Proposed MVP Reliability Analysis Alternatives Discussion

TSTF

September 16th, 2011

Iowa MVPs

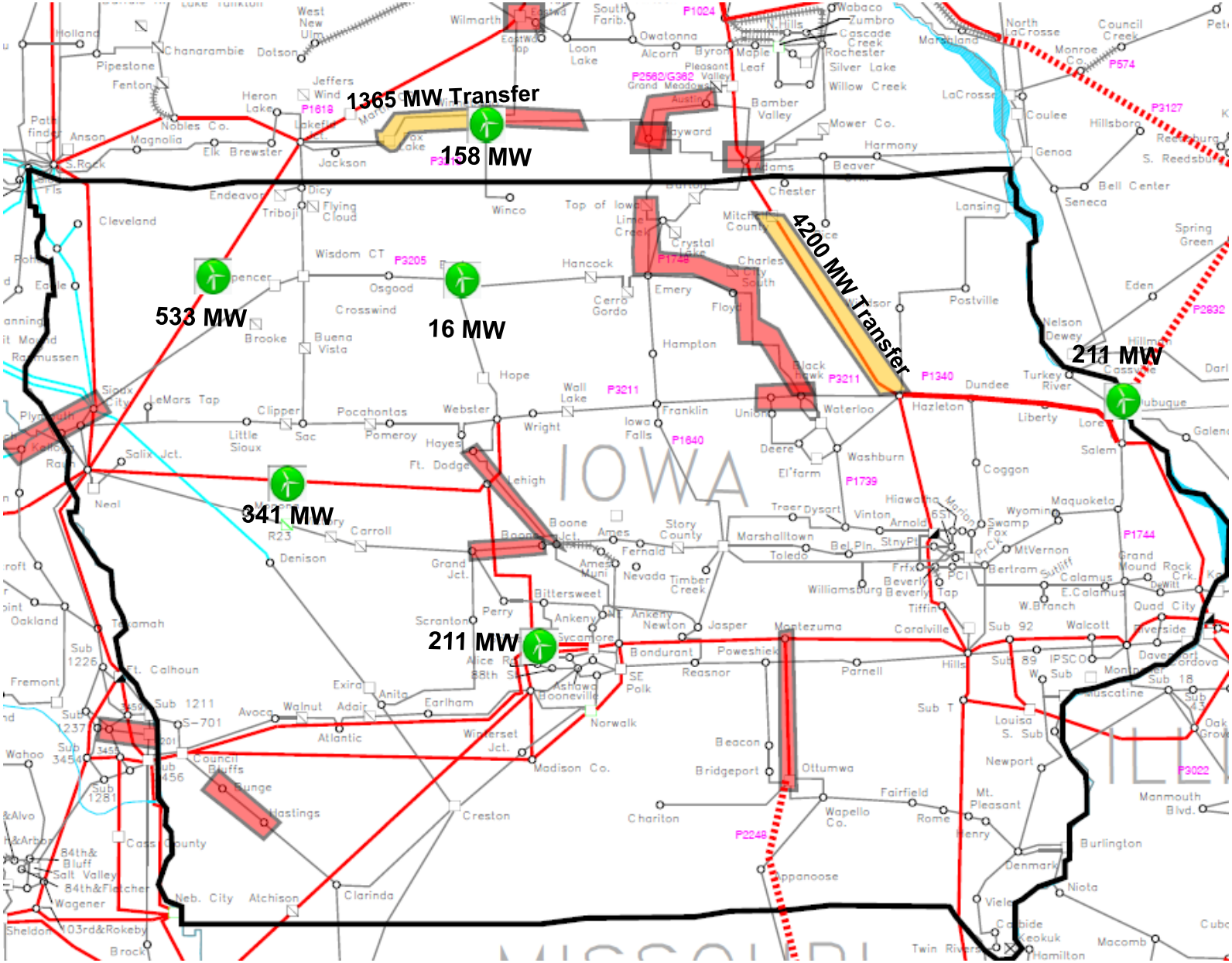
Constraint Analyses

- **Constraints shown based on:**
  - Contingency analysis on 2021 cases with and without proposals
  - Transfer analyses starting at 2021 levels and increasing until limits found
  - Transfer sources are all incremental wind zones
  - Transfer sinks are non-wind merit order
  - RPS milestone wind levels:
    - 2022 ~ 454 MW
    - 2023 ~ 909 MW
    - 2024 ~ 1363 MW
    - 2025 ~ 1818 MW
    - 2026 ~ 2272 MW

MISO

Iowa Constraints

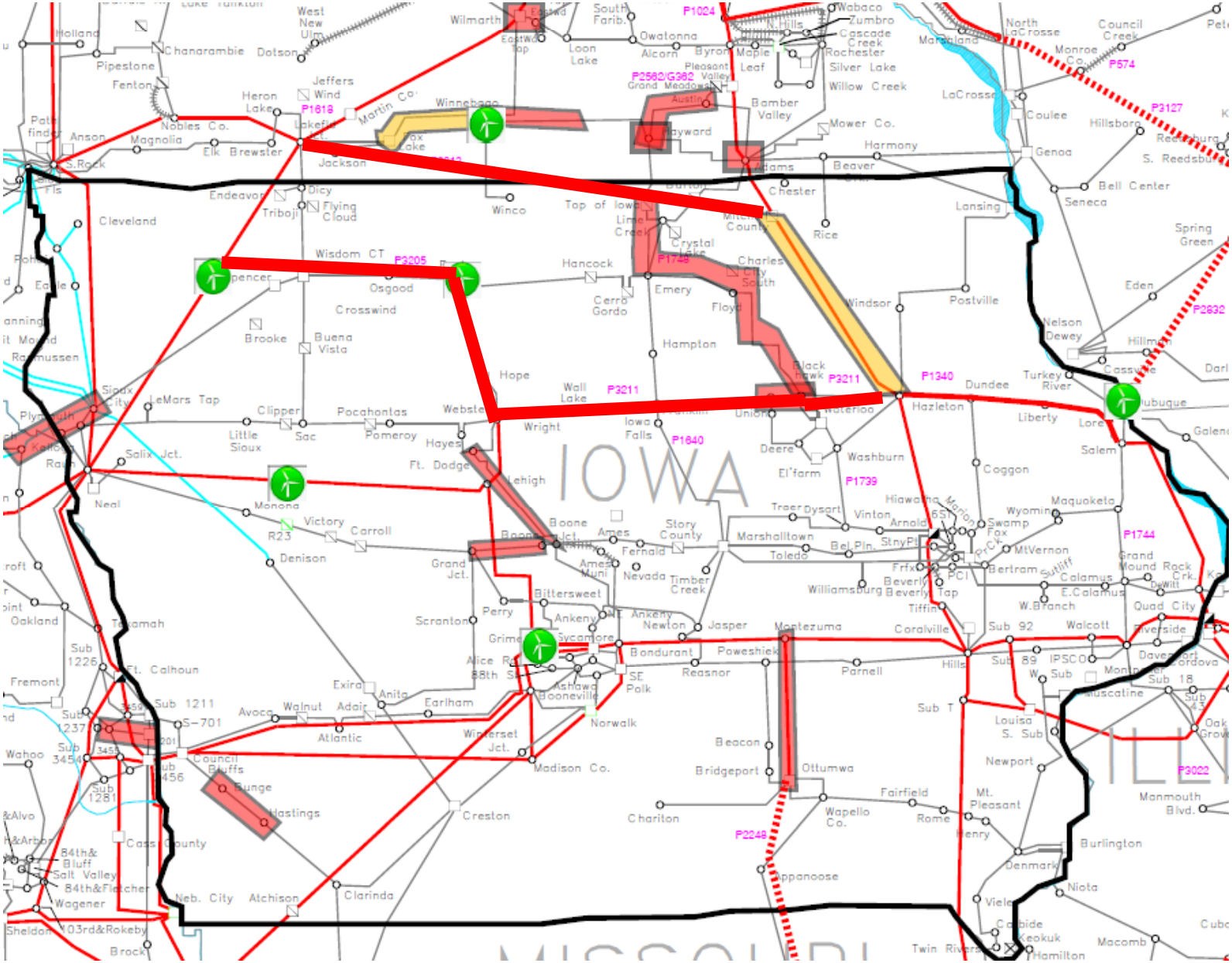
Incremental Wind Zone (2021)



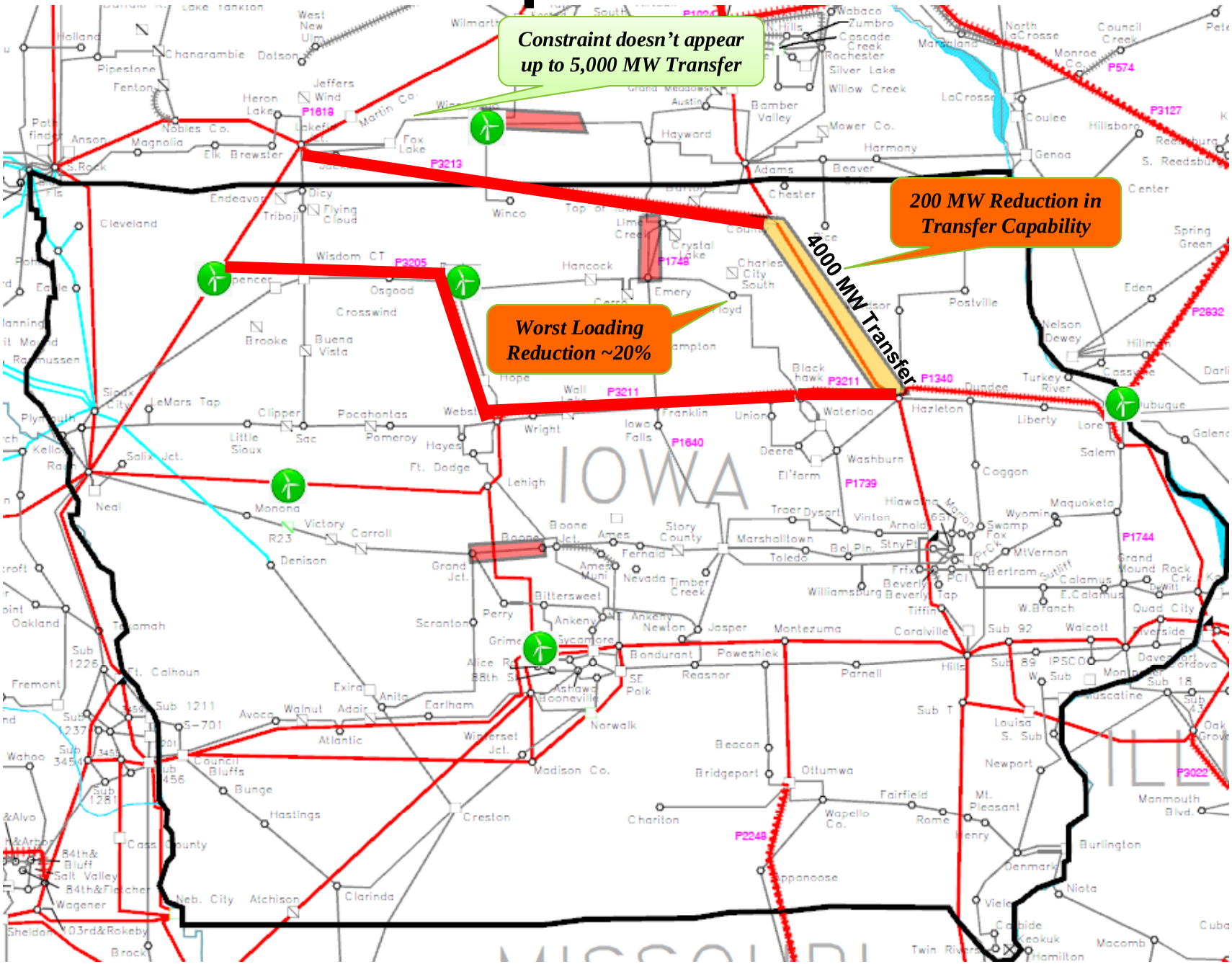
- **Red Highlights-** Constraints in CMVP Study 2021 Shoulder pre-IA CMVP Case
- **Yellow Highlights-** Constraints in Transfer Study (Beyond 2021 Wind Levels)
  - 2022 ~ 454 MW
  - 2023 ~ 909 MW
  - 2024 ~ 1363 MW
  - 2025 ~ 1818 MW
  - 2026 ~ 2272 MW

CMVP Routes

Incremental Wind Zone



CMVP Impact on Constraints



Proposed CMVP Effects

- Effectively mitigates Fox Lake-Rutland-Winnebago constraint (FCITC limit at ~1,300 MW doesn't appear post project for upto 5,000 MW of RPS wind transfer)
- Mitigates Emery-Floyd-Bremer-Blackhawk constraint
  - Though loading reduction on path is less than 20%

- Doesn't mitigate Lime Creek-Emery constraint
- Reduces transfer capability on Mitchell County-Hazelton 345 kV path (FCITC limit reduced by 200 MW for RPS wind transfer)

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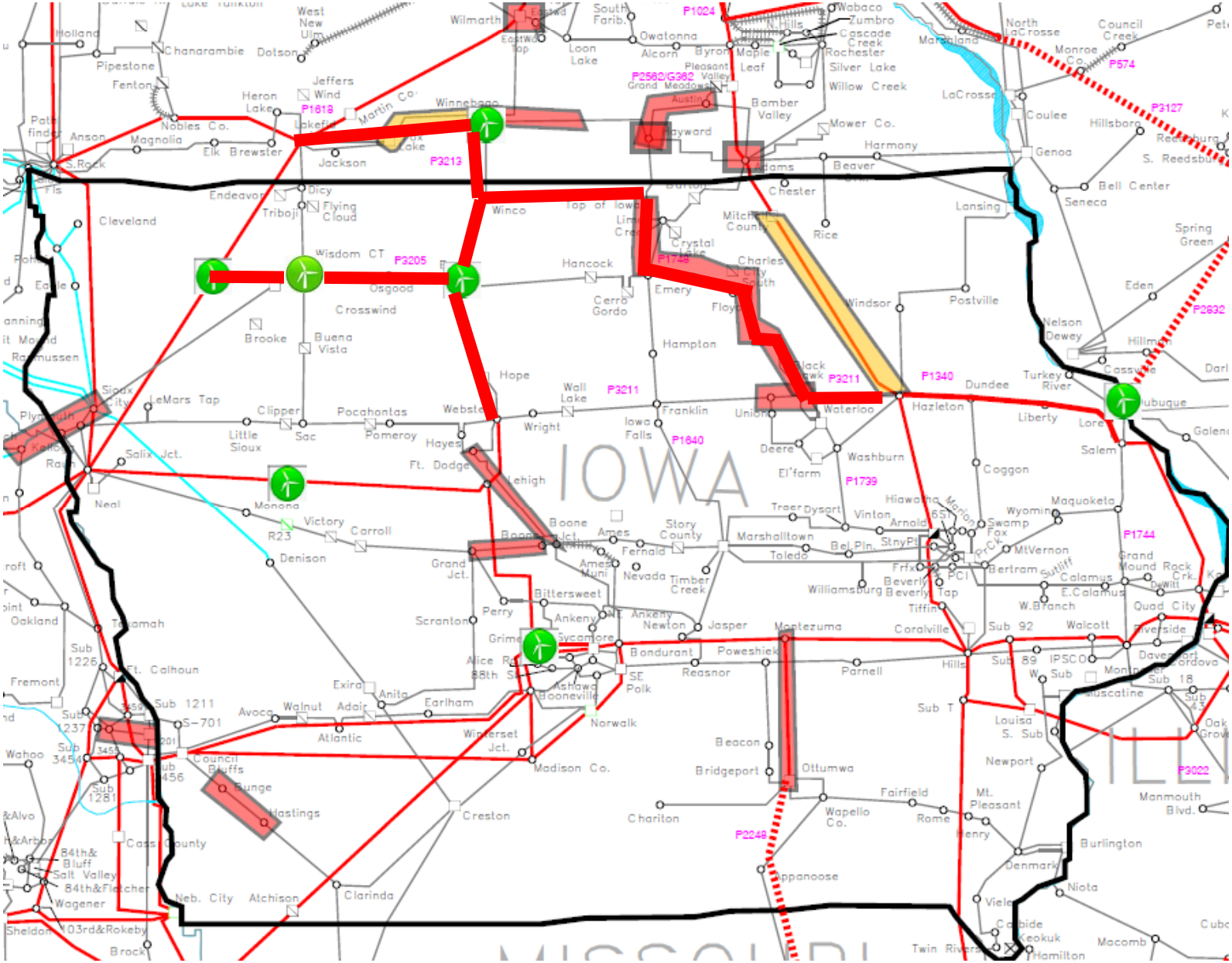
Alternate Route

Incremental Wind Zone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Marshalltown
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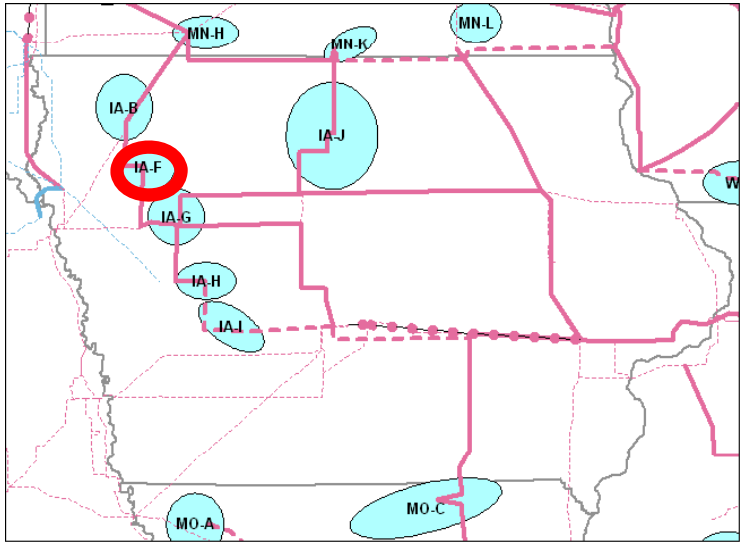
Alternate Route

- Lakefield to Winnebago 345 kV
  - Winnebago 345/161 kV transformer
- Winnebago to Webster 345 kV
- Tie Winnebago to Webster at new station and extend to Lime Creek 345 kV
  - Lime Creek 345/161 kV transformer
- Lime Creek to Emery 345 kV
  - Emery 345/161 kV transformer
- Emery to Floyd to Bremer to Blackhawk 345 kV
  - Blackhawk 345/161 kV transformer
- Blackhawk to Hazelton 345 kV
- Connect Sheldon to Winnebago-Webster ROW near Burt

Wind Zone Adjustment

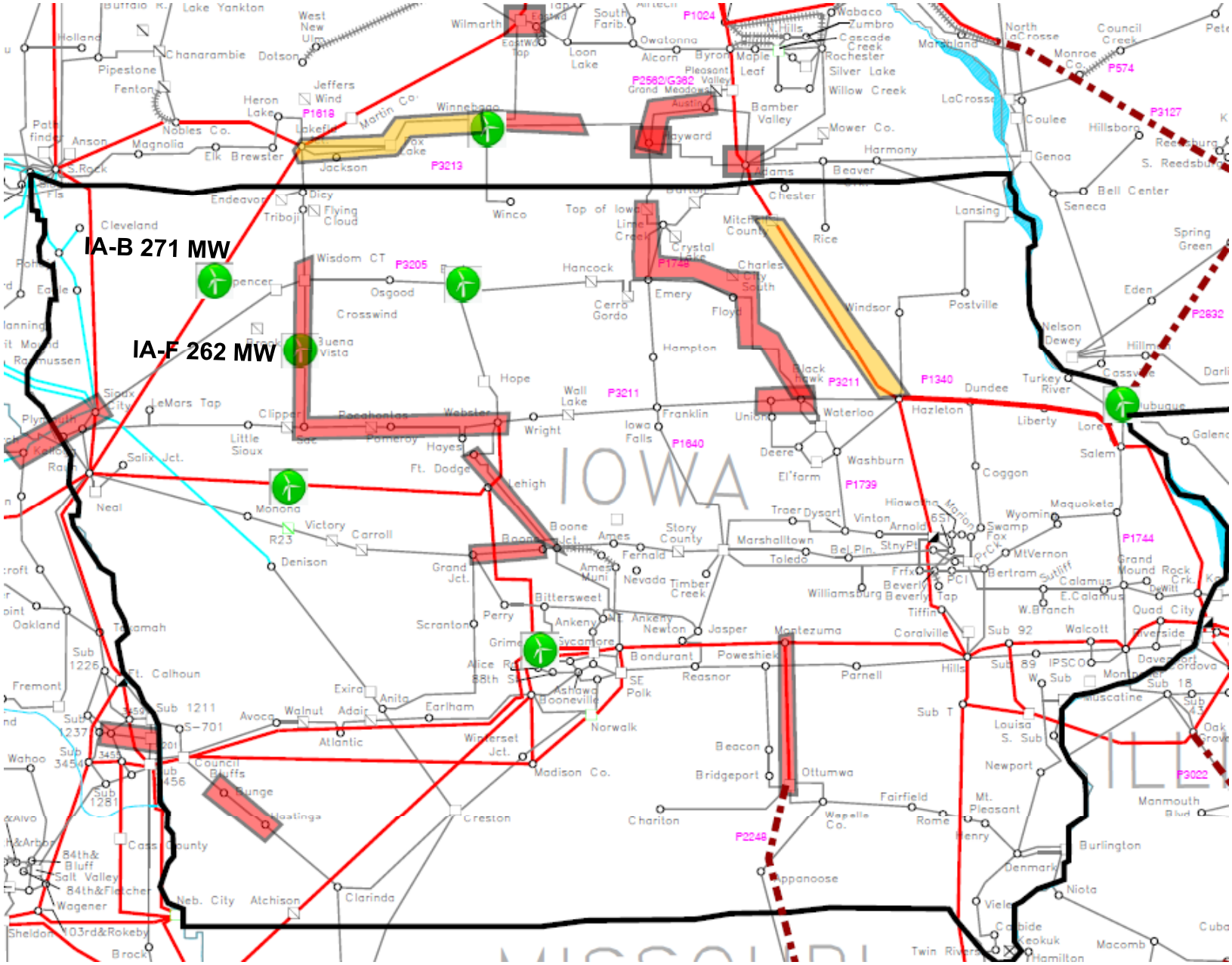
- IA-F originally in RGOS closer to Buena Vista 161 kV area
- Two zones (IA-B and IA-F) had been lumped at Sheldon 345 kV pre-MVP (533 MW) because RGOS Line from Sheldon to Lehigh not part of CMVP portfolio



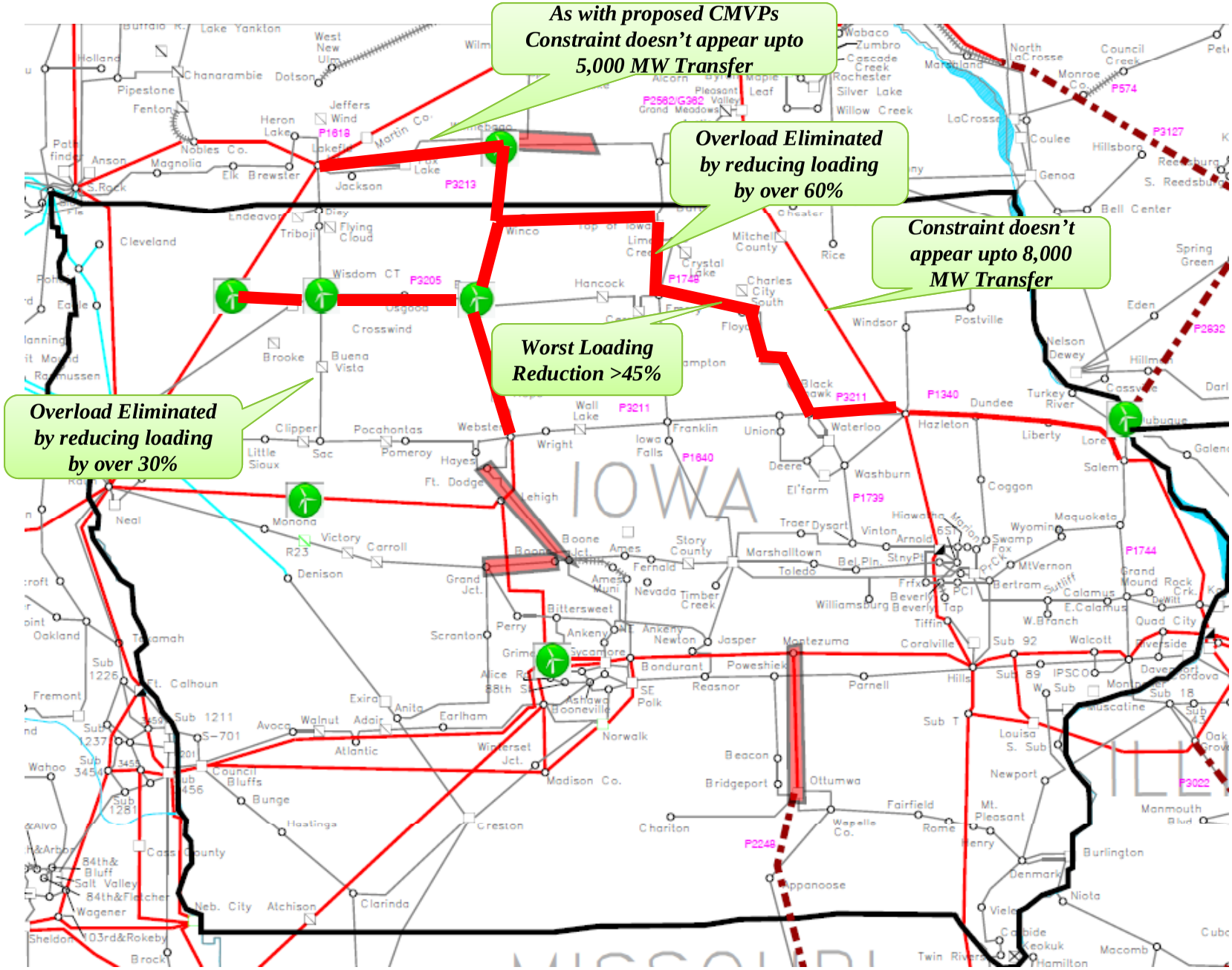
- Reasonable to assume IA-F (262 MW) on 161 kV pre-MVP
- With MVP, connect to new 345 kV MVP sub in area

Constraints

Incremental Wind Zone



Impact of Alternative on Constraints


As with proposed CMVPs Constraint doesn't appear upto 5,000 MW Transfer
Overload Eliminated by reducing loading by over 60%
Constraint doesn't appear upto 8,000 MW Transfer
Worst Loading Reduction >45%
Overload Eliminated by reducing loading by over 30%
IOWA
P3213
P3205
P1618
P1748
P3211
P1340
P1640
P1739
P1744
P3022
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P2582/G362
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Crosswind
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Clipper
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Alternative Impact

- Continues to effectively mitigate Fox Lake-Rutland-Winnebago constraint (FCITC limit at ~1,300 MW doesn't appear post project for up to 5,000 MW of RPS wind transfer). Step Down Transformation at Winnebago provides additional loading reduction.
- Mitigates Lime Creek-Emery-Floyd-Bremer-Blackhawk constraint
  - Offloads existing transmission by at least over 45% on all sections
    - Attributed to transformers at Lime Creek and Emery which help pick up wind of about 225 MW and 130 MW respectively onto the 345 kV line in base shoulder scenario acting as step up transformers.
- Does not negatively impact transfer limit on Mitchell County-Hazelton 345 kV path
  - Significant increase in transfer capability of over 4,000 MW
    - No Iowa CMVP FCITC limit on Mitchell County line at about 4,200 MW increases to over 8,500 with limit on Hazelton to Arnold

MISO

Iowa Summary

- Alternate Route is superior to proposed CMVPs
  - Routed through Lime Creek wind heavy area constraints aggravated by through transfers
    - Alternate Route helps reduce loading on existing transmission path by about half
  - Relieves congestion on Mitchell-Hazelton 345 kV path increasing wind transfer capability through Iowa by over 4,000 MW
  - Circumvents wind heavy northern Iowa regions with reliable 345 kV looped system with various transformation stations which would help facilitate future wind connections