AECB Conference 2009

Eco-towns: theory and practice

12th June 2009

Dr. Fionn Stevenson, Reader in Sustainable Design

Structure of lecture

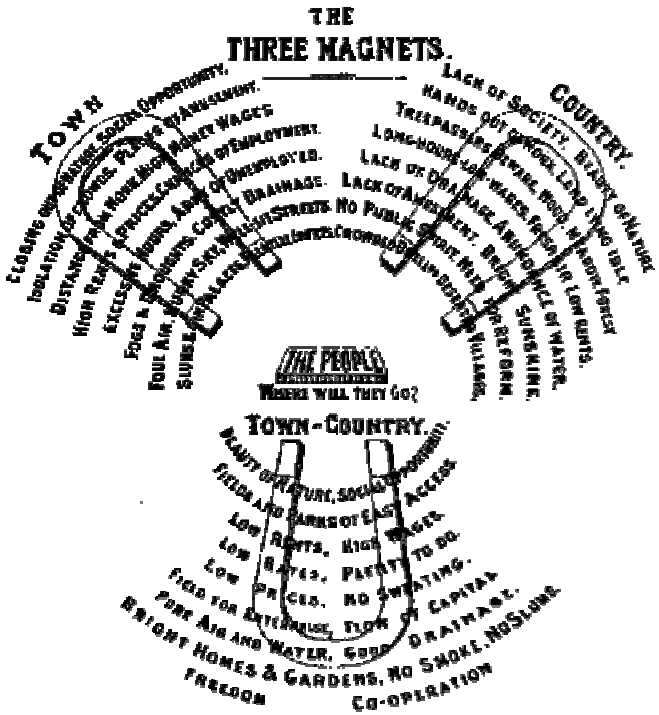
- Evolution of eco-town theory
- Capacity, land use, densities, transport
- Resource use and Industrial Ecology
- Live student project
- Case studies

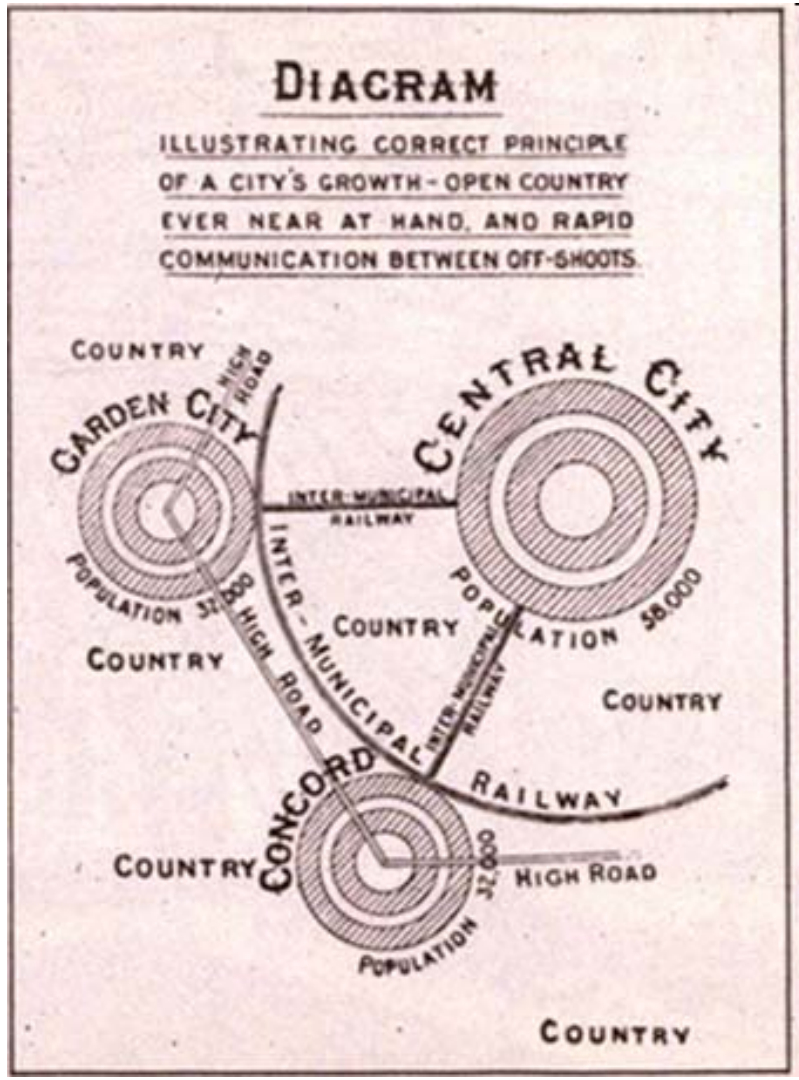
Evolution of the Eco-town – the Garden City

Ebenezer Howard

1902

32,000 people on 6,000 acres

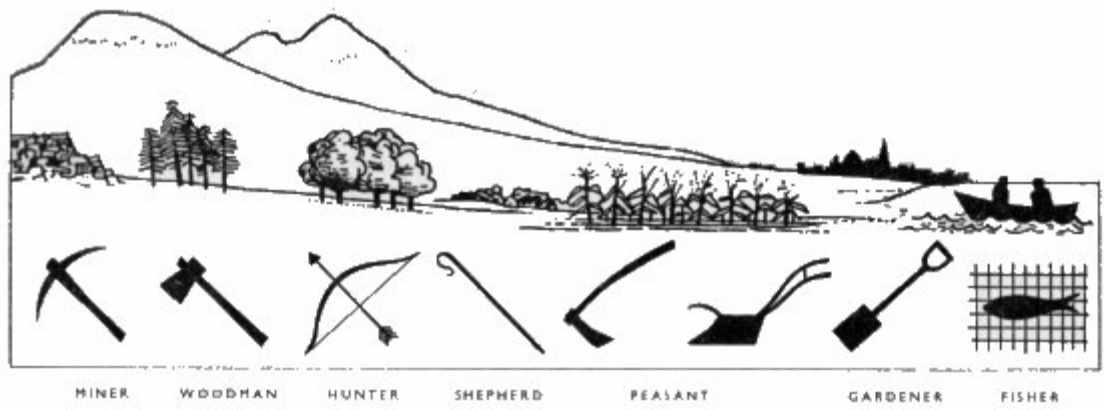




Evolution of the Eco-town – the idea spreads…..

Patrick Geddes: 1915 Bombay Town Planning Act:

- Preservation of human life and energy, rather than superficial beautification.
- Conformity to an orderly development plan carried out in stages.
- Promoting the happiness, health and comfort of all residents, rather than focusing on roads and parks available only to the rich.
- Control over future growth with adequate provision for future requirements.



The Valley Section with basic occupations

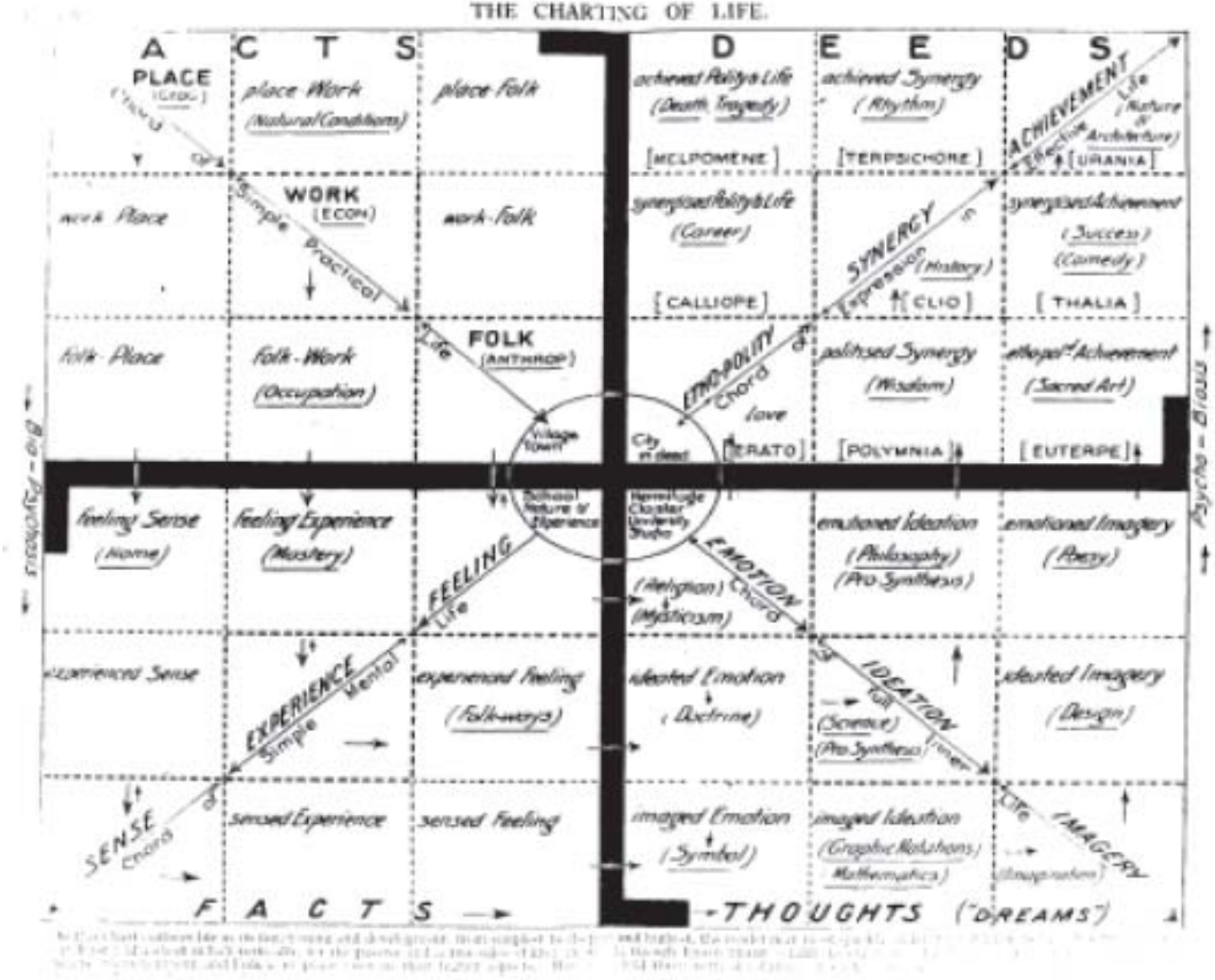
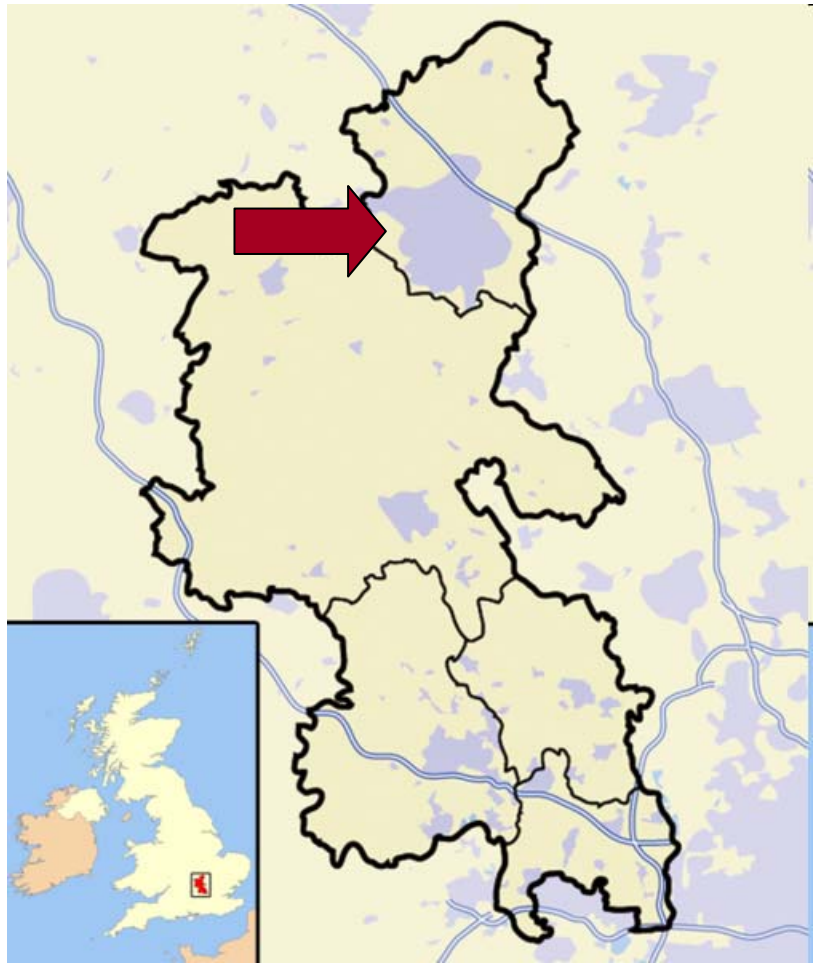


figure 2
The Notations of Life, Patrick Geddes, 1927

Evolution of the Eco-town – New Towns Act 1946

1. Basildon
2. Bracknell
3. Central Lancashire
4. Corby
5. Harlow
6. Hatfield
7. Hemel Hempstead
8. Milton Keynes (185,000 people)
9. Newton Aycliffe
10. Peterlee
11. Redditch
12. Runcorn
13. Skelmersdale
14. Stevenage
15. Telford
16. Washington
17. Welwyn Garden City



Contemporary theory for eco-towns

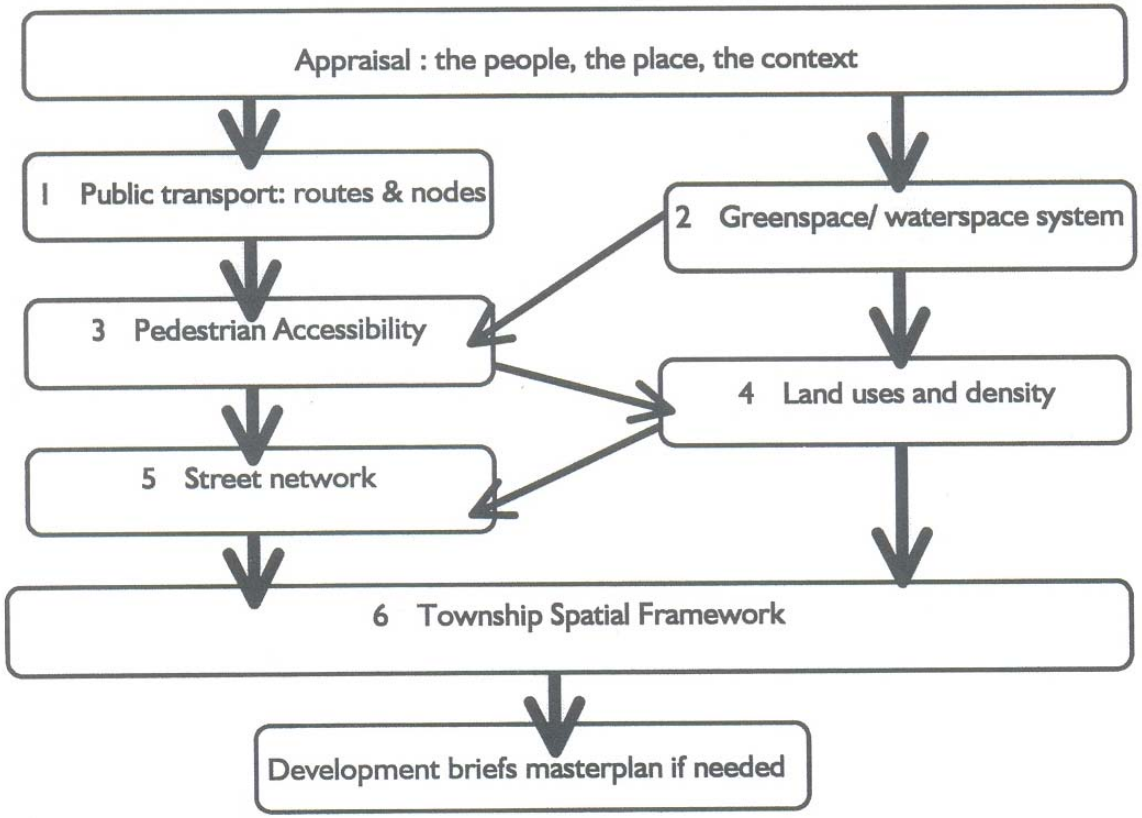
"Twin Track" model = understanding *dynamics* of urban form (Barton):

- Public transport system hierarchy – shaping human activity areas
- Greenspace/waterspace – enabling ecological activity in areas

Key dimensions:

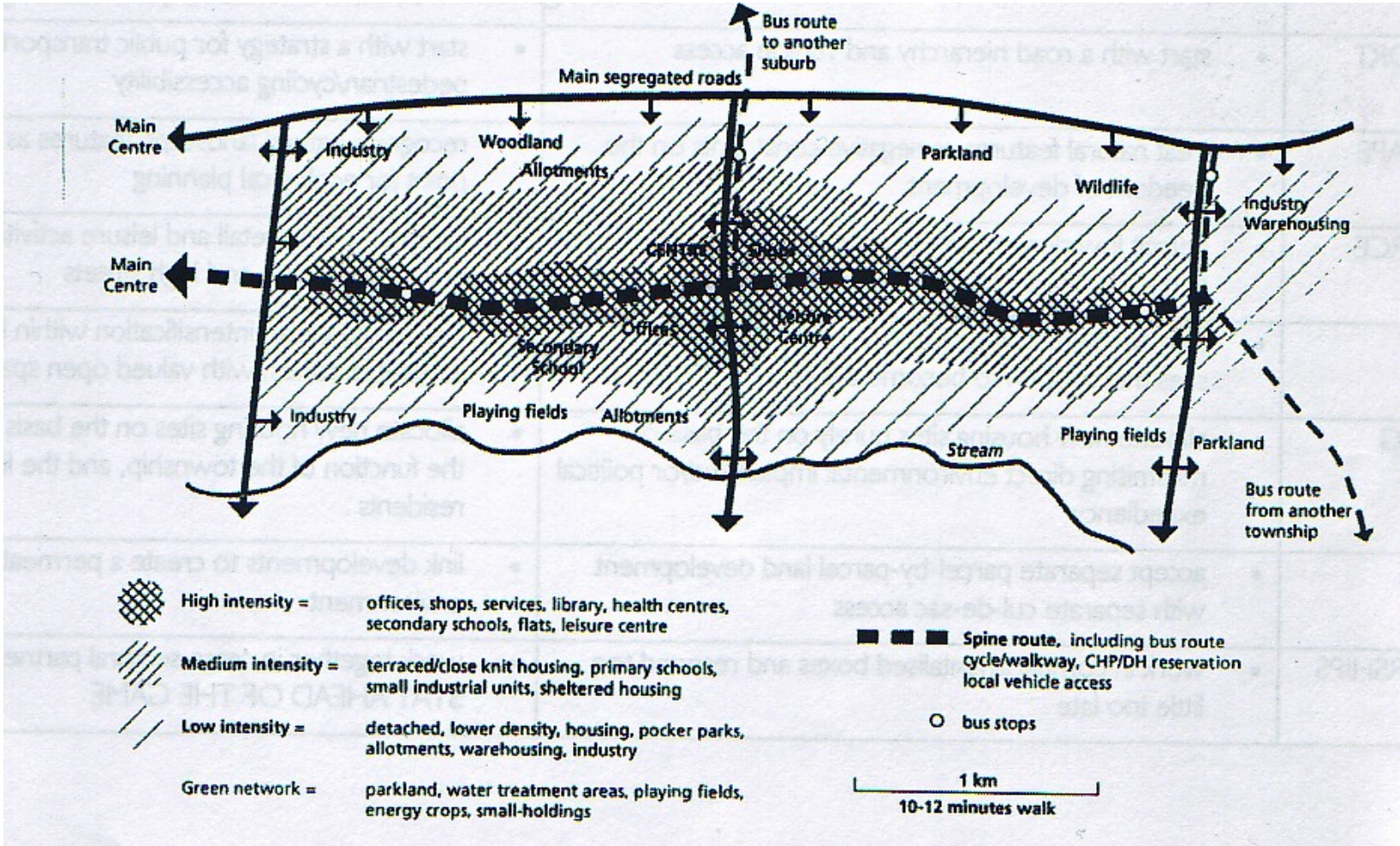
- Renewal
- Aesthetics
- Density
- Land use

Urban development process



The six stages of "twin tracking" Barton, 2002

Theoretical layout for sustainable settlement

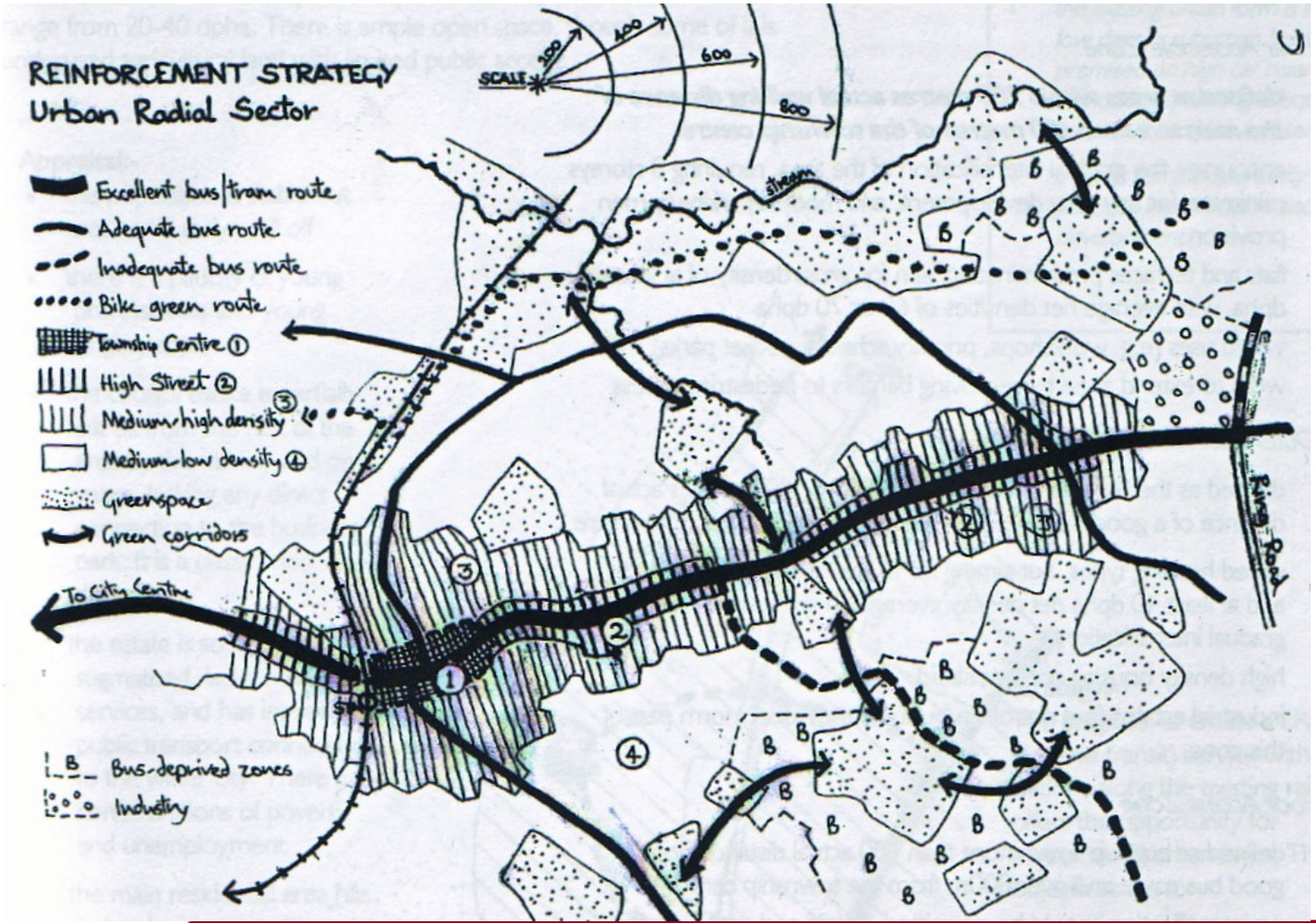


Town plan illustrating “twin tracking” model Barton, 2002

Spatial strategies for sustainability

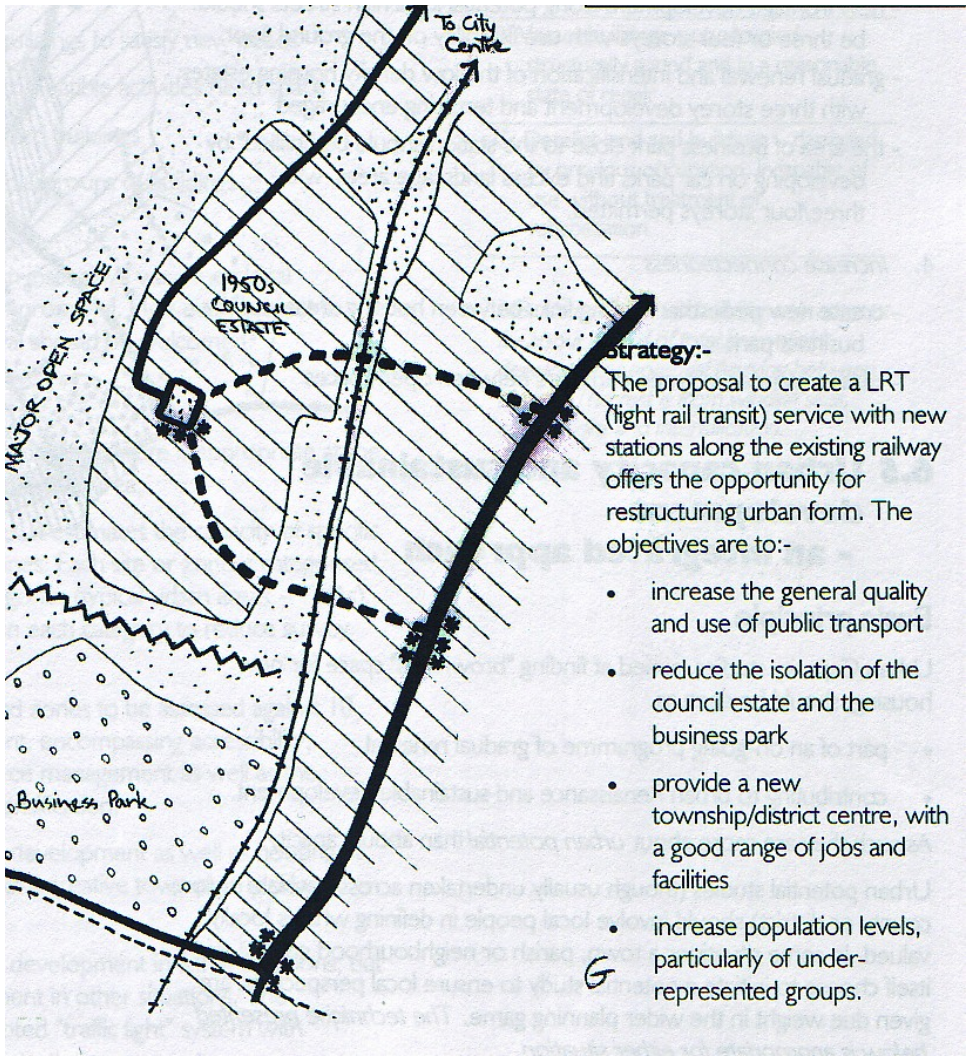
- identify access
- network of distributor roads
- 200 m grid
- Identify neighbourhoods based on local features
- Identify new proposals
- Identify greenspace
- Identify areas needing further masterplanning (Barton, 2002)

Sustainable urban settlement -reinforcement

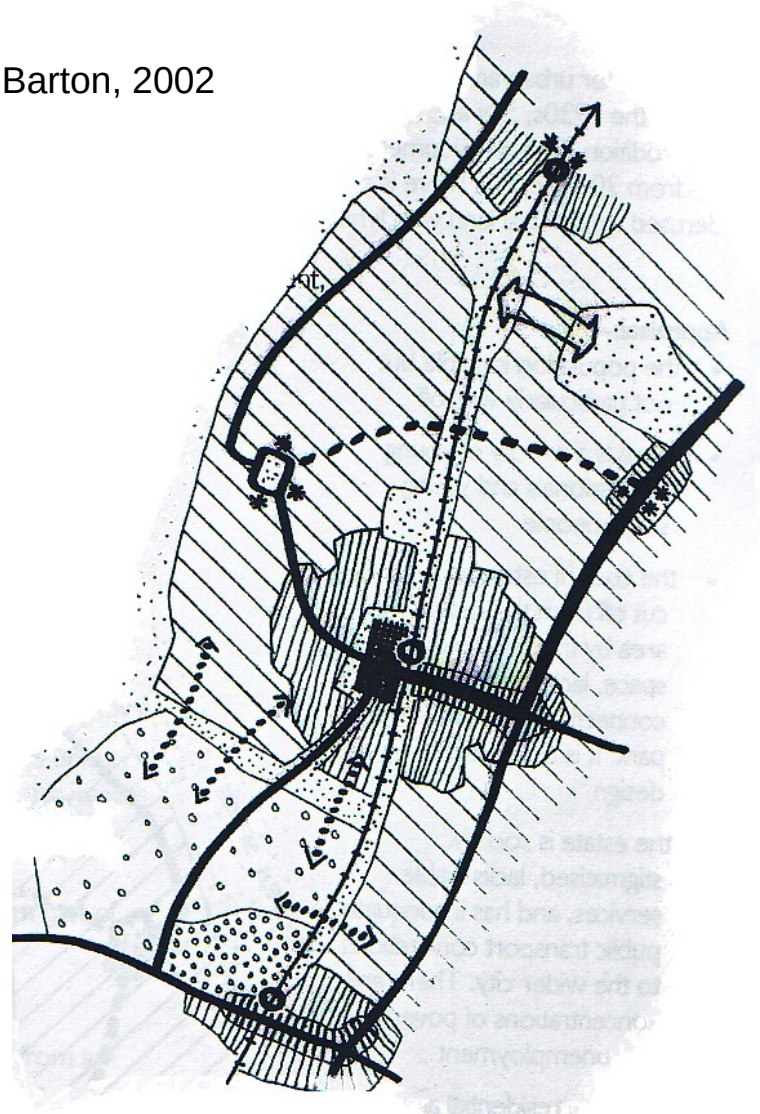


Barton, 2002

Spatial strategies for sustainability -retrofit



Barton, 2002



Assessing capacity for settlements

Focus on the *potential* for an area as well as capacity:

1. Brief and geographical area

2. Assessment framework

3. Map development potential and constraints

4. Evaluate potential against development forecast

5. Devise alternatives and cross- evaluate

6. Agree final spatial framework and brief

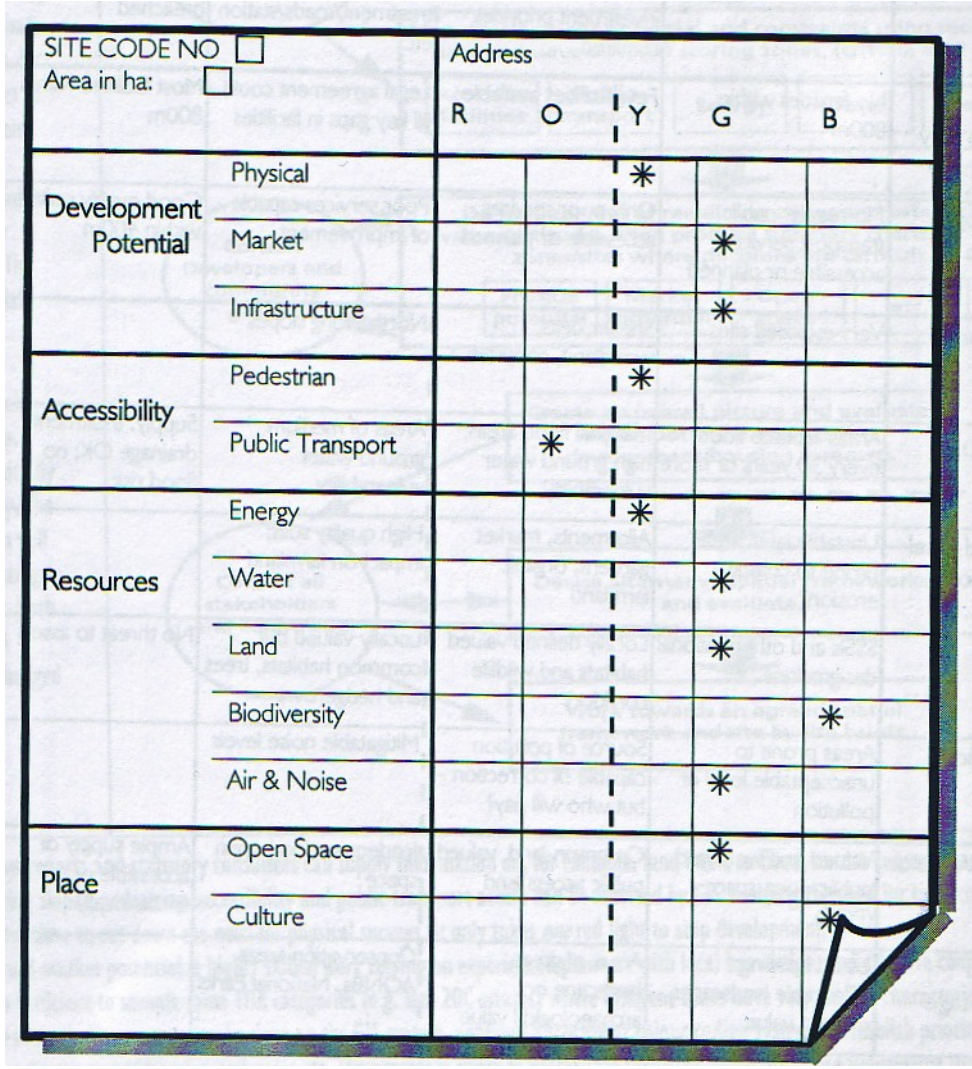
Assessing development potential

- Chart for evaluation
- Developed by Barton et al

- Used for specific sites or
- larger areas

- Based on “traffic light”
- grading

- Criteria can be weighted



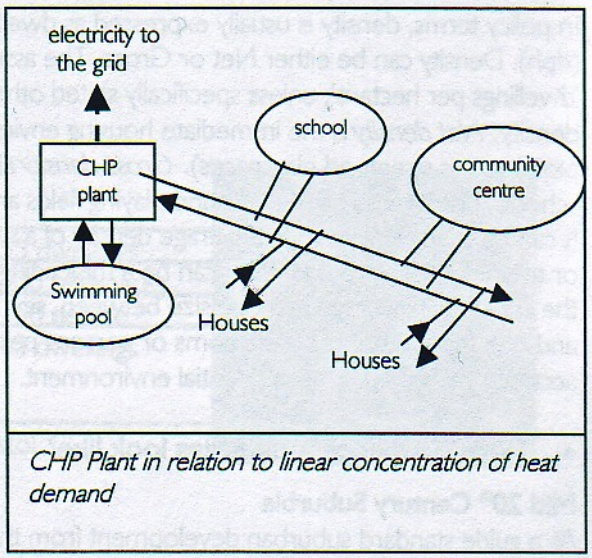
Land Use – developing mixed use strategy

Criteria:

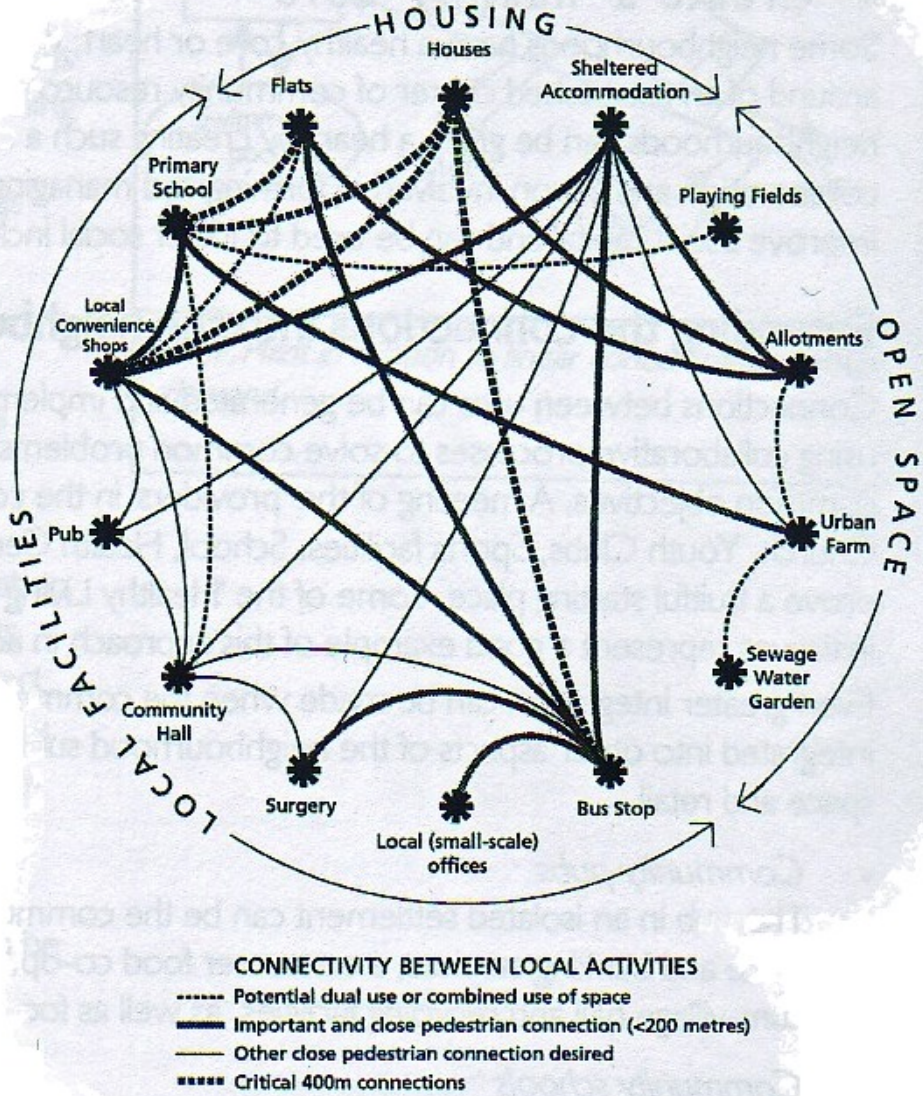
- Appropriate mix (neighbourliness) – what goes with what?
- Scale – keeping retail and manufacturing at a small scale
- Location –maximising footfall and visibility for business
- Critical mass – unrealistic to expect true diversity if use under 5,000
- Energy strategy- mixed use will maximise community heating and CHP potential – minimum density 44 dph

Land Use – developing mixed use strategy

Barton, 2002



CHP Plant in relation to linear concentration of heat demand



Densities – the debate

- Definition = dwellings per hectare (dph)

- Net density = housing, local streets, playspace
- Gross density = addition of community facilities, averaged out over area

- Suburbia = linked but detached houses = 25 -35 dph

- Town = terraced 2 storey housing = 45 dph

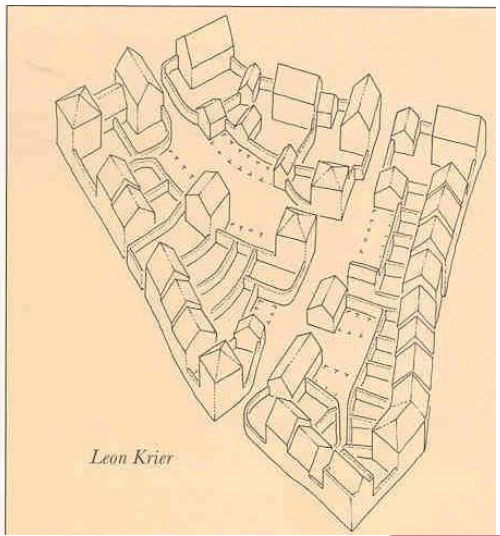
- Inner city = 4 storey blocks, flats = 65 + dph

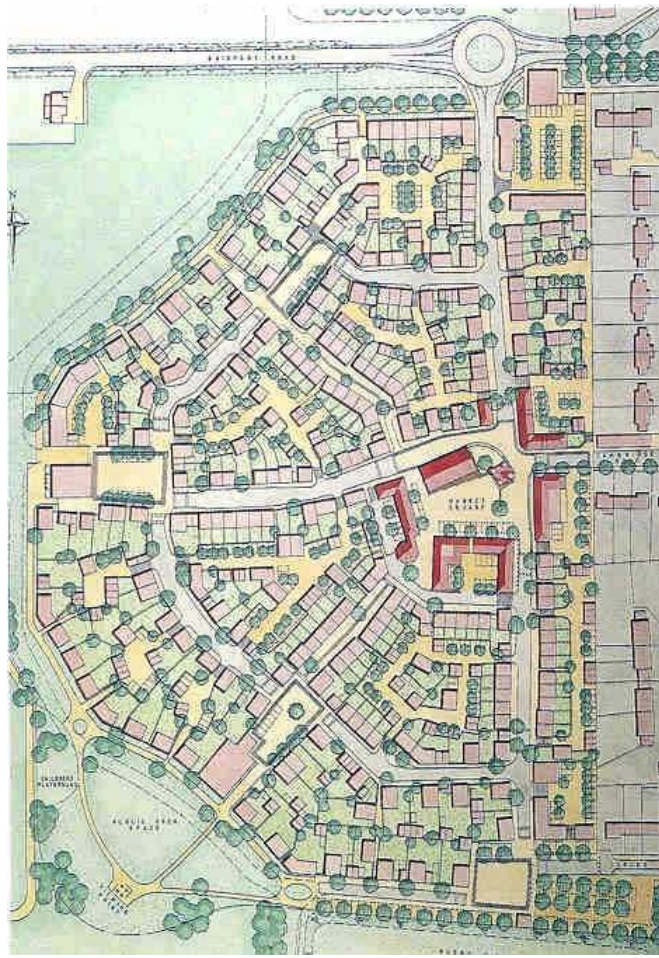
- Arguments for “sustainable suburbs” and “compact city”

Densities – what you see is not what you get !

Poundbury, Dorset = 37 dph:

- Doors onto pavement
- Tight streets
- Abrupt changes of direction
- Density is lower than perception
- Feels like a “townscape”





Transport and access

Key issues:	density, form, location, use
City models:	compact, linear, polycentric, suburban, edge
Transport response:	modes, frequency, routing

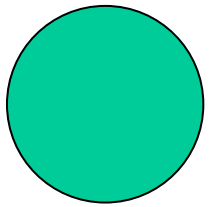
There is debate on which city model and transport strategy is most sustainable for a) new cities b) existing cities

There is general agreement that public transport needs to improve but not at expense of the convenience of the car

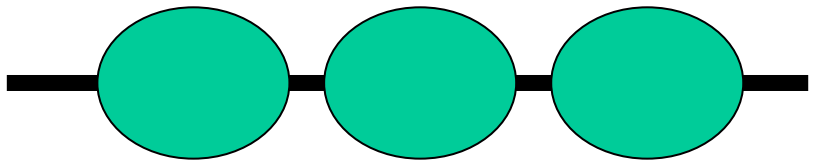
Transport interchanges, traffic management and efficient public transport will prevent car ownership rising inexorably

Notion that “shortest journey” is most “green” is overly simplified

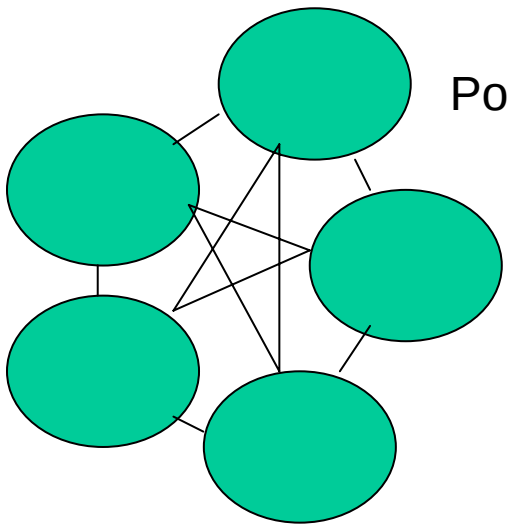
Linking transport to urban form



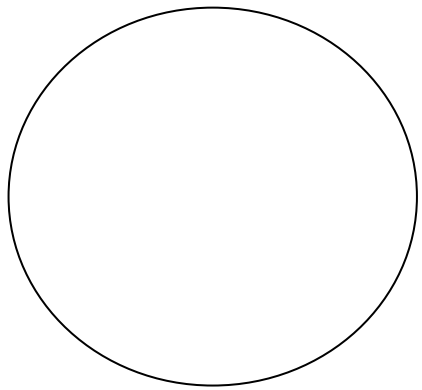
Compact City



Linear city



Polycentric city



Edge city

Curitiba – a city for the future

- Powerful mayor
- Integrated transport system
- Planned in 1968
- Established routes then the buildings (not other way round)
- Fast, frequent buses
- Easy access -designed
- Single fare – any distance
- 85% of public use it

“Fixing” the transport problem functionally

- Public transport must deliver **400 yards** of each home in city/suburb and within **10 minute intervals** Curitiba, Brazil

- High density planning with mixed use = compact city

- Link high speed inter – region coaches to peripheral interchanges, not centres

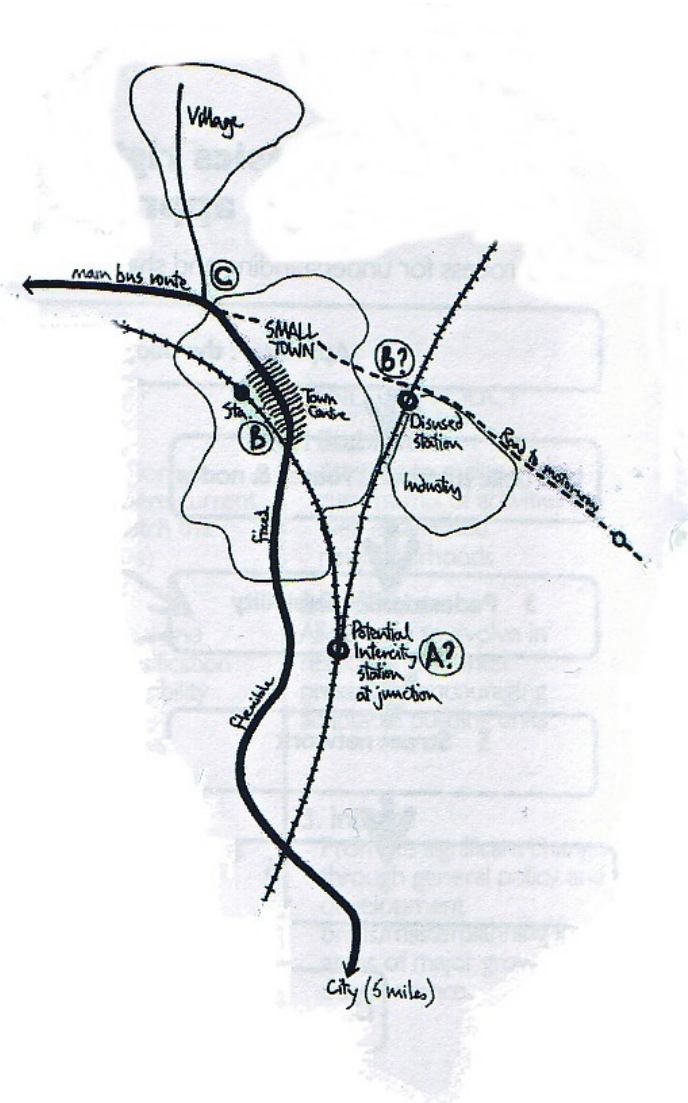
Monbiot, G. “Heat”, 2007

Who benefits?

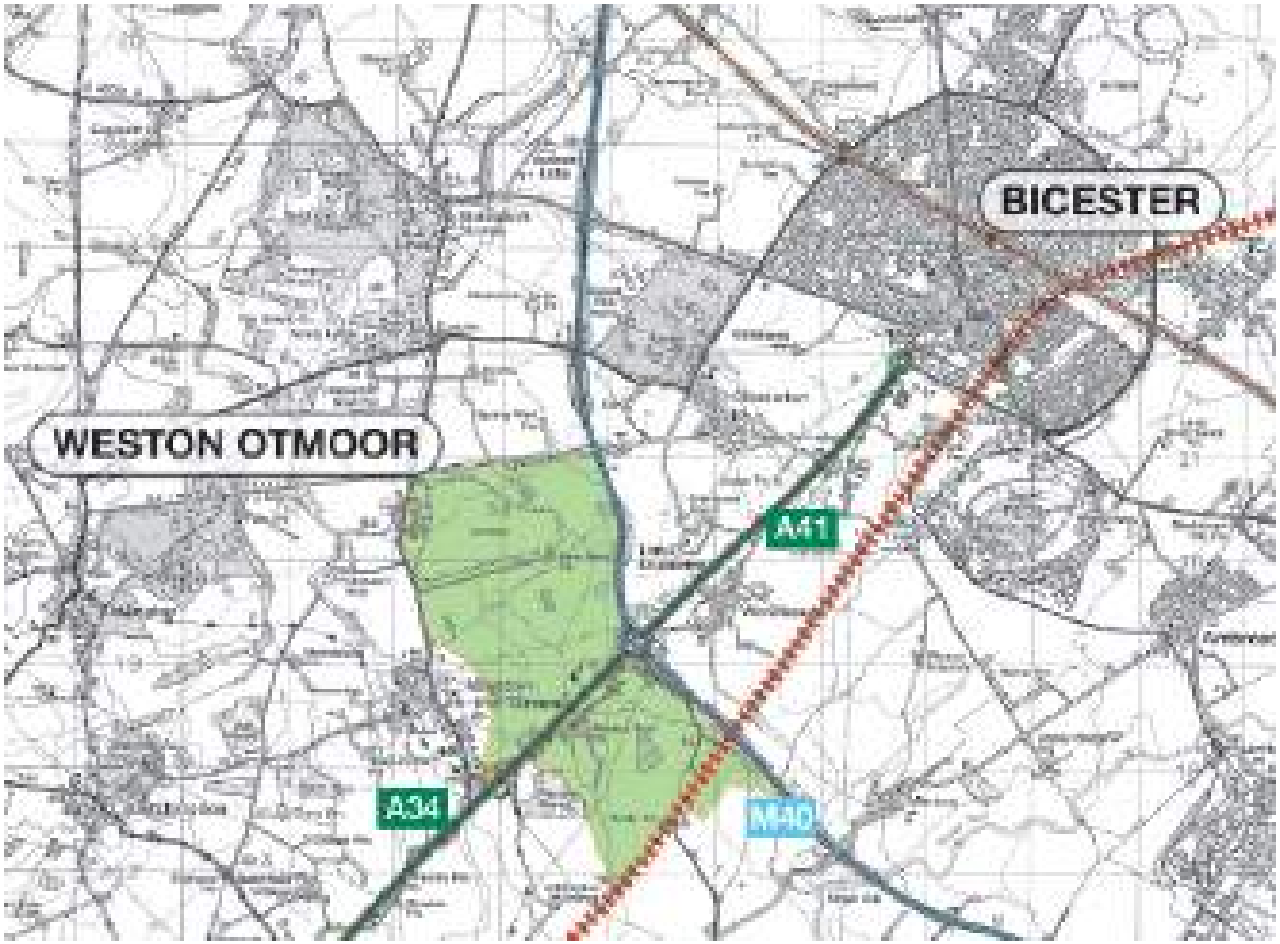
community – more social space, less resources used and less pollution
planners – can plan the city around predictable transport zoning
engineers – planned maintenance, dispersed traffic, less road wear
essential car user – less traffic= more time
wildlife/ children – less kills on the road, more wildlife corridors, safer playing

“Fixing” the transport problem spatially

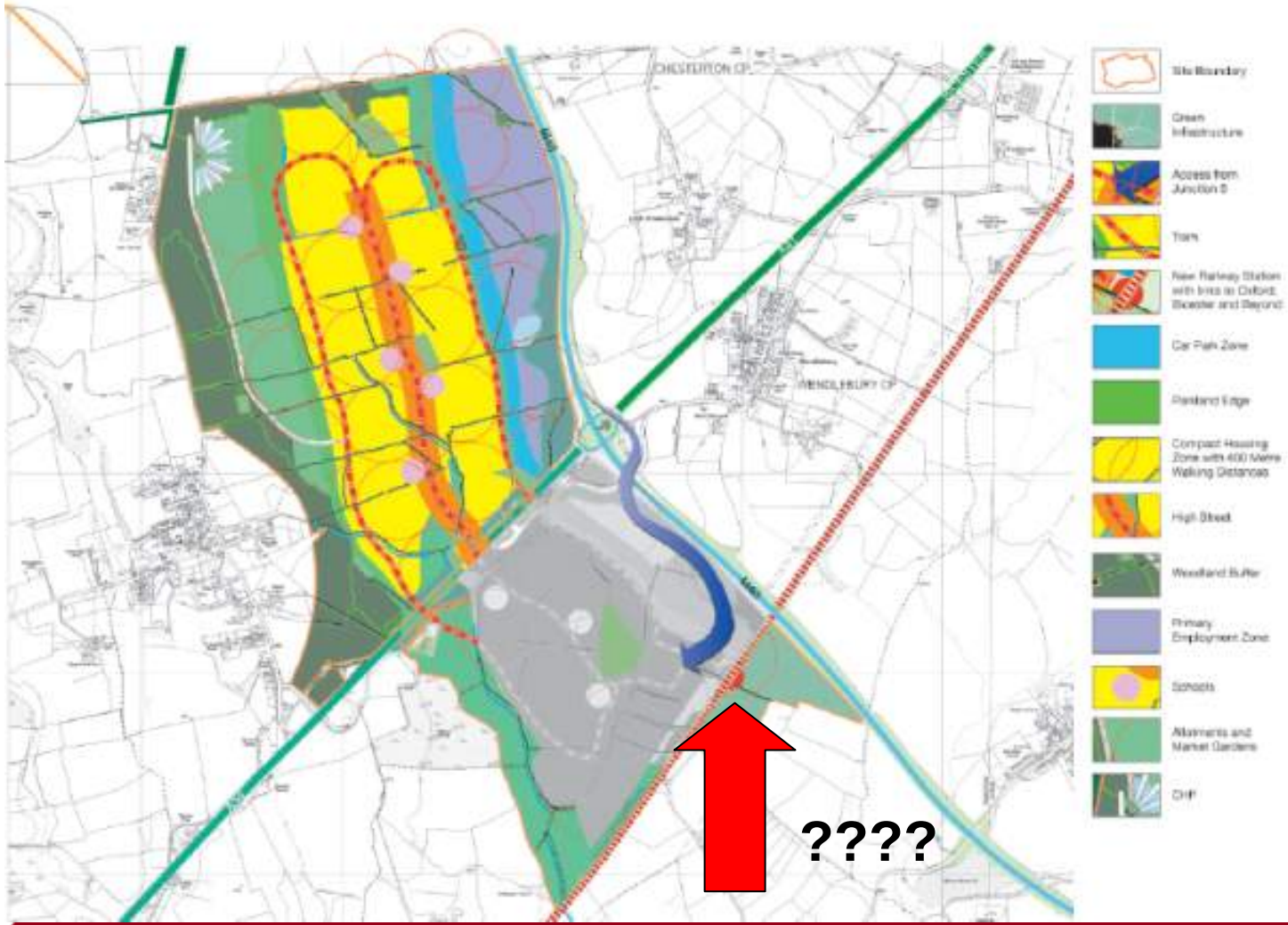
- New road links to existing rail stations
- Open up disused rail stations
- Improve pedestrian routes to transport nodes
- Increase number of transport access points (bus, car share etc.)
- Design interchanges for transport modes (car, coach, bus, train, bike, pedestrian)



How does Weston Otmoor Eco-town compare?



What happened to that rail link ?.....



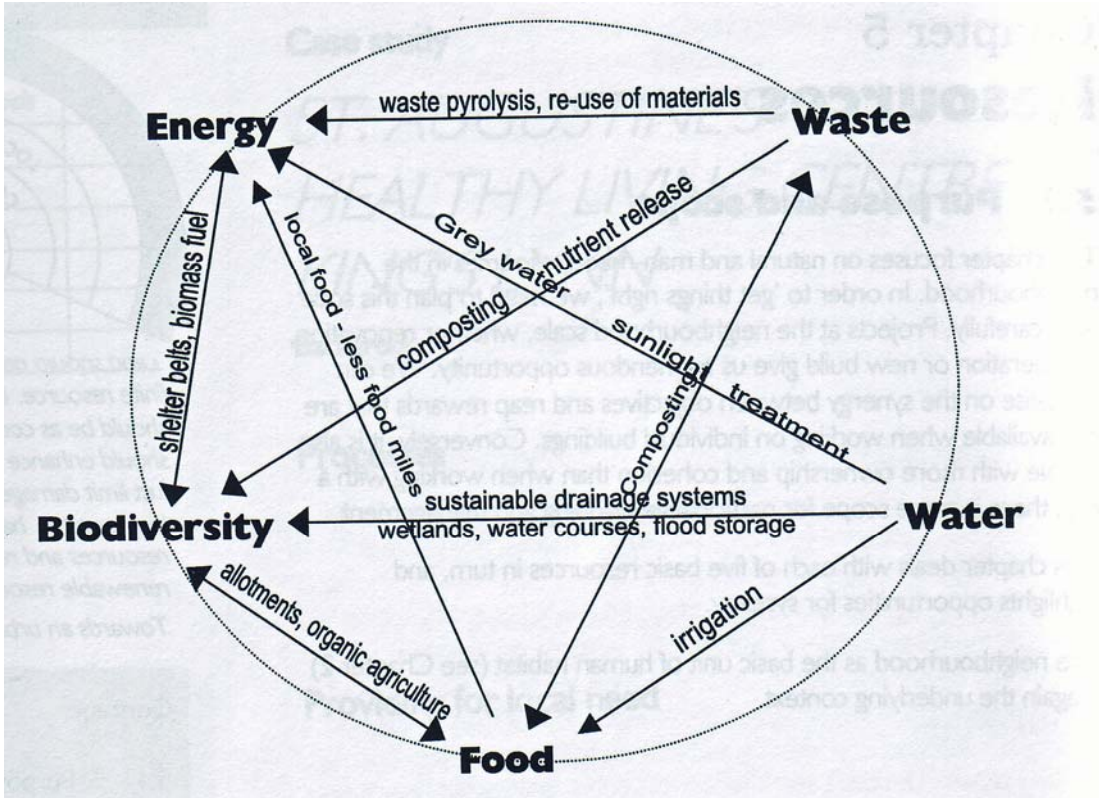
Why are resource flows important?

- Limited resources both locally and globally – predicted to run out unless we manage them more efficiently and reduce consumption (3 x planet factor)
- Resource flows condition the quality of the environment
- Planning and construction of settlements and buildings need to be dictated by sustainable resource use
- Relatively new science and poor data at present for local resource use


Resource auditing: key areas to consider for buildings and settlements

- Human
- Energy
- Water
- Food
- Biodiversity
- Waste

- Construction
- Transportation
- Infrastructure

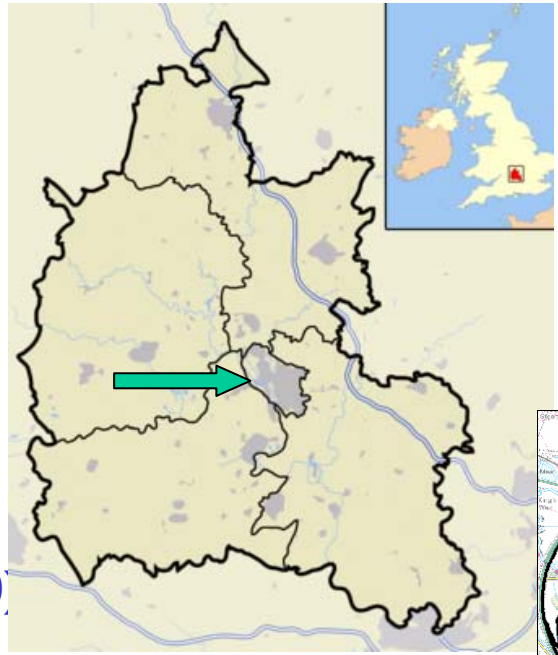


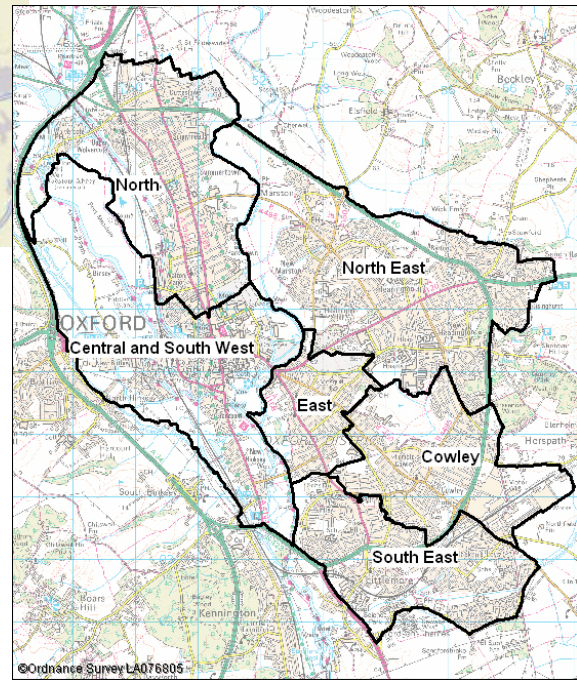
Barton, H. et al (2002)

Resource use: a question of scale and boundary

Issues of population scale:

- region (1million +)
- mega city (10 million +)
- city (100,000 – 10 million)
- town (15,000-40,000)
- neighbourhood (2,000-10,000)
- immediate locality (50-2,000)





Resource use: Oxfordshire region and Oxford City

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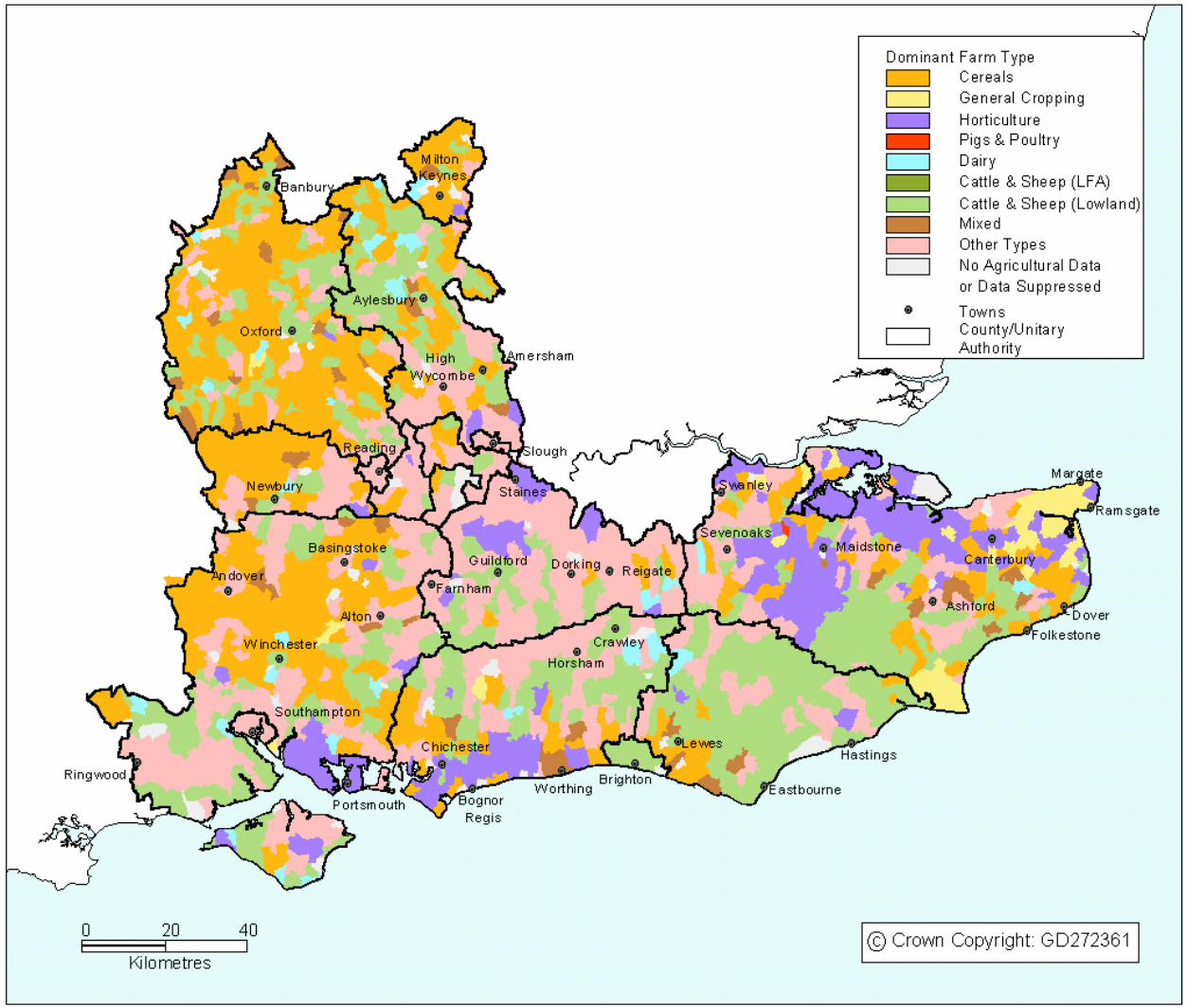
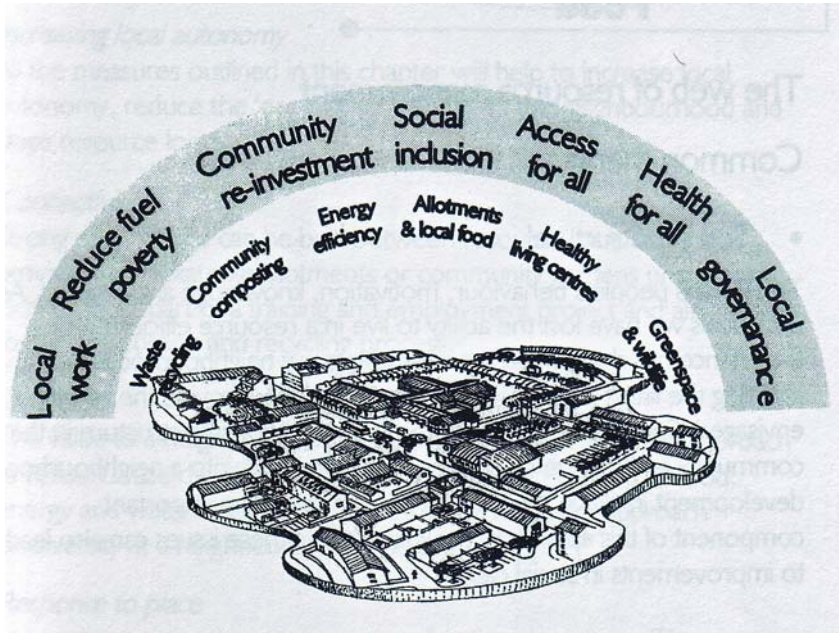
- What can we obtain from the Oxfordshire area?
- What can we obtain more locally?
- What are the priority areas to focus on based on the ecofootprint ?



Resource use: the strategy for settlements

- Stakeholder involvement
- Increasing local autonomy
- Connectivity
- Diversity
- Response to place
- Adaptability

Barton, H. et al (2002)



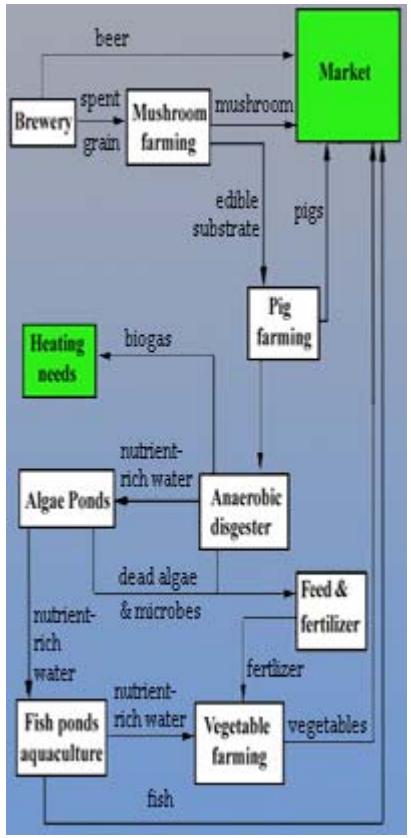
Definition of Industrial Ecology

There is no single agreed definition, but this.....

"Industrial ecology is the shifting of industrial process
from linear (open loop) systems,
in which resource and capital investments move
through the system to become waste,
to a closed loop system where
wastes become inputs for new processes"

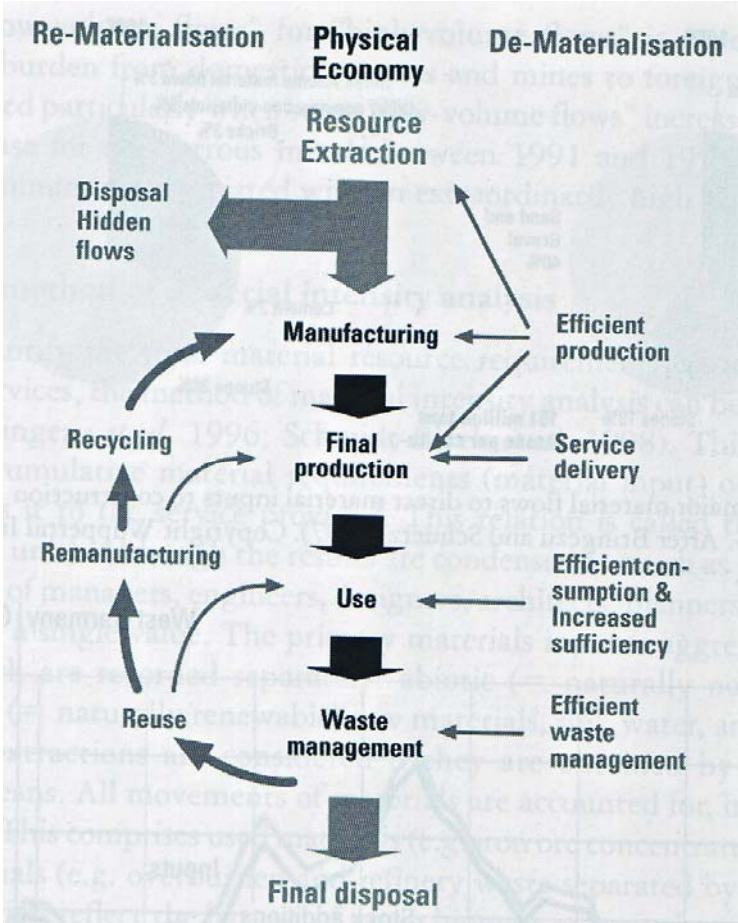
....will do for now.

Wikepedia 2008



Industrial Ecology: method

- Define boundaries of project
- Carry out inventory of impacts using Life Cycle Analysis (LCA) and MFA
- Identify areas for improvement in project processes
- Re-design processes based on eco-systems thinking
- Test new system and refine through experience

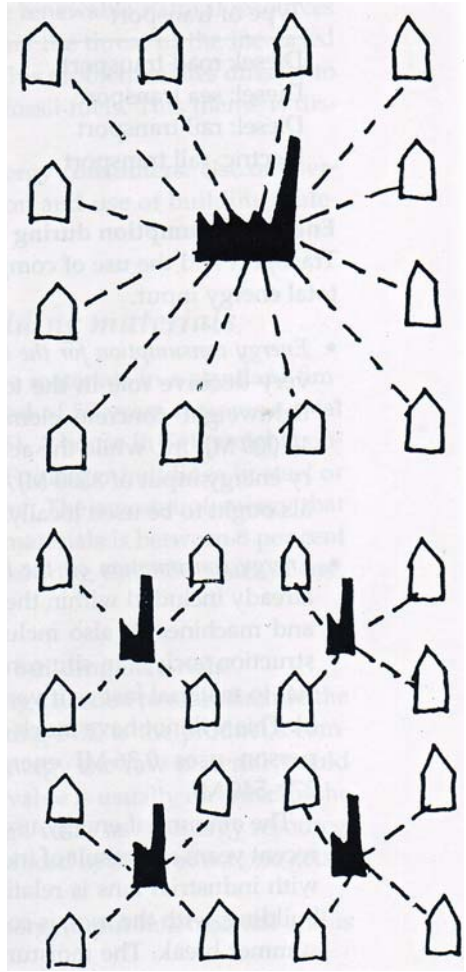


Wuppertal Institute, 1998

Industrial Ecology: limitations and critique

- Industrial systems are not “closed systems” – they live to export
- Geographical constraint may hinder some more effective processes
- Ecosystem thinking has evolved – unpredictable, self-organising, stochastic patterns, not always benign
- Accounts for environmental and economic, but not always social aspects – only part of the picture.

Tansey, J. 2006



Berge, 2000

Industrial Ecology: key areas to consider for buildings and settlements

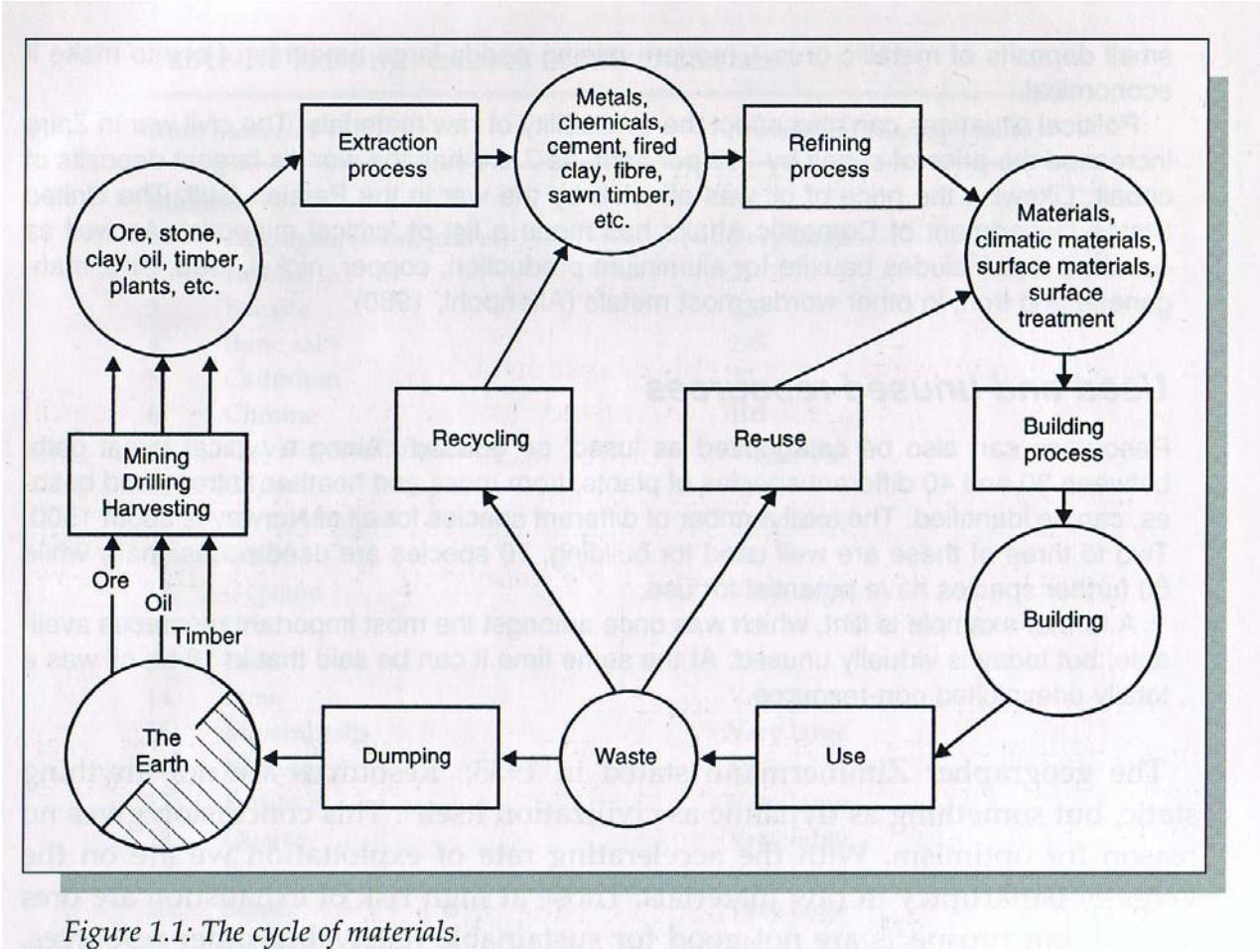


Figure 1.1: The cycle of materials.

What can be salvaged from existing built environment on site?

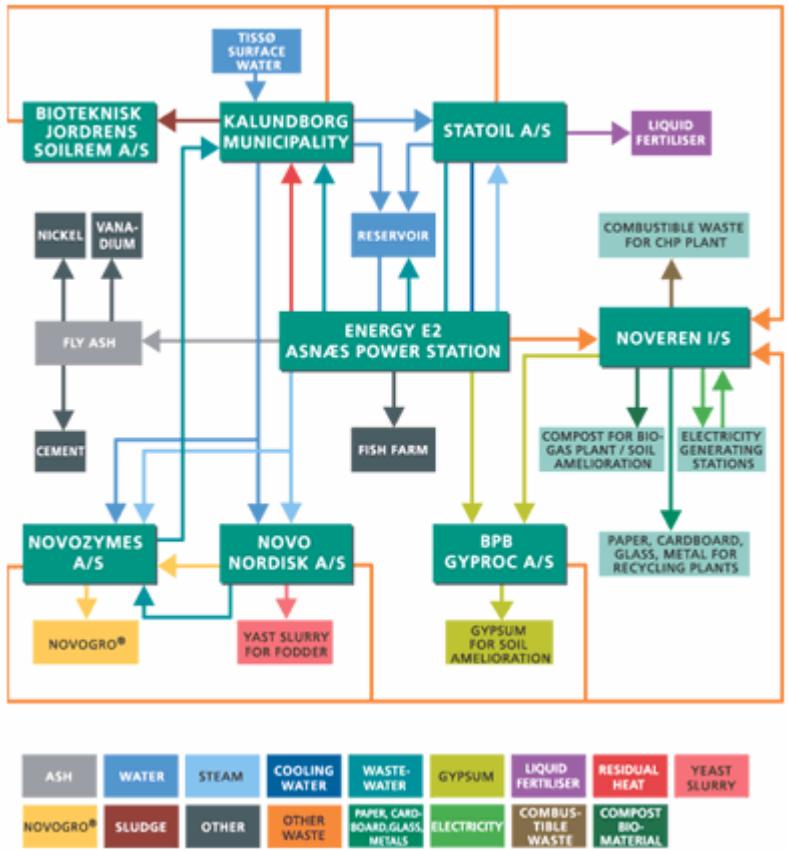
What products should be used on site to maximise local loops?

Where can things be dumped eventually?

Berge, 2000

Industrial Ecology: Settlement Example

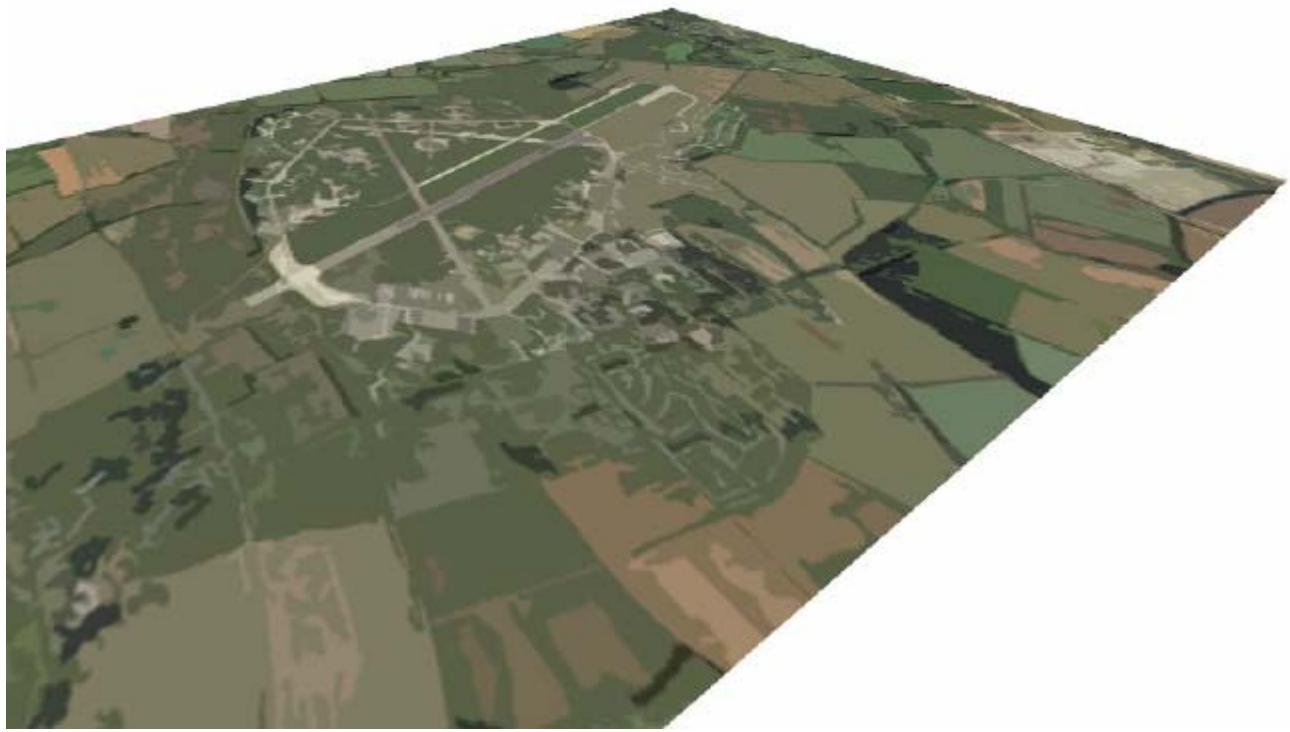
- Kalundborg province in Sweden
- numerous businesses already established
- 20 linked together to form an "industrial ecosystem"
- 4,500 households served by CHP
- Heated water used by fish farm to produce 200 tonnes of salmon daily
- 25% reduction in water use
- Many other savings in material use



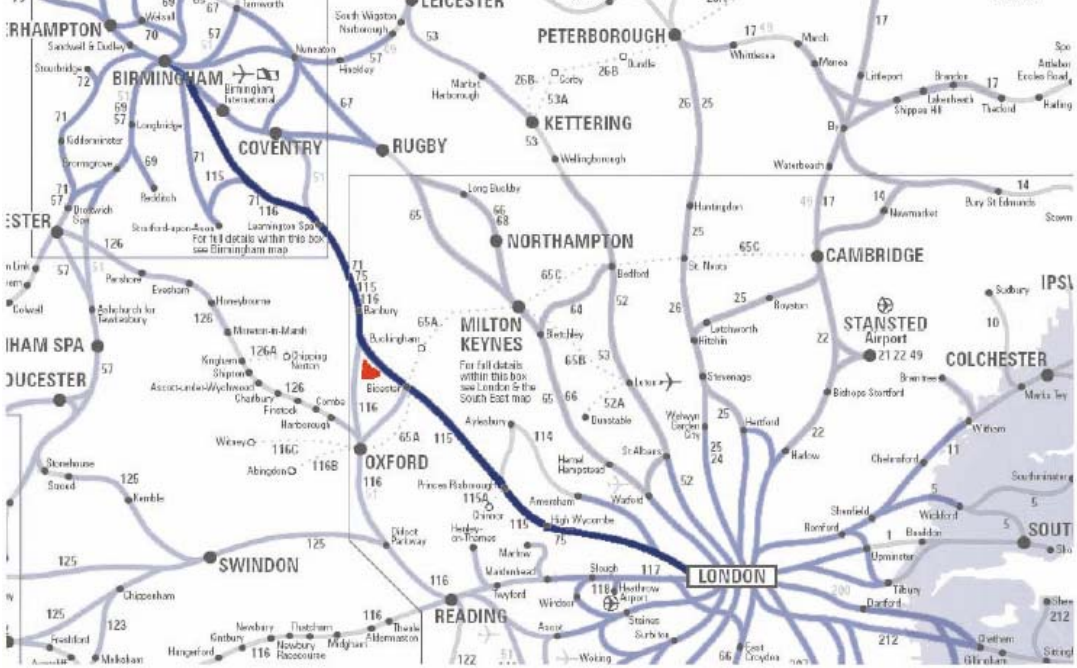
http://www.symbiosis.dk/

Student project: Upper Heyford Eco-town

Developed in ‘Bioregional Approaches to Sustainable Built Environment’ module on MSc. Sustainable Building: Performance and Design

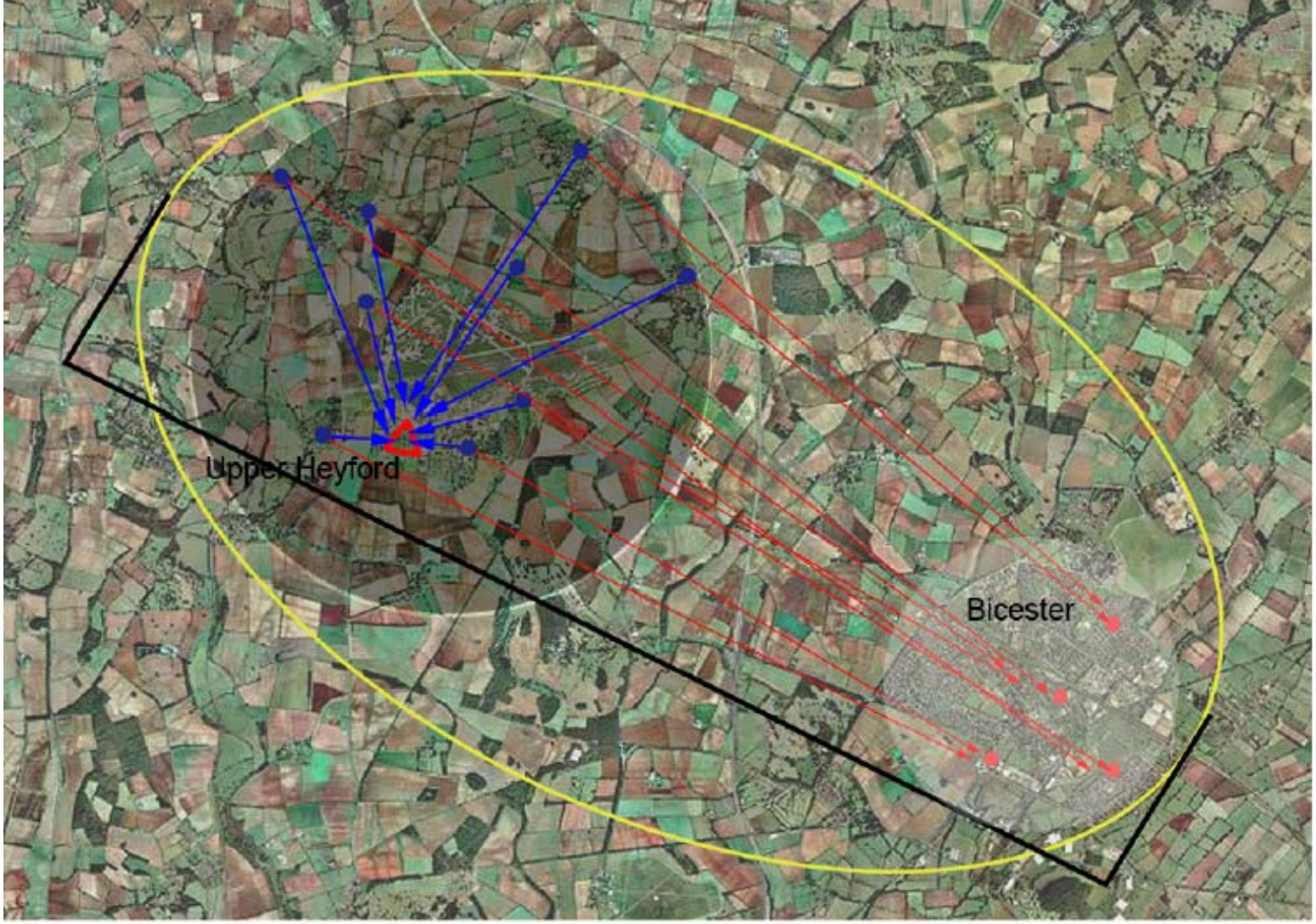


Transport links



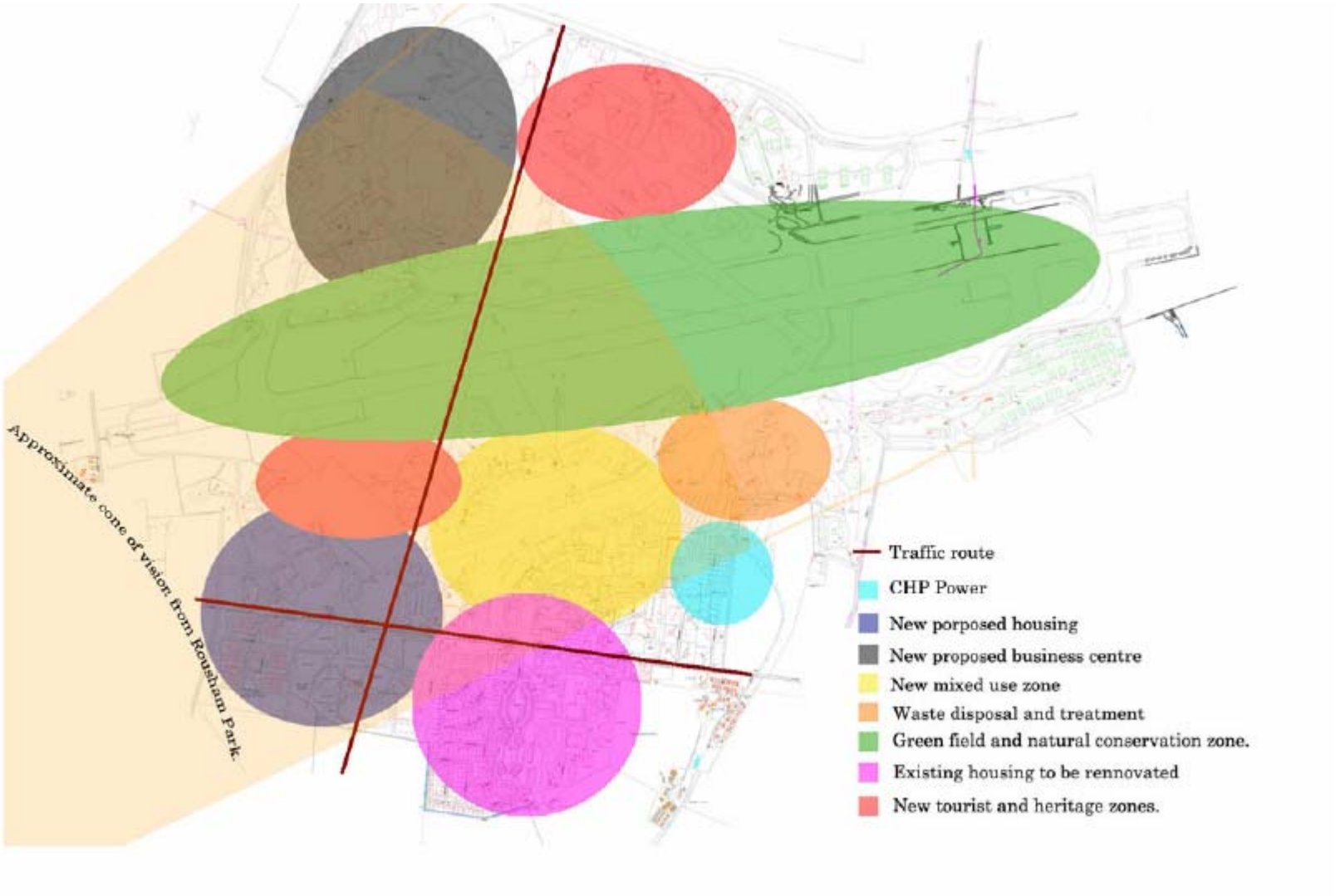
Train line connecting Birmingham and London (Marylebone).

Roads connecting to Birmingham and London.

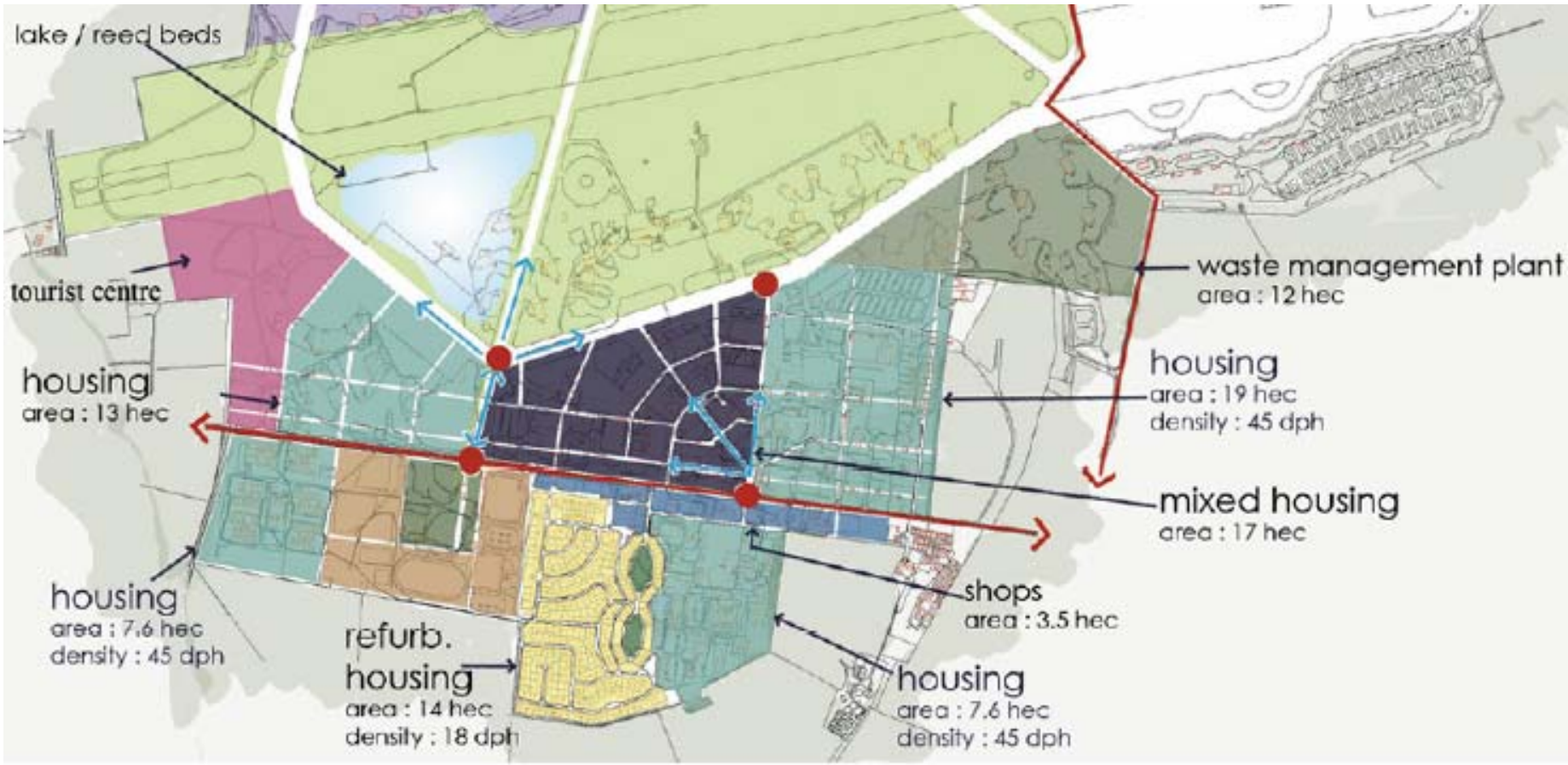


- Local farms to supply our 3000 home development.
- Existing closest supermarkets to Upper Heyford.
- Food resource outsourcing to Bicester.
- Food resource insourcing to local farmers market and mini supermarket.
- Local farmers market and mini supermarket

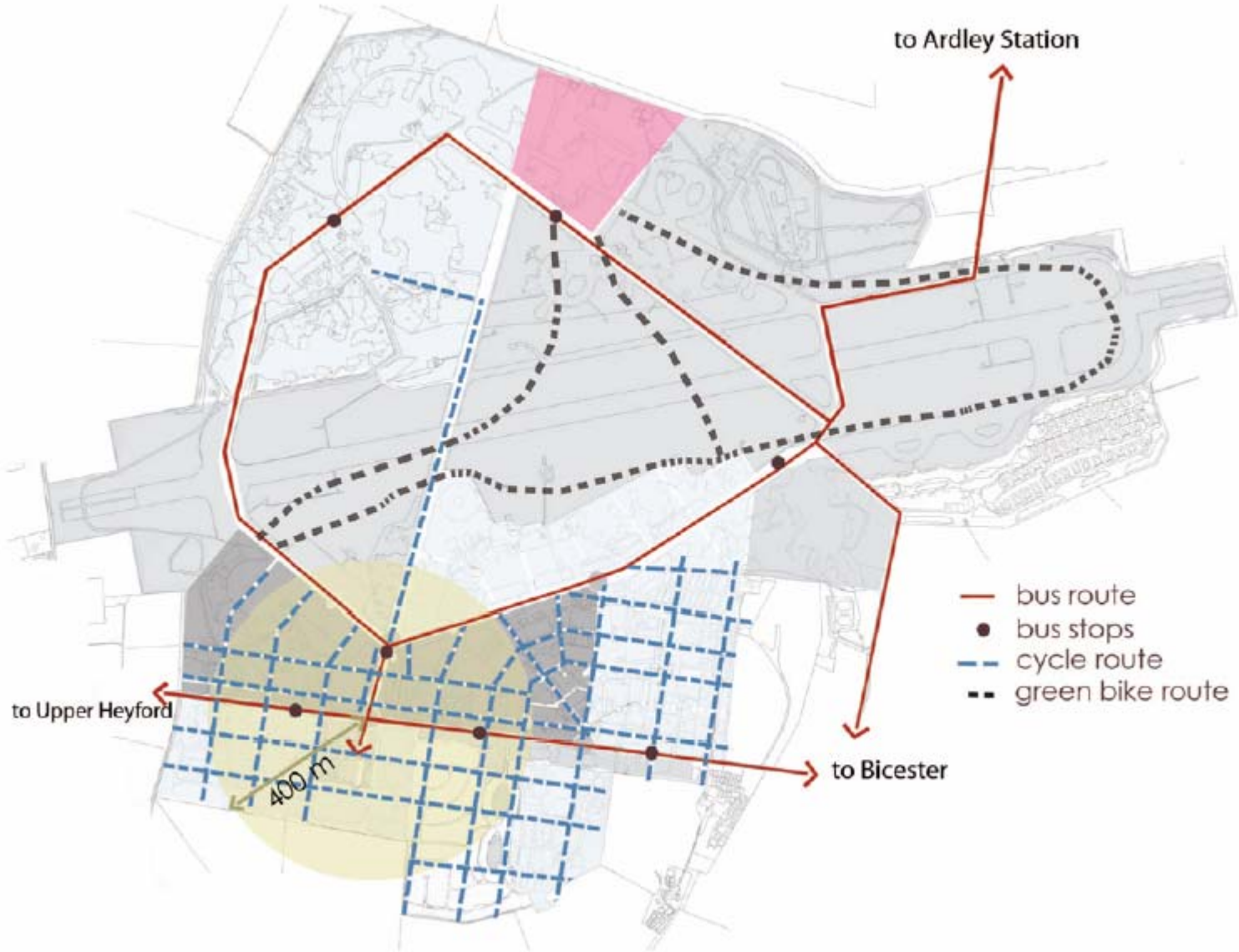
Zoning strategy



Housing strategy



Internal site transport routes



Relationship between settlement and ecology

Local sourcing of materials for site

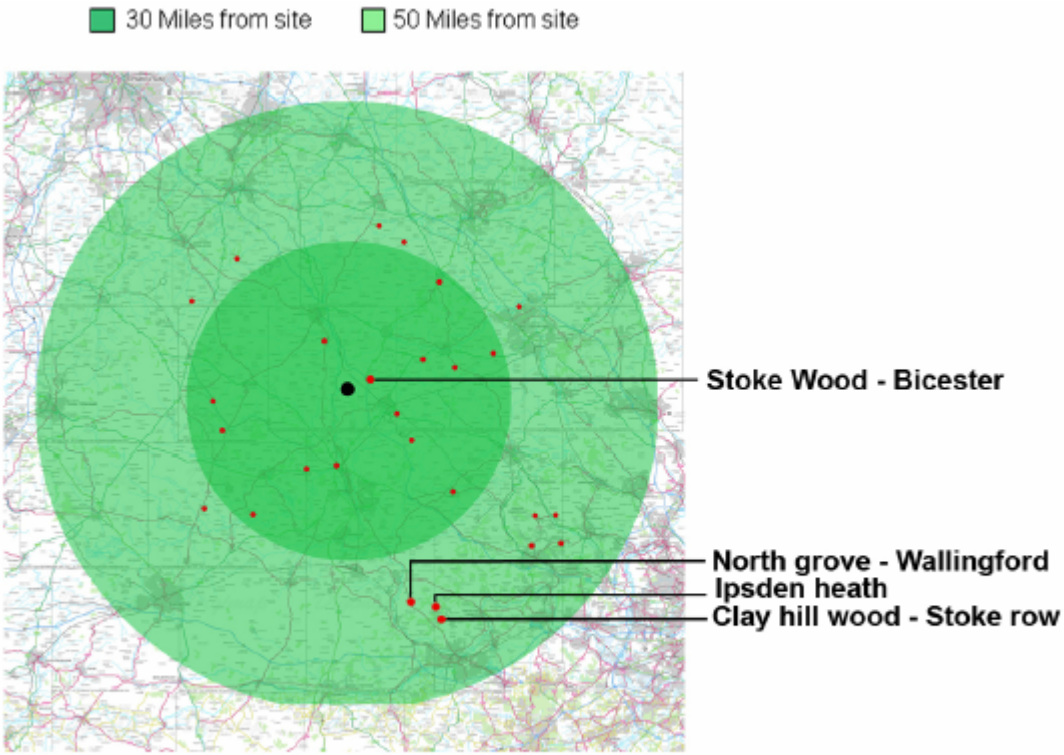


Figure 1.4 Mapping the local forests within 50 miles

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Beyond Eco-towns
Applying the Lessons from Europe
Report and Conclusions

PRP, URBED and Design for Homes

PRP responsive, intelligent, enduring design

urbed

DESIGN FOR HOMES

OXFORD BROOKES UNIVERSITY

Department of Architecture

Dr. Fionn Stevenson

3.0 The Places

Adamstown (1) near Dublin, Ireland, a private initiative in a rural area (and therefore the most similar to many of the proposed Eco-towns);

Amersfoort (2) a small historic city in The Netherlands, with its three new suburbs: Kattenbroek, Nieuwland and Vathorst;

Freiburg (3) Germany, with its two new urban extensions: Vauban and Rieselfeld;

HafenCity (4) in Hamburg, Germany, the redevelopment of a port area close to the city centre;

Kronsberg (5) in Hanover, Germany, designed as part of the EXPO 2000 international exhibition;

Hammarby Sjöstad (6) an urban extension of Stockholm, Sweden, and once promoted as the site for an Olympics bid.

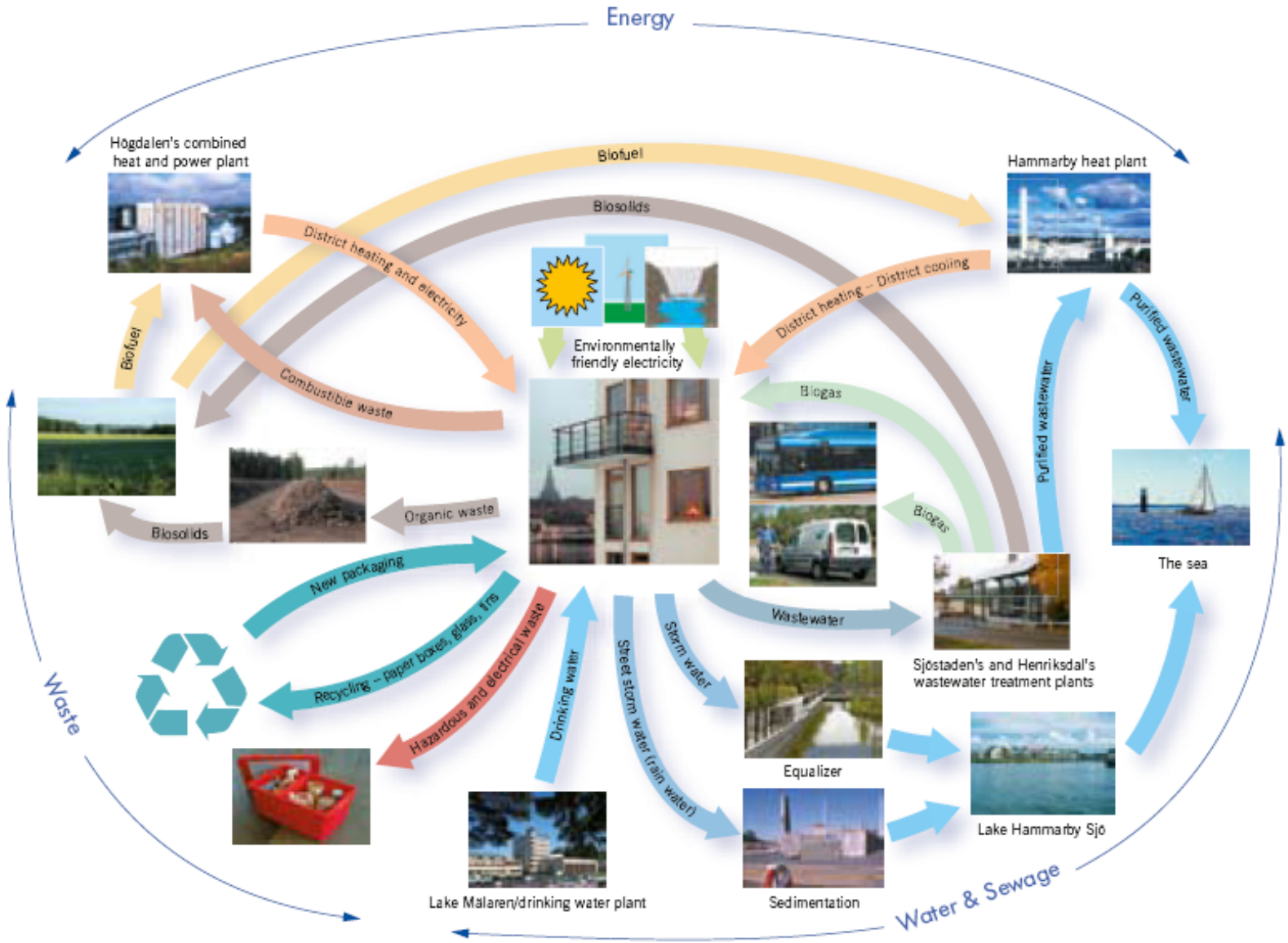
Key messages from Europe

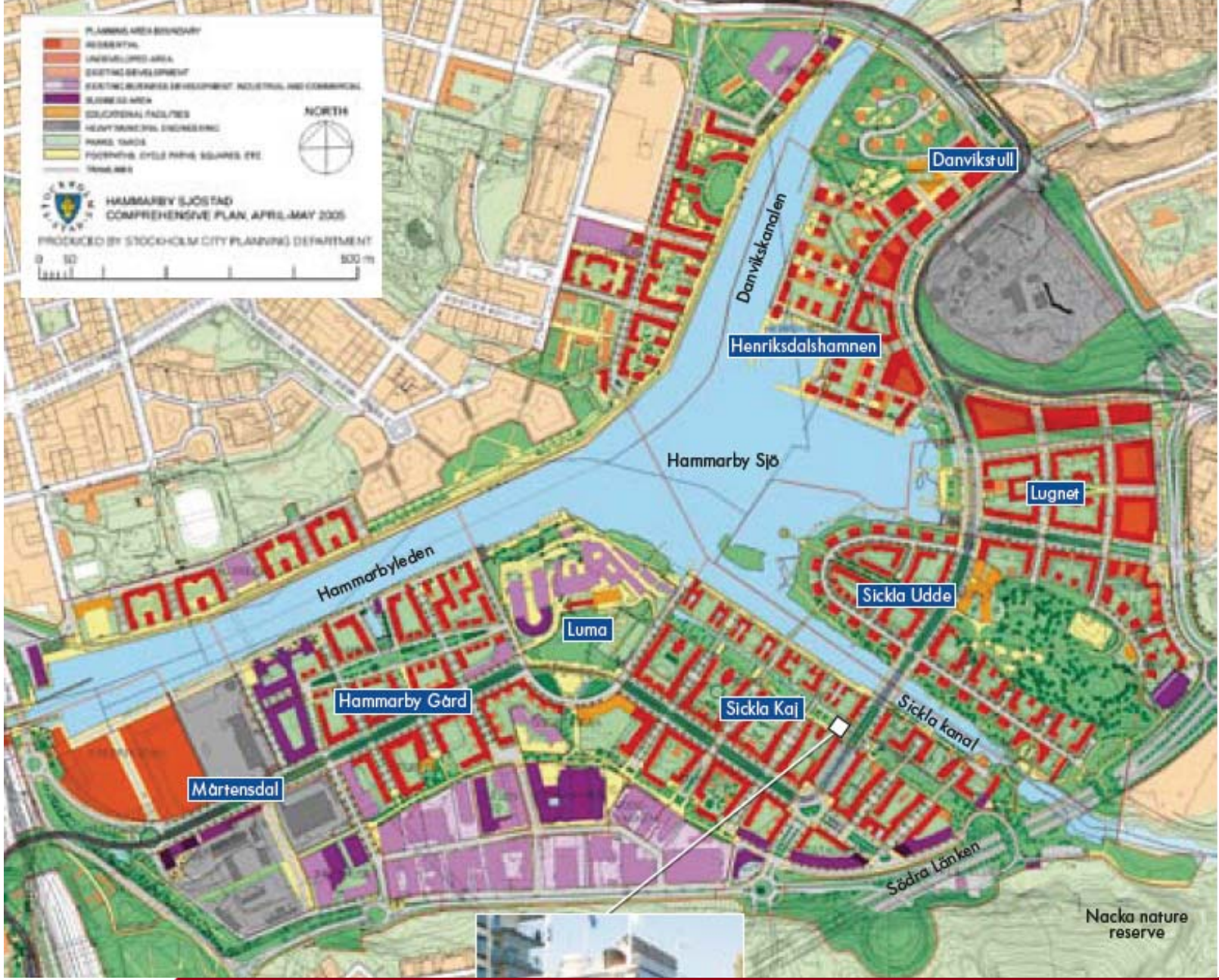
Eco-towns should have:

- close links to thriving conurbations
- mixed housing, balanced population with commmunity engagement
- clear targets for saving natural resources
- strong identity with choice of attractive places
- active civic leadership
- infrastructure funding provided from the start

http://www.symbiosis.dk/

The Hammarby model




NORTH
HAMMARBY SJÖSTAD
COMPREHENSIVE PLAN, APRIL-MAY 2005
Danvikstull
Danvikskanalen
Henriksdalshamnen
Hammarby Sjö
Lugnet
Hammarbyleden
Sickla Udde
Luma
Hammarby Gård
Sickla Kaj
Sickla kanal
Mårtensdal
Södra Länken
Nacka nature reserve

The Brookes response to Eco-town consultation

- infrastructure must be in place before development goes ahead
- sustainable transport travel needs public subsidy for bus and rail routes
- more radical transport approaches must be explored
- eco-towns are not just 'urban form' or a physical entity; they are about 'lifestyle'
- ecotowns = less than 3% of 3 million homes required
- greater emphasis should be placed on regeneration - 80% of housing built will still be there in 2050

Thank you for listening... any questions?