Context analysis

Project Location

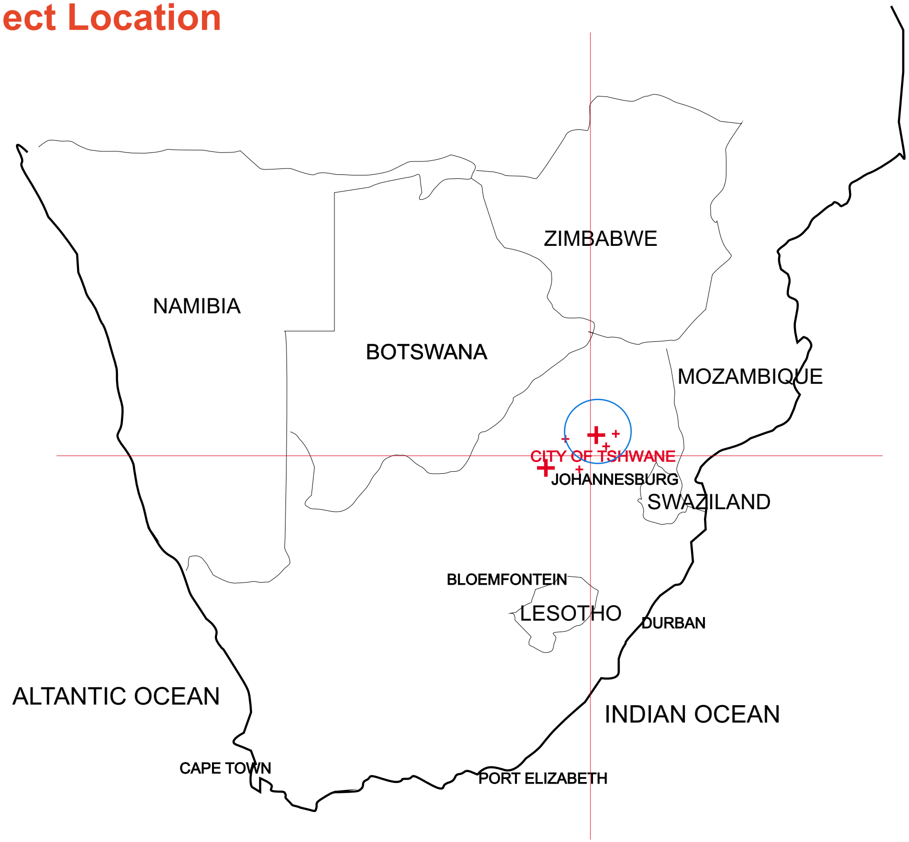


Figure 29. South Africa with City of Tshwane as indicated. From: www.samaps.co.za, edited by Author 2010.

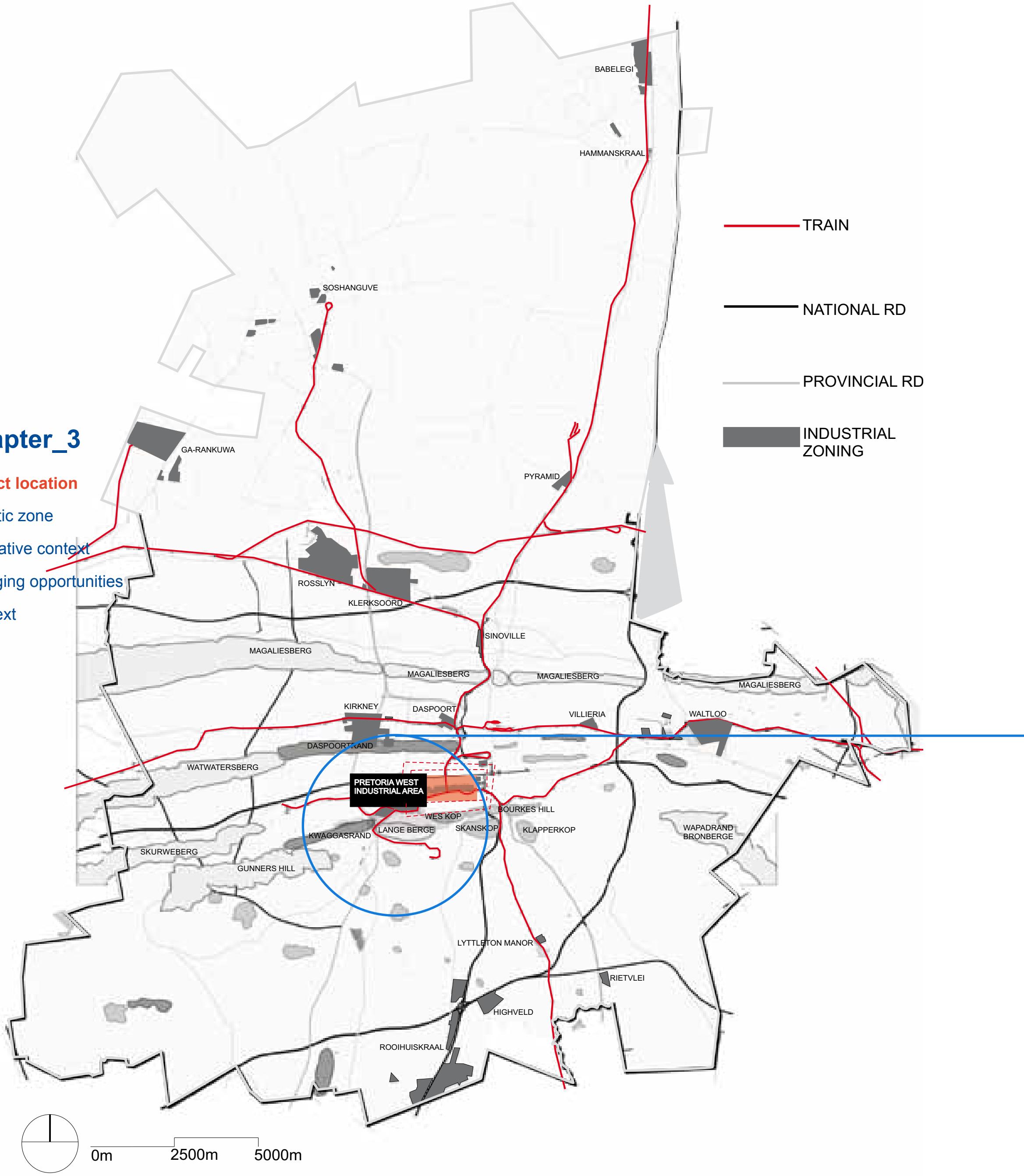


Figure 30. The study area of Pretoria West Industrial Area in context to the industrial areas of City of Tshwane. From: City of Tshwane Municipality, edited by Author 2010.

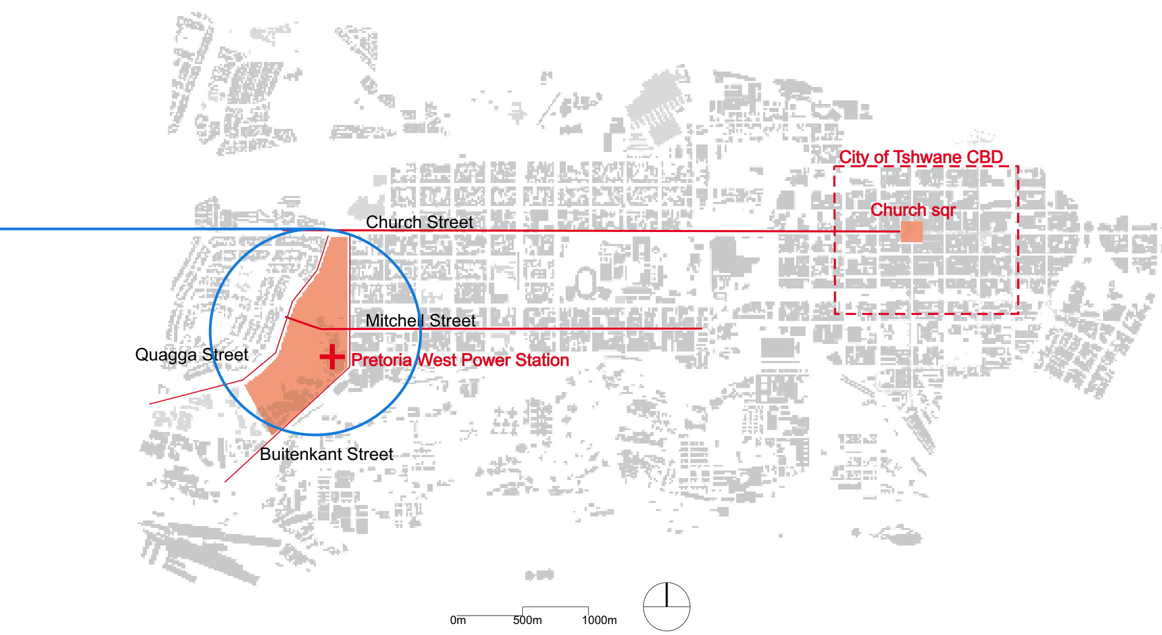


Figure 31. The study area of Pretoria West Power Station in context to the City of Tshwane CBD. From: City of Tshwane Municipality, edited by Author 2010.

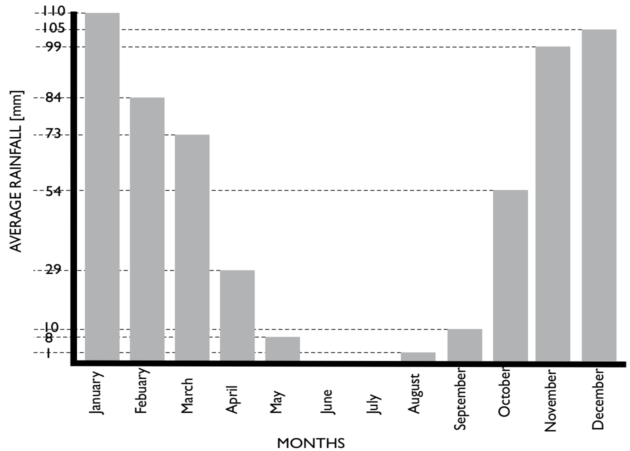


Figure 32. Average rainfall: City of Tshwane: Holm 1996.

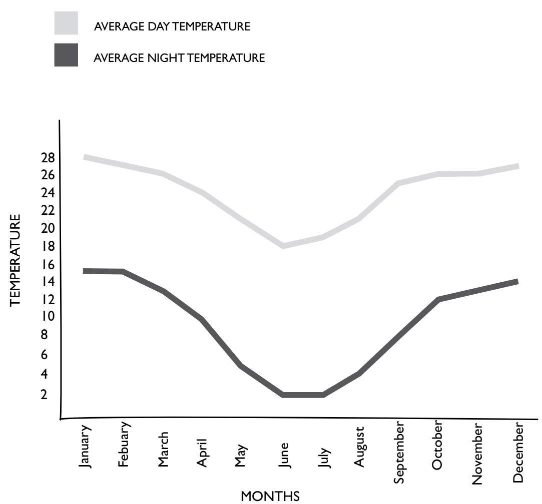


Figure 33. Average day and night temperature: City of Tshwane: Holm 1996.

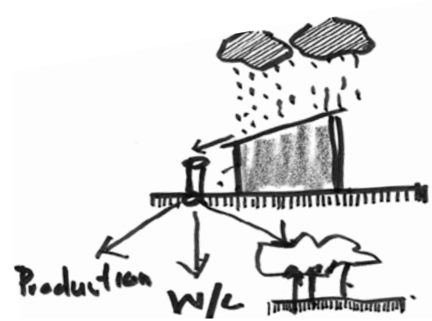


Figure 34. Rainwater harvesting: Author 2010.

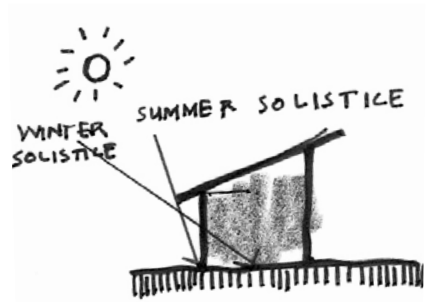


Figure 35. Passive solar design: Author 2010.

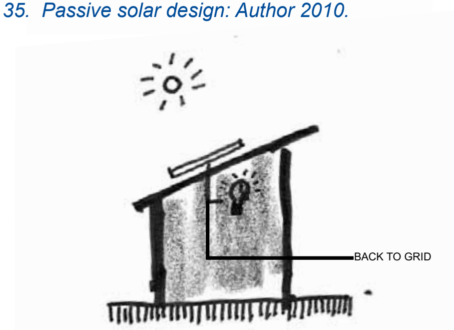


Figure 36. Capturing solar energy: Author 2010.

Climatic zone

General high temperature (fig: 33) and moderate humidity levels characterise the climate of the City of Tshwane. Thunderstorms are fairly common in this area with precipitation rates of up to 100mm per hour. The high average rainfall (fig: 32) per year provides the opportunity for rainwater harvesting (fig: 34). It would be a convenient way to shield entrances from sporadic thunder storms.

The City of Tshwane is situated in a climatic zone with large temperature variations and dry rainy seasons. Provided that the walls and floors give thermal mass, lightweight insulated roofs may be used in this area. External spaces should provide shade in the summer. External surfaces should be light coloured or reflective to minimize solar heat gain in the overheated period (Holm, 1996: 69).

Wind:

Major wind directions: north-east (summer) and north-west (winter). The City of Tshwane is located in a valley, between Magaliesberg, Daspoortridge, Skanskop and Klapperkop so wind is not a very effective energy resource. The structure of the building should be designed in such a way to maximise cross ventilation.

Solar:

Allow sunlight to enter in the winter and screen in the summer (fig: 35).

Vertical sun angle in Pretoria:
summer solstices – 64.24°
winter solstices – 40.73°

Typology:

The City of Tshwane is 1330m above sea level and is nestled between Magaliesberg, Daspoortridge, Skanskop and Klapperkop.

Renewable energies:

Electricity can be generated from the sun, using Photo Voltic(PV) panels (fig: 36). Each PV panel can generate 100 watts per square meter (depending on the type of panel), thus 10sqm = 1kW peak power.

The production depends on the area in which it is installed, i.e. sunlight hours and intensity. In the City of Tshwane, you would get an average of 6,2 hours of sunlight x 1kW = 6,2kWh/day from a 1kW array (Holm, 2010).

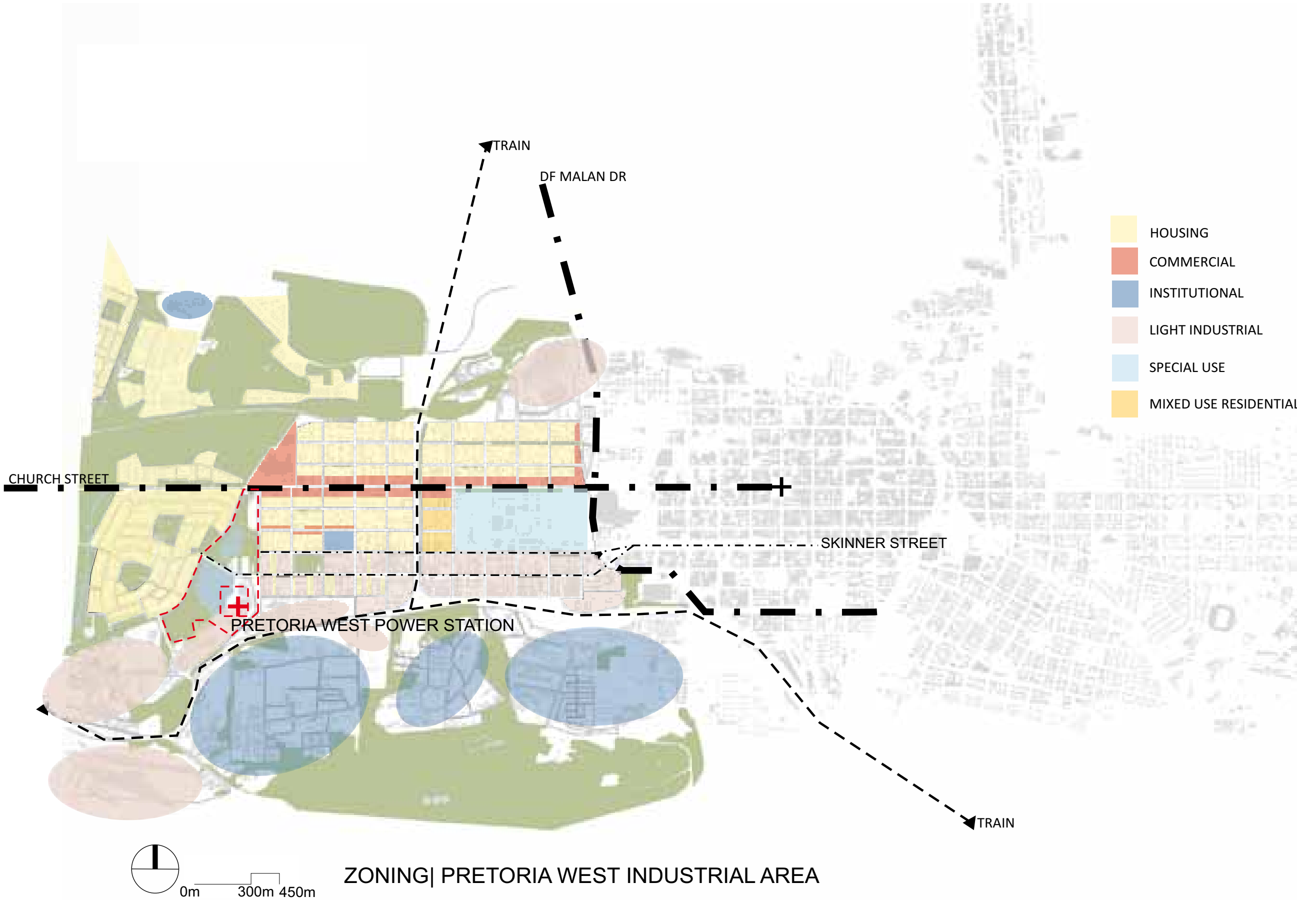


Figure 37. Zoning for Pretoria West Industrial Area. From: City of Tshwane Municipality, edited by author 2010.

Legislative context

Restrictions as per zoning certificate (fig: 37) issued by the City of Tshwane: Details: portion 460 of the farm Skinnercourt, Pretoria Town Planning Scheme, 1974

Pretoria West Power Station site area: 48.3 ha

Bio-diesel plant site area: 3700m^2

Bio-diesel plant: 2650m^2

Bio-diesel footprint: 2177m^2

Density restriction: none

Coverage: 58%

FAR: 1.2

Building lines: street – 3m

SABS classification
Occupancy class: D3 – low risk industrial

Emerging opportunities in the Pretoria West Industrial context

One of the major challenges of sustainability and eco-design is the concept of economy versus ecology. The goal of economy is to maximise wealth and power of its elite, while the goal of ecology is to maximise the sustainability of the web of life (Capra, 2002: 262). The greatest challenge of ecology in the coming decades is to fully and productively integrate the complexity and global scale of human activity into ecological research (Alberti, 2003: 1173) to generate a sustainable way of life. Sustainable development is therefore process orientated, with interconnected mechanisms. For this dissertation the definition of the NSFW (2000) on urban sustainibility will be accepted:

> *It is processes of social contexts. We understand the processes of social and ecological reproduction to be non-linear, indeterminate, contextually specific, and attainable through multiple pathways […] Within the terms of this definition sustainability: it entails necessarily flexible and ongoing processes rather than fixed and certain outcomes; transcends the conventional dualism of urban versus rural, local versus global, and economy versus environment; and supports the possibility of diversity, differences, and local contingency rather than the imposition of global homogeneity.*

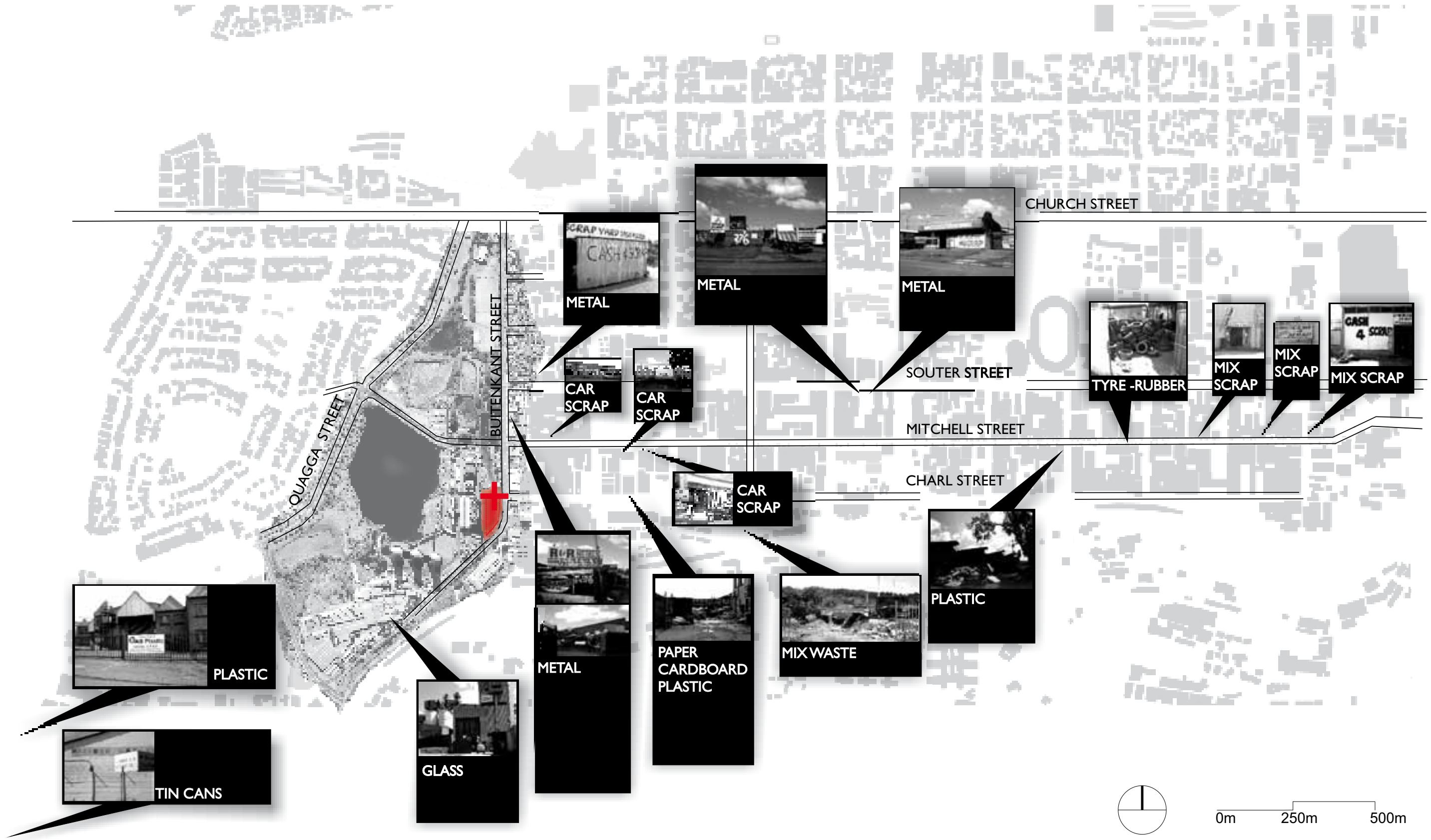


Figure 38. In the Pretoria West Industrial Area, along Charl, Mitchell and Souter Street, seventeen technical harvesting centres have been identified that could plug into the industrial metabolism where products-of-service are generated. Designing products as products of service means designing them to be disassembled and to be part of numerous cycles, generating an industrial ecosystem: Author 2010.

Capra (2002: 234) states that a major clash between economy and ecology derives from the fact that nature's ecosystem is cyclical, where as our industrial system is linear. Nature operates according to a system of nutrients and metabolism in which there is no such thing as waste (Mcdonough, 2002: 262). When waste equals food, it means that all products and materials manufactured by industry, as well as the waste generated in the manufacturing processes, must eventually provide nourishment for something new (Capra, 2002: 234).

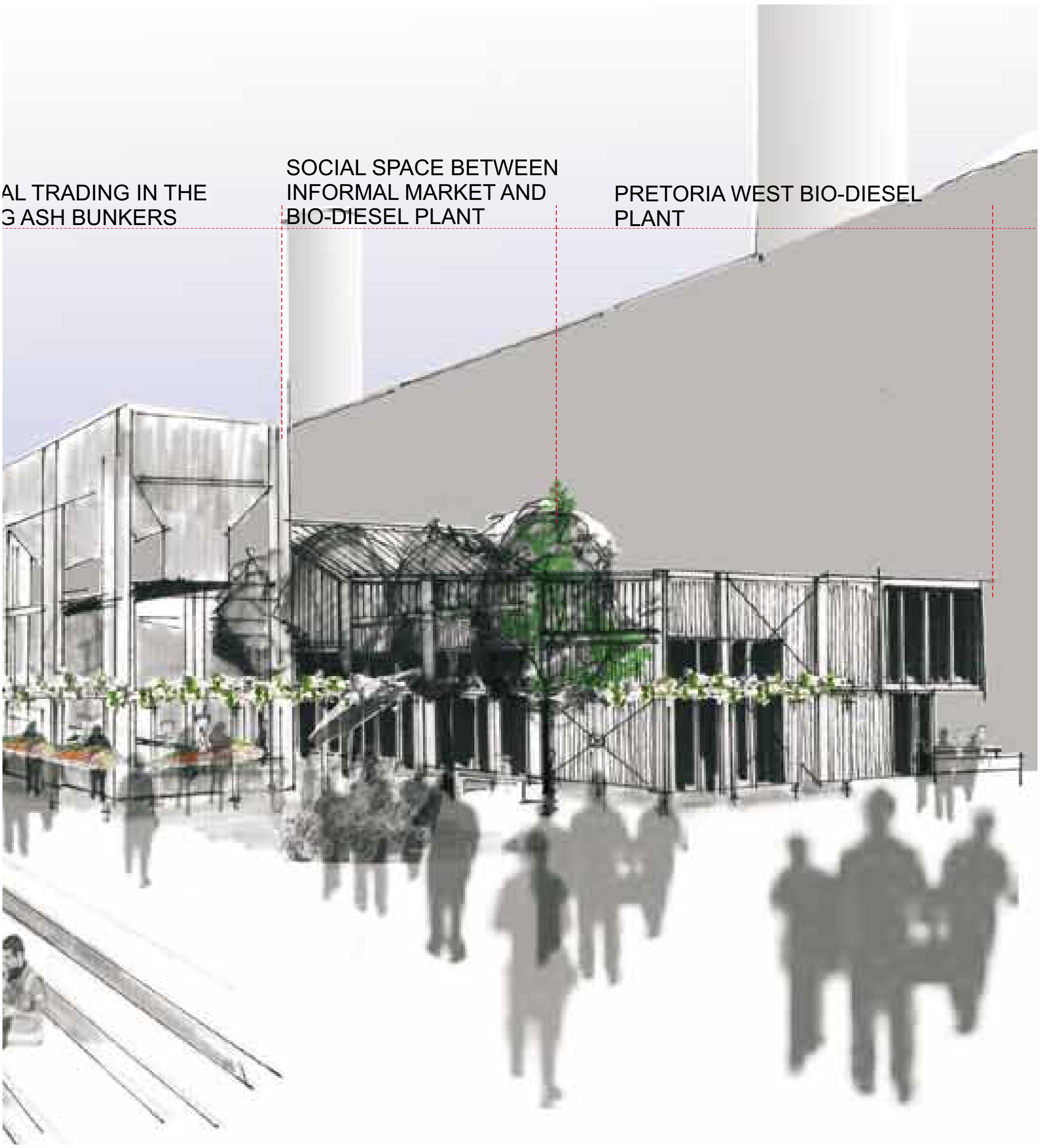
At the moment, our carbon-intensive development model treats the city as a linear system, where the consumption of energy, food, water and environmental resources are disposed as waste (Pieterse, 2010: 17). The average person produce 0.5 ton of manure and 2.5 ton of waste per year (Bjarke, 2010: 52), the City of Tshwane produce 2.5 million ton of waste per year and only 2.5% of this is recycled(Dekker, 2010).

In the book Yes is More, Bjarke Ingels Group Architects argue that one should move away from the fundamental misunderstanding that puts ecology against economy as good versus evil (Bjarke, 2010: 50). They state that ecological initiatives will only prosper in the real world if they work as viable economic models, and business models based on the wearing-down of our natural resources are not viable for long term growth. The idea is to turn the urban environment into an economical and ecological ecosystem which might seem like an Utopian idea/ model, due to its magnitude (Bjarke, 2010: 57).

The focus should shift from economy and ecology competing against each other to both becoming cyclical ecosystems existing in harmony, with energy flowing through both systems. When waste is turned into resources, new revenue streams are generated, new products are created and overall productivity increases (Capra, 2002: 265).

Mcdonough (2002: 110) states that a technical nutrient is a material or product that is designed to go back into the technical cycle, into the industrial metabolism from which it came. For example, a television consists of approximately 4360 chemicals. Some of them are toxic, but others are valuable nutrients for industry that are wasted when the television end up in a landfill. Isolating toxic chemicals from biological nutrients allow them to be up-cycled rather than recycled, to retain its high quality in a closed loop industrial cycle. Thus a sturdy plastic computer case, for example, will continually circulate as a sturdy plastic computer case, or some other high-quality product such as a car-part or medical device, instead of being down-cycled into soundproof barriers or flower pots.

In the Pretoria West Industrial Area, along Charl, Mitchell and Souter Street, seventeen technical harvesting centres (fig: 38) have been identified that could plug into the industrial metabolism where products-of-service are generated. Designing products as products-of-service means designing them to be disassemblable to become part of numerous cycles thereby generating an industrial ecosystem.


AL TRADING IN THE
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INFORMAL MARKET AND
BIO-DIESEL PLANT
PRETORIA WEST BIO-DIESEL
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