Python Scripting to Create 300+ Accessible PDF Maps in Mere Hours

Mike Dolbow | GIS Coordinator
MNIT Partnering with Department of Education

MINNESOTA IT SERVICES

Agenda

Topic
Why You Should Care About Accessibility in Maps
What Doesn't Work Well With PDF Maps from Desktop Tools
What works better? Microsoft Word
Python Library for .docx Creation
Hacking Python for Alt-Tagging Images
Batch Creation of Maps in Word
Batch Conversion of Word to PDF

Why You Should Care About Accessibility in Maps

- Mapped information is important to ALL citizens

- It's not just about checking color for people with color blindness

- If you can't sum it up quickly, provide an alternative format

- You're probably not making tactile maps

- I know I'm preaching to the choir

**Feel the map**

Taste the map

What Doesn't Work Well: PDF Maps and ArcGIS Pro

- Converting to PDF produces a pretty empty file, accessibility-wise

- Traditional tagging methods produce empty tags

- Manual process to create proper tags

- Pro version 2.6.1

- Accessibility options at 2.8 (?) are good but still leave some manual work

What Doesn't Work Well: PDF Maps and QGIS

- Default export still filled with accessibility issues

- Issues with ligatures when using Calibri font

- Manual process to create proper tags

- Version 3.10.13-A Coruña

  - (Version 3.22 looks better)
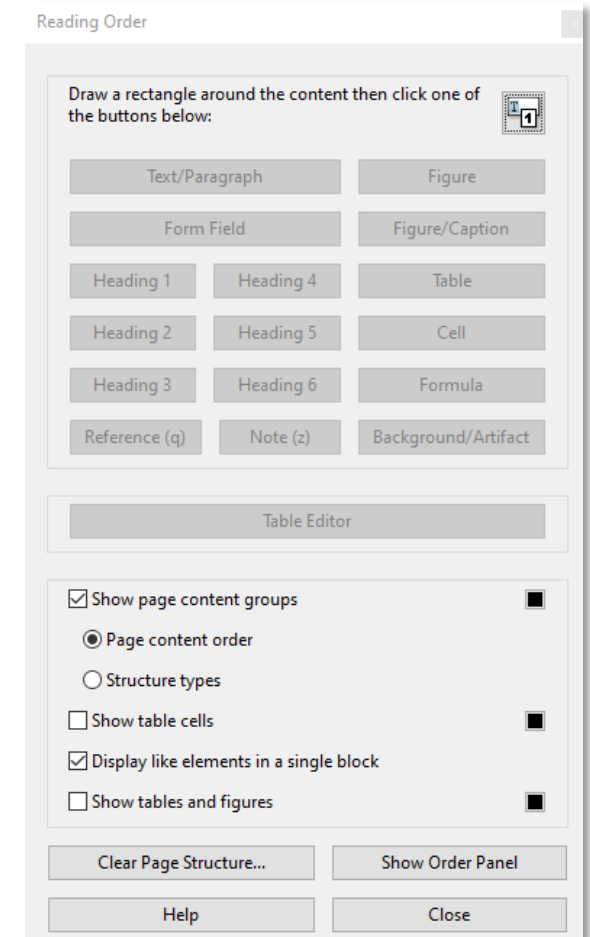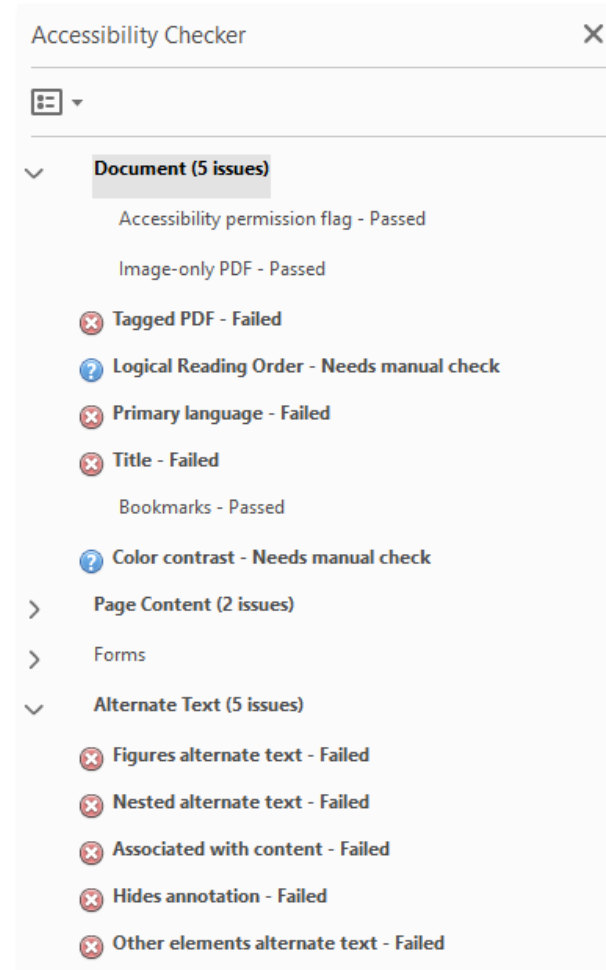
What's So Bad About Manual Steps?

Imagine doing that for over 300 maps.

What works better? Microsoft Word

- When you convert a Word doc to a PDF:

  - A Heading gets converted to…a Heading

  - Tagging an image with alt text results in…a properly tagged image

  - Bulleted lists become…bulleted lists!

  - Hyperlinks become…you guessed it!

- Requires layout planning in Word
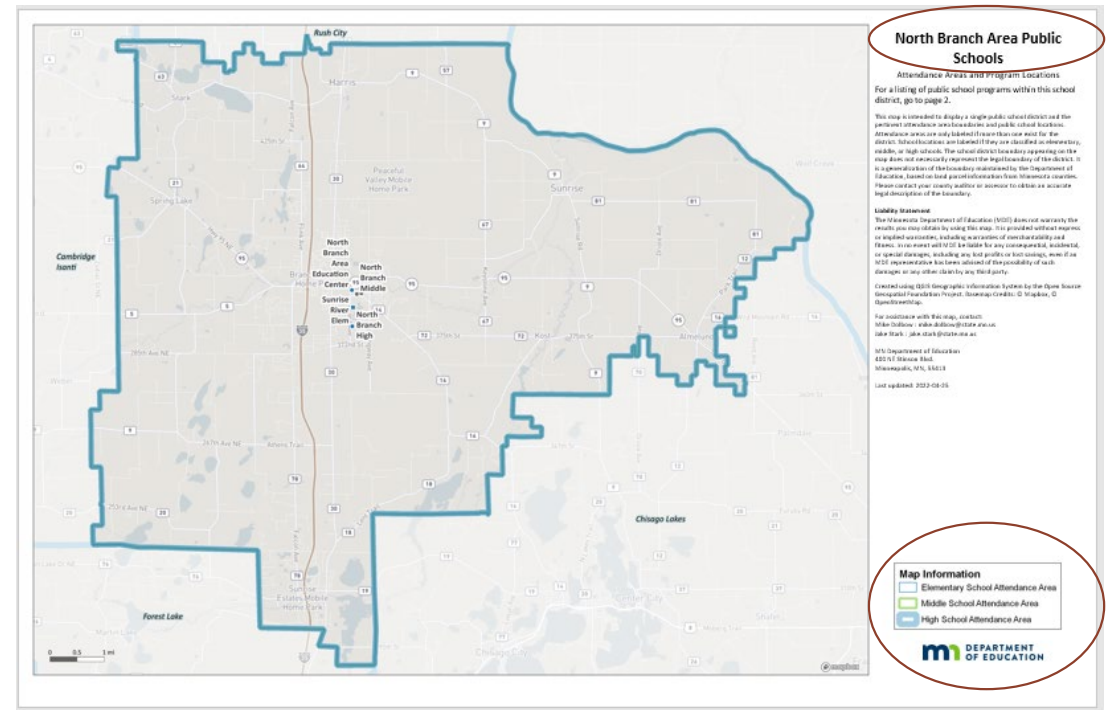
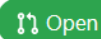# Python Library for .docx Creation

- For creating and updating Word docs

- MIT License

- 11 contributors

- OK documentation
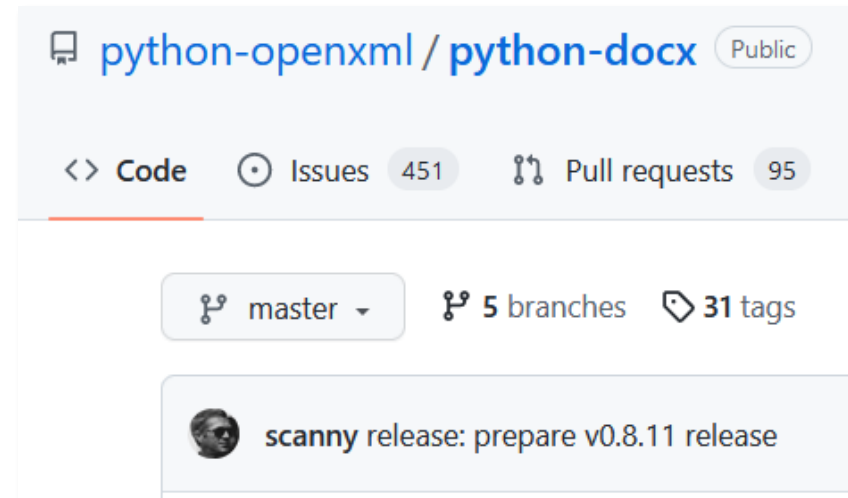
Python Library for .docx Creation, cont.

- Doesn't do alt-tagging *by default*

- Cloning and integrating a standing pull request enables alt tags

- SO: some comfort with Git, GitHub, pull requests required

I had to set up several modifications (hacks):

- I wanted floating images because they provided more layout flexibility

- I wanted to do both portrait and landscape

- I needed various lists of school programs and of course the batch/atlas-created map images

Jumbly Code Sample #1 – Floating Picture

```python
def add_float_picture(p, image_path_or_stream, alt_text, width=None,
height=None, pos_x=0, pos_y=0):

    """Add float picture at fixed position `pos_x` and `pos_y` to the
top-left point of page by default, or the passed positions

    """

    run = p.add_run()

    #ORIGINAL: anchor = new_pic_anchor(run.part, image_path_or_stream,
width, height, pos_x, pos_y, alt_text)

    anchor = new_pic_anchor(p.part, image_path_or_stream, width,
height, pos_x, pos_y, alt_text)

    run._r.add_drawing(anchor)
```

Jumbly Code Sample #2 – Layout Parameters

```
 #Set up Layout Parameters
    # dictionary format: {orientation:[pagewidth,pageheight,imagewidth]}.
    # In other words, the first parameter of each dictionary is used for Portrait maps,
the second for Landscape
    orientation = [WD_ORIENT.PORTRAIT,WD_ORIENT.LANDSCAPE]
    pagewidth = [Inches(11),Inches(17)]
    pageheight = [Inches(17),Inches(11)]
    imagewidth = [Inches(10.5),Inches(13.5)]
    margin = [Inches(0.25)] #to fit our maps we really need to use the whole page or a
very small margin
    #legendposition - different per layout format.
    legendpositionx = [Inches(7.6),Inches(13.8)]
    legendpositiony = [Inches(14.3),Inches(8.7)]
    #logoposition - also different per layout format.
    logopositionx = [Inches(8.0),Inches(14.25)] #X should be 0.4 inches greater than
legend to center when stacked
    logopositiony = [Inches(15.6),Inches(10)] #Y should be 1.3 inches greater than legend
(when stacked)
```

Jumbly Code Sample #3 – Adding floating images

```python
 # Add the map image with the floating picture option
        docx_floating_picture.add_float_picture(pFloatMapImg, mappath + "\sd_" +
districtRow[0] + ".png", mapAltText, width=imagewidth[layout], pos_x=Inches(0),
pos_y=Inches(0))

        #Add floating image paragraph to hold floating images of legend and logo (If
we just use the pFloatMapImg paragraph, the logo and legend get lumped in with the map,
and are out of order in the tag tree)
        pFloatImg = document.add_paragraph("","FloatPGraph")

        #Add legend and logo images as floats for Landscape
        docx_floating_picture.add_float_picture(pFloatImg, imgPath +
"\legend_landscape.png", "Legend for Map", width=Inches(2.65),
pos_x=legendpositionx[layout], pos_y=legendpositiony[layout])
        docx_floating_picture.add_float_picture(pFloatImg, imgPath +
"\mde_logo_lg.png", "Minnesota Department of Education Logo", width=Inches(1.9),
pos_x=logopositionx[layout], pos_y=logopositiony[layout])
```

Batch Conversion of Word to PDF

- Bulk conversion requires Adobe Acrobat Pro

- It can still require a little work:

  - Only about ~80 per run before crashing

  - Requires an "Action" for "Set Open Options" to specify to "Display Document Title" as "Yes" for Accessibility Checker to recognize the titles

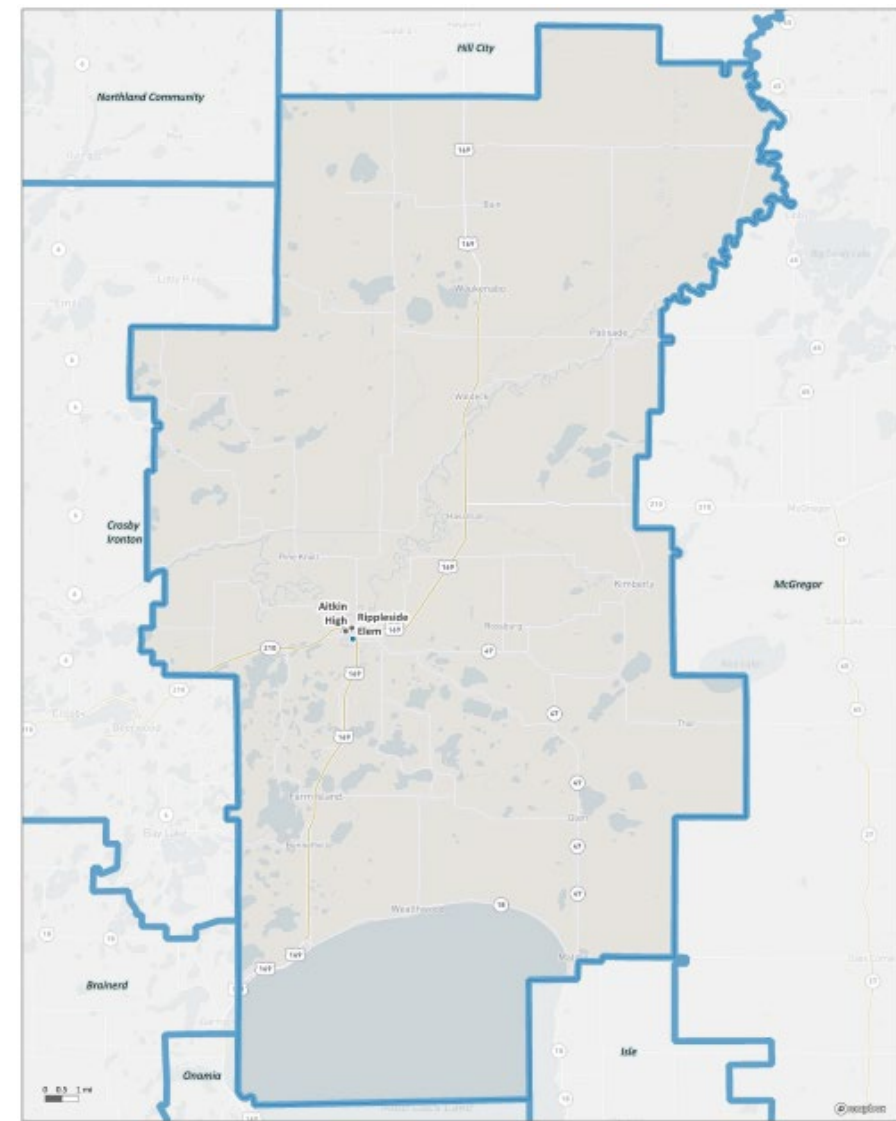YOUR SNOWBLOWER MAY BE FAST

BUT YOU AIN'T DONE YET

A look at the maps

Northfield Public School District

Attendance Areas and Program Locations

For a listing of public school programs within this school district, go to page 2.

This map is intended to display a single public school district and the pertinent attendance area boundaries and public school locations. Attendance areas are only labeled if more than one exist for the district. School locations are labeled if they are classified as elementary, middle, or high schools. The school district boundary appearing on the map does not necessarily represent the legal boundary of the district. It is a generalization of the boundary maintained by the Department of Education, based on land parcel information from Minnesota counties. Please contact your county auditor or assessor to obtain an accurate legal description of the boundary.

Liability Statement
The Minnesota Department of Education (MDE) does not warranty the results you may obtain by using this map. It is provided without express or implied warranties, including warranties of merchantability and fitness. In no event will MDE be liable for any consequential, incidental, or special damages, including any lost profits or lost savings, even if an MDE representative has been advised of the possibility of such damages or any other claim by any third party.

Created using QGIS Geographic Information System by the Open Source Geospatial Foundation Project. Basemap Credits: ® Mapbox, ® OpenStreetMap.
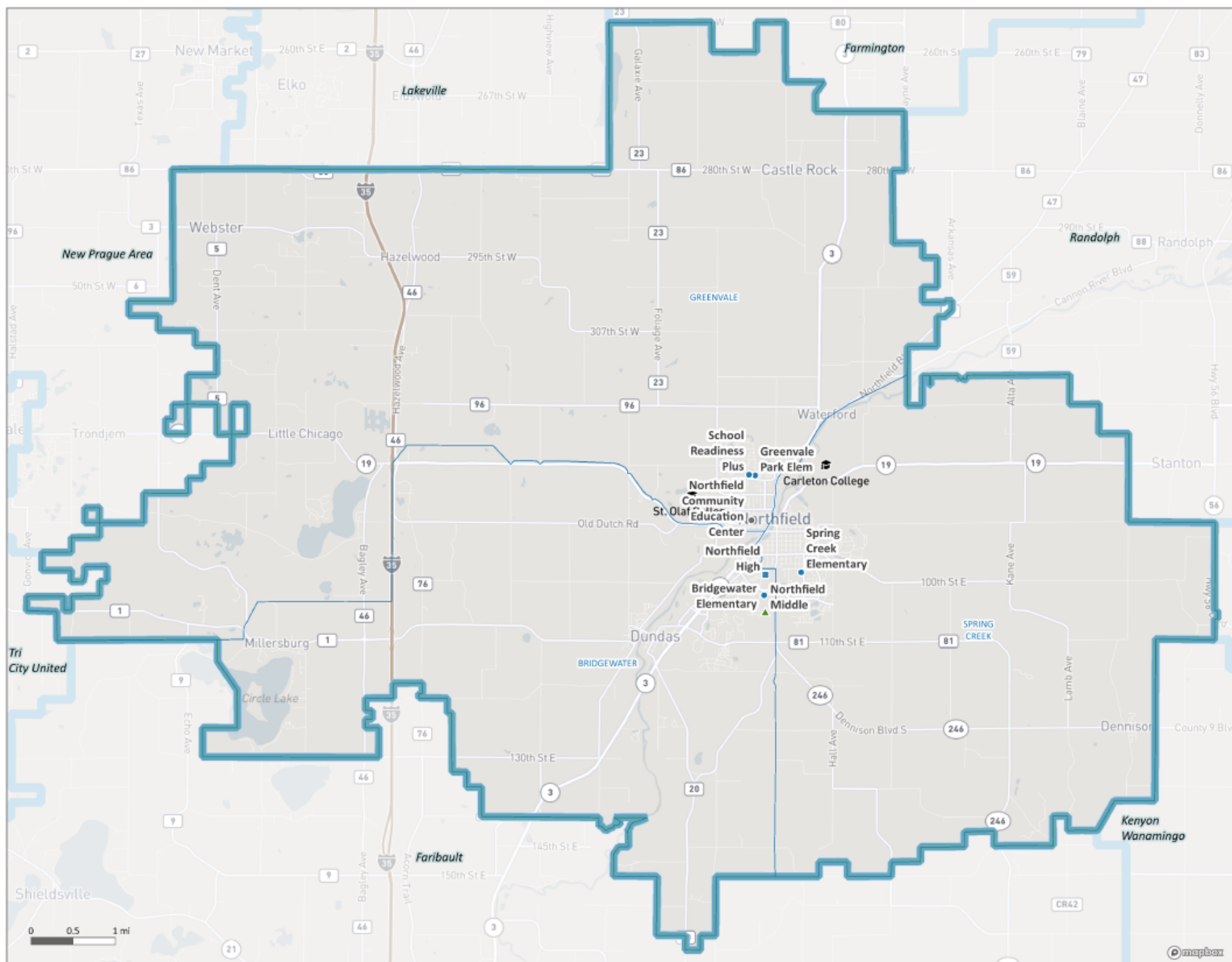
For assistance with this map, contact:
Mike Dolbow : mike.dolbow@state.mn.us
Jake Stark : jake.stark@state.mn.us
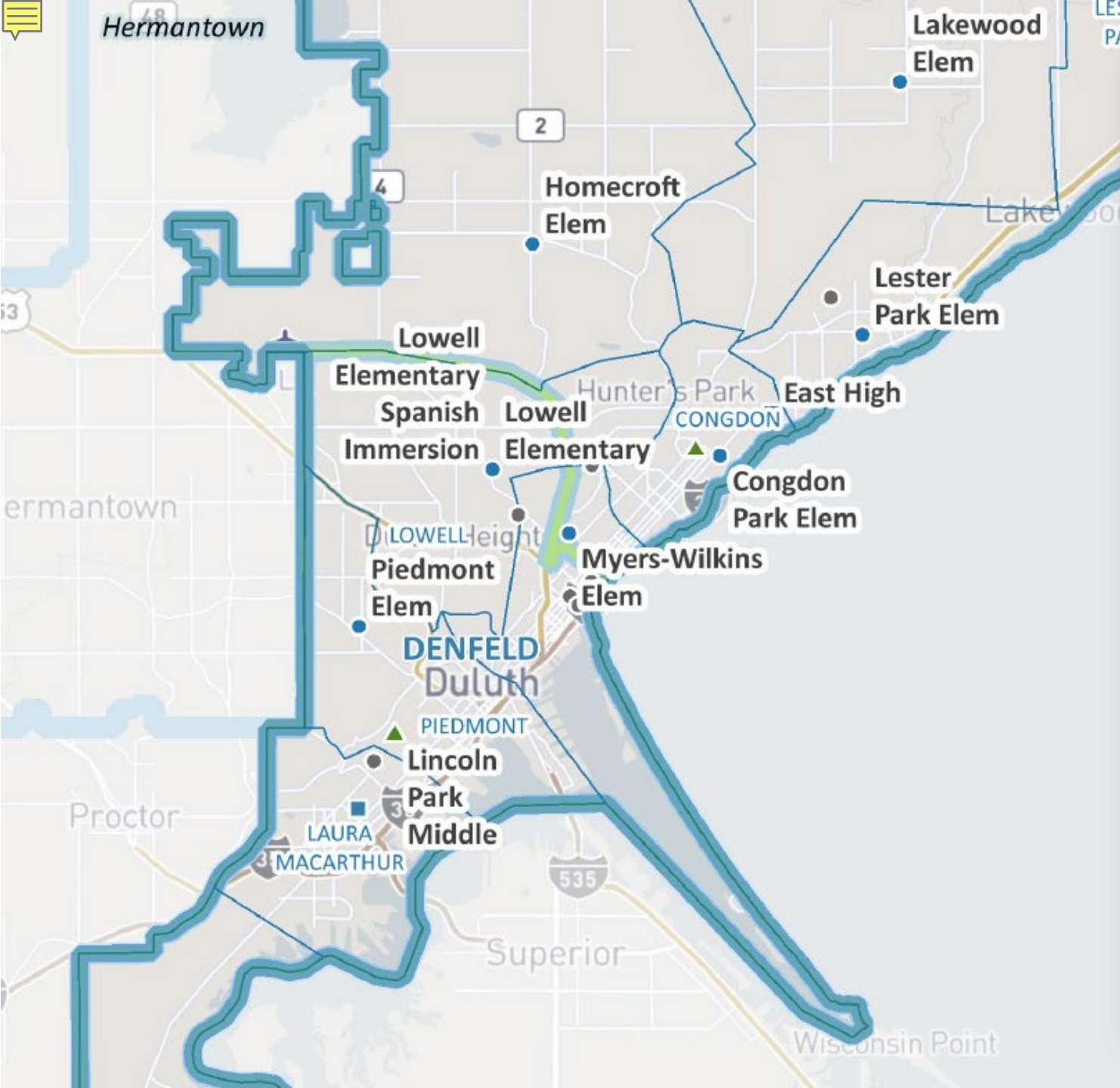
MN Department of Education
400 NE Stinson Blvd.
Minneapolis, MN, 55413

Last updated: 2022-04-25

Map Information
Elementary School Attendance Area
Middle School Attendance Area
High School Attendance Area
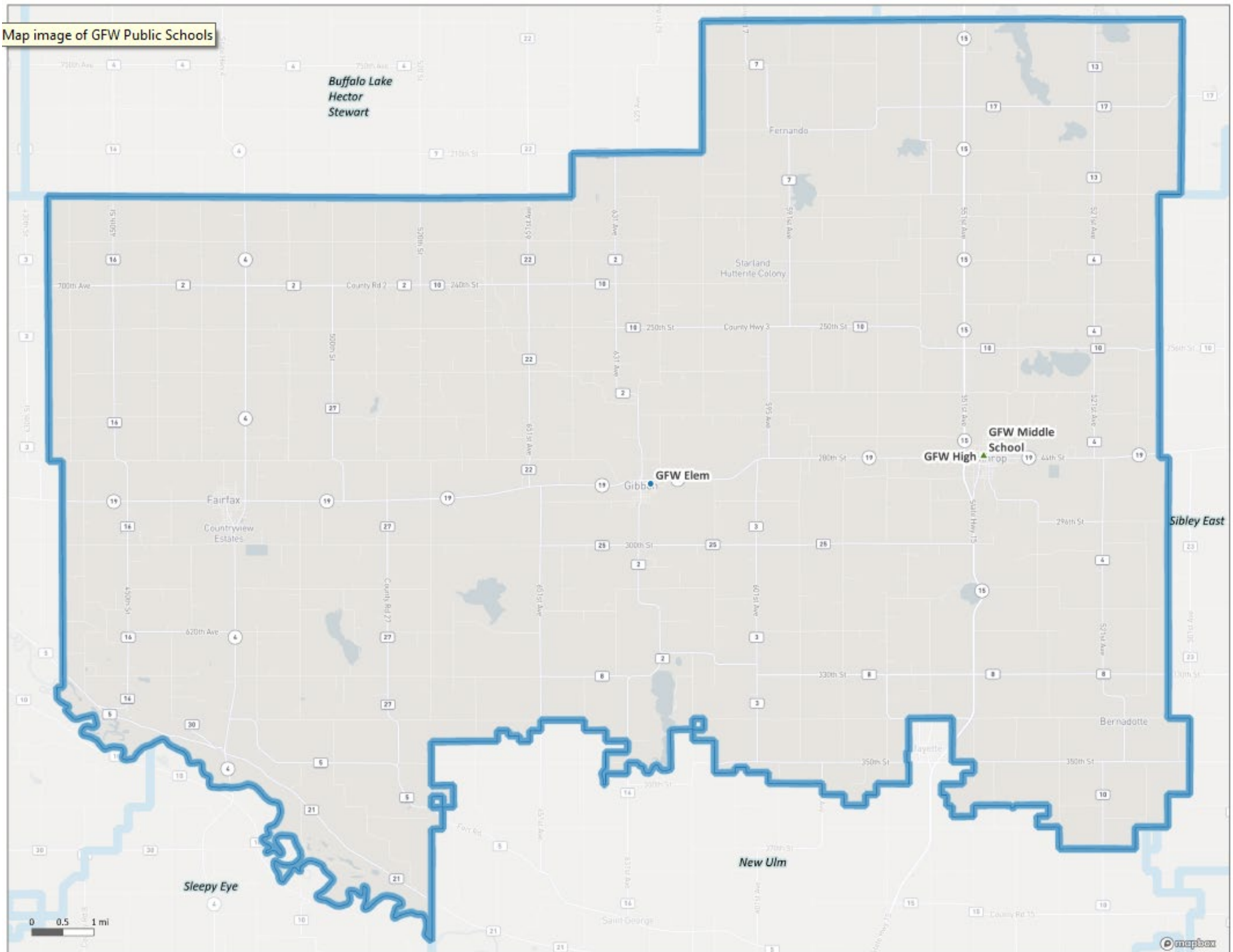
DEPARTMENT OF EDUCATION

Duluth Public School District Programs

All public school locations within the district are listed below. Corrections should be relayed to mde

- **School District Office:** 4316 Rice Lake Rd, Duluth, MN 55811
- **Academic Excellence Online:** 11 E Superior St, Duluth, MN 55802 (Grades 9-12)
- **ALC Independent Study:** 11 E Superior St, Duluth, MN 55802 (Grades 9-12)
- **ALC School Within a School:** 11 E Superior St, Duluth, MN 55802 (Grades 6-12)
- **Arrowhead Academy:** 1918 Arlington Ave N, Duluth, MN 55811 (Grades 4-12)
- **Bethany Crisis Shelter:** 4849 Ivanhoe St, Duluth, MN 55804-1131 (Grades KG-12)
- **Chester Creek Academy:** 714 1/2 W College St, Duluth, MN 55811 (Grades KG-12)
- **Congdon Elementary:** 3116 E Superior St, Duluth, MN 55812-1104 (Grades KG-5)
- **Denfeld High School:** 401 N 44th Ave W, Duluth, MN 55807-1494 (Grades 9-12)
- **Duluth Area Learning Center:** 11 E Superior St, Duluth, MN 55802-2013 (Grades 6-12)
- **Duluth Early Childhood Family Education :** 4316 Rice Lake Rd, Duluth, MN 55811
- **Duluth ESY:** 4316 Rice Lake Rd, Duluth, MN 55811 (Grades 1-12)
- **Duluth Excell Targeted Services:** 11 E Superior St, Duluth, MN 55802 (Grades 5-7)
- **Duluth School Readiness:** 4316 Rice Lake Rd, Duluth, MN 55811
- **Duluth Targeted Services:** 11 E Superior St, Duluth, MN 55802 (Grades KG-5)
- **Early Childhood Special Education:** 4316 Rice Lake Rd, Duluth, MN 55811 (Grade EC)
- **East High School:** 301 N 40th Ave E, Duluth, MN 55804 (Grades 9-12)
- **Homecroft Elementary:** 4784 Howard Gnesen Rd, Duluth, MN 55803-1226 (Grades PK-5)
- **Lakeside Academy:** 502 E 2nd St, Duluth, MN 55802-2058 (Grades KG-12)
- **Lakewood Elementary:** 5207 N Tischer Rd, Duluth, MN 55804-3010 (Grades KG-5)
- **Laura MacArthur Elementary:** 720 N Central Ave, Duluth, MN 55807-1398 (Grades EC-5)
- **Lester Park Elementary:** 5300 Glenwood Ave, Duluth, MN 55804-1699 (Grades KG-5)
- **Lincoln Park Middle School:** 3215 W 3rd St, Duluth, MN 55806 (Grades 6-8)
- **Lowell Elementary:** 2000 Rice Lake Rd, Duluth, MN 55811-4822 (Grades KG-5)
- **Lowell Elementary Spanish Immersion:** 2000 Rice Lake Road, Duluth, MN 55811 (Grades K
- **Merritt Creek Academy:** 4000 W 9th St, Duluth, MN 55807-1563 (Grades KG-12)
- **Myers-Wilkins Elementary:** 1027 N 8th Ave E, Duluth, MN 55805-1426 (Grades EC-5)
- **Ordean East Middle School:** 2900 E 4th St, Duluth, MN 55812 (Grades 6-8)
- **Piedmont Elementary:** 2827 Chambersburg Ave, Duluth, MN 55811-3004 (Grades EC-5)
- **Rockridge Academy:** 4849 Ivanhoe St, Duluth, MN 55804-1131 (Grades KG-12)
- **Special Ed. N.P.:** 4316 Rice Lake Rd, Duluth, MN 55811 (Grades EC+KG-12)
- **Stowe Elementary:** 715 101st Ave W, Duluth, MN 55808-1914 (Grades EC-5)
- **Superior Academy:** 615 Pecan Ave, Duluth, MN 55811 (Grades KG-12)
- **The Bridge:** 215 N 1st Ave E, Duluth, MN 55802 (Grade 12)

Buffalo Lake
Hector
Stewart

Sleepy Eye

New Ulm

Sibley East

GFW Elem

GFW Middle School

GFW High

18

Resources

- PDF Map Accessibility Repo (demonstrating issues with desktop tools): https://github.com/mmdolbow/pdf_map_accessibility

- MNIT Map Accessibility Page: https://mn.gov/mnit/about-mnit/accessibility/maps/

- Python Library for .docx Creation: https://github.com/python-openxml/python-docx

  - Pull request for alt text: https://github.com/python-openxml/python-docx/pull/317

- Download our maps: https://education.mn.gov/MDE/Data/Maps/

Credits

Brad Neuhauser   **Kim Wee**   **Becky Bernauer**

Thank You!

Mike Dolbow

mike.dolbow@state.mn.us

@mmdolbow