

## Supplementary Material A Maximum Common Induced Graph Algorithm

### 1. Variables used in the Pseudo-code

- 1)  $G_1, G_2$ : two graphs for which the maximum common induced graph is searched;
- 2) currentSubset: a set containing all pair of nodes which have the one to one correspondence between  $G_1$  and  $G_2$  in the current solution;
- 3) maxSubset: a set storing all pair of nodes between  $G_1$  and  $G_2$  in the maximum common induced graph;
- 4) visitedList: a list of nodes in  $G_1$  which are already mapped to nodes in  $G_2$ .

### 2. PickNodeFromG1() function

The function PickNodeFromG1() returns a node  $u$  from  $G_1$ , such that:

- 1)  $u$  is not in currentSubset and not in visitedList;
- 2)  $u$  is connected to a node in currentSubset or currentSubset is empty;
- 3) if no such node  $u$  exists, return null.

### 3. PickNodeFromG2( $u$ ) function

The function PickNodeFromG2( $u$ ) returns a node  $v$  from  $G_2$ , such that

- 1)  $v$  is not in currentSubset;
- 2) currentSubset is empty or currentSubset contains a pair  $(u', v')$ , such that:
  - node  $u'$  is connected to node  $u$  and node  $v'$  is connected to node  $v$ ;
  - $\text{abs}(I(u) - I(u')) < w$  and  $\text{abs}(I(v) - I(v')) < w$ .
- 3) if no such node  $v$  exists, return null

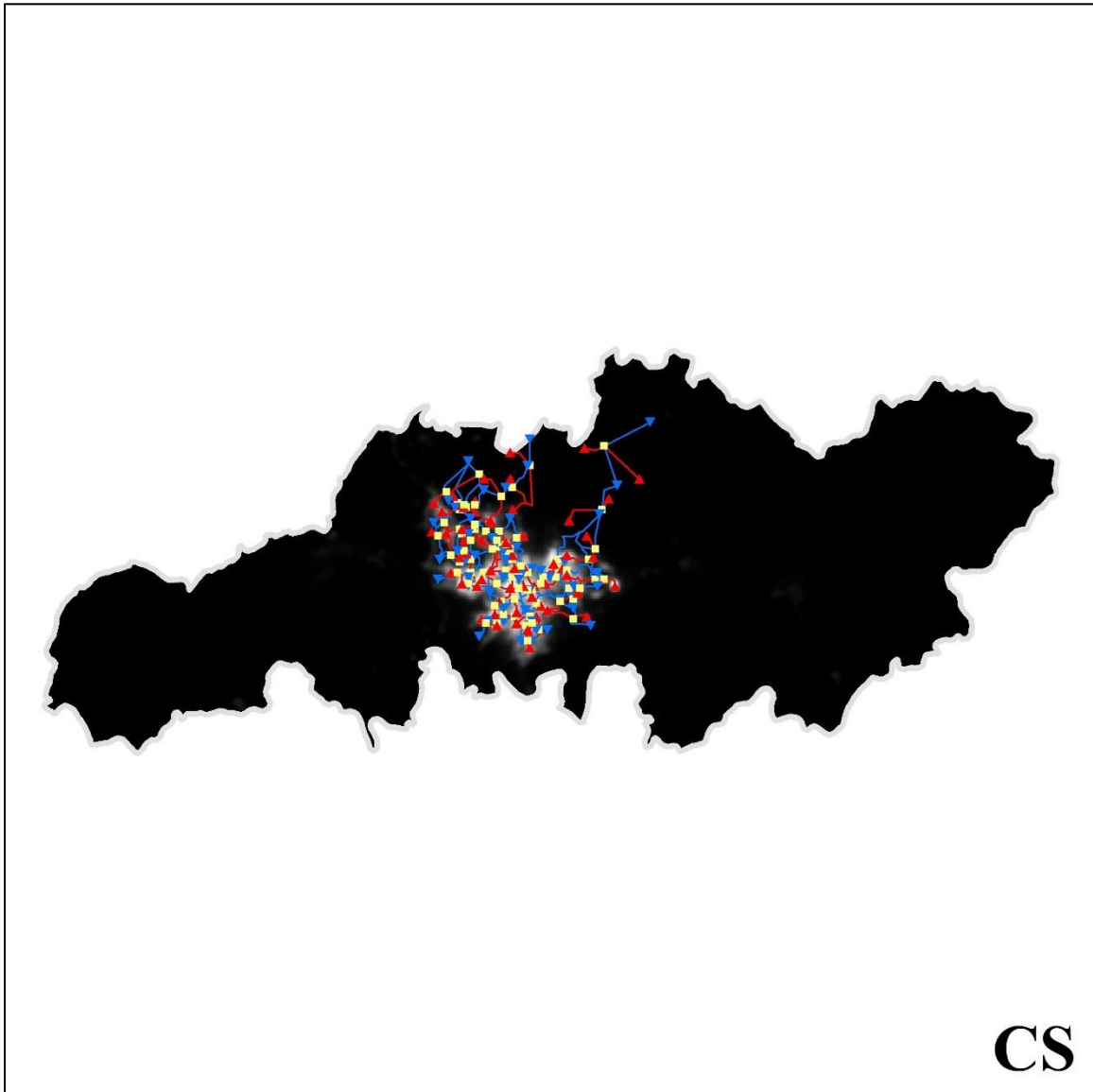
### 4. SearchMCIS() function

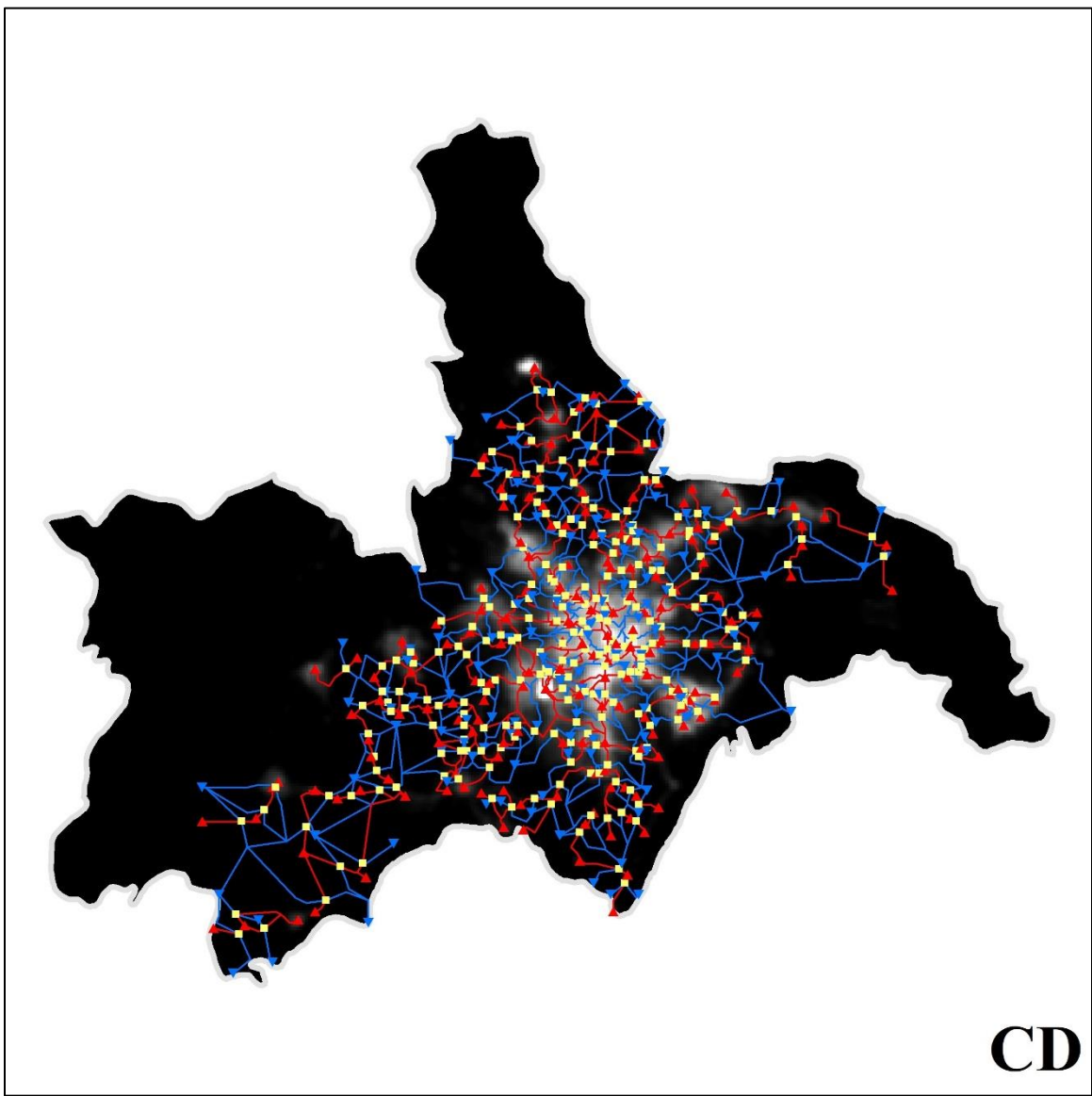
The SearchMCIS() function which does the recursive search returns the maxSubset. The maxSubset is a set storing all pair of nodes in the maximum common induced graph of  $G_1$  and  $G_2$ .

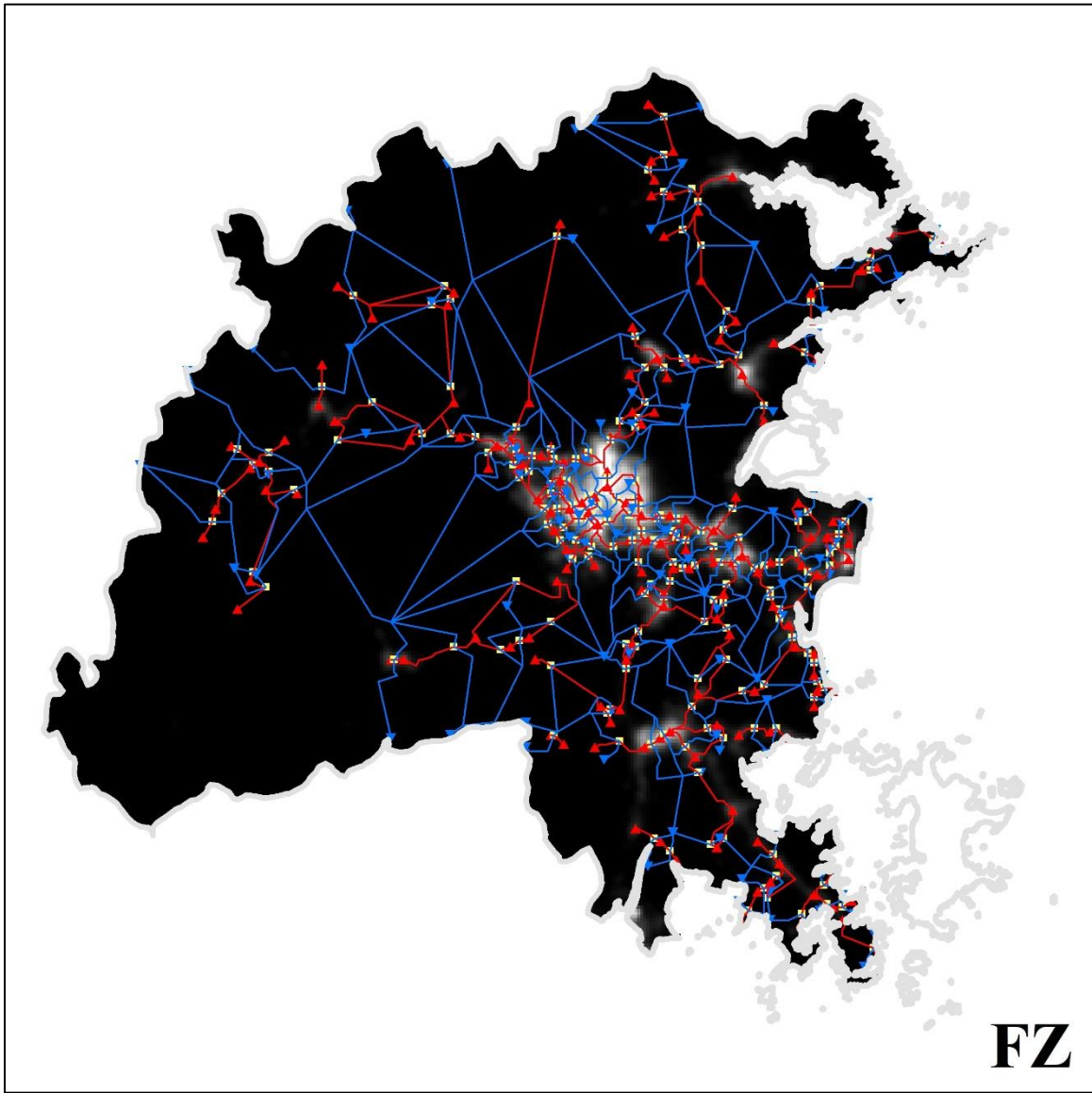
```
SearchMCIS():
     $u$  = PickNodeFromG1()
    if ( $u$  == null) then:
        If currentSubset.size > maxSubset.size
            maxSubset = currentSubset
        endif
    else:
        visitedList.add( $u$ )
         $v$  = PickNodeFromG2( $u$ )
        while ( $v$  != null):
            currentSubset.put( $u, v$ )
            SearchMCIS()
             $v$  = PickNodeFromG2( $u$ )
        SearchMCIS()
        visitedList.remove( $u$ )
    endif
```

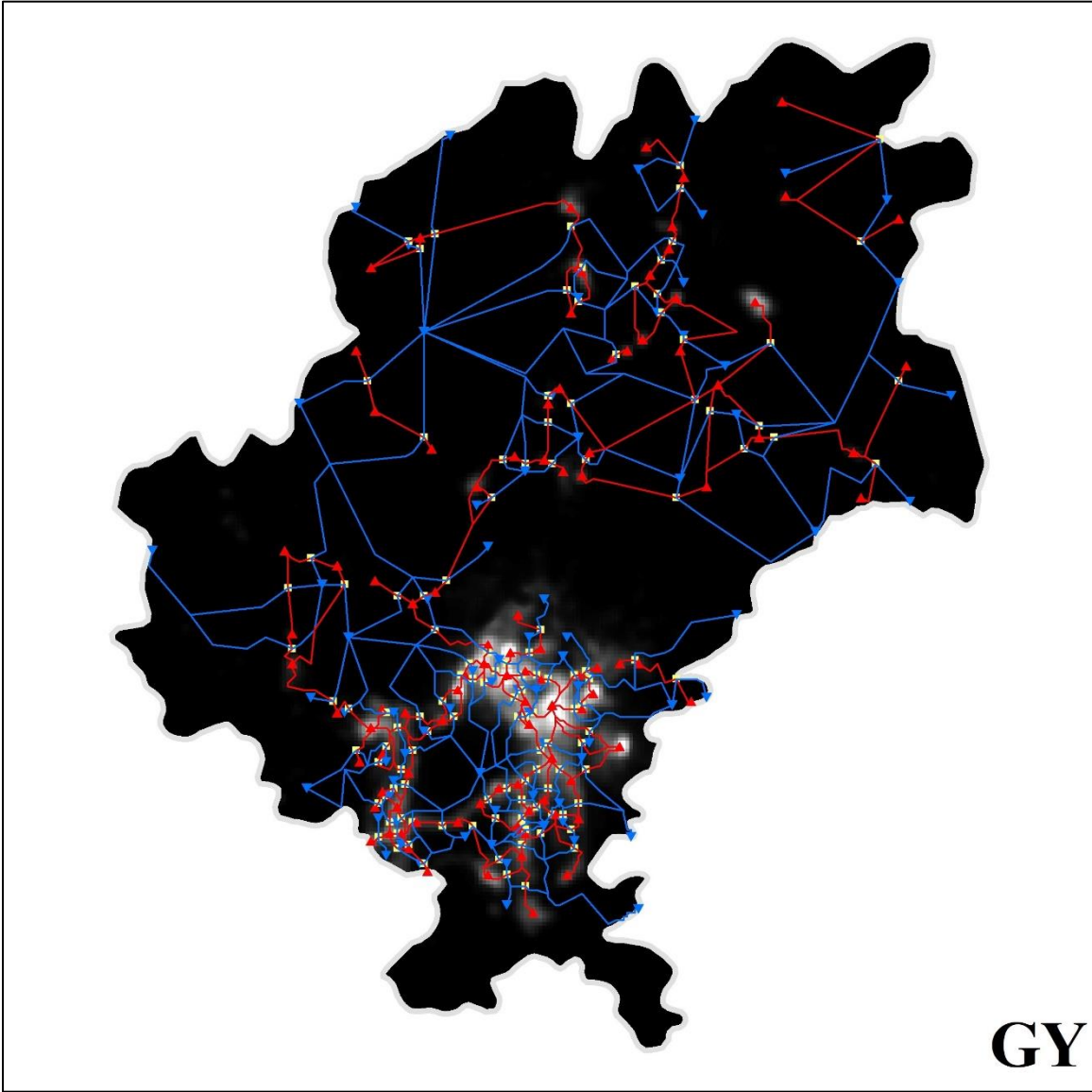
## Supplementary Material B

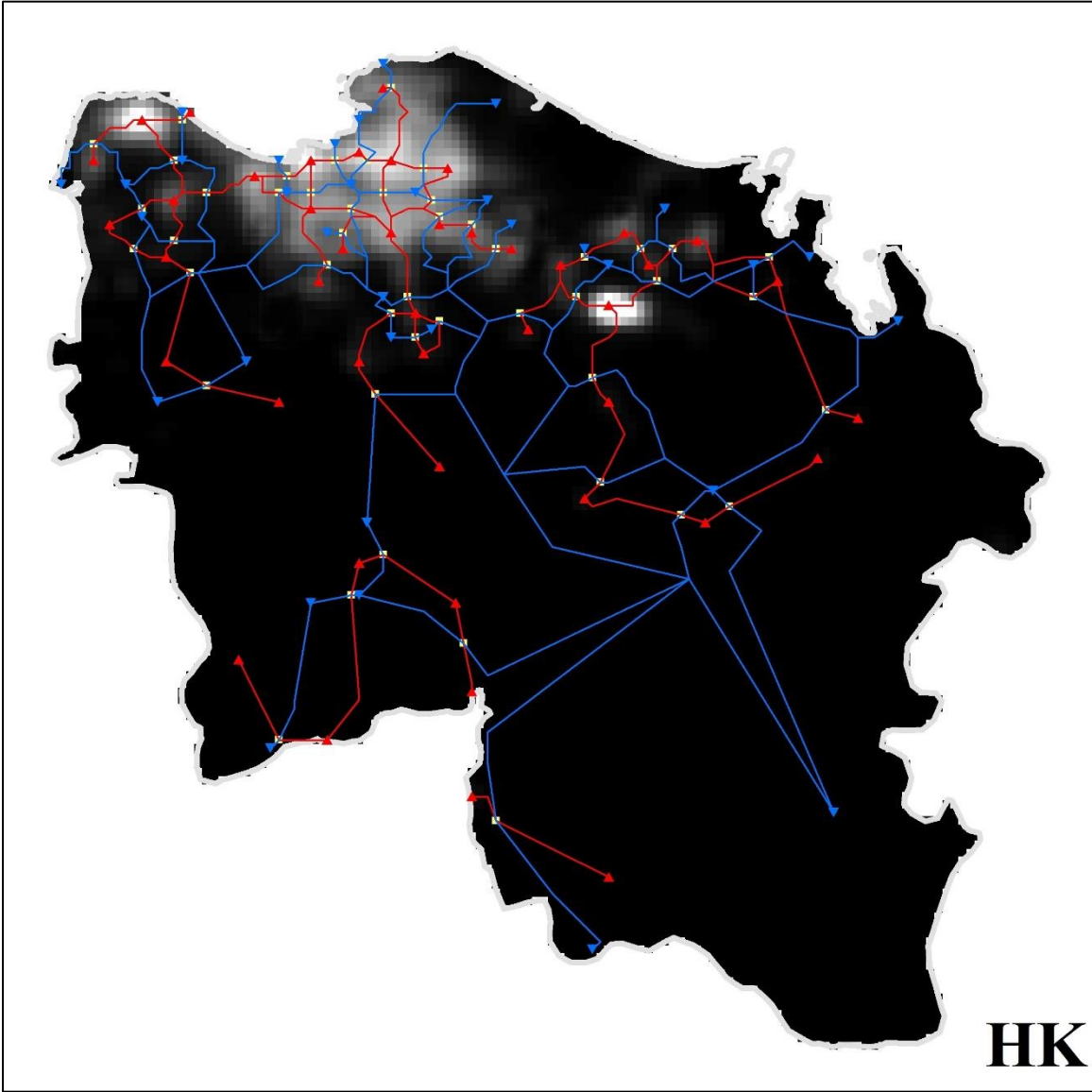
**Figure S1** Surface networks representation of nighttime light surfaces for the other 26 cities

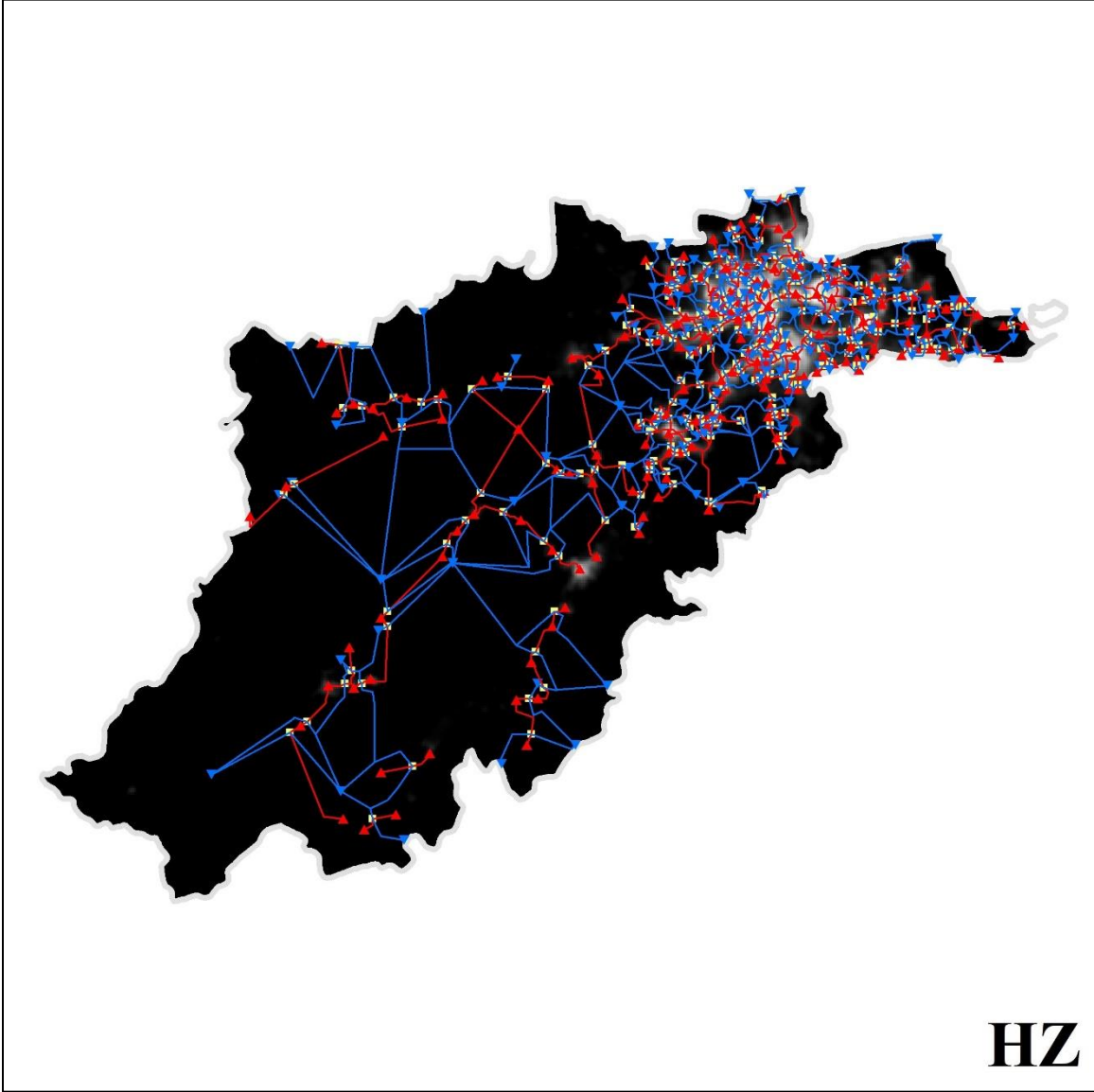




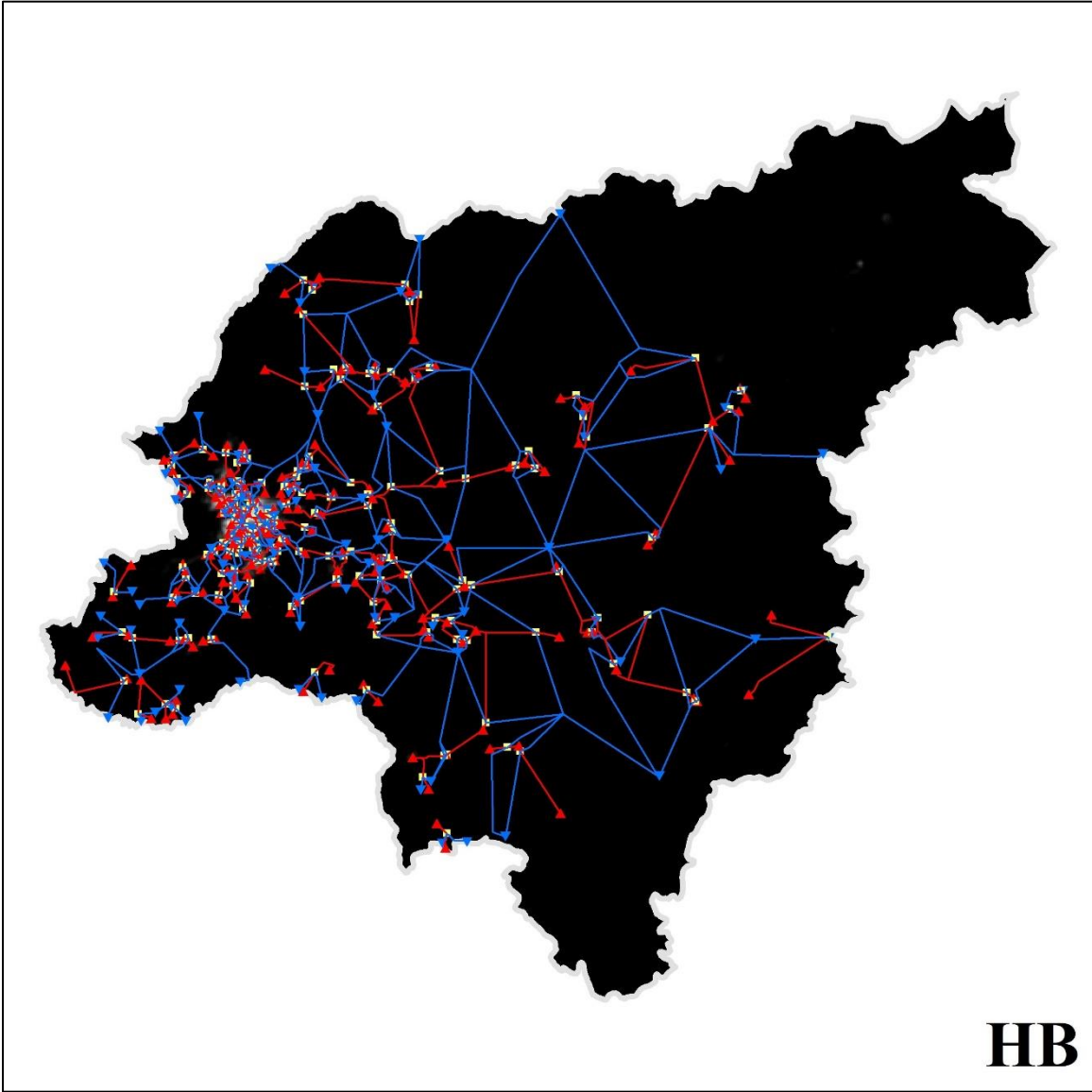


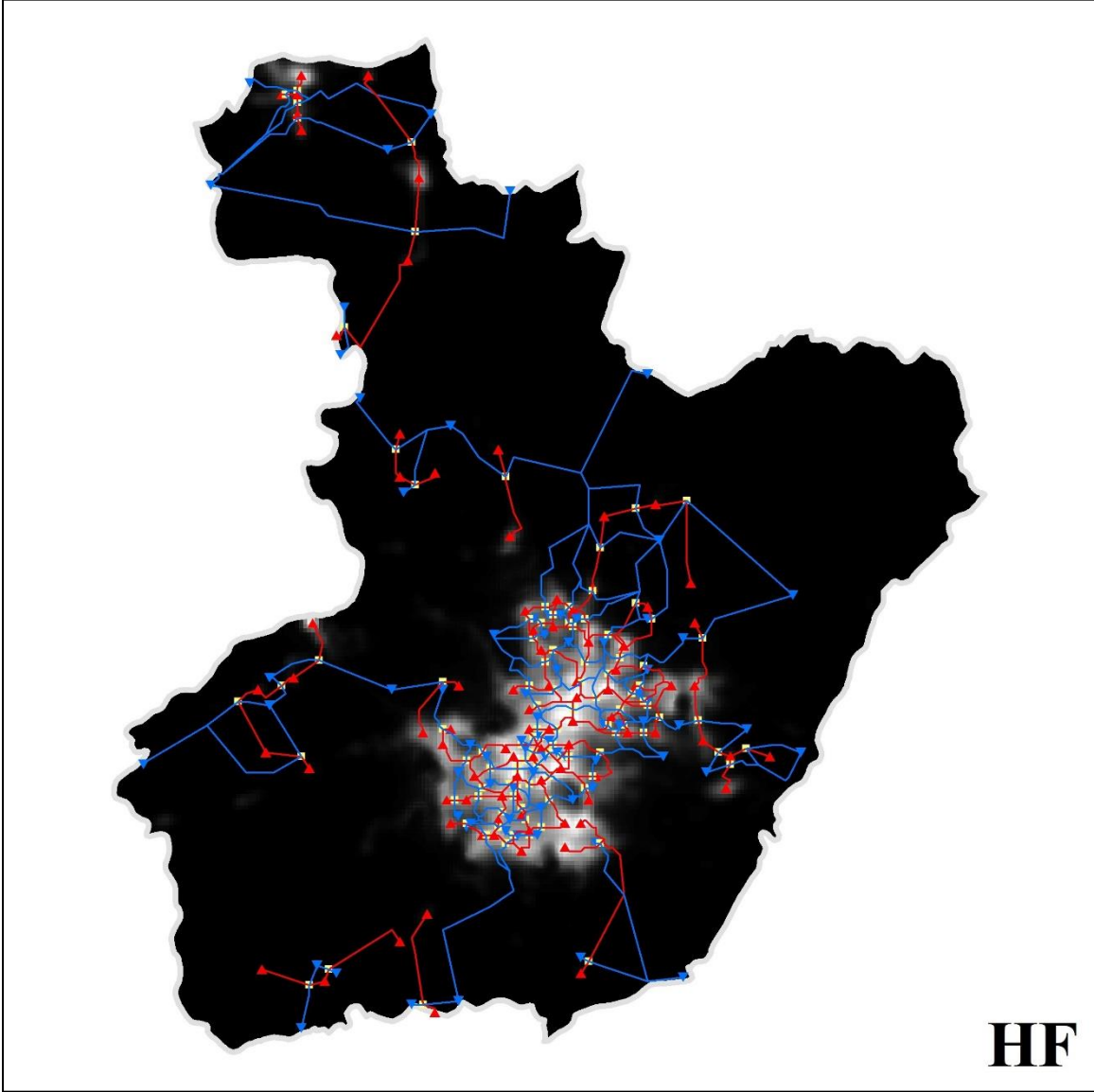


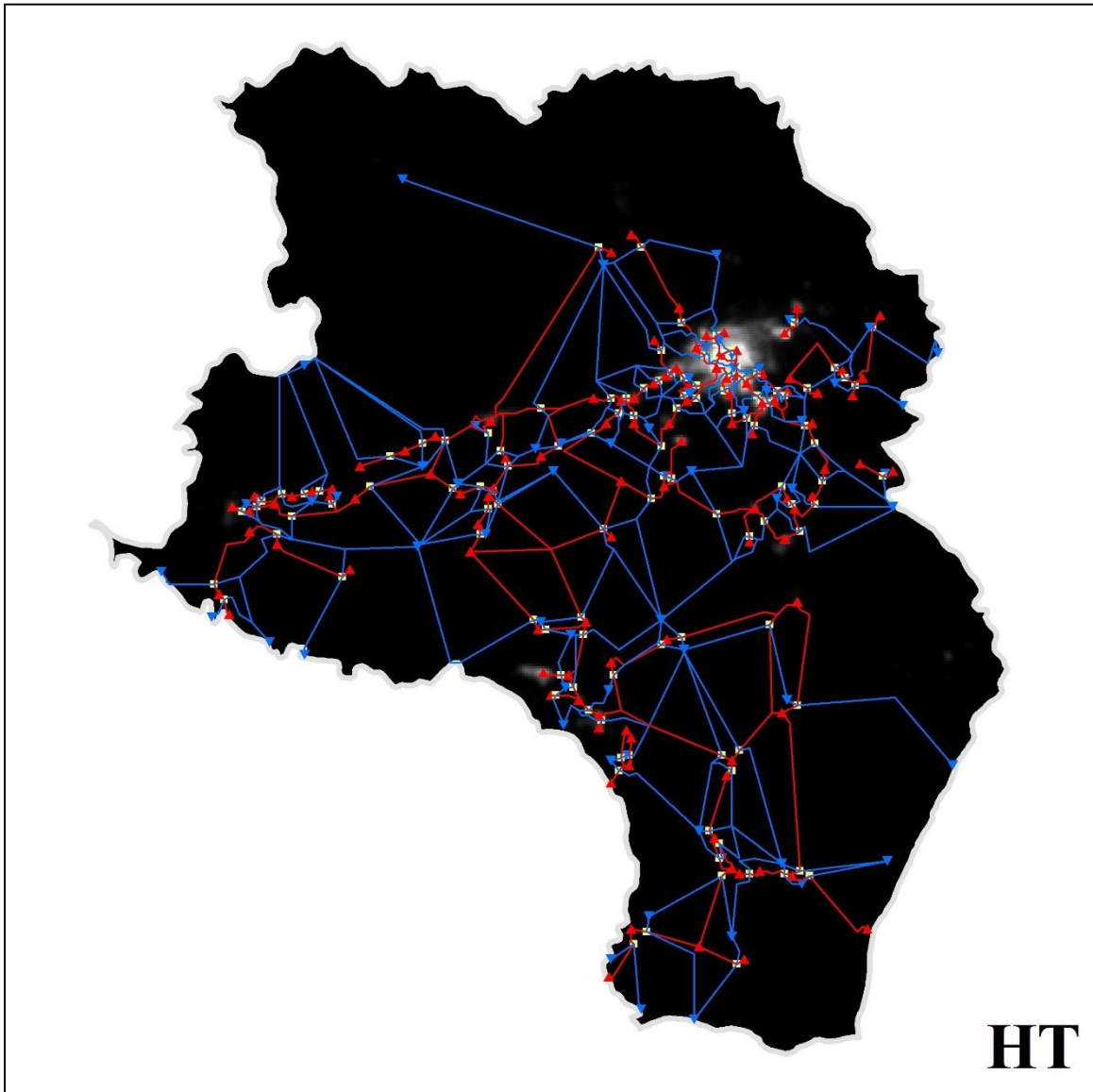


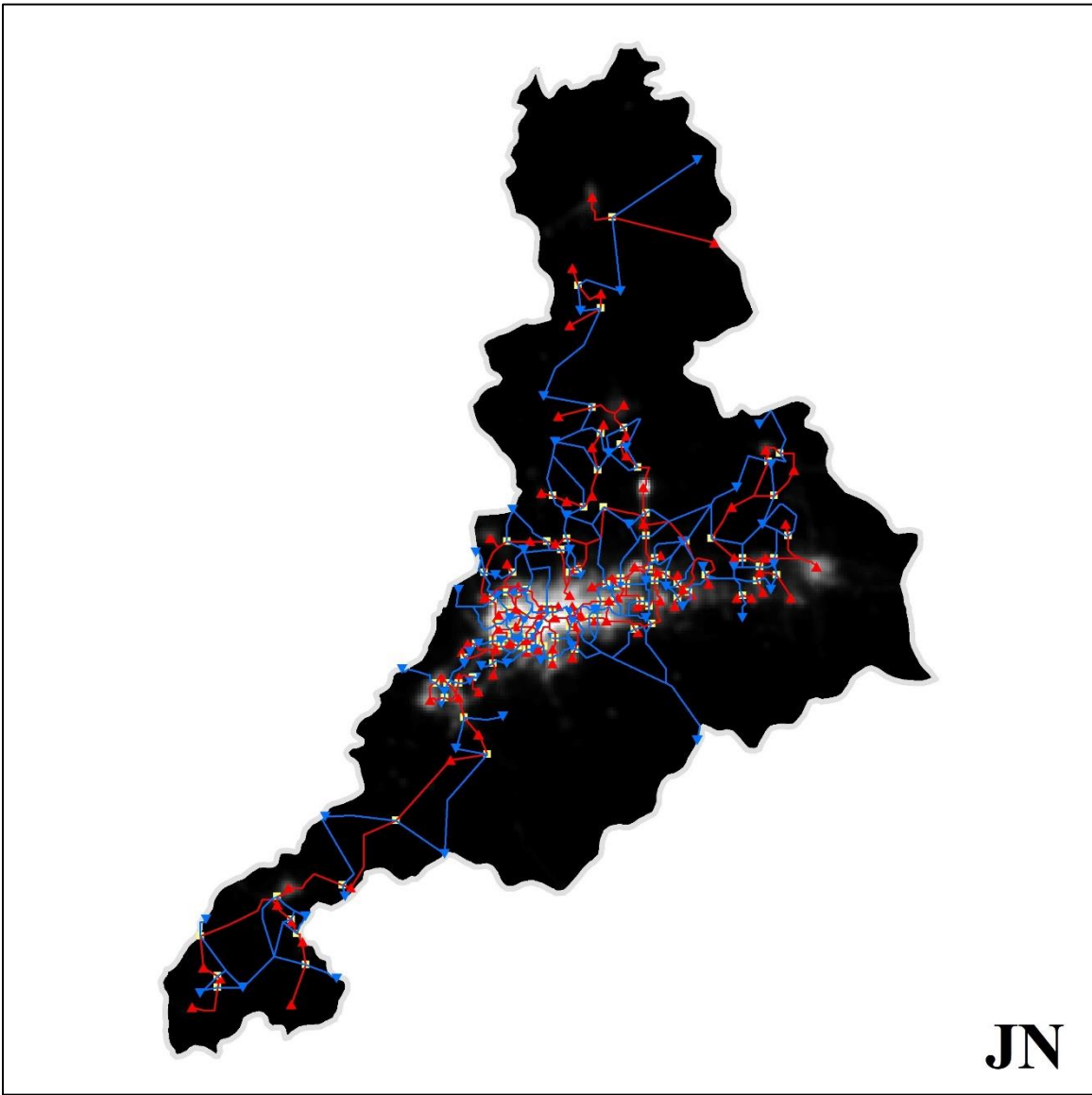


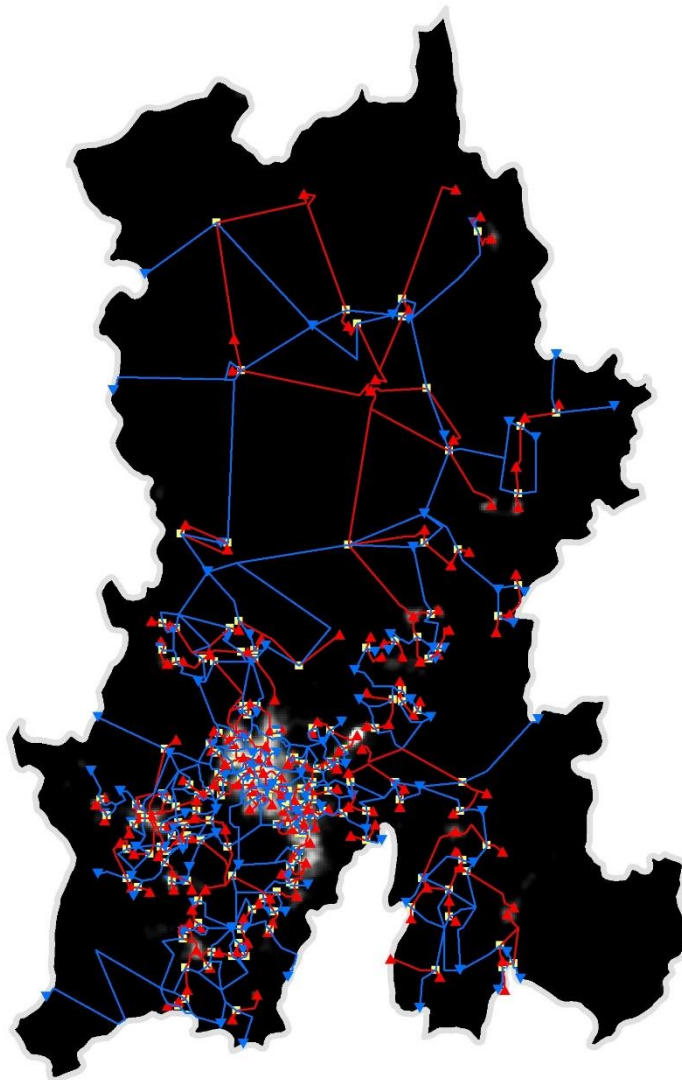




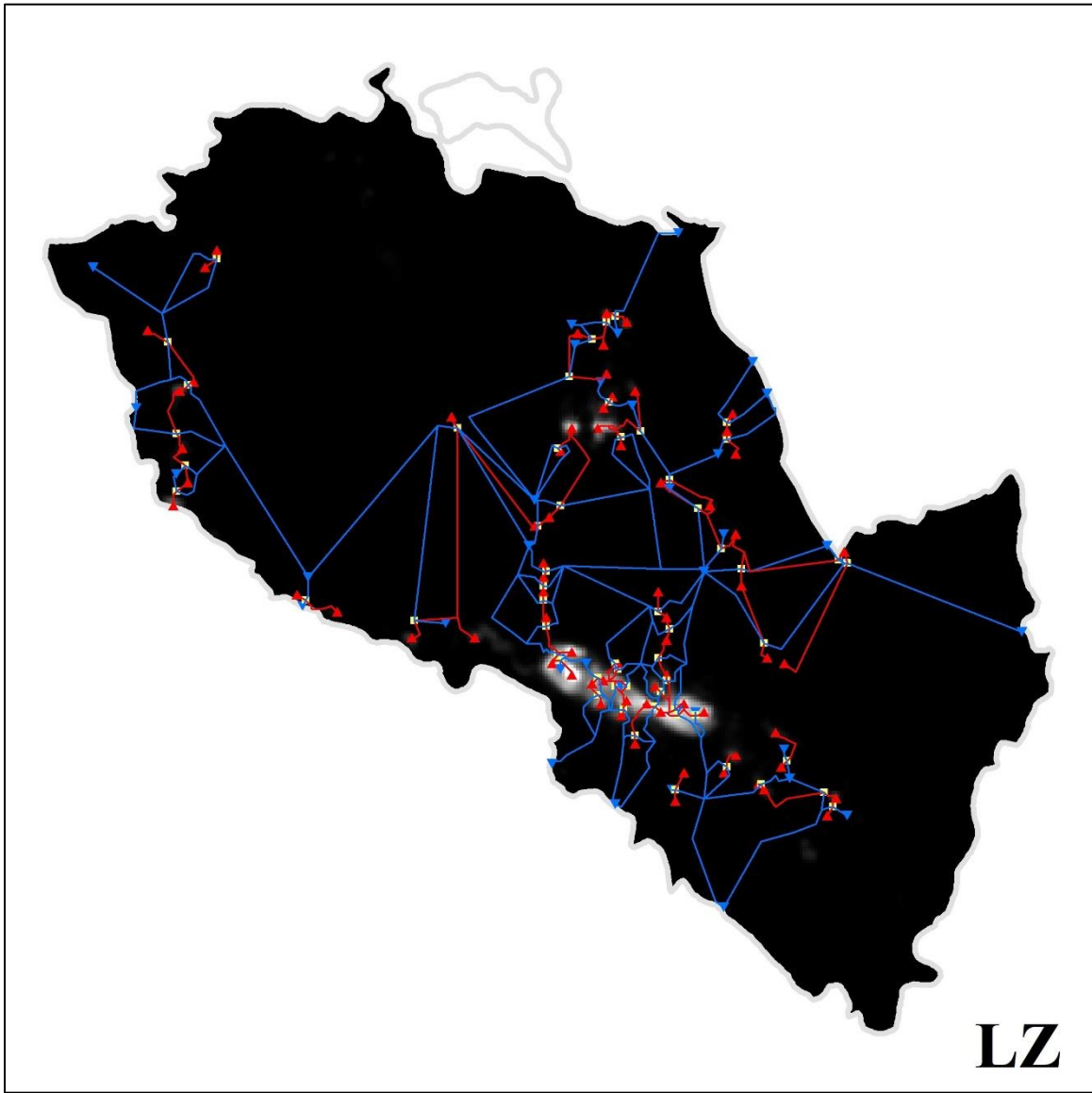


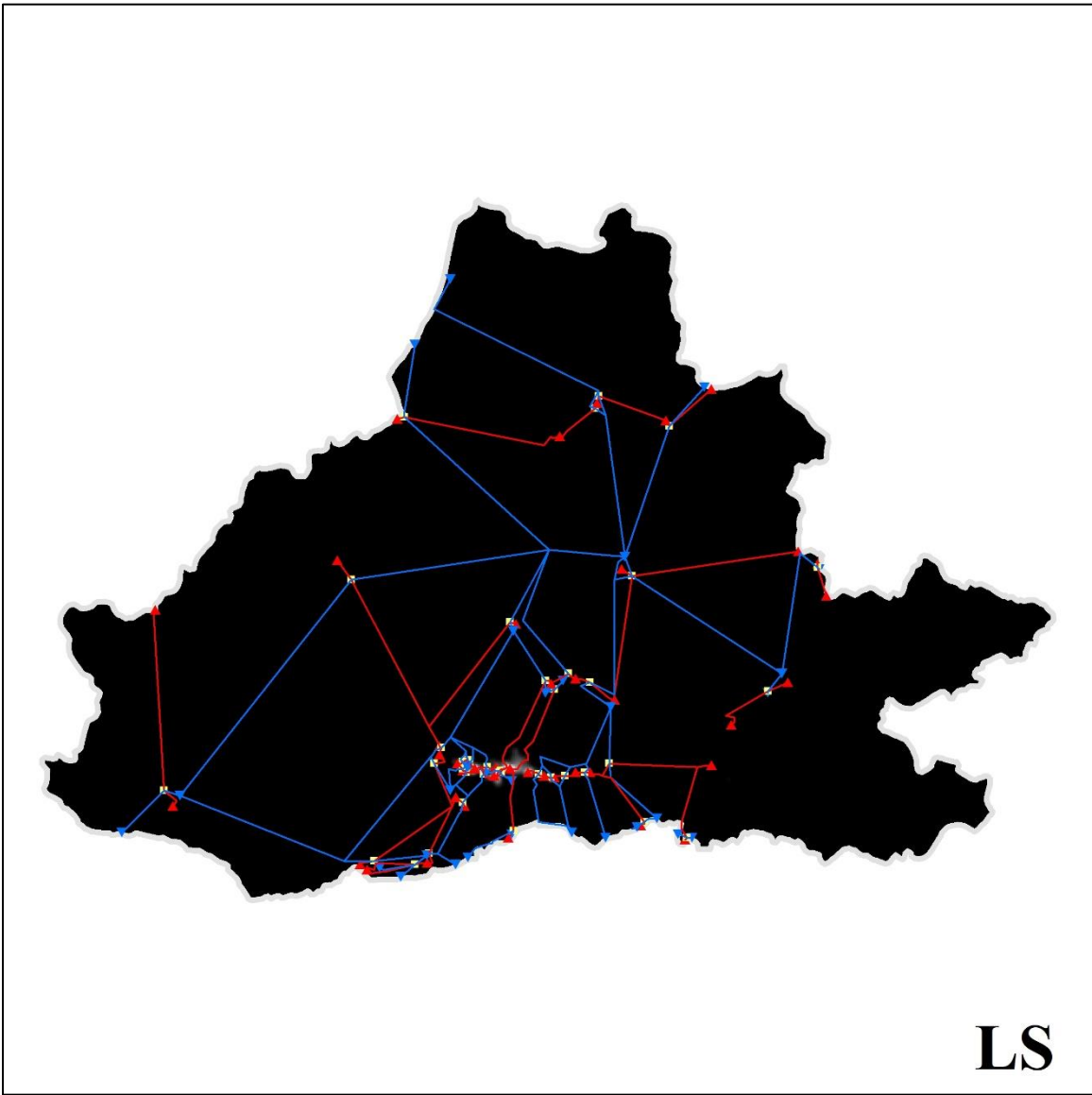


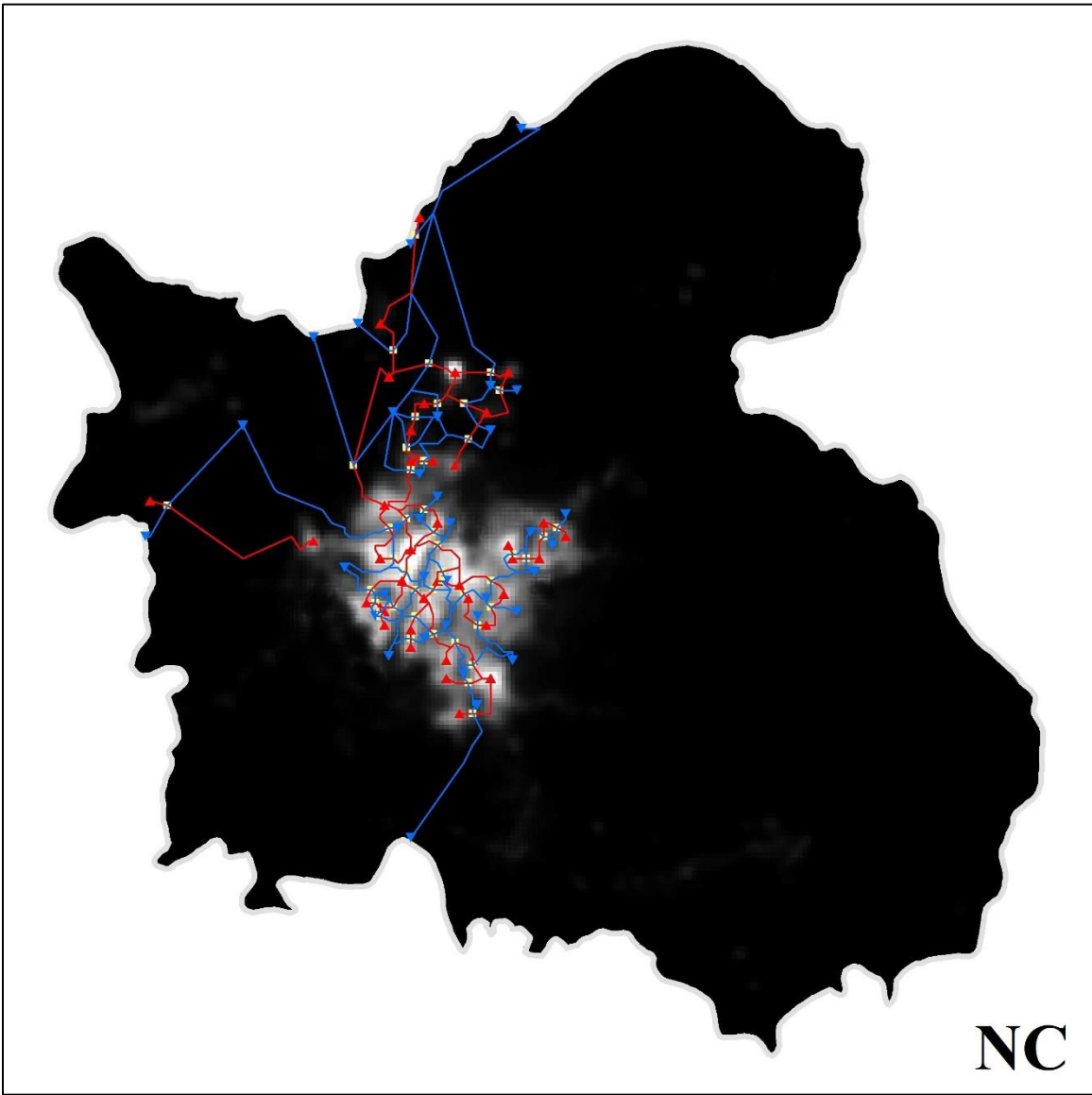




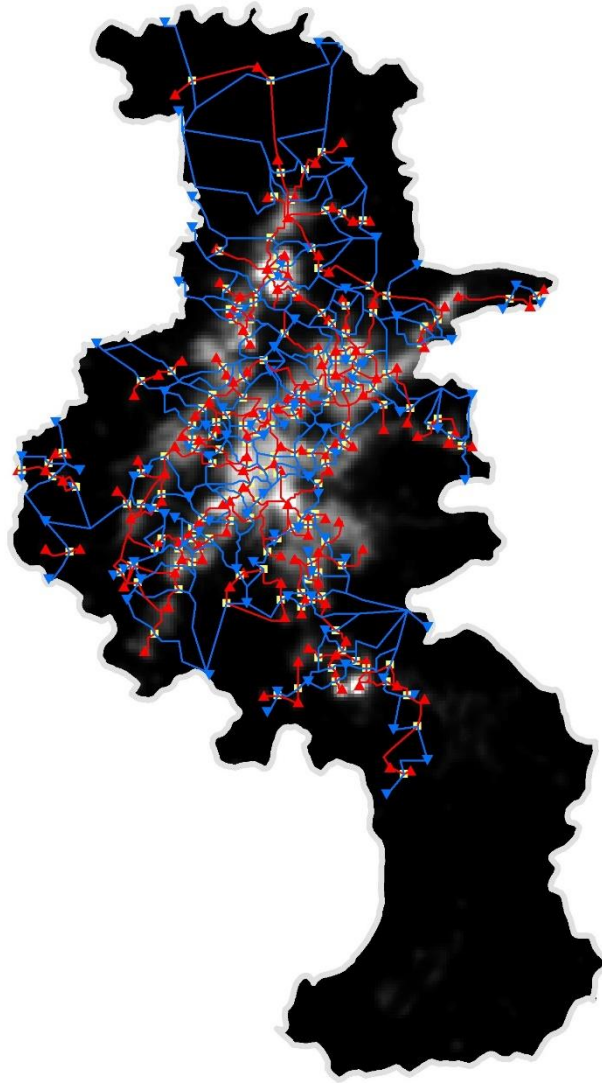
**KM**



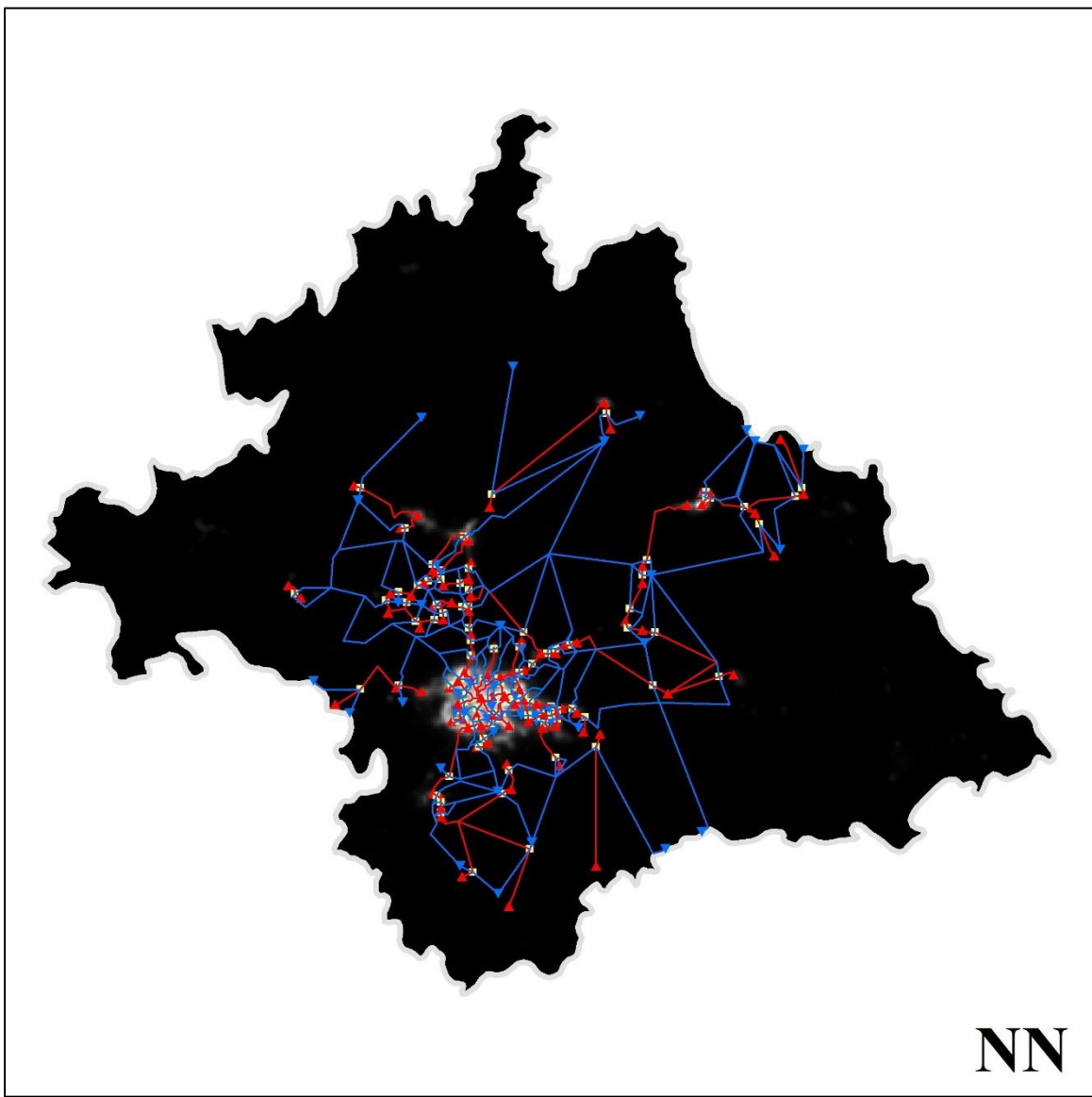


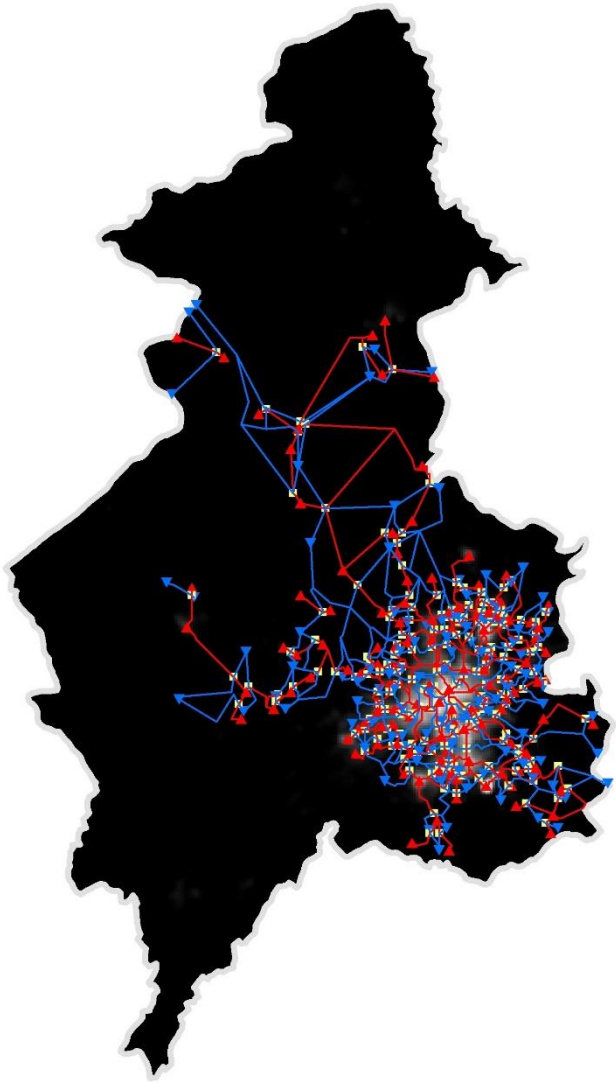




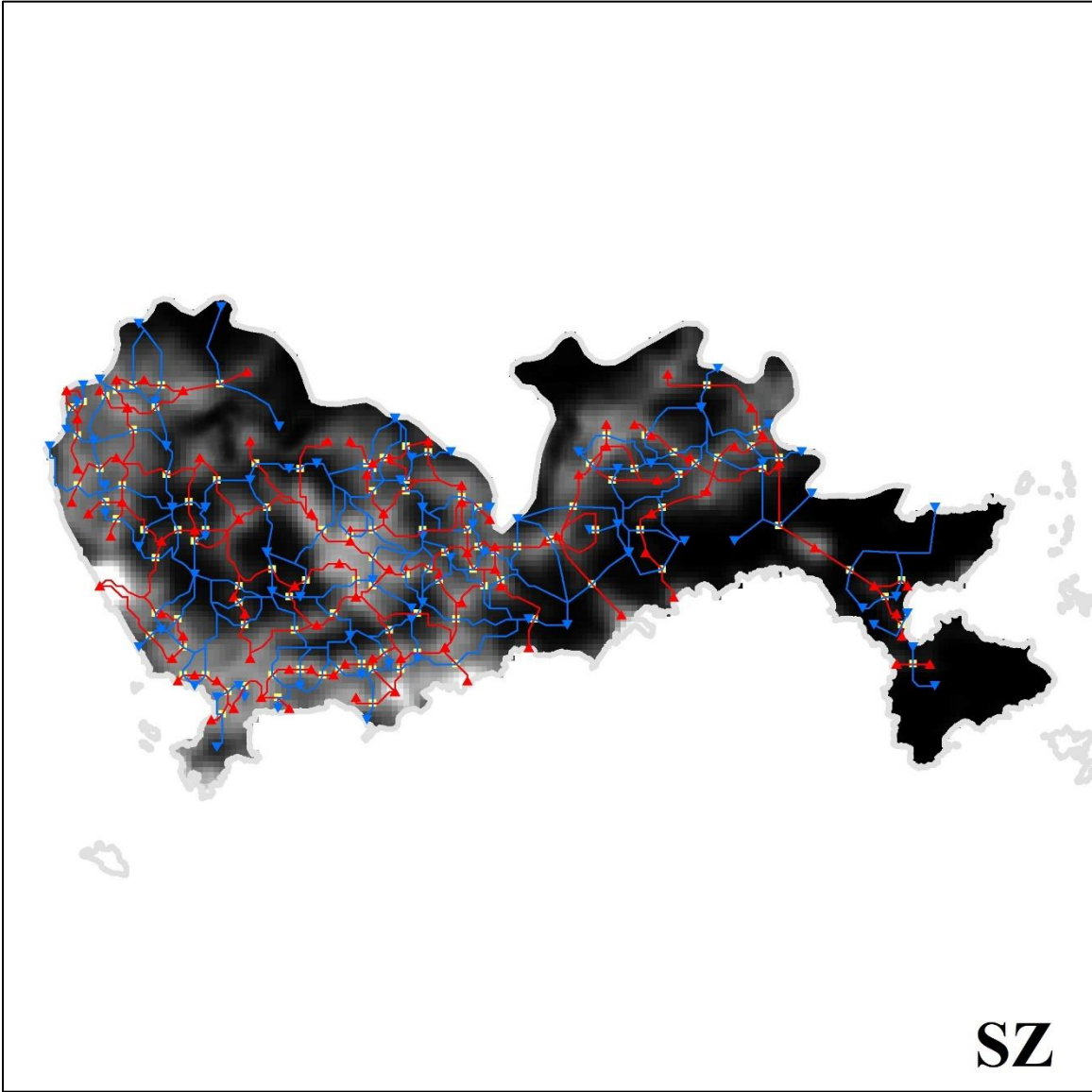


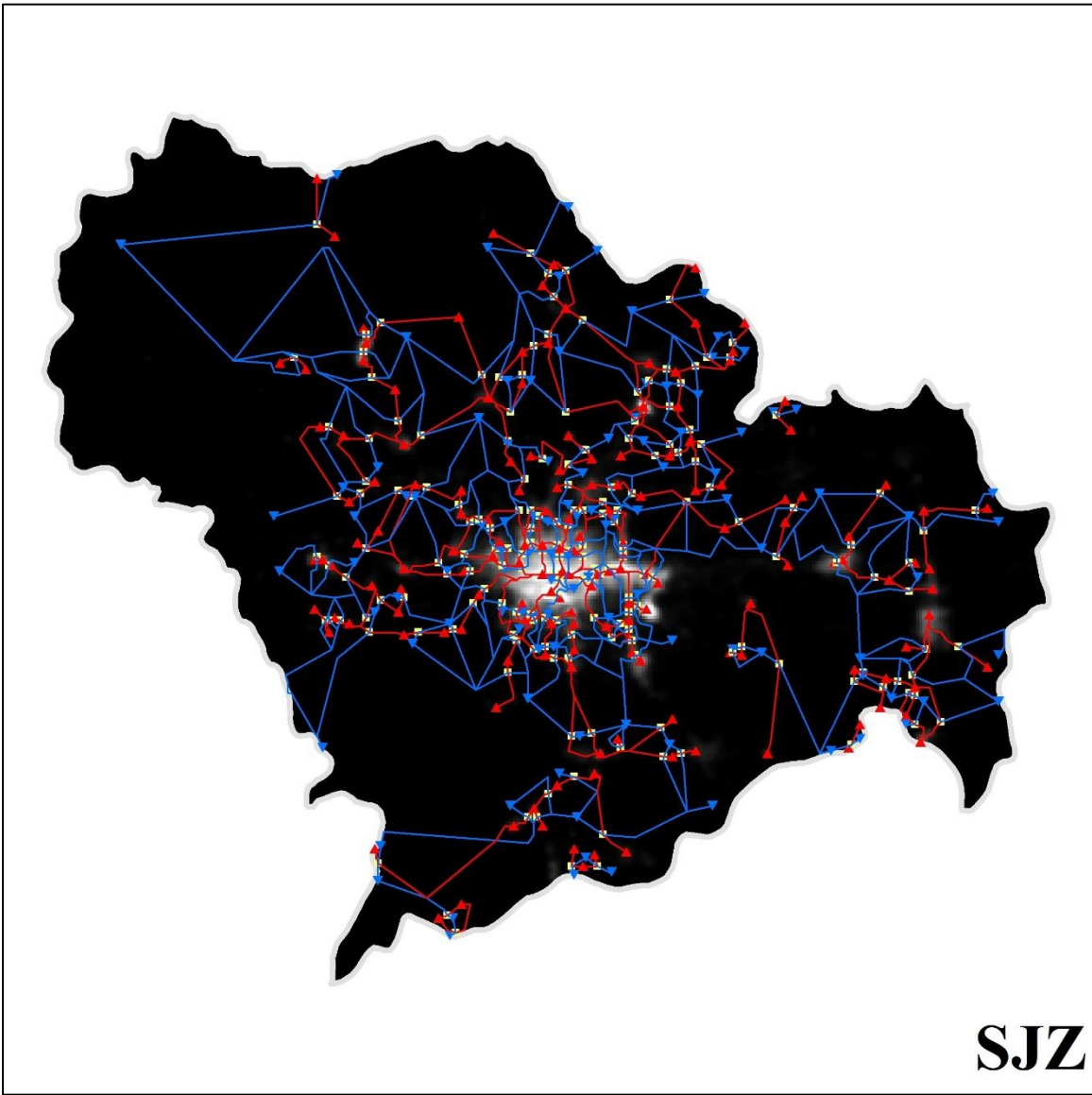
**NJ**

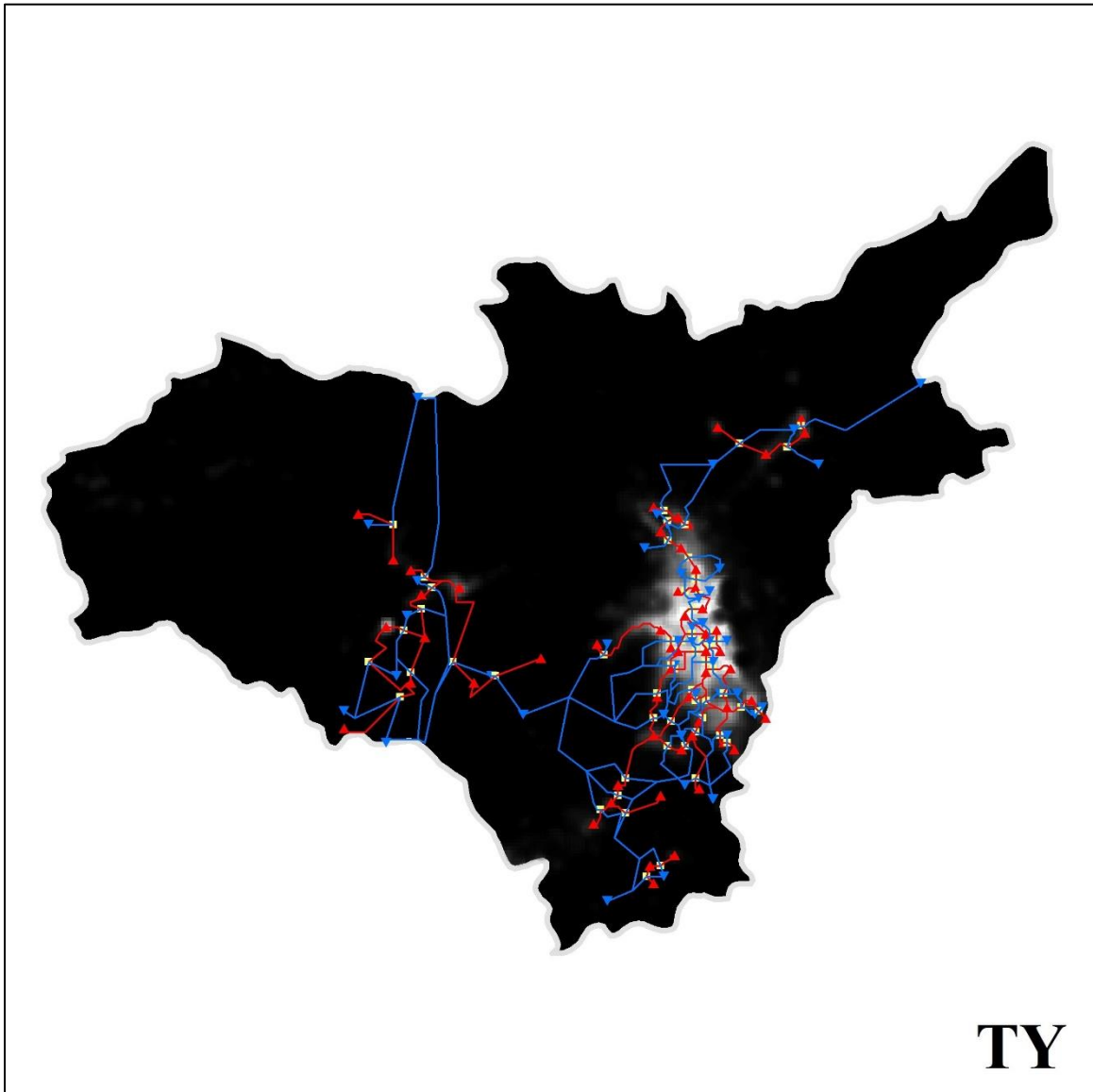


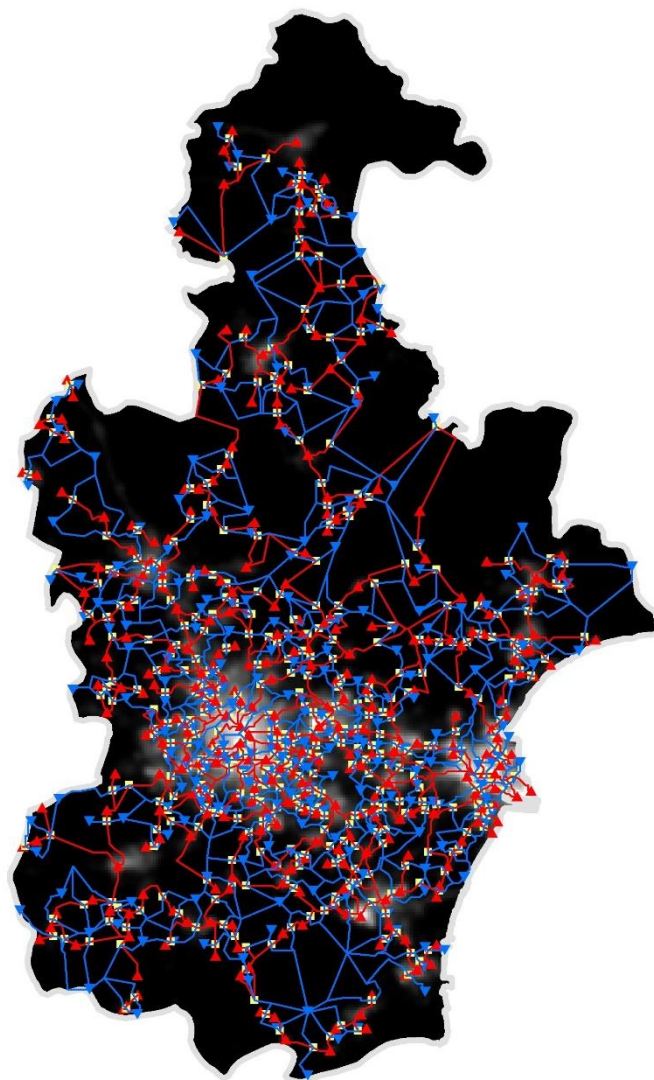


**SY**

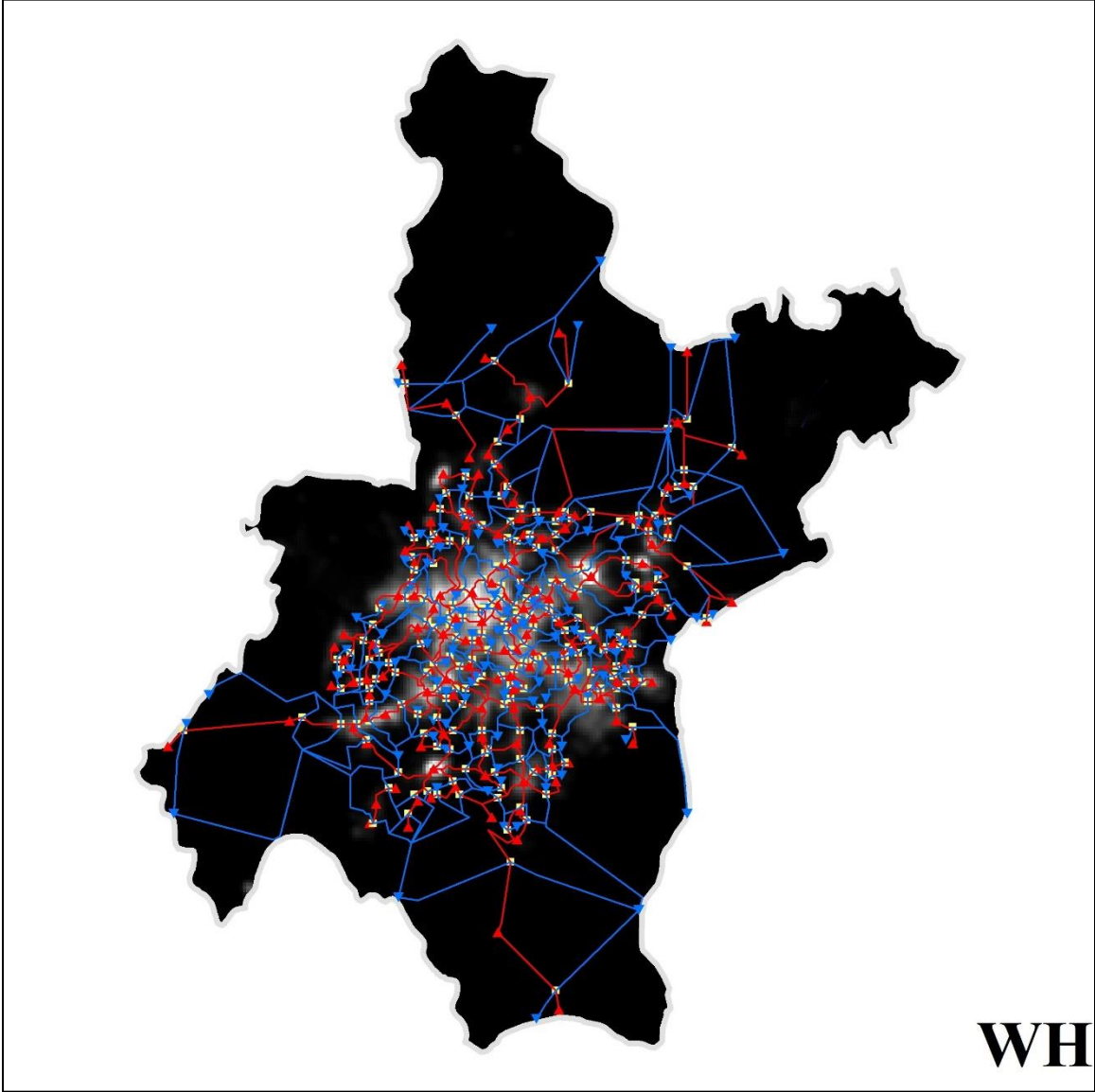




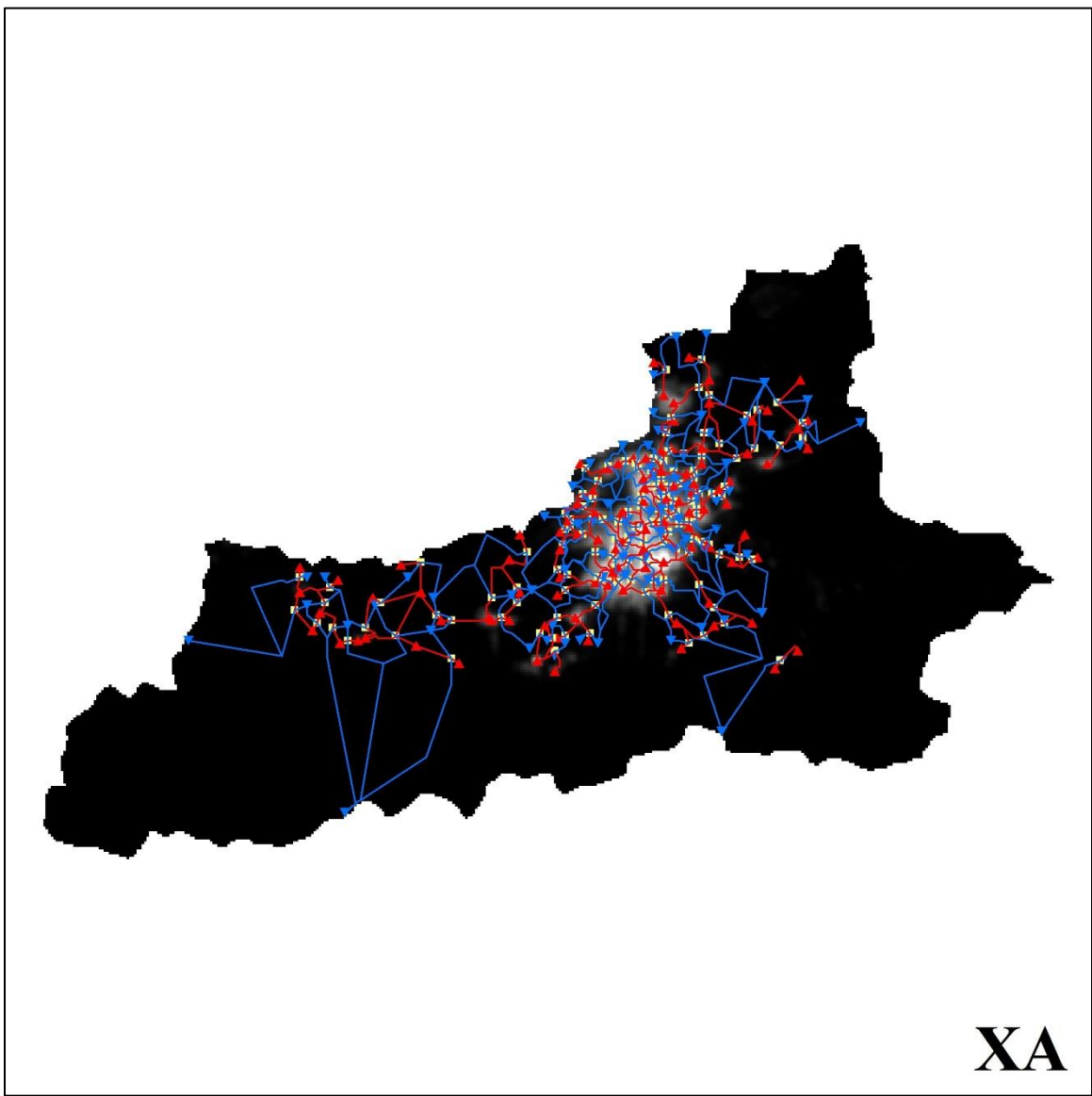


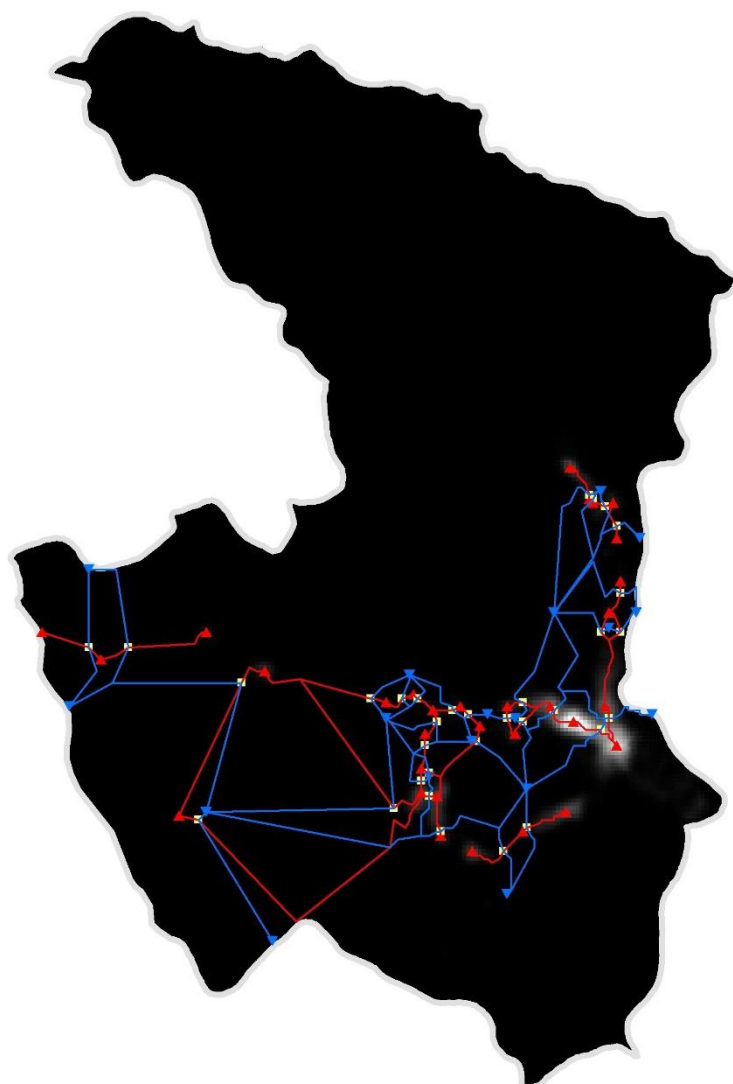


**TJ**









XN

