



Flood Mitigation

May 25th, 2023



Agenda

1. Introductions
2. Stormwater Runoff
3. Topographic Map Activity – Flow Path
4. When Runoff Becomes Flooding
5. How do we mitigate flooding?
6. Waltham Chester Brook

Introductions

Bob Wynn

– Waltham City Engineer

Fiona Worsfold

– Engineer at Brown and Caldwell

Scott Simpson

– Engineer/project manager at Brown and Caldwell



Introductions

Name

Favorite Class/Subject



Stormwater Runoff

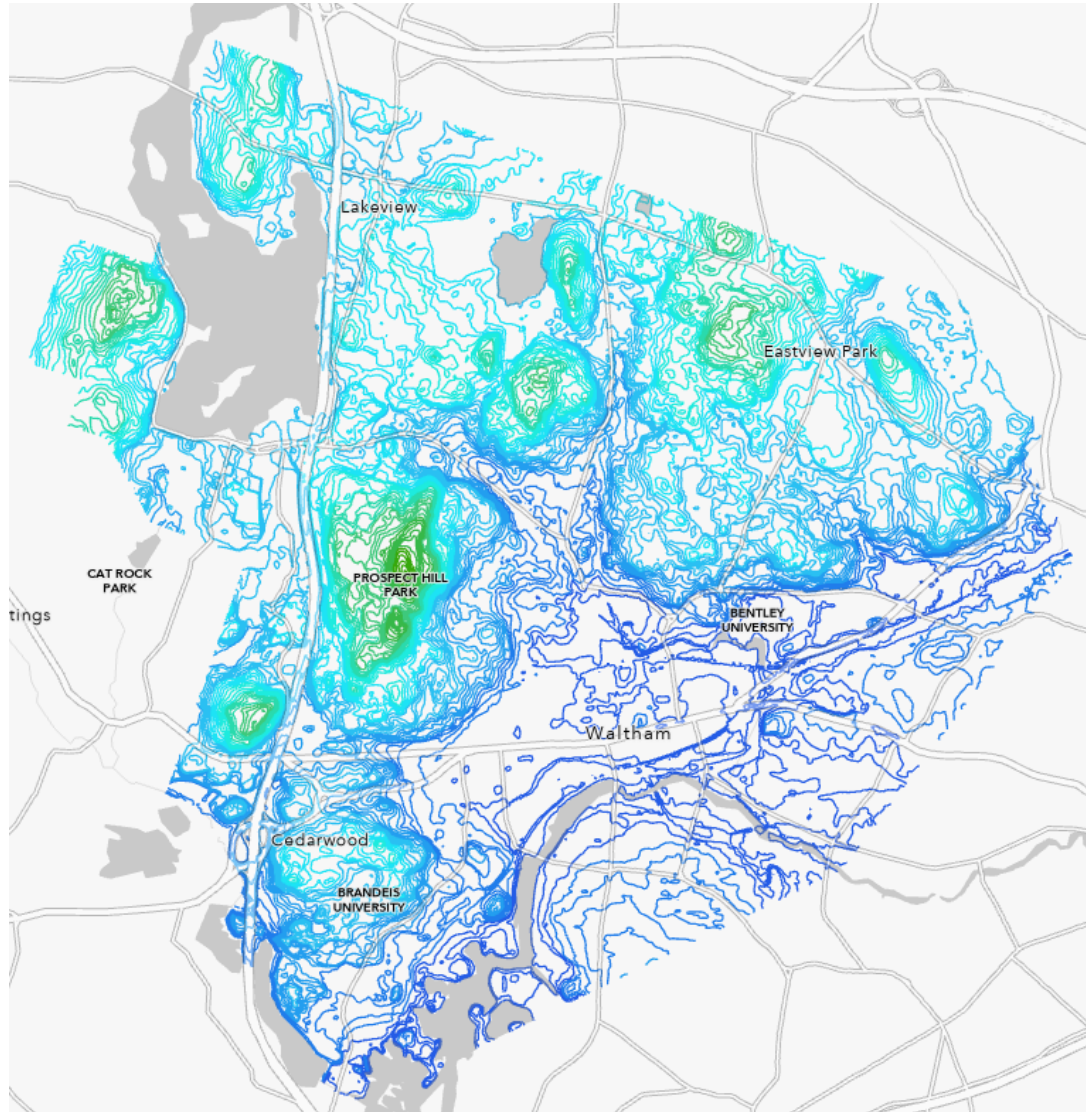
What is it?

- Rainfall can infiltrate into the ground or travel over the surface
- When it travels over the surface, it's called runoff

Where does it go?

- Runoff travels using gravity and natural or man-made channels
- It should end up in natural water systems, but if the path is blocked, it won't

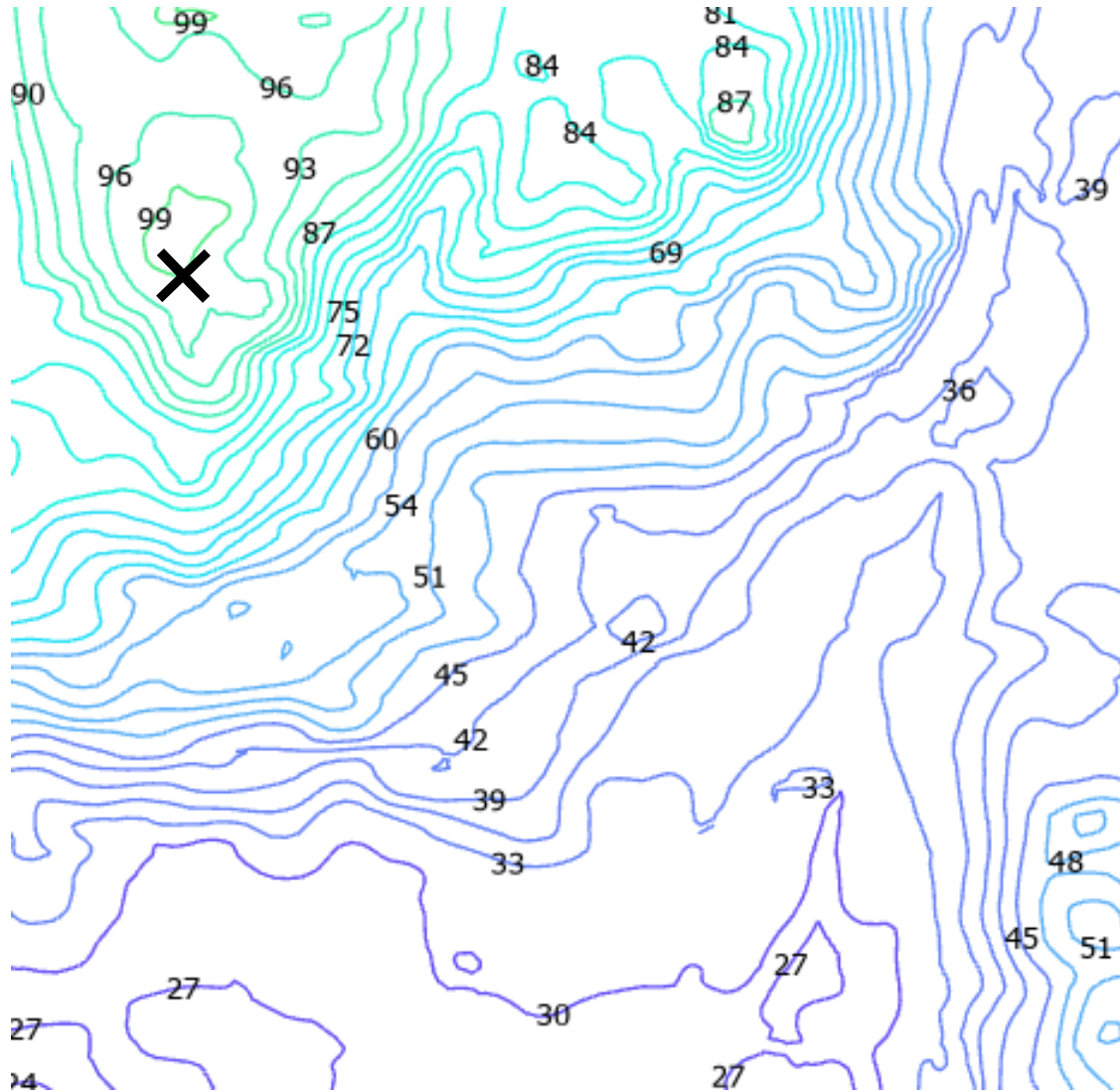




Activity

Tracking Runoff through Topography

- When dealing with flooding issues, we figure out where runoff goes
- We use the natural topography to determine the path runoff takes to see where it accumulates

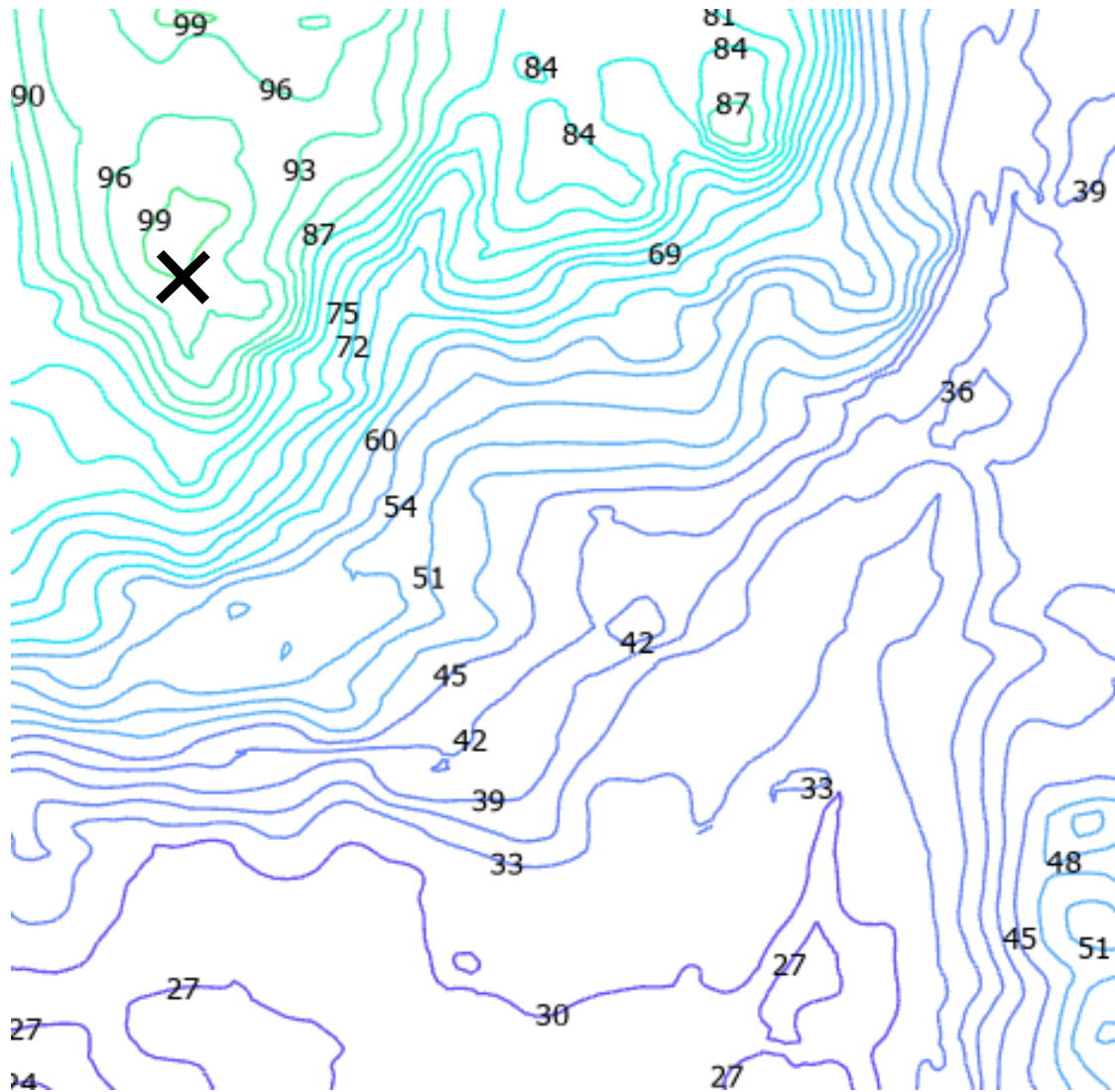


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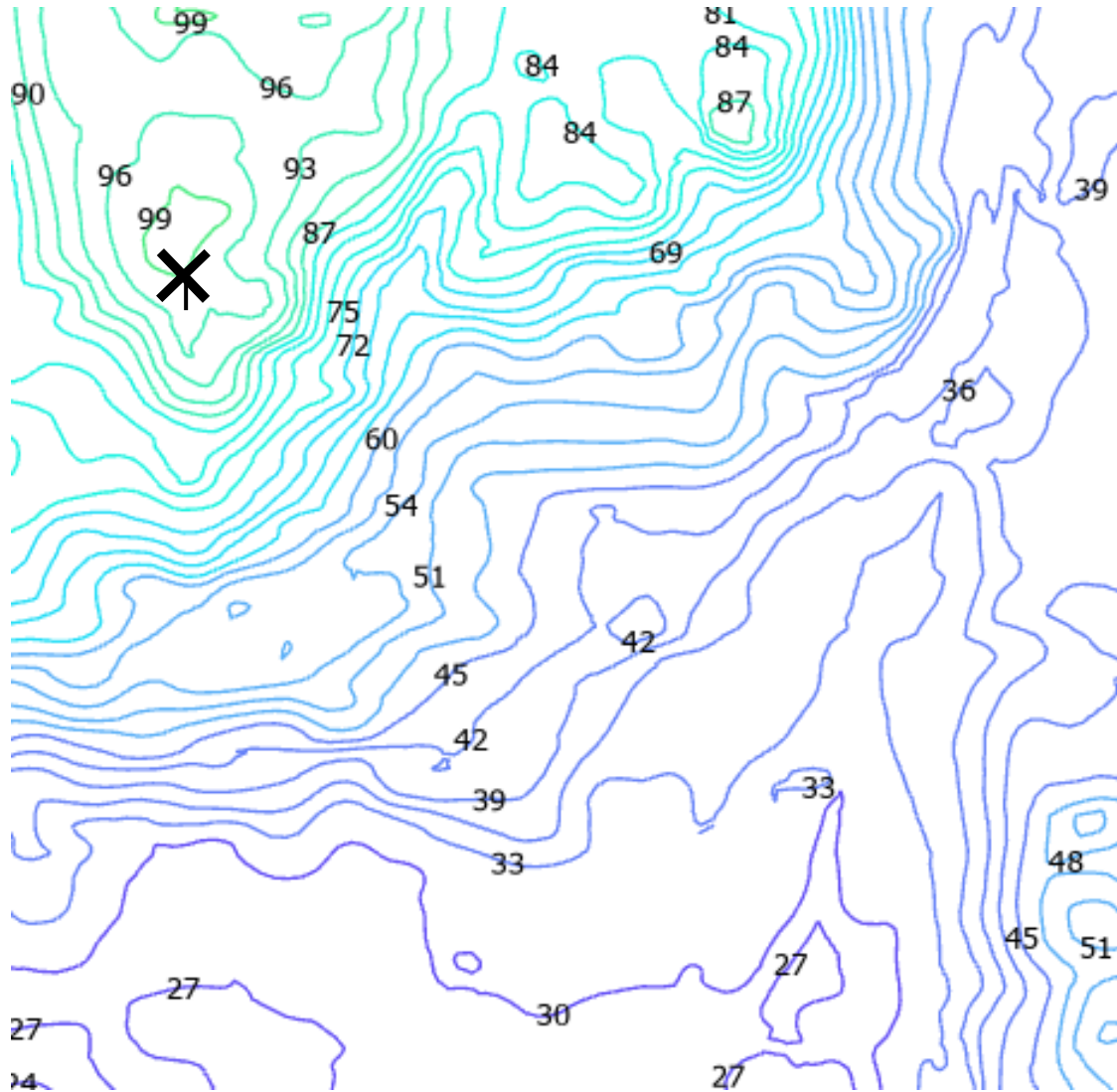


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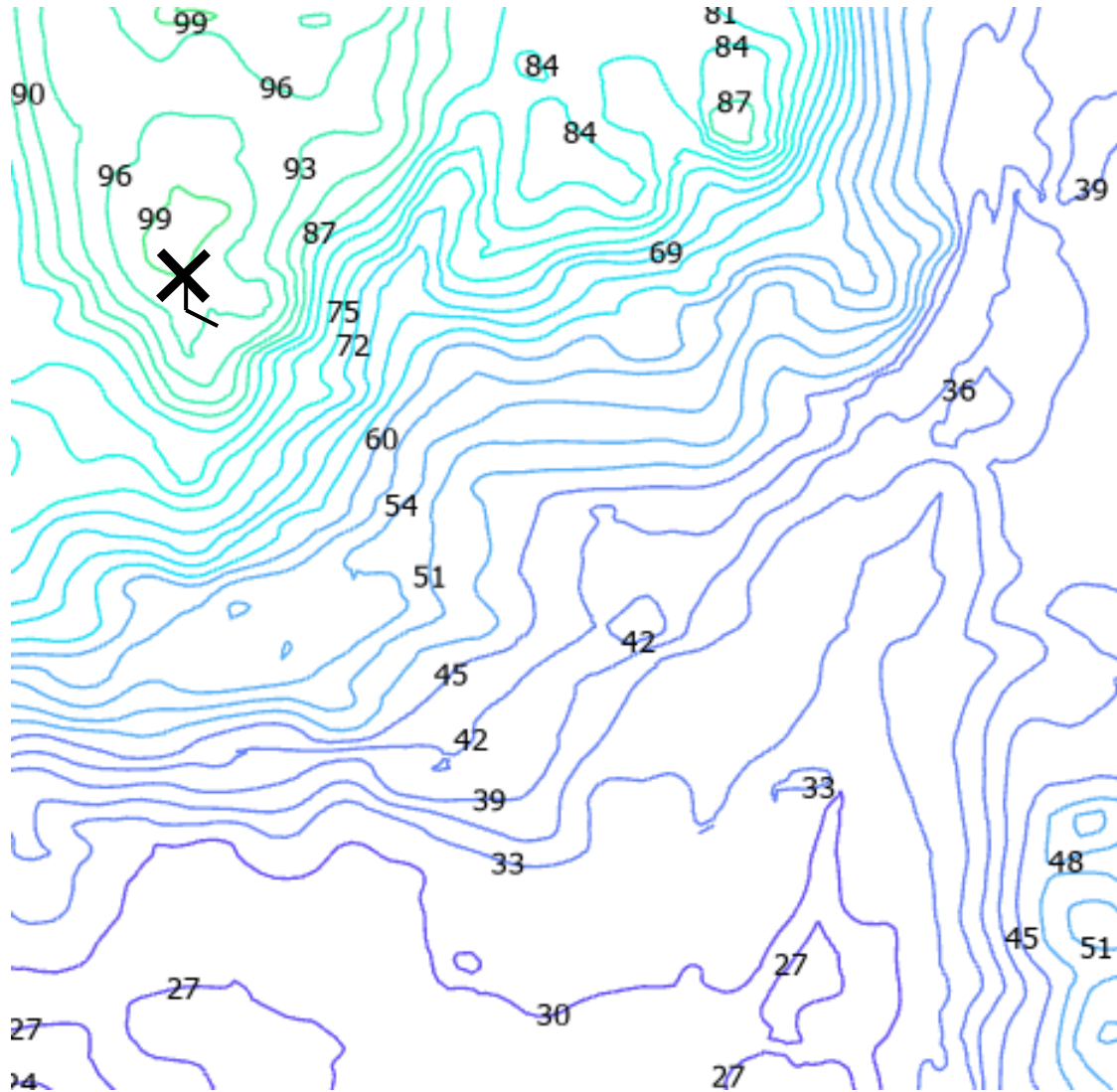


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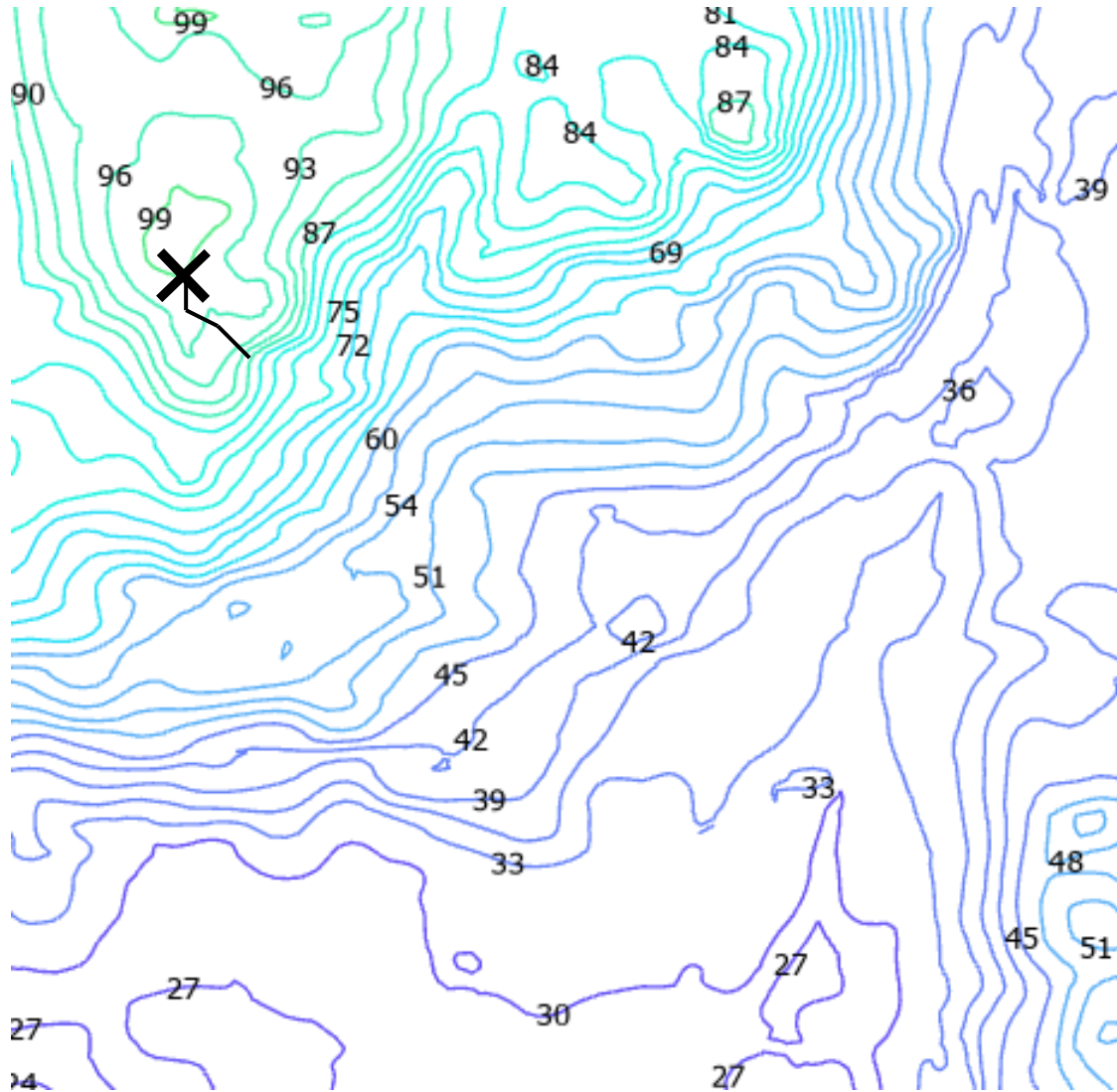


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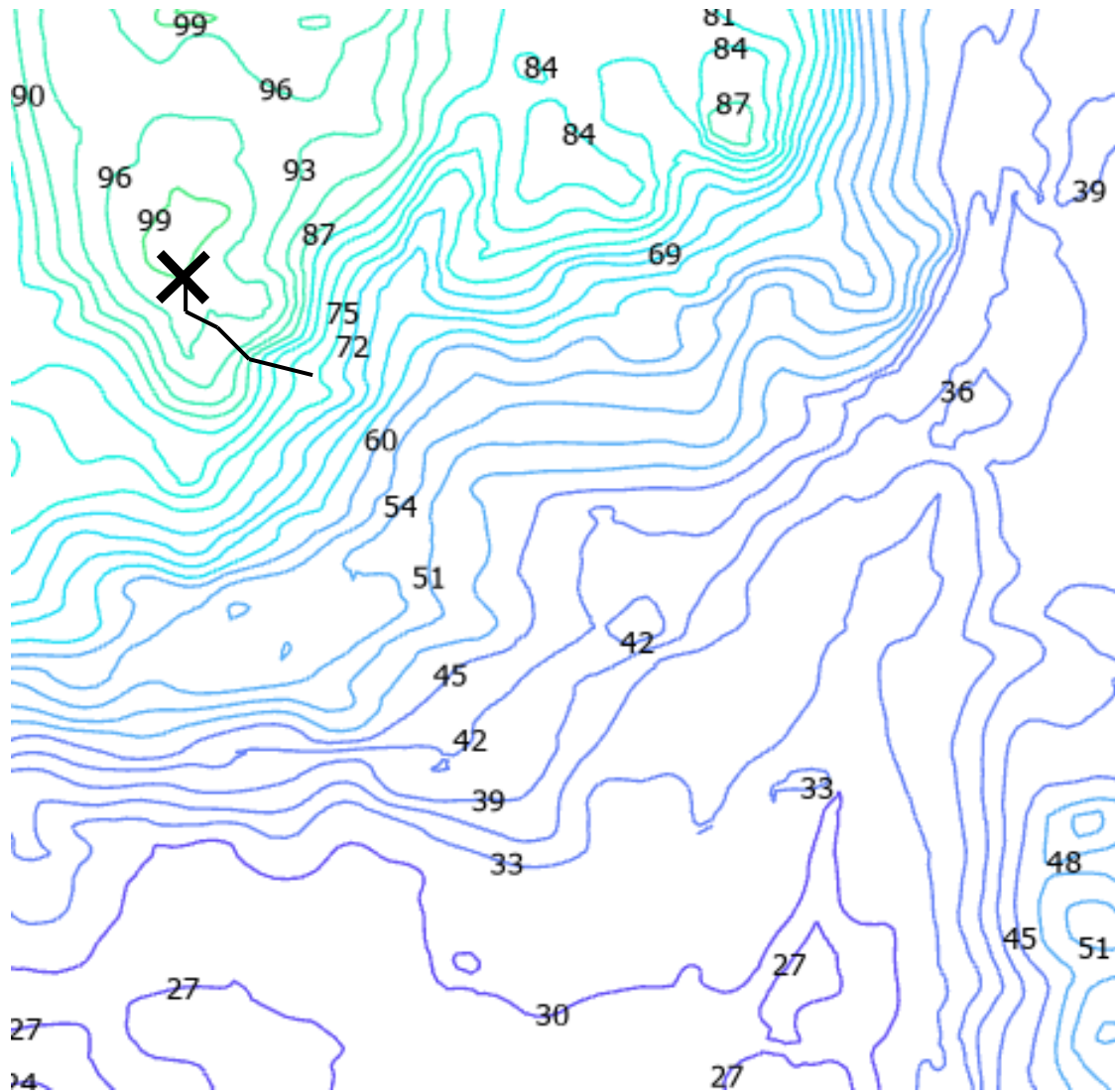


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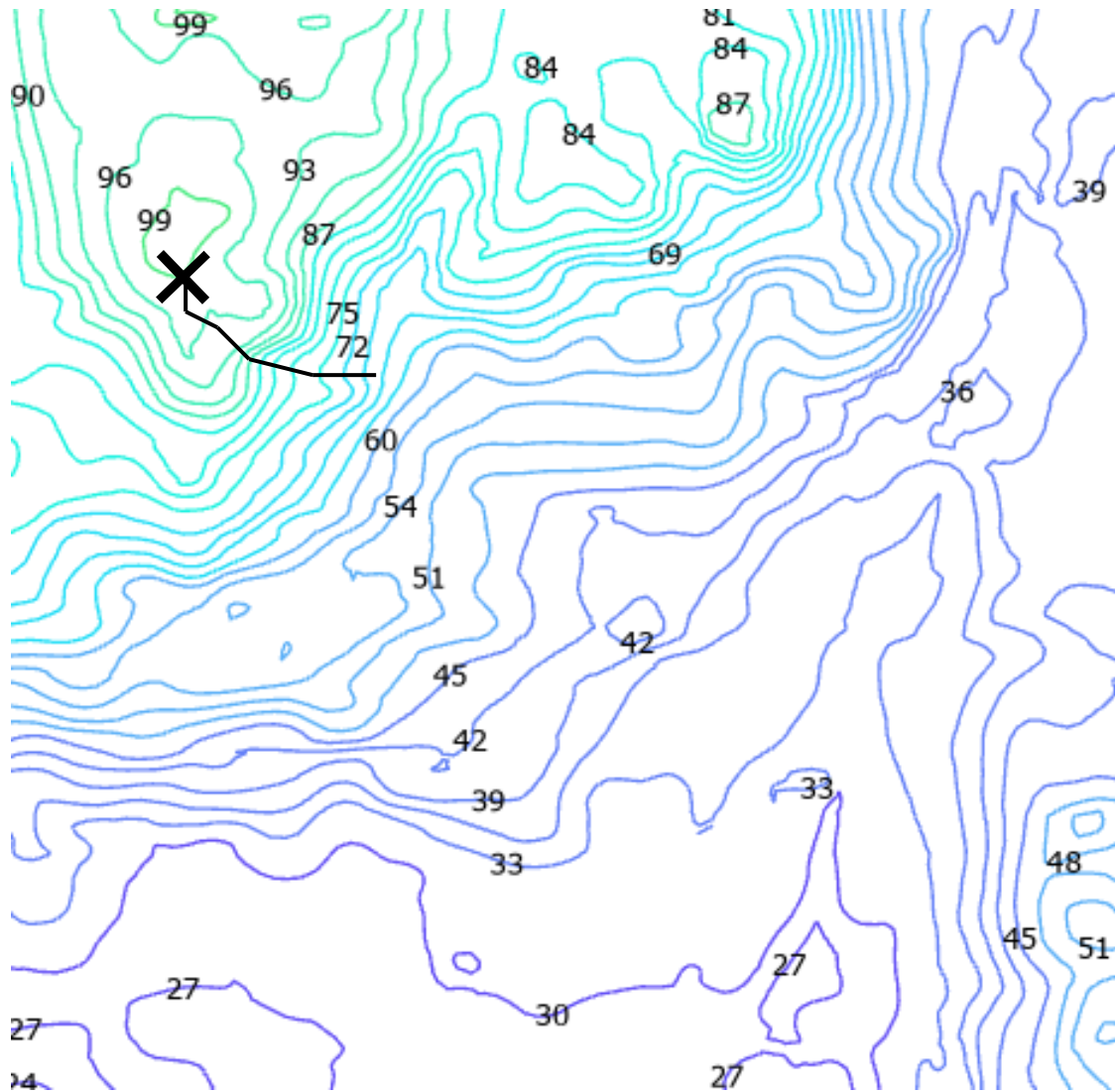


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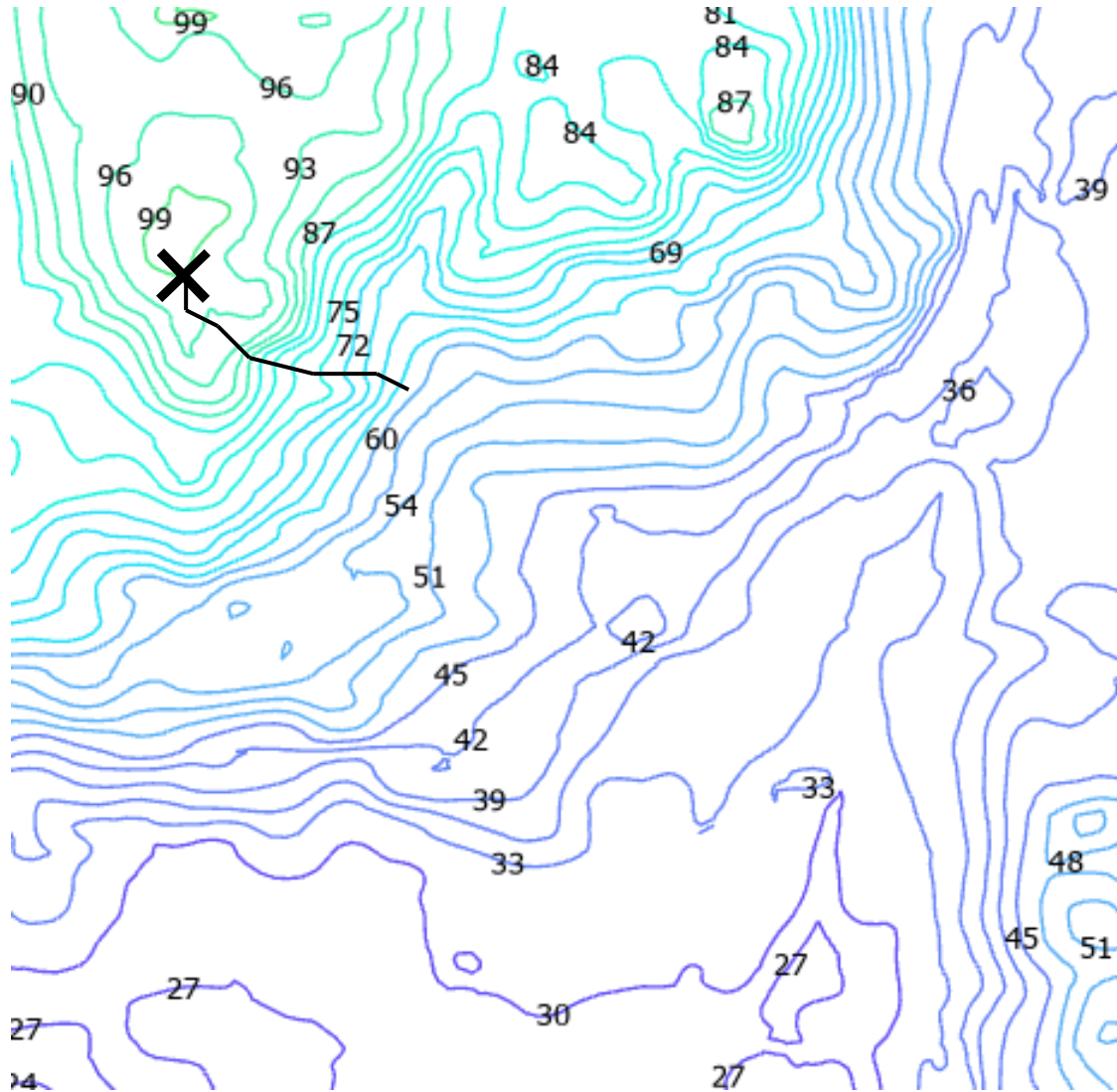


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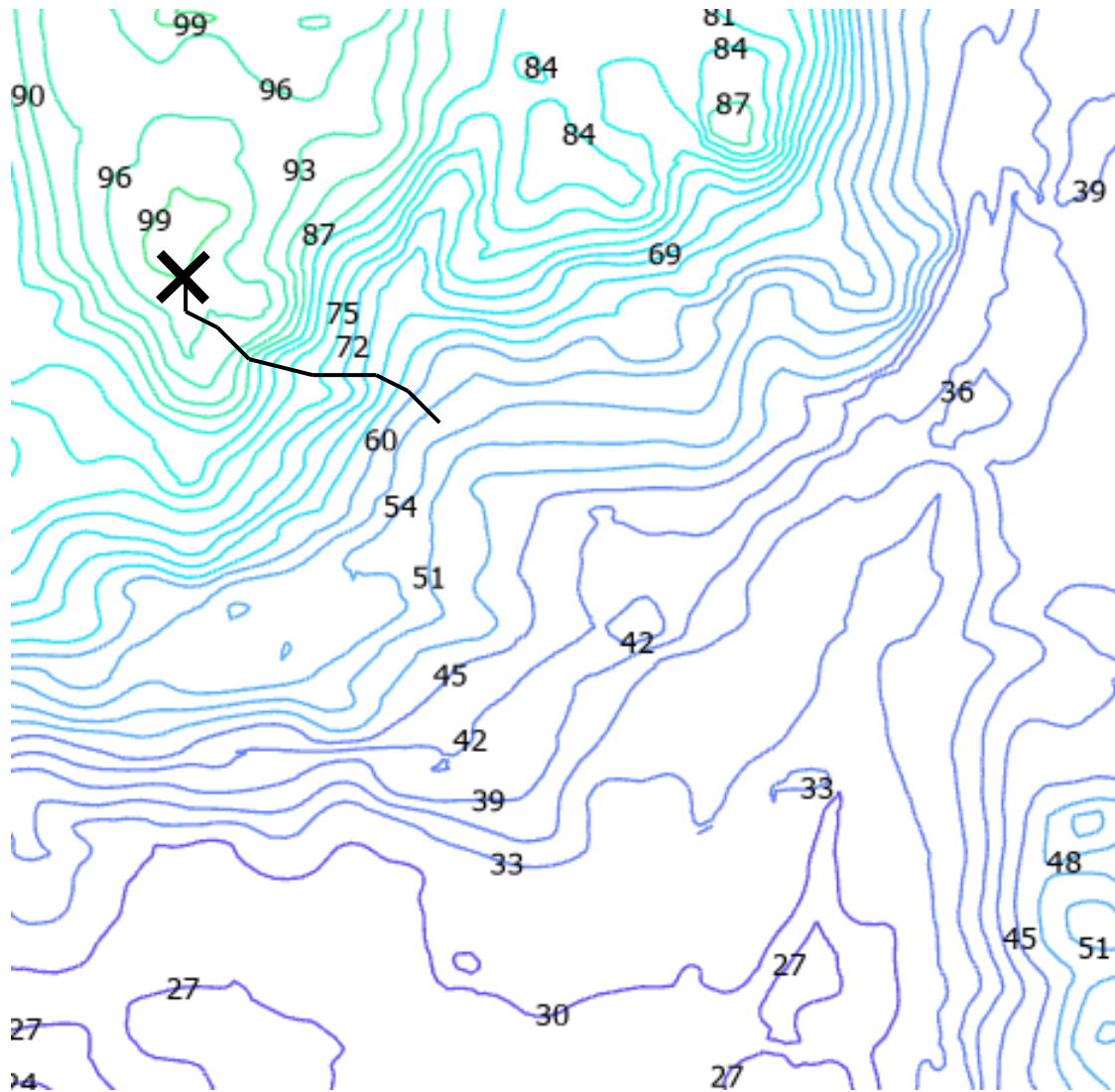


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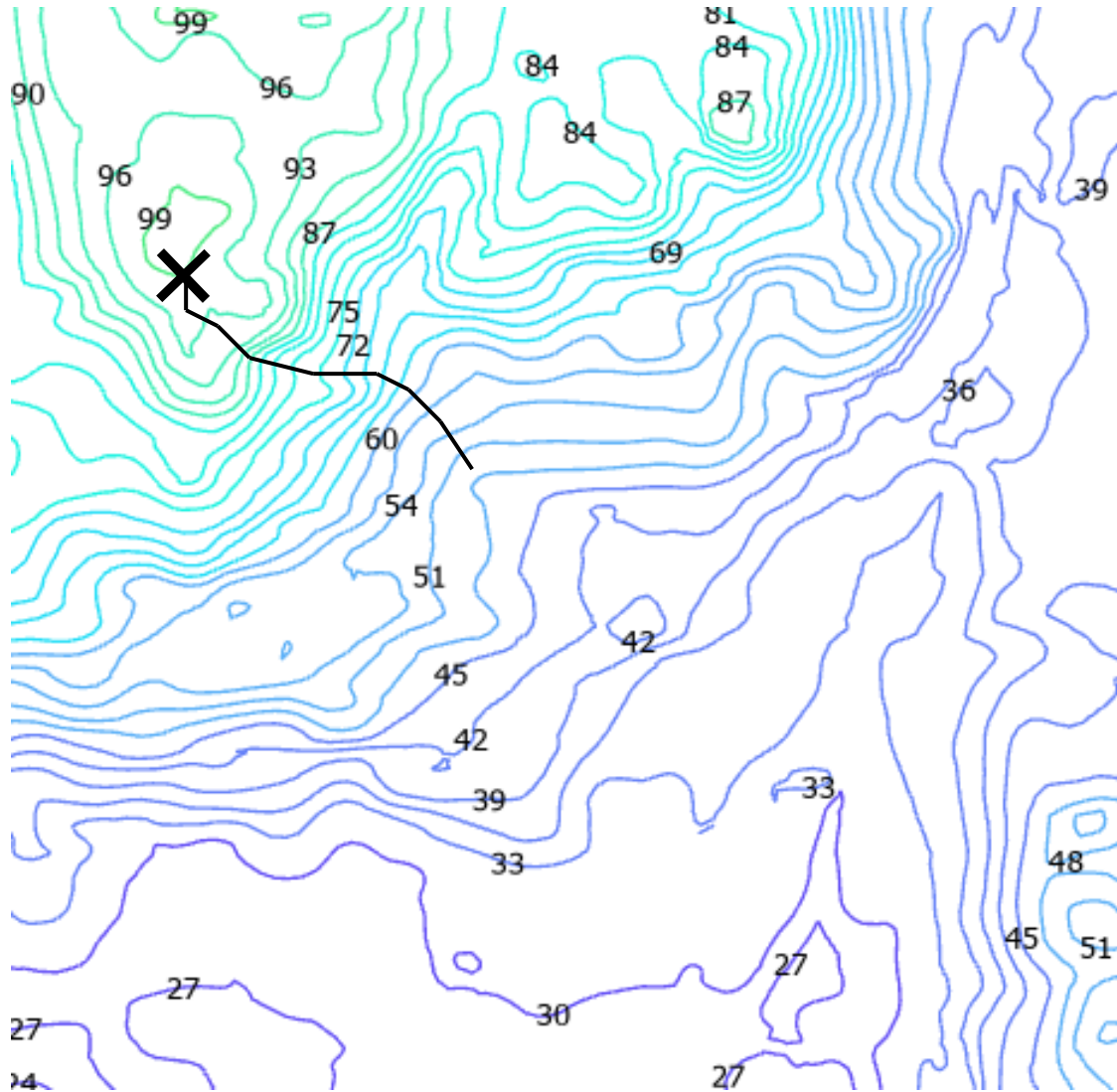


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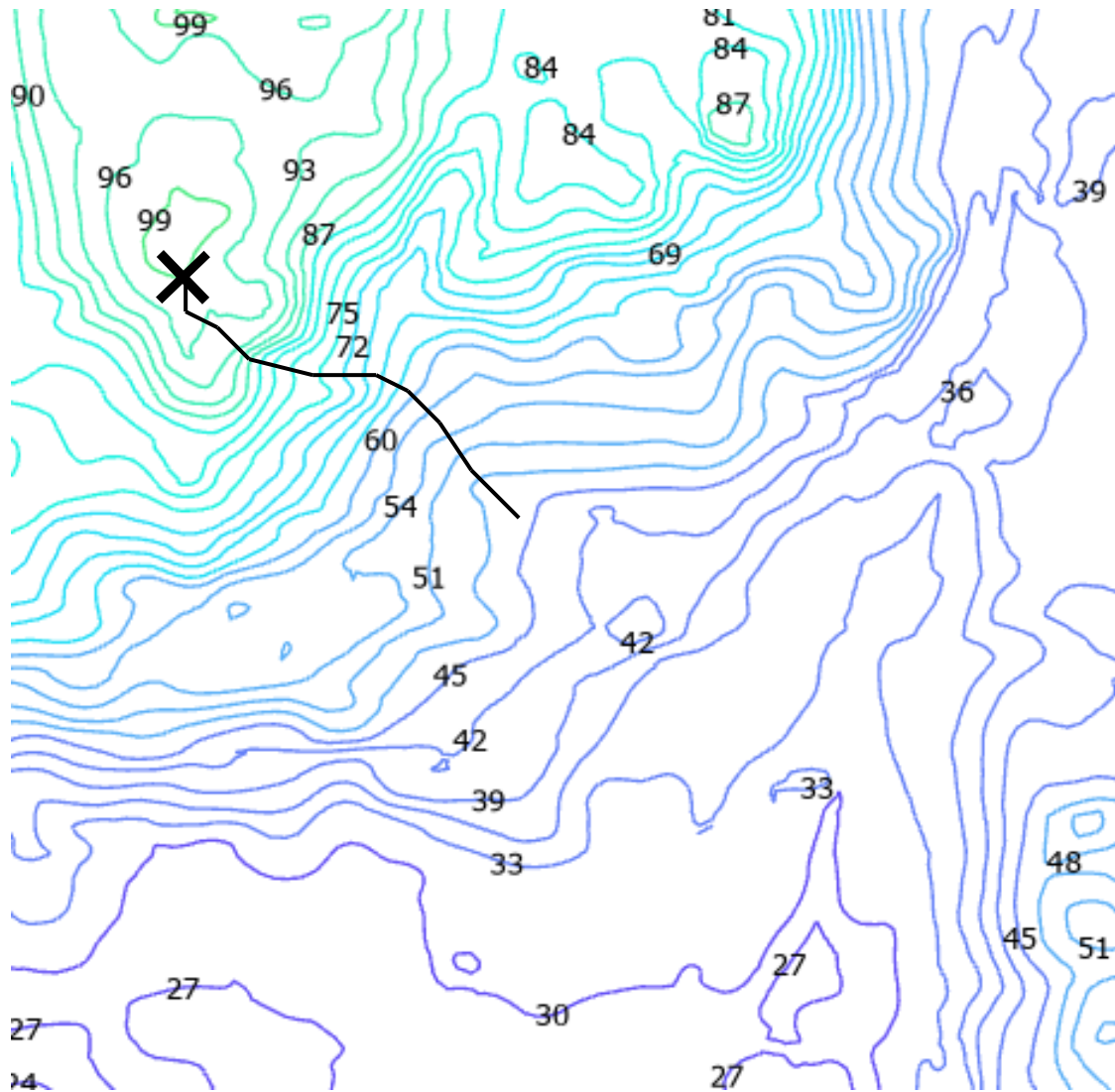


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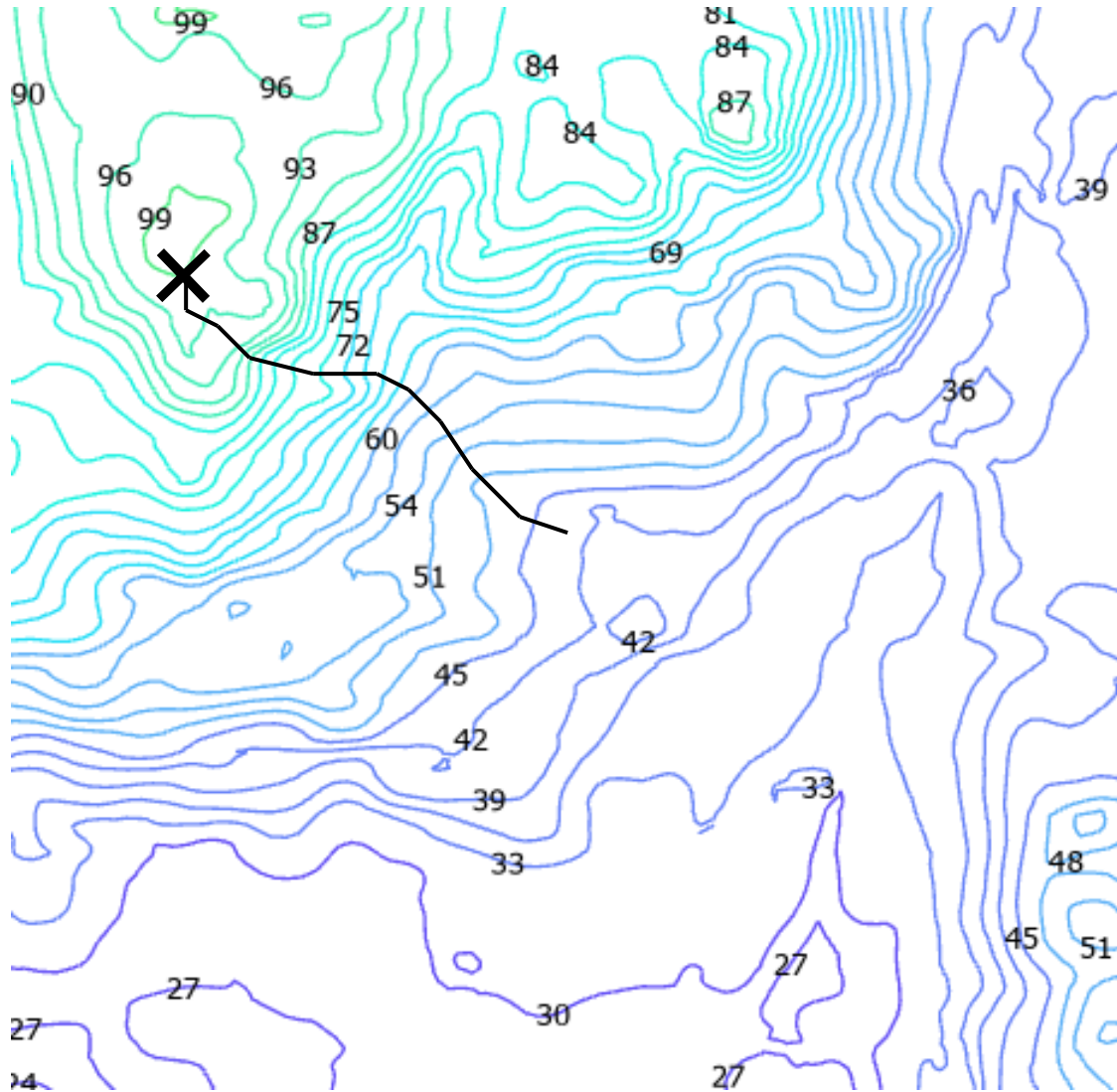


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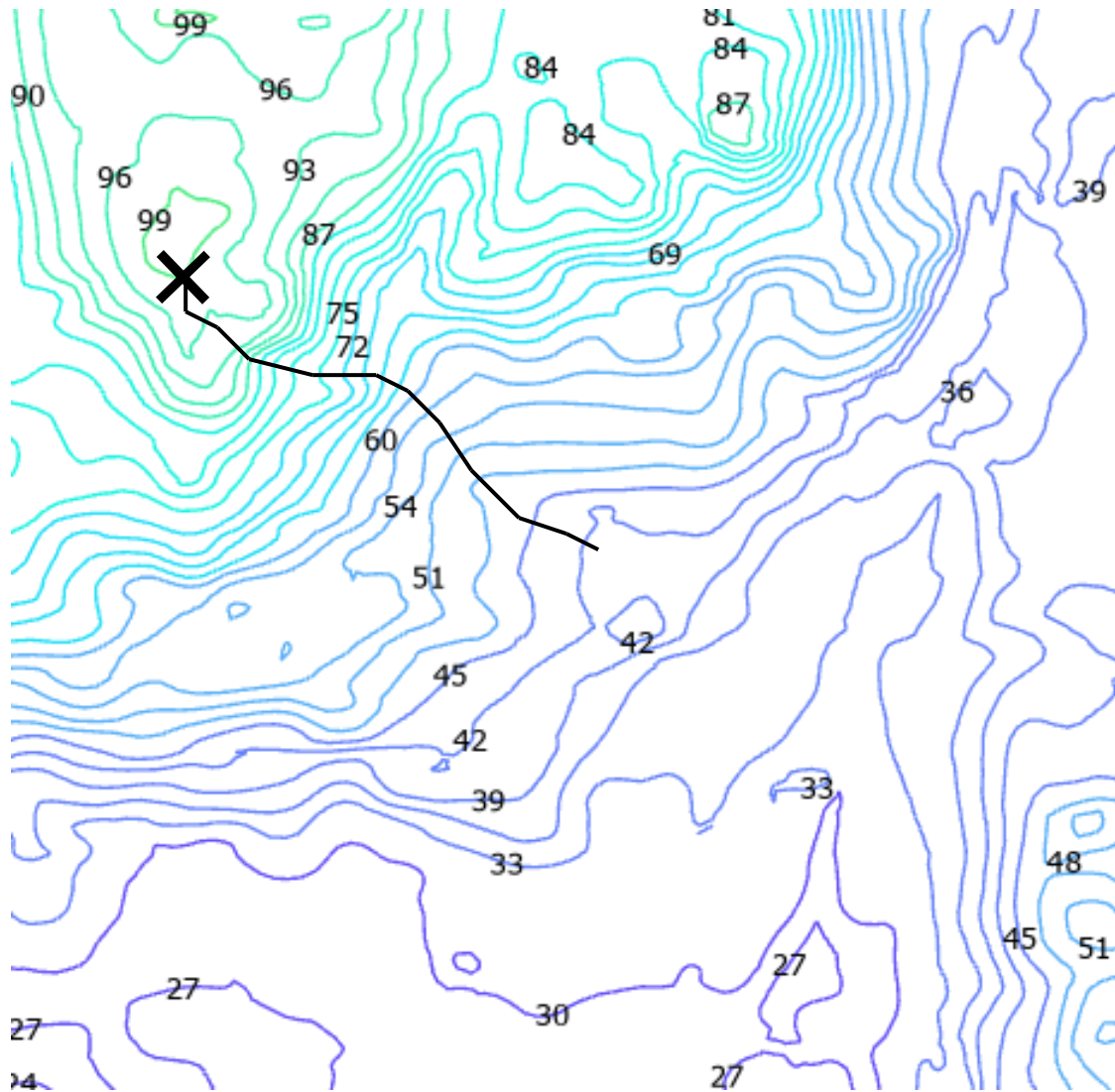


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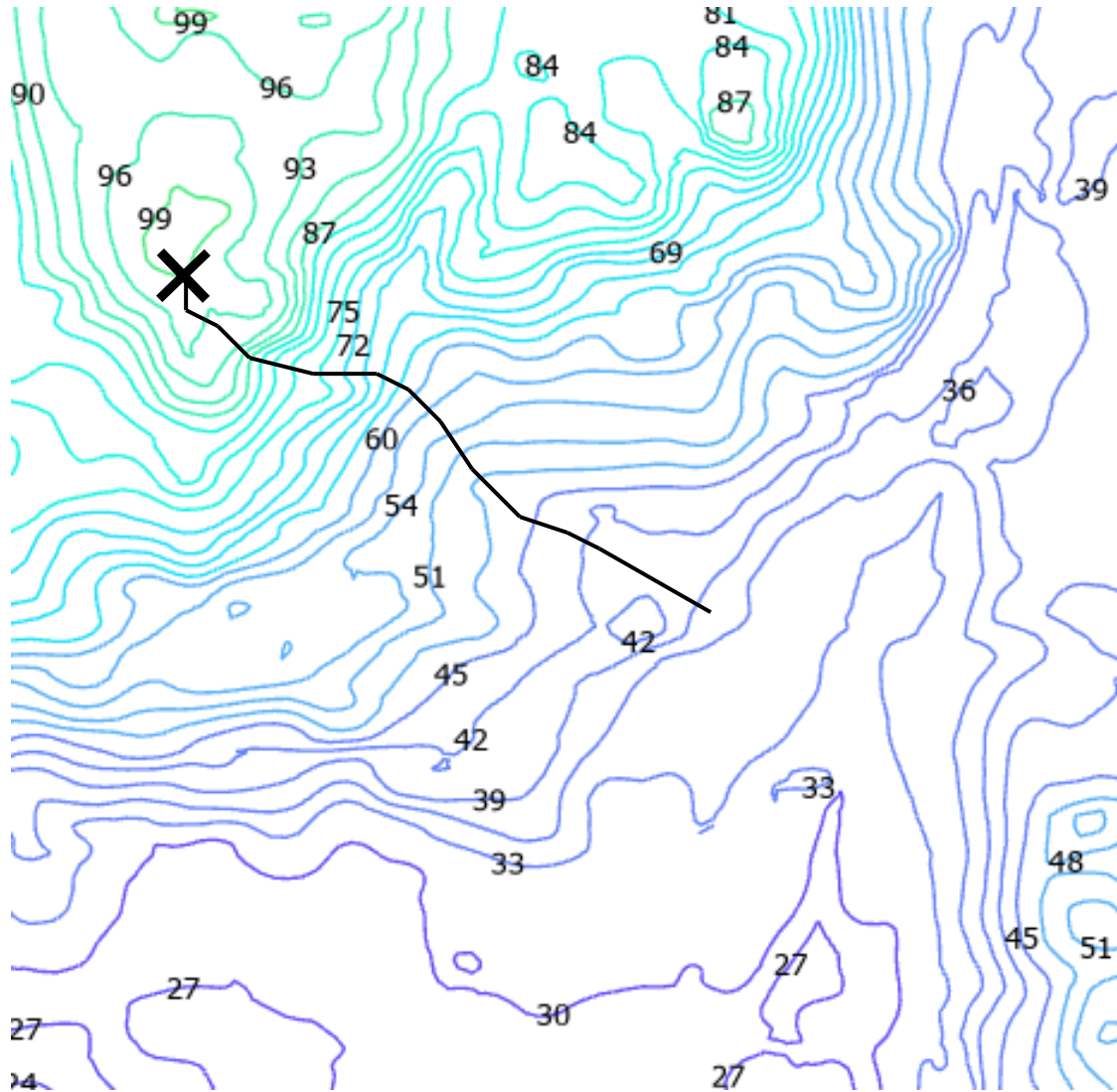


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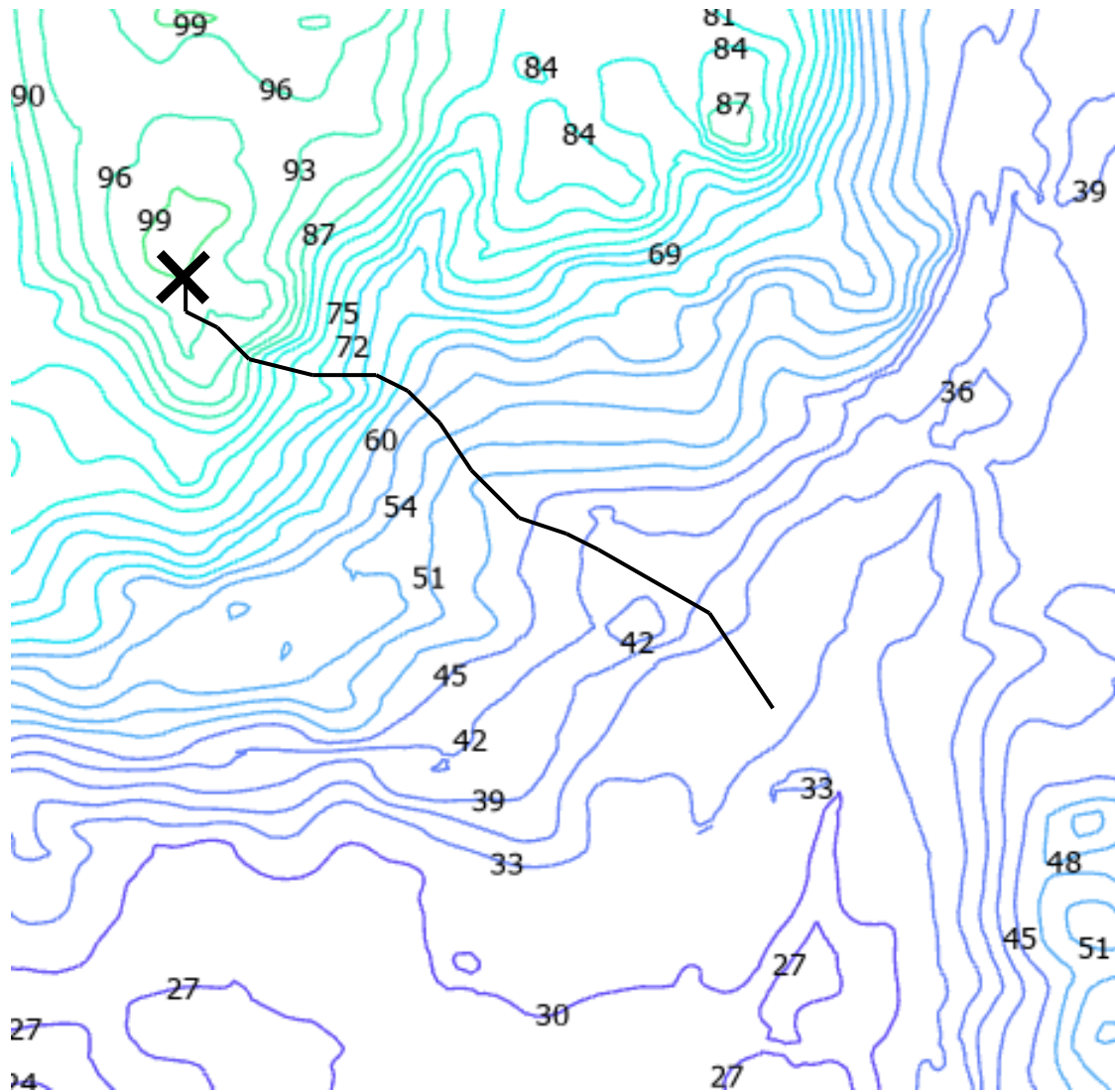


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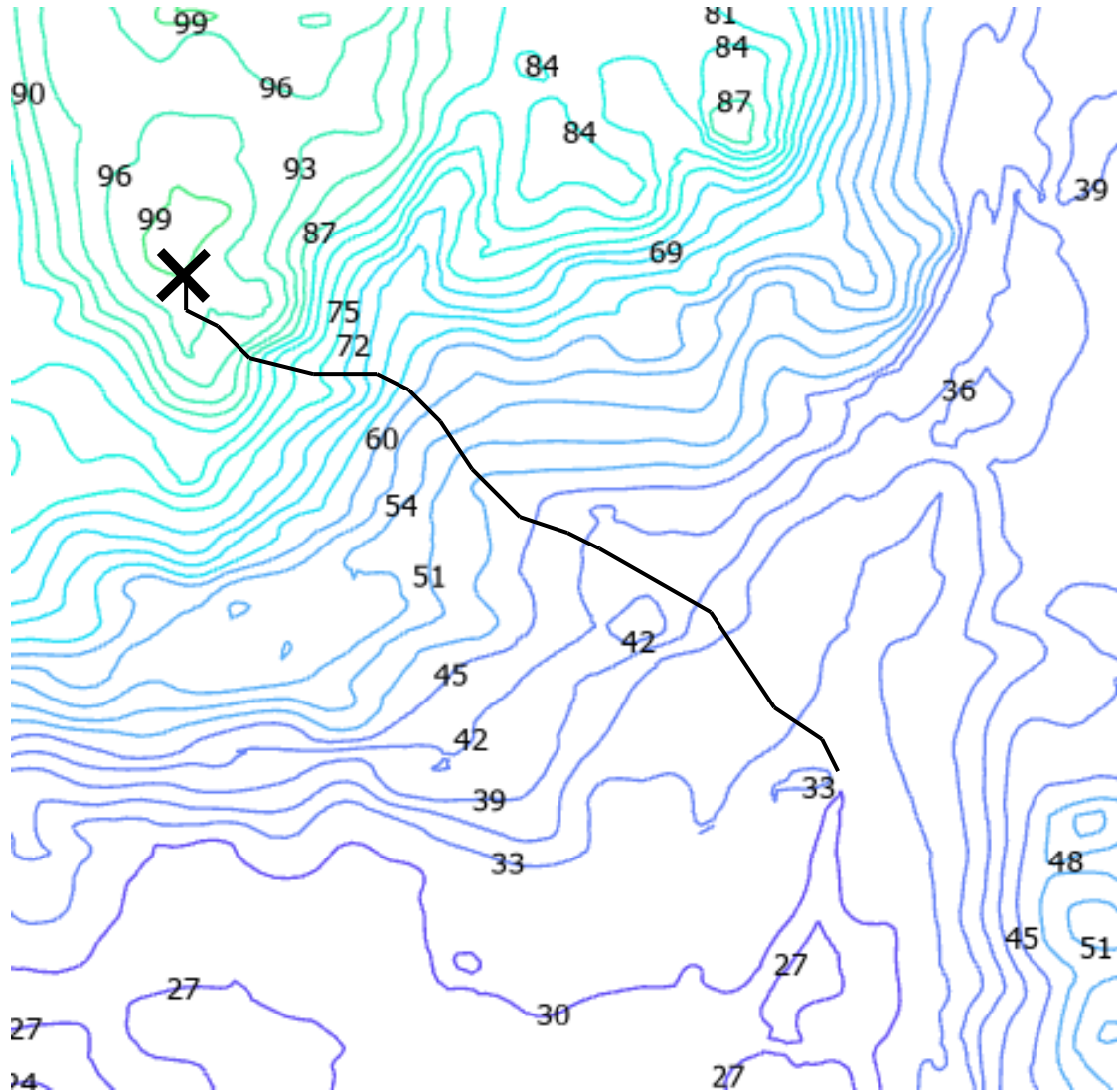


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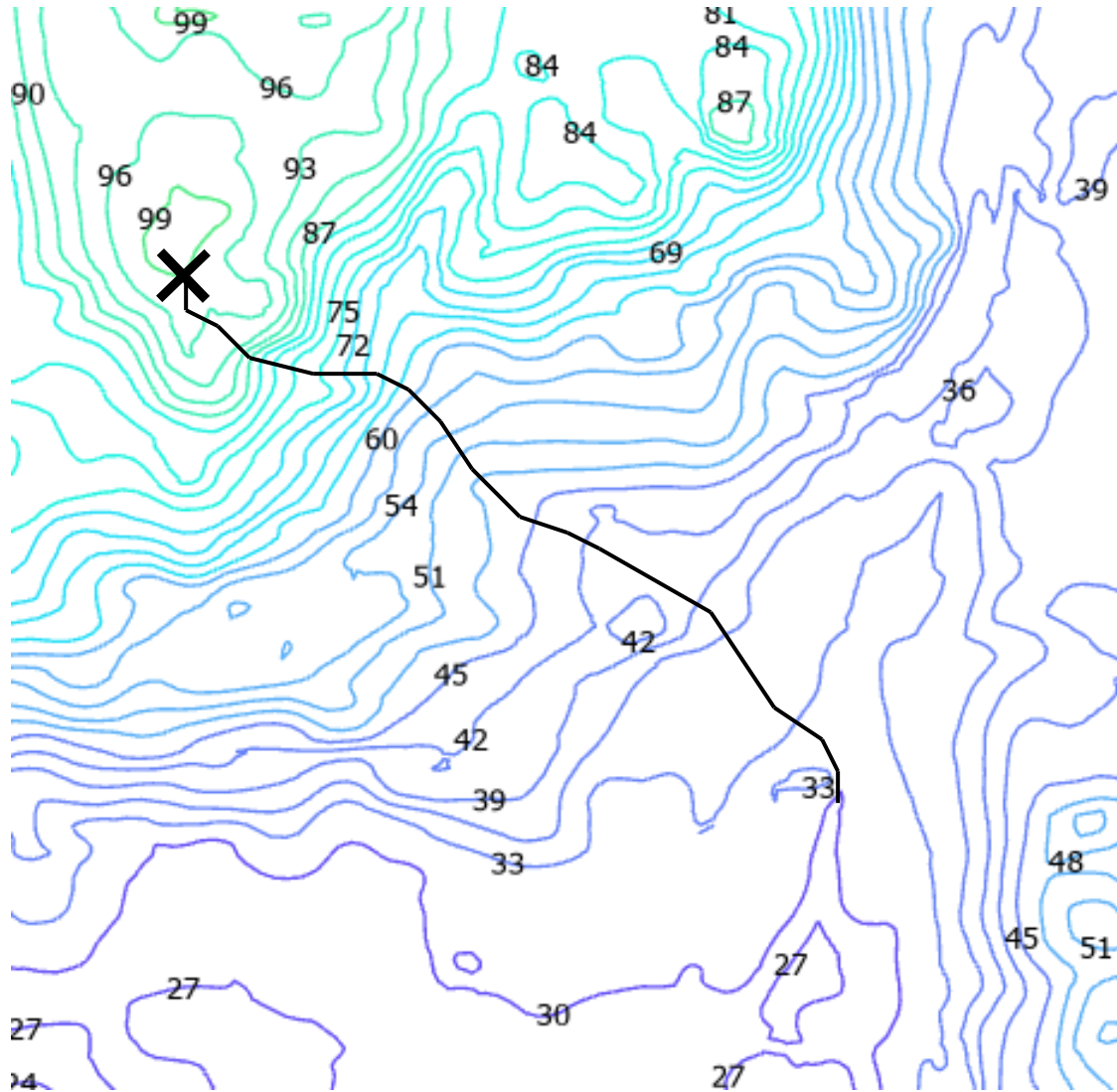


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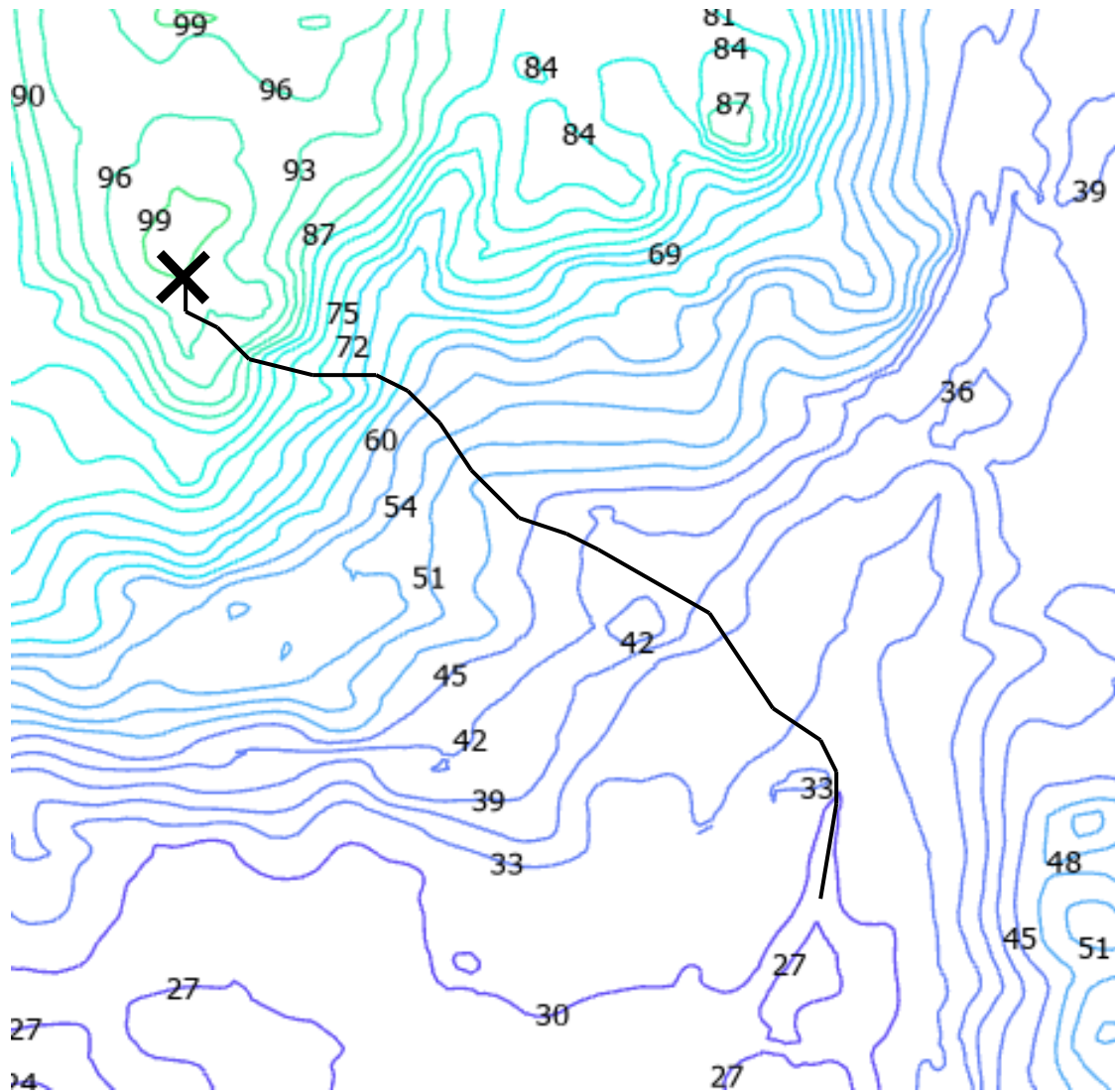


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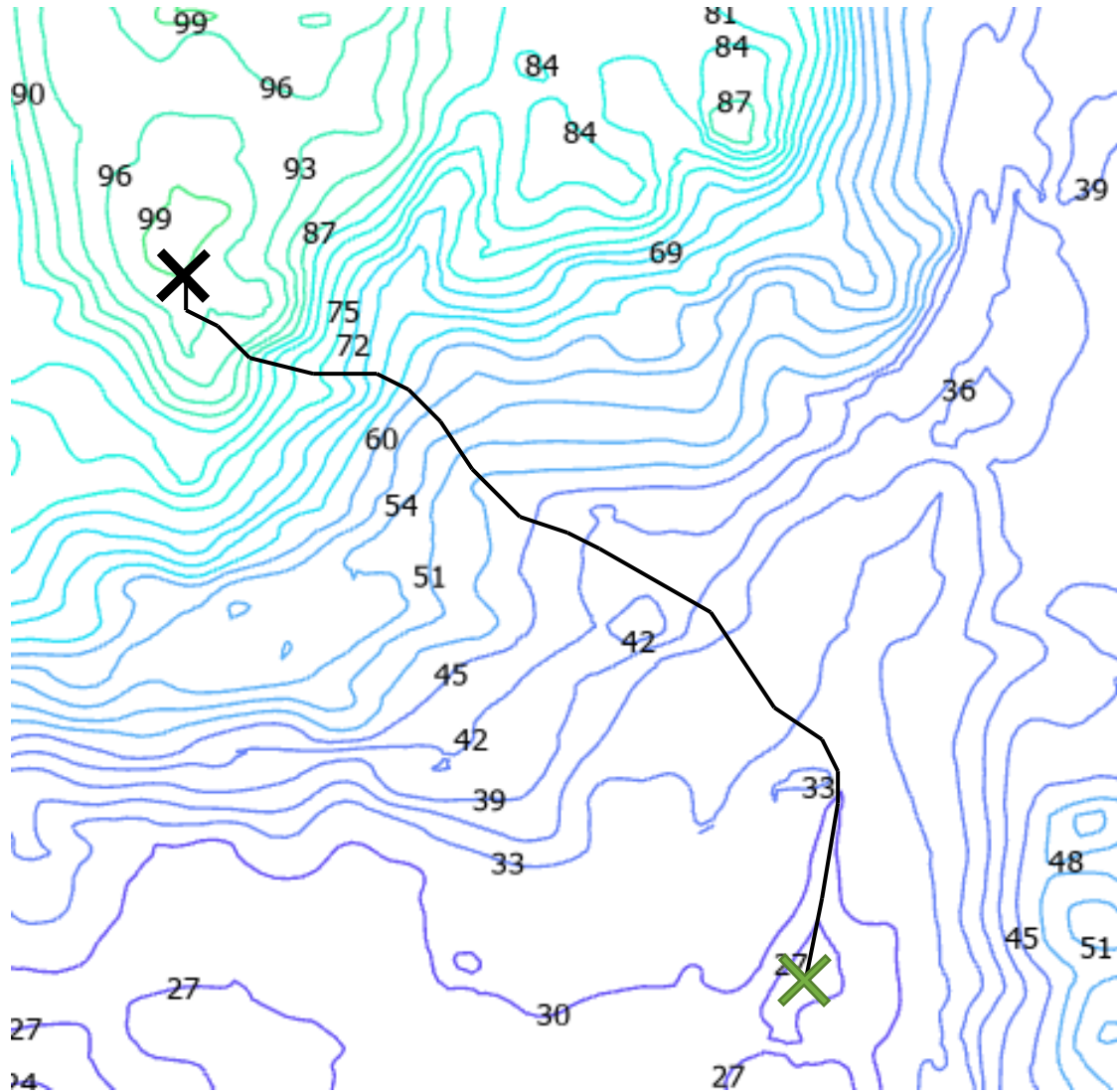


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Tracking Runoff - Activity



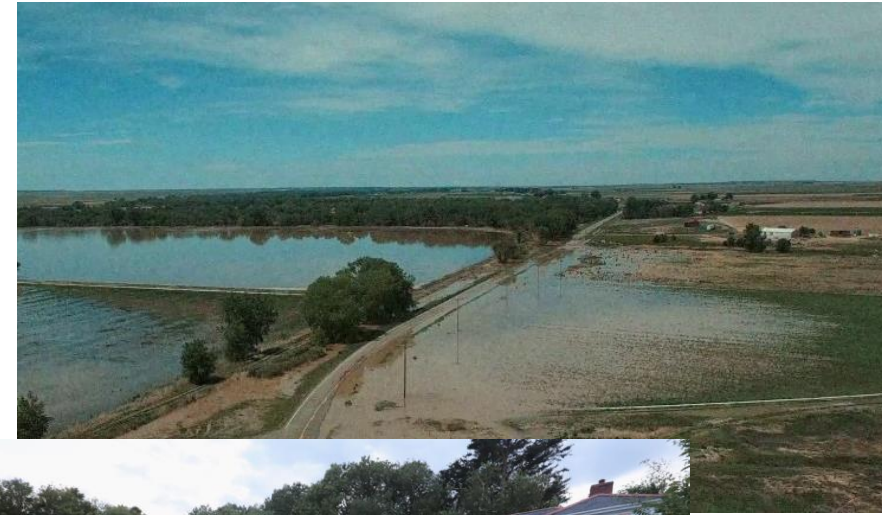
When Runoff Becomes Flooding

Modified Topography

- Development modifies existing natural channels
- When these channels are blocked or restricted, it can cause backup of stormwater, leading to flooding

Aging Stormwater Infrastructure

- Infrastructure built in the past is often undersized for the larger and more frequent storms of today
- Older infrastructure can become blocked with sediment or break down, leading to less capacity than normal



How do we mitigate flooding?



How do we mitigate flooding?

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How Do We Mitigate Flooding?

“Grey” Infrastructure

“Green” Infrastructure



Underground Storage Chamber



Bioswale



How Do We Mitigate Flooding?

“Grey” Infrastructure

Traditional Stormwater Infrastructure in the Built Environment

- Underground Storage Tanks
- Larger Conveyance Pipes

“Green” Infrastructure



Underground Storage Chamber



Bioswale



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“Green” Infrastructure

Stormwater infrastructure designed with nature to provide ‘co-benefits’

- Bioswales and Constructed Wetlands
- Permeable Pavement
- Floodable Fields



Underground Storage Chamber



Bioswale



How Do We Mitigate Flooding?

“Grey” Infrastructure

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Underground Storage Chamber

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- Floodable Fields



Bioswale



Rain Barrel

What are benefits green infrastructure can provide that grey infrastructure can't?



Co-benefits

- Additional benefits of a project are called ‘co-benefits’
- Green infrastructure typically offers varied and versatile co-benefits
- Examples of co-benefits include improved water quality, restored habitat, community space, etc.

Current Project: Chester Brook Flood Mitigation

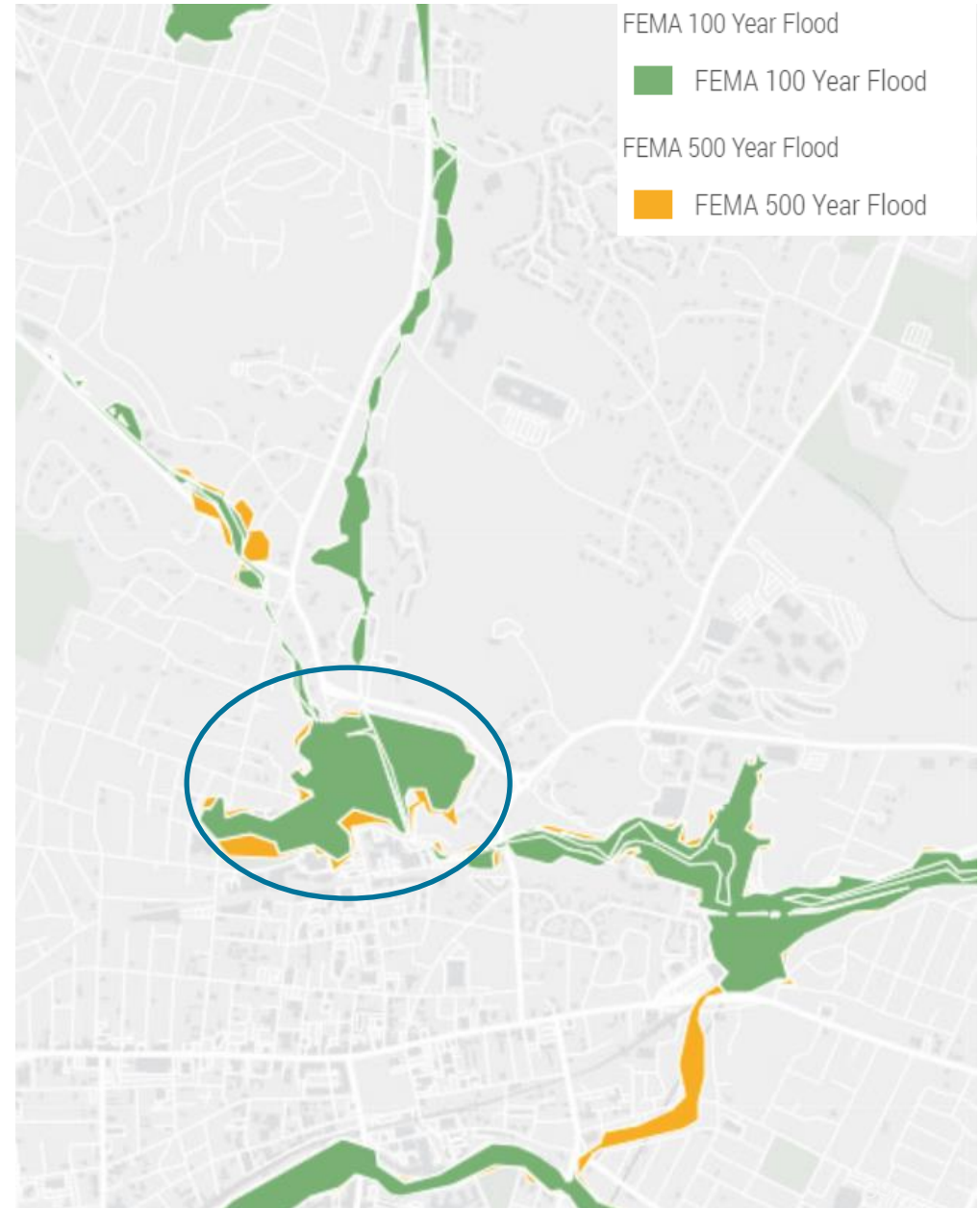


Current Project: Chester Brook Flood Mitigation

Waltham was awarded a state grant to study and address flooding occurring due to Chester Brook overflowing into developed area



Brown and Caldwell



Current Project: Chester Brook Flood Mitigation

Project Process

Data Collection

↳ Modeling

↳ Site Selection

↳ Design

↳ Construction



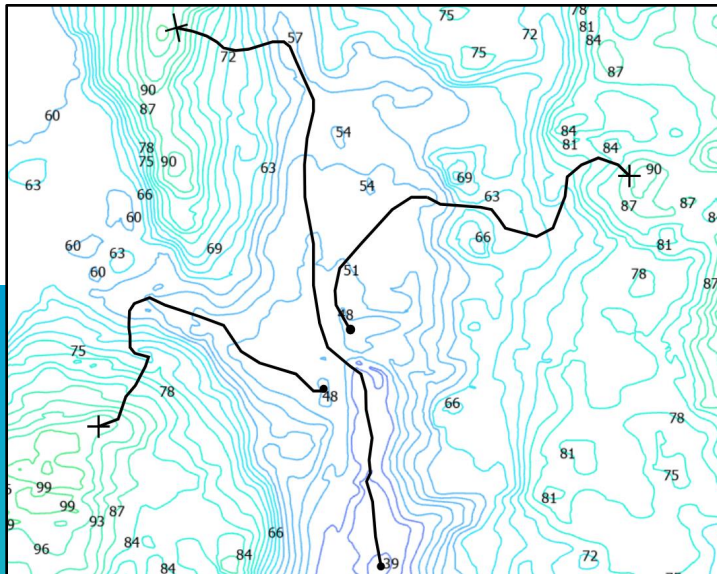
Data Collection

- Collected water level, rainfall, and temperature for 3 months
- Measured flow during dry and wet weather and correlated to level data

Stormwater Modeling

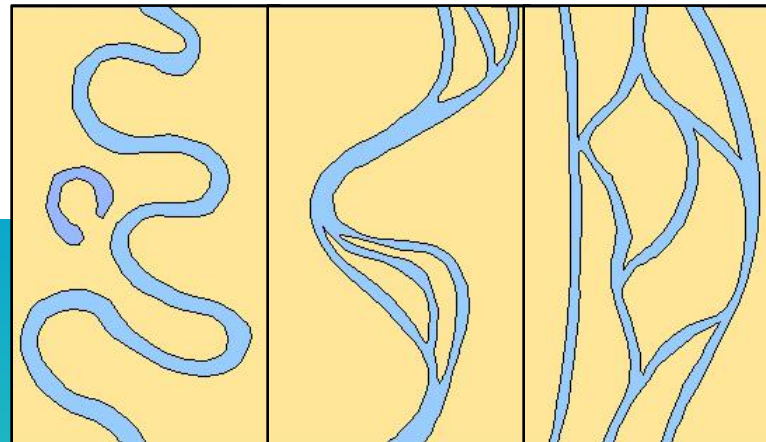
Hydrologic Information

- Topography, Soil Type and Characteristics, Impervious Area, Total Area, Slope



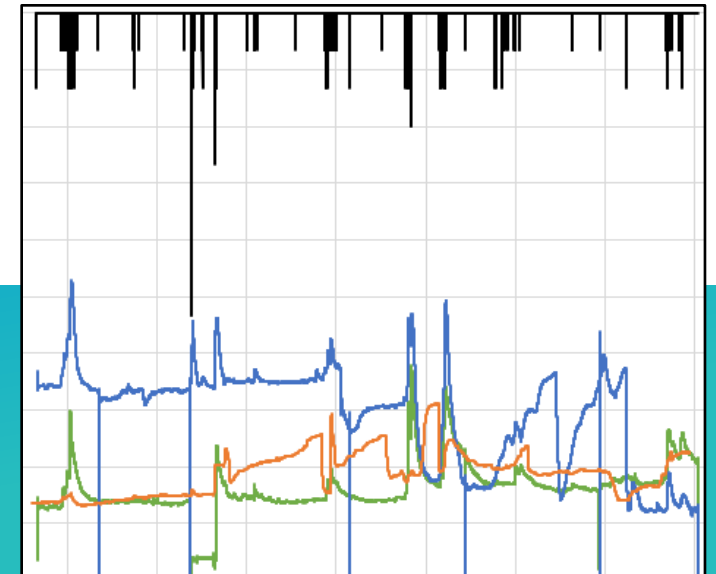
Hydraulic Information

- Channel shape and slope, groundwater characteristics, infrastructure shape and locations



Monitored Data

- Compare and calibrate model to monitored data to confirm accuracy



Site Selection

- Select a site where improvements could make the largest reduction in flooding risk
- **Co-benefits?**
- Due to basin size, location, and modeled scenarios, the wetland in front of the YMCA was selected



Design

- Someone else will be constructing the design!
- Evaluate and provide solutions for
 - Flood mitigation
 - Demolition
 - Public safety
 - Wetlands/environment
 - Fish passage
 - Erosion
 - Traffic



Thank you.

Questions?

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