

Hours per year, real case

- 1 Hours
- 8 Hours
- 20 Hours

Project:
Raah

Description:
Raahen tuulivoimapuistot

SHADOW - Map
Calculation:
 Pöllänperä SWT 2.3-101 x 4 x 100m

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 Hans Vadback / hans.vadback@fcg.fi
 Calculated:
 19.12.2012 12:08/2.8.552



Map: Uusi peruskartta, pohjoinen, Print scale 1:30 000, Map center ETRS 89 Zone: 35 East: 386 800 North: 7 184 120

Shadow receptor

Flicker map level: Height Contours: Korkeudet_ABCN_trim.wpo (10)

Project: **Raah**
 Description: Raahen tuulivoimapaistot

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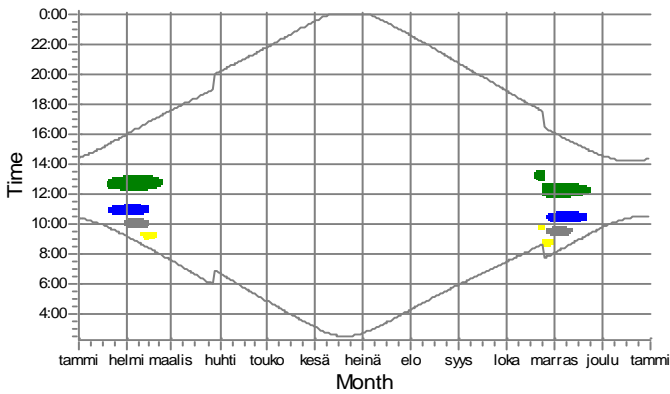
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 19.12.2012 12:08/2.8.552



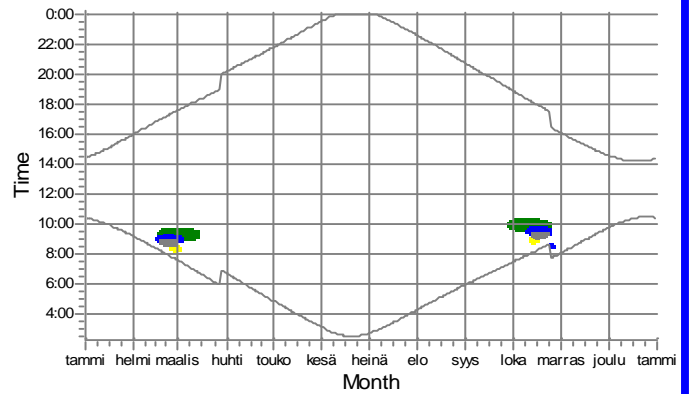
SHADOW - Calendar, graphical

Calculation: Pöllänperä SWT 2.3-101 x 4 x 100m

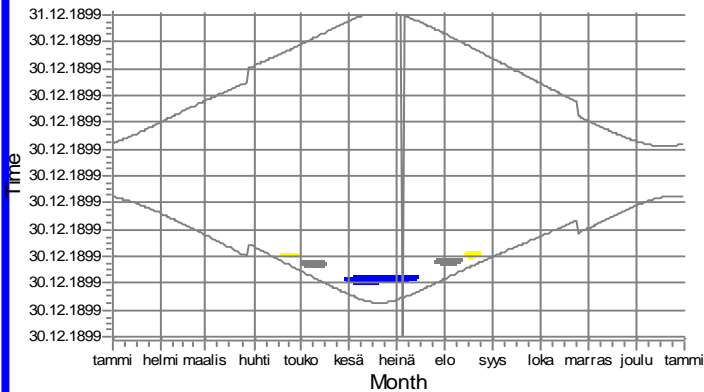
A: Lomarakennus (Loskarinlahti)



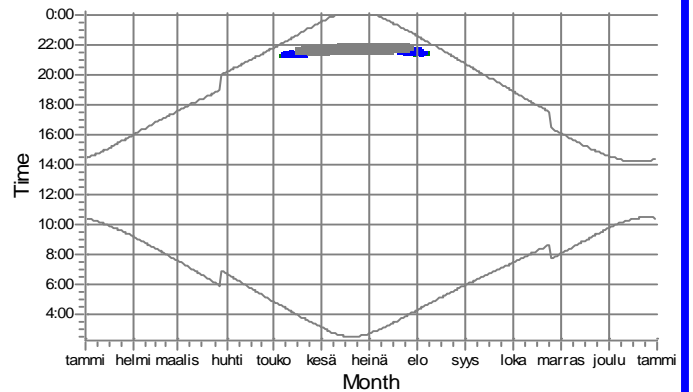
B: Lomarakennus (Loskarinlahti)



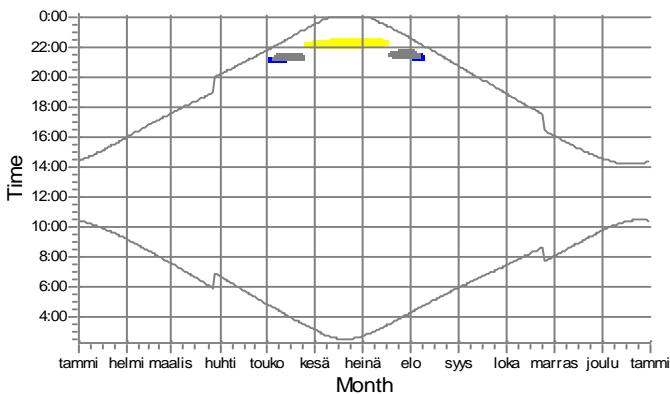
C: Asuinrakennus (Pöllänperä)



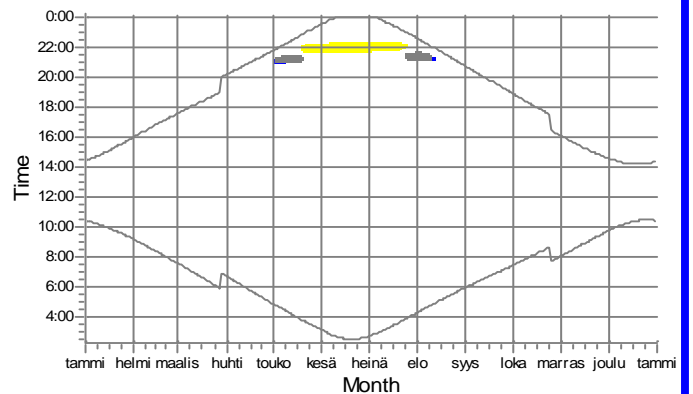
D: Asuinrakennus (Holappa)



E: Asuinrakennus

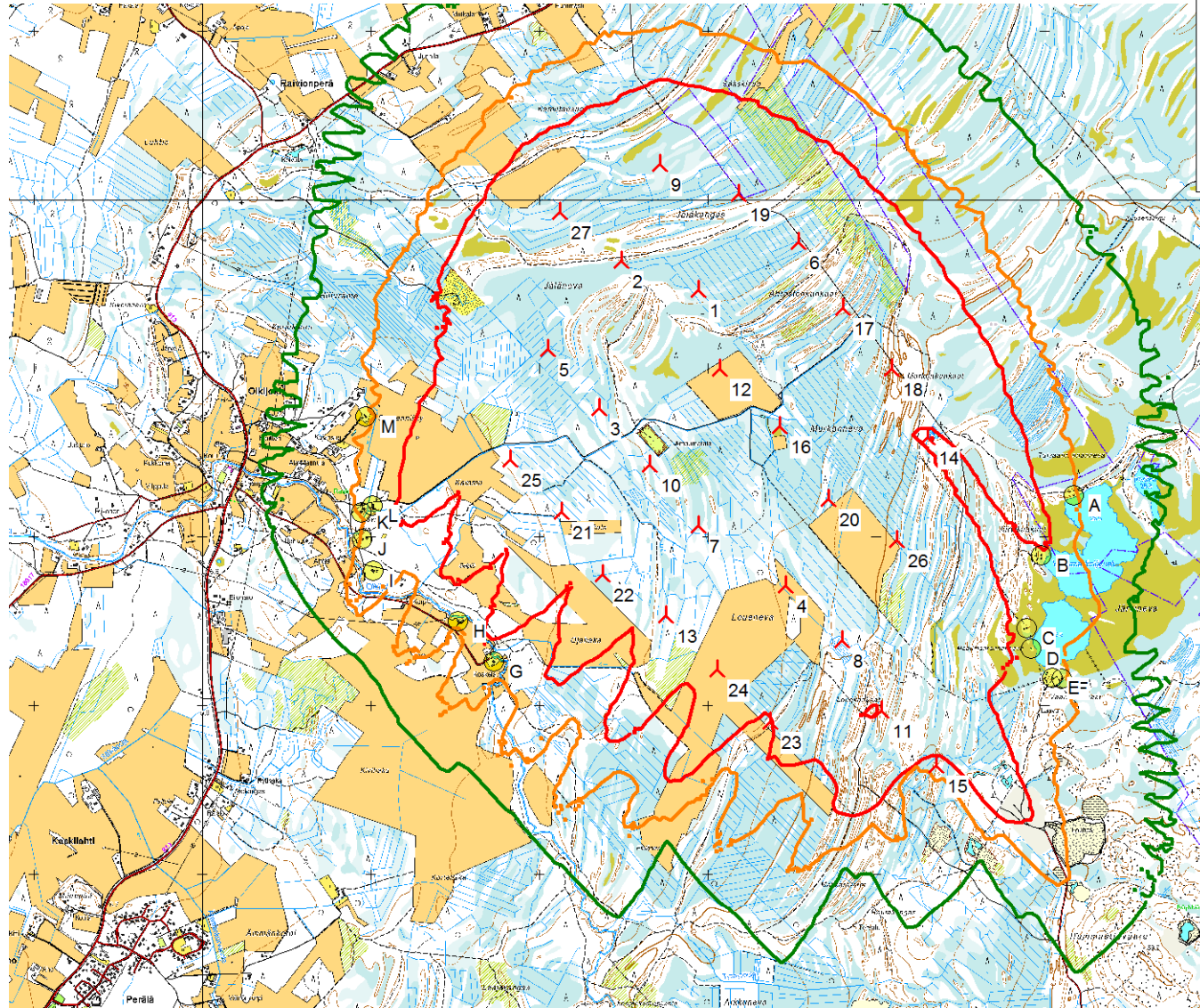


F: Asuinrakennus (Hummasti)



WTGs

- 1: Siemens SWT-2.3-101 2300 101.0 !O! hub: 100,0 m (TOT: 150,5 m) (2083)
- 2: Siemens SWT-2.3-101 2300 101.0 !O! hub: 100,0 m (TOT: 150,5 m) (2087)
- 3: Siemens SWT-2.3-101 2300 101.0 !O! hub: 100,0 m (TOT: 150,5 m) (2088)
- 4: Siemens SWT-2.3-101 2300 101.0 !O! hub: 100,0 m (TOT: 150,5 m) (2089)



Hours per year, real case

- 1 Hours
- 8 Hours
- 20 Hours

Project:
Raahe

Description:
Raahen tuulivoimapuistot

SHADOW - Map

Calculation:
Hummastinvaara N117 x 27 x 123 m

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19.12.2012 11:31/2.8.552



Map: Uusi peruskartta, pohjoinen , Print scale 1:40 000, Map center ETRS 89 Zone: 35 East: 389 060 North: 7 180 180

▲ New WTG
 ● Shadow receptor

Flicker map level: Height Contours: Korkeudet_ABCN_trim.wpo (10)

Project: **Raah**
 Description: Raahen tuulivoimapaistot

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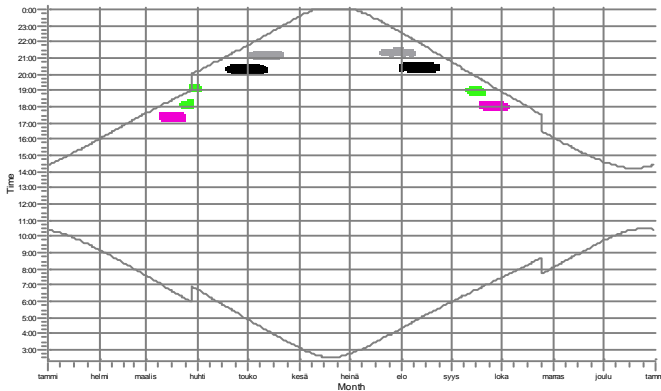
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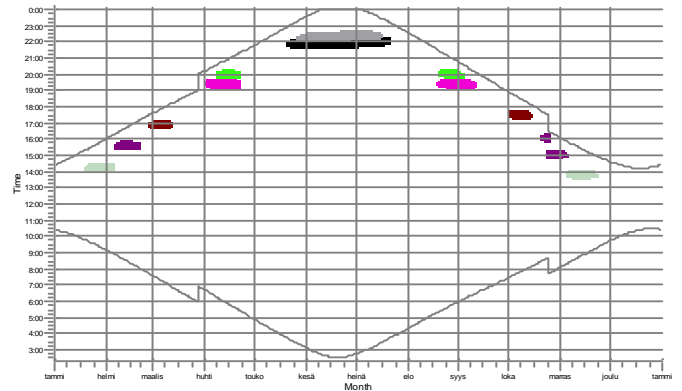
SHADOW - Calendar, graphical

Calculation: Hummastinvaara N117 x 27 x 123 m

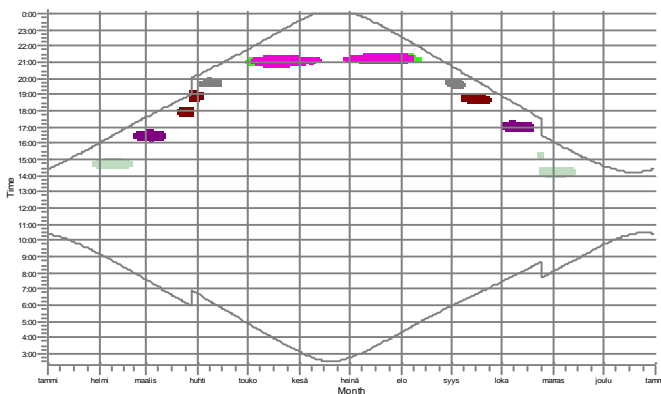
A: Lomarakennus (Hummastinjärvet)



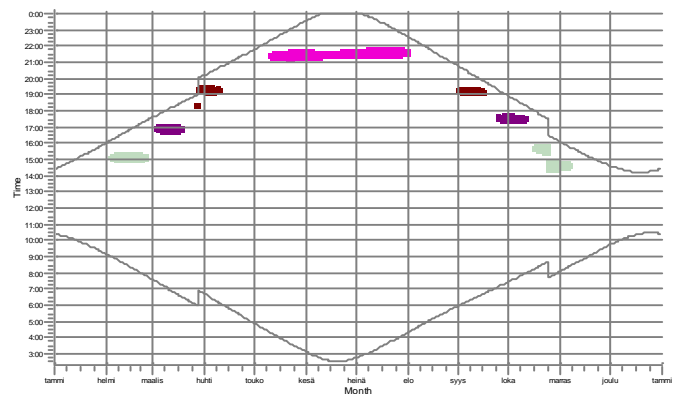
B: Lomarakennus (Hummastinjärvet)



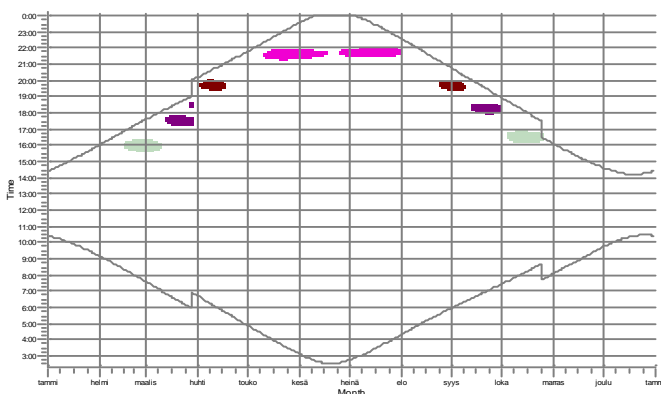
C: Lomarakennus (Hummastinjärvet)



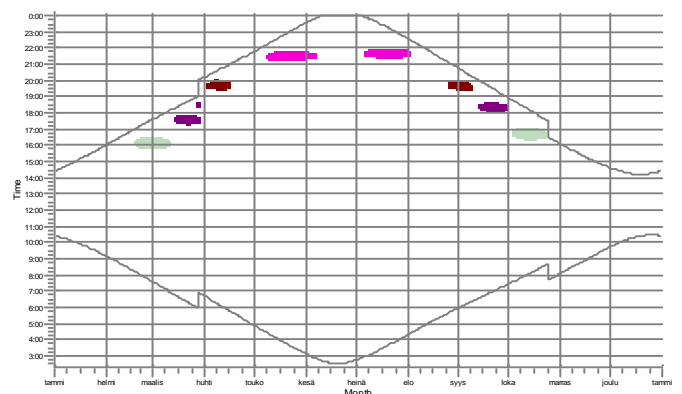
D: Lomarakennus (Hummastinjärvet)



E: Lomarakennus (Hummastinjärvet)



F: Lomarakennus (Hummastinjärvet)



WTGs

- | | | |
|---|---|---|
| 4: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2093) | 14: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2103) | 20: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2109) |
| 8: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2097) | 15: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2104) | 26: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2115) |
| 11: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2100) | 18: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2107) | |

Project: **Raah**
 Description: Raahen tuulivoimapaistot

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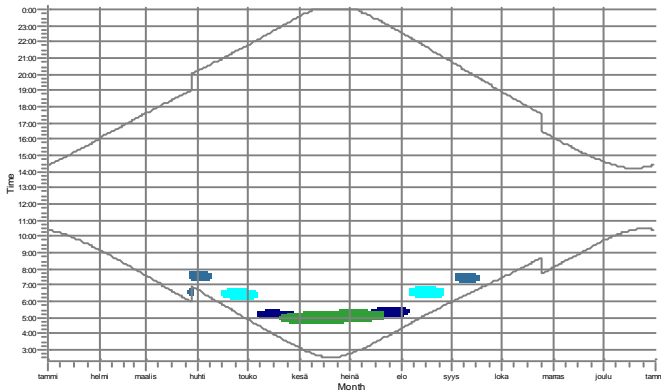


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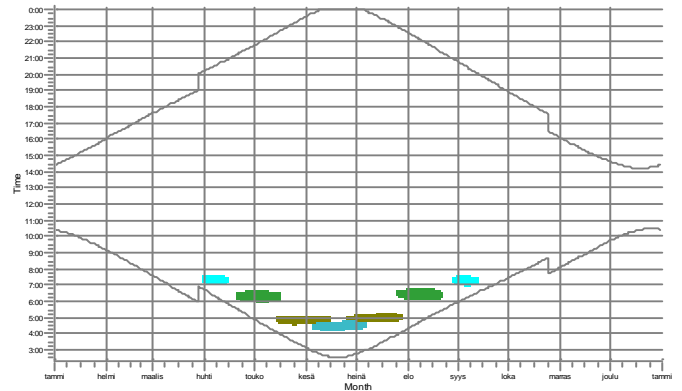
SHADOW - Calendar, graphical

Calculation: Hummastinvaara N117 x 27 x 123 m

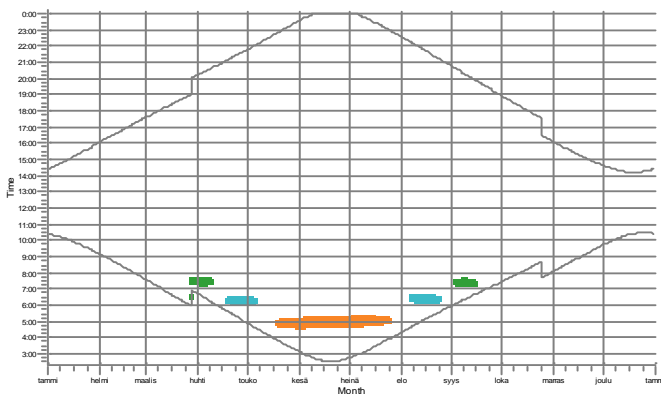
G: Asuinrakennus (Koskela)



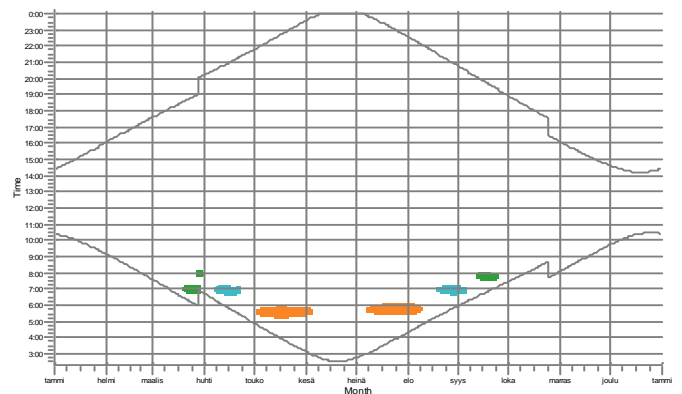
H: Asuinrakennus



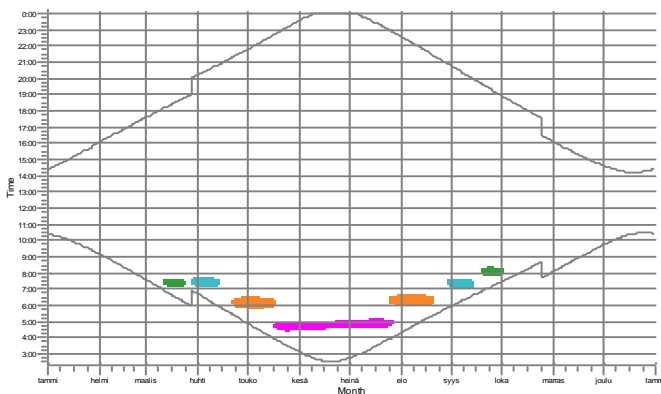
I: Asuinrakennus



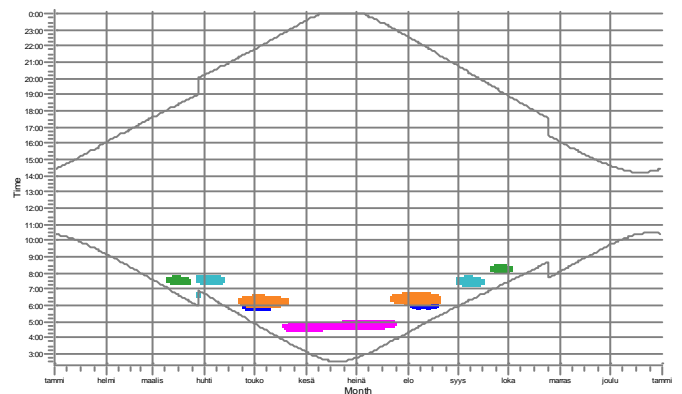
J: Asuinrakennus



K: Asuinrakennus (Syrjälä)



L: Asuinrakennus (Syrjälä)



WTGs

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> 3: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2092) 5: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2094) 7: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2096) | <ul style="list-style-type: none"> 10: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2099) 13: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2102) 21: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2110) | <ul style="list-style-type: none"> 22: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2111) 24: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2113) 25: NORDEX N117 2400 117.0 IO! hub: 123.0 m (TOT: 181,5 m) (2114) |
|--|---|---|

Project: **Raahe**
 Description: Raahen tuulivoimapuistot

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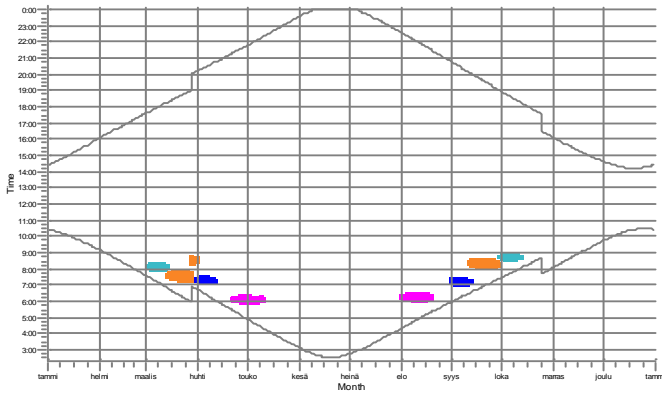
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SHADOW - Calendar, graphical

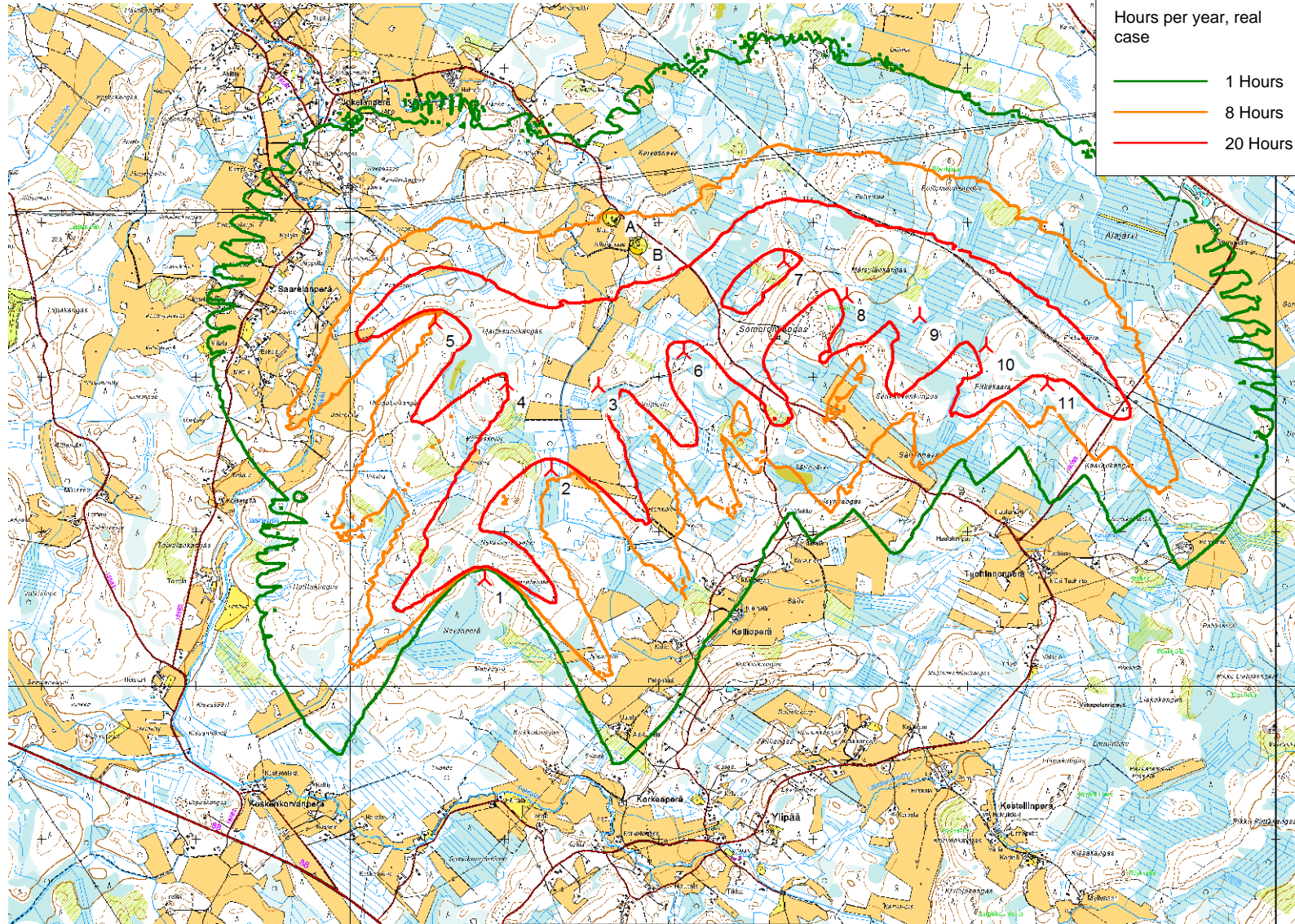
Calculation: Hummastinvaara N117 x 27 x 123 m

M: Asuinrakennus (Saarenniitty)



WTGs

- | | |
|--|--|
| <ul style="list-style-type: none"> 3: NORDEX N117 2400 117.0 IOI hub: 123.0 m (TOT: 181.5 m) (2092) 5: NORDEX N117 2400 117.0 IOI hub: 123.0 m (TOT: 181.5 m) (2094) | <ul style="list-style-type: none"> 21: NORDEX N117 2400 117.0 IOI hub: 123.0 m (TOT: 181.5 m) (2110) 25: NORDEX N117 2400 117.0 IOI hub: 123.0 m (TOT: 181.5 m) (2114) |
|--|--|



Hours per year, real case

- 1 Hours
- 8 Hours
- 20 Hours

Project:
Raahe

Description:
Raahen tuulivoimapuistot

SHADOW - Map

Calculation:
Someronkangas N117 x 11 x 141 m

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20.12.2012 10:38/2.8.552



Map: Uusi peruskartta, pohjoinen , Print scale 1:40 000, Map center ETRS 89 Zone: 35 East: 387 992 North: 7 171 434

0 500 1000 1500 2000 m

▲ New WTG ● Shadow receptor

Flicker map level: Height Contours: Korkeudet_ABCN_trim.wpo (10)

Project: **Raahe**
 Description: Raahen tuulivoimapaistot

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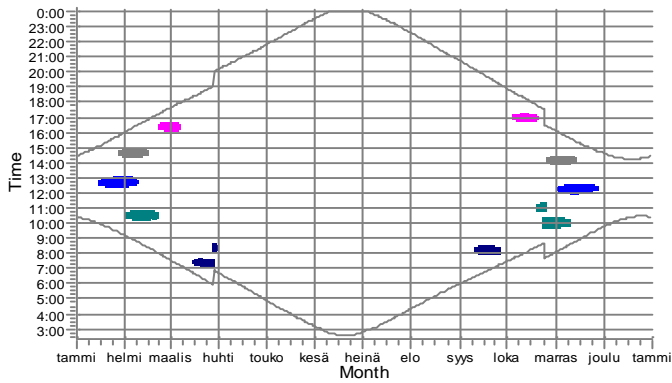
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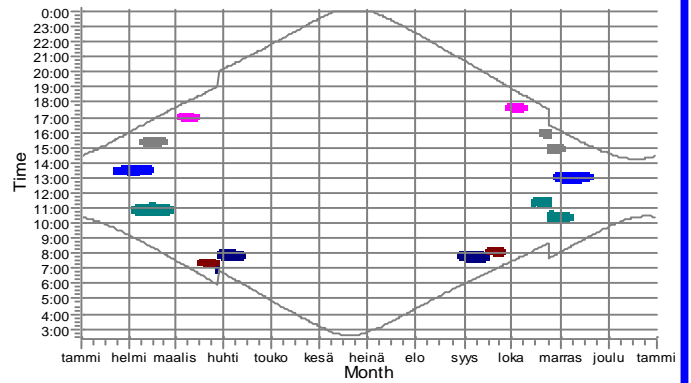
SHADOW - Calendar, graphical

Calculation: Someronkangas N117 x 11 x 141 m

A: Asuinrakennus (Mattila)

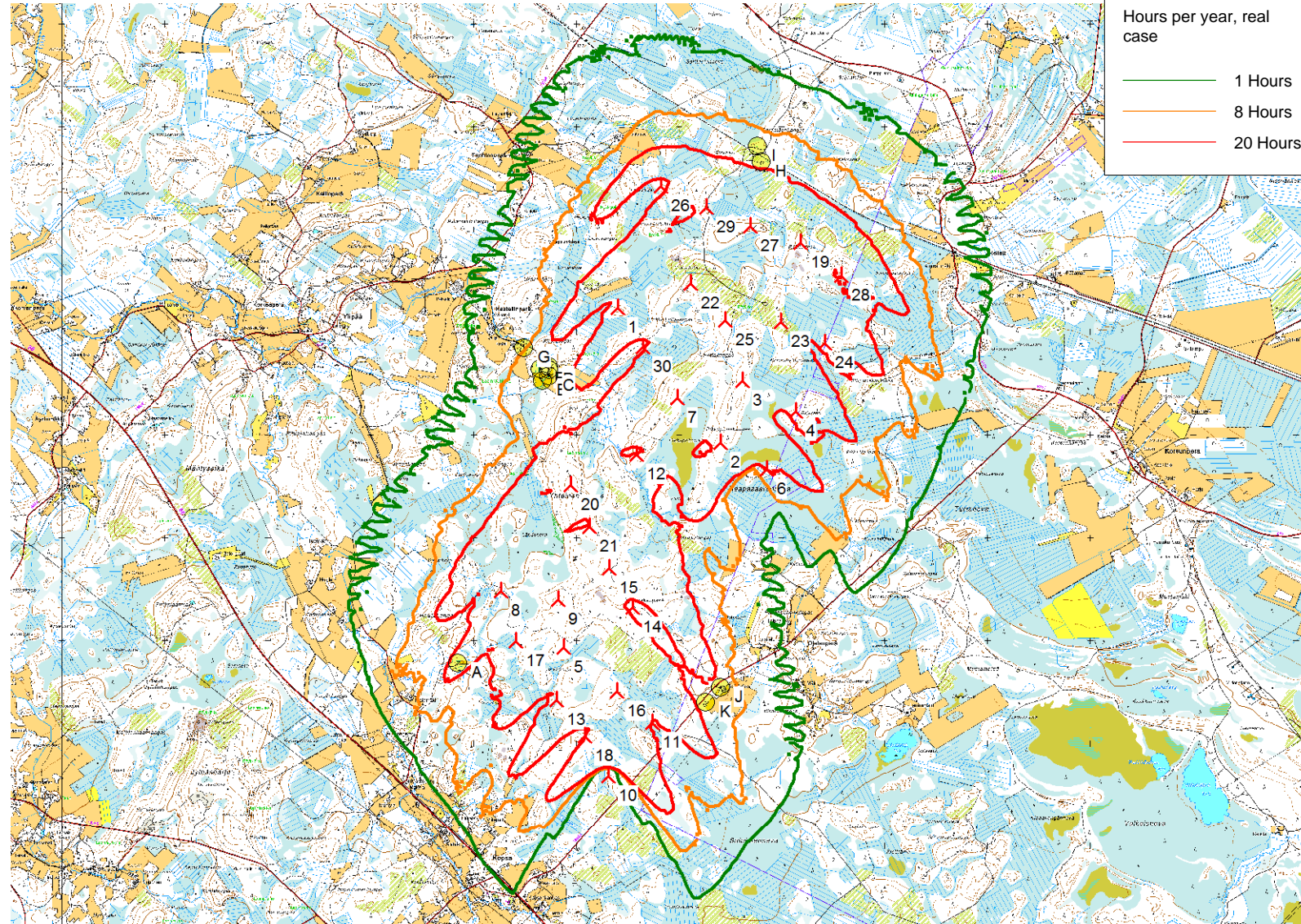


B: Asuinrakennus (Aittokangas)



WTGs

- | | |
|---|---|
| <ul style="list-style-type: none"> 3: NORDEX N117 2400 117.0 !O! hub: 141,0 m (TOT: 199,5 m) (2275) 4: NORDEX N117 2400 117.0 !O! hub: 141,0 m (TOT: 199,5 m) (2276) 5: NORDEX N117 2400 117.0 !O! hub: 141,0 m (TOT: 199,5 m) (2277) | <ul style="list-style-type: none"> 6: NORDEX N117 2400 117.0 !O! hub: 141,0 m (TOT: 199,5 m) (2278) 7: NORDEX N117 2400 117.0 !O! hub: 141,0 m (TOT: 199,5 m) (2279) 8: NORDEX N117 2400 117.0 !O! hub: 141,0 m (TOT: 199,5 m) (2280) |
|---|---|



Hours per year, real case

- 1 Hours
- 8 Hours
- 20 Hours

Project:
Raah

Description:
Raahen tuulivoimapaistot

SHADOW - Map

Calculation:
Yhteinenkangas N117 x 30 x 140 m

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New WTG

Shadow receptor

Map: Uusi peruskartta, pohjoinen, Print scale 1:60 000, Map center ETRS 89 Zone: 35 East: 391 840 North: 7 167 720

Flicker map level: Height Contours: Korkeudet_ABCN_trim.wpo (10)

Project: **Raah**
 Description: Raahen tuulivoimapaistot

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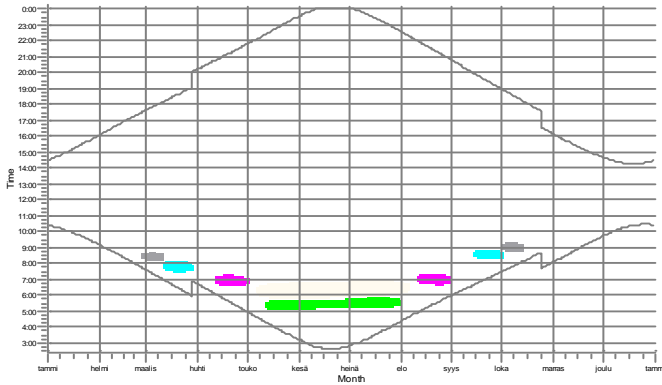
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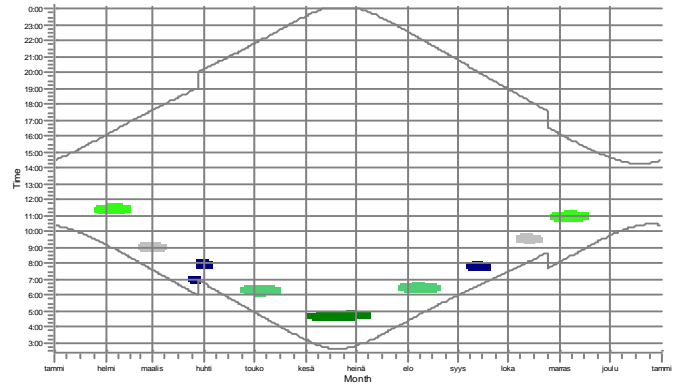
SHADOW - Calendar, graphical

Calculation: Yhteinenkangas N117 x 30 x 140 m

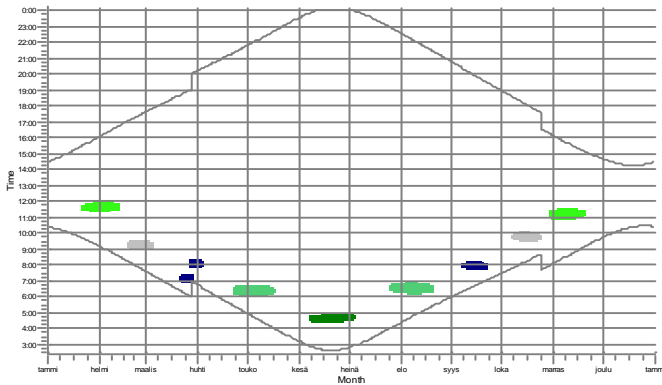
A: Lomarakennus



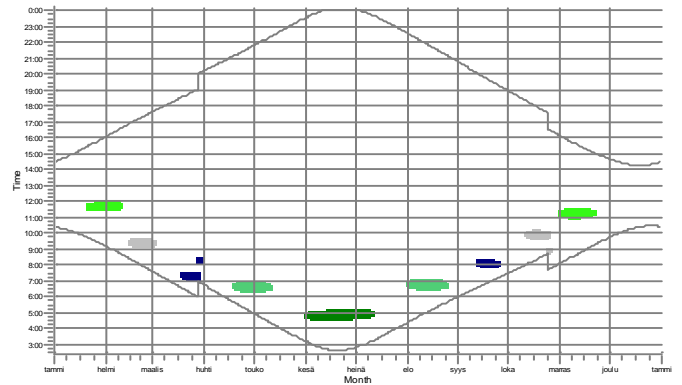
B: Lomarakennus (Myllysaari)



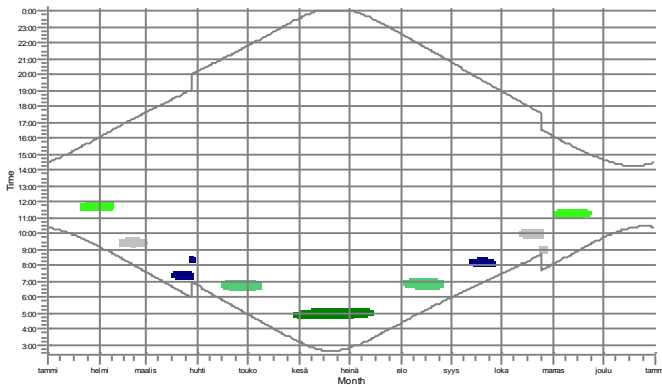
C: Lomarakennus (Myllysaari)



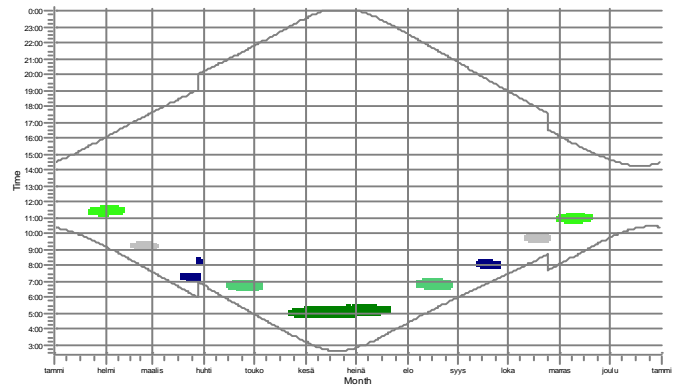
D: Asuinrakennus (Myllysaari)



E: Asuinrakennus (Myllysaari)



F: Asuinrakennus (Myllysaari)



WTGs

- | | | |
|--|---|---|
| 1: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2029) | 12: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2040) | 20: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2048) |
| 5: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2033) | 13: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2041) | 30: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2059) |
| 7: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2035) | 17: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2045) | |
| 9: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2037) | 18: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2046) | |

Project: **Raah**
 Description: Raahen tuulivoimapaistot

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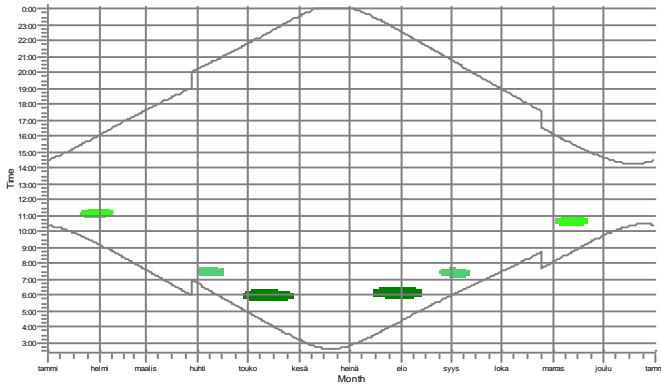
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 Calculated:
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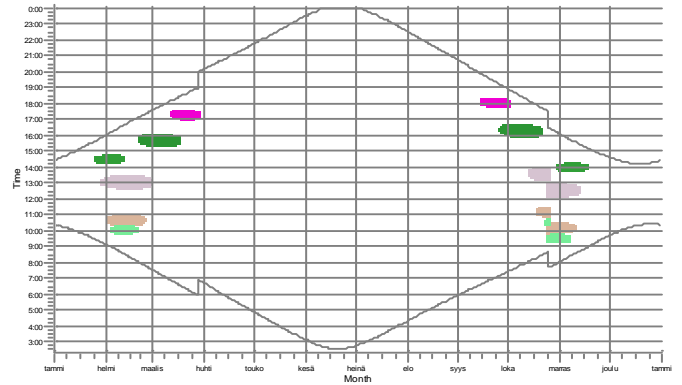
SHADOW - Calendar, graphical

Calculation: Yhteinenkangas N117 x 30 x 140 m

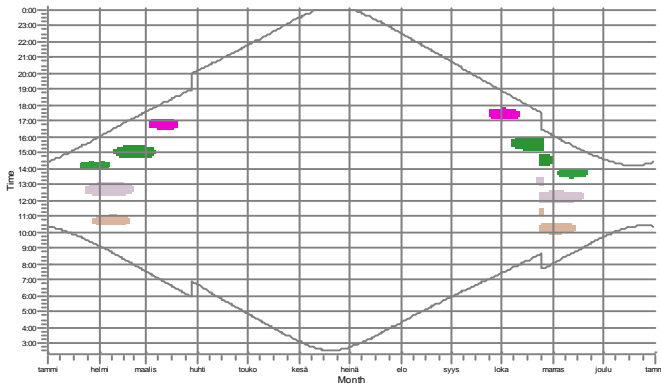
G: Asuinrakennus (Kastelli)



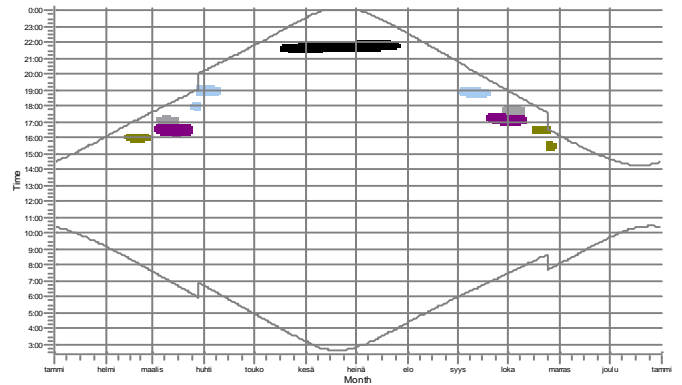
H: Lomarakennus (Koivula)



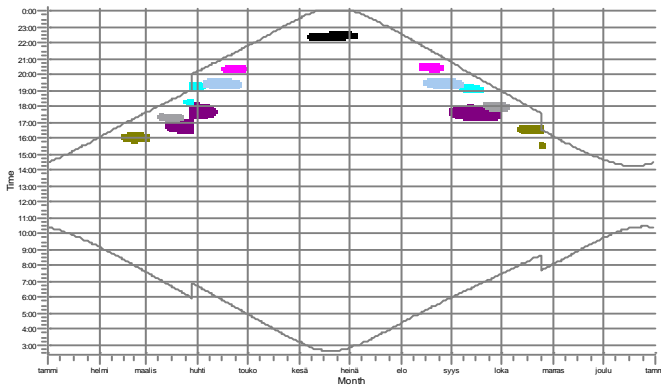
I: Lomarakennus (Sorämäenkangas)



J: Asuinrakennus (Roitonmaa)



K: Asuinrakennus (Roitonmaa)



WTGs

- | | | |
|---|---|---|
| 1: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2029) | 16: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2044) | 27: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2056) |
| 5: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2033) | 18: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2046) | 28: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2057) |
| 10: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2038) | 19: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2047) | 29: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2058) |
| 11: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2039) | 20: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2048) | 30: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2059) |
| 13: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2041) | 22: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2051) | |
| 14: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2042) | 26: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (2055) | |

Project: **Raaha**
 Description: Raahan tuulivoimapaistot

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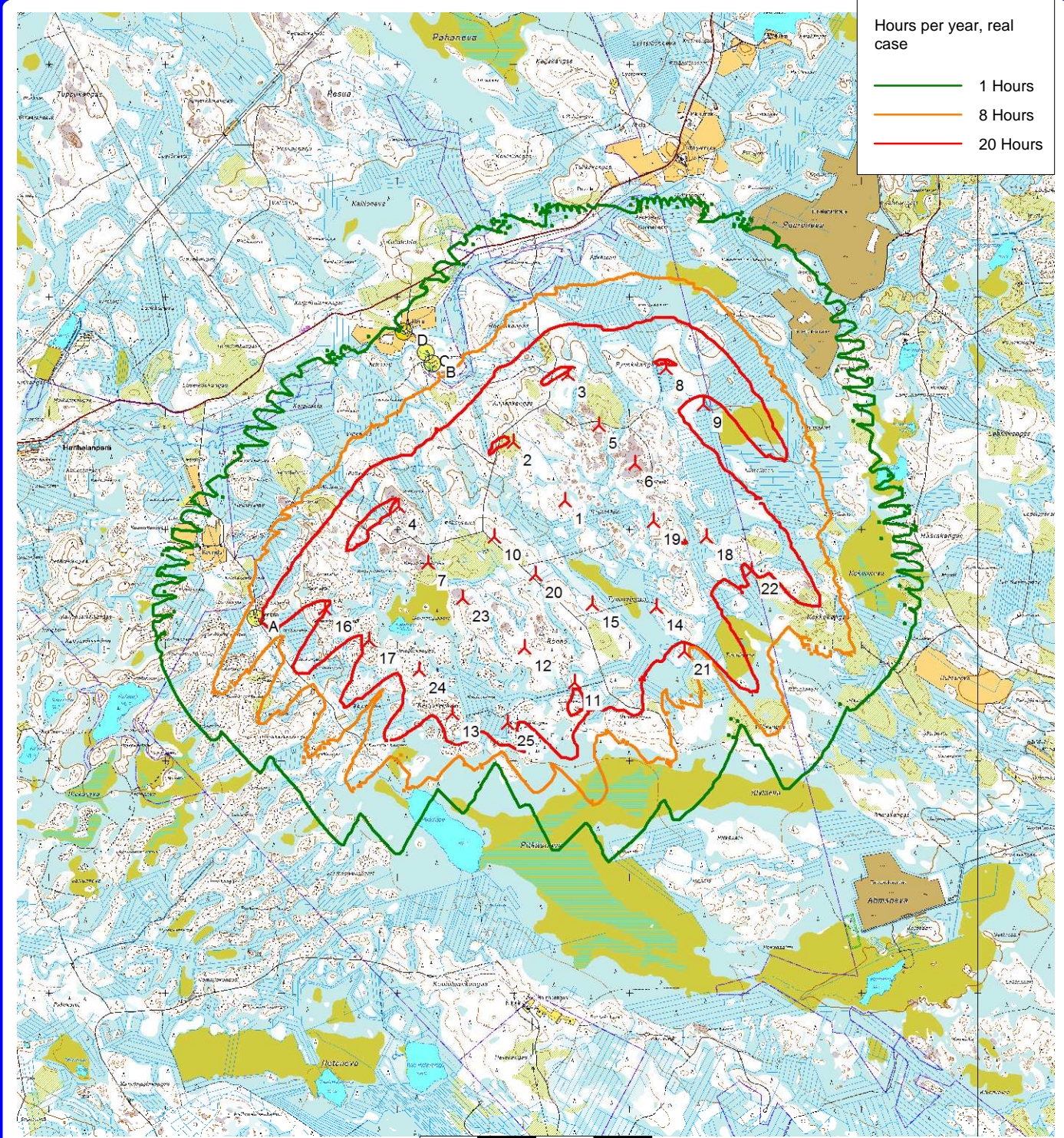
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 Calculated:
 20.12.2012 11:32/2.8.552

SHADOW - Map

Calculation: Annankangas N117 x 25 x 140 m



Hours per year, real case

- 1 Hours
- 8 Hours
- 20 Hours

0 500 1000 1500 2000 m

Map: Uusi peruskartta, etelä , Print scale 1:50 000, Map center ETRS 89 Zone: 35 East: 394 193 North: 7 152 612

New WTG Shadow receptor

Flicker map level: Height Contours: Korkeudet_ABCN_trim.wpo (10)

Project: **Raah**
 Description: **Raahen tuulivoimapuistot**

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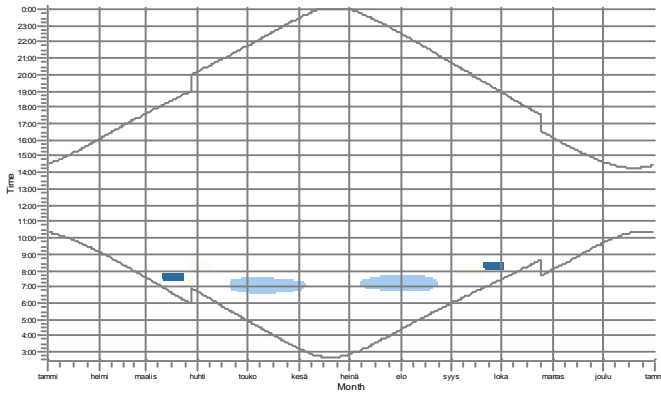


Hans Vadbäck / hans.vadback@fcg.fi
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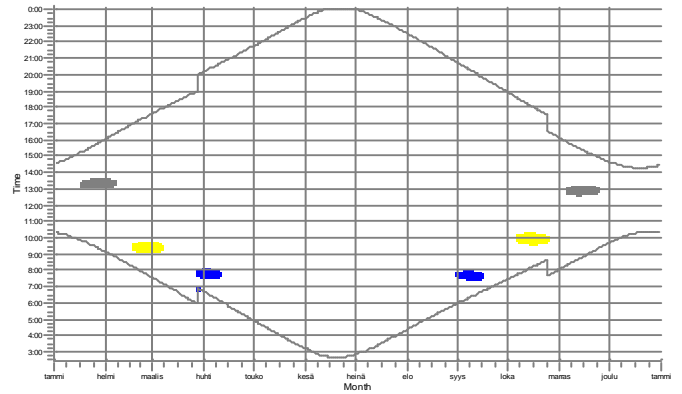
SHADOW - Calendar, graphical

Calculation: Annankangas N117 x 25 x 140 m

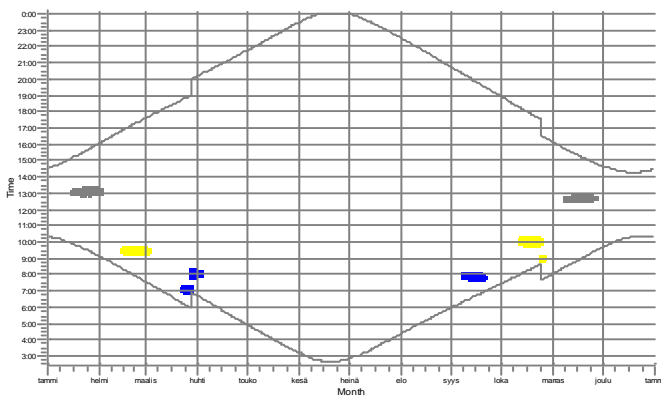
A: Asuinrakennus (Hönnilä)



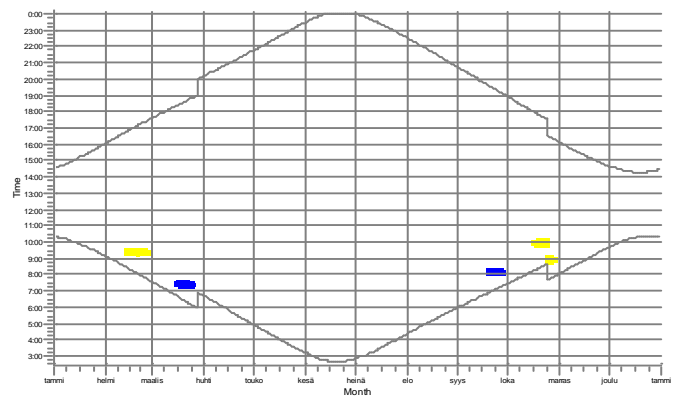
B: Asuinrakennus (Talkkunamaa)



C: Lomarakennus (Talkkunamaa)



D: Asuinrakennus (Harju)



WTGs

- | | | |
|--|---|---|
| 2: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (1603) | 4: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (1605) | 17: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (1619) |
| 3: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (1604) | 16: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (1618) | 24: NORDEX N117 2400 117.0 IO! hub: 140,0 m (TOT: 198,5 m) (1628) |

Project: **Raaha**
 Description: Raahan tuulivoimapaistot

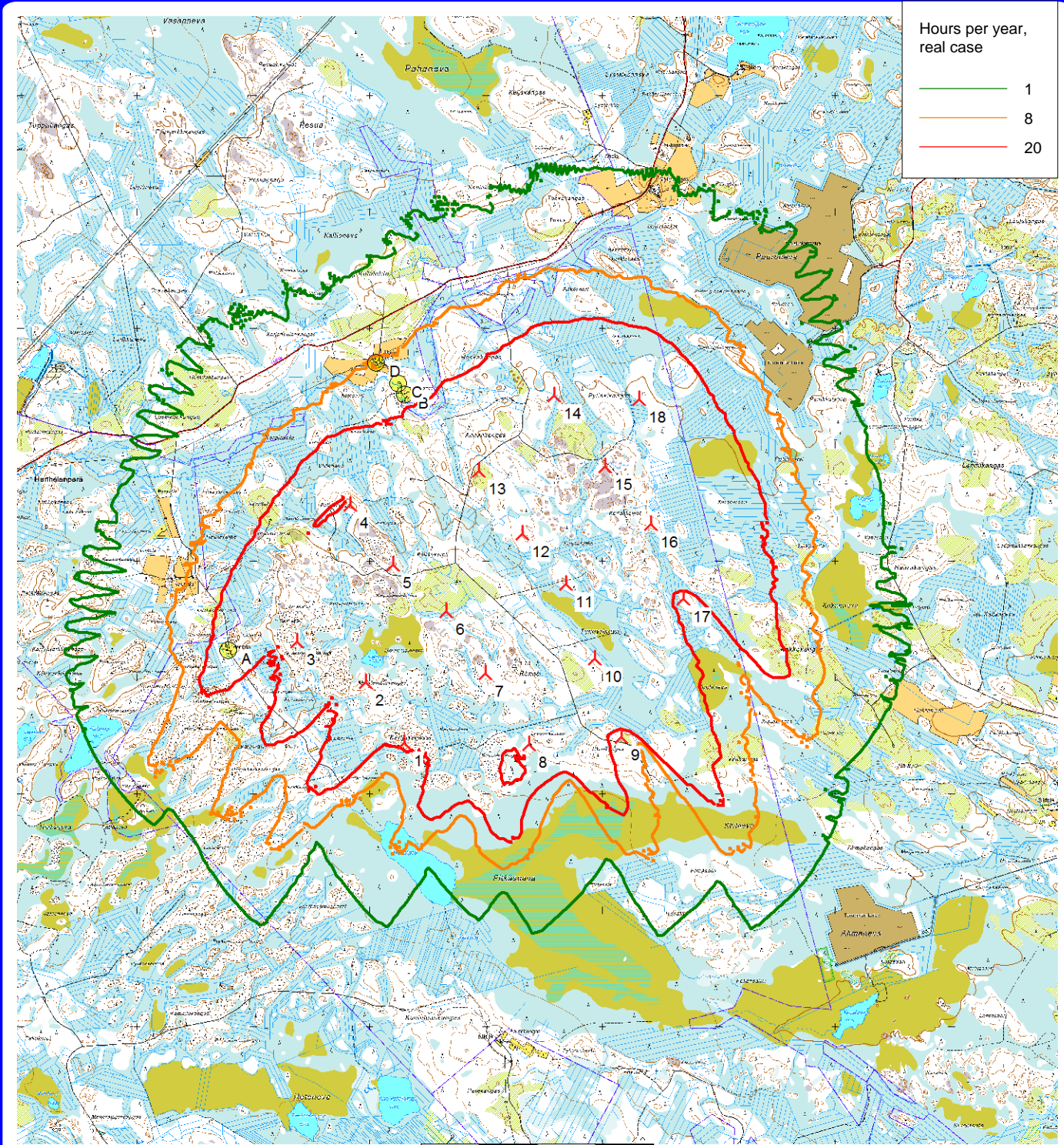
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SHADOW - Map

Calculation: Annankangas G150 x 18 x 150 m



Map: Uusi peruskartta, etelä , Print scale 1:50 000, Map center ETRS 89 Zone: 35 East: 394 440 North: 7 152 840
 New WTG Shadow receptor
 Flicker map level: Height Contours: Korkeudet_ABCN_trim.wpo (10)

Project: **Raaha**
 Description: Raahen tuulivoimapaistot

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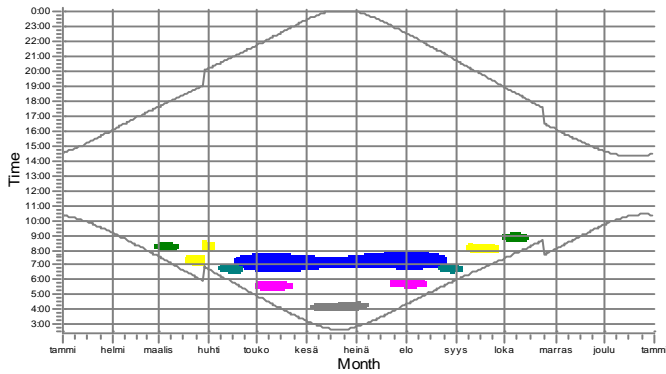
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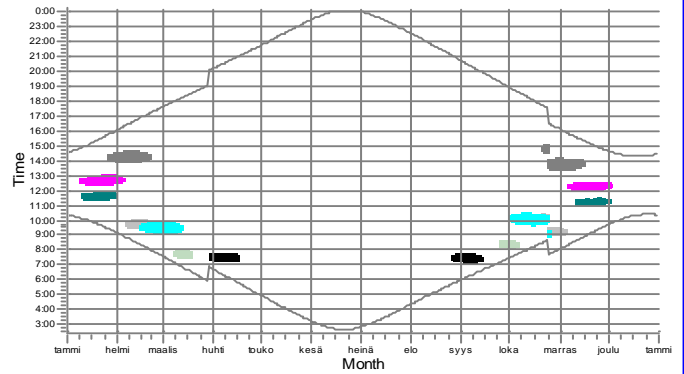
SHADOW - Calendar, graphical

Calculation: Annankangas G150 x 18 x 150 m

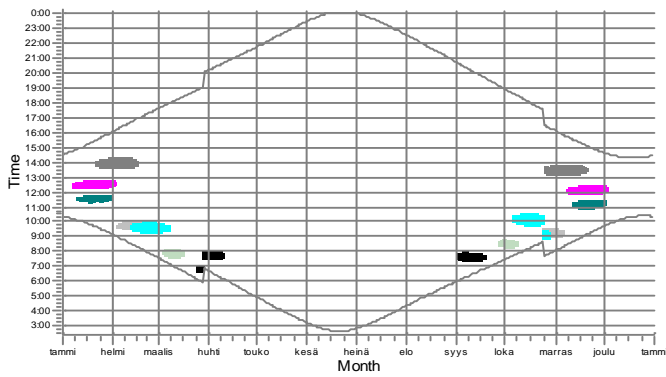
A: Asuinrakennus (Hönnilä)



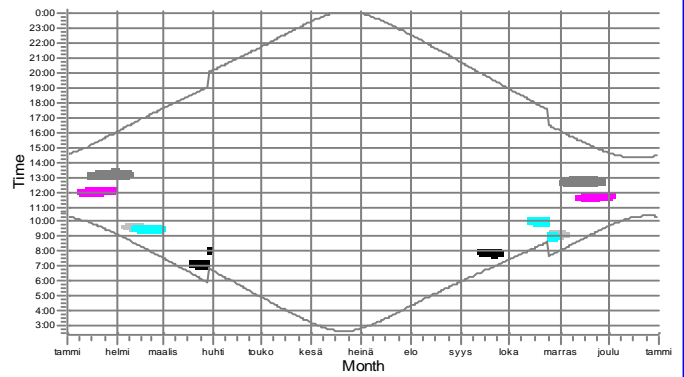
B: Asuinrakennus (Talkkunamaa)



C: Lomarakennus (Talkkunamaa)



D: Asuinrakennus (Harju)



WTGs

- 1: GENERAL G150 4500 150.0 !OI! hub: 150,0 m (TOT: 225,0 m) (2117)
- 2: GENERAL G150 4500 150.0 !OI! hub: 150,0 m (TOT: 225,0 m) (2118)
- 3: GENERAL G150 4500 150.0 !OI! hub: 150,0 m (TOT: 225,0 m) (2119)
- 4: GENERAL G150 4500 150.0 !OI! hub: 150,0 m (TOT: 225,0 m) (2120)
- 5: GENERAL G150 4500 150.0 !OI! hub: 150,0 m (TOT: 225,0 m) (2121)

- 6: GENERAL G150 4500 150.0 !OI! hub: 150,0 m (TOT: 225,0 m) (2122)
- 12: GENERAL G150 4500 150.0 !OI! hub: 150,0 m (TOT: 225,0 m) (2128)
- 13: GENERAL G150 4500 150.0 !OI! hub: 150,0 m (TOT: 225,0 m) (2129)
- 14: GENERAL G150 4500 150.0 !OI! hub: 150,0 m (TOT: 225,0 m) (2130)
- 15: GENERAL G150 4500 150.0 !OI! hub: 150,0 m (TOT: 225,0 m) (2131)

Project: **Raaha**
 Description: Raahen tuulivoimapaistot

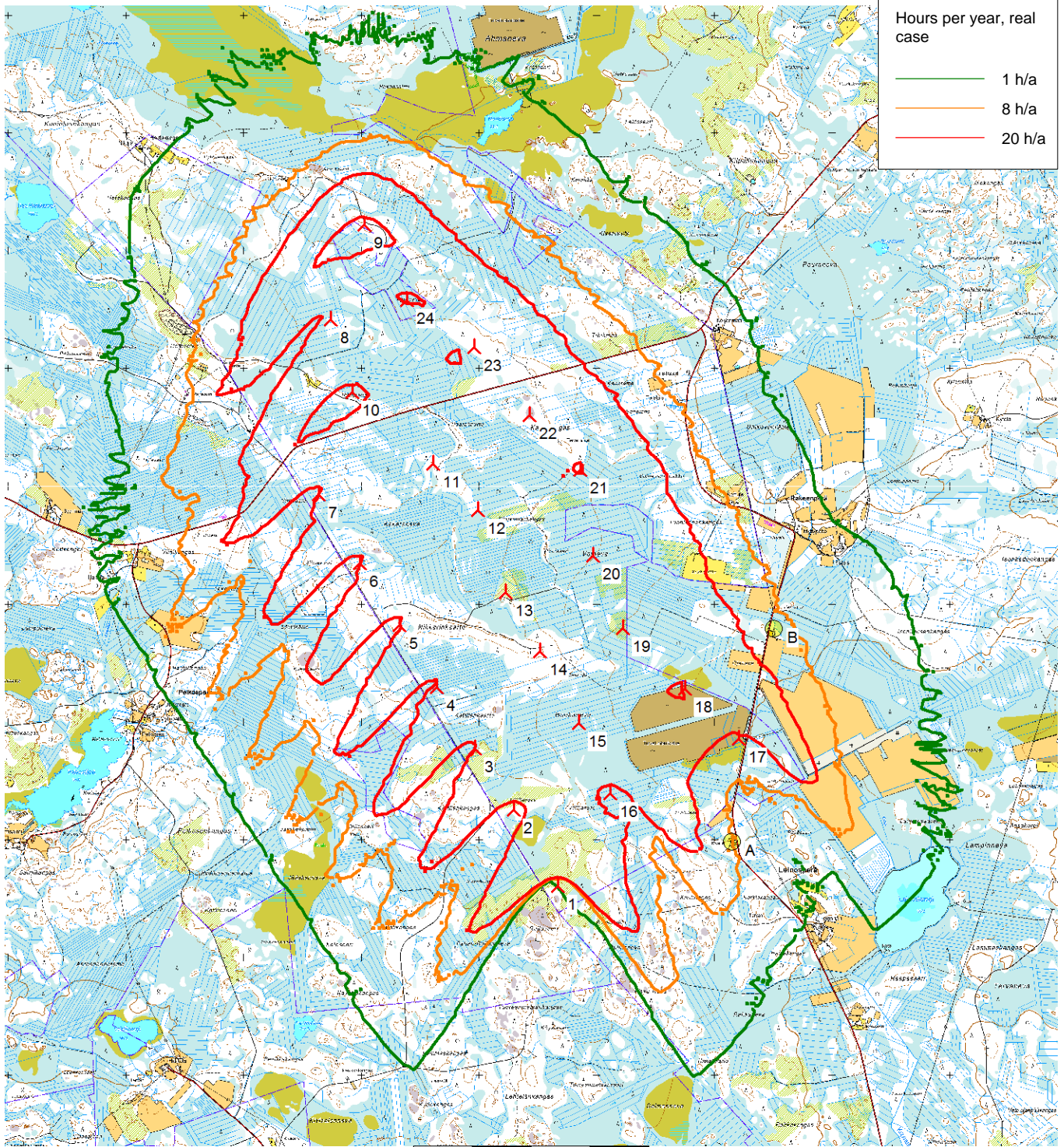
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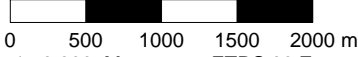


SHADOW - Map

Calculation: Nikkarinkaarto G128 x 24 x HH140 "real case"



Hours per year, real case	
—	1 h/a
—	8 h/a
—	20 h/a



Map: Uusi peruskartta, etelä , Print scale 1:50 000, Map center ETRS 89 Zone: 35 East: 397 440 North: 7 145 240

New WTG

Shadow receptor

Flicker map level: Height Contours: Korkeudet_ABCN_trim.wpo (10)

Project: **Raah**
 Description: Raahen tuulivoimapaistot

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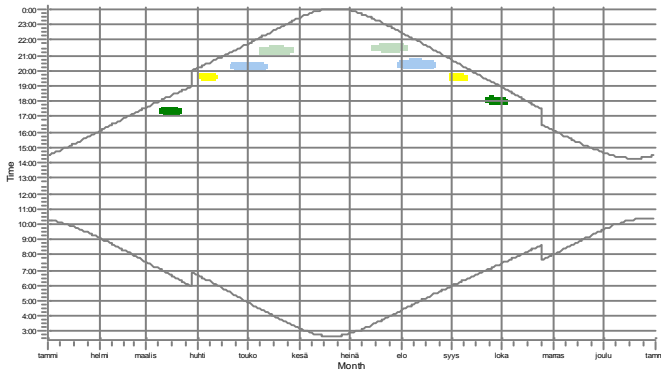
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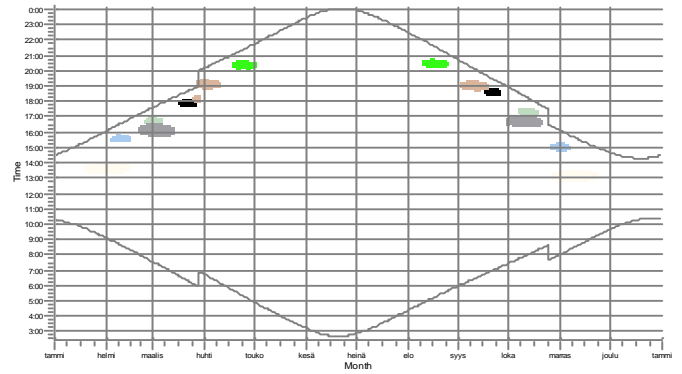
SHADOW - Calendar, graphical

Calculation: Nikkarinkaarto G128 x 24 x HH140 "real case"

A: Asuinrakennus (Kiveliö)



B: Asuinrakennus (Ojaneva)



WTGs

- 1: GAMESA G128 4500 128.0 !OI! hub: 140,0 m (TOT: 204,0 m) (1713)
- 2: GAMESA G128 4500 128.0 !OI! hub: 140,0 m (TOT: 204,0 m) (1714)
- 14: GAMESA G128 4500 128.0 !OI! hub: 140,0 m (TOT: 204,0 m) (1727)
- 15: GAMESA G128 4500 128.0 !OI! hub: 140,0 m (TOT: 204,0 m) (1728)
- 16: GAMESA G128 4500 128.0 !OI! hub: 140,0 m (TOT: 204,0 m) (1729)

- 17: GAMESA G128 4500 128.0 !OI! hub: 140,0 m (TOT: 204,0 m) (1730)
- 18: GAMESA G128 4500 128.0 !OI! hub: 140,0 m (TOT: 204,0 m) (1731)
- 19: GAMESA G128 4500 128.0 !OI! hub: 140,0 m (TOT: 204,0 m) (1732)
- 20: GAMESA G128 4500 128.0 !OI! hub: 140,0 m (TOT: 204,0 m) (1733)