Minneapolis segment is located within the median of TH 55 (Olson Memorial Highway), and portions of the two Brooklyn Park segments are within the median of CSAH 103 (West Broadway Avenue). The proposed project also includes the construction and/or reconstruction of affected roadways, construction of station platforms, several park-and-ride facilities, and an Operations and Maintenance Facility (OMF).

Hennepin County is in the preliminary design phase of a portion of CSAH 103 (West Broadway Avenue) that coincides with a portion of the Brooklyn Park 1 segment. A separate environmental assessment worksheet (EAW) and preliminary stormwater design have been completed for the Hennepin County project, which incorporates the floodplain and wetland impacts and stormwater treatment best management practices (BMPs) required to treat runoff from the BLRT Extension project. These have been documented in the EAW and in supporting technical memoranda.

## 1.2 Purpose

This *Stormwater Technical Memorandum* has been prepared in support of the Final Environmental Impact Statement (Final EIS) for the BLRT Extension project. The objective of this memorandum is to evaluate the project's potential stormwater impacts within the study area and to identify potential mitigation measures. This includes the following:

- Identify regulatory requirements that will set forth mitigation standards that are specific to stormwater management
- Determine how the proposed improvements would affect existing drainage patterns and nearby water resources
- Identify stormwater BMPs that would be used to satisfy current regulatory requirements for the project corridor

- Determine approximate sizes and locations for BMPs along the corridor

This report contains qualitative and quantitative design recommendations for the BLRT Extension project corridor that will be used by the consultant team preparing the Final EIS and will provide information about how the project would meet various regulatory requirements. Potential impacts to existing stormwater infrastructure (e.g., storm sewer and culverts) will be investigated during the next stages of design.

A separate technical memorandum has been prepared to discuss floodplains in the corridor. The analysis of wetlands adjacent to the project limits and the potential impacts to those is being performed by others.

## 1.3 Data Collection

The storm sewer and hydrology data employed for this study was obtained from a variety of sources. The following is a brief summary of the data used.

### *1.3.1 Regulatory Criteria*

Meetings and discussions took place with staff from the various cities and watershed management organizations (WMOs) to obtain a better understanding of existing systems and their respective criteria for evaluating and designing new drainage systems and BMPs.

### *1.3.2 Hydrology*

Hydrologic information came from a variety of sources, including:

- Contour data was developed from a flight of the corridor and the 2012 Hennepin County LiDAR data
- Existing drainage boundaries were based on those shown in the local water management plans of the cities and watersheds and those from recent reconstruction projects along the corridor. These were then adjusted as needed to reflect the existing contour data
- For the portion of the project within Brooklyn Park:
    - The 1995 Brooklyn Park Comprehensive Stormwater Management Plan listed discharge limits for subwatersheds and peak outflows from ponds along the corridor. After discussion with staff from the City of Brooklyn Park, it was determined that areas where drainage boundaries had not changed significantly were held to these discharge rates and that they were still applicable. Areas that experienced significant changes in land use as determined by comparing aerial images and recent construction site plans would also be held to the 1995 discharge limits.
    - In addition, ponds that discharged to creeks and channels within the Setzler Pond/Century Channel subwatershed were designed to limit discharge to 0.1 cubic-feet per second per acre of tributary drainage area.

### *1.3.3 Existing Stormwater Infrastructure*

Record drawings were collected for the BLRT Extension project, and additional record drawings were collected by Hennepin County for the CSAH 103 (West Broadway Avenue) project, which coincides with a portion of the project corridor. This information was supplemented with storm sewer maps from the various local water management plans and used to determine the connectivity of the existing storm sewer system to ponds, wetlands, and other water features.

# 2.0 Regulatory Environment

Regulatory and permitting authority for stormwater management falls to the cities, the Minnesota Pollution Control Agency (MPCA), and the WMOs. Each watershed organization is governed by a Joint Powers Agreement that is

held between the watershed organization and the member communities that are located within the boundaries of the WMO. Regulations change from time to time, and the project will be subject to regulations in effect when the design is submitted for approval by the permitting authorities. The stormwater management system for the project corridor was designed to meet the most stringent requirements for that particular segment according to the WMO and municipality boundaries. In all cases except for the OMF and park-and-ride structures, the WMO rules were the most stringent requirements. The rate and volume control requirements of the B3 Guidelines are more stringent and will be applied to those sites. The agencies listed below play a role in stormwater management within the project area; Appendix B contains a matrix listing the specific requirements of each agency.

- Minnesota Pollution Control Agency (MPCA)
- Mississippi Watershed Management Organization (MWMO)
- Bassett Creek Water Management Commission (BCWMC)
- Shingle Creek and West Mississippi Watershed Management Commission (SCWMC and WMWMC, or SCWM WMC when referred to in reference to their joint watershed management plan)
- City of Minneapolis
- City of Golden Valley
- City of Robbinsdale
- City of Crystal
- City of Brooklyn Park

# 2.1 Minnesota Pollution Control Agency

## *2.1.1 NPDES Construction Stormwater Permit*

The MPCA administers the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit program in the State of Minnesota (MN 115; MN Rule 7050). The NPDES permit program requires creation of a site-specific Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must detail temporary and permanent erosion prevention and sediment control BMPs that would be utilized during construction. The NPDES permit also requires permanent treatment of stormwater runoff on sites where construction activity results in a net increase of more than one acre of impervious surface area. The NPDES permit requires treatment for the water quality volume, which is equivalent to one-inch of runoff from the new impervious surface created by the project. The primary treatment mechanism preferred by the NPDES permit is infiltration, but other BMPs are allowed when site conditions are not conducive for infiltration.

## *2.1.2 Impaired Waters and TMDLs*

Section 303(d) of the Clean Water Act (CWA) requires states to assess all waters to determine if they meet water quality standards and to conduct total maximum daily load (TMDL) studies in order to set pollutant reduction goals. Project areas that outlet within one mile of MPCA-designated impaired or special waters must incorporate additional BMPs, including stricter stormwater treatment requirements. There are 10 impaired waters identified within one-mile of the project area, of which five would receive runoff from the project area. Impaired receiving waters within one mile of the project area are shown on **Figures 1 through 12** in Appendix A and include, from south to north:

| Impaired Receiving Water | Impairments | TMDL Status |
|---|---|---|
| Mississippi River | Mercury In Fish Tissue; Fecal Coliform; PCB In Fish Tissue | Upper Mississippi River Bacteria TMDL and Protection Plan (2014) |
| Bassett Creek | Chloride; Fecal Coliform; Fishes Bioassessments | Included in the above TMDL plan |
| Crystal Lake | Nutrient/Eutrophication Biological Indicators | Crystal Lake Nutrient TMDL Implementation Plan (2009) |
| Twin Lakes: Lower, Middle, and Upper | Mercury in Fish Tissue; Nutrient/ Eutrophication Biological Indicators; PCB in Fish Tissue; PFOS in Fish Tissue | Twin and Ryan Lakes Nutrient TMDL (2007); Plans are required for mercury, PCB and PFOS |
| Shingle Creek | Aquatic Macroinvertebrate Bioassessments; Chloride; Oxygen, Dissolved | Shingle and Bass Creeks Biota and Dissolved Oxygen TMDL Implementation Plan (2012)<br>Shingle Creek Chloride TMDL Implementation Plan (2007) |

The TMDL plans identify BMPs appropriate to addressing the impairments. BMPs for nutrient impairments may include increasing infiltration and filtration through the use of rain gardens, native plantings, and reforestation, and retrofitting existing detention ponds as ways to implement the TMDL plan. BMPs for dissolved oxygen impairments may include improving aeration and reducing nutrients. The chloride TMDL calls for a reduction in the use of sodium chloride for ice control in the watershed.

## 2.2 Watershed Agencies

### *2.2.1 Mississippi Watershed Management Organization*

The MWMO manages waters within its boundaries through its Watershed Management Plan that was amended in 2011. This plan complies with the water resource protection requirements under Minnesota Statutes 103A through 103G in conformance with Minnesota Rules Chapters 8410 and 8420. The communities within the boundaries include parts of Lauderdale, Minneapolis, St. Anthony, and St. Paul, as well as property owned by the Minneapolis Park and Recreation Board (MPRB).

The MWMO does not issue permits or provide approval letters for construction projects, but works with the member communities to ensure the implementation of its standards. The MWMO requires its member cities to develop stormwater management ordinances that reduce runoff and promote increased stormwater management for construction and redevelopment projects. The following provides a summary of the design requirements for rate control, water quality, and water quantity.

#### 2.2.1.1 Rate Control Requirements

Runoff rates for the proposed activity shall match pre-development rates for the 2-year, 10-year, and 100-year storm events. Discharge rates may be restricted to less than pre-development rates when the capacity of the downstream conveyance system is limited.

#### 2.2.1.2 Water Quality Requirements

Projects shall achieve a removal of 90% total suspended solids (TSS) from the 95$^{th}$ percentile daily rainfall total (1.17 inches over 24 hours) over the entire project area. The MWMO has an alternative compliance process for

sites that are not able to meet the MWMO's water quality standard for TSS. This is described in more detail in the MWMO Standards document.

#### 2.2.1.3 Volume Control Requirements

The MWMO does not currently have a volume control standard. The MWMO has indicated a desire to add such a standard in the future. The stormwater management standards should be reviewed during final design.

### *2.2.2 Bassett Creek Watershed Management Commission*

The BCWMC manages waters within its boundaries through its 2015 – 2025 Watershed Management Plan. This Plan complies with the water resource protection requirements under Minnesota Statutes 103A through 103G in conformance with Minnesota Rules Chapters 8410 and 8420. The BCWMC is governed by a Joint Powers Agreement that is held between the watershed organization and the member communities that are located within the boundaries of the WMO. The member municipalities include Crystal, Golden Valley, Medicine Lake, Minneapolis, Minnetonka, New Hope, Plymouth, Robbinsdale, and St. Louis Park.

The BCWMC reviews development and redevelopment project proposals once the project receives preliminary review by the municipality indicating general compliance with the existing local water management plan. All submittals involving floodplains, Bassett Creek trunk systems, water appropriations, variances, underground wet vaults or other alternative BMPs are presented at the BCWMC meetings. The BCWMC will review projects and developments to evaluate compliance with the MPCA's Minimal Impact Design Standards (MIDS) performance goals (which are adopted by the Commission as BCWMC water quality management standards) if the projects are located in member cities that have not adopted the MIDS performance goals, triggers, and flexible treatment options, or at the request of the member city. The BCWMC requires public agencies to comply with water quality management standards and policies presented in this Plan in order to maintain or improve water quality of stormwater runoff.

#### 2.2.2.1 Rate Control Requirements

For projects containing more than one acre of new or redeveloped impervious area, stormwater runoff must be managed such that peak flow rates leaving the site are equal to or less than the existing rate leaving the site for the 2-, 10-, and 100-year events based on Atlas 14 precipitation amounts and using a nested 24-hour rainfall distribution. Documentation of existing and proposed discharge rates for the 2-, 10-, and 100-year events must be provided for BCWMC review.

#### 2.2.2.2 Water Quality Requirements

The BCWMC requires all stormwater to be treated in accordance with MIDS performance goal for new development, redevelopment, and linear projects. If the MIDS performance goal is not feasible and/or is not allowed for a proposed project, then the project proposer must implement the MIDS flexible treatment options, as shown in the MIDS Design Sequence Flow Chart.

For linear projects, the MIDS performance goal is retention of whichever is greater:

- 0.55 inches from new or fully reconstructed impervious areas
- 1.1 inches from the net increase in impervious areas

#### 2.2.2.3 Volume Control Requirements

The BCWMC's volume control requirement is the same as the water quality requirements, which is summarized in the preceding paragraph.

### 2.2.3 Shingle Creek and West Mississippi Watershed Management Commissions

The SCWMC and WMWMC are two separate WMOs; however, they plan and conduct business jointly, managing waters within its boundaries. Each is governed by a Joint Powers Agreement that is held between the watershed organization and the communities/members that are located within the boundaries of the WMOs. The communities within the boundaries include parts of Brooklyn Center, Brooklyn Park, Crystal, Maple Grove, Minneapolis, New Hope, Osseo, Plymouth, Robbinsdale, and Champlin.

The SCWM WMC manages waters through its Third Generation Watershed Management Plan, which was adopted in 2013. This Plan complies with the water resource protection requirements under Minnesota Statutes 103A through 103G in conformance with Minnesota Rules Chapters 8410 and 8420.

The SCWM WMC requires project reviews for non-single family detached projects that are 0.5 acres in size or larger and linear projects that create one or more acres of new impervious surface, as well as other types of projects described in the rules. The rules and standards of the SCWM WMC must be met for the *net new impervious surface*.

The SCWM WMC requires a project's Stormwater Management Plan to be consistent with all applicable management rules and standards. Specific BMPs that are identified include detention and infiltration systems. Each new or revised crossing of Shingle Creek is required to retain adequate hydraulic capacity with no adverse impact to conveyance of the 100-year flow. The following provides a summary of the design requirements for rate control, water quality, and water quantity.

#### 2.2.3.1 Rate Control Requirements

Runoff rates for the proposed activity shall not exceed existing runoff rates for the 2-year, 10-year, and 100-year critical storm events for the project location as set forth in the NOAA Atlas 14 Volume 8, published in June 2013, or its successor, using the online NOAA Precipitation Frequency Data Server or a similar source. The applicant must document the location and event depths used. If an approved local water management plan requires more restrictive rate control, then the more restrictive rate shall govern. Runoff rates may be restricted to less than the existing rates when necessary for the public health and general welfare of the watershed. Member cities and project review applicants shall not exceed discharge rates at City boundaries as determined in the Commission's hydrologic model. Regional detention basins shall be utilized to manage peak discharge rates and meet water quality objectives when feasible.

#### 2.2.3.2 Water Quality Requirements

Stormwater must be treated prior to discharge to remove 60 percent of phosphorus and 85 percent of TSS. Treatment may be provided by one or more permanent sedimentation and water quality ponds, infiltration practices, or a combination of BMPs that together will meet removal requirements.

If permanent sedimentation and water quality ponds are used they shall be designed to the Wet Pond Design Standards set forth in Appendix A of the SCWM WMC Rules and provide:

- Water quality features consistent with NURP criteria and best management practices.
- A permanent wet pool with dead storage of at least the runoff from a 2.5-inch storm event.

Runoff may be directed to a downstream facility within the same hydrologic subwatershed that has sufficient capacity to provide the required treatment. This means that no treatment may be required for an individual development provided there is a regional facility designed and constructed to accommodate the flow from this property.

The applicant may meet both the treatment requirement and the volume requirement by infiltrating all site runoff from a 1.3 inch rain event (see Water Quantity Requirements in the following sub-section).

#### 2.2.3.3 Volume Control Requirements

Volume control BMPs must be incorporated into the site design to minimize the creation of new impervious surface and reduce existing impervious surfaces, minimize the amount of directly connected impervious surface, preserve the infiltration capacity of the soil, and limit increases in runoff volume exiting the site to the extent feasible considering site-specific conditions. Stormwater runoff volume abstraction shall be provided onsite in the amount equivalent to one inch of runoff generated from new impervious surfaces for linear projects.

## 2.3 City of Minneapolis

The City of Minneapolis' Stormwater Management Ordinance (Chapter 54) establishes stormwater management requirements for land disturbing activities on sites greater than one acre including phased or connected actions, and for existing stormwater constructed devices.

### *2.3.1 Rate Control*

The City of Minneapolis requires that development should be planned in a manner that does not increase peak flows from the existing flow rates.

### *2.3.2 Water Quality*

Water quality BMPs must be designed to remove 70 percent TSS prior to stormwater discharge from the site.

### *2.3.3 Volume Control*

The City of Minneapolis's ordinance includes a requirement to maximize infiltration. The requirement is to the greatest possible degree (except in the case of stormwater hotspots), natural drainage ways and vegetated soil surfaces should be used to convey store, filter, and retain stormwater before discharging runoff into public waters or the public storm drain system. Opportunities for maximizing infiltration include minimizing the extent of impervious surfaces and directing runoff from impervious surfaces and roof gutter systems onto lawns or other pervious surfaces.

## 2.4 City of Golden Valley

The City of Golden Valley's Stormwater Ordinance (Section 4.31) establishes regulatory requirements for land development and land disturbing activities aimed at minimizing the threats to public health, safety, public and private property and natural resources within the community resulting from construction site erosion and post-construction stormwater runoff. The portion of the BLRT Extension project that is located in Golden Valley is located within the BCWMC. Projects located within the City are required to comply with the WMO's stormwater management requirements for rate control, water quality, and volume control. Please see the BCWMC section for more detailed information on these requirements.

## 2.5 City of Robbinsdale

The City of Robbinsdale is located within the BCWMC and SCWMC. Projects located within the City are required to comply with the WMOs' stormwater management requirements for rate control, water quality, and volume control. Please see the BCWMC and SCWMC sections for more detailed information on these requirements.

## 2.6 City of Crystal

The City of Crystal's Planning and Land Use Regulations (Chapter V of Crystal City Code) include stormwater management criteria for permanent facilities.

### 2.6.1 Rate Control

The City of Crystal requires that the existing 2-year, 10-year, and 100-year storm peak discharge rates shall not be increased with the proposed development, and that accelerated channel erosion will not occur as a result of the proposed land disturbing or development activity.

### 2.6.2 Water Quality

The City of Crystal requires that detention facilities should have a permanent pond surface area equal to two percent of the impervious area draining to the pond, or one percent of the entire area draining to the pond, whichever is greater. An alternative requirement is that the volume of the permanent pool shall be equal to or greater than the runoff from a 2.0-inch rainfall over the fully developed site. The sequencing of preferred treatment options is natural infiltration of precipitation on-site; flow attenuation by use of open vegetated swales and natural depressions; stormwater retention facilities; and stormwater detention facilities.

### 2.6.3 Volume Control

The City of Crystal does not currently have a volume control standard. The City's Local Surface Water Management Plan indicates that the City may update the City's ordinances to include a volume control standard in the future. The stormwater management standards should be reviewed during final design.

## 2.7 City of Brooklyn Park

With the exception of drainage to the Setzler Pond/Century Channel system, the City of Brooklyn Park has adopted the SCWM WMC requirements for stormwater management. Development of previously open space areas draining to the Setzler Pond/Century Channel system are required by the City to control their discharge rates to 0.1 cubic-foot per second for every acres of area. The City works with the SCWM WMC on the permit reviews to ensure the stormwater management requirements are met.

## 2.8 Minnesota B3 Guidelines

Beginning in January 2004, all new buildings that receive funding from the bond proceeds fund are required to meet sustainable building design guidelines. The BLRT Extension project will be required to meet Version 2.2 of the B3 Guidelines for park-and-ride buildings and the OMF. The guidelines include a variety of criteria ranging from energy use, indoor air quality, and stormwater management to lifecycle costs. The intent of the stormwater management guideline is to minimize the negative impacts of the project, both on and off site, by maintaining a more natural hydrologic cycle through infiltration, evapotranspiration, and reuse. The particular performance criteria are listed below, but the project must meet the rules and regulations of the local governmental units if those rules are more stringent.

### 2.8.1 Runoff Rate and Volume Requirements

The rate of runoff from the post-development site must be controlled to match the runoff rates for the native soil and vegetation conditions for the 2-year and 10-year, 24-hour design storms. The stormwater management plan must be designed to prohibit discharge from the site for 1.1 inches of runoff from all new or redeveloped impervious (non-vegetated) areas.

### 2.8.2 Water Quality Requirements

The stormwater management plan must be designed to remove 80% of the post-development TSS and 60% of the post-development total phosphorus (TP).

### *2.8.3 Operations and Maintenance Requirements*

The B3 Guidelines also requires that an operations and maintenance manual be created for all BMPs specifying the maintenance requirements and schedules for completion. Operations and maintenance manuals shall be recorded with the County Registrar.

# 3.0 Affected Environment

## 3.1 Existing Conditions

### *3.1.1 Segment M – Minneapolis*

The Minneapolis segment extends from Target Field Station along 6th Avenue N and TH 55 (Olson Memorial Highway) west to the bridge over the existing BNSF Railway corridor, where the project corridor turns north. Approximately 25 percent of the segment drains to East Channel Bassett Creek, 60 percent drains to the old Bassett Creek tunnel crossing at TH 55 (Olson Memorial Highway), and 15 percent drains to the old Bassett Creek tunnel north of the project corridor. The majority of this segment of the project has an urban drainage system with curb and gutter containing runoff and conveying it to catch basins and storm sewer, but the portion within the BNSF Railway corridor has ditches and culverts to convey stormwater.

The predominant water resource in this segment is Bassett Creek, which crosses TH 55 (Olson Memorial Highway) today approximately 750 feet west of the BNSF Railway corridor. (Prior to construction of TH 55 (Olson Memorial Highway) in the 1940s, the crossing was approximately ¼ mile to the east, referred to in this report as the East Channel Bassett Creek.) A second open channel crossing of what is now TH 55 (Olson Memorial Highway) was located near Dupont Avenue N until the early 1900s, when the channel was replaced by a tunnel system. This tunnel is now known as the old Bassett Creek tunnel. The channel and the tunnel frequently flooded. As part of a flood abatement project in the 1980s and 1990s, Bassett Creek was rerouted into a new tunnel system, called the new Bassett Creek tunnel. The new tunnel is farther south and does not cross the BLRT corridor. Although Bassett Creek no longer flows into the old Bassett Creek tunnel, the old tunnel remains active, carrying stormwater runoff from local drainage systems and overflow from the new Bassett Creek tunnel. Both the old and new Bassett Creek tunnels drain to the Mississippi River.

Local areas draining to the old and new Bassett Creek tunnels are within the Mississippi Watershed Management Organization. The portion of the project which drains to East Channel Bassett Creek is within the Bassett Creek Watershed Management Commission. The jurisdictional watershed divide in the TH 55 (Olson Memorial Highway) corridor is at Russell Avenue N.

The soils in the Minneapolis segment have been highly disturbed over the past century of development. They consist of variable urban fill, frequently overlying clay loams or organic, clayey muck that was deposited when Bassett Creek flowed through the area. Therefore, Hydrologic Soil Group (HSG) C soils, which have slow infiltration rates, were assumed for the purposes of this level of analysis based upon recent soil borings and information received from the Heritage Park reconstruction. Groundwater elevations are not known for most of the corridor but are expected to be relatively close to the ground surface near the old Bassett Creek tunnel and very close to the ground surface where wetlands are adjacent to the BNSF Railway embankment.

These areas are described in detail in the following sections. See Appendix A, **Figures 1 and 2** for a representation of the flow patterns and receiving waters.

#### 3.1.1.1 Drainage to Bassett Creek Tunnels, East of I-94 (Stations 2010+75 to 2021+80)

In this portion of the segment, runoff from 6th Avenue N and the BLRT Corridor between high points at 7th Street and the I-94 bridge is captured in storm sewer and leaves the corridor, flowing north in the East Lyndale Avenue right-of-way. The storm sewer drains to a tunnel owned by MnDOT near 3rd Street N and 12th Avenue N. The MnDOT tunnel crosses the old Bassett Creek tunnel and connects to the new Bassett Creek tunnel roughly 0.5 mile to the east.

Runoff east of 7th Street N enters another existing storm sewer system that runs north through the Heyward Garage parcel. This storm sewer eventually discharges to the old Bassett Creek tunnel.

This area is industrial with some existing grassed boulevard areas, and a small amount of offsite runoff enters the storm sewer system in Olson Memorial Highway. There are no existing stormwater BMPs in this area, other than those recently constructed as part of the Target Field Station stormwater management plan.

#### 3.1.1.2 Drainage to Old Bassett Creek Tunnel, West of I-94 (Stations 2021+80 to 2075+60)

Runoff from the project corridor reaches the tunnel from two storm sewer systems in this portion of the segment. Just to the west of I-94, runoff enters a small storm sewer system that connects to the old Bassett Creek tunnel under TH 55 (Olson Memorial Highway) between Bryant Avenue N and Dupont Avenue N. Some offsite runoff from the south is collected in this storm sewer system. This area consists of both industrial businesses and multi-family homes. The median boulevard is paved for half of this area and is covered by turf grass for the rest.

A large storm sewer system starting at CSAH 2 (Penn Avenue N) runs east along TH 55 (Olson Memorial Highway) and also connects to the old Bassett Creek tunnel under TH 55 (Olson Memorial Highway) near Dupont Avenue N. This storm sewer trunk line serves a large residential area to the north of TH 55 (Olson Memorial Highway) from CSAH 2 (Penn Avenue N) to approximately James Avenue N. The trunk storm sewer also collects runoff from small offsite areas to the south of TH 55 (Olson Memorial Highway) between James Avenue N and Dupont Avenue N. This portion of the segment also features a grassed boulevard and a wide, grassed median with incrementally placed trees. Roadway runoff is not treated before entering the old Bassett Creek tunnel and eventually discharging to the Mississippi River.

#### 3.1.1.3 Drainage to Old Bassett Creek Tunnel, Heritage Park South Treatment System (Stations 2075+60 to 2081+95)

Storm sewer on TH 55 (Olson Memorial Highway) from Russell Avenue N to Queen Avenue N collects runoff from the residential area north of TH 55 (Olson Memorial Highway) and roadway runoff at this location. The system drains south and then east, collecting runoff from residential neighborhoods south of TH 55 (Olson Memorial Highway). It eventually reaches the south treatment system in Heritage Park, a series of water quality BMPs constructed with the Heritage Park redevelopment project, located south of TH 55 (Olson Memorial Highway) along Van White Memorial Boulevard. Runoff is first routed through a sediment forebay and then through a filtration basin, before entering a large wet detention pond. The pond outlet drains to the old Bassett Creek tunnel, which eventually discharges into the Mississippi River.

#### 3.1.1.4 Drainage to East Channel Bassett Creek, Russell Avenue N to TH 55 (Olson Memorial Highway) /BNSF Crossing

This portion of the segment has a storm sewer system that collects roadway runoff which discharges directly into East Channel Bassett Creek, south of TH 55 (Olson Memorial Highway). East Channel Bassett Creek diverts from the main channel just west of the existing BNSF Railway corridor and north of TH 55 (Olson Memorial Highway). The east channel crosses under the BNSF Railway corridor through three existing culverts located north of TH 55 (Olson Memorial Highway). Two large urban residential storm sewer systems discharge to the creek at this location before

the channel crosses the highway via a culvert. There is currently no treatment for this runoff prior to discharging into the East Channel Bassett Creek. East Channel Bassett Creek flows south and then east, making its way to the new Bassett Creek tunnel, which discharges into the Mississippi River.

The City of Minneapolis has discussed drainage concerns with the portion of the East Channel Bassett Creek between the BNSF Railway corridor and the TH 55 (Olson Memorial Highway) crossing. They indicated that the culvert under the highway may not have adequate capacity, may be undersized, or may be partially plugged with sediment.

#### 3.1.1.5 Drainage to East Channel Bassett Creek and Bassett Creek, TH 55 (Olson Memorial Highway) to Oak Park Avenue (Stations 2095+00 to 2109+25)

See the Segment GV section for a general overview of the BLRT Corridor in Theodore Wirth Regional Park (TWRP). See the Floodplain and Wetland Technical Memoranda for additional information on this area.

West of Vincent Avenue, the project turns north along the BNSF Railway and Canadian Pacific Railway corridors. Segment M ends at Oak Park Avenue. Runoff from the corridor and residential areas to the east is picked up by ditches along the railroads, but it does not always appear to drain to the creek due to flat grades, poor soils, high groundwater, and buried or missing culverts. Generally, the ditches flow south and discharge to East Channel Bassett Creek except for the northernmost portion which discharges to Bassett Creek.

### *3.1.2 Segment GV – Golden Valley*

The Golden Valley segment extends along the existing BNSF Railway corridor from Oak Park Avenue north to 26th Avenue N. The entire segment ultimately drains to Bassett Creek, but a portion drains first to the wetlands north of Golden Valley Road or to smaller wetlands adjacent to the creek. The entire segment is within the BCWMC boundaries.

The BNSF Railway corridor has a typical railroad section, with an embankment constructed of ballast rock and ditches or water bodies on either side. Outside of the BNSF Railway right-of-way, the corridor is surrounded by residential areas to the east and two parks, TWRP and Mary Hills Nature Area, to the west. Drainage from eastern residential areas drains into the ditches in the BNSF Railway corridor right-of-way and through culverts into the parks.

There are a number of areas along the BNSF Railway corridor where depressions in the ditches are not fully drained due to flat grades, poor soils, high groundwater, and buried or missing culverts. These areas have been delineated as wetlands. There are additional areas where ditches are very small or nonexistent and water appears to drain over the railroad embankment or through the ballast rock.

Like much of the Bassett Creek watershed, the soils in the Golden Valley segment are typically in HSG C or D, and groundwater is high in many places along the corridor where wetlands are present. The portion of the BLRT Corridor between Plymouth Avenue and 26th Avenue is in a Drinking Water Supply Management Area (DWSMA) with high vulnerability.

The segment is described in more detail in the following sections. See Appendix A, **Figures 2 and 3** for a representation of the flow patterns and receiving waters.

#### 3.1.2.1 Drainage to Bassett Creek, Oak Park Avenue to Plymouth Avenue (Stations 2109+25 to 2122+55)

Drainage from residential areas to the east of the corridor collects in the eastern BNSF Railway corridor ditch and discharges to wetlands in TWRP and to Bassett Creek. The existing ditch provides a small amount of water quality treatment by slowing down runoff and allowing for some settlement of larger sediments and some degree of rate

attenuation due to the storage volume in the ditch. There is no ditch on the west side of the tracks, and runoff from the BNSF Railway corridor that drains directly to the west is untreated before it flows to Bassett Creek in the park.

Bassett Creek has undergone a recent streambank stabilization and habitat restoration project from Golden Valley Road to Irving Avenue, which extends south beyond the BLRT Extension project limits.

#### 3.1.2.2 Drainage to Bassett Creek, Plymouth Avenue to Theodore Wirth Parkway (Stations 2122+55 to 2154+00)

Upstream of Plymouth Avenue and just south of 14th Avenue N, a large storm sewer system discharges to Bassett Creek. Approximately 680 acres of Minneapolis storm sewer drains through two large hydrodynamic separators located southwest of the intersection of Xerxes Avenue and 14th Avenue N. See Drainage Design Approach below for a description of BMPs such as these. The storm sewer passes under the BNSF Railway corridor and directly into Bassett Creek.

Additional residential areas east of the BNSF Railway corridor drain to the eastern railroad ditch before discharging through culverts to wetlands in TWRP and to Bassett Creek. North of 14th Avenue N, runoff discharges to a wide channelized wetland before entering Bassett Creek. The existing ditch provides a small amount of water quality treatment by slowing down runoff and allowing for some settlement of larger sediments and some degree of rate attenuation due to the storage volume in the ditch. There is no ditch on the west side between the tracks and the wetland, and runoff from the BNSF Railway corridor that drains west is untreated before it enters the wetland.

The City of Golden Valley and the BCWMC propose to construct a stormwater treatment BMP between the project corridor and Theodore Wirth Parkway at approximate northbound station 2142+00. The project will treat 115 acres of residential drainage. Both entities have included the project in their capital improvement plans for construction in 2018 to 2019. The exact location, size, and type of the BMP are not known at this time.

#### 3.1.2.3 Drainage to Bassett Creek, Golden Valley Road Wetlands (Stations 2154+00 to 2165+50)

The wetlands just north of Golden Valley Road on either side of the BNSF Railway corridor cover an area that was historically one wetland that was divided into two when the BNSF Railway corridor was built. An east-west bisection was created in the 1930s, when a 48-inch watermain was installed, and a berm constructed over it. This berm has partially collapsed between the southeast and the northeast basins, allowing the eastern basins to function as one pond. The western basins are equalized through a submerged culvert under that portion of the berm.

The eastern basin drains to the western through a culvert under the BNSF Railway. The western basins drain to Bassett Creek via a surface overflow and small channel through Mary Hills Nature Area. According to field survey data, the basins on either side of the railroad embankment act independently, and the normal water level of the eastern basin is roughly two feet higher than that of the western basins. Initial modeling shows that the eastern wetland overtops the BNSF Railway in the 50-year storm event and that the 100-year high water level of the eastern basin is approximately five higher than that of the western basins. City of Golden Valley staff has expressed concern that any changes in the storage available in these basins could affect the 100-year flow rates and floodplain elevations of Bassett Creek. There are several homes adjacent to the creek in this area that have little to no freeboard above the 100-year flood elevation and that could be impacted by even small changes in the function of the basins.

Rainfall landing on the railroad embankment drains directly into the wetlands on either side. In addition to drainage to the ponds from the railroad corridor, approximately 100 acres of residential area to the east drain to the ponds through storm sewer.

#### 3.1.2.4 Drainage to Bassett Creek, Station 2166+00 to 2185+00 at 26th Avenue N

Existing storm sewer carries residential drainage from Byrd Ave N and Kewanee Way to storm sewer that discharges to an undrained depression on the east side of the existing BNSF Railway corridor. It is not clear how water moves from the east depression to the west side of the railroad. There are two additional depressions on the west side of the railroad that also appear to be landlocked. Water that overtops the western depressions flows though the Mary Hills Nature Area, over an existing trail, through a wetland, and into Bassett Creek. It is possible that the east and west depressions were once connected by a culvert under the railroad, but there was no evidence of a culvert during field surveys for the BLRT project.

### *3.1.3 Segment R – Robbinsdale*

The Robbinsdale segment extends from 26th Avenue N to 47th Avenue N along the existing BNSF Railway corridor. The area surrounding the corridor primarily consists of residential neighborhoods, with the southernmost portion of the segment running through Sochacki Park. Additionally, the corridor passes just to the east of two smaller parks, Lee Park and Triangle park, and just to the west of downtown Robbinsdale. The northernmost portion of the segment corridor, after crossing over TH 100, runs parallel to CSAH 8 (West Broadway Avenue), before making its way into Crystal.

Much of the existing offsite drainage flowing towards the BNSF Railway corridor is either collected in storm sewer systems before reaching the corridor or flows into the many wetlands along the corridor. However, in some cases, there are existing culverts and short runs of storm sewer that discharge into the ditches along the railroad. The corridor itself generally drains to ditches and flat grassed areas along the track or to the existing wetlands. This segment falls within the BCWMC south of 36th Avenue N and within the SCWMC north of 36th Avenue N. Stormwater runoff in BCWMC drains to Grimes, North Rice, and South Rice Ponds upstream of Bassett Creek. The stormwater in SCWMC primarily drains to Crystal Lake and Middle and Lower Twin Lakes which are nutrient-impaired lakes and have TMDL implementation plans. Approximately 34 percent of the corridor drainage ultimately flows to Bassett Creek (via Grimes, North Rice, and South Rice Ponds), 51 percent to Crystal Lake, and 15 percent to Twin Lakes.

Like much of the Bassett Creek watershed, the soils in the portion of the segment south of 36th Avenue N are typically HSG C or D, with slow to very slow infiltration rates. Between 36th Avenue N and TH 100, the soils consist of HSG B soils, with moderate infiltration rates, while the soils north of TH 100 are typically HSG A soils having high infiltration rates. The groundwater table is high in many places within the trench portion of the corridor, as indicated by the presence of many wetlands adjacent to the BNSF Railway embankment. Groundwater elevations elsewhere in the segment are not known.

The segment is described in more detail in the following sections. See Appendix A, **Figures 4 through 6** for a representation of the flow patterns and receiving waters.

#### 3.1.3.1 Drainage to South Rice Pond, Existing Stormwater Pond in Sochacki Park (Stations 2185+00 to 2196+80)

South of 27th Avenue N, the corridor drains to adjacent wetlands that drain under the corridor and eventually to South Rice Pond via culverts. The City of Robbinsdale recently constructed a wet detention pond in Sochacki Park that receives stormwater from a storm sewer system draining the residential area east of the project corridor. The existing pond receives runoff from the project corridor in the existing condition. The pond ultimately discharges to South Rice Pond.

#### 3.1.3.2 Drainage to Grimes and North Rice Ponds (Stations 2196+80 to 2252+35)

While the jurisdictional watershed divide between BCWMC and SCWMC is at 36th Avenue N and neighboring residential drainage is split here, the portion of the corridor starting at Lee Park drains south under the bridge at 36th Avenue N. Lee Park and an adjacent retirement home drain to a low lying area in Lee Park that eventually discharges to the corridor. This portion of the corridor is very flat and contains primarily HSG B soils, so it is likely that much of the corridor water infiltrates. The portion of stormwater runoff that does not infiltrate eventually discharges to Grimes and North Rice Ponds.

South of 36th Avenue N there are wetlands running along both the east and west sides of the corridor. These receive both corridor water and discharge from several storm sewer systems and only appear to have natural overflows that eventually discharge to Grimes and North Rice Ponds.

From 33rd Avenue N to just north of 27th Avenue N, the corridor drains to Grimes Pond on the east and North Rice Pond on the west through various wetlands. There is also residential runoff draining to both of these ponds, which are separated by the existing BNSF Railway embankment and connected by a 48"culvert on the south end of the ponds. Grimes and North Rice ponds discharge to South Rice Pond, which ultimately discharges to Bassett Creek.

#### 3.1.3.3 Drainage to Crystal Lake (Stations 2251+00 to 2298+00)

The northern portion of Robbinsdale is in the SCWMC and drains to Crystal Lake and Middle and Lower Twin Lakes. In this portion of the corridor, instead of wetlands and ditches, the BNSF Railway corridor is adjacent to residential and commercial properties. The area south of TH 100 is characterized by HSG B soils. From north of Lee Park to 42nd Avenue N, corridor water that does not infiltrate and residential area runoff is picked up by storm sewer and drains to Crystal Lake. There are two storm sewer systems in this area that outlet directly to the lake.

#### 3.1.3.4 Drainage to Middle Twin Lake (Station 2298+00 to 2329+00)

North of 42nd Avenue N, the adjacent storm sewer systems would likely only receive corridor runoff in large events. North of TH 100 the HSG A soils and the flat grassed edges of the corridor also likely infiltrate some runoff from the ballast. These storm sewer systems drain to a series of ponds near TH 100 before discharging to Lower and Middle Twin Lakes, which eventually drain to Shingle Creek. Middle Twin Lake receives the corridor and offsite water from north of TH 100 while Lower Twin Lake receives primarily residential water from between TH 100 and 42nd Avenue N.

### *3.1.4 Segment C – Crystal*

The Crystal segment extends from 47th Avenue N to 62nd Avenue N. The proposed project continues in the BNSF Railway corridor, which is along the west side of CSAH 8 (West Broadway Avenue) in the south and transitions to run along the west side of CSAH 81 (Bottineau Boulevard) in the north. The area around the project limits is fully developed with a mixture of ¼-acre residential lots, townhomes, commercial, and industrial uses. There are several parks in the area adjacent to the project. The Crystal Airport is also near the project corridor in the north portion of the segment. Approximately 66 percent of the project area drains to the Upper and Middle Twin Lakes and 34 percent drains to the Crystal Airport infiltration area.

Web soil survey information for this segment categorizes the existing soils as predominantly "urban land". Soil borings for the area show fine-grained sand, occasionally with a layer of loamy sand and/or sandy loam above it. These would be typical of HSG A and B soils, with high to moderate infiltration capacity. The project falls within a wellhead protection area south of the Canadian Pacific Railway corridor but is not within an emergency response area. Groundwater elevations for this segment are not known at this time.

**Figures 6 and 7** in Appendix A show the existing flow patterns and receiving waters. The sections below provide more detail regarding the drainage within this segment.

#### 3.1.4.1 Drainage to Twin Lakes, BNSF Railway Corridor South of CSAH 10 (Bass Lake Road) (Station 2520+80 to 2380+90)

In the southern portion of the Crystal segment, the BNSF Railway corridor transitions from running along the west side of CSAH 8 (West Broadway Avenue) to the west side of CSAH 81 (Bottineau Boulevard). During this transition, the corridor runs through a commercial and industrial area and is not adjacent to a roadway. Due to the presence of sandy soil, most of the runoff infiltrates along the railroad corridor and there appears to be no catch basins or culverts to collect or direct runoff. Any runoff that does not infiltrate may flow into adjacent parking lots and enter catch basins, which ultimately discharge into Upper or Middle Twin Lake.

There are storm trunk lines which pass under the railroad corridor where it crosses Corvallis Avenue and to the west of the intersection of Wilshire Boulevard and CSAH 81 (Bottineau Boulevard). There is also a pair of culverts running underneath the track from the wetland southeast of the Canadian Pacific Railway crossing that connects to storm sewer lines that flow to an existing pond in the southwest quadrant of the intersection of CSAH 8 (West Broadway Avenue) with the Canadian Pacific Railway corridor.

#### 3.1.4.2 Drainage to Twin Lakes, Bass Lake Road Park-and-Ride (Station 2371+25 and 2379+30)

The area proposed for a future park-and-ride between the BNSF Railway corridor and CSAH 81 (Bottineau Boulevard), immediately south of CSAH 10 (Bass Lake Road), is a petroleum brownfield with a high risk of groundwater contamination. The area is mostly open, grassy space, but other land uses include a small commercial property with a surface parking lot, walking path, and a cul-de-sac for vehicle access to a cellular tower. There is a catch basin located in the area that connects to the CSAH 10 (Bass Lake Road) trunk line which discharges into Upper Twin Lake without further treatment.

Another concern in the area is that, as noted in the Water Resources Preliminary Design Report (July 2004) prepared for the CSAH 81 reconstruction project, the existing CSAH 10 (Bass Lake Road) trunk storm sewer is known to have capacity issues and has an emergency relief system in place.

#### 3.1.4.3 Drainage to Crystal Airport Infiltration Area (Station 2380+90 to 2418+75)

North of the intersection with CSAH 10 (Bass Lake Road), the BNSF Railway corridor continues along the west side of CSAH 81 (Bottineau Boulevard) throughout the remainder of the segment. Runoff in this section collects in ditches on either side of the track. Any runoff that does not infiltrate flows to a low point on the west side of CSAH 81 (Bottineau Boulevard) across from the Crystal Airport. At the low point, two culverts drain water from the west side of the tracks, and another culvert passes underneath CSAH 81 (Bottineau Boulevard) to drain the ditches, along with stormwater from a section of CSAH 81 (Bottineau Boulevard), into an infiltration area located on the Crystal Airport property. The outfall from the infiltration area is a series of ditches and culverts within the airport property to a large wetland complex and ultimately to Twin Creek and Upper Twin Lake.

The Metropolitan Airport Commission will not allow an increase in rate or volume being discharged to the existing infiltration area without permission, and the FAA will not allow surface ponds close to airports as they may attract birds which can interfere with airplane safety.

### *3.1.5 Segment BP2 – Brooklyn Park 2*

The BP2 segment is in the portion of the project located in southern Brooklyn Park and extends from 62nd Avenue N to just south of Candlewood Drive N. The project corridor consists of the BNSF Railway corridor immediately adjacent to CSAH 81 (Bottineau Boulevard) from 62nd Avenue N to 73rd Avenue N, where the BLRT Extension

project will leave the BNSF Railway corridor, and the CSAH 103 (West Broadway Avenue) corridor from 73rd Avenue N to the northerly segment boundary. The reconstruction of CSAH 103 (West Broadway Avenue), including the addition of turn lanes, trails, and boulevards, and a portion of CSAH 152 (Brooklyn Boulevard) is included in this segment. The main receiving waters in this segment are Twin Creek, which flows into Upper Twin Lake and collects runoff from the portion of the segment south of I-94; and Shingle Creek, which collects runoff from the remainder of the segment. Approximately 22 percent of the project area drains to Twin Creek and 78 percent drains to Shingle Creek.

The soils in this segment of the BLRT Project corridor have been categorized as predominantly HSG B soils south of 75th Avenue N and predominantly HSG A soils north of 75th Avenue N. These soils have moderate to high infiltration capacity. Much of this segment falls within a wellhead protection area but is outside the emergency response area. Groundwater elevations are unknown at this time, except immediately adjacent to wetlands that are an expression of the surficial groundwater table.

**Figures 7 through 9** in Appendix A show the existing flow patterns and receiving waters. The sections below provide more detail regarding the drainage within this segment.

#### 3.1.5.1 Drainage to Twin Creek, 62nd Avenue Wetland (Stations 2418+75 to 2436+30)

The existing BNSF Railway corridor runs adjacent to a stormwater wetland located in the northwest quadrant of 62nd Avenue N and CSAH 81 (Bottineau Boulevard). Runoff that collects in ditches on the west side of the railroad corridor between 62nd Avenue N and 63rd Avenue N, and does not infiltrate, flows into the wetland. The ditch on the east side of the railroad corridor has a different drainage pattern which is explained below. The wetland currently receives runoff from a watershed of approximately 625 acres. Roughly 250 acres of that, consisting largely of ¼-acre residential lots located west of CSAH 81 (Bottineau Boulevard) and south of I-94, is routed directly to the wetland. The pond outlet is in the southeast corner. From there, the outlet pipe crosses under CSAH 81 (Bottineau Boulevard), runs along the property line directly east, and discharges to a wetland in Southbrook Park east of industrial properties. It eventually discharges to Twin Creek, where it crosses 63rd Avenue N.

In 2003, the City of Brooklyn Park re-graded the wetland and improved the outlet structures to reduce flooding in the City of Crystal and provide additional water quality benefits. The wetland system allows suspended sediments to settle out and also provides filtering through a buffer of wetland vegetation. According to hydraulic modeling performed by the City of Brooklyn Park, the high water level of the wetland is roughly 8.2 feet higher than the normal water elevation.

#### 3.1.5.2 Drainage to Twin Creek, CSAH 81 (Bottineau Boulevard) (Stations 2436+30 to 2468+00)

As mentioned above, the BLRT project runs along the existing BNSF Railway corridor adjacent to CSAH 81 (Bottineau Boulevard) until the crossing at 73rd Avenue N. South of Dutton Avenue N, CSAH 81 (Bottineau Boulevard) has an urban drainage section with a trunk storm sewer that routes roadway runoff away from the ditch between the BNSF Railway corridor and CSAH 81 (Bottineau Boulevard). North of Dutton Avenue N, CSAH 81 (Bottineau Boulevard) currently has a rural drainage section.

The ditch on the east side of the existing BNSF Railway embankment collects runoff from about 700 feet south of the Brooklyn Park/Crystal border to 63rd Avenue N. The ditch flows to a low point across from the 62nd Avenue N wetland where a culvert drains into the CSAH 81 (Bottineau Boulevard) storm sewer. The east ditch between 63rd Avenue N and the I-94 interchange, which receives runoff from northbound CSAH 81 (Bottineau Boulevard) in the rural section north of Dutton Avenue N, also drains into the CSAH 81 (Bottineau Boulevard) storm sewer system through an inlet north of 63rd Avenue N. Both of these systems discharge to Twin Creek east of CSAH 81 (Bottineau Boulevard), near the intersection of 63rd Avenue N and Florida Avenue.

Runoff from southbound CSAH 81 (Bottineau Boulevard) flows into the ditch on the east side of the BNSF Railway corridor, where most of it infiltrates due to the presence of sandy soils. Any runoff not infiltrated flows to Twin Creek for the portion of the corridor south of I-94. In addition to the volume reduction from infiltration, the ditches also provide a degree of water quality treatment (due to vegetative filtering and plant uptake) and rate attenuation (due to the storage volume available). Hennepin County plans to reconstruct CSAH 81 (Bottineau Boulevard) in the near future. It is likely that the new roadway will utilize the same fully urban drainage section as for the portions of CSAH 81 (Bottineau Boulevard) reconstructed in Robbinsdale and Crystal. Further coordination with Hennepin County will be needed to understand the future drainage conditions.

#### 3.1.5.3 Drainage to Shingle Creek, Stations 2468+00 to 2540+50 at CSAH 152 (Brooklyn Boulevard)

The project corridor continues along the west side of CSAH 81 until 73rd Avenue N, where it transitions to the CSAH 103 (West Broadway Avenue) corridor. South of station 2481+00, the characteristic of project corridor is consistent with the BNSF Railway corridor to the south. The portion of this segment between stations 2468+00 and 2481+00 drains into the ditches on either side of the BNSF Railway corridor. The ditches drain through the I-94 corridor and ultimately discharge to Shingle Creek to the east of the BLRT Corridor. Between station 2481+00 and the crossover to CSAH 103 (West Broadway Avenue), runoff from the project corridor drains to Shingle Creek to the west of the BLRT Corridor.

As the BLRT Corridor transitions to the CSAH 103 (West Broadway Avenue) alignment, it passes through commercial areas with a high percentage of impervious cover. There is minimal existing storm sewer in the area between CSAH 81 (Bottineau Boulevard) and CSAH 103 (West Broadway Avenue). Runoff flows to the surrounding vegetated areas and is infiltrated, collected by storm sewer in Jolly Lane, or flows into the roadside ditches along Lakeland Avenue. The storm sewer and ditches drain to a narrow pond on the east side of the BNSF Railway track adjacent to DNR Wetland #563W to the west of the project corridor, which ultimately drains to Shingle Creek.

CSAH 103 (West Broadway Avenue) has curb and gutter to channel stormwater into catch basins and storm sewer. There is a trunk storm sewer running to the north along CSAH 103 (West Broadway Avenue) from 73rd Avenue N to CSAH 152 (Brooklyn Boulevard). This trunk line connects to a larger trunk line running to the east along CSAH 152 (Brooklyn Boulevard) that discharges without treatment into Shingle Creek approximately 0.75 miles from the project corridor. In addition to the roadway runoff, the CSAH 103 (West Broadway Avenue) trunk storm sewer collects the outflow from stormwater BMPs in the Cub Foods/Target parking lot to the west.

#### 3.1.5.4 Drainage to Shingle Creek, North of CSAH 152 (Brooklyn Boulevard) (Stations 2540+50 to 2552+65)

North of CSAH 152 (Brooklyn Boulevard), CSAH 103 (West Broadway Avenue) has curb and gutter with catch basins to collect the stormwater. A trunk storm sewer runs from just north of CSAH 152 (Brooklyn Boulevard) to just north of 78th Avenue N where it turns east and collects stormwater from the residential area north of CSAH 152 (Brooklyn Boulevard) and west of Idaho Avenue N. This area discharges into Shingle Creek where it intersects with Candlewood Drive. In addition, the trunk storm sewer collects runoff from a portion of the residential area around the 78th Court N cul-de-sac and the shopping area, including outflow from stormwater BMPs, to the northeast of the CSAH 103 (West Broadway Avenue) and CSAH 152 (Brooklyn Boulevard) intersection.

### *3.1.6 Segment BP1 – Brooklyn Park 1*

This segment extends from the Shingle Creek Crossing at CSAH 152 (West Broadway Avenue) just south of Candlewood Drive north to Oak Grove Parkway/101st Avenue N, where the OMF will be located approximately one-half mile northwest of the Target North Campus. Drainage from the Shingle Creek crossing north to CSAH 109 (85th Avenue N) is within the SCWMC jurisdiction and drains to Shingle Creek. Drainage north of CSAH 109 (85th Avenue N) is within the WMWMC jurisdiction and is tributary to the Mississippi River via Century Channel and other

drainageways. These areas are described in more detail in the following sections. Approximately 20 percent of the project drains to Shingle Creek, 35 percent to Century Channel, and 45 percent to the Mississippi River.

The soils in this segment of the BLRT Project corridor has been categorized as HSG A and B soils, with high to moderate infiltration capacity. Much of this segment falls within a wellhead protection area, but only the portion between CSAH 109 (85th Avenue N) and Maplebrook Parkway N is within or near the emergency response area, which would be considered a highly vulnerable portion of the Brooklyn Park Central DWSMA.

See **Figures 9 through 12** in Appendix A for a representation of the existing flow patterns and receiving waters for this segment.

#### 3.1.6.1 Drainage to Shingle Creek, Shingle Creek Crossing to Maplebrook Parkway N (Station 2552+65 to 2604+20)

The portion of CSAH 103 (West Broadway Avenue from Shingle Creek to roughly Maplebrook Parkway N consists of both rural and urban drainage systems. Inlets in the roadside ditches and catch basins in the street route the runoff into an existing trunk storm sewer under CSAH 103 (West Broadway Avenue). In addition to the road runoff, the trunk storm sewer serves large offsite areas consisting of single- and multi-family homes, the North Hennepin Community College (NHCC), and parks before discharging to Shingle Creek downstream of the crossing at CSAH 103 (West Broadway Avenue). Runoff from the rural roadway section receives some amount of water quality treatment through vegetative filtering and rate attenuation when flowing through ditches. However, much of the roadway runoff receives no treatment.

#### 3.1.6.2 Drainage to Century Channel, Setzler Pond and the DNR Wetlands (#559W) (Station 2604+20 to 2644+15)

Setzler Pond is located in the northwest quadrant of the intersection of 89th Avenue N and CSAH 103 (West Broadway Avenue). Runoff from a portion of CSAH 103 (West Broadway Avenue) between 89th Avenue N and Setzler Parkway is conveyed to the pond via ditches. Setzler Pond was created as a regional rate control pond in the location of a public watercourse. Much of the stormwater that flows into Setzler Pond is runoff from the commercial and industrial land surrounding the pond from the north and west, as well as large contributing areas in the cities of Maple Grove and Osseo. Setzler Pond discharges through an existing culvert that crosses CSAH 103 (West Broadway Avenue), reconnecting into Century Channel. Century Channel is also known as Edinbrook Channel and Mattson Brook at various points along its course, with Mattson Brook at the most downstream end. Mattson Brook ultimately discharges into the Mississippi River.

DNR Wetland #559W is located between Setzler Parkway and 92nd Avenue N. The wetland was bisected with the original construction of CSAH 103 (West Broadway Avenue). DNR #559W receives stormwater runoff from CSAH 103 (West Broadway Avenue) between Setzler Parkway and CSAH 30 (93rd Avenue N), which has a rural drainage system. Roadway runoff receives some amount of water quality treatment through vegetative filtering prior to reaching the wetland. Although it was not designed as a treatment basin, the wetland provides additional water quality treatment via sedimentation and plant uptake, as well as rate attenuation. DNR #559W discharges through an existing culvert in the southwest corner of the west wetland. This culvert travels west until connecting into the trunk line traveling beneath Wyoming Avenue N. This trunk line discharges into Setzler Pond, which ultimately discharges to Century Channel.

The jurisdictional divide between the SCWMC and WMWMC falls at CSAH 109 (85th Avenue N). However, the hydrologic divide occurs at approximately Maplebrook Circle N.

### 3.1.6.3 Drainage to Century Channel, TH 610 Ponding System (Station 2644+15 to 2684+00)

CSAH 103 (West Broadway Avenue) between CSAH 30 (93rd Avenue N) and TH 610 has an urban drainage system with a trunk storm sewer running down the east gutter line. A small portion immediately north of CSAH 30 (93rd Avenue N) drains into an existing infiltration basin on the east side of CSAH 103 (West Broadway Avenue). This basin's outlet connects into the existing trunk line. The remainder of CSAH 103 (West Broadway Avenue) north to TH 610 drains directly into the trunk line, which discharges into existing stormwater treatment basins located inside the infield area in the southeast quadrant of the TH 610 interchange. CSAH 103 (West Broadway Avenue) runoff from approximately 800 feet north of the TH 610 bridge is conveyed via storm sewer running down the east gutter line and discharges into existing stormwater treatment basin located inside the infield area in the northeast quadrant of the TH 610 interchange. The TH 610 ponds ultimately discharge to Century Channel.

CSAH 103 (West Broadway Avenue) drainage from 800 feet north of TH 610 to 101st Avenue N is conveyed via storm sewer and roadside ditches to the existing stormwater pond located in the southeast quadrant of the intersection of CSAH 103 (West Broadway Avenue) and Oak Grove Parkway. Between Oak Grove Parkway and Winnetka Avenue N, CSAH 103 (West Broadway Avenue) transitions from an urban drainage section to rural section. Where the urban section ends, roadside culverts pick up ditch drainage, providing conveyance to the existing stormwater pond, which overflows south to the TH 610 system. The area bordered by TH 610, CSAH 103 (West Broadway Avenue), and Winnetka Avenue N flows south to an existing 42-inch culvert beneath CSAH 103 (West Broadway Avenue), and discharges to the north loop infield area of the TH 610 interchange, which ultimately drains to Century Channel.

### 3.1.6.4 Target North Campus Drainage

According to the 2012 AUAR Update – Stormwater Management for Target North Campus, the Target North Campus stormwater is treated with onsite BMPs that are routed to the existing stormwater pond southeast of Oak Grove Parkway and CSAH 103 (West Broadway Avenue) intersection, which then discharges to the TH 610 system. This appears to have been intended as a temporary drainage connection, and the City of Brooklyn Park 1995 Comprehensive Stormwater Management Plan (CSMP) and the 2013 Shingle Creek and West Mississippi Watershed Management Commissions Third Generation Watershed Management Plan indicate that the Target North Campus drainage is intended to flow northeast into a series of wetlands and drainageways that ultimately reach the Mississippi River. Further coordination is needed with the City of Brooklyn Park, WMWMC, Target North Campus, and other stakeholders to determine exactly how the Target North Campus drainage functions in the existing condition and whether the current drainage patterns will be maintained.

### 3.1.6.5 Drainage to Mississippi River, North of TH 610 (Station 2684+00 to OMF)

North of TH 610, the project includes additional site development outside of the corridor (i.e. park-and-ride, OMF, and the Oak Grove Parkway realignment), which extends approximately 1,500 feet to the west of Winnetka Avenue N. See **Figures 11 and 12** in Appendix A for Oak Grove Parkway N realignment concept design.

Per the 2013 Shingle Creek Third Generation Plan, the area west of Winnetka Avenue N is within the 'Northwest/Riverside' West Mississippi Subwatershed, which is within the Anoka sand plain and is relatively flat with little relief. Per the 2009 City of Brooklyn Park Draft Local Water Management Plan Update, runoff generated in this area that is not infiltrated within the numerous low areas eventually drains easterly into a series of wetlands, open channels, and a trunk storm sewer system. At the eastern end of 101st Avenue N, this system discharges into a large wetland complex, ultimately reaching the Mississippi River.

# 4.0 Drainage Design Approach

## 4.1 Proposed Project

The proposed project includes the following basic components:

- Construction of a northbound and a southbound BLRT guideway. The majority of the guideways will be ballasted track, except within at-grade intersections. In some areas, the guideways will replace existing vegetated surfaces. Where the guideway will be ballasted, six-inch perforated pipe track drains will be located below the subballast.
- Reconstruction of TH 55 (Olson Memorial Highway), the majority of CSAH 103 (West Broadway Avenue), and Oak Grove Parkway within the project limits
- Construction of new roadways as needed to support the OMF and park-and-ride in the BP1 segment
- Relocation of the BNSF tracks and construction of an access road to be used by BNSF for access to their facility
- Construction of LRT stations and platforms
- Construction of park-and-ride facilities

As noted above, the project has been divided into six segments: Minneapolis, Golden Valley, Robbinsdale, Crystal, Brooklyn Park 2, and Brooklyn Park 1. The following sections will describe the overall drainage design approach and the types of BMPs being considered. They will also provide more detail of the proposed changes in each segment and the specific stormwater strategies recommended.

## 4.2 Methodology

In general, a proposed stormwater plan needs to analyze three items, which are discussed in more detail in the sub-sections below:

1. Existing drainage patterns and the regulatory environment (the latter was summarized in the Section above).
2. Changes to hydrology due to an increase in impervious surface
3. Changes to hydraulics due to a conversion from one conveyance system to another (surface flow in ditches versus pipe flow) and due to reduction in the storage available

Following this, the stormwater management plan needs to include the design of BMPs in accordance with the regulatory agencies' rules and ordinances to manage changes to these three items. The sequencing approach to locating BMPs was as follows:

1. Locate BMPs within the available right-of-way to the greatest extent practicable
2. Locate BMPs within other public right-of-way or remnants of parcels that are anticipated to be acquired due to other project requirements
3. Locate BMPs within currently undeveloped land outside of the right-of-way

### *4.2.1 Drainage Patterns*

The intent of the proposed drainage system for the BLRT Extension project is to mimic the existing drainage patterns to the greatest extent possible while also meeting the requirements of the regulatory agencies. There are some instances where small diversions in drainage patterns are proposed in order to route project runoff to a BMP. These diversions are limited to below the subwatershed level, such that stormwater will not be diverted between jurisdictional watershed agencies and typically will not be diverted between different water bodies within a

watershed. When diversions are proposed for treatment purposes, the BMPs will need to be designed to ensure that there is no increase in discharge rates to existing storm sewer facilities or to the receiving water.

### *4.2.2 Changes to Hydrology*

For the purposes of this preliminary design, the portions of the project that will be constructed on ballast rock have been considered to be impervious surface due to the compacted class 5 aggregate underneath the ballast. However, the calculations have assumed the ballast to have a lower runoff coefficient (a curve number of 85) than other impervious surfaces, such as concrete and asphalt (with a curve number of 98), due to the higher percentage of surface area of the ballast rock to abstract more rainfall than pavement and due to the higher percentage of void spaces that allow for some storage of rainfall. Impervious surfaces translate to higher runoff volumes and higher discharge rates due to the decrease in pervious areas capable of infiltrating the rainfall. They also tend to correlate to a faster time of travel for the rainfall runoff due to the lower resistance of paved surfaces, which also results in higher discharge rates.

Changes from pervious to impervious land uses are also typically associated with increased pollutant loads in the runoff. This is especially true of impervious surfaces associated with automobiles, such as roadways and parking lots. Therefore, BMPs will be proposed that can provide rate attenuation, water quality treatment, and, where conditions permit, reduction in runoff volumes.

### *4.2.3 Changes to Hydraulics*

The proposed conveyance system for the majority of the Minneapolis, Golden Valley, Robbinsdale, and Crystal segments will match that of the existing condition. However, due to widening of the roadway in the Brooklyn Park segments, the existing roadside ditches will be partially or completely eliminated, and the drainage will be captured in storm sewer systems instead. In general, changing the conveyance system from ditch flow to storm sewer flow increases the velocity of the stormwater. It tends to eliminate the attenuation of flow that happens in open channel systems. There is also an increase in the volume of stormwater due to the elimination of evapotranspiration. Therefore, changing to a storm sewer system from a ditch system can also result in an increase peak discharge rates and volumes.

The project corridor is bounded by natural and constructed stormwater detention basins along much of its length, in particular in the Golden Valley, Robbinsdale, and Brooklyn Park segments. Because the proposed BLRT and BNSF facilities will be wider than the existing BNSF facility, the area available to store stormwater in some of these basins will be reduced. Reduction in storage volumes can lead to an increase in high water levels (HWLs) and/or an increase in discharge rates. The proposed stormwater management plan includes various storage BMPs to mitigate increases in discharge rates and HWLs in an effort to match existing conditions.

It should be noted that several wetlands and regulated floodplains exist along the corridor. Many of these will also be partially filled by the project. A separate technical memorandum has been prepared to discuss floodplain impacts and mitigation. The analysis of wetlands adjacent to the project limits and the potential impacts to those is being performed by others.

## 4.3 Proposed BMPs

The proposed stormwater management plan includes a variety of BMPs that can provide water quality treatment, rate control, and volume reduction. The Proposed Conditions section below will discuss the BMPs that appear to be best suited for the particular segment and may suggest preferred options. However, specific BMP types and locations will need to be confirmed as the design progresses and as more is known about the existing soil conditions. Further coordination with city and watershed organization staff may also affect the ultimate stormwater management plan. The following includes a brief description of the BMPs being considered.

### 4.3.1 Bioretention Basins

Bioretention basins are shallow, dry depressions that rely on a combination of plants, microbes, and soil to provide water quality treatment. Stormwater runoff is captured in the basin where it then infiltrates through a soil medium. The soil medium may be the native soil where conducive to infiltration or may be an engineered soil mix where the native soils are too clayey, which is not conducive to infiltration. Plants and microbes within the basin take up nutrients and other pollutants in the runoff. The plants also create macropores in the soil that aid in the infiltration of runoff. Bioretention basins remove pollutants by a number of mechanisms, including filtration, adsorption, cation exchange, volatilization, plant uptake, and decomposition. It is important that the basins drain within 48 hours of a rainfall event so that the plants do not drown.

Basins are typically designed with 12 inches to 18 inches of depth. Therefore, while they will provide rate attenuation for smaller storms, they may not be sufficient to provide rate attenuation for the 100-year rainfall event on their own. Modeling will be completed during the next phase of design to ensure adequate storage has been incorporated.

Depending on site conditions, bioretention basins can be designed as infiltration or filtration basins. The former are sometimes referred to as bioinfiltration basins while the latter are referred to as biofiltration basins. Typically, bioretention basins are designed to promote infiltration, thereby attaining volume reduction through evapotranspiration and infiltration in addition to water quality treatment and some degree of rate attenuation. The NPDES permit provides guidance on the site conditions that preclude the use of bioinfiltration and infiltration practices (such as insufficient depth to the groundwater table, contaminated soil and groundwater, and “tight” soils). Where infiltration practices are not encouraged, biofiltration basins can be designed with perforated piping to minimize infiltration and ensure the basin drains within the specified 48 hours. In addition, a liner could be utilized to prevent infiltration.

Pretreatment is required before discharging runoff into bioretention basins. This can take the form of proprietary hydrodynamic oil and grit separators, wet sediment forebays, or filter strips.

### 4.3.2 Ditch Treatment and Bioswales

The ditches that will be constructed between the BLRT guideway and BNSF tracks and/or the outside ditches will be utilized to provide water quality treatment, rate attenuation, and volume reduction (where conditions permit). In general, these are long ditches with very flat longitudinal slopes that will convey stormwater as a traditional ditch does. These are expected to take one of two general forms:

1. It is expected that the center corridor protection ditch (CPD) and any ditch to the outside of the BNSF Railway will be rock lined, either with free-draining ballast rock or riprap. The flat longitudinal slope will slow the velocity of water flowing in the ditches, which will encourage sedimentation and infiltration. Where conditions allow infiltration, a sand section would be included if needed to increase the available storage volume prior to infiltration. Where soil or groundwater conditions do not allow infiltration, either a sand section with perforated piping would be included below the ditch bottom to allow for filtration of runoff, or rock weepers would be included to provide horizontal filtering. Furthermore, the elevations of culverts would be set above the bottom of the channel to encourage infiltration/filtration.
2. Vegetated ditches may be possible to the east of the BLRT guideways. Where conditions allow infiltration, a sand section would be included if needed to increase the available storage volume prior to infiltration. Where conditions do not allow infiltration, either a sand section with perforated piping would be included for filtration or rock weepers would be included to provide horizontal filtering. The vegetated ditches would act similarly to bioswales.

Bioswales are vegetated swales that use the same soil as a bioretention basin. They convey stormwater to low areas similarly to a traditional swale, but ditch checks, rock weepers, and other devices are used to encourage

infiltration or filtration. The vegetation, microbes, and soil in the bioswale allow this BMP to provide the same treatment functions as bioretention basins.

Treatment ditches and bioswales can be designed to provide rate attenuation in addition to the water quality treatment and volume reduction benefits. However, because bioswales are vegetated and therefore need to drain within 48 hours of a rain event, they may not be able to attenuate the 100-year rainfall event. Modeling will be completed during the next phase of design to ensure adequate storage has been incorporated.

### *4.3.3 Hydrodynamic Separators*

Hydrodynamic oil and grit separators are underground structures that remove larger particles and the pollutants that may be attached to them, as well as floating debris and oils. They are not capable of providing the level of treatment required but are used to pretreat runoff routed to bioretention and other infiltration BMPs, thereby prolonging their lifespans. They can be used as the sole treatment measure if no other options are practicable, but they do not provide any rate attenuation or volume reduction.

### *4.3.4 Wet Detention Pond*

Also called NURP (for National Urban Runoff Program) ponds, these ponds are usually constructed at the end of storm sewer pipes or near ditch low points. Their function is to remove a large majority of the sediment and associated pollutants contained in the stormwater runoff prior to being discharged downstream. Furthermore, most pond designs incorporate skimmer structures that cause floating debris and oils to be trapped in the pond. Because of their relatively large surface area, they also can be used to attenuate peak discharge rates. In general, wet detention ponds do not provide volume reduction, but they can be used to pretreat runoff upstream of bioretention or infiltration practices.

### *4.3.5 Tree Trenches*

Tree trenches are typically used in the boulevard areas adjacent to roadways. They consist of a prepared soil mix, an underdrain system, and a tree. If the tree trench is located in a boulevard with turf grass, the soil mix is similar to that used in bioretention basins. If the tree trench is located in a more urbanized setting with a paved surface, a structural soil or other structural technique is used that provides adequate void space for tree roots to develop but also support for the paving above.

Tree trenches provide water quality treatment by filtering runoff through the prepared soil mix and through uptake of some pollutants by the trees and microbes. Tree trenches also reduce the volume of runoff through infiltration into the underlying soils and through evapotranspiration. However, the amount of rate attenuation provided, especially for the larger storm events, varies by the type and design of system used.

### *4.3.6 Underground Detention and Infiltration*

Underground detention systems can be used solely to store stormwater runoff temporarily or they can include an infiltration component. These systems typically consist of multiple parallel pipes that can be solid wall, perforated, or have an open bottom. When infiltration is not possible due to site conditions, solid wall pipes or liners are used. Their primary function in this case is rate control. When infiltration is possible, perforated or open-bottom pipes are set on top of and within a free-draining aggregate layer that allows for water quality treatment through filtering, volume reduction, and rate attenuation.

# 4.4 Proposed Conditions

## *4.4.1 Segment M – Minneapolis*

In the Minneapolis segment, the proposed BLRT alignment will run down the center of TH 55 (Olson Memorial Highway), replacing the existing grassed median. The track will be in track panels at intersections and in ballast with ballast curb for the remainder of the roadway section. Track drains will collect runoff from the BLRT guideway that will be connected to the roadway storm sewer. A variety of stormwater BMPs are being considered for this portion of the project in order to meet regulatory requirements to the greatest extent possible. See **Figures 1 and 2** in Appendix A for the potential locations of the stormwater BMPs. **Tables 1 and 2** below provide a summary of the changes in impervious surfaces and the sizes of potential BMPs.

In addition to the proposed pedestrian sidewalk, a 10-foot wide cycle track is currently proposed to run on the north side of TH 55 (Olson Memorial Highway) from Van White Memorial Boulevard west to the TH 55 (Olson Memorial Highway) bridge over the BNSF Railway corridor. The cycle track will tie in with existing cycle trails in TWRP on the west side of the BNSF Railway corridor. The design accommodates the future cycle track.

### 4.4.1.1 Drainage to Bassett Creek Tunnels, East of I-94 (Stations 2010+75 to 2021+80)

Right-of-way constraints and a high number of underground utilities limit the type and size of BMPs that can be used in this area. Runoff from this portion of the project is proposed to be treated using tree trenches placed in the boulevard between the roadway and sidewalk on the north side, and between the sidewalk and frontage road on the south side. Because of poor soils in this area of the project, the proposed tree trenches would use a perforated pipe underdrain to both distribute water through the trench, but also to prevent extended periods of full saturation of the soil that could damage the trees. This portion of the corridor is owned by MnDOT, but the TH 55 (Olson Memorial Highway) corridor was designated to follow Lyndale Avenue south of the I-94 crossing several years ago. Therefore, the roadway in this area is operated and maintained by the City of Minneapolis.

### 4.4.1.2 Drainage to Old Bassett Creek Tunnel, West of I-94 (Stations 2021+80 to 2076+20)

Design of the BLRT guideway in this portion of the corridor is complicated by the shallowness of the old Bassett Creek tunnel near Dupont Avenue N. Further complications for the project include the number of underground utilities, including major sanitary sewer lines owned by the City of Minneapolis and by Metropolitan Council.

This portion of the project is proposed to have two storm sewer trunk lines, one to the north and one to the south of the proposed BLRT alignment, in order to minimize the number of storm sewer crossings under the proposed guideway. These storm sewer trunk lines will start at approximately CSAH 2 (Penn Avenue N) and discharge into the old Bassett Creek tunnel where it crosses TH 55 (Olson Memorial Highway) near Dupont Avenue N. Storm sewer will also collect runoff from TH 55 (Olson Memorial Highway) between the I-94 bridge and approximately Dupont Avenue N that will connect to the old Bassett Creek tunnel at the same location. As part of the MnDOT trunk highway system, the BMPs within their right-of-way need to be limited to those acceptable to MnDOT. Therefore, further coordination with staff from MnDOT and the City of Minneapolis will be required to finalize BMP types and locations.

Because right-of-way and open space is very constrained between the old Bassett Creek tunnel and I-94, no stormwater BMPs are being proposed in this area. BMPs west of the old Bassett Creek tunnel would be designed to treat otherwise untreated off-site runoff to compensate for lack of treatment east of the tunnel. The BMPs west of the old Bassett Creek tunnel may also need to be designed to provide enough rate attenuation such that there is no increase in peak discharge rates to the tunnel at the connections near Dupont Avenue. Coordination with the the City of Minneapolis will be required to confirm this approach.

Several BMP options are being considered to treat roadway runoff in this segment of the project, including bioretention basins, hydrodynamic separators, underground detention, and a NURP pond. Bioretention basins could be implemented in the south boulevard within the current TH 55 (Olson Memorial Highway) right-of-way. However, MnDOT has committed to conveying surplus right-of-way along the south side of TH 55 (Olson Memorial Highway) between Russell Avenue and Knox Avenue to the City of Minneapolis once the BLRT project and roadway improvements are completed. City staff has indicated a desire to have redevelopment occur in these spaces. Therefore, the locations of any basins would balance stormwater treatment needs and minimizing the impacts to land that the City of Minneapolis is considering for future redevelopment. The basins will function as retention and filtration with perforated pipe underdrains to ensure the basins drain within the allowed 48-hour drawdown time. Hydrodynamic separators or similar pretreatment BMPs will be used where viable to pretreat runoff before entering a bioretention basin. The existing three-cell treatment system in the Heritage Park south park area described above may have capacity to provide water quality treatment and rate control for the project area and future redevelopment. Further coordination with the City of Minneapolis will be necessary to understand the constraints and opportunities in the south park area. East of Knox Avenue N, right-of-way is very constrained, leaving little to no room for traditional above-ground BMPs. For this reason, underground detention BMPs are being considered for locations under low-volume frontage roads, aiming to avoid potential utility conflicts. This type of BMP provides rate control only, and hydrodynamic separators would be used to provide some level of water quality treatment. These could be used in conjunction with bioretention basins as needed to manage the total project discharge rate to the old Bassett Creek tunnel in this portion west of I-94.

A wet detention pond or other regional BMP could be implemented as part of future redevelopment of the parcel currently owned by the Minneapolis Public Housing Authority south of TH 55 (Olson Memorial Highway) and west of Van White Memorial Boulevard. This may provide an opportunity to cooperate on construction of the BMP to accommodate runoff from the BLRT Extension project and obtain both rate control and water quality treatment.

#### 4.4.1.3 Drainage to Old Bassett Creek Tunnel, Heritage Park South Treatment System (Stations 2075+60 to 2081+95)

Although this portion of the segment drains to a series of existing water quality and rate control BMPs, the increase in discharge rates will need to be mitigated before connecting to the existing storm sewer systems immediately downstream of the project corridor. Furthermore, the existing treatment facilities would need to be investigated to determine if there is excess capacity to provide the treatment for the additional runoff. Options being investigated include a bioretention basin, which would treat offsite and project runoff in the boulevard at Russell Avenue, and that would connect to the existing storm sewer, thereby maintaining existing flow patterns.

However, because the City of Minneapolis desires to use the existing grassed boulevard for future redevelopment, a similar bioretention basin or other above-ground BMP is not possible at Queen Avenue N, and runoff would therefore enter the existing system untreated. Alternatively, offsite runoff could continue south to the existing storm sewer by crossing under the BLRT and roadway, while project runoff is routed to other proposed BMPs to the east and west. The proposed high point is located approximately half way between Russell Avenue N and Queen Avenue N, so approximately half of project runoff in this area would be routed to the old Bassett Creek tunnel, and half to East Channel Bassett Creek. Further coordination with the City, MnDOT, and BCWMC will be required to resolve this location.

#### 4.4.1.4 Drainage to East Channel Bassett Creek, Russell Avenue N to TH 55 (Olson Memorial Highway)/BNSF Crossing

Runoff from this portion of the roadway is currently proposed to be treated in bioretention basins and an underground detention BMP. To limit the need for storm sewer crossings under the BLRT guideway, BMPs are being considered on both sides of the road. Due to the limited right-of-way on the north side of TH 55 (Olson Memorial Highway), an underground detention BMP is being considered under the north frontage road, between Thomas

Avenue N and Sheridan Avenue N. Before entering the underground storage BMP, water would be routed through a hydrodynamic separator for pretreatment. Bioretention basins are being considered on the south side of TH 55 (Olson Memorial Highway), where there is sufficient right-of-way, and would be designed with extra storage to provide rate control. Because of limited right-of-way to the west of the BNSF corridor, BMPs east of the bridge would be designed to compensate for the project runoff that is unable to be treated west of the bridge.

Westbound TH 55 (Olson Memorial Highway) will be realigned to the north to accommodate the BLRT guideway. A retaining wall is proposed to limit the amount of fill placed into the area near the upstream end of the East Channel Bassett Creek culvert crossing the highway. As a result of this, the culvert will need to be lengthened. More analysis will be done during the next stages of design to verify the culvert has the necessary hydraulic capacity. It may also be necessary to coordinate with the City of Minneapolis and the MPRB to better understand the drainage issues and opportunities in this area.

#### 4.4.1.5 Drainage to East Channel Bassett Creek and Bassett Creek, TH 55 (Olson Memorial Highway) to Oak Park Avenue (Stations 2095+00 to 2109+25)

See the Segment GV section for general discussion of the BLRT Extension project corridor in TWRP. See the floodplain and wetland technical memoranda for additional information on this area.

Some water quality treatment and rate control will be achieved in the CDP between station 2098+00 and station 2109+30, which will discharge to East Channel Bassett Creek. Limited right-of-way and flat grades restrict the options for BMPs in this area. Ditch treatment, both on the east side of the BLRT tracks and in CPD, will be maximized during final design to the extent practicable.

**Table 1. Change in Impervious Cover**

| Receiving Water | Total Area (acres) | Existing Impervious (acres) | Existing Percent Impervious | Total Proposed Impervious(1) (acres) | Change in Impervious (acres) | Proposed Percent Impervious | Percent Impervious Increase |
|---|---|---|---|---|---|---|---|
| Bassett Creek Tunnels at 7th St (East of I-94) | 6 | 5 | 83% | 5 | 0 | 83% | 0% |
| Old Bassett Creek Tunnel at TH 55 (West of I-94) | 23 | 17 | 74% | 20 | 3 | 87% | 18% |
| Heritage Park South Pond | 2 | 2 | 100% | 2 | 0 | 100% | 0% |
| East Channel Bassett Creek | 8 | 4 | 50% | 6 | 2 | 75% | 50% |
| Bassett Creek | 5 | 2 | 40% | 3 | 1 | 60% | 50% |

(1) This reflects only the impervious surface that will be in place following construction of the proposed project, which includes the access road adjacent to the relocated BNSF track. It does not include the additional impervious area from possible expansion of operational capacity in the BNSF Railway corridor. See the Golden Valley segment below for more discussion.

**Table 2. Potential BMP Strategies**

| Receiving Water/Location | Water Quality Volume Required (acre-feet) | BMP Options Considered | BMP Surface Area (square feet) | BMP Volume Provided (acre-feet) |
|---|---|---|---|---|
| Bassett Creek Tunnels at 7th St (East of I-94) | 0.24 | Tree Trenches | 16,850 | 0.31 |
| Old Bassett Creek Tunnel at TH 55 (West of I-94) | 0.90 | Bioretention<br>Wet Pond<br>Underground Detention<br>Hydrodynamic Separator | 30,500<br>37,120<br>N/A<br>N/A | 0.91<br>0.80<br>1.0(3)<br>N/A |
| Heritage Park South Pond | 0.09 | Bioretention | 4,050 | 0.10 |
| East Channel Bassett Creek | 0.28 | Bioretention<br>Underground Storage<br>Hydrodynamic Separator | 13,350<br>N/A<br>N/A | 0.27<br>0.17(3)<br>N/A |
| East Channel Bassett Creek(1) | 0.12 | CPD | N/A(2) | 0.05 |

(1) The Water Quality Volume Required calculation includes the approximate impervious area that would be added by an expansion in operational capacity by BNSF. Total area of future freight impervious in segment M is approximately 0.4 acres.
(2) The treatment BMP is incorporated into the ditches that are part of the typical section for the proposed project, and therefore, the surface area is not provided as a separate number.
(3) This BMP is designed for rate control only.

### *4.4.2 Segment GV – Golden Valley*

In the Golden Valley segment, the BLRT Corridor is located within the easterly 50 feet of the BNSF right-of-way along the eastern edge of TWRP. To make room for the BLRT guideway, the existing BNSF tracks will be relocated to the western 50 feet of the right-of-way. An access road will be constructed on the west side of the proposed BNSF Railway from TH 55 (Olson Memorial Highway) to Theodore Wirth Parkway. Due to poor soils and wetlands, the access road has been eliminated from Theodore Wirth Parkway to the northern end of the segment. The preliminary stormwater management strategy has been to include mitigation for the access road, which is generally where potential expansion of the BNSF Railway would occur, to the extent practicable.

The BLRT Extension project corridor in this section is a ballasted section with retained embankment and retaining walls used as needed. Either ditches or walls are expected to be used throughout the segment for corridor protection. For the most part, the profile of the BNSF track is lower than the BLRT. The corridor does not have any at-grade crossings, but does pass under bridges at Plymouth Avenue, Theodore Wirth Parkway, and Golden Valley Road.

Limited right-of-way, the potential for expansion of BNSF operational capacity, and the effort to minimize park impacts has reduced the possibilities of placing BMPs, including ditch treatment, on the west side of the corridor. Infiltration will not be considered in the Golden Valley segment because of the prevalence of HSG C and D soils, high groundwater levels, and the DWSMA with high vulnerability. In part because the BNSF profile is lower than the BLRT profiles, much of the BNSF track drainage will be difficult to pick up and treat. It sheet flows into TWRP in the same way as in the existing condition. In final design as much runoff from the BNSF Railway will be collected and treated as is practicable.

Several stormwater BMPs are being considered for this portion of the project in order to meet regulatory requirements to the greatest extent possible. As much water quality treatment as possible will be achieved through biofiltration basins and in the CPDs. Ditch treatment, both on the east side of the BLRT and in the CPD, will be maximized in the final design to the extent practicable. Because of poorly drained soils, ditch treatment will be through filtration and detention via rock weepers. When other treatment options are unavailable, pretreatment via hydrodynamic separators will be used as feasible.

**Figures 2 and 3** in Appendix A provide a representation of the potential locations of the stormwater BMPs. **Tables 3 and 4** below provide a summary of the changes in impervious surfaces and the sizes of potential BMPs. See the floodplain and wetland technical memoranda for additional information on other water resources impacts and mitigations of the project in this area.

#### 4.4.2.1 Drainage to Bassett Creek, Oak Park Avenue to Plymouth Avenue (Stations 2109+25 to 2122+55)

Some water quality treatment and rate control will be achieved in the CPD from station 2109+30 to station 2114+50, which will discharge to the west into Bassett Creek.

A large biofiltration basin is currently proposed on the east side of the BLRT Corridor between Oak Park Avenue and Plymouth Avenue in the excess Canadian Pacific Railway right-of-way in this area. The biofiltration basin will treat as much corridor drainage as possible between station 2107+00 and 2135+00 as well as from residential areas to the east, and will discharge to Bassett Creek downstream of Plymouth Avenue. The basin is larger than what is required to treat the project water quality volume that can drain to it. The additional water quality volume provided will to be used to compensate for other areas within the segment where treatment is less feasible. Access for maintenance will be investigated more fully during final design, and if determined not to be feasible, this basin may be modified. The project will continue to coordinate with MPRB for any construction that affects parkland.

The alignment of the creek will be shifted to the east to accommodate the BLRT project. Effort will be made to minimize the impacts to the recent streambank restoration project.

#### 4.4.2.2 Drainage to Bassett Creek, Plymouth Avenue to Theodore Wirth Parkway (Stations 2122+55 to 2154+00)

As described in the Existing Conditions section, the City of Golden Valley and the BCWMC are proposing to construct a stormwater BMP in the area to the west of the BNSF Railway corridor, north of Plymouth Avenue and east of Theodore Wirth Parkway. If the BMP is built, some corridor runoff would drain to it. If the city's project goes forward, it is possible that the BLRT Extension project could coordinate with the city and BCWMC to expand or deepen the BMP as needed to also provide treatment for corridor runoff. This will occur during the next phases of design.

A biofiltration basin/trench is proposed on the east side of the BLRT Corridor, north of 16th Avenue N. The biofiltration basin will treat as much corridor drainage as possible between station 2135+00 and 2147+00 as well as from residential areas to the east, and will drain to the wetland west of the corridor. Access for maintenance will be investigated more fully during final design, and if determined not to be feasible, this basin may be modified.

#### 4.4.2.3 Drainage to Bassett Creek, Golden Valley Road Wetlands (Stations 2154+00 to 2165+50)

Drainage in this section discharges to the wetlands north of Golden Valley Road. The current BLRT Extension project design through the Golden Valley Road wetlands includes building bridges for the BLRT guideways while maintaining the existing BNSF embankment. The guideway bridges would minimize fill impacts to the wetlands. Any mitigation necessary to maintain existing water surface elevations and flow rates would be addressed in final design but could include excavation at the edges of the wetlands and lowering the normal water level of the basins to provide additional active storage.

Discharge to the Golden Valley Road wetlands from the project will be difficult to treat before it reaches the basins. Other corridor runoff would be treated as much as practicable through ditch treatment before being discharged to the ponds.

A park-and-ride between Theodore Wirth Parkway, Golden Valley Road, and the BNSF Railway corridor has been proposed but is not currently part of the project. If it is included in the final design, it is expected that water quality treatment will be provided to meet BCWMC requirements on the site via tree trenches, biofiltration, or other options that are determined to be feasible during the final design.

#### 4.4.2.4 Drainage to Bassett Creek, Station 2166+00 to 2185+00 at 26th Avenue N

This section drains through Sochacki Park to Bassett Creek. The minimal space between the BLRT Extension project corridor and Kewanee Way limits the possibility of ditch treatment on the east side of the tracks in this area. The potential expansion of BNSF operational capacity and park land on the west side limit opportunities for ditch treatment on the west side. The CPD from station 2166+75 to station 2176+75 will provide some water quality treatment and rate attenuation to corridor runoff.

Two existing storm sewer systems from residential areas to the east discharge into the existing ditch. These will be extended and routed west, under the BLRT guideway and BNSF Railway, picking up drainage from the CPD and the west ditch. Because of elevation constraints, the pipe will outlet further west, to one of the existing channels at station 2169+00 or station 2176+00. From the pipe, the stormwater will flow through Mary Hills Nature Area before eventually reaching Bassett Creek.

**Table 3. Change in Impervious Cover**

| Receiving Water | Total Area (acres) | Existing Impervious (acres) | Existing Percent Impervious | Total Proposed Impervious[2] (acres) | Change in Impervious (acres) | Proposed Percent Impervious | Percent Impervio Increase |
|---|---|---|---|---|---|---|---|
| Bassett Creek[1] | 21 | 6 | 29% | 16 | 10 | 76% | 166% |

(1) This includes 5.1 acres that drain to the Golden Valley Road wetlands before draining to Bassett Creek.
(2) This reflects only the impervious surface that will be in place following construction of the proposed project, which includes the access road adjacent to the relocated BNSF track. It does not include the additional impervious area from possible expansion of operational capacity in the BNSF Railway corridor.

**Table 4. Potential BMP Strategies**

| Receiving Water/Location | Water Quality Volume Required[1] (acre-feet) | BMP Options Considered | BMP Surface Area (square feet) | BMP Volume Provided (acre-feet) |
|---|---|---|---|---|
| Bassett Creek/ South of Golden Valley Road | 0.61 | CPD<br>Biofiltration Basin (Sta 2112 to Sta 2122)<br>Biofiltration Basin (Sta 2136 to 2139) | 2,100<br>18,000<br>3,600 | 0.02<br>1.10<br>0.29 |
| Golden Valley Roads Wetlands | 0.22 | Additional treatment volume will be provided in other portions of the segment | | |
| Bassett Creek/ North of Manor Drive[3] | 0.25 | CPD | N/A[2] | 0.05 |

(1) The Water Quality Volume Required calculation includes the approximate impervious area that would be added by an expansion in operational capacity by BNSF. Total area of future freight impervious in segment GV is approximately 2 acres.
(2) The treatment BMP is incorporated into the ditches that are part of the typical section for the proposed project, and therefore, the surface area is not provided as a separate number.
(3) Some of this area drains to the Robbinsdale segment.

### *4.4.3 Segment R – Robbinsdale*

In the Robbinsdale segment, the BLRT Corridor is located within the easterly 50 feet of the BNSF right-of-way. To make room for the BLRT guideway, the existing BNSF tracks will be relocated to the western 50 feet of the right-of-way. An access road will be constructed on the west side of the proposed BNSF Railway from the north end of Grimes and North Rice Ponds to the northerly end of the segment. (Due to poor soils and wetlands, the access road has been eliminated from the southerly end of the segment through Grimes and North Rice Ponds.) The preliminary stormwater management strategy has been to include mitigation for the access road, which is generally where potential expansion of the BNSF Railway would occur, to the extent practicable.

The primary method of achieving water quality treatment in Robbinsdale is through treatment ditches, either by infiltrating where soils are suitable (HSG A and B) or via filtration through rock check dams. All ditches within the jurisdictional boundary of the BCWMC will function as filtration ditches with ditch blocks due to the presence of HSG C soils. It has been assumed that these ditches will be covered with ballast rock but will have uncompacted native soils beneath the ballast rock. Overall drainage patterns will be maintained as much as is feasible and corridor water will be treated to the extent practicable. Ditch volumes have been checked to ensure that they can accommodate both the BLRT Extension project site runoff and the BNSF access road, which is generally where potential expansion of the BNSF Railway would occur. Although there are currently ditch sections proposed along the western edge of the corridor, these ditches were not included in water quality computations because parts of them would be eliminated if there is a future expansion in BNSF operational capacity. In final design, freight and access road runoff will be collected and treated with runoff from the BLRT Corridor where feasible. The alignment may also shift east, impacting the amount of treatment volume available, so ponding offsite is also being considered, although not preferred.

**Figures 4 through 6** in Appendix A provide a representation of the potential locations of the stormwater BMPs in the Robbinsdale segment. **Tables 5 and 6** below provide a summary of the changes in impervious surfaces and the sizes of potential BMPs. See the floodplain and wetland technical memoranda for additional information on other water resources impacts and proposed mitigation in this area.

#### 4.4.3.1 Drainage to South Rice Pond, Existing Stormwater Pond in Sochaki Park (Stations 2185+00 to 2196+80)

There will be an eastern ditch from station 2184+00 to 2190+00 that will treat water before discharging to the existing stormwater pond in Sochacki Park that was recently constructed by the City of Robbinsdale. This ditch has enough capacity to treat water from the portion of the corridor within Robbinsdale south of Grimes and North Rice Ponds. Runoff from the Golden Valley segment also drains to this area and may require the existing pond be expanded or deepened if it does not have enough capacity to accommodate the project runoff. The expanded pond will also likely be needed for rate control as City of Golden Valley staff has expressed concern about increasing discharge rates to Bassett Creek due to the proximity of several homes to the creek's flood elevation.

#### 4.4.3.2 Drainage to Grimes and North Rice Ponds (Stations 2196+80 to 2252+35)

In the BCWMC portion of Robbinsdale, the BLRT guideway will run along the eastern side of the corridor. The current design puts the BLRT on bridges over the ponds while the BNSF freight track will remain on its existing embankment. The fill at the BLRT bridge abutments will be compensated for by excavation at the edges of Grimes and North Rice Ponds in order to maintain the existing 100-year HWL and peak discharge rates of the ponds. The relocated BNSF track will run along the western side with an access road starting at the north end of Grimes and North Rice Ponds and extending to the northern end of the watershed.

Stormwater runoff from the project will be treated in CPDs where they have been incorporated into the corridor and in eastern ditches from station 2219+00 to 2230+00 and station 2210+00 to 2211+00. The outflow from these BMPs drains to Grimes and North Rice Ponds. Infiltration will occur in eastern ditches from station 2240+00

to station 2245+00. This is the area adjacent to Lee Park that currently infiltrates and drains over the watershed divide. This infiltration ditch would continue to discharge to the south through the eastern ditches and eventually to Grimes Pond in large events.

#### 4.4.3.3 Drainage to Crystal Lake (Stations 2251+00 to 2298+00)

There will be infiltration in ditches from approximately station 2253+00 to station 2290+00 and underground detention at the proposed park-and-ride and station at 42nd Avenue N. The overflow would drain to existing storm sewer running down Hubbard Ave N, eventually discharging to Crystal Lake. Runoff would be routed through a pretreatment BMP, such as a hydrodynamic separator, before entering the underground detention system.

#### 4.4.3.4 Drainage to Middle Twin Lake (Station 2298+00 to 2329+00)

A portion of the Crystal segment flows into the Robbinsdale segment to a low point near 45-1/2 Avenue N. Infiltration will occur in the CPD between approximately station 2313+00 to station 2325+00 and the east side ditch from station 2308+00 to station 2312+00 before discharging to Graeser Pond, an existing wet detention pond in MnDOT right-of-way that may need to be enlarged to accommodate the additional runoff from the project corridor. As design progresses, the intent will be to treat project runoff within the treatment ditches to the greatest extent practicable and thereby limit any changes needed to Graeser Pond. Outflow from Graeser Pond is routed to another existing pond east of CSAH 81 before the stormwater discharges to Middle Twin Lake.

**Table 5. Change in Impervious Cover**

| Receiving Water | Total Area (acres) | Existing Impervious (acres) | Existing Percent Impervious | Total Proposed Impervious(1) (acres) | Change in Impervious (acres) | Proposed Percent Impervious | Percent Impervious Increase |
|---|---|---|---|---|---|---|---|
| Bassett Creek | 5 | 2 | 40% | 3 | 1 | 60% | 50% |
| Grimes and Rice Ponds | 7 | 2 | 29% | 6 | 4 | 86% | 200% |
| Crystal Lake | 18 | 11 | 61% | 15 | 4 | 83% | 36% |
| Middle Twin Lake | 6 | 3 | 50% | 4 | 1 | 67% | 33% |

(1) This reflects only the impervious surface that will be in place following construction of the proposed project, which includes the access road adjacent to the relocated BNSF track. It does not include the additional impervious area from possible expansion of operational capacity in the BNSF Railway corridor.

**Table 6. Potential BMP Strategies**

| Receiving Water/Location | Water Quality Volume Required(1) (acre-feet) | BMP Options Considered | BMP Surface Area (square feet) | BMP Volume Provided (acre-feet) |
|---|---|---|---|---|
| Bassett Creek | 0.22 | Treatment Ditch | 1,660 | 0.22 |
| Grimes and Rice Ponds | 0.38 | Treatment Ditch | 3,620 | 0.48 |
| | | CPD | N/A(2) | 0.31 |
| Crystal Lake | 0.76 | Treatment Ditch | 12,320 | 1.32 |
| | | Underground Detention | 5,530 | 0.41 |
| Middle Twin Lake | 0.15 | CPD | N/A(2) | 0.48 |
| | | Treatment Ditch | 1,210 | 0.13 |

(1) The Water Quality Volume Required calculation includes the approximate impervious area that would be added by an expansion in operational capacity by BNSF. Total area of impervious associated with the future BNSF track in segment R is approximately 3 acres.

(2) The treatment BMP is incorporated into the ditches that are part of the typical section for the proposed project, and therefore, the surface area is not provided as a separate number.

### *4.4.4 Segment C – Crystal*

In the Crystal segment, the BLRT Corridor is located within the easterly 50 feet of the BNSF right-of-way as it runs along CSAH 8 (West Broadway Avenue) in the south portion of the segment and transitions to along CSAH 81 (Bottineau Boulevard) in the north portion. To make room for the BLRT guideway, the existing BNSF tracks will be relocated to the western 50 feet of the right-of-way. An access road will be constructed on the west side of the proposed BNSF track. The preliminary stormwater management strategy has been to include mitigation for the access road, which is generally where potential expansion of the BNSF Railway would occur, to the extent practicable.

There are at-grade crossings at CSAH 8 (West Broadway Avenue), Corvallis Avenue, and CSAH 10 (Bass Lake Road). Where the BNSF track crosses the Canadian Pacific Railway north of Corvallis Avenue, a bridge will be constructed for the BLRT while the freight track will cross at-grade. One station and park-and-ride surface lot is proposed for this segment at CSAH 10 (Bass Lake Road).

**Tables 7 and 8** provide a summary of the anticipated increases in impervious area from this project and the sizes of potential BMPs. **Figures 6 and 7** in Appendix A show the potential locations of BMPs. The floodplain and wetland technical memoranda contain more information about the impacts to those resources.

#### 4.4.4.1 Drainage to Twin Lakes, BNSF Railway Corridor South of CSAH 10 (Bass Lake Road) (Station 2520+80 to 2380+90)

Along the stretch of the BNSF Railway corridor south of CSAH 10 (Bass Lake Road), the freight railroad and the BLRT run between CSAH 8 (West Broadway Avenue) and CSAH 81 (Bottineau Boulevard). This section of track has ditches on either side of the proposed ballasted sections and a wall or retained embankment between the BNSF track and the BLRT for corridor protection. This section can be split into two drainage boundaries at proposed high points as explained below.

The first drainage area extends from just north of the end of the segment to just north of Corvallis Avenue. The remainder of the segment to the south will go to a BMP located in the Robbinsdale segment. A bioretention basin is proposed to provide volume control and water quality treatment through infiltration and plant uptake and will likely be located on the parcel of land currently occupied by Steve O's Bar and Grill, which will likely be acquired by the project. Pretreatment will be used before the BLRT track drains discharge to the bioretention practice. An overflow structure will direct overflow into existing storm sewer along CSAH 8 (West Broadway Avenue) which discharges to Middle Twin Lake.

The second drainage area extends just north of Corvallis Avenue to CSAH 10 (Bass Lake Road). This area contains the BLRT bridge over the Canadian Pacific Railway. Options for stormwater BMPs in this portion of the segment are limited due to lack of open space and right-of-way constraints. The track drains in this segment will discharge to another bioretention basin or to an underground detention BMP. The bioretention basin will likely be located in open space to the west of station 2366+00 or a currently vacant lot west of station 2359+00. If these are determined to not be feasible during final design, BMPs located elsewhere in the corridor that take offsite stormwater would be oversized to provide the necessary treatment volume. A hydrodynamic separator or other pretreatment method will be used prior to discharge into the basin or underground detention. An overflow structure will direct overflow into existing storm sewer near the BMP which discharges to Upper Twin Lake.

#### 4.4.4.2 Drainage to Twin Lakes, Bass Lake Road Park-and-Ride (Station 2371+25 and 2379+30)

There is a surface parking lot proposed on the site between the BNSF Railway corridor and CSAH 81 (Bottineau Boulevard) south of CSAH 10 (Bass Lake Road). Due to the high likelihood of existing contamination on the site, infiltration practices are not allowed. To provide water quality treatment, an underground filtration BMP or other

underground practice will be used as there is a lack of available space for surface treatment. There are two potential outlets for the site: the trunk storm sewer in CSAH 10 (Bass Lake Road), which drains to Upper Twin Lake, and the storm sewer system in CSAH 81 (Bottineau Boulevard), which drains south through Wilshire Pond and Xenia Pond before discharging to Upper Twin Lake. The design of the storage for the underground BMP and the outlet will need to balance the capacity concerns of the trunk storm sewer in CSAH 10 (Bass Lake Road) and maintaining drainage flow patterns if the CSAH 81 (Bottineau Boulevard) ponds do not have capacity to take the site runoff.

#### 4.4.4.3 Drainage to Crystal Airport Infiltration Area (Station 2380+90 to 2418+75)

North of CSAH 10 (Bass Lake Road) the BLRT Corridor follows the BNSF Railway corridor along the west side of CSAH 81 (Bottineau Boulevard). The existing ditch between CSAH 81 (Bottineau Boulevard) and the BNSF Railway corridor will be filled as part of the BLRT project. Further investigation will be needed during final design to ensure that adequate conveyance systems are provided for systems that drained into the ditch.

The Metropolitan Airports Commission prohibits the construction of new open water features within a specified distance of airport runways due to the potential for conflicts between waterfowl and planes taking off and landing. All stormwater BMPs within that zone will need to meet their criteria for maximum duration of ponded water.

There is a CPD proposed between the realigned BNSF track and the BLRT guideway. This CPD can serve as an infiltration trench as the in situ soils in this area appear to be sandy and have a high infiltration rate. Additional treatment is planned for the ditches on the outside of the tracks, which will also provide opportunities to infiltrate the runoff. The existing culverts under the freight track and CSAH 81 (Bottineau Boulevard) will be maintained or replaced. Careful design will be necessary to ensure there is no increase in the rate or volume discharging to the infiltration area at the Crystal Airport. Some of the overflow from both the inside and outside ditches may need to be routed to another BMP.

**Table 7. Change in Impervious Cover**

| Receiving Water | Total Area (acres) | Existing Impervious (1) (acres) | Existing Percent Impervious | Total Proposed Impervious (acres) | Change in Impervious (acres) | Proposed Percent Impervious | Percent Impervious Increase |
|---|---|---|---|---|---|---|---|
| Twin Lakes | 19 | 6 | 32% | 14 | 8 | 74% | 133% |
| Crystal Airport infiltration area | 10 | 2 | 20% | 7 | 5 | 70% | 250%(2) |

(1) This reflects only the impervious surface that will be in place following construction of the proposed project, which includes the access road adjacent to the relocated BNSF track. It does not include the additional impervious area from possible expansion of operational capacity in the BNSF Railway corridor.

(2) The feasibility of infiltration in the treatment ditches will need to be verified during final design to ensure there is no increase in discharges to the Crystal Airport.

**Table 8. Potential BMP Strategies**

| Receiving Water/Location | Water Quality Volume Required (1) (acre-feet) | BMP Options Considered | BMP Surface Area (square feet) | BMP Volume Provided (acre-feet) |
|---|---|---|---|---|
| Twin Lakes/Steve O's Bar and Grill | 0.32(3) | Bioretention | 8,520 | 0.30 |
| Twin Lakes/Sta 2366+00 LT or Sta 2359+00 LT | 0.43 | Bioretention | 15,730 | 0.54 |
| Twin Creek/Bass Lake Rd Park-and-Ride | 0.33 | Underground Detention (Filtration) | 13,125 | 0.36 |
| Shingle Creek/North of Bass Lake Road | 0.60(4) | Treatment Ditch | N/A(2) | 0.88 |

(1) The Water Quality Volume Required calculation includes the approximate impervious area that would be added by an expansion in operational capacity by BNSF. Total area of future freight impervious in segment C is approximately 1.6 acres.

(2) The treatment BMP is incorporated into the ditches that are part of the typical section for the proposed project, and therefore, the surface area is not provided as a separate number.

(3) Some of this area drains to the Robbinsdale segment.

(4) Some of this area drains to segment BP2.

### *4.4.5 Segment BP2 – Brooklyn Park 2*

In the BP2 segment, the BLRT Corridor is located in the easterly 50 feet of the BNSF right-of-way along CSAH 81 (Bottineau Boulevard) south of 73rd Avenue N. To make room for the BLRT guideway, the existing BNSF tracks will be relocated to the westerly 50 feet of the right-of-way. An access road will be constructed on the west side of the proposed BNSF track. The preliminary stormwater management strategy has been to include mitigation for the access road, which is generally where potential expansion of the BNSF Railway would occur, to the extent practicable.

At 73rd Avenue N, the BLRT Extension will cross CSAH 81 (Bottineau Boulevard) on a bridge structure and then transition to the center median of CSAH 103 (West Broadway Avenue). CSAH 103 (West Broadway Avenue) will be reconstructed to accommodate the BLRT and will include the addition of turn lanes, trails, and sidewalk.

**Tables 9 and 10** below provide a summary of the anticipated increases in impervious area from this project and the sizes of potential BMPs. **Figures 7 through 9** in Appendix A show the potential locations of BMPs. The floodplain and wetland technical memoranda contain more information about the impacts to those resources.

#### 4.4.5.1 Drainage to Twin Creek, 62nd Avenue Wetland (Stations 2418+75 to 2436+30)

To accommodate the repositioned BNSF Railway and access road, there will be fill placed along the east edge of the 62nd Avenue wetland. As noted above, the basin has a high 100-year high water level elevation associated with it that is based on city modeling. The existing storage volume needed to attenuate larger rain events and maintain the 100-year HWL will be partially filled by the project. Although the wetland is not a regulated floodplain, mitigation for both the wetland and storage impacts is proposed along the northwest edge and the southeast corner As currently conceived, neither the fill nor the grading will affect the above-mentioned buffer section in the center. The outlet for the wetland may need to be reconstructed depending on the final grading limits. No changes to drainage into or out of this basin are anticipated with this project at this time.

The existing ditch between CSAH 81 (Bottineau Boulevard) and the BNSF Railway corridor will be filled as part of the BLRT project. Further investigation will be needed during final design to ensure that adequate conveyance systems are provided for systems that drained into the ditch.

There has been discussion about reconstructing the surface parking lot at the existing park-and-ride at 63rd Avenue to the west of the project corridor. At the time of this memorandum, the proposed BLRT Extension project does not include this work. If the park-and-ride is reconstructed in the future, a stormwater management plan will be developed that will include any changes to the existing stormwater BMPs and any new BMPs that are needed to meet the effective regulatory environment at that time.

#### 4.4.5.2 Drainage to Twin Creek, CSAH 81 (Bottineau Boulevard) (Stations 2436+30 to 2468+00)

The proposed BLRT will run along the BNSF Railway corridor adjacent to CSAH 81 (Bottineau Boulevard) until the crossing at 73rd Avenue N. The addition of the two BLRT tracks and an access road create an increase in the impervious area of approximately 12.6 acres along this portion of the corridor. The existing ditch between the railroad corridor and CSAH 81 (Bottineau Boulevard) south of 63rd Avenue N will be filled in to accommodate the BLRT Corridor.

The proposed CPDs between the BNSF track and BLRT, which run along most of CSAH 81 (Bottineau Boulevard), will likely be used as infiltration trenches. Because of the sandy soils present in this area, the infiltration rate of the in situ soil is high. Infiltration will be encouraged due to the flat longitudinal grade of the ditches and through the use of check dams or by setting culvert elevations above the bottom of the ditches. The storage in the ditches and

the rock will also provide rate attenuation. Additional water quality volume could be similarly treated and infiltrated in ditches to the outside of the tracks as well.

In the 63rd Avenue station area where there is no ditch, runoff will be routed to the ditches to the north and south via track drains. Overflow structures will be used to make sure stormwater does not overtop the tracks and will direct the overflow into existing storm sewer.

Hennepin County is proposing to reconstruct CSAH 81 (Bottineau Boulevard) from Dutton Avenue to 71st Avenue. It may be possible that the Hennepin County project could provide stormwater BMPs that would include runoff from the BLRT Extension project north of Dutton Avenue if the CPDs are not able to. Further coordination with Hennepin County during final design will determine whether this is feasible.

#### 4.4.5.3 Drainage to Shingle Creek, Stations 2468+00 to 2540+50 at CSAH 152 (Brooklyn Boulevard)

To accommodate the BLRT track's transition from the BNSF Railway corridor along CSAH 81 (Bottineau Boulevard) to the center median of the CSAH 103 (West Broadway Avenue) corridor, property will be acquired by the project. The intersection of Jolly Lane and CSAH 103 (West Broadway Avenue) will be removed with Jolly Lane ending in a cul-de-sac just north of the proposed BLRT Corridor. BMPs being considered include a bioretention basin in the remnants of the parcel(s) being acquired, an underground storage/infiltration practice, and a hydrodynamic separator or similar pretreatment. The BMP(s) will drain to the proposed trunk along CSAH 103 (West Broadway Avenue), which will connect to the trunk line on CSAH 152 (Brooklyn Boulevard) and ultimately discharges to Shingle Creek.

After crossing from the BNSF corridor, the BLRT will run down the center median of CSAH 103 (West Broadway Avenue). CSAH 103 (West Broadway Avenue) will be reconstructed to make room for the BLRT and will also include the construction of trails and grass boulevards on either side of the road. A station will be constructed just south of the intersection with CSAH 152 (Brooklyn Boulevard). In order to minimize the number of crossings under the BLRT guideways needed for a single trunk line, two trunk storm sewer lines are proposed, one for each outside gutter, to collect roadway drainage. These will then connect into the trunk along CSAH 152 (Brooklyn Boulevard) as in the existing condition. This system ultimately drains to Shingle Creek.

There is very limited right-of-way available in this area for stormwater BMPs other than in the boulevards. Due to a potential redevelopment project within the Target/Cub Foods complex, it will not be possible to expand the existing ponds within the parking lot. Therefore, tree trenches in the boulevards between 75th Avenue N and CSAH 152 (Brooklyn Boulevard) are the primary BMP being investigated. Underdrains will connect to the CSAH 103 (West Broadway Avenue) trunk, which will connect to the CSAH 152 (Brooklyn Boulevard) system that ultimately discharges to Shingle Creek.. If the tree trenches are not possible, additional treatment capacity will need to be added to other proposed BMPs to compensate for the area.

#### 4.4.5.4 Drainage to Shingle Creek, North of CSAH 152 (Brooklyn Boulevard) (Stations 2540+50 to 2552+65)

North of Brooklyn Boulevard, the BLRT continues down the center of CSAH 103 (West Broadway Avenue). Similar to above, two trunk lines on either side of CSAH 103 (West Broadway Avenue) are proposed which will connect with a system to be constructed by Hennepin County to carry stormwater down CSAH 103 (West Broadway Avenue) to a wet detention pond, also constructed by Hennepin County, just south of Shingle Creek and will drain into Shingle Creek. The pond will provide rate control with an outlet control structure as well as water quality treatment through sedimentation. The residential area around the 78th Court N cul-de-sac will continue to discharge to the trunk line as in the existing condition. The portion of existing storm sewer from where the existing trunk turns east north of 78th Avenue N will be separated from the CSAH 103 (West Broadway Avenue) roadway drainage.

**Table 9. Change in Impervious Cover**

| Receiving Water | Total Area (acres) | Existing Impervious (acres) | Existing Percent Impervious | Total Proposed Impervious[1] (acres) | Change in Impervious (acres) | Proposed Percent Impervious | Percent Impervious Increase |
|---|---|---|---|---|---|---|---|
| Twin Creek | 12 | 3 | 25% | 8 | 5 | 67% | 167% |
| Single Creek | 33 | 17 | 52% | 25 | 8 | 76% | 47% |

(1) This reflects only the impervious surface that will be in place following construction of the proposed project, which includes the access road adjacent to the relocated BNSF track. It does not include the additional impervious area from possible expansion of operational capacity in the BNSF Railway corridor.

**Table 10. Potential BMP Strategies**

| Receiving Water/Location | Water Quality Volume Required[1] (acre-feet) | BMP Options Considered | BMP Surface Area (square feet) | BMP Volume Provided (acre-feet) |
|---|---|---|---|---|
| Twin Creek/South of I-94 | 0.56 | Treatment Ditch | N/A[2] | 0.61 |
| Shingle Creek/North of I-94 | 0.38 | Treatment Ditch | N/A[2] | 0.59 |
| Shingle Creek/Crossover Section | 0.26 | Bioretention | 1,800 | 0.05 |
| Shingle Creek/West Broadway Ave: 75th Ave N to Brooklyn Blvd | 0.50 | Tree Trenches | Maximize available boulevard space | 0.76 |
| Shingle Creek/North of Brooklyn Blvd | 0.56 | See **Table 12** | See **Table 12** | See **Table 12** |

(1) The Water Quality Volume Required calculation includes the approximate impervious area that would be added by an expansion in operational capacity by BNSF. Total area of future freight impervious in segment BP2 is approximately 1.4 acres

(2) The treatment BMP is incorporated into the ditches that are part of the typical section for the proposed project, and therefore, the surface area is not provided as a separate number

### *4.4.6 Segment BP1 – Brooklyn Park 1*

In the BP1 segment, the BLRT Corridor alignment follows the center median of CSAH 103 (West Broadway Avenue), which will be incorporated into Hennepin County's reconstruction of CSAH 103 (West Broadway Avenue) from just south of Candlewood Drive to approximate northbound station 2651+15. North of this, the BLRT guideway alignment will shift west of CSAH 103 (West Broadway Avenue) and run northerly parallel to CSAH 103 (West Broadway Avenue) across a new TH 610 bridge. The BLRT alignment will continue north of the bridge for approximately 2,250 feet, where it will turn 90 degrees and head west for another 2,250 feet to the new OMF.

This segment includes construction of the BLRT guideway, reconstruction of CSAH 103 (West Broadway Avenue) north of the Hennepin County project, reconstruction of Oak Grove Parkway and 101st Avenue N, construction of new roads as necessary to serve project facilities, and construction of park-and-ride and OMF facilities. The guideway will be ballasted throughout this section except through at-grade intersections, and track drains will route runoff to the same BMPs as described by drainage segment in the CSAH 103 (West Broadway Avenue) EAW. The CSAH 103 (West Broadway Avenue) project has committed to constructing BMPs that will provide stormwater treatment for the portion of the BLRT footprint located within the CSAH 103 (West Broadway Avenue) project limits, as is summarized in the following paragraphs.

**Tables 11 and 12** below provide a summary of the anticipated increases in impervious area from this project and the sizes of potential BMPs. **Figures 9 through 12** in Appendix A show the potential locations of BMPs. The floodplain and wetland technical memoranda contain more information about the impacts to those resources.

#### 4.4.6.1 Drainage to Shingle Creek, Shingle Creek Crossing to Maplebrook Parkway N (Station 2552+65 to 2604+20)

This portion of the segment consists solely of the BLRT guideway, which will be in the center median of CSAH 103 (West Broadway Avenue). Hennepin County is currently working on the design of the reconstruction of CSAH 103 (West Broadway Avenue) as noted above. As part of Hennepin County's project, stormwater BMPs are planned that will accommodate runoff from the BLRT project. Although not part of the BLRT project, the BMPs that are currently being proposed by the County are summarized here.

Underground BMPs (either for detention or infiltration/filtration) are proposed at College Park Drive and/or North Hennepin Community College (NHCC) to treat stormwater draining from just north of 85th Avenue N to College Park Drive before ultimately discharging to Shingle Creek. Runoff from the area between College Park and Shingle Creek will be treated in a sedimentation basin on the west side of CSAH 103 (West Broadway Avenue) and with a hydrodynamic separator on the east side of CSAH 103 (West Broadway Avenue) before ultimately discharging to Shingle Creek. For more detail on this design, see the *West Broadway (CSAH 103) Reconstruction Final Stormwater Technical Memorandum*.

CSAH 103 (West Broadway Avenue) will be widened at the Shingle Creek crossing to accommodate the BLRT and trail crossings. The proposed changes will result in floodplain fill. Refer to *West Broadway (CSAH 103) Reconstruction Final Floodplain Technical Memorandum* for additional details on proposed impacts and mitigation options under consideration.

#### 4.4.6.2 Drainage to Century Channel, Setzler Pond and the DNR Wetlands (#559W) (Station 2604+20 to 2644+15)

As noted above, this portion of the project falls within the area of CSAH 103 (West Broadway Avenue) that will be reconstructed by Hennepin County. The BMPs proposed with that project are summarized here. Setzler Pond will

continue to receive corridor drainage and offsite drainage. Because of the added impervious area that will be directed to this pond, additional volume will be created and a new outlet control structure will be added in order to provide water quality and rate control before discharging to Century Channel. A flow splitter and hydrodynamic separator are proposed upstream of DNR Wetland #559W to maintain hydrology to this wetland and send additional runoff generated by new impervious directly to Setzler Pond for treatment. There is also the possibility of expanding sediment forebays already present at this wetland, such that a flow splitter may not be needed. Setzler Pond will continue to receive corridor drainage and offsite drainage. Because of the added impervious area that will be directed to this pond, additional volume will be created and a new outlet control structure will be added in order to provide water quality and rate control before discharging to Century Channel.

The expansion of CSAH 103 (West Broadway Avenue) will result in floodplain fill impacts to Setzler Pond and DNR #559W. Refer to *West Broadway (CSAH 103) Reconstruction Final Floodplain Technical Memorandum* for additional details on proposed impacts and mitigation options under consideration.

#### 4.4.6.3 Drainage to Century Channel, TH 610 Ponding System (Station 2644+15 to 2684+00)

The southernmost part of this area falls within the Hennepin County CSAH 103 (West Broadway Avenue) project limits, between CSAH 30 (93rd Avenue N) and northbound station 2651+15. North of that, the BLRT Extension project will reconstruct CSAH 103 (West Broadway Avenue) in addition to construction of the BLRT guideway. The existing culvert just north of CSAH 30 (93rd Avenue N), which drains a small portion of CSAH 103 (West Broadway Avenue) runoff to a basin at the TH 610 Commerce Center, will be lengthened and the flow to the basin will be maintained. The remainder of West Broadway/BLRT guideway drainage will be re-routed to a new wet pond on the property southwest of the TH 610 and CSAH 103 (West Broadway Avenue) intersection, in what is known as the Baxter Property. An existing wet pond at the southeast corner of this property will be partially filled in to accommodate the shift of the BLRT alignment west of CSAH 103 (West Broadway Avenue) in this location. This pond will be relocated to the west of its existing location and the existing trunk storm sewer currently routing runoff from this segment to the TH 610 ponds will be removed and a new trunk storm sewer will be installed to convey CSAH 103 (West Broadway Avenue) runoff to the new pond. The pond will be increased in size to accommodate all existing tributary areas and the new impervious surface created by the BLRT project. The pond overflow will likely be directed north to discharge into the existing stormwater treatment basin located inside of the infield area in the south loop of the TH 610 interchange, which discharges to Century Channel.

CSAH 103 (West Broadway Avenue) will be realigned north of the intersection with Oak Grove Parkway. This intersection will shift north approximately 800 feet, and north of the intersection, CSAH 103 (West Broadway Avenue) will shift west to tie into Winnetka Avenue approximately 1,000 feet north of 101st Avenue N. The proposed CSAH 103 (West Broadway Avenue) section will widen 650 feet north of TH 610 to accommodate a series of bioretention basins to be located within the 100-foot wide median between the northbound and southbound CSAH 103 (West Broadway Avenue) lanes. The widened section will end just past the new intersection of Oak Grove Parkway and CSAH 103 (West Broadway Avenue). The BLRT alignment will turn west at the new Oak Grove Parkway and CSAH 103 (West Broadway Avenue) intersection and will follow along the north side of the proposed Oak Grove Parkway extension that will tie into 101st Avenue N just past the proposed OMF location. See **Figure 11 and 12** in Appendix A for illustrations of the concept plan for this area.

Construction of Oak Grove Parkway will occur in multiple phases. At the opening of the METRO Blue Line Light Rail Extension, Oak Grove Parkway west of CSAH 103 (West Broadway Avenue) will be an undivided two-lane roadway. Similarly, CSAH 103 (West Broadway Avenue) transitions to an undivided two-lane roadway north of the Oak Grove Parkway. Future plans could include adding a second set of lanes for a four-lane divided parkway.

The proposed bioretention basins will provide storage and treatment for parts of the reconstructed portions of Oak Grove Parkway, CSAH 103 (West Broadway Avenue), Main Street, as well as the Oak Grove Park-and-Ride and Station. Pretreatment such as hydrodynamic separators will be provided prior to stormwater discharge to the bioretention basins. It appears that these basins would overflow to the TH 610 system unless coordination with adjacent landowners allows for conveyance of this drainage to the drainageway system consistent with the City of Brooklyn Park CSMP and Shingle Creek Third Generation Plan.

A potential regional treatment pond has been discussed on the property northwest of the intersection of TH 610 and CSAH 103 (West Broadway Avenue). This regional pond could provide storage and treatment for some of the surrounding area, and could be discharged into the TH 610/MnDOT drainage system. Another regional treatment pond has been discussed for a location near the intersection of CSAH 103 (West Broadway Avenue) and Oak Grove Parkway. Given that the drainage for the larger subwatershed flows in the general direction of the latter pond, it is likely that it could provide treatment for much of the rest of the surrounding area. Further coordination will be required between the City of Brooklyn Park, MnDOT, the WMWMC and other stakeholders during final design.

#### 4.4.6.4 Target North Campus Drainage

The proposed CSAH 103 (West Broadway Avenue) section will have a wider footprint than the existing section, which will require filling in the existing stormwater pond located southeast of the intersection of Oak Grove Parkway and CSAH 103 (West Broadway Avenue). The existing ditch system and associated infrastructure along CSAH 103 (West Broadway Avenue) that currently conveys runoff from the pond, which appears to include Target North Campus drainage, will be maintained and/or replaced as needed, unless a potential regional treatment pond northwest of the Target North Campus is implemented. This pond could provide storage and treatment of much of the surrounding area before discharging northeast to the existing drainageway, consistent with the flow pattern shown in the 2013 Shingle Creek Third Generation Plan.

#### 4.4.6.5 Drainage to Mississippi River, North of TH 610 (Station 2684+00 to OMF)

Treatment of runoff from the proposed OMF is currently proposed to occur in two new BMPs located in the southern portions of the property and just south of the property. The BMPs would provide treatment of runoff from the ballast and pavement runoff north of the building, runoff from the roof, ballast south of the building, parking lot, and the adjacent roadways. These ponds would drain to the adjacent roadway trunk storm sewer systems, which will flow to the series of wetlands and open channels that eventually discharge to the Mississippi River.

In **Table 12** below, the 'BMP Volume Provided' includes only project runoff, but could be revised to accommodate future development runoff and expansion of Oak Grove Parkway. Further coordination to determine feasibility will be required with the City of Brooklyn Park, the WMWMC, Hennepin County and other stakeholders during final design.

**Table 11. Change in Impervious Cover**

| Receiving Water | Total Area[1] (acres) | Existing Impervious (acres) | Existing Percent Impervious | Total Proposed Impervious (acres) | Change in Impervious (acres) | Proposed Percent Impervious | Percent Impervious Increase |
|---|---|---|---|---|---|---|---|
| Shingle Creek | 4[2] | 4[2] | 100% | 4[2] | 0 | 100% | 0% |
| Century Channel | 3[2] | 3[2] | 100% | 3[2] | 0 | 100% | 0% |
| TH 610 | 21 | 10 | 48% | 15 | 6 | 71% | 60% |
| Oxbow Creek | 42 | 4 | 10% | 33 | 29 | 79% | 725% |

(1) Total area within LOD, does not include "Future Construction"
(2) Only accounts for impervious areas due to the Blue Line Light Rail Transit Extension project, see the EAW for the Hennepin County CSAH 103 project for changes due to that project.

**Table 12. Potential BMP Strategies**

| Receiving Water/Location | Water Quality Volume Required (acre-feet) | BMP Options Considered | BMP Surface Area | BMP Volume Provided (acre-feet) |
|---|---|---|---|---|
| Shingle Creek | (1) | (1) | (1) | (1) |
| Century Channel | (1) | (1) | (1) | (1) |
| TH 610/West Broadway Sta 2676+00 to Sta 2685+00 | 1.13 | Bioretention | 38,335 | 1.31 |
| Oxbow Creek/West Broadway north of Sta 2685+00 | 1.48 | Bioretention | 49,660 | 1.72 |
| TH 610/Baxter Property, SW of TH 610 | 2.68 | Wet Pond | 32,121 | 2.68 |
| Oxbow Creek/Reconstructed Oak Grove Parkway west of Sta 2702+00 | 1.16 | Wet Pond | 16,012 | 1.16 |
| Oxbow Creek/Southern OMF Property | 1.11 | Wet Pond | 15,444 | 1.11 |
| Oxbow Creek/Northern OMF Property | 0.33 | Wet Pond | 6,167 | 0.33 |

(1) Stormwater runoff from the project corridor will drain to the BMPs being constructed by the Hennepin County CSAH 103 project. See the EAW for that project for more information.

# 5.0 Conclusion

Construction of the proposed BLRT Extension project will affect water resources in a variety of ways. The increased impervious surfaces and the decrease in ditch capacity will have the effect of increasing runoff quantity and pollutant loading without mitigation. The preliminary stormwater management plan proposes several mitigation measures, including the use of existing regional facilities, expansion of existing facilities, and construction of new BMPs at key locations throughout the corridor near storm sewer outfalls.

Further coordination with the cities is needed regarding DWSMA and wellhead protection requirements, groundwater elevations, and soil types in order to finalize the selected BMP strategies. Additional soil borings and piezometers may be needed to better understand the feasibility of implementing BMPs as shown. Further coordination is also needed regarding the BMP options for the portions of the corridor within MnDOT and Hennepin County right-of-way to clarify ownership and maintenance responsibilities of the BMPs. Although not covered in the sections above, the final plans will include temporary and permanent erosion and sediment control measures to protect water resources and stormwater infrastructure during and after construction in compliance with the NPDES permit. Finally, coordination with the cities is needed to better understand the condition and capacity of existing storm sewer systems that are to remain in place and to provide maintenance access to existing or proposed storm sewer systems.

The stormwater management plan will need to be approved by the BCWMC, SCWM WMC, the cities, and the MPCA, and therefore, to the extent practicable, adverse impacts due to the project will be mitigated.

# APPENDIX A. STORMWATER FIGURES

LEGEND

- PROP LRT ℄
- DRAINAGE DIVIDES
- WATERSHED BOUNDARY
- WETLAND DELINEATION
- CITY LIMITS
- EXISTING STORM SEWER OR CULVERT
- FLOODPLAIN
- RECEIVING WATERS
- SURFACE FLOW DIRECTION
- POTENTIAL BMP LOCATION
- PROPOSED BMP LOCATION (BY OTHERS)

GENERAL NOTE:
FLOODPLAIN AND FLOODWAY BOUNDARIES SHOWN ON FIGURE ARE FROM GIS SHAPEFILES DOWNLOADED FROM MnDNR.

OLD BASSETT CREEK TUNNEL

OLD BASSETT CREEK TUNNEL

HERITAGE PARK SOUTH TREATMENT SYSTEM

NEW BASSETT CREEK TUNNEL (APPROXIMATE LOCATION)

TARGET FIELD STATION

TARGET FIELD

DRAFT-WORK IN PROCESS

# BLUE LINE LRT EXTENSION

WATER RESOURCES PRELIMINARY OVERVIEW
FIGURE 1 OF 12

10/7/2015

NORTH
0 50 200 400
SCALE

METROPOLITAN COUNCIL

Kimley»Horn

SRF Consulting Group, Inc.

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GENERAL NOTE:
FLOODPLAIN AND FLOODWAY BOUNDARIES SHOWN ON FIGURE ARE FROM GIS SHAPEFILES DOWNLOADED FROM MnDNR.

LEGEND
- PROP LRT ℄
- DRAINAGE DIVIDES
- WATERSHED BOUNDARY
- WETLAND DELINEATION
- CITY LIMITS
- EXISTING STORM SEWER OR CULVERT
- FLOODPLAIN
- RECEIVING WATERS
- SURFACE FLOW DIRECTION
- POTENTIAL BMP LOCATION
- PROPOSED BMP LOCATION (BY OTHERS)

SEGMENT GV

SEGMENT M

THEODORE WIRTH REGIONAL PARK

BASSETT CREEK

BASSETT CREEK FLOOD CONTROL STRUCTURE

EAST CHANNEL BASSETT CREEK

WIRTH LAKE

THEODORE WIRTH REGIONAL PARK

BASSETT CREEK

EAST CHANNEL BASSETT CREEK

CITY OF GOLDEN VALLEY

CITY OF MINNEAPOLIS

BASSETT CREEK WMC

MISSISSIPPI WMO

XERXES AVE
FARWELL AVE
OAK PARK AVE
WASHBURN AVE
VINCENT AVE
UPTON AVE
THOMAS AVE
SHERDAN AVE
RUSSELL AVE
QUEEN AVE
PENN AVE
OLIVER AVE
NEWTON AVE
MORGAN AVE
LOGAN AVE
THOMAS PL
JAMES AVE
KNOX AVE
8TH AVE N
5TH AVE N
4TH AVE N
HEANER TER
GLENWOOD AVE
TH 55 SON MEMORIAL HWY
TH 55

DRAFT-WORK IN PROCESS

# BLUE LINE LRT EXTENSION

WATER RESOURCES PRELIMINARY OVERVIEW
FIGURE 2 OF 12

10/7/2015

NORTH
0 100 200 400
SCALE

METROPOLITAN COUNCIL

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SRF Consulting Group, Inc.

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LEGEND

- PROP LRT ℄
- DRAINAGE DIVIDES
- WATERSHED BOUNDARY
- WETLAND DELINEATION
- CITY LIMITS
- EXISTING STORM SEWER OR CULVERT
- FLOODPLAIN
- RECEIVING WATERS
- SURFACE FLOW DIRECTION
- POTENTIAL BMP LOCATION
- PROPOSED BMP LOCATION (BY OTHERS)

GENERAL NOTE:
FLOODPLAIN AND FLOODWAY BOUNDARIES SHOWN ON FIGURE ARE FROM GIS SHAPEFILES DOWNLOADED FROM MnDNR.

BASSETT CREEK
SWEENEY LAKE
BRANCH

THEODORE WIRTH
REGIONAL PARK

BASSETT CREEK

MARY HILLS NATURE AREA

GOLDEN VALLEY
ROAD WETLANDS

GOLDEN VALLEY
PARK-AND-RIDE

CITY OF GOLDEN VALLEY

CITY OF MINNEAPOLIS

DRAFT-WORK IN PROCESS

# BLUE LINE LRT EXTENSION

WATER RESOURCES PRELIMINARY OVERVIEW
FIGURE 3 OF 12

10/7/2015

0 100 200 400
SCALE

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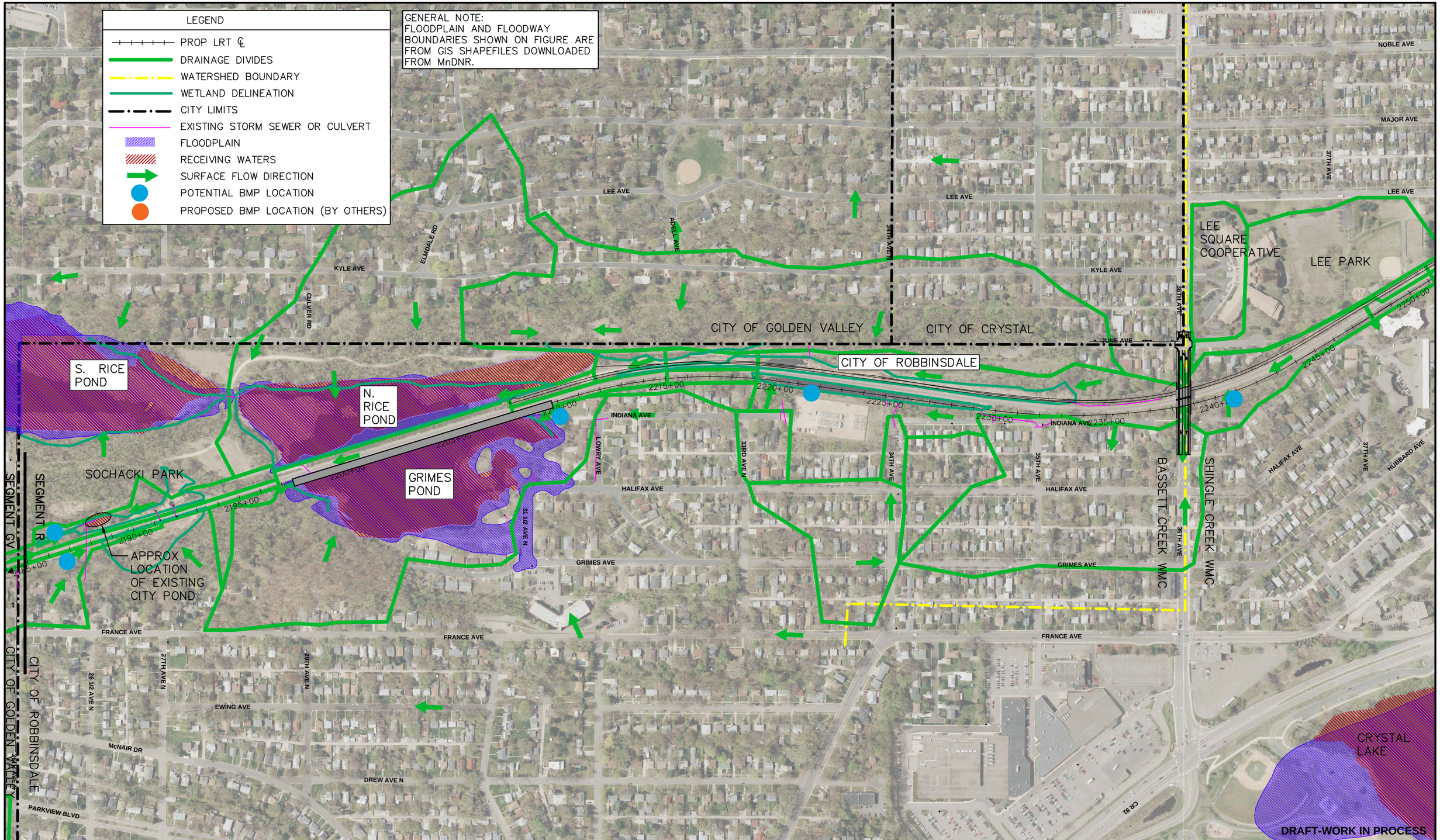



# BLUE LINE LRT EXTENSION

WATER RESOURCES PRELIMINARY OVERVIEW
FIGURE 4 OF 12

10/7/2015

NORTH
0 100 200 400
SCALE

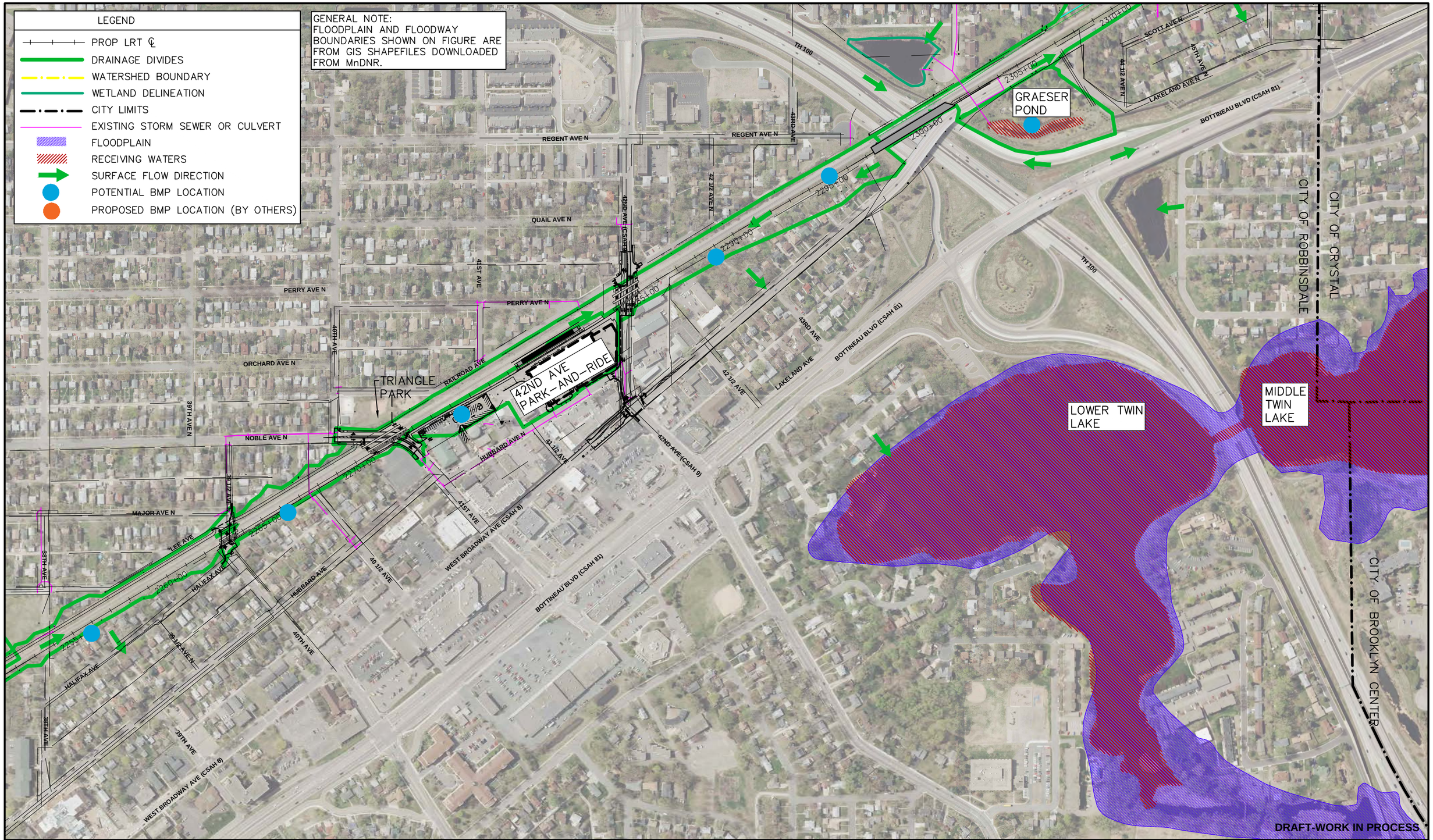
METROPOLITAN COUNCIL

Kimley»Horn
SRF Consulting Group, Inc.

LEGEND

- PROP LRT ℄
- DRAINAGE DIVIDES
- WATERSHED BOUNDARY
- WETLAND DELINEATION
- CITY LIMITS
- EXISTING STORM SEWER OR CULVERT
- FLOODPLAIN
- RECEIVING WATERS
- SURFACE FLOW DIRECTION
- POTENTIAL BMP LOCATION
- PROPOSED BMP LOCATION (BY OTHERS)

GENERAL NOTE:
FLOODPLAIN AND FLOODWAY BOUNDARIES SHOWN ON FIGURE ARE FROM GIS SHAPEFILES DOWNLOADED FROM MnDNR.




# BLUE LINE LRT EXTENSION

WATER RESOURCES PRELIMINARY OVERVIEW
FIGURE 5 OF 12

10/7/2015

NORTH
0 100 200 400
SCALE

METROPOLITAN COUNCIL

Kimley»Horn

SRF Consulting Group, Inc.

LEGEND

- PROP LRT ℄
- DRAINAGE DIVIDES
- WATERSHED BOUNDARY
- WETLAND DELINEATION
- CITY LIMITS
- EXISTING STORM SEWER OR CULVERT
- FLOODPLAIN
- RECEIVING WATERS
- SURFACE FLOW DIRECTION
- POTENTIAL BMP LOCATION
- PROPOSED BMP LOCATION (BY OTHERS)

GENERAL NOTE:
FLOODPLAIN AND FLOODWAY BOUNDARIES SHOWN ON FIGURE ARE FROM GIS SHAPEFILES DOWNLOADED FROM MnDNR.

BASS LAKE ROAD PARK-AND-RIDE

WILSHIRE POND (EXISTING)

XENIA POND (EXISTING)

CITY OF CRYSTAL

CITY OF ROBBINSDALE

SEGMENT C

SEGMENT R

WEST BROADWAY (CSAH 8)

LAKELAND AVE

LAKELAND AVE N

BOTTINEAU BLVD (CSAH 81)

CANADIAN PACIFIC RAILROAD

HANSON CT

WILSHIRE BLVD

ZANE AVE

YATES AVE

XENIA AVE

FAIRVIEW AVE

47TH AVE

48TH AVE

WELCOME AVE

WELCOME AVE N

CORVALLIS AVE

VERA CRUZ AVE

46TH AVE

45TH AVE

44TH AVE N

UNITY AVE N

TOLEDO AVE N

SCOTT AVE N

45TH AVE N

LAKESIDE AVE

49TH AVE

50TH AVE

51ST AVE

BYRON AVE

2300+00

2305+00

2310+00

2315+00

2320+00

2325+00

2330+00

2335+00

2340+00

2345+00

2350+00

2355+00

2360+00

2365+00

2370+00

DRAFT-WORK IN PROCESS

# BLUE LINE LRT EXTENSION

WATER RESOURCES PRELIMINARY OVERVIEW
FIGURE 6 OF 12

10/7/2015

NORTH
0 100 200 400
SCALE

METROPOLITAN COUNCIL

Kimley»Horn

SRF Consulting Group, Inc.

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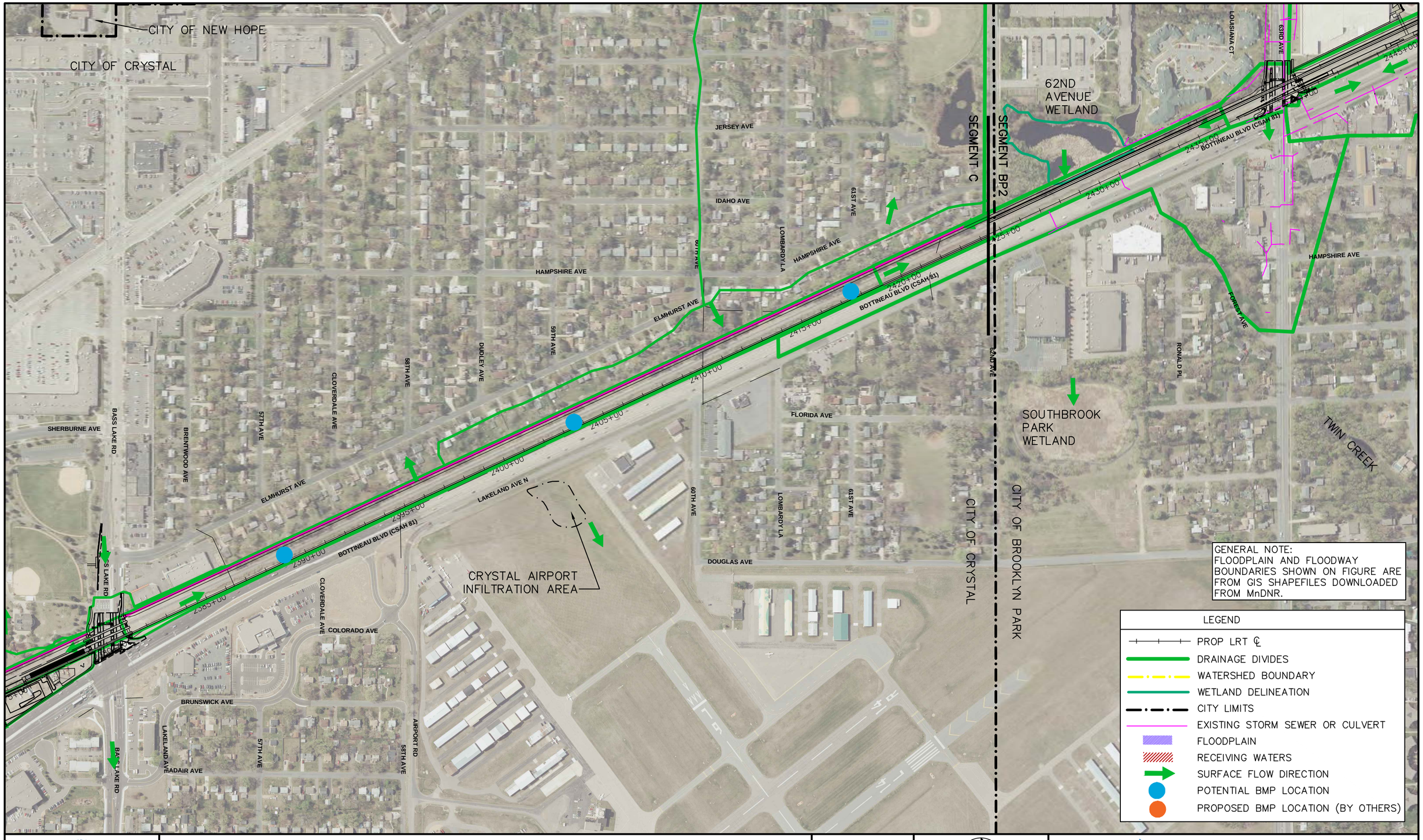


GENERAL NOTE:
FLOODPLAIN AND FLOODWAY BOUNDARIES SHOWN ON FIGURE ARE FROM GIS SHAPEFILES DOWNLOADED FROM MnDNR.

LEGEND

- PROP LRT ℄
- DRAINAGE DIVIDES
- WATERSHED BOUNDARY
- WETLAND DELINEATION
- CITY LIMITS
- EXISTING STORM SEWER OR CULVERT
- FLOODPLAIN
- RECEIVING WATERS
- SURFACE FLOW DIRECTION
- POTENTIAL BMP LOCATION
- PROPOSED BMP LOCATION (BY OTHERS)

# BLUE LINE LRT EXTENSION

WATER RESOURCES PRELIMINARY OVERVIEW
FIGURE 7 OF 12

10/7/2015

NORTH
0 100 200 400
SCALE

METROPOLITAN COUNCIL

Kimley»Horn
SRF Consulting Group, Inc.

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LEGEND

- PROP LRT ℄
- DRAINAGE DIVIDES
- WATERSHED BOUNDARY
- WETLAND DELINEATION
- CITY LIMITS
- EXISTING STORM SEWER OR CULVERT
- FLOODPLAIN
- RECEIVING WATERS
- SURFACE FLOW DIRECTION
- POTENTIAL BMP LOCATION
- PROPOSED BMP LOCATION (BY OTHERS)

GENERAL NOTE:
FLOODPLAIN AND FLOODWAY BOUNDARIES SHOWN ON FIGURE ARE FROM GIS SHAPEFILES DOWNLOADED FROM MnDNR.

WINNETKA AVE
68TH AVE
MYER AVE
69TH AVE
QUEBEC AVE
MODERN AVE
I-94
IRIS AVE
67TH AVE
WEST BROADWAY
BOTTINEAU BLVD (CSAH 81)
WEST BROADWAY (CSAH 103)
71ST AVE
CR 130
70TH AVE
MARYLAND AVE
LOUISIANA AVE N
HARKOFF LN N
65TH AVE
OREGON AVE N
CARTESIAN AVE
64TH AVE
63RD AVENUE PARK-AND-RIDE
DUTTON AVE
2510+00
2505+00
2500+00
2495+00
2490+00
2485+00
2480+00
2475+00
2470+00
2465+00
2460+00
2455+00
2450+00
2445+00
COM-OH
HO-WOO
GAS-UG

DRAFT-WORK IN PROCESS

# BLUE LINE LRT EXTENSION

WATER RESOURCES PRELIMINARY OVERVIEW
FIGURE 8 OF 12

10/7/2015

NORTH
0 100 200 400
SCALE

METROPOLITAN COUNCIL

Kimley»Horn

SRF Consulting Group, Inc.

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DNR #563W

BOTTINEAU BLVD (CSAH 81)

LAKELAND AVE

JOLLY LANE

BROOKLYN BLVD

TARGET/CUB FOODS PARKING LOT

WEST BROADWAY (CSAH 103)

SEGMENT BP1

SEGMENT BP2

CSAH 103 PROJECT

BEGIN HENNEPIN COUNTY

SUMTER AVE N

QUEBEC CT

82ND AVE

COLLEGE PARK DR

OREGON AVE N

78TH CT N

78TH AVE N

79TH AVE N

CANDLEWOOD DR

SHINGLE CREEK

KENTUCKY CIR N

KENTUCKY AVE N

LOUISIANA AVE N

74TH AVE N

74TH WAY N

75TH AVE N

75TH CIR N

76TH AVE N

78TH AVE N

GENERAL NOTE:
FLOODPLAIN AND FLOODWAY BOUNDARIES SHOWN ON FIGURE ARE FROM GIS SHAPEFILES DOWNLOADED FROM MnDNR.

LEGEND

- PROP LRT ℄
- DRAINAGE DIVIDES
- WATERSHED BOUNDARY
- WETLAND DELINEATION
- CITY LIMITS
- EXISTING STORM SEWER OR CULVERT
- FLOODPLAIN
- RECEIVING WATERS
- SURFACE FLOW DIRECTION
- POTENTIAL BMP LOCATION
- PROPOSED BMP LOCATION (BY OTHERS)

NOTES:

① SEE CSAH 103 EAW FOR INFORMATION ON BMPs PROPOSED SOUTH OF 94TH AVENUE FOR THAT PROJECT.

② SRF CONSULTING GROUP, INC. MODIFIED GIS FLOODPLAIN SHAPEFILE TO INCLUDE AREA AS SHOWN ON FLOOD INSURANCE RATE MAP

DRAFT-WORK IN PROCESS

# BLUE LINE LRT EXTENSION

WATER RESOURCES PRELIMINARY OVERVIEW
FIGURE 9 OF 12

10/7/2015

NORTH
0 100 200 400
SCALE

METROPOLITAN COUNCIL

Kimley»Horn

SRF Consulting Group, Inc.

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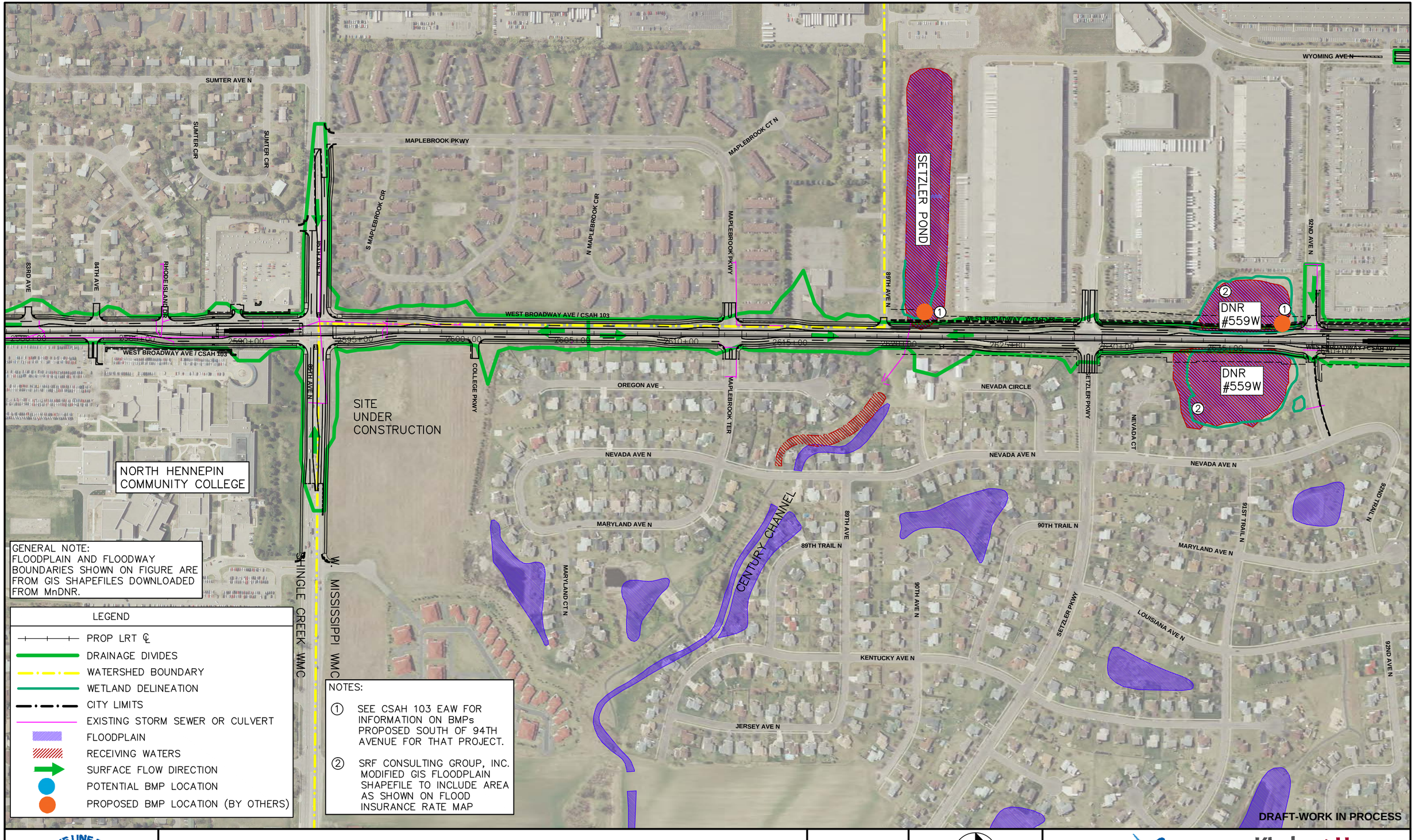



GENERAL NOTE:
FLOODPLAIN AND FLOODWAY BOUNDARIES SHOWN ON FIGURE ARE FROM GIS SHAPEFILES DOWNLOADED FROM MnDNR.

LEGEND

- PROP LRT ℄
- DRAINAGE DIVIDES
- WATERSHED BOUNDARY
- WETLAND DELINEATION
- CITY LIMITS
- EXISTING STORM SEWER OR CULVERT
- FLOODPLAIN
- RECEIVING WATERS
- SURFACE FLOW DIRECTION
- POTENTIAL BMP LOCATION
- PROPOSED BMP LOCATION (BY OTHERS)

NOTES:

① SEE CSAH 103 EAW FOR INFORMATION ON BMPs PROPOSED SOUTH OF 94TH AVENUE FOR THAT PROJECT.

② SRF CONSULTING GROUP, INC. MODIFIED GIS FLOODPLAIN SHAPEFILE TO INCLUDE AREA AS SHOWN ON FLOOD INSURANCE RATE MAP

DRAFT-WORK IN PROCESS

# BLUE LINE LRT EXTENSION

WATER RESOURCES PRELIMINARY OVERVIEW
FIGURE 10 OF 12

10/7/2015

NORTH
0 100 200 400
SCALE

METROPOLITAN COUNCIL

Kimley»Horn

SRF Consulting Group, Inc.

WINNETKA AVE N

WINNETKA AVE N

WINNETKA AVE N

WEST BROADWAY AVE

BAXTER PROPERTY

94TH AVE

TH 610

OAK GROVE PARK-AND-RIDE

2690+00

2685+00

2680+00

2675+00

2670+00

2665+00

2660+00

2655+00

2650+00

2645+00

2700+00

2705+00

2710+00

WEST BROADWAY AVE

OAK GROVE PARKWAY

OAK GROVE PARKWAY

TH 610 POND

CSAH 103 PROJECT

END HENNEPIN COUNTY

SITE UNDER CONSTRUCTION

CENTURY CHANNEL TRIBUTARY

TARGET NORTH CAMPUS

GENERAL NOTE:
FLOODPLAIN AND FLOODWAY BOUNDARIES SHOWN ON FIGURE ARE FROM GIS SHAPEFILES DOWNLOADED FROM MnDNR.

LEGEND

- PROP LRT ℄
- DRAINAGE DIVIDES
- WATERSHED BOUNDARY
- WETLAND DELINEATION
- CITY LIMITS
- EXISTING STORM SEWER OR CULVERT
- FLOODPLAIN
- RECEIVING WATERS
- SURFACE FLOW DIRECTION
- POTENTIAL BMP LOCATION
- PROPOSED BMP LOCATION (BY OTHERS)

DRAFT-WORK IN PROCESS

# BLUE LINE LRT EXTENSION

WATER RESOURCES PRELIMINARY OVERVIEW
FIGURE 11 OF 12

10/7/2015

NORTH

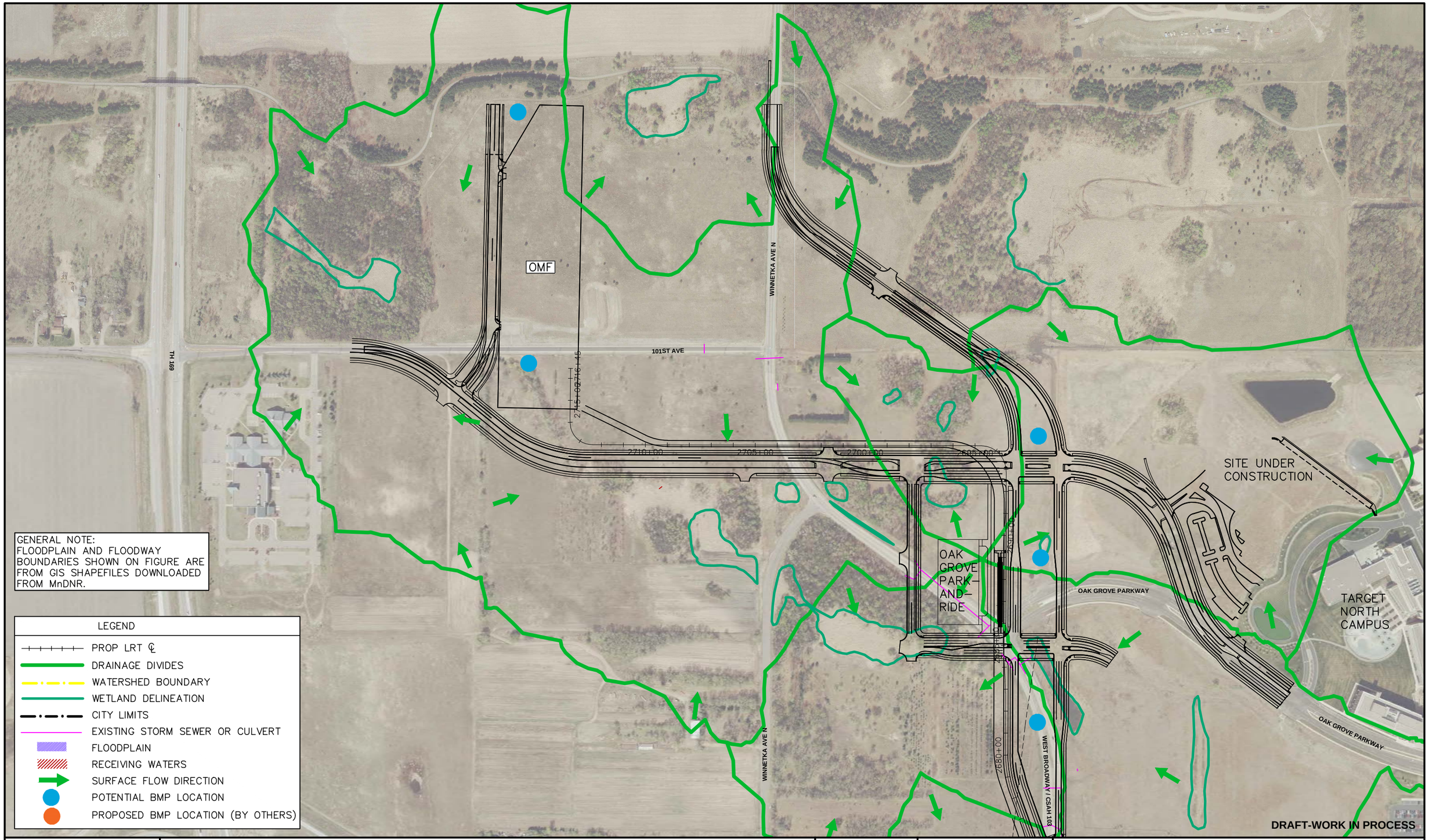
0 100 200 400

SCALE

METROPOLITAN COUNCIL

Kimley»Horn

SRF Consulting Group, Inc.




# BLUE LINE LRT EXTENSION

WATER RESOURCES PRELIMINARY OVERVIEW
FIGURE 12 OF 12

10/7/2015

NORTH
0 100 200 400
SCALE

METROPOLITAN COUNCIL

Kimley»Horn
SRF Consulting Group, Inc.

# APPENDIX B. SUMMARY OF REGULATORY CRITERIA

**Blue Line LRT Extension**
**Water Resources - Regulatory Matrix - DRAFT**
2/5/2015
Revised 10/5/2015

RFPE = Regulatory Flood Protection Elevation [2]

| Requirements Summary | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Organization** | **Applies to** | **Rainfall Data** | **Rate Control** | **Water Quality (1)** | **Volume Control** | **Floodplain/Flood Control Requirements** | **Plan Review Process** | **Comments** |
| MWMO<br>MWMO Watershed Management Plan 2011-2021, dated May 10, 2011 | Segment M | TP-40 or "subsequent revisions" | Match pre-development rates for 2-, 10-, and 100-year; may be restricted to less than pre-development rates when the capacity of the downstream conveyance system is limited | Remove 90% TSS from 95th percentile daily rainfall total (1.17 in. over 24 hrs) over entire project area, or Alternate Compliance which involves payments and/or credits and is summarized in MWMO standards document | Includes statement: placeholder for future volume standard by ~ 2013 | Public Roadway Condition - roadway shall not flood when adjacent to stormwater storage basin or subsurface stormwater managmeent BMP designed to store the 100-year event. Freeboard requirement set by road authority. Alternative - minimum freeboard requirement above the 100-year HWL may be calculated as the height determined by adding depth of volume of runoff received by BMP from two-year event over the BMP. | The MWMO works with the member communities to ensure the implementation of its standards. The MWMO recommends members adopt its ordinance-ready MWMO Standards language into their local ordinances. | Note in the Standards Section that the MWMO will be working with agencies and its member organizations over the next 2.5 years to review or determine new water quality and volume standards. |
| BCWMC<br>BCWMC 2015-2025 Watershed Management Plan, dated September 2015 | Segment GV and Segment R | Atlas 14 | Match existing rates for 2-, 10-, and 100-year events | Meet MIDS performance goals<br>FOR LINEAR PROJECTS:<br>Retention of whichever is greater:<br>- 0.55 in from new or fully reconstructed areas or<br>-1.1 in from the net increase in impervious areas<br><br>If the MIDS performance goal is not feasible and/or is not allowed for a proposed project, then the project must implement the MIDS flexible treatment options, as shown in the MIDS Design Sequence Flow Chart | Meet MIDS performance goals<br>FOR LINEAR PROJECTS:<br>Retention of whichever is greater:<br>- 0.55 in from new or fully reconstructed areas or<br>-1.1 in from the net increase in impervious areas<br><br>If the MIDS performance goal is not feasible and/or is not allowed for a proposed project, then the project must implement the MIDS flexible treatment options, as shown in the MIDS Design Sequence Flow Chart | Prohibits new structures or improvements in the floodplain, which would be subject to damage by the 100-year flood, including basements, public utilities, and streets. Where streets, utilities, and structures currently exist below the 100-year floodplain, BCWMC encourages member cities to remove these features as development/redevelopment allows. Projects within the floodplain must maintain no net loss to floodplain storage and no increase in flood level at any point along the trunk system. Prohibits expansion of existing non-conforming land uses within floodplain unless fully flood-proofed.<br>OLD REQUIREMENTS DOC:<br>Filling will generally not be allowed within the floodplain. Proposals to fill within the established floodplain must obtain BCWMC approval and must provide compensating storage and/or channel improvement so that the flood level shall not be increased at any point along<br>the trunk system due to the fill | BCWMC reviews development/redevelopment proposals after project receives preliminary review by municipality indicating general compliance with existing local water management plan. Complex projects may require additional review time. All submittals involving floodplains, Bassett Creek trunk system, appropriations, variances, underground wet vaults or other alternative BMPs are presented at the BCWMC meetings. | Requirements for Improvements and Development Proposals' document has not been updated to match the revised standards in the 2015 Draft plan. |

| Requirements Summary | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Organization** | **Applies to** | **Rainfall Data** | **Rate Control** | **Water Quality (1)** | **Volume Control** | **Floodplain/Flood Control Requirements** | **Plan Review Process** | **Comments** |
| SCWMC<br>SCWMC Rules and Standards, dated April 2013 | Segment C,<br>Segment BP2, and<br>Segment BP1 | Atlas 14 | Match existing rates for 2-, 10-, and 100-year events | Remove 60% of P and 85% of TSS<br><br>Use NURP ponds or infiltrate all site runoff from 1.3-inch event<br><br>NURP pond dead storage requirement is runoff from 2.5-inch storm event over the contributing drainage area<br><br>Linear projects that create one acre or more of new impervious surface must meet all Commission requirements for the **net new impervious surface.** | 1-inch of runoff from impervious surfaces.<br><br>Linear projects that create one acre or more of new impervious surface must meet all Commission requirements for the **net new impervious surface.** | Floodplain alteration/filling shall not cause a net decrease in flood storage capacity below the 100-year critical flood elevation unless it is shown that the proposed alteration or filling, together with the alteration or filling of all other land on the affected reach to the same degree of encroachment will not cause high water or aggravate flooding on other land and will not unduly restrict flood flows. | The Commission reviews proposed land development and redevelopment projects affecting water resources. Projects are reviewed in accordance with the management standards and policies of the SCWMC and recommendations are made to the member City in which the project is located. It is the City's responsibility to enforce the Commission's recommendations. Linear projects that create one acre or more of new impervious surface must meet all Commission requirements for the **net new impervious surface**. Projects impacting wetlands where Commission is LGU must be reviewed regardless of size. Plans for developemtn within the 100-year floodplain as defined by the FIS must be reviewed. | |
| MPCA (via NPDES permit issued 8/1/2013)<br><br>As of 2/5/2015, the impaired and special waters within 1 mile of corridor include:<br>Shingle Creek<br>Upper Twin Lake<br>Middle Twin Lake<br>Lower Twin Lake<br>Crystal Lake<br>Bassett Creek<br>Mississippi River | All segments | N/A | N/A | Water quality volume of 1-inch of runoff from new impervious surfaces must be retained on site. If infiltration is prohibited,must use other methods of volume reduction and the water quality volume (or remainder if some volume reduction is achieved) must be treated by a wet sedimentation basin, filtration system, regional ponding or equivalent methods prior to discharge of stormwater to surface waters.<br>If use wet sedimentation pond to provide treatment, dead storage requirement is 1800 cubic feet per acre of surface area drained. | Retain on site 1-inch of runoff from new impervious surfaces. If infiltration is prohibited, must use other methods of volume reduction and the water quality volume (or remainder if some volume reduction is achieved) must be treated by a wet sedimentation basin, filtration system, regional ponding or equivalent methods prior to discharge of stormwater to surface waters.<br><br>NOTE: infiltration BMPs are prohibited when soil infiltration rates are > 8.3 in/hr unless the soil is amended to slow it down. See permit for other conditions that prohibit infiltration. | N/A | SWPPP must be submitted to MPCA for review if the project size is 50 acres or more and will discharge to special or impaired waters. Application and SWPPP must be submitted at least 30 days before the start of the construction activity. | The General Permit used to develop this matrix expires on 8/1/2018. It will be necessary to verify how any proposed changes in the permit would apply to this project. |
| Minnesota B3 Guidelines | OMF and park-and-ride buildings in all segments | | Match runoff rates for the native soil and vegetation conditions for 2- and 10-year, 24 hr design storms | Remove 80% of post development TSS<br><br>Remove 60% of post development TP | Retain 1.1 inches from all new or redeveloped impervious | N/A | N/A | Minimize the negative impacts of the project, both on and off site, by maintaining a more natural hydrologic cycle through infiltration, evapotranspiration, and reuse. |

| Requirements Summary | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Organization** | **Applies to** | **Rainfall Data** | **Rate Control** | **Water Quality (1)** | **Volume Control** | **Floodplain/Flood Control Requirements** | **Plan Review Process** | **Comments** |
| City of Minneapolis<br><br>Email from Jeremy Strehlo, dated 1/23/15<br><br>Minneapolis Floodplain Overlay District Ordinance (Chapter 551.540)<br><br>Minneapolis Erosion and Sediment Control and Drainage Ordinance (Chapter 52)<br><br>Minneapolis Stormwater Ordinance (Chapter 54) | Segment M | | Maintain discharge rates at or below the existing rates.<br>May be restricted to less than existing rates when the capacity of the downstream conveyance system is limited | Remove 70% TSS | N/A | Linear projects within the floodplain shall be designed to minimize increases in flood elevations and shall be compatible with local comprehensive floodplain development plans.<br>Protection to the RFPE shall be provided where failure or interruption of public facilities would result in danger to public health or safety where facilities are essential to orderly functioning of the area.<br>Conditional uses in Floodway District allowed provided such uses shall have a low flood damage potential, shall not cause an increase in the stage of the regional flood or cause an increase in flood damages in the reach(es) affected. | Must submit application and obtain approval for Storm Water Management Plan from the city engineer. Requirements are included in Chapter 54.70 of City Code. | |
| City of Golden Valley | Segment GV | | Must meet BCWMC standards. | Must meet BCWMC standards. | Must meet BCWMC standards. | Linear projects may be located in the floodplain provided they are designed to minimize increases in flood elevation and are compatible with the BCWMC Management Plan. These uses can cause no increase in stage to the 100-year flood within the floodway and cannot increase the floodplain elevation by more than 1/2 foot in a designated Zone A or AE where a floodway has not been designated. Protection to the RFPE shall be provided where failure or interruption of these public facilities would endanger the public health or safety or where such facilities are essential to the orderly functioning of the area. | See BCWMC plan review process for information on stormwater management review.<br><br>Floodplain alteration permit will be submitted to the City, which will then submit the information to the DNR Commisssioner and BCWMC for review. | |

| Requirements Summary | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Organization** | **Applies to** | **Rainfall Data** | **Rate Control** | **Water Quality (1)** | **Volume Control** | **Floodplain/Flood Control Requirements** | **Plan Review Process** | **Comments** |
| City of Robbinsdale<br><br>Robbinsdale 2030 Comprehensive Plan - Appendix IIIA Storm Water Management Plan | Segment R | | Must meet SCWMC and BCWMC standards. | Must meet SCWMC and BCWMC standards. | Must meet SCWMC and BCWMC standards. | No structure, fill (including for roads and levees),..., or other uses may be allowed as a conditional use in the **floodway** that will cause any increase in the stage of the 100-year regional flood or cause an increase in flood damages in the reach(es) affected.<br>Floodplain developments shall not adversely affect the hydraulic capacity of the channel and adjoining floodplain of any tributary watercourse or drainage system where a floodway or other encroachment limit has not been specified on the Official Zoning Map. | See SCWMC and BCWMC plan review process for stormwater management.<br><br>Floodplain Alteration - must submit application for review to the City's Zoning Administrator and obtain all necessary State and Federal permits. | |
| City of Crystal<br>2009 Local Surface Water Management Plan and Land Use and Planning Ordinance | Segment C | | Existing rates for 2-, 10-, and 100-year events; accelerated channel erosion will not occur as a result of the proposed land disturbing or development activity. | Detention facilities should have permanent pond surface area = to 2% of impervious area draining to pond, or 1% of entire area draining to pond, whichever is greater;<br>Or as an alternative, the volume of permanent pool shall be equal to or greater than the runoff from a 2.0-inch rainfall for the fully developed site.<br>Sequencing of preferred treatment options: infiltration, flow attenuation by using open space, stormwater retention, stormwater detention | LSWMP includes text that the City's ordinances need to be revised to include volume control standard that is in line with most restrictive between SCWMC and MPCA as it relates to discharge to impaired waters. | No structure, fill (including for roads and levees),..., or other uses may be allowed as a conditional use in the **floodway** that will cause any increase in the stage of the 100-year regional flood or cause an increase in flood damages in the reach(es) affected.<br>Floodplain developments shall not adversely affect the hydraulic capacity of the channel and adjoining floodplain of any tributary watercourse or drainage system where a floodway or other encroachment limit has not been specified on the Official Zoning Map. | SCWMC and BCWMC review projects that fall within the watershed review authority. Crystal forwards development plans to the applicable watershed when received at the City. | |
| City of Brooklyn Park<br><br>Email from Kevin Larson (City), dated 2/4/14<br><br>Flood Hazard Area Overlay Ordinance (152.510) | Segment BP1 and Segment BP2 | | Must meet SCWMC standards. | Must meet SCWMC standards. | Must meet SCWMC standards. | Railroad tracks, roads, and bridges must be elevated above the regulatory flood protection elevation where failure of facilities would result in danger to public healthy/safety or where facilities are essential to orderly function of area.<br>None of these uses shall increase flood elevations. No fill, excavation, or storage of materials or equipment that obstruct flows or increase flood elevations will be permitted. | Must submit application to City Manager. SCWMC will review projects that fall within watershed review authority. | |

(1) Wet stormwater pond design should follow the guidelines in the MPCA Stormwater Manual for dead storage depth, side slopes, and benches.
(2) Refers to an elevation 1 foot (minimum) above the 100-year flood plus any stage increase due to the designation of flood fringe areas. In Minnesota, the floodplain management ordinances (local regulations) require that the elevation of the surface of the lowest floor of a dwelling be at or above the regulatory flood protection elevation. Local regulations will also require the top of the access road elevations to be within 2 feet of the flood protection elevation.
All regulatory entities will have requirements for erosion and sediment control and at a minimum will refer back to the NPDES requirements.

# Appendix F
# Supporting Technical Reports

## F.11 Financial Analysis in Support of the FEIS

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**METRO Blue Line LRT Extension (BLRT)**
5514 West Broadway, Suite 200, Crystal, MN 55428 www.bluelineext.org

**To:** Paul Danielson,
Kimley-Horn

**From:** Jim Baker,
Connetics Transportation Group

**Date:** January 29, 2016

**Subject:** Financial Analysis in Support of the FEIS

# 1.0 Introduction

The METRO Blue Line Extension (BLRT) project area extends 13 miles northwest from downtown Minneapolis through the neighborhoods of north Minneapolis and into the communities of Golden Valley, Robbinsdale, Crystal, and Brooklyn Park in Hennepin County, Minnesota.

This memo documents the methodology, assumptions and results of the high-level financial analysis undertaken to support the BLRT Project's Final Environmental Impact Statement (FEIS). Costs and revenue estimates presented in this memo for capital, as well as operating and maintenance (O&M), build upon estimates recently prepared for Metropolitan Council's Southwest LRT Project. Primary references used in the development of this memo are:

- Southwest LRT Financial Analysis in Support of the FEIS (Draft) September 15, 2015
- Financial Management Plan, Southwest Light Rail Transit, Revision 02-00, August 2015, Metropolitan Council/Metro Transit Finance
- Blue Line Extension Operating Costs table developed from the BLRT Finance Team (Excel file OperatingCosts20150910_true_JRH_R1.xlsx)

# 2.0 Capital Plan

## 2.1 Capital Cost

In Year of Expenditure (YOE) dollars, the BLRT Project's estimated capital cost for the Locally Preferred Alternative (LPA) is $1,496,431,000. This estimate uses the following methodology/assumptions:

- **Schedule:** Base year costs (2015) were inflated to YOE dollars based on the current project schedule. Specifically, 2018 is identified as the start year of heavy construction and 2021 as start year of revenue operations.
- **Standard Cost Categories (SCC):** Capital costs were developed using the Federal Transit Administration's (FTA's) SCCs.
- **Cost Escalation Assumption:** Costs were inflated at 3% per year.

Table 2-1 presents this information by category in base year (2015) dollars and in inflated YOE dollars.

**Table 2-1: Capital Cost Estimates of the LPA, by FTA SCC**

| FTA Standard Cost Category | Base Year Costs 2015$ (millions) | YOE Costs (millions) |
|---|---|---|
| 10 Guideway & Track Elements | $297.343 | $333.775 |
| 20 Stations, Stops, Terminals, Intermodal | $65.834 | $74.875 |
| 30 Support Facilities: Yards, Shops, Administration Buildings | $76.500 | $85.865 |
| 40 Sitework and Special Conditions | $154.096 | $173.267 |
| 50 Systems | $166.963 | $191.616 |
| 60 Right-of-Way, Land, Existing Improvements | $60.312 | $66.801 |
| 70 Vehicles | $119.779 | $136.245 |
| 80 Professional Services | $230.009 | $245.783 |
| 90 Unallocated Contingency | $140.500 | $158.204 |
| 100 Finance Contingency Charges | $24.778 | $30.000 |
| **Total** | **$1,336.114** | **$1,496.431** |

*Source: FTA Worksheets dated December 15, 2015 (BLRT Municipal Consent Cost Estimate)*

## 2.2 Sources of Capital Funds

The capital cost of the project is anticipated to be funded from federal, state and local sources, as listed below. The financial analysis applied to projections of the following anticipated sources of capital funds:

- **Federal Funds:** It is anticipated that all Federal funding will come from Section 5309 New Starts. The BLRT Project assumes 49% Section 5309 New Starts funding, with a New Starts Full Funding Grant Agreement signed in 2018.
- **State Funds:** It is anticipated that the State of Minnesota will fund 10% or approximately $149,643,000 of the Project through bonding and supplemental appropriations. Further, to fund the State's share of the capital plan, it is anticipated that the securities will be general obligation debt and the supplemental appropriations will be general fund appropriations to fund its share of the capital plan.
- **Regional Railroad Authorities (RRA):** The Hennepin County Regional Railroad Authority (HCRRA) is anticipated to fund the project from their dedicated property taxes. The amount of their funding is 10% or approximately $149,643,000 of the Project. HCRRA obtains its funds from a property tax levied under the authority of MS 398A plus interest earned on balances. This tax is distinct from the Council's property tax authority.
- **Counties Transit Improvement Board (CTIB):** The CTIB is anticipated to fund 31% or approximately $463,893,000 of the total capital costs. Each of the five counties the CTIB is comprised of is authorized to levy a 0.25% sales tax and a $20 motor vehicle sales tax to provide capital and operating funding for transitway projects. The BLRT Project is eligible for capital and operating funding by the CTIB under its *Transitway Investment Framework*.
- **Other Local Funding Sources:** The BLRT Project Office and Metropolitan Council are working with local cities, MnDOT, and Hennepin County on securing additional necessary contributions as needed through local funding agreements.

Table 2-2 presents capital cost funding by source.

**Table 2-2: LPA Capital Cost Funding by Source (YOE $)**

| Anticipated Funding Source | Share | Contribution ($ millions) |
|---|---|---|
| Federal Transit Administration | 49% | $733.251 |
| County Transit Improvement Board | 31% | $463.894 |
| State of Minnesota | 10% | $149.643 |
| Hennepin County Regional Railroad Authority | 10% | $149.643 |
| **Total** | **100%** | **$1,496.431** |

# 3.0 Operating Plan

## 3.1 BLRT No-Build Alternative O&M Cost Estimates

The BLRT project assumes the Southwest LRT Project is already in operation as part of a "No-Build" scenario. For consistency with the Southwest LRT Project's FEIS, that project's Build Alternative O&M cost estimate is assumed to be the BLRT's No-Build O&M cost estimate (since construction of the Southwest LRT Project is to precede the BLRT Project). The Southwest LRT Project's O&M cost estimates utilized unit costs for Metro Transit bus and LRT based on 2013 actual expenditures. Specific cost methodology used in the Southwest LRT Project, and thus reflected in the BLRT's No-Build cost estimates, are as follows:

- **Metro Transit LRT and Metro Transit/Metropolitan Transportation Services (MTS) Corridor Bus Routes:** Unit O&M costs and service plan statistics were taken from the Southwest LRT Project's *Service Plan Updates and O&M Cost Results for the FEIS Report* (July 21, 2015).
- **Metro Transit/MTS Non-Corridor Bus Routes:** The regional travel demand model was used to estimate service statistics for non-corridor Metro Transit/MTS non-corridor bus routes. These statistics were applied to unit costs in the Southwest LRT Project's *Service Plan Updates and O&M Cost Results for the FEIS Report*.
- **Other Providers Non-Corridor Bus Routes:** Similarly, the regional travel demand model was used to estimate service statistics for other opt-out providers in the Twin Cities region. These statistics were applied to Metro Transit unit costs.
- **Northstar, Metro Mobility and Transit Link:** Finally, to arrive at a total regional transit O&M cost, Northstar, Metro Mobility and Transit Link O&M costs were included. The 2014 Met Council Unified Budget was used to identify an annual O&M cost for each of these services.

An average inflation rate of 3.15% was used to present costs in 2015 and 2040 dollars. Table 3-1 presents projected regional transit O&M costs for the BLRT Project's No-Build Alternative.

**Table 3-1: Year 2040 Annual O&M Cost Estimates of the BLRT No-Build Alternative**

| Operator/Transit Service | Base Year Costs 2015$ (millions) | YOE Costs 2040 $ (millions) |
|---|---|---|
| Metro Transit Light Rail Transit | $88.392 | $191.931 |
| Metro Transit/MTS/Other Twin Cities opt-out providers | $466.494 | $1,012.924 |
| Northstar | $18.357 | $39.859 |

| | | |
|---|---|---|
| Paratransit (Metro Mobility & Transit Link) | $67.848 | $147.322 |
| **Total** | **$641.091** | **$1,392.036** |

*Source: Southwest LRT Financial Analysis in Support of the FEIS (Draft) September 15, 2015*

## 3.2 BLRT LPA O&M Cost Estimate

Annual O&M costs for the BLRT Project's LPA are based on corridor service plans developed specifically for use and analysis in this project's FEIS. Metro Transit bus and LRT unit costs used in the Southwest LRT Project were applied to estimates of incremental service statistic changes for BLRT service and corridor bus service. The resulting change from the No-Build Alternative in corridor O&M costs is noted below in Table 3-2.

**Table 3-2: Year 2040 Incremental O&M Cost Estimates for BLRT Corridor Service Changes**

| Operator/Transit Service | Base Year Costs 2015 $ (millions) | YOE Costs 2040 $ (millions) |
|---|---|---|
| Metro Transit Light Rail Transit | $21.772 | $47.275 |
| Metro Transit/MTS/ Other Twin Cities opt-out providers | $1.351 | $2.933 |
| **Total** | **$23.123** | **$50.208** |

*Source: OperatingCosts20150910_true_JRH-R1.xlsx and BLRT FEIS O&M Cost Estimates Memo prepared by CTG for Kimley-Horn (Oct. 2015)*

Incremental O&M cost estimates from Table 3-1 were added to No-Build Alternative O&M cost estimates (Table 3-2) to arrive at system-wide annual O&M cost estimates for the BLRT LPA, shown below in Table 3-3.

**Table 3-3: Year 2040 Annual O&M Cost Estimates of the BLRT LPA**

| Operator/Transit Service | Base Year Costs 2015 $ (millions) | YOE Costs 2040 $ (millions) |
|---|---|---|
| Metro Transit Light Rail Transit | $110.164 | $239.206 |
| Metro Transit/MTS/ Other Twin Cities opt-out providers | $467.845 | $1,015.857 |
| Northstar | $18.357 | $39.859 |
| Paratransit (Metro Mobility & Transit Link) | $67.848 | $147.322 |
| **Total** | **$664.214** | **$1,442.244** |

# 4.0 Regional Transit O&M Revenues

The basis of this project's O&M revenue forecasts is a Financial Management Plan previously prepared for the Southwest LRT Project, which included revenues for the BLRT Project and the Orange Line BRT Project. That document presented revenue forecasts through the Year 2035. For the Southwest LRT Project's FEIS, those forecasts were extended to the Year 2040. Revenue assumptions identified in the Southwest Finance Assumptions Memo are noted below.

## 4.1 Metro Transit

Revenue assumptions for Metro Transit in the Southwest LRT Project Financial Management Plan are as follows:

- **Fare Revenue:** Fare revenues are based on projected ridership that reacts primarily to increasing population and employment. Established Metropolitan Council fare policy requires a 10% increase in average fares whenever the bus farebox recovery declines to 28.5%.

- **CTIB:** The CTIB has approved a resolution to commit to fund 50% of the Southwest LRT operating deficit (operating cost net of farebox revenue). It is also anticipated to provide 50% of the net operating deficit for the BLRT Project, and 41.95% for Northstar rail services.
- **State General Funding:** State general fund operating subsidies have historically grown more rapidly than inflation in recent years. However, in an attempt to be conservative, the State operating funds in the Southwest LRT financial capacity analysis assumes that the state general fund revenues grow proportionally with inflation (assumed to be 3.15% per year).
- **Motor Vehicle Sales Tax (MVST):** The primary source for non-Southwest LRT operating assistance is the statewide MVST. This financial analysis uses an average annual increase of 4.90% to project MVST revenues between 2015 and 2040.
- **Other Metro Transit Operating Revenues:** Other revenue including advertising revenue for bus and existing light rail transit services will grow at 1.0% per year from 2016 to 2040.
- **FTA Funds:** The 2015 Financial Plan forecasts FTA Section 5307 Urbanized Area Formula Funds at a fixed annual growth rate, which is approximately 2.4% after 2014 and 3.0% after 2024. Other federal revenues included in the Financial Plan include 5337 State of Good Repair, 5339 Bus and Bus Facilities and Congestion Mitigation Air Quality (CMAQ) funds.

## 4.2 BLRT Revenues vs. Cost Analysis

As noted earlier, O&M revenue forecasts for the Southwest LRT Project's Financial Management Plan already include anticipated revenues for the BLRT Project. Table 4-1 presents a comparison of annual system-wide costs to revenues for the year 2040. Total O&M cost figures for both the No-Build and Build Alternatives are from Section 3.0 of this memo. Revenue figures for the BLRT Build are consistent with those previously developed for the Southwest LRT FEIS, since those figures already took into account Blue Line revenues. For the No-Build Alternative, revenues were reduced, based on documentation in the Southwest LRT Financial Management Plan which presented 2035 BLRT revenues, and 2035 to 2040 revenue growth assumptions used in the Southwest LRT FEIS. As shown in this table, system-wide O&M costs are not anticipated to exceed system-wide revenues.

**Table 4-1: Annual System-wide O&M Costs and Revenues in 2040: No-Build and LPA (2040 dollars, in millions $)**

| Costs/Revenue Source | SW LRT Build / BLRT No-Build | BLRT Build |
|---|---|---|
| **Total O&M Costs** | **$1,392.036** | **$1,442.242** |
| **Revenues** | | |
| Fares | $337.998 | $354.544 |
| Motor Vehicle Sales Tax | $804.036 | $804.036 |
| CTIB | $86.722 | $101.813 |
| Other Revenue | $17.112 | $17.659 |
| Local Operating Assistance | $5.254 | $5.254 |
| Federal Operating Assistance | $15.245 | $15.245 |
| State Operating Assistance | $206.460 | $221.551 |
| Interest on Operation Balance | $1.133 | $1.133 |
| **Total Revenues** | **$1,473.960** | **$1,521.235** |

*Sources: Southwest LRT Financial Management Plan, Revision 02-00, August 2015, Southwest LRT Financial Analysis in Support of the FEIS (Draft) September 15, 2015.*

## 4.3 Potential Responses to Operating Shortfalls

Short term shortfalls, forecasted for selected years in the cash flow projections, are covered by the operating reserves. In the longer term, Metro Transit relies on the MVST growth and its fare policy. Presently, nearly 46% of the Metropolitan Council Transportation Division's operating funds are obtained from the statewide MVST revenues. MVST is the Council's single largest source of transit operating funding. The baseline forecast assumes significant real growth over the long run from this source as a result of passage of the November 2006 referendum. The MVST revenues are projected to increase at a rate of 4.90% per year in the long run. This forecast is viewed as conservative for financial planning purposes as historical trended MVST receipts for the period of 1973 to 2014 averaged 5.10%. The fare policy is an even stronger guarantee of sustainability, because it assures that passenger revenue will growth with operating costs. This policy recommends a 10.0% increase in average fares whenever the bus farebox recovery ratio declines to 28.5%. The Metropolitan Council had their last fare increase in 2008.

Several sources of supplemental operating funding could be made available to Metropolitan Council's Transportation Division in the event that MVST revenues do not grow as expected.

These sources include:

- **Metropolitan Council Transportation Division Operating Reserve:** The Metropolitan Council Transportation Division reserve at the end of 2014 is $120.19 million and can be used to cover any deficits that might arise with or without the BLRT Project in place.
- **State General Funds/State Commitments:** The State's commitment to transit in the Metro region, and its specific commitment to developing the BLRT Project, may be regarded as an opportunity for financial risk management of operations. State general fund appropriations for transit operating subsidies have historically grown more rapidly than inflation in recent years. However, in an attempt to be conservative, the State operating funds in the baseline capacity analysis are anticipated to increase slowly from their 2015-2016 level at 3.15% proportionately with inflation.
- **Moderate Additional Fare Increases:** Under the baseline projection by the Metropolitan Council, a fare increase was implemented in 2008. Fare increases could be accelerated if needed. Transit fare increases typically result in increased fare revenues but decreased ridership.
- **Apply New Operating Funding Sources:** New operating funding sources could include the implementation of new or expanded non-farebox revenue sources (e.g., expanded advertising or joint development).
- **Reduce Service:** Reduce the length or number of daily trips, weekend and seasonal/holiday service, or the length of trains.
- **Apply New, Non-Operating Sources:** Apply additional CTIB operating assistance if available and develop supplemental sources of State or other revenues.

The stability of Metropolitan Council's financial environment will permit managing the long-term maintenance and operation of the BLRT Project's service in a well-planned, deliberate and financially prudent manner.