

## CALUMET AREA LAND USE PLAN & DESIGN GUIDELINES

**WORKING GROUP MEETING #5** 

DEPARTMENT OF PLANNING AND DEVELOPMENT COMMISSIONER CIERE BOATRIGHT





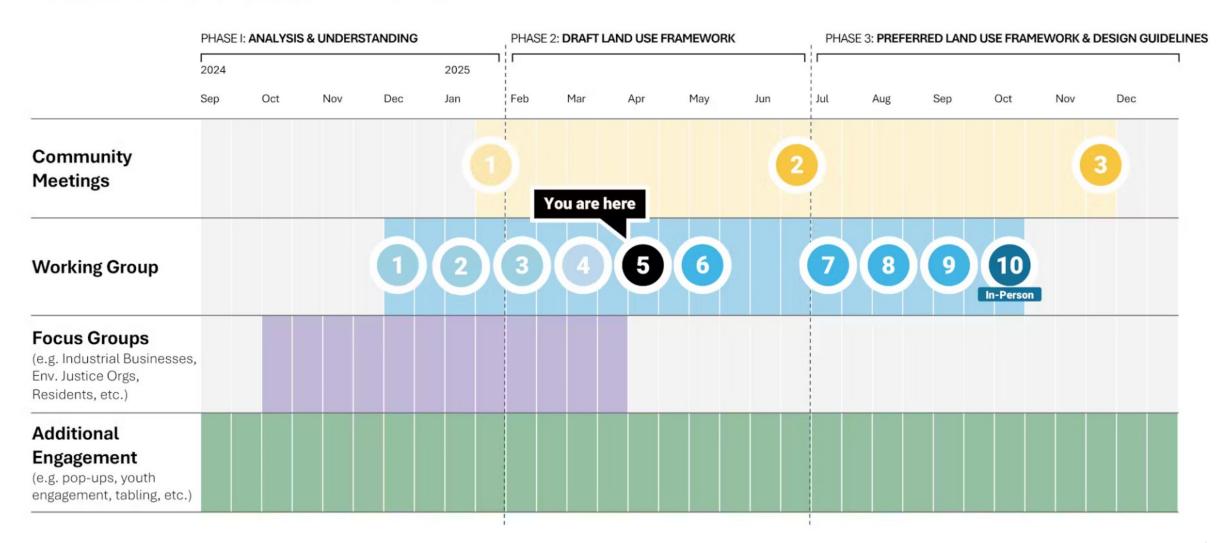
## Welcome! Agenda, Introductions, Plan Timeline

# Agenda

1. Welcome	1.1 Agenda		
[5 Minutes]	1.2 Working Group #4 Recap		
[o i matee]	1.3 Engagement Calendar		
	1.5 Today's Goals		
2. CDOT Presentation	2.1 Presentation on CDOT and IDOT projects		
[20 Minutes]			
3. Understanding Opportunity Areas	3.1 What are opportunity areas?		
[45 minutes]	3.2 How are opportunity areas selected?		
[ 40 minutes]	3.3 Deep Dive: Specific Opportunity Areas		
	3.4 Large Group Discussion		
	3.5 Feedback on opportunity areas		
4. Next Steps	5.1 Survey: Opportunity Areas		
[15 Minutes]			



# Engagement Schedule Phase 2: Draft Land Use Framework



Working Group Anticipated Meeting Topics (Working Group Meetings 2-6)

Working Group #2	Working Group #3	Working Group #4	Working Group #5	Working Group #6	
Recap WG #1 / Goals Planning Topics Overview Draft Objectives	Economy & Workforce	Nature & Ecology	Transportation & Infrastructure Opportunity Areas	Health & Community  Land Use Framework	

### Working Group #4 Recap Open Space

#### Goals:

- Discuss quantity and accessrelated challenges to open space in the study boundary.
- Discuss considerations in open space expansion within the study boundary
- Discuss where and how open space can increase within the study boundary



## River Ecology Governance Task Force

- 1. Discuss potential opportunity sites for Calumet River access.
- 2. Discuss the considerations for river access at potential sites.
- 3. Begin to discuss potential programming for the sites.

#### Opportunity Site #7

Hegewisch Marsh / CID Landfill

Address: 13000 S Torrence, 13124 S Calumet River

Ownership: Cook County (stormwater) NICTD (rail ROW), Chicago Park

(CID landfill), USACI Current use: Open s stormwater), former

#### Why this site?:

- · Previously identif Framework Plan,
- Access from 130
- · Existing open spa
- · Bridge / lock view

#### Challenges / consid

- · Security for adjac
- · Limited vehicle ac





Address: 12534 S Calumet River, 2500 E 130th St

Ownership: MWRD (SEPA), private (Auto Warehousing)

Current use: Open space (SEPA), vehicle storage (Auto Warehousing)

#### Why this site?:

- Previously identified Framework Plan)
- Existing open spar
- · Existing trail infras
- · Good potential bil
- Bridge views

#### Challenges / consid

- · Security for adjact
- Can access be pre-



### **Opportunity Site #3**Former Wisconsin Steel Site

Address: 10802 S Calumet River

Ownership: Private

Current use: Vacant

#### Why this site?:

- Significant river frontage
- · Currently used as informal open space
- Accessible from 106<sup>th</sup> St

#### Challenges / considerations:

- · Surrounding industrial uses (views, odors, etc.)
- What is the appropriate future use of the rest of













## **Goals for Today**

- 1. Project updates from CDOT
- 2. Get feedback on Opportunity
  Areas (potential future uses,
  additional areas to focus on,
  etc.)

Aerial photo of Industrial Corridor

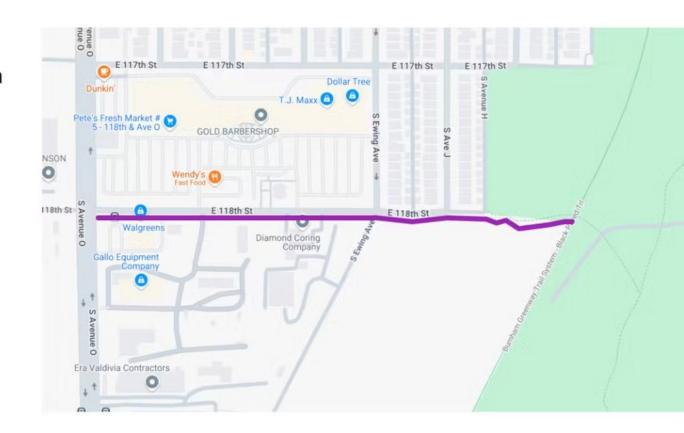




# Presentation from Chicago Department of Transportation (CDOT)

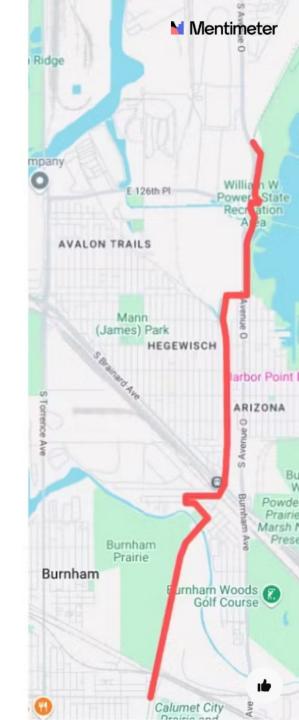
# CDOT Complete Streets Program 118th Street Connection to Burnham Greenway

- Design of two-way protected bike lanes on 118<sup>th</sup> St and an off-street multi-use trail connection (Burnham Connector) between Ave O and existing Burnham Greenway Trail
- Additional improvements:
  - Sidewalk replacement
  - ADA ramps
  - Drainage improvements
- Construction: Summer/Fall 2026



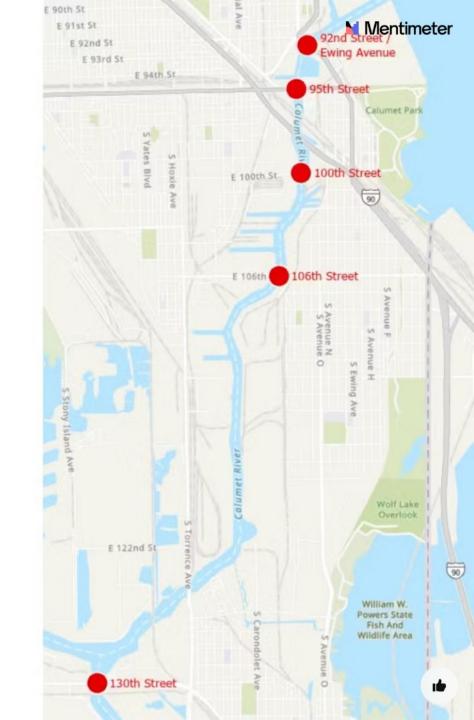
# **CDOT Complete Streets Program**Burnham Greenway Extension

- Extend existing Burnham Greenway Trail to fill in a missing three-mile gap
- This will create a 10-mile uninterrupted trail
- Construction: 2027



# **CDOT Bridge Improvement Program**Five Calumet River Projects

- 92nd Street / Ewing bridge (2025)
- 95th Street bridge (2026)
- 100th Street bridge (2027)
- 106th Street bridge (2028)
- 130th Street bridge (2025)



### CDOT / IDOT Roadway Improvements

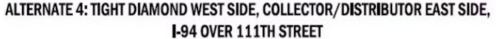
111th / Bishop Ford interchange

#### I-94 @ 111TH STREET INTERCHANGE

The preferred alternative appears to have the most positive attributes from CDOT's perspective:

- No grade change for trail
- Minimizes trail intersections with streets/ramps (two, both signalized)
- Eliminates trail conflicts with NB on ramp traffic
- Directly integrates Doty East into the local street network

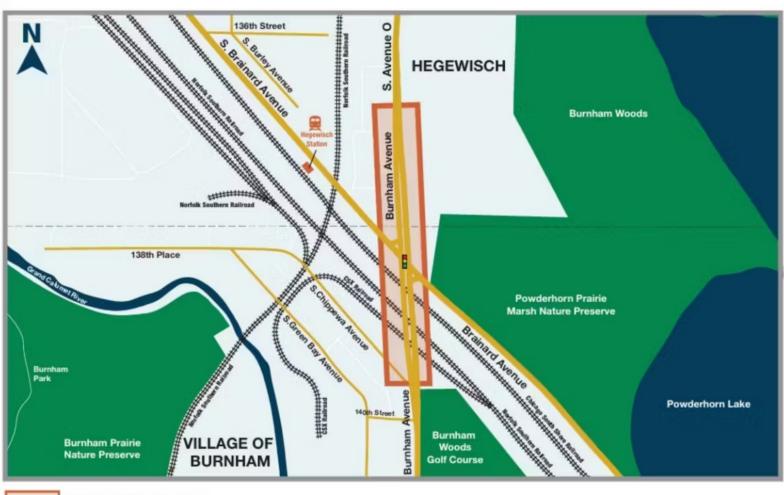






# **Cook County Improvements**Burnham Avenue Rail Crossing

- Phase I study for the grade separation of South Shore, CSX and NS railroads
- Improvements to Brainerd and Burnham Avenue intersection
- Phase I expected completion Summer 2025



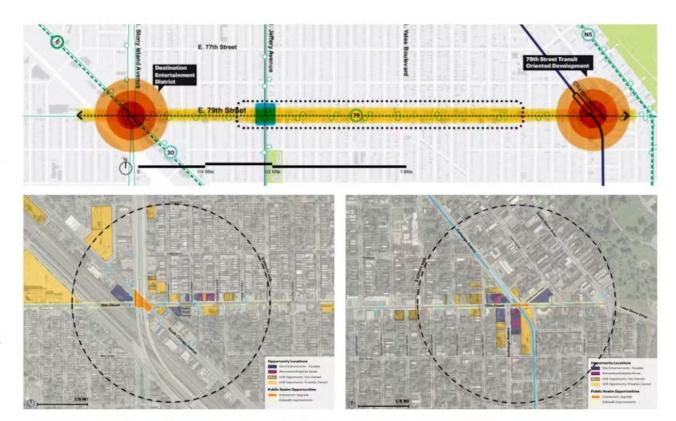
**Project Study Area** 



### What are opportunity areas?

**Opportunity areas** are properties and clusters of properties that have the potential to change within the next 10-20 years. By identifying appropriate uses in these key locations, these "catalytic" sites can help to shape land uses in surrounding parts of the corridor as well.

Today's conversation will focus on opportunity areas based on a **vacant property** analysis and excludes sites for which community plans have already been established. Additional areas that are not currently vacant may also be considered as the planning process continues.

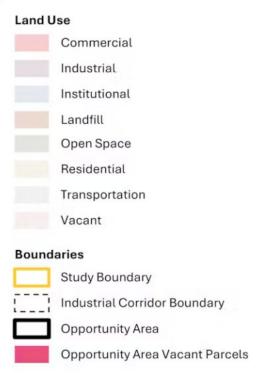


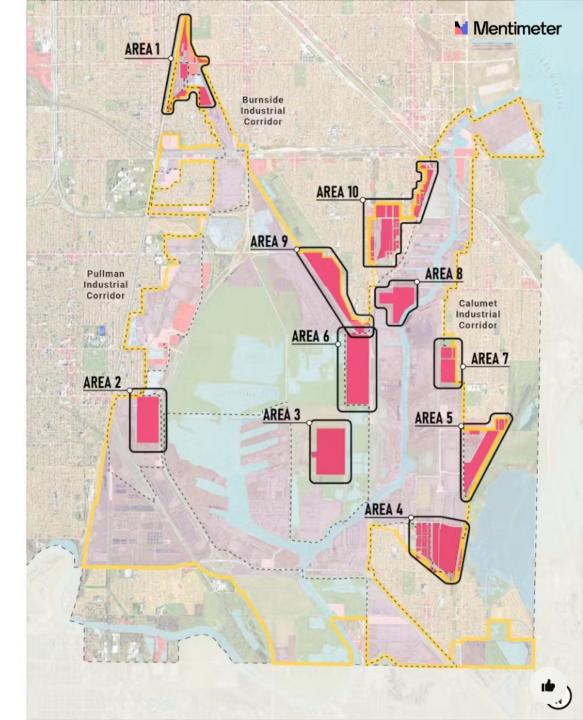
Opportunity Area Example – South Shore Corridor Plan (2020)

### How are opportunity areas selected?

#### Considerations include:

- 1. Is the property vacant?
- Are there more than approximately 15 acres of contiguous vacant land?
- 3. What does ownership look like?
- 4. What are the edge conditions / surrounding uses?
- 5. Is this an area of interest for the community?







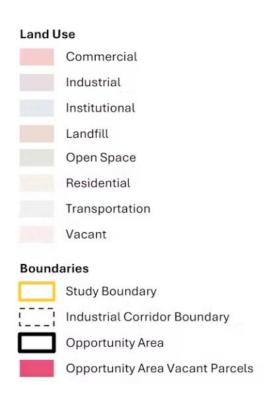
# Deep Dive Opportunity Areas

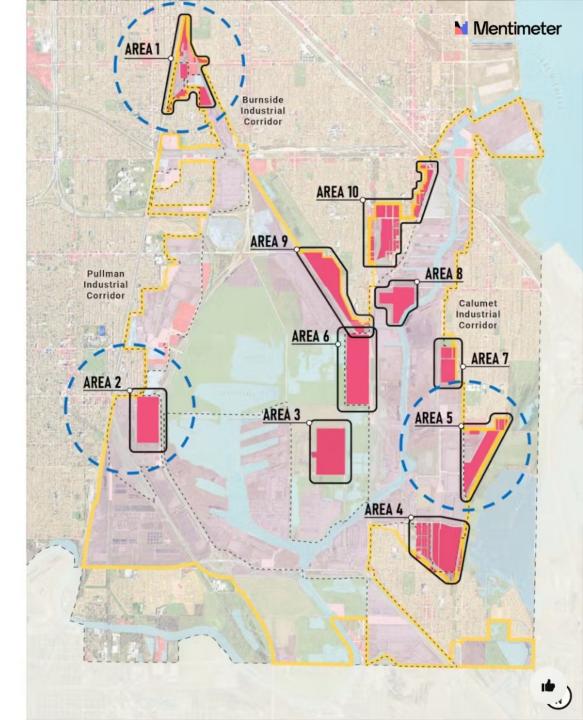
### Opportunity Areas – Today's Focus

#### Today we will focus on one Opportunity Area in each Industrial Corridor:

- Burnside Area 1
- Pullman Area 2
- Calumet Area 5

We will be sharing an online survey that allows for feedback on all Opportunity Areas tomorrow.





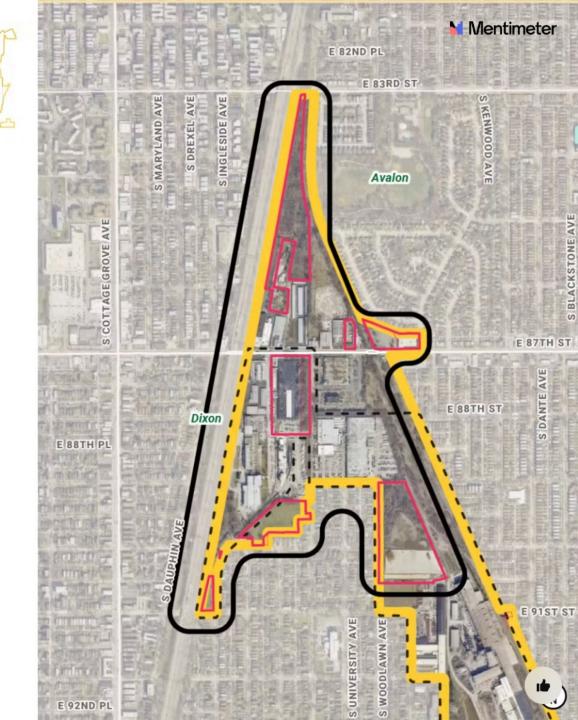
Overview

**Description:** Non-contiguous vacant parcels and vacant buildings along 87<sup>th</sup> 90<sup>th</sup>, Drexel, and Woodlawn

Industrial Corridor: Burnside

Acreage: 35.1 vacant acres





### Land Use and Amenities

#### **Surrounding Land Uses:**

- Heavy Industrial uses
- Light Industrial uses
- Commercial offices
- Parks and Open Space
- Healthcare facilities

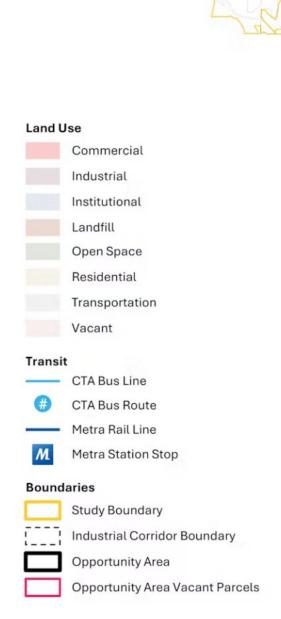
#### **Nearby Amenities:**

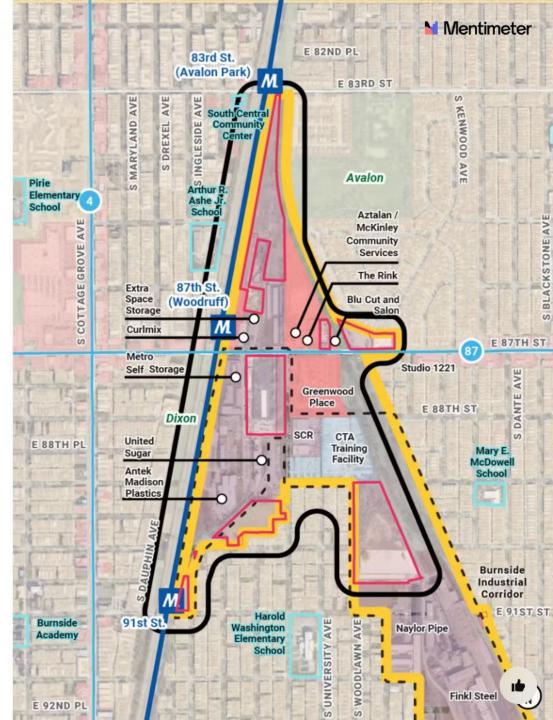
- The Rink
- Daycare
- Youth programs
- Metra Electric stations
- CTA 87 Bus

#### **Edge Condition Considerations:**

- South Woodlawn Ave (SE corner) adjacent to residential
- No freight access
- Remainder of sites within industrial zones are on 87<sup>th</sup> Street





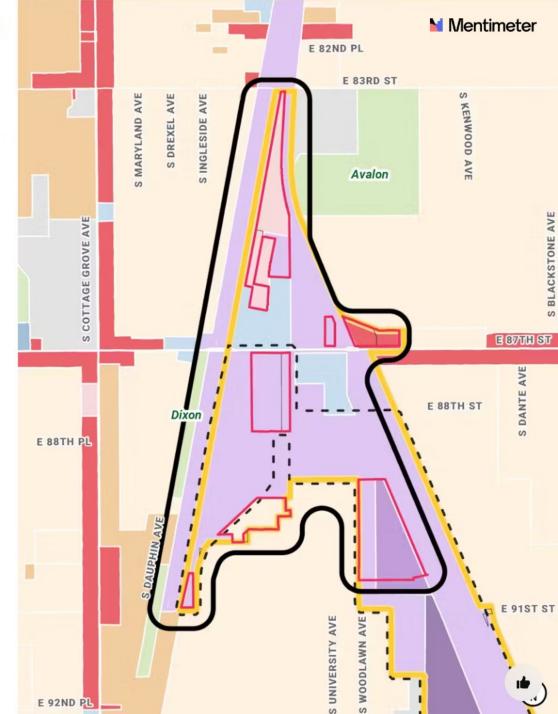


# **Opportunity Area 1** Zoning

Opp. Area Vacant Parcels: RS, B1, B3, M1, M2

Surrounding Zoning: RS, B1, C1, M1, M3





### Opportunity Area 1 Ownership

#### **Property Ownership:**

100% private (multiple owners)





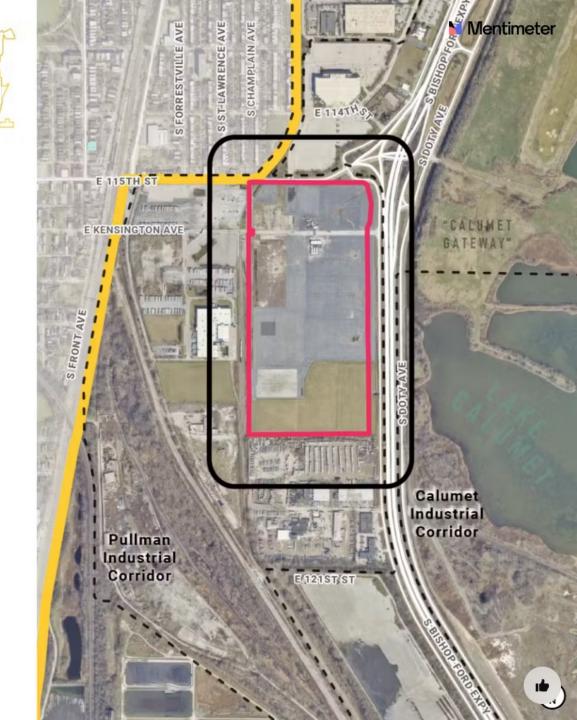
Overview

**Description:** Sherwin-Williams remediation site

Industrial Corridor: Pullman

Acreage: 71.5 vacant acres





### Land Use and Amenities

#### **Surrounding Land Uses:**

- Heavy Industrial uses
- Light industrial uses
- Multi-family homes
- Transportation infrastructure
- Recreation

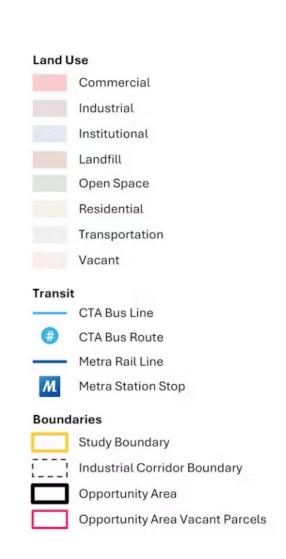
#### **Nearby Amenities:**

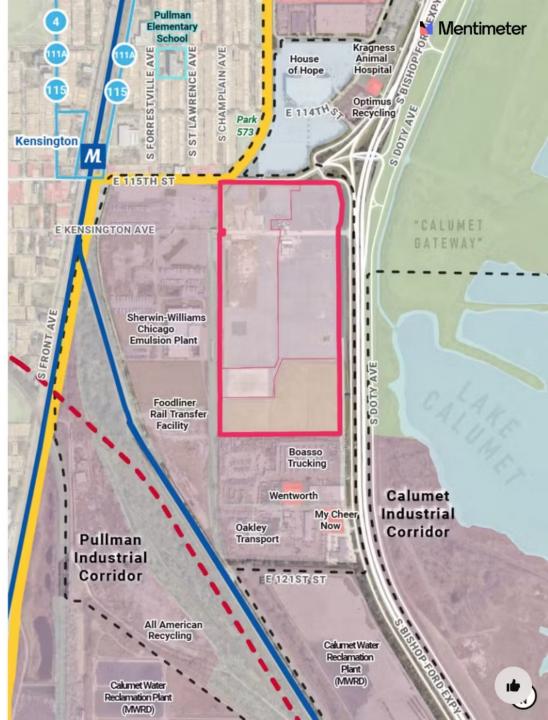
- Single and multi-family homes
- Community gardens
- House of Hope Church
- Pullman Commercial Corridor
- Metra Electric station
- Several CTA Buses

#### **Edge Condition Considerations:**

Entirely bound by existing active industrial and interstate







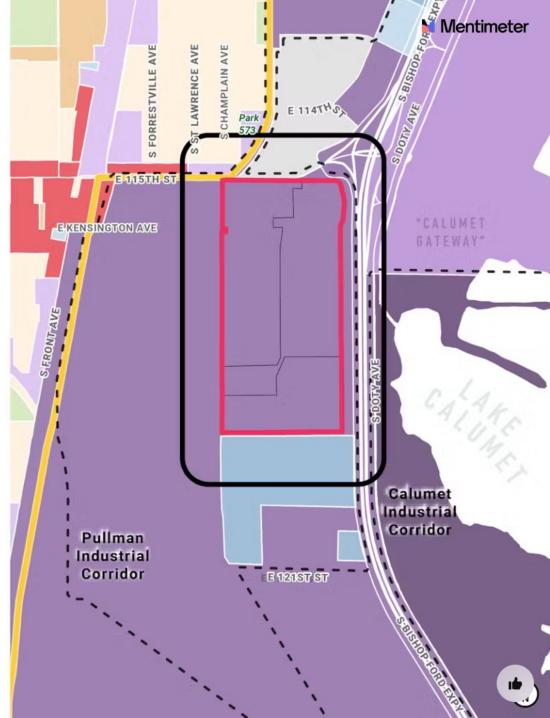
Loning

Opp. Area Vacant Parcels: M3

Surrounding Zoning: C2, M1, M3, PMD 6, PD 877



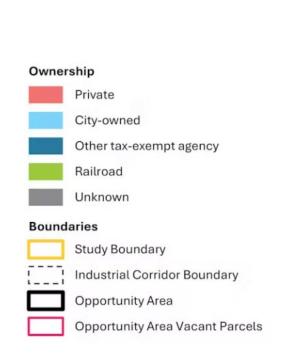


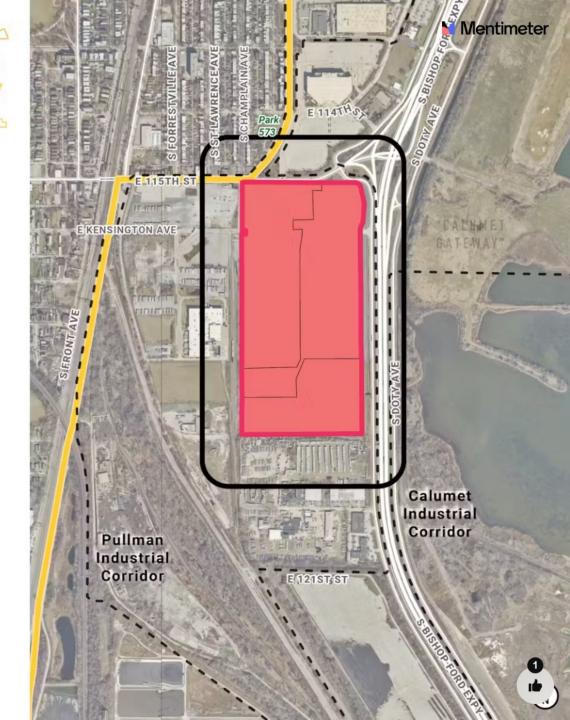


## Opportunity Area 2 Ownership

#### **Property Ownership:**

100% private (Sherwin-Williams)





Overview

Description: Vacant parcels between Ewing /

Avenue O and Burnham Greenway

**Industrial Corridor:** Calumet

Acreage: 57.61 acres of vacant land





# **Opportunity Area 5**Land Use and Amenities

#### **Surrounding Land Uses:**

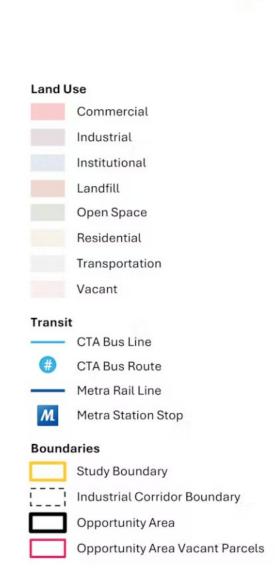
- Light industrial uses
- Single-family homes
- Multi-family homes
- Transportation infrastructure
- Recreation

#### **Nearby Amenities:**

- Wolf Lake / William Powers
- Eggers Grove
- George Washington High School
- George Washington Elem. School
- Rowan Park
- CTA 30 Bus

#### **Edge Condition Considerations:**

- Residential adjacencies along S Avenue J
- Rail buffer on east edge along
   William W. Powers State Rec. Area





# **Opportunity Area 5** Zoning

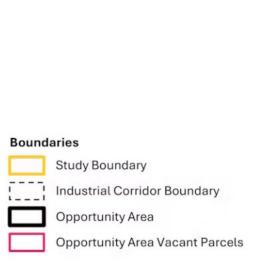


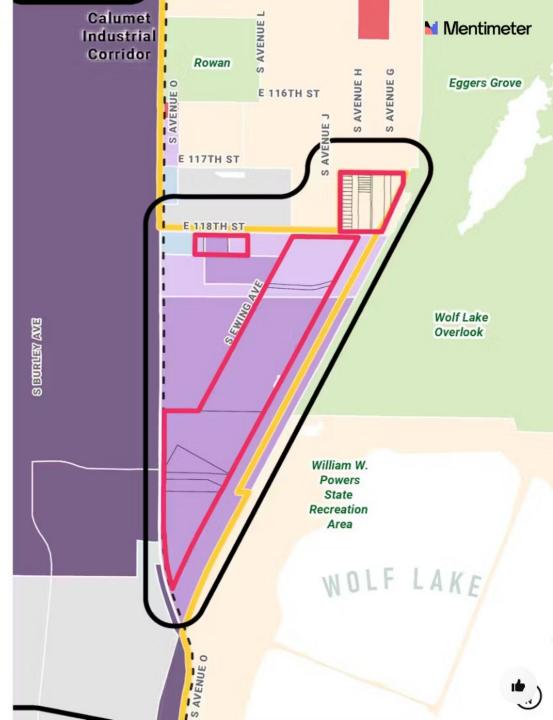
Opp. Area Vacant Parcels: M1, M2, RS

**Surrounding Zoning:** RS, B3, C1, M1, M2, PMD 6, POS, PD 248, PD 804



PD - Planned Development





# **Opportunity Area 5**Ownership

#### **Property Ownership:**

- 89.5% private (multiple owners)
- 6.5% unknown
- 3.9% City-owned

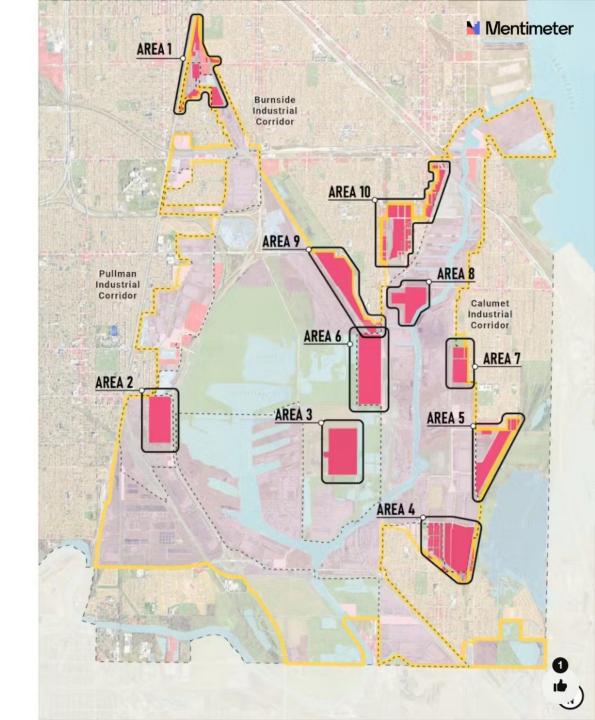


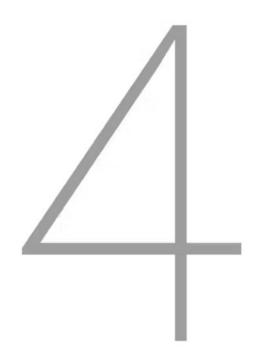


## Feedback on Opportunity Areas

#### **Using Mentimeter**

- Where else might there be opportunity areas in the study boundary? Please explain why.
  - Note: (These do not have to be vacant properties but areas of interest to you/your organization)
- 2. What are other criteria to consider when selecting opportunity areas?
- 3. Is there any other feedback you have on opportunity areas?





# **Next Steps**

## Working Group Upcoming Discussion Topics

Working Group #2	Working Group #3	Working Group #4	Working Group #5	Working Group #6
Recap WG #1 / Goals Planning Topics Overview Draft Objectives	Economy & Workforce	Nature & Ecology	Transportation & Infrastructure Opportunity Areas	Health & Community  Draft Land Use Framework

# Post-work: Survey Opportunity Areas

An online survey will be sent out to the working group to provide input on all opportunity areas.

The survey will stay open for two weeks.

### Calumet Area Land Use Plan Opportunity Areas Survey

The purpose of this survey is to provide insight and feedback on to the opportunity areas for the Calumet Area Land Use Plan.

Opportunity Area #1: Land Use and Amenities



## **Next Steps**

#### Working Group Meeting #6

Tuesday, May 13 | 6:00 – 7:30pm | Zoom Topic: Health & Community + Land Use Framework Discussion

Public Meeting #2 End of June

**Questions, Comments, Concerns?** 

Dhara Shah - dhara@musecommunitydesign.com

# Appendix A Mentimeter Results

Opportunity Area 1: What types of land uses would be appropriate in this area and why?

Manufacturing warehousing Retail logistics Light manufacturing, retail, workforce development business incubator Commercial healthcare, park, residential. Not logistics.

#### Opportunity Area 1: What types of land uses would be appropriate in this area and why?

housing - near transit

Grocery store

Industrial; Healthcare; **TDL** 

park land and other youth services

Keep landscape buffers as buffers, the triangles at the furthest north esp. Other sites along roadways can be redeveloped. Sites at the southeast seems to be very close to residential, so res. maybe

Park. There aren't enough green spaces, and support the health if the residents

Health care and residential

Park, two flats with like 3 bedrooms





#### Opportunity Area 1: What types of land uses would be appropriate in this area and why?

industrial and commercial because that fits with what is there now Can be a node of residential to benefit from the Metra stations plus maybe light industrial Noting that a majority of these sites were former industrial sites, id hesitate to convert them to parks unless heavy remediation was done

commercial along 87th near the metra stop

Grocery Store, they are lacking in this area, particularly around 87th and cottage grove Retail along 87th

Retail

If market needs support: residential, community commercial, light industrial. Seems lots residential surrounding so workforce available.





#### Opportunity Area 1: What types of land uses would be appropriate in this area and why?

Commercial closer to 87th Street

Continuing the retail strength between 87th and Cottage Grove to Stony Island housing near the metra

Landscape buffers can serve as stormwater infrastructure to reduce flooding in the area. Wooded areas the furthest north.

Food incubator similar to The Hatchery Good TOD potential for the site near the Metra Woodruff. Cottage grove #4 is nearby and also a frequent route.





#### Opportunity Area 1: What types of land uses should be avoided in this area and why?

Heavy dirty industry

Heavy industry

Heavy manufacturing (petrochemicals)

other than sw no residential

heavy industry as each node is located near residential areas Recreational parks and housing

Industrial along 87th.

Residential because of the proximity to industrial land uses

#### Opportunity Area 1: What types of land uses should be avoided in this area and why?

Industrial and/or manufacturing

childcare facility, especially ones with outdoor play space Uses that might impact the surrounding residential areas, since this area is surrounded by residential communities and parks on all sides.

no noisy or air polluting uses

Heavy industry, no more pollution is needed here

anything that contributes to additional negative air, water, or soil impacts

Retail in north node seems unrealistic. Very limited market and foot traffic

No industrial along residential on the east and north



#### Opportunity Area 1: What types of land uses should be avoided in this area and why?

Avoid Industrial as this area seems to have a good amount of transportation connections, a nearby park, and community amenities no warehouses near residential because of the size of the building and the truck traffic Past Industrial land use may need remediation and conflicting use with existing industry Green space unless remediated. Perhaps better to do Greenstreets. No heavy industrial with pollutants.

Avoid putting residential right adjacent to some of the heavier industrial uses w/o a buffer

Excessive Truck use should be avoided also

Logistics, heavy polluting industry

Heavy industry Any usage that does not require remediation since this was an industrial area should be avoided. Any business should agree to remediation and work with community

Opportunity Area 1: What types of land uses should be avoided in this area and why?

no inudstrial near the park on 87th

Religious facilities





#### Opportunity Area 1: What is most important to consider when making land-use decisions here?

public transit access as positive for residential

Remediation needs Access to public transit Community buy-in is crucial. Open and frequent communication with community

Surrounding land uses including what's adjacent to the opportunity area

Permanent job creation and new private investments.

whatever is relative to a needs based assessment according to the community members

access to public transit

Cumulative impacts







#### Opportunity Area 1: What is most important to consider when making land-use decisions here?

Health, proximity to public transit, not wanting to over burden one community with too much pollution How it will affect the residents. Pros and cons. Financially, health, community,

Good paying job opportunities which means some industry.

Depending on its potential as a healthcare/commercial corridor, the AADT of pedestrians, bus riders, cars, and 87th St Metra passengers

impact on livelihood, such as access to spaces, local hires for light industries, impact of pollutants from industries near by already

Adjacent land uses

Including the community members in the area so they can say what they need What impacts removing existing landscape buffers might have, its seems like some of the open parcels are serving as space between residential and industry. need to create setbacks with future plans.





#### Opportunity Area 1: What is most important to consider when making land-use decisions here?

Community benefits

take advantage of embankments as protection to adjacent residential

Use adjacency and understanding the operations on the ground with industrial

Sense of community.

How much open space is available

proximity to existing residential and potential traffic or air quality impacts if considering industry that would require high truck traffic

Seems like this is the site out of all of them that is most surrounded by residential uses and has probably the best current transit connections

where is transit located





Opportunity Area 1: What is most important to consider when making land-use decisions here?

are the streets sized for trucks

Rail friendly industries over truck reliant

Uses that support walkability and connectivity between surrounding community areas and to the transit station.

Proximity to homes and a school; public health.
Providing jobs and building community wealth





#### Opportunity Area 2: What types of land uses would be appropriate in this area and why?

light industry and transportation and logistics

light industry

logistics or industrial

Manufacturing and TDL.
Compatible to Sherwin
Williams' current operations

Other than storage or light industrial/transportation facilities, I can't see strong use of this site given the amount of remediation required

An active green space

Use mix similar to the north of 111th street, mix of job creating creative industries. Gotham Greens / Method, etc.

"green" industry like method/Gotham Greens type would be awesome







#### Opportunity Area 2: What types of land uses would be appropriate in this area and why?

Heavy industries south of Kensington and light industry or commercial north of Kensington

mixed-use retail and residential if remediated

Forestry to buffer the e-way Open space to give some breathing room Remediation planting + solar farm if there's enough space industry/ manufacturing

Greenspace

Logistics, workforce development training site (construction, logistics) Transportation proximity to Interstate 94 and light Industrial because of adjacent existing land uses I'd say residential, but being so close to the highway, Biosolids and pain factory make me nervous to suggest that use

#### Opportunity Area 2: What types of land uses would be appropriate in this area and why?

Once remediated, an open space area like a botanical garden

Clean Industrial. Highway access ideal to minimize impact to neighborhoods.

commercial and light industry

maybe residential in the north

Light industrial, mixed use with some residential at the north.

Would support green industry too like method soap plant

Industrial is the only realistic use.

if close to the future pathway across Lake Calumet, what kind of community entry "hub", connecting end point or feature could this be?



#### Opportunity Area 2: What types of land uses should be avoided in this area and why?

Dirty industry as a whole. We might be zoned for it but we don't need it here. smell/air issues could be a real concern considering surrounding area Residential. No one would buy there.

Anything open space or residential

Residential due to the proximity of the interstate and industrial land uses

Heavy industrial uses

residential, since there is already industrial uses in the area and isn't near public transportation Residential anywhere except towards the north nearish the current residential





#### Opportunity Area 2: What types of land uses should be avoided in this area and why?

The adjacent land uses of this site are nearly all industrial. I don't think we should build residential units on a site surrounded by these heavy polluting uses.

Residential - proximity to highway and industry is not it Manufacturing/industrial land use compatible to other industrial uses and site has access to rail and expressway Residential, there is hardly any ecosystem/ land use around to build homes

Anything with lots of emissions - it's already so bad right here and that school needs to be protected!! Any industrial use that doesn't have lots of jobs/doesn't build local wealth

Seems fairly isolated, with highways and rail surrounding, so not a great location for residential use.

Residential, commercial.

Schools, parks, homes, recreation. To much contamination in the air, water, and soil



#### Opportunity Area 2: What types of land uses should be avoided in this area and why?

Heavy industry, why add to what is there already especially if they are remediating the land No auto oriented uses. Even being next to a highway, there's no need for gas stations or auto shops here when we can grow other businesses here



Opportunity Area 2: What is most important to consider when making land-use decisions here?

compatible adjacencies

Community needs always

Proximity to the interstate and surrounding industries

Doesn't seem to have friendly or good access for those not in vehicles

Accessibility to public transit

the noise and pollution from highway traffic

the north end should be buffering/appropriate for proximity to residential

Proximity to eway Climate change Moving to clean industry for the future





#### Opportunity Area 2: What is most important to consider when making land-use decisions here?

surrounding land uses, noise (highway) and air (adjacent land use)

Compatibility, existing transportation assests and potential job creation and retent

Train and highway access vs historic district to north and water area to east

Cumulative impacts, uses that provide good jobs or involve local ownership/wealth building, development that's compatible with nearby homes

Effects on community health

The increase of commercial businesses along Doty down to 115th demands a consideration of how this space will interact (or even complement) with these developments

Need for remediation

Its a very large site, so could be attractive to a large employer, but what infrastructure would be needed for that type of facility, to make sure it was beneficial without burdening surrounding res.





Opportunity Area 2: What is most important to consider when making land-use decisions here?

The effect on community

Seems to have good existing transportation infrastructure

adjacency to lake calumet keeping pollution from reaching the lake





#### Opportunity Area 5: What types of land uses would be appropriate in this area and why?

#### Open space

Use as buffer between Wolf Lake and the Commerce Park west of Avenue O Commercial immediately south of 118th. Open land use north of 118th far east open land use expansion south along the Burnham Greenway open spaces accessible for residents, inc possibly connecting bike trails

Residential north of 118th, commercial / small business along 118th, buffers and green infrastructure on wetlands / open sites. At least, buffers along the trail. residential and open space/recreation

Extend naturalized area from Wolf Lake. Absolutely nothing that requires trucks - the residential neighborhood that surrounds this building s already too burdened with truck traffic

Residential on East side adjacent to Burnham Greenway, expanded commercial on south side 118th, light industrial on Ave O





#### Opportunity Area 5: What types of land uses would be appropriate in this area and why?

Seems best as an addition to the Forest Preserves to act as a passive open space buffer. expansion/connection of Eggers Grove to Wolf Lake could be really amazing If remediation is not needed, expand the wetland

Recreational open space

Park space, natural area. It would make that part of the trail even nicer!!

Commercial and green space - would love to see those existing uses in this area expanded on

warehousing on big parcel

Wetland expansion to prevent flooding in the residential area adjacent to the northern vacant space



#### Opportunity Area 5: What types of land uses would be appropriate in this area and why?

Small businesses that can leverage the trail and recreational proximity

protect the wetlands

maybe some additional outdoor recreation opportunities in that openspace ie. more trails, other cool outdoor features that the area doesn't have

Small portion on north could extend residential. Also some open space

Housing

Housing



### Opportunity Area 5: What types of land uses should be avoided in this area and why?

All types of industrial

Warehousing - low wages and adds truck traffic

heavy industry

Uses that would negatively impact trail, forest preserves, or residents.

Heavy and light industries

access mainly from south north from 118th to larger site

Manufacturing

Industrial/warehousing/ distribution







#### Opportunity Area 5: What types of land uses should be avoided in this area and why?

being so close to existing residential and water/good nature areas, heavy industry should be avoided, or really any industry

No Retail, housing or industry, it should be nature driven

Any use that has large areas of pavement.

industrial and warehousing

Residential to preserve the natural wetlands of the area

industrial corridor is zoned right across ave o on the other side, so please no more industry that may further impact the community







Opportunity Area 5: What is most important to consider when making land-use decisions here?

Most definitely community since it is near residential areas job density without compromising public health

How it will benefit the community

it is next to an important wildlife area

keep higher intensity uses to south and access from Avenue O Preservation of the wetlands at the far east of the opportunity area

High density residential plus good quality natural areas to the east

road access is limited





#### Opportunity Area 5: What is most important to consider when making land-use decisions here?

An opportunity to create a buffer between recreational, residential and industry

Public health, proximity to wolf lake and the land's value to manage stormwater

Stormwater needs. Area is flat and has adjacent parks storing water

Open space and trail connectivity. Buffers / role of green infrastructure in protecting community health. Water quality related to area waterways including Wolf Lake.

Avoid adding truck traffic to Avenue O

wolf lake and eggers grove

community health, addressing the needs in the area, maintaining wildlife and surrounding nature

Any industrial use needs to provide lots of jobs but not add truck traffic or other pollution





Opportunity Area 5: What is most important to consider when making land-use decisions here?

Community needs of course, but rerouting and/or keeping truck traffic further away from residents

Wildlife habitat / restoration

limited visibility - wont be good for commercial use Bike connectivity / recreational safety

Keeping the trail pleasant





Where else might there be opportunity areas in the study boundary? Please explain why.

the area near Hegewisch marsh 103rd eastside of Torrance

heron pond/deadstick

Southeast corner, Burnham woods area, the future could be more active green spaces here

Any areas closer to the red line extension

East of Torrence along the river. Old rail property that people use for fishing and open land. Currently used as dumping site as well.

Getting naturalized buffers along river edges and commercial buffers on streets (eg Torrence) would be great. Adding sidewalks and trails along those areas would also be greatt

Area across from Senior center in hegewisch







## What are other criteria to consider when selecting opportunity areas?

How contaminated are the sites?

Needs assessment of gaps experienced in any particular community.

How was the land used

Near rail, barge, shipping and highway access

expanding and connecting existing resources ie. people to jobs, natural areas to homes,

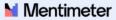
Nature elements and how these are helping prevent flooding (like wetlands) are important to think about

No more trucks!

Historic landmarks/areas; contamination; previous land use; can existing/abandoned areas be used for opportunities, rather than building on green areas?







## What are other criteria to consider when selecting opportunity areas?

If it is public property or if it has delinquent private ownership

Costs, risks, vs. benefits

potential impacts to surrounding areas traffic, pollution, etc

Transportation options besides driving

Getting more good jobs in our community while making things safer for health and walking







## Do you have any other feedback on opportunity areas?

Is there potential for un/underused areas in/around Lake Calumet?

It should be an opportunity for the community not industry. Some of the sites are large, and each edge might have a different approach based on the edge context. Might have different answers and the next scale of detail....

connecting spaces is so critical. so many areas are close on the map, but FAR for a person in terms of barriers

