

THE AUTONOMOUS TOWN

Penarth, Vale of Glamorgan

"Unless we are guided by a conscious vision of the kind of future we want, we will be guided by an unconscious vision of the kind of present we already have"

The Edge Magazine, 1995 (cited by Barton, 2000)

MSc Theory and Practice of Sustainable Design 2010-11
Sustainable Design Practice
06.06.2011
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The variety of backgrounds illustrates the diverse knowledge, skills and perceptions upon which the report is founded

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Chapter 1
Introduction

"There is a great tradition in urban planning, dating back to the 19th century, of creating "garden cities"- semi-utopian new towns that combine the best aspects of the city and the country" to ensure the highest quality of life for its inhabitants (Ambasz, Green Cities, 2000). Today urban planning is once again shifting towards an enhancement of green spaces and the environment; however the context has now changed. . .

Today this shift is a result of the increasing awareness of the depletion of the world's natural resources and the knock on effects across all three of the pillars of sustainability. This has triggered more community-led response to the pressures of climate change, fossil fuel depletion and increasingly, economic contraction. There are already thousands of initiatives around the world which seek to enable towns and communities to answer this key question: "*how can we make our community stronger and happier as we deal with the impacts of peak oil and economic contraction while at the same time urgently reducing CO_2 emissions*?" (www.transitionnetwork.org)

Many believe that the answer to this question lies in the greater use of local resources and increased resilience this installs. It is increasingly important for towns and communities to develop their resilience to the challenges presented by the resulting social, economic and environmental fallouts of climate change and resource depletion. Social resilience is based upon the ability for positive adaptation despite adversity (Luthar and Cicchetti 2000). In other words it's the ability of communities 'to adapt in the face of external social, political or environmental stresses and disturbances' (Adger 2000). To do this, Penarth must develop three general characteristics: 'the ability to buffer disturbance, the capability to self-organise and the capacity for learning and adaptation' (Carpenter et al., 2001; Trosper 2002).

One approach is to reduce the dependency of the community on external resources and to increase self-sufficiency. This approach relies on the implementation of social and ecological systems that are better placed to withstand shocks and surprises and to revitalise itself if damaged. It offers the prospect of an efficient and sustainable response.

This report outlines our vision of Penarth as the 'Autonomous Town'; a town moving towards self-sufficiency; a town defined by its community engagement in resource management; a town continuing to think globally whilst prioritising and acting locally to ensure an economically, socially and environmentally prosperous community.

Report Outline

This report provides guidance on the journey towards becoming a more sustainable and self-sufficient community. It is not intended to be a narrow set of instructions for achieving a singular outcome. Instead it is intended to be flexible so as to allow the users to interpret and implement the directions in ways that are appropriate to the ever changing complexities of the surrounding environment. Allowing this flexibility will allow Penarth to develop and implement the correct strategies for successfully increasing Penarth's resilience to anthropogenic climate change. It also enhances the ability to ensure all aspects of the community are considered in tandem, not

as isolated issues.

Climate change literature tends to split the response options that are potentially available to Penarth's decision makers into adaptation or mitigation. Adaptation refers to '*the actions that people take in response to, or in anticipation of projected or actual changes in climate, to reduce adverse impacts or take advantage of the opportunities posed by climate change*'. Mitigation however refers to '*actions taken to prevent, reduce or slow climate change, through slowing or stopping the build-up of greenhouse gases in the atmosphere*' (Hulme 2002). Our vision of the 'Autonomous Town' incorporates both responses. Making the most of local resources, whilst maintaining ties with the surrounding world, not only provides the flexibility to adapt but also allows for the required levels of resource efficiency and waste reduction to mitigate.

Figure 1 illustrates the progression of the report as it moves from introducing 'The Vision' and the basic principles upon which it is founded to the 'Toolkit' and its intended purpose and a demonstration of how to use it.

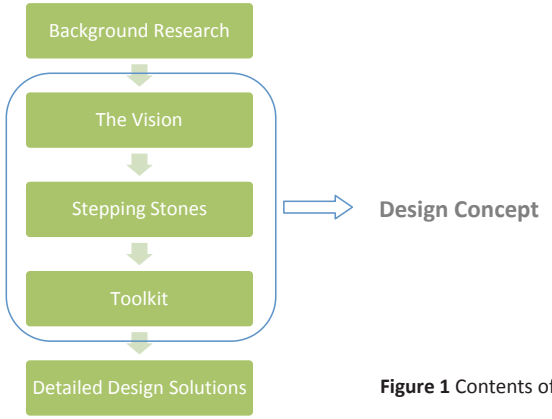


Figure 1 Contents of Report

Background Research:

Background Research is dedicated to establishing the concept of autonomy and self-sufficiency. It explains why it is important for Penarth to install some of the underlying principles of these concepts into its plans, policies and strategies going forward.

The Vision:

Once the stage has been set the report begins to outline 'The Vision' and the common principles which must be adhered to if Penarth is to achieve it.

Stepping Stones:

The scale of the journey towards 'The Vision' is so great that Penarth is likely to require a "step change" rather than incremental improvement alone. A step change which in turn must be divided into a number of "stepping stones" so as to provide something of a "breathing space" whilst the community readies itself for the significant changes to come. This section therefore provides three stepping stones, and their associated goals, to break up the journey into manageable steps.

Toolkit:

The toolkit is designed to take the reader through the stepping stones and provide guidance on how to achieve each of the goals. The generic goals within each stepping stone should be interpreted slightly differently for each topic and therefore the goals become bespoke. This report provides two examples of developing these bespoke goals and provides the associated toolkit to achieving them. The two topics selected are Food and Transport.

Design:

Following on from the two examples mentioned above the report concludes by illustrating how the toolkits can be used to develop designs for relevant aspects of the community through the stepping stones approach. For both food and transport designs have been developed for the first stepping stone across a portion of Penarth. Going further the report then provides a design right up to the final stepping stone at a particular location to illustrate how the topics should be designed to complement one another.

A community workshop held on the 9th of April informed the design process by allowing members of the community within Penarth to map both existing and potential future locations of the various aspects of 'The Vision'. The locations identified within the design, for food and transport, reflect these findings. Please see Appendix B to view the posters used for the workshop and pictures of the community feedback.

Holistic Approach to Sustainability

Holistic sustainability promotes a more synergistic understanding of the environmental, social and economic factors of a certain location and how each of these factors work in tandem to create a more sustainable community (www.klingmann.tumblr.com). These factors are generally considered to be the three pillars of sustainability. A holistic approach uses each of the pillars together to develop projects that make use of surrounding resources and promote the growth of strong, integrated and healthy communities which live within the limitations afforded to them by the surrounding environment.

This report focuses on providing Penarth with the necessary guidance to increase its sustainability through the use of local resources and to build resilience to the oncoming impacts of climate change and resource depletion through greater levels of self-sufficiency. However, as stated in the first part of the introduction, this approach is also aimed at creating an economically, socially and environmentally prosperous community within Penarth. Each topic, stepping stone and goal is directed towards this very aim and therefore to achieving holistic sustainability. Local cultures and communities are developed and strengthened so as to enhance the interesting and unique aspects of Penarth. Resources already in place are promoted, reinforcing Penarth's natural assets and cultural heritage as a historic welsh town – '*The Garden by the Sea*'.

The holistic approach to sustainability promoted in this project brings together disparate social aspects of the community so that they support each other and support development and growth. Increasing the use of local resources, from food and technology to the people themselves, not only reduces CO_2 emissions but also boosts local business, which in turn supports the community by building a strong economic foundation. Penarth will become economically sustainable, moving away from the importation of homogenous chains and allowing the local culture to flourish. The interactive connection between people and environment as people learn and develop the necessary skills to produce, share and trade resources will go a long way to creating environmentally healthy living.

*** Please note**
Although the stepping stones and associated goals are designed to allow the promotion of all three of the pillars of sustainability, this will only be achieved if the toolkit is prepared, and later implemented, to reflect this. This responsibility lies with Penarth and the communities desire to achieve 'The Vision'.

Chapter 2

Background Research

The Autonomous Town Project stimulates curiosity and interest, but at the same time raises many questions as well:

What is The Autonomous Town?

and

What makes Penarth an Autonomous Town?

These fundamental questions have led us to establish a theoretical framework (Figure 2) that is providing the background knowledge to our design project. We are aware that "The Autonomous Town" is probably a quite unrealistic approach in the modern world nowadays, however, we are keen on finding out how far we can push this idea of a city that has *"reduced the dependency of the community on external resources and to increase self-sufficiency […]"*. We are eager to investigate to what extent can Penarth become *"a modern town that continues to think globally whilst prioritising and acting locally."* (The Autonomous Town, Project Brief, 18.02.2011)

The theoretical framework (Figure 2) consists of three main themes: (1) *Background*, (2) *Initiatives&Concepts* and (3) *Live Project*. The first theme, *Background,* focuses on the idea of the "ideal city" and how that ideal has changed over the past century. The second theme, *Initiatives and Concepts,* looks into current developments such as Transition Towns, One Planet Initiative, Eco-Towns and compares them with urban concepts like the Ecosystem approach or the Metabolism Model. The third theme, *Live Project*, evaluates episode one, summarizing strengths and weaknesses about the economical, social and environmental context of Penarth today.

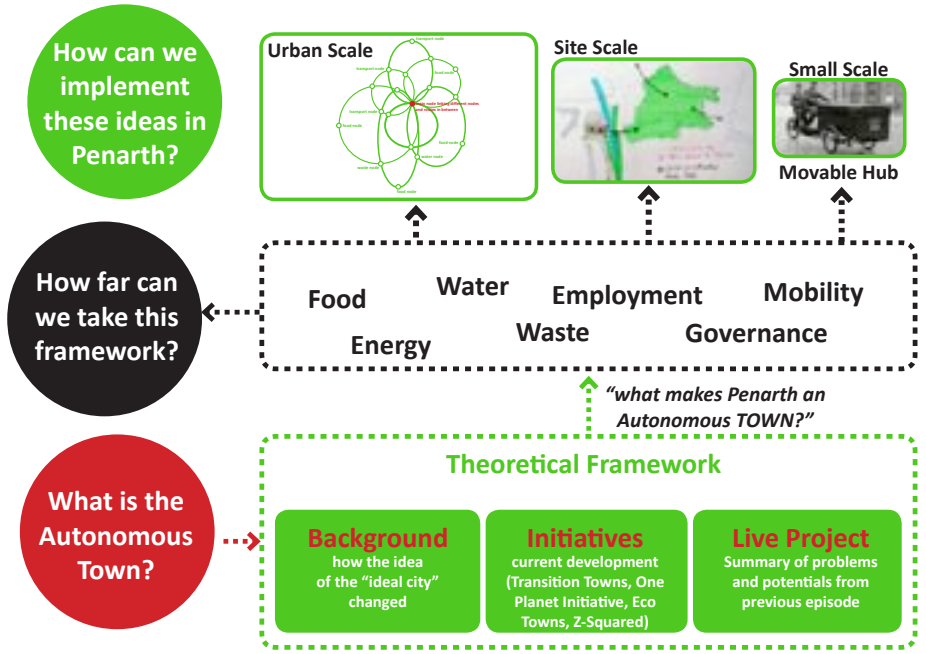


Figure 2
Theoretical Framework

This theoretical framework provides a solid foundation for our project. It enables us to gain sufficient background knowledge in order to understand the breadth of *What makes Penarth an Autonomous Town?* Moreover, it allows us to define topics which are relevant for a small town like Penarth

that wants to increase self-sufficiency: Food, Water, Waste, Energy, Transport, Employment and Governance. They all interrelate with each other which will be explained in detail in chapter 3.

The implementation of our theoretical ideas into a real life situation is influenced by the three pillars of sustainability where social, economical and environmental factors served as a guideline during the complete process of this project from the concept design (chapter 3 and 4) to the detailed design phase (chapter 5).

In order to find sustainable solutions for Penarth, we need to fully understand how cities work and function, socially, economically and environmentally speaking. Due to this, we looked back and searched for urban developments of the 20th century.

2.1 The Ideal City

Which way of living is the right one? And how does urban planning and architecture have an influence on this?

Throughout history, architects, urban theorists and planners have always asked themselves these fundamental questions. However, the answers have not always been the same. Attitudes are constantly changing as they are very much influenced by the spirit of time.

When starting this project we asked ourselves *why people depend so much on cars? Why are cities so dominated by them? Why is urban planning still investing in the construction of new highways/car parks instead of focusing on sustainable transport?* Furthermore, we asked ourselves *why a town like Penarth does not make more use of its own resources* ("garden by the sea" with a large amount of green spaces, Alzughabi et al. 2011)? *Why do they make themselves so dependent on importing food from around the globe, if food can grow infront of their doors?*

These fundamental research questions brought up the Autonomous Town Project representing *"a modern town that continues to think globally whilst prioritising and acting locally."*

The following sections will discuss these questions while diving into three great urban utopias of the 20th century, the Garden City, the Broadacre City and the Radiant City. Although they have been considered to be utopian perspectives, they have shaped the modern (European) city.

2.1.1 Urban Utopias of the 20th century

Why is the modern city of today more dependent on cars than on public transport and active modes such as cycling or walking?

"The city of the late nineteenth, early twentieth century was in a process of transformation. […] the automobile assailed historic street patterns, causing the equivalent of gridlock and a dangerous situation for pedestrians. In sum, industrial capitalism was destroying the historic city as well. Urban theorist have been grappling, since that time, with how to reinvent the city in ways that will benefit humankind and nature." (Kennedy, 1998).

Technological innovations of that time have very much influenced our modern city of today. The car, the train, the airplane, the radio, the TV, the skyscraper have not only shaped our modern society, they also had a major impact on contemporary urbanism and architecture (Fishman, 1994).

Ruano (2000) argues that *"**The car has dominated urbanistic thinking** for more than half a century. Cars have **colonized the public realm**, deprived open space of human scale and **dehumanized entire communities**"*

Urban theorists were influenced by *"the power and beauty of modern technology and the most enlightened ideas of social justice"* (Fishman, 1994). Architects like Howard, Wright and LeCorbusier were proponents of these ideas and kept searching for the new "ideal city" pretty much all their lives. Although all three of them followed different approaches (Figure 3), their ideas were very much influenced of that time because *"all three based their ideas on the technological innovations that inspired their age: the express train, the automobile, the radio and the skyscraper"* (Fishman, 1994).



Howard's
"Garden City"
plan for moderate **decentralization** and cooperative socialism. Wanted to build wholly **new cities in the midst of unspoiled countryside**."



Wright's
"Broadacre City"
"Wanted the whole US to become a nation of individuals. Decentralization beyond the small community to **the individual family home"** who would grow their own food on their one acre plot of land."



Corbu's
"The Radiant City"
Dense metropolis Industrial cities were not yet dense enough. **Skyscraper-vertical streets.**

Figure 3 "The Ideal City" of the 20th century

Ebenezer Howard's *"Garden City of Tomorrow"* (1898)

Howard's plan for a *"moderate decentralization and cooperative socialism"* (Fishman, 1994) seeked to build completely new cities in the middle of the countryside. His so-called garden cities were restricted in size (max. 30.000 people), with a circular plan (the most efficient layout) and enclosed by a "greenbelt". He did not aim to serve some metropolis as a "satellite town" or "bedroom town", his main idea was to develop a theoretical model of small scale cities that are functioning independently from the great cities. Additionally, Howard wanted to ensure that everyone would be within walking distance to work.

- moderate decentralization
- cooperative socialism
- walking distance to work

Frank Lloyd Wright's *"Broadacre City – The Disappearing City"* (1932)

Wright's idea about the *Broadacre City* was mainly based on individualism and decentralization. He *"wanted the whole US to become a nation of individuals. Decentralization beyond the small community to the individual family home who would grow their own food on their one acre plot of land."* (Fishman, 1994). The *Broadacre City* is more extreme than Howard's plan of the Garden City. His book, *The Disappearing City*, proposed a network of superhighways creating links between the dispersed elements of society. The individual cars made it possible to live this lifestyle.

- Individual family home

- Decentralization of communities
- Everyone has the right to as much land as he can use
- Food production on own plot of land
- Promotion of individual cars

Le Corbusier "The Radiant City" (1930-35)

In the Radiant City, LeCorbusier proposed an urban theory, which went in the opposite direction. He argued that industrial cities of that time were not yet dense enough. By introducing high-rise, pre-fabricated apartment blocks, *les unites*, located in parks inside the cities, he wanted to densify the urban pattern. Working, living and free time were strictly separated from each other. The "urban" life was taking place inside not outside the building. Elevators, corridors and staircases inside the buildings were functioning as vertical streets.

- High rise "standard housing" (Kennedy)
- Appartment block functioning as urban community
- Big scale (buildings, open spaces, streets, highways)
- Densify the urban pattern

To summarize, all of the three shortly introduced concepts represent a new zeitgeist (spirit of time) of the 20th century. New technological innovations shaped those ideas. Although considered to be utopian, to a large extend these ideas have influenced contemporary urbanism until today. None of them seeked "the amelioration of the old cities, but a wholly transformed urban environment. This transformation meant the **extensive rebuilding** and even **partial abandonment of the cities of their time**." (Fishman, 1994). Howard went even further: ***"The old cities have done their work".***

Nowadays, the approach is different. Although architects and urban planners are still searching for the "Ideal City", the zeitgeist has changed. Climate change, depletion of fossil fuels, the urgent need for renewable energy technologies are just a few challenges to be mentioned. Cities, once dominated by cars, will have to adapt to a new lifestyle eventually.

2.1.2 Urban Environmentalism – "from ideology into economic reality"

*"**Thirty years ago**, environmentalism in Germany was still on the "hippy fringe"; its application to building, along with its **"woolly jumper brigade"** exponents, was regarded with certain **condescension**. Since then, sustainable development has moved beyond ideology into economic reality. For many companies today, it is the force behind a modern and innovative image."* (Gauzin-Mueller, 2002, Pp.19)

In 1990 Eckhart Hahn proposed a first set of principles for sustainable development which was published in the "**Okologischer Stadtumbau"** (enlg. transl. "ecological urban restructuring"). This set consisted of the following subjects:

- **Participation and democratization**
- **Structuring through networks**

- **A return to the natural world**
- **Controlled urban density and mixed development**
- **Ecology and economy**

The implementation of this set has positive consequences for daily life:

- **A cleaner, less noisy and less polluted city**
- **Traffic priority given to pedestrians and cyclists**
- **More welcoming public spaces**
- **Enhanced community life and sense of civic pride**

Over the past 20 years, these subjects have become more important in urban planning. Moreover, it has triggered the beginning of urban environmentalism. Many initiatives and theoretical concepts have used this set of principles as foundation, which will be discussed in the following section current approaches to urban sustainability (2.2).

2.1.3 From the Autonomous House to the Autonomous Town?

Keeping this set of urban environmental principles in mind, we began to question what *autonomy* means in the urban context? Very often the term is related with topography, borders or economic-political territories (Figure 4). Originally Greek (*auto "self", nomos "law"*), autonomy means: ***"one who gives oneself his own law".*** Usually this concept is found in moral, political and bioethical philosophy, however our approach is based on the sustainable urban context.



Figure 4 "Autonomy" related with topography, borders ad economic-political territories

The Autonomous House - Living off the grid (1975)



Figure 5 "The Autonomous House"
(source: Vale, 2000)

Thirty-six years ago, when environmentalism was still in its infancies and ecological ideas were regarded as green ideologies of only a small group (Gauzin-Mueller,2002), the architect duo Robert and Brenda Vale developed strategies of a sustainable built environment. They published their ideas in "The Autonomous House" (Vale, 1975) in which they focused on sustainable buildings that have no negative impact on the earth. Almost 20 years later, in the beginning of the 90's they realized this autonomous house in Southwell, Midlands.

This highly insulated and well sealed house with triple glazing and integrated PV's on the roof is similar to energy efficient housing like the Passivhaus standard. However, one main feature is really unique. The autonomous house functions off the grid, which implicates that the building generates its own energy and collects its own water.

Keeping their ideas in mind, we began to question whether it is possible to translate this approach into the urban scale. To what extent can a town become self-sufficient? Is it possible to act independently from the global market in terms as food, energy, water, mobility or employment? Tayler (in Barton, 2000, p.19) asks *"How feasible is it constructing such local forms of life…when most people have ceased to live much of their lives locally?"*

Furthermore, Desai (2010) argues that the concept of *"The Autonomous House*" cannot be transferred into the urban scale. In his opinion *"At larger scales and higher densities, it is better to adopt an approach based on providing sustainable infrastructure."*

In the next section we discuss several current initiatives and urban concepts keeping in mind in particular one of our initial research questions: How feasible is the Autonomous Town?

2.2 Current approaches to urban sustainability

Nowadays diverse initiatives are evolving in the field of urban development pursuing the aim of sustainability, building resilience to climate change and self-sufficiency. They are being applied to real settlements and communities where social, economical, cultural and environmental issues are tackled as a whole, in relation to each other. We have looked at some of those initiatives in order to establish a solid foundation for our own bespoke proposal in Penarth. Those initiatives are briefly explained in this chapter, not in a comprehensive way, but highlighting the aspects that differentiate them from others. However, there are some trends that remain constant. In order to explain that, fundamental changes in the realm of urban design and development, apart from the introduction of the concept of sustainability, should be acknowledged. They allowed the shift from the designer's utopias explained in the previous chapter to these somehow holistic and realistic initiatives. The concepts that have inspired those changes are also included in this chapter.

2.2.1 Concepts

The Ecosystem Approach (Lynch 1981, analysed in Barton 2000)

In comparison to the disaggregated process of the urban development in the late 20th century, when different subjects (i.e. transport, dwellings, leisure, energy, water...) were 'planned' independently from each other, and usually with opposed approaches, the urban theorist Kevin Lynch presents in his work *Good City Form* (1984, originally published in 1981 as A Theory of Good City Form) the concept of the ecosystem to explain the city, after evaluating and eventually rejecting contemporary accepted concepts such as '*the city as a machine for living in'* or '*the city as an organism'*.

This theory gives a solution to the traditionally confronted positions of designers and researchers. It provides a 'scientific' alternative to metaphoric concepts designers usually rely on, but at the same time avoids the reductionist method of researchers that reinforces an atomized view of the world.

The Ecosystem Approach,

> *"applied to human settlements, recognizes the complexity of an **open system** with living and non-living elements, **cyclic processes** and a complicated **network of relationships***" (Barton 2000)

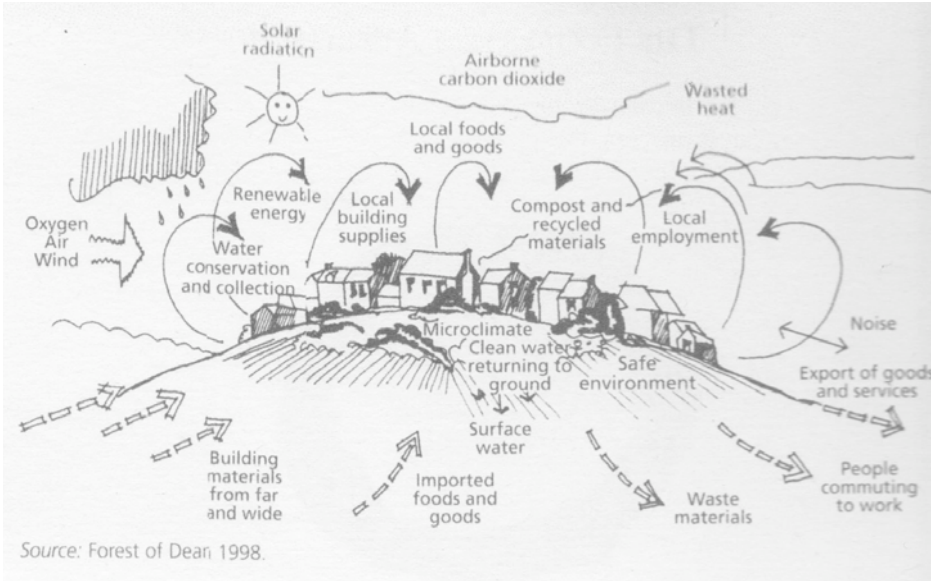


Figure 6.The Ecosystem Approach (source: Barton, 2000. Chapter 6)

As explained by Barton (2000 p 87), it is not an idealistic image, it is a useful way of describing settlements at scientific level as well as an effective tool for designers and politicians in their explanatory and normative tasks.

The principles of this new ecosystem approach follow the **premise** that it is positive to reinforce local self-sufficiency and autonomy, other things remaining the same. This premise does not advocate for settlements to be closed systems, but to pay attention and foster resource flows and cycles. Despite what a first impression could suggest, this concept is not only about physical systems, it is about the human habitat and therefore the **focus** is on human needs. When combining the ecosystem approach with the Brundtland definition of sustainable development, and widening the scope to cover environmental interests, the specific **purpose** of the approach is to enhance

the quality of life and the natural ecosystem at the same time (Barton, 2000. Chapter 6):

> *"Sustainable development is about maintaining and enhancing the quality of human life – social, economic and environmental – while living within the carrying capacity of supporting ecosystems and the resource base"*

The basic principles of the ecosystem approach applied to human settlements are as follow:

- increasing Local Autonomy
- Increasing Choice and Diversity
- Responsiveness to Place
- Connection and Integration
- Flexibility and Adaptability
- User's Control

The ecosystem approach, with a comprehensive perspective over a town such as Penarth, would pursue the reduction of its ecological footprint making use of local resources as much as possible, providing opportunities to local people, linking different local neighbourhoods and areas, such as the Marina or the Pier, and at the same time, recognizing the interrelation with wider areas and communities, such as Vale of Glamorgan or Cardiff, to boost a complex, robust and rich culture. This approach would improve not only the quality of life of its inhabitants but also their natural and physical ecosystem.

The Metabolism Model

Not all authors reject the idea of 'the city as an organism', since the 60's many theorists have utilised the metabolism model to describe the city in terms of inputs and outputs (Newman 1999).

Authors such as Rogers et al. (1998) or Girardet (2006), and more recently Desai in his book "One Planet Communities" (2010), argue that most of the cities remain in the post-second world war culture of disposal and obsolescence with a linear (as usual) metabolism, taking in nutrients, fossils fuels and other natural resources while producing large amount of CO_2 and waste in all its forms (gas, liquid and solid) that mainly end up in landfills.

Communities should shift towards a circular metabolism, by making them aware of resource depletion and potential of recycling, and with the infrastructure to support it. In those communties nutrients, waste, energy, water... would be reused, recycled, transformed,... in cycles within the city, increasing the outcome of resources utilised and reducing the ultimate waste output. This circular metabolism has been applied in the Z-'squared' or 'zero carbon zero waste' community project, by Foster and Partners for BioRegional (Desai, Durey 2004)

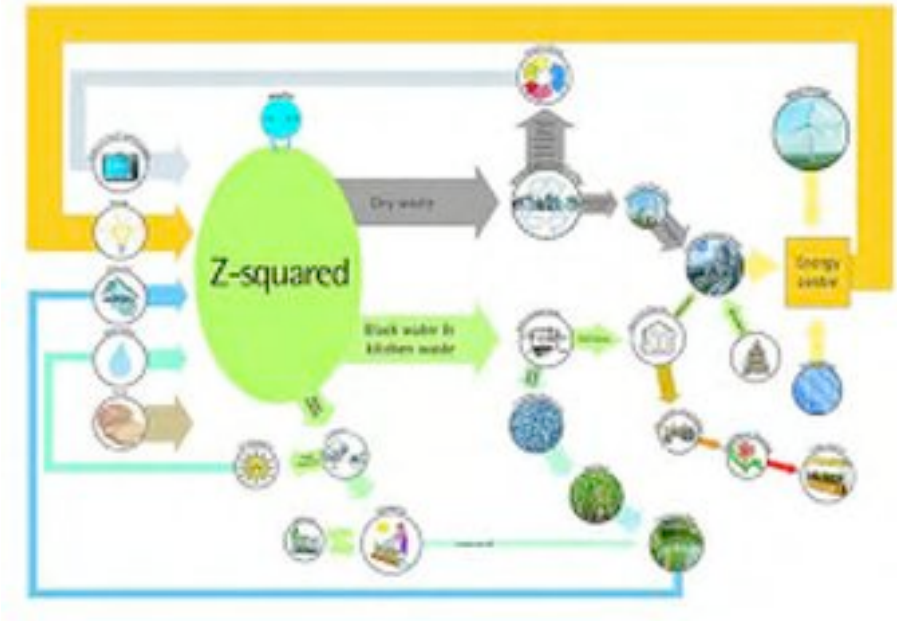


Figure 7. Metabolism of Z-squared (source: Foster and Partners in Desai, Durey 2004)

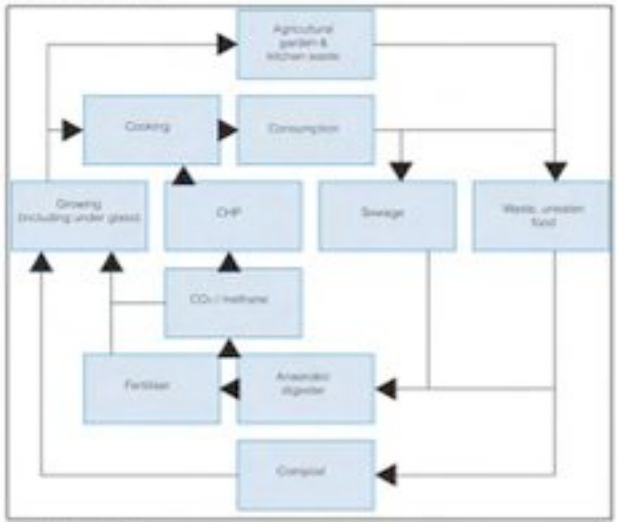


Figure 8. Circular Food System (source: Desai, Durey 2004)

Heading back to previous development of the urban metabolism concept we come across Peter Newman that in 1999 published his article *Sustainability and the city: extending the metabolism model.* Accepting the, at that time already extended, ecosystem approach Newman aims to answer the following question:

> *"How does a city define its goals in a way that enables it to be more sustainable? How do you make a systematic approach that begins to fulfil the global and local sustainability agenda?"*

In the 'Extended Metabolism Model of the City' the basic metabolism concept is widened to include dynamics and livability of settlements:

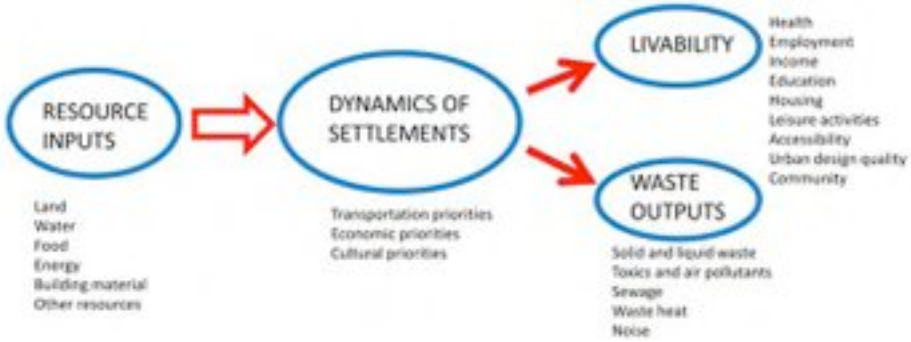


Figure 9. Extended metabolism model of the city. (source: Authors' reproduction from Newman, 1999)

The metabolism model is a biological image of the processes that resources pass through to be converted into products and waste. This can be recycled by applying energy, but eventually all materials will end up as waste, either CO_2 or other forms, that can not be recycled any more without great energy inputs, hence to reduce output impacts, resource inputs have to be reduced

(Newman, 1999). The extension of this model takes into account the fact that the city is a place for people, it is about creating opportunities for people, linking with the idea of human ecosystems and the introduction of economic and social subjects along with the environmental one by including the concept of livability. In Newman's words:

> *"It is possible to define **the goal** of sustainability in a city as the **reduction of the city's use of natural resources and production of wastes** while simultaneously **improving its livability**, so that it can better fit within the capacities of the local, regional and global ecosystems."* (Newman, 1999)

Two main ideas can be extracted from this metabolism model to be applied in our project in Penarth:

The implementation of circular systems and flows of materials, energy etc within the town will increase the payoff of resources utilised, reducing the waste output. This could be, for example, reuse of rain water, compost of food waste to enrich soil, anaerobic digestion of organic waste obtaining gas for fuel and fertiliser, recycling material...

If the resource inputs are reduced, which is possible once the benefit obtained from them is increased, the ultimate waste output and its impact will be reduced as well

The Permaculture approach (Permanent agriculture)

Although inherently related to agriculture and the sustainable production of food as a new form of organic agriculture, this concept is founded in a series of basic principles applicable to any kind of process or activity *"in a world of less energy and resources"* (permaculture principles.com) and in fact included in some of the initiatives explained below. This principles are:

- Observe and interact
- Catch and store energy
- Obtain a yield
- Apply self regulation and accept feedback
- Use and value renewable resources and services
- Produce no waste
- Design from patterns to details
- Integrate rather than segregate
- Use small and slow solutions
- Use and value diversity
- Use edges and value the marginal
- Creatively use and respond to change

Whichever the system, it is designed while thinking about how each part of it effects each other, and how links and partnerships can be made to maximise benefits. To begin with, much effort and thought is needed but as it develops

the system will regulate and maintain itself. In Hemenway's words (2009):

> *'focus less on objects themselves and more on the careful design of relationships between them – interconnections – that create a sustainable whole'*

This particular approach will be further explained in following chapters, when the subject of food production is developed in more detail. But the main idea extracted from this concept to apply in Penarth is the relevance of relationships and interconnections between different entities and realms to maximise benefits and achieve a system that auto-regulates and maintains itself, increasing its resilience.

The concepts presented here provide us with, on one hand, useful tools to tackle our own work in Penarth and, on the other hand, a base knowledge to better understand the initiatives explained below, which in their turn will help us to shape our bespoke proposal for the town.

2.2.2 Initiatives

Late 20th century initiatives

In the late 20th century several initiatives stress the importance of human-scale and locality for a more sustainable lifestyle. These are some examples of that approach.

The **Eco-Villages Network**, firstly within a rural context, is based on autonomy of the community that relies on local resources for food, energy and water and the relationship with the environment with a permaculture approach. In 1998, this initiative was first recognized as an excellent model of sustainable living by the United Nations, among its top 100 listing Best Practice. (Global Ecovillage Network website)

The Network has expanded since then to a global dimension, including rural and urban communities, members and partners worldwide.

In 1995 the **Freiburg Statement on New Urban Neighbourhoods** emphasize the *"care and culture of human beings"* as main purpose of a new development (Barton, 2000 pp.11-12), highlighting the following ideas in its principles:

- heterogeneous social composition, with special attention to vulnerable groups
- human-scale environment providing pedestrian areas to facilitate 'good social life'
- mixed use in a compact, low rise urban fabric

- participation process for planning and design of the area
- architectural identity rooted in the collective memory of the local community
- active transport network within the area and linking with the rest of the city, discouraging motorized transport
- ecological and social responsible development principles, cutting energy use and pollution

These aspirations towards locality and convivial communities are reproduced by different schemes worldwide, however, as Barton (2000) points out:

> *"We need to acknowledge powerful tendencies in the modern world which run counter to the project of creating local communities or even forms of life in which people live out much of their lives within a given locality"*

Therefore, from the initiatives explained so far, rather than extracting the conclusion of creating local communities, what it is important to apply in Penarth is the idea of working at local level. This should be done without forgetting wider forces and impacts at global level. That is the idea expressed by the well-known slogan widely used and adopted by the Summit in Rio de Janeiro in 1992, which promoted the concept of Local Agenda 21

"Think globally, act locally"

Transition Initiative

The Transition Initiative was launched by R. Hopkins while working on an academic project with his permaculture students, put first in practice in Kinsale (Cork, Ireland) in 2005, and later on in his home town in Totnes (Devon) the UK's first Transition Town. This initiative clearly focuses on overriding problems, bigger than the community itself, trying to answer the following question:

> *"for all those aspects of life that this **community needs** in order **to sustain itself** and thrive, how do we significantly **rebuild resilience** (to mitigate the effects of Peak Oil and economic contraction) and drastically **reduce carbon emissions** (to mitigate the effects of Climate Change)?"* (Transition towns)

The objective of the Transition Initiative is to develop an Energy Descend Action Plan (EDAP) to tackle the issues of Peak Oil and Climate Change. This objective is developed by the community that adopts the Transition Initiative in **four phases:**

- **1st** an initiating group develops a programme of awareness raising, hooking up with existing groups.
- **2nd** the group becomes larger, it self-organises in groups in all the key areas: food, transport, energy, housing, education, textiles etc, and creates practical projects
- **3rd** Energy Descent Action Plan (EDAP) process. This plan consist on a community-visioned and community-designed 15-20 year plan

including a coordinated range of projects in all the key areas, with the aim of bringing the community to a sufficiently resilient and low CO2-emitting state.

- **4th** implementing the EDAP, sharing successes and failures with other Transition Initiatives that are following the same path.

More than 70 official Transition Towns and many more that take the initiative as example for development exist nowadays, providing a wide range of case studies.

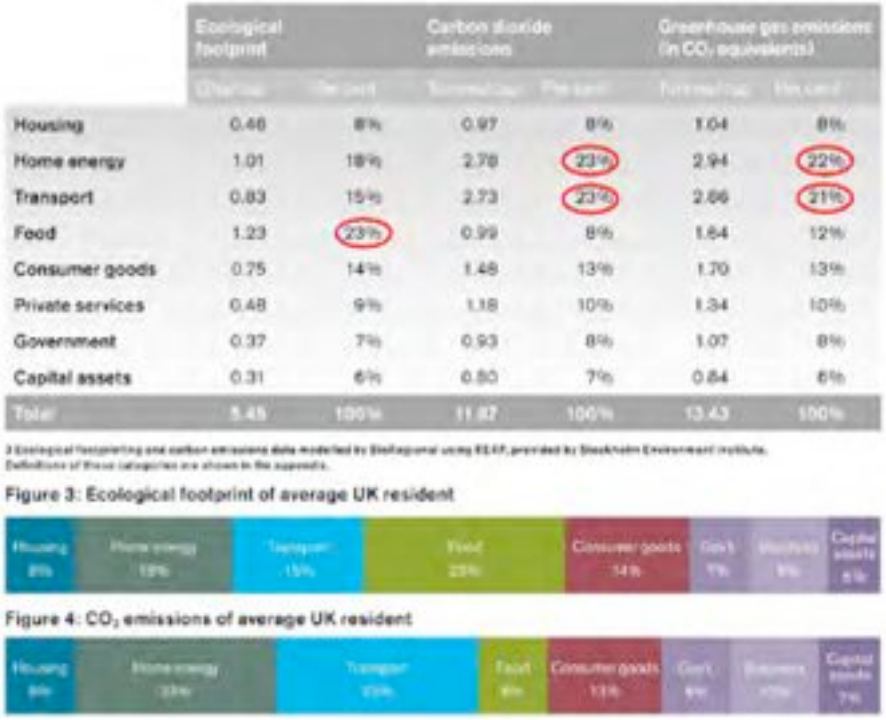
From our analysis and what we know about the Gwyrddio Penarth Greening group (GPG), we consider that a similar process can be applied to the community of Penarth, being this nowadays in between the first and second phase, with some groups already created and working in some areas, while others are planned for development. Our work could hopefully boost the evolution of the project, pushing the community towards the third stage by designing a vision for the future of Penarth towards which the community can work.

What makes an Ecotown (BioRegional and CABE, 2008)

The document What Makes an Eco-Town, published in 2008, stresses the relevance of an adequate infrastructure to provide the framework in which a sustainable lifestyle is encouraged

> *"An Ecotown needs to offer **sustainable infrastructure and choices** that will allow residents to reduce the CO2 emissions of their homes, home energy use, transport, food and consumer goods"*

The following table extracted from the document details the Ecological and Carbon Footprint of an average UK resident.



	Ecological footprint		Carbon dioxide emissions		Greenhouse gas emissions (in CO_2 equivalents)	
	Gha/cap	Per cent	Tonnes/cap	Per cent	Tonnes/cap	Per cent
Housing	0.46	8%	0.97	8%	1.04	8%
Home energy	1.01	18%	2.70	23%	2.94	22%
Transport	0.83	15%	2.73	23%	2.66	21%
Food	1.23	23%	0.99	8%	1.64	12%
Consumer goods	0.75	14%	1.48	13%	1.70	13%
Private services	0.48	9%	1.18	10%	1.34	10%
Government	0.37	7%	0.93	8%	1.07	8%
Capital assets	0.31	6%	0.80	7%	0.84	6%
Total	5.45	100%	11.87	100%	13.43	100%

Figure 3: Ecological footprint of average UK resident

Figure 4: CO_2 emissions of average UK resident

Figure 10. Ecological footprint and carbon emissions breakdown. (source: Bioregional 2008)

These numbers help us in our process to decide which issues should be tackled first in Penarth, according to their higher impact. From the table can be drawn that 'home energy', 'food' and 'transport' are the categories that have more weight on the ecological and carbon footprints of the average UK resident. Of course, this conclusions should be contrasted against the analysis undertaken in Penarth, making sure the relevance of each section.

One Planet Initiative (BioRegional 2011)

Recently, January 2011, BioRegional Development group, the same organisation that launched the document "What makes an Ecotown" explained above, develops the One Planet Initiative, out of their experience in BedZed eco-village. They set a series of ten International Targets that serve as guiding principles in order to achieve three environmental aims *"Sustainable Ecological Footprint, Sustainable Carbon Footprint and Clean (non polluting) activities"*. These guiding principles point out the subjects that have to be considered when tackling sustainability in a community:



Figure 11. Guiding principles. (source: Bioregional 2011)

What this list reveals, similarly to the document previously presented, is that in order to achieve sustainability a wide range of aspects should be tackled. If our aim is to improve the sustainability of a place, in this case Penarth, focusing on one and only subject may not be enough or even feasible if we recall the *"complicated network of relationships"* observed in the ecosystem approach, or the *"focus on interrelations"* between different entities that the permaculture approach highlights as important *"to create a sustainable whole"*.

Again, before taking this list as it is, a comparison with the actual issues detected in Penarth is necessary, in order to tailor a bespoke project for the reality of the town.

2.3 Penarth – Summary of Episode 1

Complementary to the academic foundation the specific problems and potentials of Penarth frame the basis for our work. The conclusions extracted from theory must be compared with the reality. A series of reports in different key issues were produced by the TPSD group at the Welsh School of Architecture analysing the town of Penarth. Here is a summary of that work.

Strengths

· **"The Garden by the Sea"**
· Parks and open spaces accessible in less than 4 min (400m) walking.
· Conservation Area: fine buildings and features. Strong historical background
· Close proximity to Cardiff with good connection by public transport
· Existing Vale of Glamorgan railway line
· Internally well-connected bus network

· Existing waterbus
· **Comfortable walkable and "bikeable"distances**
· Tree-shaded streets, potential green corridors
· **Potential for pedestrianisation and shared spaces**
· Lively town centre

· **Little or no hurdle to active modes of transport in the main part of the town**
· Very steep streets localized and limited in extension
· **Some locally sourced food shops**
· **Community Orchard, Garden, plot shared scheme**
· Large proportion of highly qualified city workers
· High levels of employment
· Good variety and even distribution of schools
· existing local and long established businesses
· **GPG actively raising awareness on climate change**
· Knowledge resources available
· Existing public buildings waiting for function: Penarth Leisure Centre, Pavilion...
· Building stock. Renovation
· Potential for reduction on CO_2 emissions, retrofitting
· Scope for large-scale uptake of microgeneration technologies

(Alzughabi et al. 2011; Jain et al. 2011; Morris et al. 2011; Alexander et al. 2011)

Weaknesses

· **Surplus of green spaces underused**
· Rainy and cold weather are limiting
· Conservation Area: limits to change
· Predominantly a commuter town to Cardiff
· Inequal accessibility to public transport.
· Coordination of public transportation network. Inconvenient and time-consuming
· Bus network, not good legibility nor punctuality
· Waterbus underused
· **72% of residents commute by car. Lifestyle dependent on cars**
· **Only 2% of travels are made by bike, 10% walking**
· **Bad condition and legibility of pathways**
· Concentrated shopping area, bus stops, car traffic…
· facilities concentrated in town center
· Low density, not much mixed-use
· **Cliffs = Barrier centre-shore**
· The steepest street connects key spots in town
·**Food accessibility and sources**

· High percentage of elderly people
· Unemployment correlated with lack of qualifications
· prosperity uneven distributed. Difficulty for social cohesion
· Small number of business compared to the total population
· struggles to ascertain financial support

· Vacant properties under threat of decay
· High energy consumption in dwellings, compared to Vale of Glamorgan

(Alzughabi et al. 2011; Jain et al. 2011; Morris et al. 2011; Alexander et al. 2011)

Gwyrddio Penarth Greening Group

The group GPG and the projects they are undertaking is the base for this work. Because it is important to rely on local resources, and this group is a main one. Building upon their experience and knowledge of their own town, and provided their willing to perform further improvements is the main asset that the town can have.

The following is a list of actions that the group is either planning or actually already undertaking. Extracted from the three-year plan that the group provided us with. This is important to know, in order to build upon existing projects (Greening Penarth website).

- Raising awareness on Climate Change and Peak Oil
- Communication: Website, posters, local radio, papers
- Providing regular films on climate change and related issues
- Plotshare
- Community Garden Project
- Community Orchard: Tree planting
- Map green spaces
- Loyalty cards: Shop in Penarth Scheme
- Food Forum: Eco Fest – Big Lunch
- Cittaslow action (local food)
- Penarth Bag: reducing use of plastic bags
- Event with VoG recycling team
- Survey on household energy /water consumption
- Promotion of smart metering
- Support on Solar heating scheme for suitable houses
- Campaign inviting households to switch to green tariff
- Transport map: public + active transport
- Campaign for a car-free day
- Promoting car share scheme
- Bike week
- Walking buses
- Skills audit
- Skills share event
- 3-year business plan

The list of strengths and weaknesses informs us on the subjects that have been stressed so far by the initiatives studied and the position of Penarth in relation to them. The actions planned or actually undertaken by GPG give us an idea of what is going on in town, and which projects can be worthy to build upon.

From the summary of the analysis of Penarth, these are some conclusions that can be extracted:

The important asset and potential that Penarth's green spaces represent, in some cases underused

The high car dependence of average Penarth's lifestyle. A whole study of this reality could be undertaken, but gathered information indicates that this could be partly influenced by urban configuration, facilities distribution and topography, although behaviour and willing for active and public transport, as well as convenience of these means, would have also their weight on that matter.

Despite the low rate on locally sourced food currently available, there

are already some actions taking place on this regard, which could be strengthened by integrating them in a more comprehensive plan.

There is a vast field of work in energy efficiency of buildings with potential for renovation and retrofitting. (This topic has been developed on another report from our peers)

GPG has a large list of actions planned or actually being undertaken. Lack of people and time have been reported as barrier for some projects to evolve. In other cases governance and policies do not allow actions to take place. Those experiences must be taken into account in our work in order to foreseen barriers to our proposal and provide solutions.

The most important from this summary of the first stage analysis of Penarth is the simply act of bearing its reality in mind throughout the whole project.

2.4 Conclusions

The present chapter has provided us with a solid academic background to undertake our project on the Autonomous Town, as well as the necessary knowledge of the reality of Penarth. This will allow us to implement theoretical ideas in a real life situation of Penarth.

The research on urban developments in the 20th century reveals the utopias that have shaped our modern European cities, explaining why our lifestyle is so influenced by the use of car and other innovative technologies of that time.

After having established the historical background of the “Ideal City”, the concept of autonomy related to sustainability has been introduced. Furthermore, current initiatives and the concepts that sustain them have been studied. This review of background theory has been implemented with the summary of the analysis of Penarth undertaken in a previous stage. The combination of theory, case studies on initiatives and reality in Penarth conform the foundation for our work towards the Autonomous Town. The main messages emerging from this chapter are:

The project of the Autonomous Town, in their pursuit of Penarth's sustainability, should provide the town with a vision in which diverse topics (i.e. transport, waste, water, energy) are taken into account. The success of this project and its maintenance through time will depend on the interrelations created between different schemes and the reliance on local resources and assets, while wider global impacts and forces are considered. This will generate a network where flows and outputs return as inputs to the system, and where relations towards the surroundings are also enhanced

increasing the benefits obtained from resources that come into play.

As a result, quality of life and opportunities for people will be increased providing a framework where sustainable lifestyle will be encouraged and convenient. Urban and natural environment will be enhanced, reducing negative impacts and ecological footprint. And benefits from activities in the town will be to the advantage to the local economy.

Chapter 3
The Concept

The present chapter, the Design Concept, must be considered in the flow of our work as the conclusion from previous stages. The review of the background in the Ideal City, the concept of autonomy within the realm of sustainability and the study of current concepts and initiatives in the pursuit of urban sustainability have provided us with a solid foundation to develop our own Design Concept. This needs to be bespoke for the reality in Penarth, therefore its analysis and the comparison with suggestions emerging from the academic research are as well an important part of the foundation of this proposal of the Autonomous Town.

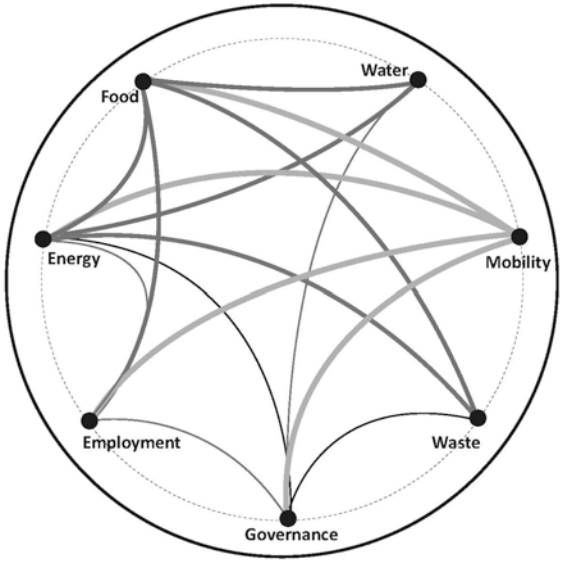


Figure 12. The Autonomous Town Design Concept. (Source: Authors)

Seven topics have been selected out of the research undertaken. These seven topics are complementary and interrelated, they influence each other in a way that holistic sustainability may not be achievable by tackling just one, or even all of them, in isolation.

Outputs of one scheme may be inputs for another, increasing the benefits of the resources introduced in the system. But this scheme is not only related to cycles and flows of materials and energy. It also takes into account local cultures communities and businesses, as well as natural and historical assets in the town and surroundings.

From an environmental perspective, this approach will reduce resource consumption, as well as the waste output and its impact on the environment.

Economic-wise, waste will be a new resource. When primary resources were needed, they will be local, whenever possible, reducing reliance on external resources which would mean unnecessary use of energy for transport, and boosting local businesses. This will also reinforce local culture and character as opposed to homogenous imported chains.

The use of green spaces with food, leisure or social purpose will revert on enhancement of those spaces and an increased asset for Penarth.

Socially, community will be reinforced by encouraging social interconnection of varied groups, which will support a mutual development and growth. The reliance on local assets will increase opportunities for local people, and the improvement of the environment that the reduction of waste impact means will also turn out as benefits for the people and their quality of life.

The interrelations between different flows and schemes will strength them, leading to a system that balances and maintains itself. This does not mean that the system, Penarth in this case, will be cut off their surroundings, quite the opposite, the links with surrounding systems will be similarly reinforced in a web of interconnections for mutual benefits.

The topics of Food and Transport as an example

These two topics have previously been proven as relevant for the work that we are undertaken. They will act, through our whole report as examples of how theory is applied to reality.

We will see in further chapters how designs for food and transport are constructed, individually at first, but always in relation to each other. The purpose of this is to show how their development should always be done whilst considering all seven topics. Even though we have not developed schemes for the other subjects, employment, governance, waste, energy, and water, they have been included within the subjects we have addressed. This is because they all relate to each other, and links should always be made between them. For example, in the food scheme; governance is extremely important for gaining access to sites and changing policies, diverse employment opportunities result from the projects, and compost schemes are developed to limit waste and fertilise soil. Developing a local and organic food system will conserve large amounts of energy.

Water is obviously extremely important for growing, and with an increase in

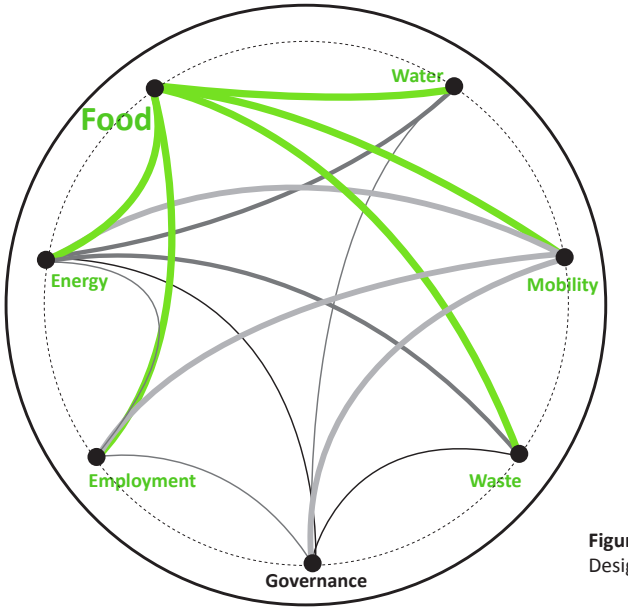


Figure 13 The Autonomous Town Design Concept - FOOD

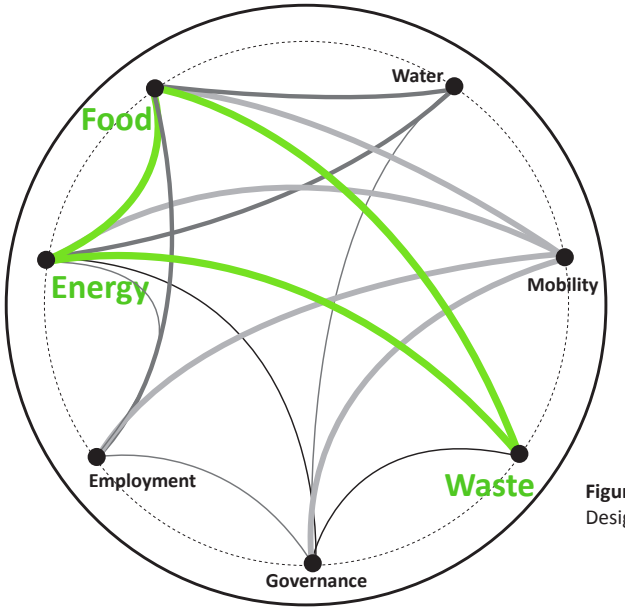


Figure 14 The Autonomous Town Design Concept - WASTE

urban agriculture the strain on water demand will be increased. It could be argued that in Penarth's location rain water is plentiful, but there needs to be a secure supply in case of dry spells.

The evolution of an effective active, and carbon neutral, transport system will benefit all aspects of the community and has effects on the other topics. In relation to food, it is imperative that all sites and projects can be easily accessed, preferably by active methods. The same is true for delivery of food to markets and distribution points. Similarly food related design should be developed and located in such a way as to promote and enable the use of sustainable transport methods.

Chapter 4
The Vision

Unfortunately economic growth has not been "decoupled" from its demand on energy and the natural environment. The complex relationships between 'rate of consumption and consumers, economic growth and population change and location, spatial development, technological change, and the market and regulation' are forever increasing energy demands and consequently the pressure on natural resources and the environment both home and abroad (ENEP, 2000). Unfortunately to suggest that Penarth could make a significant difference by acting more sustainability would be somewhat misleading. It is only a small community in South Wales after all.

Our vision of Penarth therefore has slightly different roots. Although Penarth may not represent a significant solution to the rapid depletion of the world's resources becoming more self-sufficient represents a cost effective solution to mitigating the inevitable economic, social and environmental fallouts.

Based on these findings our vision of Penarth in 2050 (the Autonomous Town) is as follows:

- A town with **car free zones for social interaction**. Community facilities and workplaces within **easy walking and cycling distance**. A town that offers everything you need within 30 minutes.
- A town that provides a **Local Food Network and Mapping database** - Enabling all food to be **produced and sourced locally**.
- A town with **farmers markets, meeting places and general community activities**.
- An **energy efficient town** making the most of local renewable energy technologies
- A town moving towards **Zero Waste**! Resources used efficiently whilst waste is **reused/recycled** rather than sent to landfill
- A town with **high community engagement** and **social security** whilst allowing individual freedom within a **sustainable framework**.
- A town with a **wide range of skills and business** and a **low level of unemployment**
- A town renowned for its **high quality of life**.
- A town with **modern, forward thinking legislation** that facilitates, rather than hinders, sustainable development.
- A town that provides a pleasant public realm that relates to the local context, provides key facilities and develops amenities - all with sustainability as an ongoing and integrated element
- A town which **thinks globally** whilst **acting locally.**



Common Principles

The development of a more resilient and sustainable Penarth by 2050 relies upon adherence to the following principles at all times:

1. **Community awareness:** Knowledge is the base for action
2. All projects facilitating widespread **community participation** at appropriate stages of the design process. “Citizen Ownership”.
3. **Taught syllabus in schools**: Children are the holders and agents of the future. Working on their education is a guarantee of maintenance.
4. **Available grants or lottery money** used before public or private funds.
5. **"Think big, start small"** (Richardson 2007): Relevant existing plans and strategies strengthened rather than forgotten.
6. **Aims, objectives and processes clearly defined**.
7. **Transparency of plans and strategies:** Invites trust within the community.
8. **A vision for all**: All disadvantaged or more vulnerable groups identified and considered within all plans.
9. **Minimum standards defined** and strictly adhered to.
10. **Policy makers and stakeholders** engaged from the beginning**.** The former to facilitate implementation, the later to help to push it.
11. **Fully accessible to all**
12. **All actions interrelated**
13. **Ultimate aims** to drive all actions:
    - **CO_2 emissions** to be reduced
    - **Increased Resilience** to the future impacts of climate change and resource depletion
    - **Making the most of local resources:** Only what is available locally to be used - support mechanisms, knowledge, groups and organisations, sites (green spaces, or existing buildings).
    - **Waste is not waste:** It is just another resource



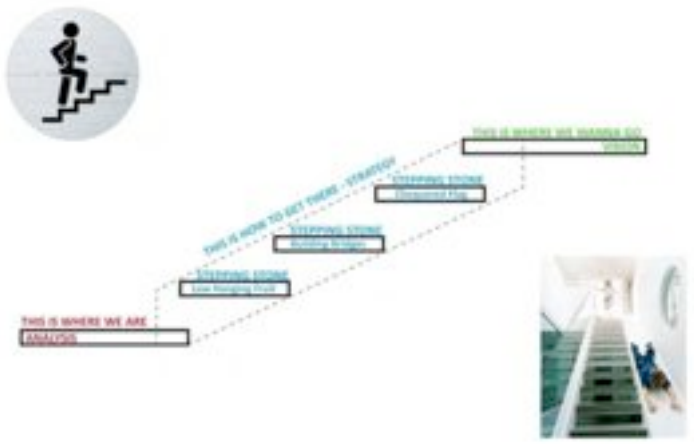
Stepping Stones

The importance of becoming resilient to the fallouts of climate change and resource depletion is such that Penarth, along with every other community in the UK, needs to respond immediately. However, the scale of the journey is so great that Penarth is likely to require a "step change" rather than incremental improvement alone. A step change which in turn must be divided into a number of "stepping stones" so as to provide something of a "breathing space" whilst the community readies itself for the significant changes to come.

The following steeping stones and associated goals have been identified for Penarth's journey towards sustainability and greater self-sufficiency:



1. **Low Hanging Fruit** – Selecting small achievable steps which set the foundation for Penarth's transition to a sustainable town
    a. Increasing Community Awareness and Participation
    b. Introducing principles of sustainability and self-sufficiency within existing school curriculum
    c. Building upon existing plans, policies, and projects
    d. Identifying disadvantaged or more vulnerable groups
    e. Allocate locations for specific projects and plans
    f. Engaging with Council to drive the introduction of new plans, policies, and projects
    g. Mapping local resources
    h. Creating community groups/events
2. **Building Bridges** – Providing the necessary space, freedom and funding to allow projects, plans and strategies to come to fruition.
    a. Increasing Community Awareness and Participation
    b. Expanding school curriculum and adding new subjects directed purely at issues of sustainability
    c. Adapting legislation.
    d. Introducing fines and/or taxes on unsustainable practices
    e. Taking resource mapping further to enable local networks
    f. Providing technical training and education to increase skill sets
    g. Encouraging partnerships and collaborations between stakeholders
    h. Enabling meeting space for spontaneous interaction
3. **Chequered Flag** – Taking the final steps towards the finish line and 'the vision



The Goals

This section provides a brief description of the generic goals that are covered throughout the stepping stones. It describes their importance in relation to achieving 'the vision' and provides an indication as to what processes should be underway at each stepping stone. The goals are directed towards Transforming Penarth into a more self sufficient and holistically sustainable community. Achieving each goal therefore relies upon the promotion of all three of the pillars of sustainability: Economic, Social and Environmental.

Please note that these generic goals apply differently to each topic and therefore the specific methods to achieving them are bespoke. Toolkits for Transport and Food have been provided in latter sections of this report which provide an illustration of how to apply these principles and goals to the specific topic areas.

Increasing community awareness and participation



Community participation goes hand in hand with increasing awareness and should be driven throughout all three stepping stones. Projects should not be imposed upon residents as it can lead to resentment, regardless of the potential benefits. Instead the residents should be utilised to identify priority issues. This resource of information can help to identify the key stakeholders, their needs, priorities and the problems unique to the community (DCSF, 2009). In Penarth, the residents should psychologically be made to feel as if they have ownership of a proposed project and to develop a sense of responsibility for its design and upkeep. Residents might then move from a position of indifference to one of guardianship, making these projects feel like a personal investment.



Increasing community awareness is fundamental to the successful uptake of town plans and strategies. This is especially true for sustainability directed plans due to the remaining scepticism towards not only the correct ways forward but also the very concept itself. It is widely understood that the behaviour of individuals with regard to the natural environment is directly related to their perceptions and attitudes. Successful endeavours to modify behaviour in all aspects of sustainability

therefore rely on effective communication techniques aimed at moving public attitudes towards sustainability. Such endeavours exist against a backdrop of social, cultural and psychological factors. Understanding these factors is essential to identifying the appropriate methods of communication and ensuring the wider involvement of community members.

There are two key channels to instigating change. Government or council led regulations, taxations and economic incentives represent the more aggressive approach. In contrast there is the "soft" approach which involves information campaigning and knowledge dissemination. These channels rarely exist in isolation; in fact the reinforcing effect of these approaches made in parallel on an issue can have powerful impacts on attitudes and behaviour (Owens and Driffill, 2008). For instance, communication can be effectively strategized to build on existing regulatory incentives. It might also aim to raise awareness against a backdrop of government-funded economic incentives.

Communicating the issues surrounding the need for sustainability and the ways to go about achieving it requires three principle qualities: (Manzo, 2010a; Keys et al., 2009; Maibach and Priest, 2009).

1. an understanding of the issue,
2. an emotive impact or relation of the issue to individuals, and
3. the ability to instil sufficient motivation to act

The first quality has been developed over the last few months through the process of completing the various stages of the Penarth live project. As a group we now have an in depth understanding of the numerous sustainability concerns. The stepping stones and associated toolkit are targeted towards achieving qualities two and three.

Within 'Low Hanging Fruit' the focus is directed towards awareness campaigns and the development of community groups. By the 'Chequered Flag' Penarth's community are aware of the principles of sustainability and the benefits of self sufficiency and are seeking to fully participate in all projects, plans and initiatives aimed at achieving them.

Relevant to the following Stepping Stones:

- ✓ **Low Hanging Fruit**
- ✓ **Building Bridges**
- ✓ **Chequered Flag**

Education, training and 'lifelong learning

Schools exist to provide children with the necessary knowledge and skills to become active members of tomorrow's society. "*If all education is for the future, then the future needs to be a more explicit concern in education. In the first decade of 21st century, the current state of the planet guarantees a future very different from today*." - David Hicks, Citizenship for the Future.



The current generation are, and are justified in being so, worried about climate change, global poverty and the impact our lifestyles are having on the environment and indeed the food we eat. Schools therefore need to help children help themselves and others through demonstrating models of good practice for children and their communities. In 1998 the Council for Environmental Education published a report called the Education for Sustainable Development in the Schools Sector (CEE, 1998). This states that "*Education for sustainable development enables people to develop the knowledge, values and skills to participate in decisions about the way we do things individually and collectively, both globally and locally, that will improve the quality of life now and without damaging the planet for the future*". Introducing the importance of local resources within the learning experience of every child is fundamental to encouraging future innovation and improvement. "*It is not education, but education of a certain kind, that will save us*." (David Orr, 1994)

For Penarth to grow as a community, children aren't the only ones who need to be learning. Adults are just as important, especially given the relatively new concept of sustainability and the on-going development of its application in a world that changes from day to day. Once education improves within a community a positive feedback loop is triggered where by the more educated a community becomes the more people learn from each other. In this regard, education within a community expands to more than just formal education in schools; education becomes linked to the community and the ability to learn from our neighbours.

"... *The lifelong learning framework emphasis that learning occurs during the whole course of a person's life. Formal education contributes to learning as do the non-formal and informal settings of home, the workplace, the community and the society at large*" (OECD, 2001c).

The plans and polices, needed for Penarth to complete its transition to self-sufficiency, will only be successful if the community are given the correct training and skills to make use of them.

'Low Hanging Fruit' is directed towards developing greater coverage and demonstration of the principles of sustainability and self-sufficiency within the existing school curriculum. It also seeks to provide free classes to adults within the community. 'Building Bridges' seeks to broaden the curriculum to include classes aimed specifically at providing children with the necessary skills to live more self sufficient lives, with regards to local resources, as they grow up. At this stage adults will be putting their training to the test and applying them to develop and make use of local resources.

Relevant to the following Stepping Stones:

- ✓ **Low Hanging Fruit**
- ✓ **Building Bridges**
- ✓ **Chequered Flag**

Plans and policies

The principles of sustainability and self-sufficiency have already been incorporated in the Government's vision for developing sustainable communities. This is illustrated in *Sustainable Communities – building for the future*. For Penarth to achieve this vision it needs a transparent, flexible,

predictable, efficient and effective planning system that will produce the best plans and policies to ensure a steady transition towards a sustainable community (HM Government, 2007). These plans should be drawn up with community involvement and present a shared vision and strategy of how the area should move forward.



Local authorities have more freedom to do this since the planning reforms of 2004 which encouraged a shift away from the general view of planning as a narrow, regulatory system and a shift towards seeing it as a positive way to shape the places and communities in which we live, through implementing sustainable strategies. The Local Government White Paper published in October 2006 goes further and strengthens the leadership role of local authorities as placeshapers. It sets out a 'new settlement between central government, local government and citizens with greater devolution and a more streamlined performance management regime' (HM Government, 2006). If used well, the Sustainable Communities Act 2007 could be a key driving force behind the next stage of the devolutionary process, taking people back towards self-sufficiency. It provides local authorities with an opportunity to take a more proactive leadership role in formulating policy. The benefits of which will strengthen the 'arguments for the devolution of powers, responsibilities and funding to the local level' (Brand 2008).

With this new leadership role comes great responsibility. To become more sustainable and self sufficient Penarth and the Vale of Glamorgan must provide:

- positive strategic planning at the heart of the local authority;
- an improved local development framework process;
- further performance improvements in planning;
- effective intervention to address poor performance; and
- additional skills and capacity to deliver projects;

It is important to acknowledge and build upon past work related to sustainability, as well to utilize strengths that are already in place. Penarth has already made great strides towards sustainability through the introduction of effective plans and policies. 'Low Hanging Fruit' is therefore directed towards building upon these whilst the new plans and policies, with a greater focus towards enabling sustainable practices through self sufficiency, are carefully put together and passed through the planning system during the Building Bridges Stage. At the 'Chequered Flag' these policies will have come to fruition and been readily accepted ad used within the community.

"Planning has a key role to play in the creation of sustainable communities: communities that will stand the test of time, where people want to live, and which will enable people to meet their aspirations and potential" (HM Government, 2006).

Relevant to the following Stepping Stones:

- ✓ **Low Hanging Fruit**
- ✓ **Building Bridges**

Disadvantaged/vulnerable groups



Penarth needs to identify the wide range of disadvantaged or vulnerable groups whose needs have to be given great consideration in order to ensure a full and open commitment to social inclusion. Planning policies need to take into account the needs of women, young people and children and the elderly, as well as disabled people, ethnic groups, and other disadvantaged groups (Shelter, 2004). There are also certain groups which are often thought of as undesirable by the wider community, for example people with mental health issues, people with drug or alcohol issues, ex-prisoners etc. It is essential that Penarth's plans and policies don't ignore these issues but include clear guidance and solutions to resolving them.

Once identified Penarth can provide the necessary support service provisions to ensure that these disadvantaged groups are afforded the opportunities to meet their full potential and live successfully within the community (Shelter, 2004).

Relevant to the following Stepping Stones:

- ✓ **Low Hanging Fruit**
- ✓ **Building Bridges**
- ✓ **Chequered Flag**

Local resource network and mapping database



A local resource database/website would vastly improve the chances of successfully achieving 100 % uptake of local resources. The aim of the website would be to allow anyone with local produce or skills to upload their address and the nature of the resource available onto the website. All this information would automatically appear on a map of Penarth and the surrounding area to anyone registered. This could be used to allow not only the purchasing of local resources, whether it be food, equipment or skills, but perhaps also the trading of resources so that they are spread equally and not wasted.

Other benefits of resource mapping might include:

- Assets of individuals, organizations, or institutions are identified.
- Existing or potential partnerships become apparent.
- The needs of groups or individuals become clearer.
- Long-term planning is made significantly more achievable.

Long term planning is essential to enabling Penarth's transition to a more autonomous community. Everyone within the community has their own lifestyles, knowledge and resources. Decisions should be made on the basis of these available resources. One way to achieve this is through participatory resource management. For example, in order to plan for improved education, you need detailed information on the number of schools and children within the town; to improve agriculture, what kind of soils exist and what kind of drainage is available for irrigation, how much water is available,

and so on. All of this information should be made freely available through resource mapping. This resource database should be continually developed as local people collect the information, collate it and map it.

Relevant to the following Stepping Stones:

- ✓ **Low Hanging Fruit**
- ✓ **Building Bridges**
- ✓ **Chequered Flag**

Community groups and events enabling spontaneous interaction

Creating community groups and organizing various events ties in closely with increasing community awareness and participation and helps to ensure community ideas, concerns and aspirations are listened to, understood and, most importantly, harnessed for the benefit of all.



Community involvement enables the community to provide ongoing and in-depth input into Penarth's community planning decisions and into the development of various solutions and resources that are sufficient to meet the needs of a sustainable and self-sufficient community. It also allows the community to have a greater say into the development of services.

These participatory structures would go a long way to installing a greater sense of empowerment within Penarth's community and enable the residents, including those identified as disadvantaged or vulnerable, to gain skills in community participation. Social interaction is vital to installing a sense of community within Penarth and ensuring the transition to sustainability is pushed from within.

As Penarth moves through the stepping stones the availability of spaces for community events and gatherings should increase both in number and in terms of the quality and ease of access.

Relevant to the following Stepping Stones:

- ✓ **Low Hanging Fruit**
- ✓ **Building Bridges**
- ✓ **Chequered Flag**

Encouraging partnerships and collaborations between stakeholders

Research into partnerships has illustrated that traditional 'command-and control' regulatory approaches to solve the planet's environmental, social and economic challenges have led to an over reliance on government and local authorities as the sole caretakers for the environment (Sinding et al., 1998; Wylynko, 1998). The problems of climate change are significant and have become far too complex to be solved by individuals (Norberg-Bohm, 1998; Wylynko, 1998). The weight of the issue needs to be spread across the shoulders of many.

Achieving economic, social and environmental sustainability warrants greater collaboration of stakeholders and the development of partnerships. It needs alternative forms of leadership and contributions from industry, citizens, nongovernment organizations and other environmental stakeholders. Penarth must use these collaborations as a path to sustainability and place its decision makers in the role of collaborative leaders. Sharing the responsibility for Penarth's future in such a way will foster new values of sustainability, self sufficiency and efficiency within the community. In the same way this report is founded by the collaboration of students and shared understanding of the topic at hand, Penarth's problems can be resolved through the combined efforts of the many.

Word of warning – It is imperative that collaboration is made available to a variety of people from different backgrounds. Collaboration that is limited to the socially powerful in Penarth may have the effect of reinforcing the towns 'status quo' and further marginalizing the politically and socially weaker groups identified in the Socio-economics report compiled by the Welsh School of Architecture (Levy, 2997). Indeed the distribution of environmental, social and economic costs and benefits may be skewed toward the advantage of groups already in positions of power. This would inhibit any system change towards sustainability and would sit in complete contrast to 'The Vision'.

Relevant to the following Stepping Stones:

- ✓ **Low Hanging Fruit**
- ✓ **Building Bridges**
- ✓ **Chequered Flag**

TOOLKIT SECTION

FOOD + TRANSPORT

Two demonstrations of using the generic goals to develop bespoke toolkits

FOOD











4.4.1 Why Food?

'Food production and distribution contributes up to 22% of the UK's total greenhouse emissions.' (Church, 2005)

Why is local and organic food important?

There are currently a number of problems associated with our food supply chain. These issues result from a complex mixture of factors but can ultimately be simplified as an over reliance on fossil fuels and farming methods that damage soil fertility through intensive monoculture (single crop).

Adopting more local and organic production methods can reduce the carbon and ecological footprint of your food. The following will explain what the issues with food production and supply are, and how local and organic methods can reduce these impacts.

The current food production and supply system is unsustainable and hugely dependant on fossil fuels, especially oil. Large amounts of energy are required for the production of chemical fertilisers, operation of machinery, transportation, irrigation, raising of livestock, pesticide production, and drying of crops. There are also energy costs associated with packaging and refrigeration. (Pfeiffer, 2004)

The monoculture method of farming has resulted in the requirement of more and more pesticides and inorganic fertilisers. Fields of single crops attract pests which mean pesticides have to be used. The organic material has also been mined from the soil which means chemical fertiliser is needed so the crops will grow, as well as increased irrigation. These fertilisers are damaging the soil, causing erosion, which is requiring more and more inputs just to keep yields at a constant level. Soil degradation can occur for a number of reasons, including; excess water and use of pesticide and inorganic fertiliser, tillage of the soil, and farm machinery. The overall result of these issues is that modern agriculture must continue increasing energy inputs just to maintain current crop yields. (Pfeiffer, 2004) (Church 2005)

Once the food is produced, in this country or abroad, the food is then transported by plane, ship, train, and trucks which use large amounts of fossil fuel, contributing further to atmospheric greenhouse emissions. A local food production system can reduce these impacts.

"95% of fruit & 50% of vegetables eaten in UK are imported" (Sovereignty, 2006)

'Britain imports 240,000 tonnes of pork and 125,000 tonnes of lam a year, while exporting 195,000 tonnes of pork and 102,000 tonnes of lamb' (Church, 2005)

So what about the impact of the farming industry? Organic growing methods can dramatically reduce the impacts of these issues. Organic agriculture requires less, if any, fossil fuel inputs due to its natural growing methods. In the face of falling fossil fuel supplies, organic growing seems a far more secure source of food. There are also major benefits to soil quality as the methods build organic matter in soil, rather than degrading and eroding it.

'A study comparing organic and conventional livestock, dairy, vegetable and arable systems in the UK found that, with average yields, the energy saving with organic production was, on average, 42 per cent. The improved energy

efficiency in organic systems is largely due to lower (or zero) fertiliser and pesticide inputs' (Church, 2005)

However, these benefits attributed to organic growing are lost if the produce is then transported large distances.

'Of all organic food consumed in the UK, three-quarters is imported' (Sustain, 2001)

There is also the unknown entity of climate change, which could increase strains on the agriculture industry through flooding and/or droughts. The UK currently sources large proportions of its food from abroad. If yields start to fall then countries may reconsider the amount of food available for export. Therefore, it is imperative the UK increases the amount of food being grown on home soil.

Looking at this simplified discussion of the food industry is seems clear that the path to a more sustainable food supply is locally produced organic agriculture. Another issue to consider is biodiversity; arable and pastoral land does not lend itself to hosting wildlife, and absorbing carbon from the atmosphere. Therefore, the more growing we can do in, or close to, urban areas, the more land we can return to natural forest. This leads us to urban, organic agriculture. There many other benefits to urban agriculture, for example; community involvement, and social cohesion and well-being. Activities such as agriculture within the community create a method for engaging with local people and enhancing a balance between areas of the town. (Garrett, 2008)

How much can be grown in Penarth through organic fruit and vegetable growing?

Some rough calculations;

Land needed – Vegetables = 0.3m²/KG

– Fruit = 0.5m²/KG (Gerben-Leenes, et al, 2002)

- 3 servings of Veg a day – 70 hectares = 21,095 people
- 2 servings of Fruit a day – 75 hectares = 20,547 people

In recent years, there has been development of a new form of organic agriculture called; Permaculture. Permaculture has been defined and described in a number of ways, such as;

'Consciously designed landscapes which mimic the patterns of nature, while yielding an abundance of food, fibre and energy for provision of local needs'. (Holmgren, 2007)

'focus less on objects themselves and more on the careful design of relationships between them – interconnections – that create a sustainable whole' (Hemenway, 2009)

Permaculture developed in Australia as a form of permanent agriculture and has since spread all over the world. The basic principles can be used to design anything, for example; buildings, energy systems, businesses, and decision-making processes. In terms of agriculture, it can be simply explained by a shift from monoculture to polyculture (mixture of crops). Instead of fields of

single crop that are susceptible to disease, degrade the soil, and limit biodiversity, a natural self-regulating system is designed to provide the food. It is a careful mix of perennial, annual, and cover crops, combined natural ways of building soil fertility. The system is designed while thinking about how each part of the system effects each other, and how links and partnerships can be made to maximise benefits. In other words, an ecosystem is designed so that most of the work is done for you. To begin with, much effort and thought is needed but as it develops you can sit back and reap the rewards. There will obviously be some vegetables that still need to be planted each year, but yields are high as a result of the productivity of the system, without any artificial fertilisers and pesticides.

The following is a quote from a permaculture farmer about the system he designed;

'Unlike other organic farmers, I almost never used even organic pesticides on my farm. The permaculture ecosystem I designed was so self-managing and self-maintaining with natural controls such as carnivorous insects, toads, lizards, snakes, owls, bats, and other allies, that it was rare that I needed to intervene' (Blume, 2008)

How much food can it produce?

Permaculture farmer, David Blume explains that to support oneself (without meat) you need the following amount of space;

- With a good, but sloppy design - 500 square feet (46.5m²)
- With a very good design - 200 square feet (18.6m²) - (1 hectare = 10,000m²)

Therefore, for the population of Penarth;

- Good but sloppy, for 21,000 people = 97.7 hectares
- Very good, for 21,000 people = 39.1 hectares

Green Space in Penarth (hectares)



Recreation Area	23.9
Parks	8.5
Garden	4.8
Natural Forests and Fields	242.0
Waterfront	2.4
Sports Field	66.3
Schools	24.5
Green Buffer Zone	13.7
Old Railway Track	2.7
Total	388.9

(Grace, 2010)

During a workshop that was held with members of the community there was an expressed interest in community growing schemes. The workshop, where members of the town mapped local resources, provided an opportunity to discover what they regarded as important issues and locations. In terms of food, locations were mapped where community gardens exist, and also suggestions made for future sites. This information had used in the later stages of the design project. Further details of the community meeting can be seen in the Appendix.

'in the 1850's, prior to refrigerated transport, New York City supplied all its food for a population of over a million from within 7 miles of the borders of the city' (Blume, 2008)



Figure X Generic goals linked to food goals

Low Hanging Fruit **Selecting small, achievable steps which set the foundation for Penarth's transition to a sustainable town**

FOOD - GOALS



1) Community Awareness



2) School Syllabus



3) Start Planting



4) Farmers Markets



5) Rewarding Good Practice



6) Organic Gardeners



7) Resource Mapping



8) Gardening Clubs

TOOLKIT



Community Awareness

Communicating environmental issues requires what can be defined as a set of three qualities: an understanding of the issue, an emotive impact or relation of the issue to individuals, and instilling motivation to act. (Manzo , 2010a; Keys et al., 2009; Maibach and Priest, 2009) Penarth must consider these factors when forming methods of communication.

The basic first step might include; organising activities and events that promote the projects that are already underway and explain plans for the future. This will also be achieved through the setting up community groups where information can be shared, and organisation of events and initiatives.

Show people what you are doing and tell them how it can benefit them. Make projects visible, either directly or indirectly. This doesn't mean being obtrusive and planting directly in people's faces. However, planting in areas that people see on a regular basis can increase awareness without any extra work. This will be covered further in the 'Start Planting' section. Alternatively, promote the projects and schemes through other forms, such as media, community groups and clubs, and events.



School Syllabus

'How to grow fruit and vegetables' introduced to taught syllabus at schools

The first step here would be to approach nearby schools (especially primary schools) and discuss the possibility of teachers finding time to inform children about the importance of eating local and organic food. Also, learning and practicing how to plant and take care of plants with field trips to community gardens and farms.

Another approach would be to contact the council, and/or education board in attempt for the idea to be implemented from the top-down, with more authority.

Sign your local school up to the 'Food for Life Partnership', which brings together the expertise of four food focused charities to transform the food culture of schools around UK.

'The Food for Life Partnership programme is a catalyst for engaging pupils, parents, school cooks, teaching staff and the wider community, creating a powerful alliance to help shape food culture in your school.'(FFLP, 2011)

Visit the website for a detailed description of the program;

http://www.foodforlife.org.uk/Whygetinvolved/Wholeschoolapproach.aspx



The town of Todmorden have had great success implementing the FFLP. Every school in the town is now actively involved in growing and learning about food. Each year the children from the area enter into an agriculture show where they can show off what they have learned and raise awareness in the community. See more about this scheme, and much more, on the website;

http://www.incredible-edible-todmorden.co.uk/projects/growing-in-schools

This idea does not only need to happen in the classroom, or the fields, but in the canteen as well. Teach the children what they are eating and where it has come from. It is then not just theory, or something they have to learn, but its

part of their life. Hopefully success will spread from the schools back to the families at home.



Encourage people to start planting

Start growing wherever possible. Start not only community gardens but plant where everyone can see to spread the message. Raised beds on patios and rooftops, fruit trees in car parks, wherever there is space. Look for permission to used derelict land. Start with already existing allotments and community gardens and look to expand them. Identify sites early that will be purely for growing and those sites that lend themselves to other purposes. For example, certain sites can be developed so they can be accessed by schools and other groups to have tours. Therefore, sites should be considered in relation to location and access, as well as attractiveness of the site itself.

Ask the council for support on these issues, they should see the benefits;

'Many local authorities link allotments to Local Agenda 21 (LA 21) initiatives. This has drawn support from central government and Parliament as well from LA 21 campaigners. The Local Government Association has recognised the value of encouraging the linkage between the two and sees possibilities to form new partnerships between allotment groups and members of the environmental health, teaching, and health visitor professionals.' (FoodVision, 2010)

http://www.foodvision.gov.uk/pages/allotments

The town of Todmorden has had great success with this idea. They have grown around town in locations such as; outside the railway station, old people's home, opposite the cricket club, and outside the college. They have also contacted the council and been given the use of council land for orchards, planters, and plots.

Another great idea they have been using is that of a 'land bank' where people can offer, or suggest, land that can be used for growing. For more info see the website;

http://www.incredible-edible-todmorden.co.uk/projects/projects-how-can-i-get-involved

Guerrilla gardening is a slightly more extreme option and could cause problems in certain situations. However, the idea comes from sound ideology; seeing a piece of land that is unused and planting it.

http://www.guerrillagardening.org/tips/seedgrenadekit.pdf

http://www.guerrillagardening.org/ggseedbombs.html

Start community food waste collection schemes for compost available to whoever wants it. Households collect their organic waste and periodically deposit it in community compost bins, or even their own.

Another case study where people have taken an unused site and started growing; **http://www.transitionheathrow.com/grow-heathrow/**

Some tips and general guidance on how to grow organically can be found in books at libraries, or alternatively websites such as;
http://www.organicgardening.com/learn-and-grow/edibles/vegetables

Get the council moving (Governance);



- **Farmers markets**

Encourage/persuade councils to develop strategies to encourage and protect street markets and farmers' markets. Start searching for local producers and farmers who would wish to use them.

These markets will be a place for food to be sold by local producers and also a distribution point for the other schemes, like the food produced by paid gardeners. Once there is more food grown in the town these markets will become a necessity, and success will draw suppliers from further reaches.

To get them up and running, start with trial runs. With the food that people are already growing, start making meals and try selling them. This could also be combined with a raising awareness event. For example, at the train station, on a weekend, you could organise a 'local food day' where people can come and try food made from local produce. There may be legality issues that prevent people from selling the vegetables directly. However, these community days can be the basis for regular farmers markets and distribution points.

There are currently organisations that give advice, helping farmers markets evolve. The 'Making Local Food Work' program has a section with the sole purpose of developing farmers markets;

http://www.makinglocalfoodwork.co.uk/about/cfm/index.cfm

The riverside market in Cardiff has established itself as a thriving hub of activity where there is access to a plethora of local food. However, it is not just a place get you're shopping. It has been instrumental in raising awareness and developing education programs in local communities.

http://www.riversidemarket.org.uk/

http://www.foodvision.gov.uk/pages/rcma-social-enterprise-riverside-cardiff



- **Rewarding those who source locally**

Consumers have the power! Stand up against processed and packaged food. Encourage people to start buying local organic rather than commercial alternatives.

Give councils the power to reward retailers and restaurants who source their food from local and organic suppliers. This could be in the form of tax breaks, or even financial incentives.

How can the council be pushed?

Use the sustainable communities act!

'The Sustainable Communities Act became law in October 2007 due to a 5 year campaign by the Local Works coalition. It changes our system of governance by setting up a new process where local communities and their local authorities (including county councils) can drive central government policy and action on reversing community decline and promoting local sustainability.'

It can be used to promote action for a wide range of things, including organising farmers markets and limiting fast food.

How does the Act work and how can you use it?

Central government must invite local authorities (including county councils) to submit proposals for new government action. So first you need to insist that your council resolves to respond to this invite and submit proposals to central government as invited. It is not compulsory for councils to do this and

so it is vital that local people lobby their councillors to do so. You are then able to suggest proposals through representatives from the community.

For full information on how to use this act download the following help documents which give detailed explanations about how the act works;

http://www.localworks.org/files/localworks.org/Promoting%20Local%20Food%20and%20Ending%20Food%20Poverty.doc

http://www.nlgn.org.uk/public/wp-content/uploads/sustainable-communities-act.pdf

The 'Local Works' website is; **http://www.localworks.org/**

Penarth should take advantage of this act to help implement strategies to promote the use of local food resources and local suppliers to ensure the successful recycling of local expenditure. It is estimated that "every £1 spent with a local shop is worth £1.76 to the local economy, but only 36p if it is spent with a supermarket chain" (www.neweconomics.org 2010). Encouraging street/farmers markets will go some way to enabling the much needed growth in both the production and sourcing of local food resources whilst providing an excellent vessel for social interaction within the community.



Organic agriculture specialists

Find a full time gardener. This person should be well versed in organic growing methods, or ideally permaculture. Once there are enough people willing to pay a small amount of money per week/month, these gardeners can grow food for those signed up to the scheme. It may take a while until you find enough people, but with continued raising awareness and through developing community groups and clubs, it will come with time.

If a full scale permaculture operation was desired that would eventually feed large proportions of the town; these kinds of specialists could be contacted through the organisations that train them. For example, the Brighton Permaculture Trust; **http://www.brightonpermaculture.org.uk/**

http://www.permaculture.org.uk/



Resource Mapping

Benefits to all parties should provide sufficient incentives for members to sign up and provide the relevant information (to be made available to others). Contact local producers, distributors, and retailers of local produce and explain the idea. Explain how a widely available map showing how and where people can access locally grown food can benefit all parties. This is likely to start off as a very basically drawn map with a small number of locations. However, as more people get involved and success increases the map can become a detailed database of not only locations, but detailed information about each member. This is likely to need to be communicated through a widely accessible medium like a website.

An example of this idea working in practice is the town of Todmorden. The website can be seen here**;**

http://www.incredible-edible-todmorden.co.uk/localfood/local-food

Further information and help can be seen at;

http://www.makinglocalfoodwork.co.uk/about/fwm/index.cfm



Gardening clubs

This may be last of the list of goals, but it is certainly not least important. They will be the medium for sharing information, getting projects started, and developing ideas. Encourage groups to start in different parts of the town, so ideas and information can be spread easily.

Starting community groups that, share a common interest, can happen as a result of friends or colleagues getting together to do something they believe in. These types of clubs can spread over time to create a useful way of sharing information and meeting new people in your community.

Another method is to begin with a more structured approach with a wider reaching scope from the outset. A group that attracts people from outside an already existing group of friends is more appropriate in a case such as this. Meeting new local people will create better sense of community and social well-being. There is a website that is ideal for this kind of networking. It is called ‘Streetlife’ and is already being used by communities across the country.

http://www.streetlife.com/

Building Bridges **Providing the necessary space, freedom and funding to allow projects, plans and strategies to come to fruition**

FOOD - GOALS



1) Community Awareness



2) Local Food Network



3) Growing for the People



4) Use it or Food It!



5) Training



6) Food Distribution



7) Local Initiatives



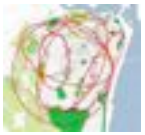
8) Local Farmers

TOOLKIT



Continued raising awareness

Here a continuation of awareness campaigns, promote schemes, promote success so far, and the explain benefits. ‘Local Food’ events, education and training, and garden/farm tours, should all be regular occurrences. The websites and databases should be up and running.



Local food network

A strong database should be emerging at this stage giving consumers, producers, retailers, and restaurants access to information about how and where to get what they need locally. This should create links and partnerships that will result in a network of supply chains with in the town. Having a wealth of natural resources being produced locally provides many business opportunities for people willing to make something out what is available. This stage is essentially just continued improvement of resource maps and database of suppliers, etc. This might be the time to expand into different methods of display and communication. For example, using GIS mapping software and websites will provide widespread access to the information.

http://www.foodvision.gov.uk/pages/food-mapping

At this stage businesses should be persuaded to sign up to the local food network, sourcing their food from identified local farmers and locally grown produce, for example restaurants, cafes, and schools.



Growing for the People

With people having become aware of the importance of locally grown food, starting a monthly, or weekly, payment scheme can now become possible. This can only work if there are enough people signed up and paying regularly. The money will go towards paying gardeners to grow the food and the resources they need. The food that is then grown is given (‘free’) back to the paying customers, either through markets or home delivery.

For example, 100 people paying £10 per week provides over £50,000 for the year.

This is an example of a box scheme that is in already in operation in the south Wales region;

http://www.greencuisineorganics.net/box.cfm

To be able to provide high proportions of the population with local organic food, this type of scheme needs to be operating within the town, or as close to it as possible.

Alternatively, there is a more mixed (hands on) approach. An expert, gardener or farmer, plants an area with a mixture of crops and then customers take care of them. For example, in the picture you see vertical rows of crops in a field, with each row different. Then the plots are divided up horizontally giving each member a diverse choice of produce that they would have been unable to grow themselves. With this method, the slightly more arduous and technical work is carried out by an expert, but people who like to get involved can take over the plots once they are ready.





Use it or Food it!

Allocate green space for food production. Increase the amount of growing area by choosing areas to be converted from under-used green space to community gardens. This will obviously require collaboration with land owners and council members. Another possibility is raising money to buy cheap, unused land. This becomes a viable option once you have people who see the benefits, and are on board to box schemes and farmers markets. These gardens can serve other purposes, such as education if they are designed to create a place where schools, or anyone, can come and learn about what is being done. For example, signs explaining each area with pathways and gathering points.



These spaces will not just be productive in terms of growing food but can benefit many social aspects of the community, forming a hub of activity and producing enjoyable spaces to spend time.



Training

Over recent generations many skills that used to be a pre-requisite for life have been lost. Local experts should start classes that aim to train people to rediscover these lost skills, ranging from growing to cooking to hand crafting. This training should be widely accessible to both adults and children. This will create many new business opportunities, for the specialists running the courses and for the members with new skills.

Again, Todmorden is good example of putting this into practice. They have regular training courses and hold events to inform the community about certain subjects. See;

http://www.incredible-edible-todmorden.co.uk/projects/learning-and-skills



Food Distribution

There will be many types of local food distribution, for example; box schemes and farmers markets. The locations and methods for distributing the food grown for the paying customers should be widely known and accessible. These locations are likely to be combined with markets where local famers, growers, cooks, tradesmen, and craftsmen can sell their produce. There should be organised times/days and allocated space through discussion with the council. It is also worth considering home delivery or moveable hubs/stalls where the 'box scheme' food could be distributed.

http://www.makinglocalfoodwork.co.uk/about/ds/index.cfm



Local Initiatives

Initiatives can be set up to effect change and promote new ideas throughout the town. If you have a great idea, don't be afraid to start a process that will make it happen. Many of the steps already outlined could be could forms of initiatives, for example buying local food instead of fast food, community agriculture groups, and distribution networks.

Alter planning rules and develop local initiatives that encourage use of derelict/un-used sites, for allotments.

Pressure public sector industries in the area, you can enforce change to how they source their food. The government has already made an attempt to improve this with their 'Public Sector Food Procurement Initiative', which encourages the public sector to procure food locally. With this initiative already in place and an increase in local, organic, food being grown in Penarth, persuading these places to procure the food should be relatively painless.



Local Farmers

Once the farmers markets have started having success nearby farmers can be invited to bring other food types to the town that are more difficult to produce within the limits of the town, for example meat and grain.

There are schemes available that will help set up such partnerships, such as Community Supported Agriculture (CSA), that attempt to create links between local people and local farmers. The basic idea is for local people to invest in their local farm in return for a share of the harvest. There are benefits for both sides here, as people are reconnected with their nearby land and farmers have a secure income. With these partnerships we should see a return of butcher shops that source their meat from local farmers.

http://www.soilassociation.org/Takeaction/Getinvolvedlocally/Communitysupportedagriculture/tabid/201/Default.aspx

Chequered Flag **Taking the final steps towards the finish line and 'the vision'**

FOOD - GOALS



1) Full Capacity



2) Growing for the People



3) Markets



4) Learning



5) Fresh Food



6) Local Farmers

TOOLKIT



Full Capacity

The population of Penarth will now be sourcing the majority of their food from local resources. All fruit and vegetables are grown within a 2 mile radius of Penarth, 80% within Penarth itself. It was calculated in the earlier section of the report, on organic food production, that there is enough green space in Penarth to feed the entire population. However, it is understood that is it not feasible to convert all green space for community gardens. Therefore, the remainder should come from as near as possible, with the other foods (meat and grain) sourced from local farmers. There will also always be a desire for exotic foods that cannot be produced locally. If the majority of food comes from local sources, then a limited amount of these other foods could be sourced from abroad, due to the dramatic reduction of the overall impact.



Growing for the People

Households will now be paying approximately £10 a week. This pays for full time staff to maintain, and look after crops. (FOOD FREE for those registered to scheme) Other types of schemes will also be up and running, for example people who grow food themselves, or in cooperation with experts. Also, there are many new small businesses that make food based products from the wide range of produce being grown.



Markets

At this point markets should be set up all over town, perhaps each with different niches and specialities, making unique and attractive areas to come to. These markets take a number of forms. There will be numerous collection points for the food grown as part of the 'contract growing' where the food is picked up by the consumers. There are also markets and stalls where people, farmers, etc. can sell their produce. The people involved with these markets should have been, and should continue to, contribute to other projects, for example education, initiatives, and policy change.



Learning

There are regular school visits/day trips to urban agriculture spots where schools can learn about how the whole food growing operation works. They will also have their own plots where they can practice growing themselves.

Training courses are held all over town for anyone who wishes to learn any from a wide range of skills.



Fresh Food

Food is grown within minutes of the people who are consuming it. There is no need for packaging or long distance transport. Wherever possible, food should be distributed in boxes or sustainable bags.



Local Farmers

Strong links have now been made with local farmers and they now bring their harvest to markets and stalls all over town. The local butcher shop is now seen in multiple locations.

TRANSPORT



4.5.1 Why Transport

As explained in the report "*What is the potential for sustainable mobility in Penarth"* from Episode 1 of TPSD group (Jain et al. 2001) transport allows people to move from one location to another and provides individuals, communities, businesses, and governments with means to trade goods at all levels. It is critical for the development of communities, although is usually related to greenhouse gas emissions, noise and pollution (Banister 2005)

This relation is due to the extended use of motorized vehicles, which consume fossil fuels for their operation. Among those the car represents the most unsustainable of the means. The pollution and noise that it generates is coupled with its limited capacity to carry people, multiplying the damage that it produces for the quantity of units that are actually running on our streets and roads. Moreover, cars are often used below their full capacity and for relatively short journeys. Specially in those cases, more efficient and consequently sustainable options could be utilized.

The analysis of Penarth on a first episode of our work (non-published documents) summarized in the list of strengths and weaknesses in chapter 2 of this report, stresses the high use of car, both for short distances within town as well as for commuting, mainly to Cardiff. According to that analysis 72% of journeys is made by car, while only 2% is made by bike and 10% walking.

Regarding public transport, the apparent underusage of train and buses seems to be influenced by several factors, from inconvenience of timetable and bad legibility of network to lack of willingness of travelers.

The analysis shows a huge potential for improvement in the mobility system in Penarth. Besides, this improvement would have an important role in the reduction of ecological and carbon footprint of the town, according to data published by BioRegional and CABE (2008). Only coupled by energy efficiency in homes, subject already covered by peers in the TPSD group.

People in Penarth are already aware of improvements that could be undertaken in this subject. They expressed their interested during the community event with consultation purpose held in the first stage of the project. In that opportunity topics like the regeneration of the surroundings of the train station for a more pedestrian friendly environment or the development of cycling routes were pointed out.

This report has already stressed the inconvenience of working on subjects in isolation therefore, even if transport is the main subject to be tackled, it will always be in relation to the rest of the seven topics introduced in the design concept (chapter 3)

The provision of a sustainable mobility system would mean a reduction of car dependency, encouraging public and active means (i.e. walking and cycling) and consequently the reduction of impacts on the environment derived from motorized vehicles (i.e. pollution, noise, congestion).

Socially speaking, a sustainable transport system will benefit disadvantaged groups without car access, by improving convenience, coverage and accessibility of public transport (i.e. bus, train and waterbus). Cyclers and walkers can also be considered disadvantaged groups, usually forgotten in urban environments dominated by cars. A sustainable transport network will provide adequate routes, services and facilities for walking and cycling. Encouraging cycling and walking, urban proximity and social interaction would be fostered and reconstructed, especially in areas where traffic represents a barrier and a nuisance for social activities, like terraces on pavements or shopping areas. In these areas a pedestrian friendly urban environment would be provided boosting social interaction and local businesses. It also works the other way around; encouraging local businesses and increasing variety of choices in town it would be more attractive for locals to walk and spend their time in cafes, shops and facilities in walking or cycling distance from their homes. All together it will promote the improvement of quality of life of residents as well as the economic wealth of local businesses.

Following with the economic benefits, a sustainable transport system, meaning the improvement of connections within town and outside, coupled with the enhancement of touristic attractions in Penarth (historic and natural), will encourage visitors from the surroundings, as well as the installation of businesses in search of good well connected locations.

In following chapters it will be explained how this sustainable transport system could be achieved in Penarth.

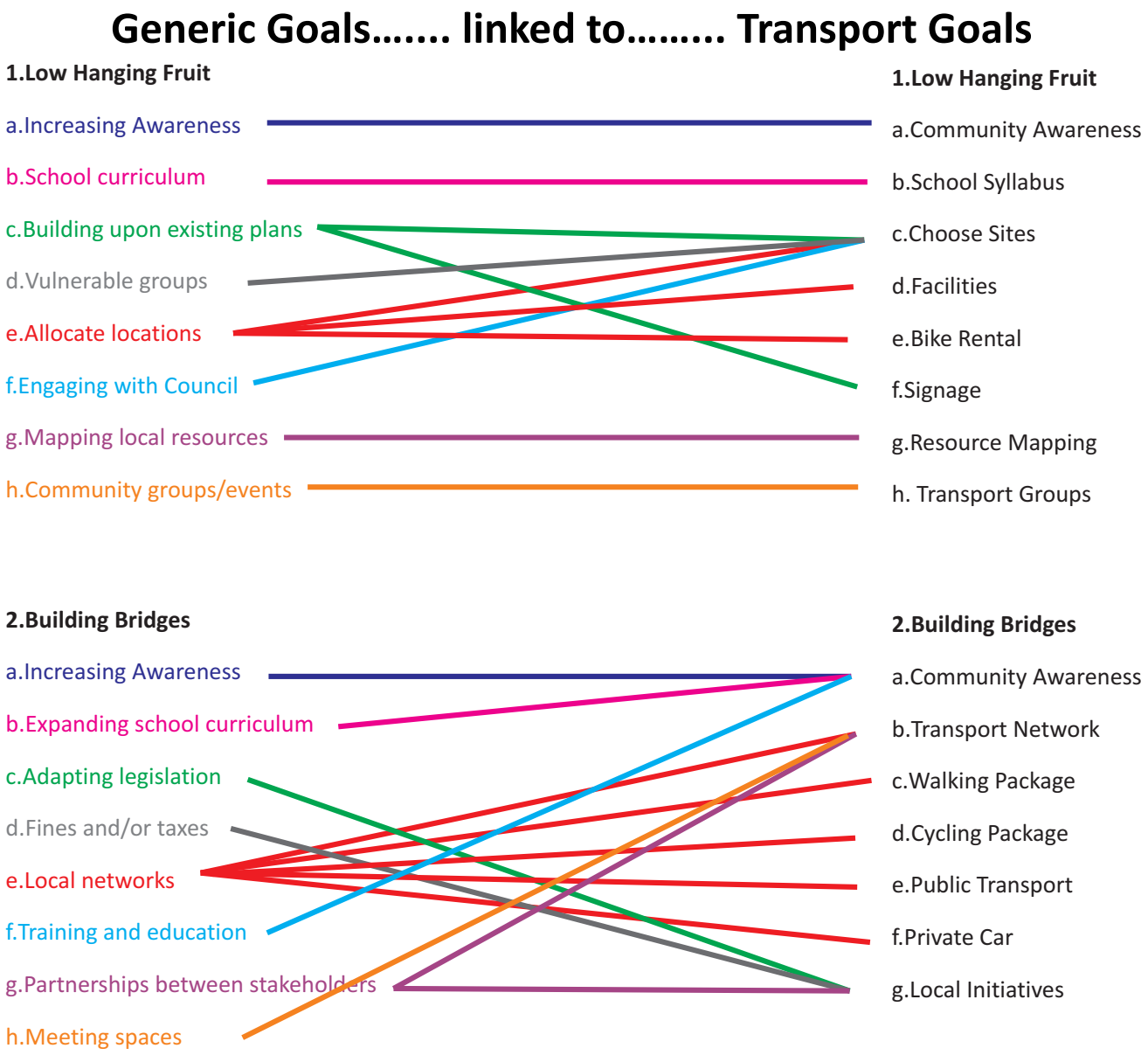


Figure X Generic goals linked to transport goals

Low Hanging Fruit **Selecting small, achievable steps which set the foundation for Penarth's transition to a sustainable town**

Transport - GOALS



1) Community Awareness



2) School Syllabus



3) Choose Sites



4) Facilities



5) Bike Rental



6) Signage



7) Resource Mapping



8) Transport Groups

TOOLKIT



Community Awareness

Similarly to food this stage is all about organise activities and events that promote sustainable transport and discuss on going and future plans. This will also be achieved through the setting up community groups where information can be shared, and organisation of events and initiatives. These events and groups could be multi-purposed, for example promoting both local food and new cycle lanes in one go. Make schemes and systems visible and accessible, through frequency of options and signage.

At this stage, the benefits attributed to sustainable means of transport should be promoted through an engaging collection of reports, leaflets, exhibitions, posters and promotional material.



School Syllabus

Introduce the concepts of sustainable methods of transport and their benefits. There should also be education of the positive aspects of a more active transport system. There are the obvious environmental benefits to both these schemes, but it is important to remember other benefits such as a healthier lifestyle. These issues should be related to students at a young age so they become second nature as they grow up. Also, develop 'Safe to School' walking schemes for local schools, where children can safely walk to and from schools.

If the educational process is geared towards encouraging young people to make decisions for themselves then Penarth's youths need to be equipped with the skills and knowledge that will enable them to do so in a sustainable way (www.scotland.gov.uk).

At this stage sustainable transport methods should be included within the existing curriculum. Penarth's schools may like to (www.caerphilly.gov.uk):

- Develop a School Travel Plan
- Implement a road safety awareness programme for pupils
- Map pupils routes to school and collate onto one large map
- Discuss the impact of different modes of transport and their impact on the environment
- Undertake a green transport survey
- Run cycle proficiency training
- Set up a walking bus or cycle train

These are designed to introduce students to the concept of sustainable transport and provide them with the necessary foundations to make informed decisions later in life.

Once introduced into the existing curriculum the same themes should be developed further at each stepping stone. As the schools expand their curriculum in response to the changing needs of the world around them these themes of sustainable transport should become a key factor in a core module directed at sustainability.



Choose Sites

Locate and develop existing cycle lanes and propose routes for new ones. These should include all major roads, and increase access to key areas and destinations, such as public transport nodes and routes to Cardiff. Disadvantaged areas should be highlighted, in terms of access to transport and new public transport routes proposed to the council. Roads should be highlighted for stricter speed limits to create safer cycling conditions. Increasing car parking fees in the town centre will also help to reduce car density.



Facilities

Facilities should be installed that make active transport easier and safer. This can include:

- Cycle racks on all train stations (Penarth Central, Dingle Rd, Cogan), and
- Cycle racks in front of all public buildings (library, schools, etc.).

The construction, installation, and maintenance of these facilities can create business opportunities if done by local people.



Bike Rental

There are many examples of successful bike rental schemes, in the UK and abroad. They can be extremely effective if they are done well. A cost effective system with different pick up and drop off locations becomes an attractive option to people going short, or medium, distances. If Penarth developed multiple nodes throughout the town where people could pick up a bike and cycle to the other side of town, without hassle, it could dramatically reduce the number of cars. The success of this scheme is also dependant on a network if cycle lanes. There is currently a bike share scheme in Cardiff called ‘OYBike’. This could be an example of how to develop a similar system.

Start introducing bike rental schemes to enable a steady transition. People would be able to choose when to use the bikes and get familiar with the idea of using them as an alternative means of transport. Penarth should place these initial schemes in highly visible and oft used locations to ensure the concept is known to a significant proportion of the community. The train station would be a good example of this. This strategic location also means that the people in the area are travelling from A to B and will therefore appreciate the offer of an alternative, perhaps more cost effective, means getting there. Furthermore, Dingle Road Station, Cogan Station, as well as the Pier, Barrage South and Windsor Road should be within the bike sharing network.http://www.oybike.com/oybike/cms.nsf/Home



Signage

This is also linked to raising awareness, showing people what is available and where to find it. These signs should be for things like:

- Secure cycle lanes and visible racks (not hidden behind fences/buildings)
- Walking routes
- Public transport nodes

An example of how these signs could be used is: linking Cardiff Bay Trail with “Penarth Trail” (Barrage to Pier) through signage.



Resource Mapping

A database and maps of transport routes and nodes should be widely accessible. The detailed information should be visible at locations:

- On site
- Online
- In leaflet/map form for people to keep



Transport Groups

Through community groups people can organise regular car sharing schemes. There are many examples of successful car rental schemes, in the UK and abroad. They can be extremely effective if they are done well. A cost effective system with different pick up and drop off locations becomes an attractive option to people that either decided to not own a car or that cannot afford to own a car.

http://carshare2cardiff.com/x.jsp;jsessionid=1881EFBB9F14CDE46A70D2B556FBE4D6?ano=0

Building Bridges **Providing the necessary space, freedom and funding to allow projects, plans and strategies to come to fruition**

Transport - GOALS



1) Community Awareness



2) Transport Network



3) Walking Package



4) Cycling Package



5) Public Transport



6) Private Car

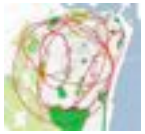
7) Local Initiatives

TOOLKIT



Continued raising awareness

Here a continuation of awareness campaigns, promote schemes, promote success so far, and the explain benefits. 'Community events and training should all be regular occurrences. The websites and databases should be up and running and route maps widely distributed.



Transport Network

A network should be emerging that incorporates walking, cycling, and public transport. At this stage, introduce new sites and routes for the schemes. These networks are communicated in the form of maps available in a number of forms, as mentioned. There is an example in Australia where the council have developed sustainable transport system. It provides guidance on, and promotes, walking, cycling, public transport, and car-pooling. Information can be seen on their website:

http://www.ballina.nsw.gov.au/cp_themes/default/page.asp?p=DOC-YJD-88-27-82&c=387



Walking Package

Develop new walking routes, extending into new areas creating links between areas of the town. For example, extending "Penarth Trail" to other parts of town (e.g. the Pier, Cosmeston Lakes)



Cycling Package

There should now be bike services (maintenance) at all train stations (Penarth Central, Dingle Rd, and Cogan). Cycle racks should be installed in front of all office buildings. Cycle lanes on major roads are separated and continuous. Extend cycle lanes to smaller roads in order to move between all public nodes (library, school, and the pier). Extend street based bike rental (at all large transit stations, bus stops, in front of public buildings, important nodes in the town).



Public Transport

There should be improvements made to the bus timetable in terms of frequency and timing. They should be extended into areas where, at this time, there is still limited access. There should also be allowances for bicycles to be taken on all forms of public transport. (Bus+Cycle) Proposals should be

made to the council for the conversion of buses to carbon neutral technology, such as hydrogen power.



Private Car

The car share program is now developed further, with more pick up locations and methods of communication between members. The numbers of car parking spaces, at locations such as the train station, are reduced. Extend the speed limit zones to the areas where cycle lanes are being developed.

Local Initiatives

Initiatives can be set up to effect change and promote new ideas throughout the town. If you have a great idea, don't be afraid to start a process that will make it happen. Many of the steps already outlined could be could forms of initiatives, for example walking schemes, cycle to work schemes, and car sharing. Work with the council to alter planning rules and develop sustainable transport network.

Chequered Flag **Taking the final steps towards the finish line and 'the vision'**

Transport - GOALS



1) Full Capacity



2) Walking Package



3) Cycling Package



4) Public Transport



5) Private Car

TOOLKIT



Transport Network

The network should be complete, connecting all areas of the town with multiple methods of sustainable transport.



Walking Package

Walking routes are extensive, well signed, and accessible. There could also be an extension to other walking routes in the Vale of Glamorgan, for hiking ('The Penarth Trail'). For example, in Holland they have walking events to promote healthy living. (Nijmeegse 4daagse-Nijmegen - 4Day Marches)



Cycling Package

Collaborate with businesses to implement changing facilities in all office buildings. Also, suggest the idea for companies providing a cycle scheme for their employees. Specific cycling route maps of Penarth (complete cycling network to go from A to B safely: based on destinations, site network, street gradients, safe routes, scenic routes etc, bike rental, bike service, racks etc) To overcome issues with the steepness of terrain there could be construction of bike elevators. An example of this being done is; **http://www.trampe.no/english/**



Public Transport

Cycle racks installed in front of all bus stops and train stations. With the development of renewable/ carbon neutral transport, it should now be feasible for all new buses to be CO2 neutral.



Private Car

Cars are only used when it is necessary, and car sharing is a regular occurrence. All new purchased cars have to be CO2 neutral.

Chapter 5

The Design

From concept design to detailed design solutions: Implementing theoretical ideas in a real life situation

This project has undergone three phases: context, concept design and detailed design solutions. While the first phase, already discussed in the report of episode 1, has analyzed Penarth with all its problems, challenges and positive aspects, the attention of the second phase, the concept design, lies on the establishment of a theoretical model, which forms the foundation of our work. This theoretical design model explained so far has been materialized in a detailed design project as a mere example of how the developed theory about urban sustainability could be practically applied to the reality of Penarth. Similarly to the toolkit (chapter 4), the design project focuses on the issues of food and transport, more specifically active transport, i.e. cycling and walking. Both subjects, food and transport, have been developed together. As an example of how the development of different toolkits should be done in relation to each other: Employment, governance, waste, energy, and water, they all have been considered within the subjects we have addressed. They do all interrelate and links should always be made between them.

All those aspects should be taken into account when fully defining and applying toolkits for every subject. For now our design project has focused on applying both food and active transport, and to do that two scales have been



Figure 15: Important nodes in the centre of Penarth (source: authors)

considered with a different but complementary approach: The scale of the town as a whole, and the scale of a site.

5.1 The urban scale

Accurately predicting Penarth's progression through the three stepping stones would be quite unrealistic. The urban environment is an ever evolving reality and although we have defined a vision for the future of Penarth and a toolkit to achieve it, the pathway that the town will follow will be only known when walking it.

At this very moment what is in our scope is to initiate, or suggest a starting point for that pathway with a design proposal for the Low Hanging Fruit phase.

As explained in previous chapters, the Low Hanging Fruit phase is about '*targets/goals which are easily achievable and which do not require large amount of work'.* In the first step existing and potential routes and locations in Penarth need to be identified. Three sites are chosen according to their specific asset, their strategic location and the potential to connect existing and interesting routes (Figure 15).

These three spots configure a triangle defining an incipient network where functions related to the topics of food and public transport are located and interrelated. The existing routes that the network connects extend outwards beyond the limits of this first phase scheme which may facilitate a wider second phase network, as well as the connection with Cardiff.



Figure 16: Important nodes in the centre of Penarth (source: authors)

The nodes, and the existing routes related to them, are:

- *The train station* - a pass by location for visitors from outside town and commuters from Penarth by train, and a link with the hidden path to Cosmeston Park
- *Barrage South* - connects to Cardiff Bay and its trail for cycling and walking, and to Cardiff city center by waterbus
- *The Pier and Pavillion* - with the esplanade and the path along the cliff

From these starting nodes the network is developed as follows:

Active Transport

Three main routes are proposed to interlink the three nodes, with three different characters and speeds. A signage scheme and an information map available to the public will be key to boost these routes.

A scenery walking route extends the existing 'Cardiff Bay trail', that nowadays stops at Barrage South without further indications, towards the top of the cliff in Penarth, the Pier and the Esplanade, across Alexandra Park and ending at the train station for an alternative route back to Cardiff. A leisure stroll for locals and visitors to admire views, and enjoy historic features in town.

A more direct walking route connects Barrage South with the center of Penarth and the train station.

A cycling route continues an incipient cycling lane, following streets with more adequate gradients for this means, connects Barrage South with the town center and the train station and beyond that, the path to Cosmeston Park, another route to extend the existing 'Cardiff Bay trail'.

The role of the nodes is to concentrate services and functions, pit-stops with attractive character in themselves

- a bike sharing scheme have their first locations at these three spots, boosting the use of bikes in the surroundings of the spot and through the routes between them
- a bike service next to the train station promotes the use of this means.
- racks are distributed along the network related to different interesting spots

Food

Sites to allocate functions related to the food toolkit have been carefully chosen in a way that they are related to the active transport network, reinforcing its entity by providing spots of interest for the community.

The following is an explanation of why each site has been chosen:

Site One - This is an empty square plot of grass that seems to be unused. This could be a site where some new planting could take place. An approach to the council should be made to council for permission, rather than 'guerrilla gardening' the space. Even if you only get permission for a small portion of the land, it is a starting point to develop from.

Site Two - This site is a location where there are already allotments in place. Communicate with this group, if not already, to develop the site further and work with them on other projects/goals. Groups who are already on board with the general principles are likely to be helpful for other projects such as community awareness events, developing markets, and training. If the people who take care of these allotments are not already in a gardening group, then suggest starting one. As these groups and sites grow, the idea of paying a gardener to develop the projects further can be achieved.

Site Three - This is very similar to site 2, in that there are already a group of allotments. It is fairly close to site 2 so could be considered as part of the same group, or developed separately. Sites 1, 2, and 3 are all along, or just off, the cycle route proposed. This makes them widely accessible, and in a perfect location for people returning home from Cardiff, or other.

Site Four - This site has been chosen for its central location within the surrounding community, and the available land. There is currently a playground and bowling green, with some unused land adjacent. Therefore, the site is already attracting a wide range of age groups, meaning a community garden at this site would have many benefits other than just producing food. A small amount of land converted to growing vegetable would attract attention from the people who already use the area, raising awareness. Also, the central location makes it an easy spot for other people to walk past and see what is happening. The site is also on the walking route proposed.

Site Five - A section of Alexandra Park for growing could be difficult to obtain, but the benefits would be vast. It is currently, a very nice park with walkways gaining access to different areas of the town, and has sporting activities nearby. The purpose of this site would be an education and tour space where people could come and learn about growing and enjoy spending time. There is space at the side of the current park for the development of this kind of garden. Due to its location, it can be a real hub of activity, a place where members of the community can meet, spend time, and learn about organic food growing. The site already has great access, but this will increase further as the walking network is developed.

Site Six - There is currently a walking path located where the old train track used to be. It is somewhat hidden, but is already a great walking spot. It is proposed that this could be planted with fruit trees to create a community orchard, as well as the berries that already exist. The result would be a beautiful walk through an orchard that stretched the length of the town. This fruit could be widely available for whoever wants it, or collected by groups to make food stuffs, for example jam. As the stepping stones develop, an application could be made to certify the fruit, so it could be sold at the markets. It could also be used as part of the box schemes people sign up to.

Market One - There is currently a farmers market held at Westbourne school every fourth Saturday of the month. This is an ideal place to start development because they already have permission to hold it. This market could be increased in size by attracting new sources of food, and organising new stalls that sell cooked products made from local food. As the market becomes more popular, the next step is to hold it on a more regular basis. As the number of stalls increase, there can be development of new locations.

Market Two - The pier has enormous potential, and was historically a popular destination and meeting space. It has been highlighted as an area that needs redevelopment. One suggestion is to start a farmers market to bring people down to the water front. With the improved walking and cycling routes the market will be ideal method for this. The market could have its own specialties, such as sea food. As with all these projects, there will need to be applications made to the authorities. However, if the correct tools (e.g. sustainable communities act) are used in doing so, this idea could become a reality.

Market Three - With improved access by bike and foot, this site could be redeveloped to create a community hub. One idea is to create a regular farmers market in a central square. It is in the perfect location because people can access it through many modes of transport, and is in the centre of town. As the site develops, the link can be made with the orchard through the old railway line, ‘berry path’, and through to Alexandra park.



Figure 17: Aerial view of the site in front and around the train station (source: google.maps.com)



Figure 18: Car park in front of train station (source: author)

5.2 The Site

The space in front and around the train station has been chosen as the site. The aim is to regenerate this area according to the theoretical concept explained in chapter 3 and 4. Although the project aims to implement the principles, common goals and targets at this specific site, it can be considered as a large urban intervention, given that the connections to several important parts in town that are created extend the impact of the intervention to a wider area in Penarth. Having chosen the scale of a relatively small site enables us to illustrate how this certain location could evolve through the three stepping stones to include services and activities related to food and active transport. Before diving into the design process/solutions, a thorough analysis of the current situation demonstrates the weaknesses, strengths, opportunities and threats of the site. This careful investigation, in combination with the academic framework and the theoretical concept, enables us to develop design solutions that eventually will lead towards a *Green Town Square in social, economical and environmental balance.*

The following sections illustrate each of the three stepping stones of transformation of the space, from car-park towards the Green Town Square. The timing of these steps is not set, as that could change depending on many different factors such as economical feasibility, land property, willingness of neighbours etc.

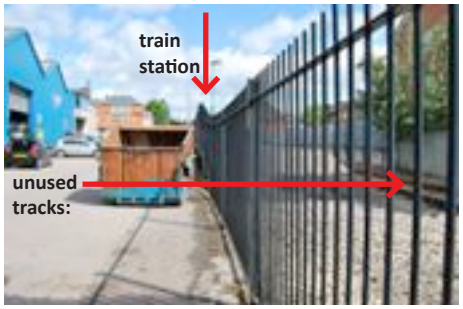
Analysis of current situation (Figure 21)

What is possibly the only well delimited and wide urban space in the center of town that could be called a square, surrounded by attractive cafes and shops, for its extension capable to gather all sort of activities and events, and the first

Figure 19: Area in front and around train station (source: author)



Backstreet parallel to station and tracks



Backstreet running parallel to unused tracks



Entrance to path

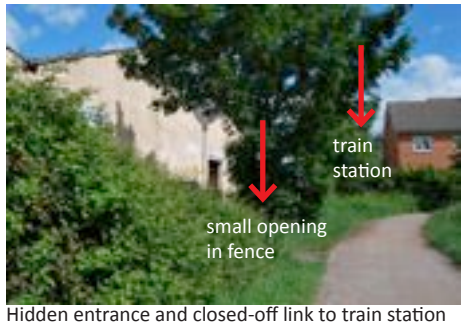


Entrance to path





Hidden path, walking and cycling, delineated with berries substitutes what once was the old railway line



Hidden entrance and closed-off link to train station



Existing flora and fauna

impression for those that arrive by train to visit Penarth, this location is nowadays consigned to remain as a car park (Figure 18).

This relatively central position and the easy connection from here to any other location in town, either by walking, cycling or by public transport (i.e. the obvious train station and several bus stops around the area), makes of it a very interesting site with a huge potential, although currently some of those connections are awkward or not existing, as it is explained below.

Opened in 1878, originally the train line ran through Penarth connecting it with other stations such as Lower Penarth (Cosmeston Park), Lavernock, Swanbridge, Sully and Barry Island. However, in 1968 this line was closed leaving a corridor of unused tracks behind which have partially been converted to a walking path. Nowadays, the train line ends at Penarth Railway Station, where the old tracks extend uselessly about 100m beyond the stop line. Currently, this space is surrounded by a high steel fence which makes any direct connection to the other side of the tracks impossible (Figure 19). Not only does this fence create a spatial barrier, it also acts as a visual barrier between the train station and the center of the town as well as the pier.

Following this fence southwards to the end of the unused tracks, a hidden path delineated with berries substitutes what once was the former rail line continues all the way down to Cosmeston Park. Although a perfect cycling and walking link to lower Penarth, this path is not well integrated in the urban fabric as it is very well hidden from the rest of town. Arriving at the train station, first of all one needs to know that this route exists and second of all one needs to desperately search for an entrance which neither makes it easily accessible nor inviting. However, once the entrance is found, an attractive route with many trees, wild growing bushes and berries can be discovered

(see picture). For about 2 km this route can be used without sharing it with cars or other fast traffic modes, which makes this path ideal for walking and cycling. If it would be more accessible, it could serve as an important route to connect Lower Penarth with the train station.

Alexandra Park could serve as another important route to connect the train station with the Pier and the Esplanade. However, here we find a similar situation where on the back side of the fence, a path sneaks between buildings on its way to Alexandra Park and from there down to the Pier. Due to this fence a direct accessibility is made impossible. Nowadays, to arrive to this pathway from the train station an indirect route has to be taken but due to its hidden position only a person who has been informed of its existence will arrive to use it (Figure 21).

Furthermore, we noticed that currently there are neither outside spaces (i.e. terraces), waiting areas nor meeting spots around the station. When arriving by train, a narrow sidewalk of about 1.5m just outside the train station hall welcomes visitors and commuters. Although the space would be ideal to be a town square, it is now dominated by cars where pedestrians and cyclists are disadvantaged. Apparently the owners of the cars parked here are mostly locals commuting to work. By encouraging and boosting active transport (i.e. cycling and walking) it will become more convenient for people to move around the town, and eventually it will prevent commuters from driving their cars for short distances.

However, we are convinced that this area has a lot of potential as the overview of our SWOT analysis indicates (Figure 20). A new sustainable design concept which sustainably regenerates the square gradually from car park to a green town square would not only have a positive effect on social and environmental aspects, also economical factors will benefit from this intervention. Not only pedestrians, cyclists, locals, commuters and tourists, but also the allocated shops and cafes would profit from this urban regeneration.

Strenghts	**Weaknesses**
• Important node in Penarth's transport network • Situated in centre of town • Strategic location (short distance to many other places) • Many shops, cafes, galeries, hotels in and around the station • Situated next to Alexandra Park and pathway to Cosmeston Park (which used to be old railway-track) • Due to urban density, ideal for a town square	• Car park (parking space for 47 cars) • No meeting/waiting area infront of station • Disadvantaged groups: pedestrians & cyclists (no facilities such as cycle lanes, only a few nondescript racks inside the station) • Fence around the tracks create a spatial and visual barrier • Isolated from the rest of town
Opportunities	**Threats**
• Town Square • Promoting active transport (cycling and walking) by providing meeting space & waiting area infront/around station, cycle lanes, shared-bike-sheme (interesting for tourists/short term visitors), bike service, secure cycle storage) • Link with Alexandra Park, the Pier and Cosmeston Park • Extension of pathway to Cosmeston Park • Promoting food • Space for community events such as farmer's market, food fares, concerts, etc.	• Economic feasibility • Land property • Willingness of commuters • Willingness of neighbours • Willingness of council

Figure 20: SWOT analysis of the area in front of train station

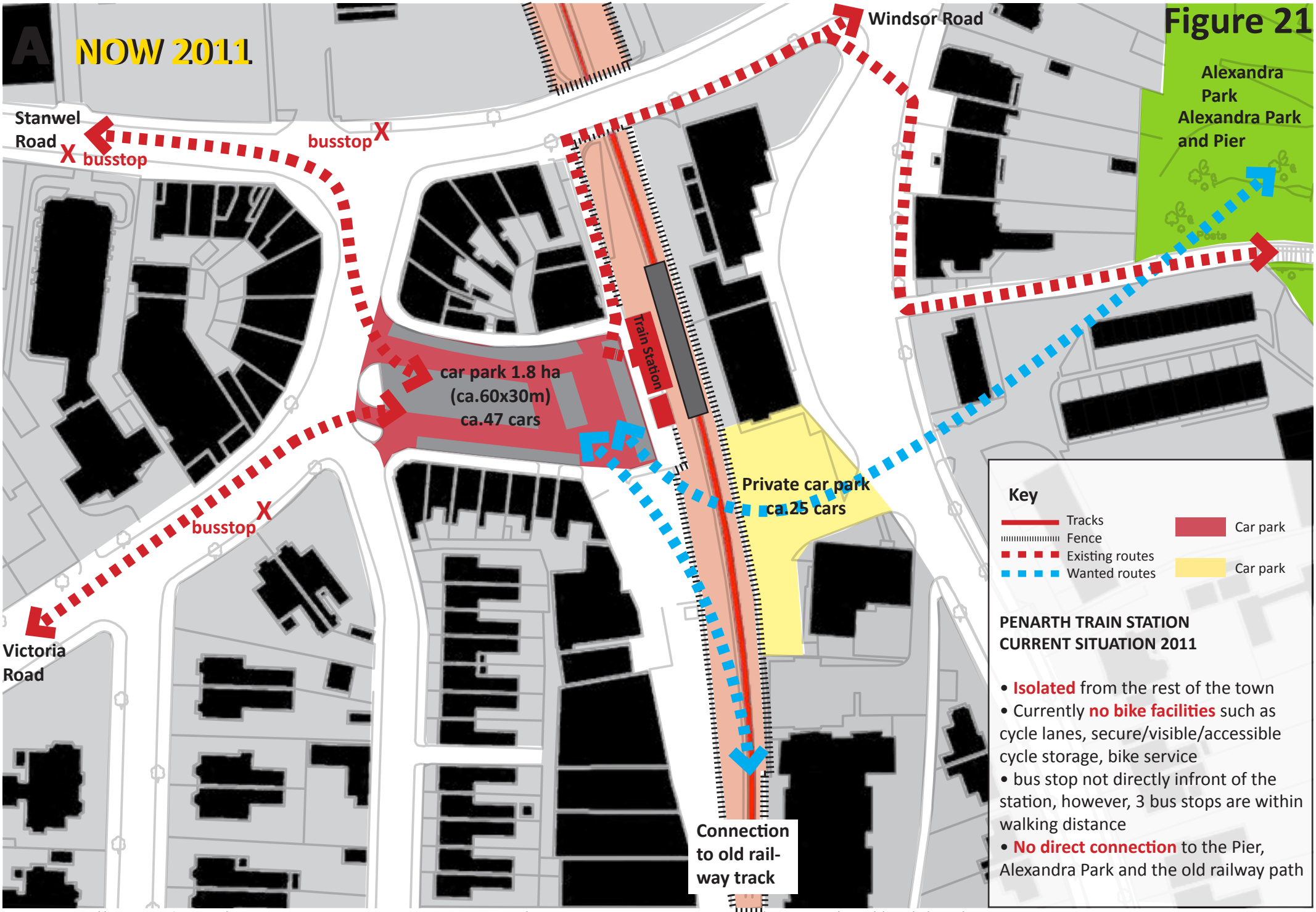

A
NOW 2011
Figure 21
Windsor Road
Alexandra Park
Alexandra Park and Pier
Stanwel Road
busstop
busstop
busstop
busstop
car park 1.8 ha
(ca.60x30m)
ca.47 cars
Train Station
Private car park
ca.25 cars
Victoria Road
Connection to old rail-way track
Key
Tracks
Fence
Existing routes
Wanted routes
Car park
Car park
PENARTH TRAIN STATION
CURRENT SITUATION 2011
• Isolated from the rest of the town
• Currently no bike facilities such as cycle lanes, secure/visible/accessible cycle storage, bike service
• bus stop not directly infront of the station, however, 3 bus stops are within walking distance
• No direct connection to the Pier, Alexandra Park and the old railway path



Figure 23:
1. Wind park



FIgure 24:
2. Photovoltaic field



FIgure 25:
3. Community Garden



FIgure 26:
4. Apple Trees



Figure 22:
Current situation (car park)

Generally speaking, there are many different design approaches possible as can be seen on the examples on the left. We are convinced that there is not only one right answer to solve a problem.

However, our approach is based on a holistic idea of sustainable urban regeneration according to our theoretical design concept as explained thoroughly in earlier chapters. The implementation takes part in three main stages according to the stepping stones and the toolkits. Starting with the *Low Hanging Fruit* phase, developing it further with *Building Bridges* and eventually finalizing the design according to *Chequered Flag*.

Furthermore, our proposal aims to integrate the two subjects of Transport and Food, by introducing an alternative solution to the private car and by initiating a communal space where the local production of food is visible and accessible to all groups of people. We consider the area in front and around the train station highly suitable for this approach.

The Design Proposal - first stage

Low Hanging Fruit (Figure 27 and 28)

Selecting small achievable steps which set the foundation for Penarth's transition to a sustainable town

The regeneration of this highly potential urban space around the train station is divided into 3 main stages. In the first stage of regeneration, the Low Hanging Fruit phase, a small square of approximately 7x30m will be created in front of the station, differentiating it from the rest of the space by a soft pedestrian friendly pavement. This will give commuters a place to wait, locals a place to meet and tourist a place to arrive adequately (Figure 30).

Cycling and walking regarded as active transportation modes will be promoted by introducing several measures as already explained in Chapter 4. These are representing a few examples:

- visible bike racks (not hidden behind a fence/building)
- Bike-sharing-scheme (in particular attractive for day-tourists)
- Bike service shop (integrated next to the train station hall)
- Benches (sitting areas)
- Green spaces, including spaces for growing food (e.g. apple trees)
- Cycle lanes on all roads directly linked with the train station

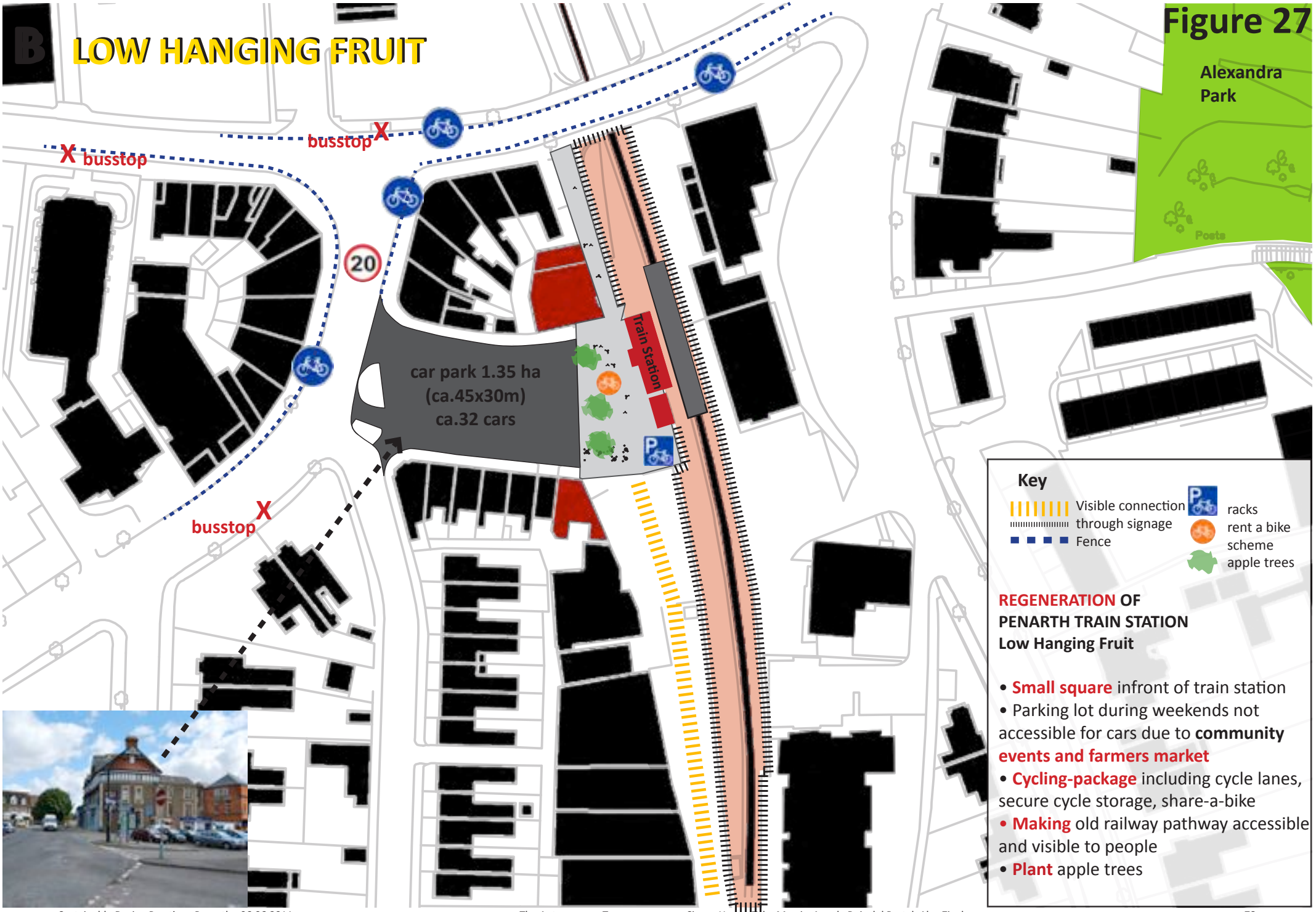
Only 15 parking spaces will have to be removed in order to implement the toolkit of the first stage. During the week the rest of the car park will remain accessible, but on weekends the whole space will be car free, so community gathering events and the farmer's market can be held at this spot.

The shops and cafes around the space will already benefit from this new configuration. In particular, the café at the corner will profit from this design already as it can be used for an outside terrace as well. Moreover, during weekends the other shops may see their sales going up due to the attraction of this new space and its community events. Where people used to rush by to catch a train, people gather and remain.

The hidden pathway beyond the railway tracks will be visible through signals and accessible to people that will be able to rent a bike at the very new square or just stroll covering the route all the way down to Cosmeston Park.

LOW HANGING FRUIT

Figure 27



Key

- Visible connection through signage
- Fence
- racks
- rent a bike scheme
- apple trees

REGENERATION OF PENARTH TRAIN STATION
Low Hanging Fruit

- **Small square** infront of train station
- Parking lot during weekends not accessible for cars due to **community events and farmers market**
- **Cycling-package** including cycle lanes, secure cycle storage, share-a-bike
- **Making** old railway pathway accessible and visible to people
- **Plant** apple trees

LOW HANGING FRUIT

busstop

busstop

busstop

20

During weekends:
communal space/
community food events/
farmer's market

Train Station

Alexandra Park

Figure 28



Key

- Visible connection through signage
- farmers market
- racks
- rent a bike scheme
- apple trees

REGENERATION OF PENARTH TRAIN STATION
Low Hanging Fruit

- **Small square** infront of train station
- Parking lot during weekends not accessible for cars due to **community events and farmers market**
- **Cycling-package** including cycle lanes, secure cycle storage, share-a-bike
- **Making** old railway pathway accessible and visible to people
- **Plant** apple trees



Figure 29: Current view of car park in front of train station (2011)



Figure 30: Design Proposal - **LOW HANGING FRUIT**

Second Stage

Building Bridges (Figure 31 and 32)

Providing the necessary space, freedom and funding to allow projects, plans and strategies to come to fruition

At this second stage the square extension is increased but what is more important, the existing fence as well as the useless end of the railway tracks will be removed and the square will be directly connected to the pathway towards the South. At the same time a direct connection to the other side of the tracks will be possible, requesting from the hotel permission to cross their terrain towards the pathway to Alexandra Park, adequately indicated.

With the extension of the square, the parking space will be again slightly reduced. The scheme of car-free weekends for events will continue and the cycling package will be improved with more cycling lanes, secure cycle storage and continuing with the share-a-bike scheme (providing more bikes, introducing more locations)

In a second sub-phase within this Building Bridges the greenery in the new extended square will be increased with more apple trees planted here. Fruit trees will be also planted all along the new stretch of the path towards Cosmeston Park, while extending and taking care of existing berries. The council will buy the terrain from the hotel to convert the crossing leg towards Alexandra Park in public space. Part of the square, the pathway across the hotel's terrain and the berry-path will be conditioned with pedestrian friendly and permeable pavement. By reinforcing the pedestrian connection towards Alexandra Park, cultural facilities, cafes and other commercial spots, hotel included, once on a less frequented street at the back of the train station will see their status changing to a main walking route, increasing their public and consequently benefiting their businesses financially.

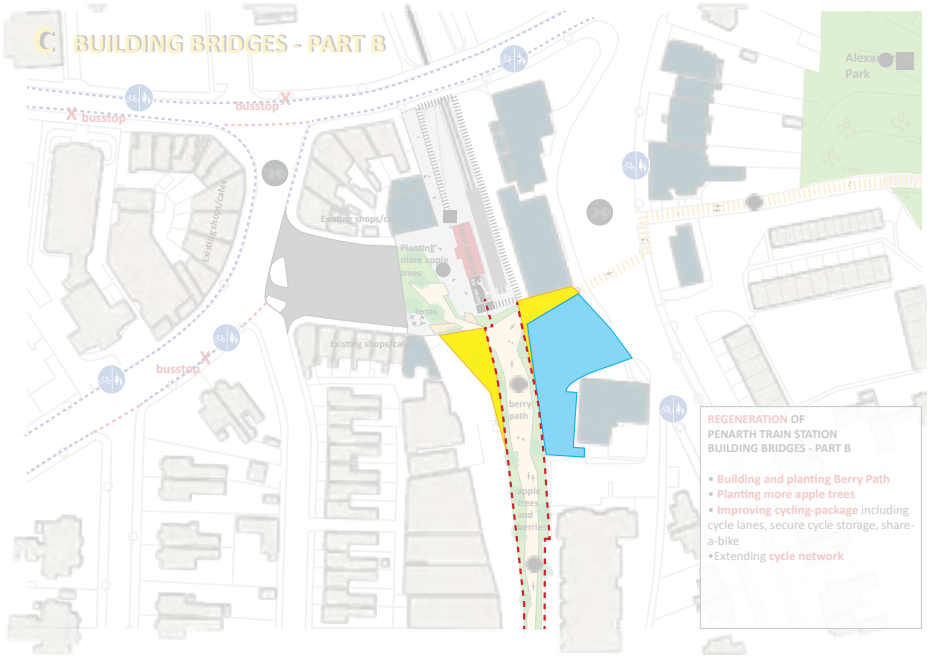


Figure 33: Providing the necessary space (Building Bridges)

BUILDING BRIDGES - PART A

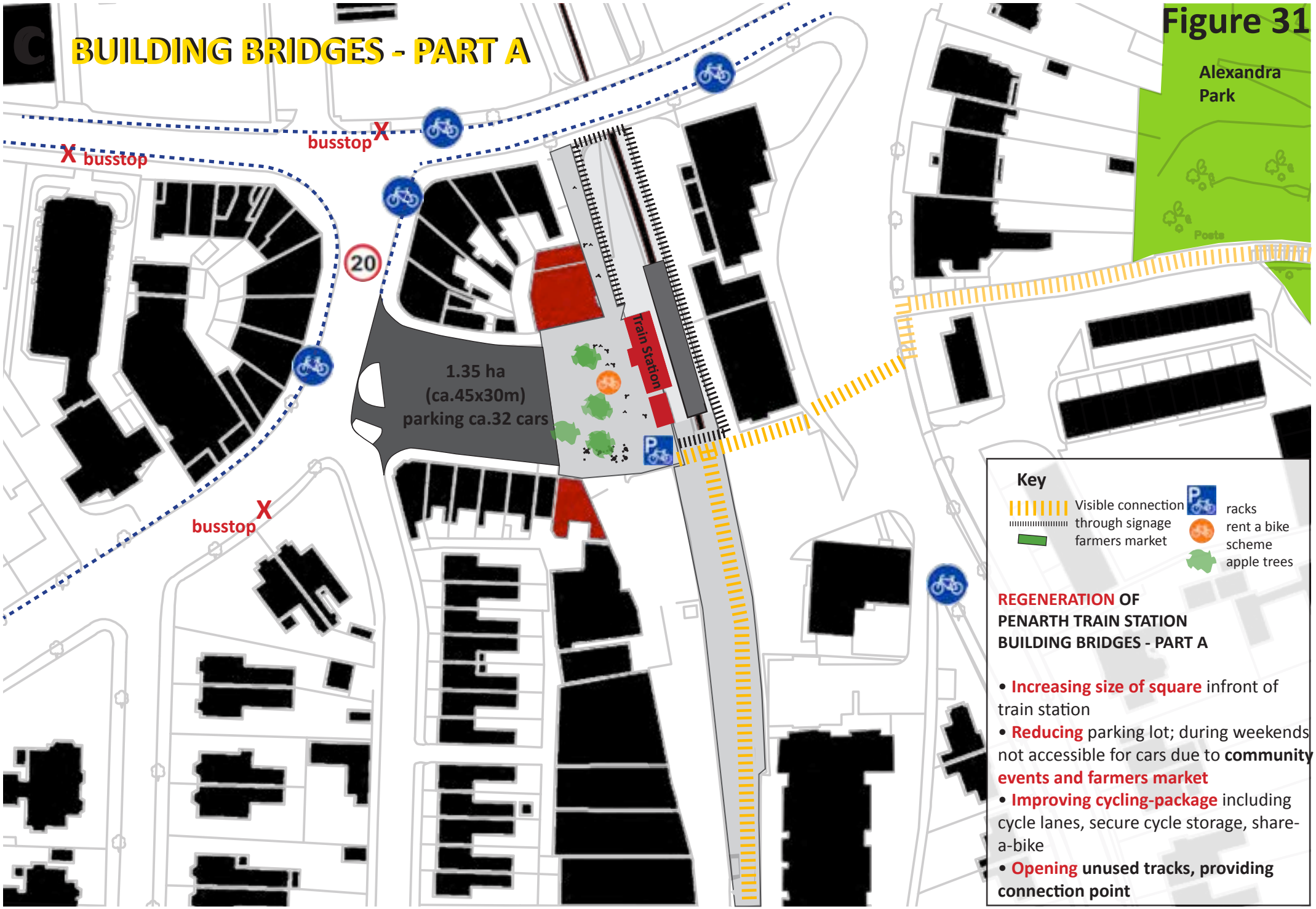


Figure 31

Key

- Visible connection through signage
- farmers market
- racks
- rent a bike scheme
- apple trees

REGENERATION OF PENARTH TRAIN STATION BUILDING BRIDGES - PART A

- **Increasing size of square** infront of train station
- **Reducing** parking lot; during weekends not accessible for cars due to **community events and farmers market**
- **Improving cycling-package** including cycle lanes, secure cycle storage, share-a-bike
- **Opening unused tracks, providing connection point**

BUILDING BRIDGES - PART B

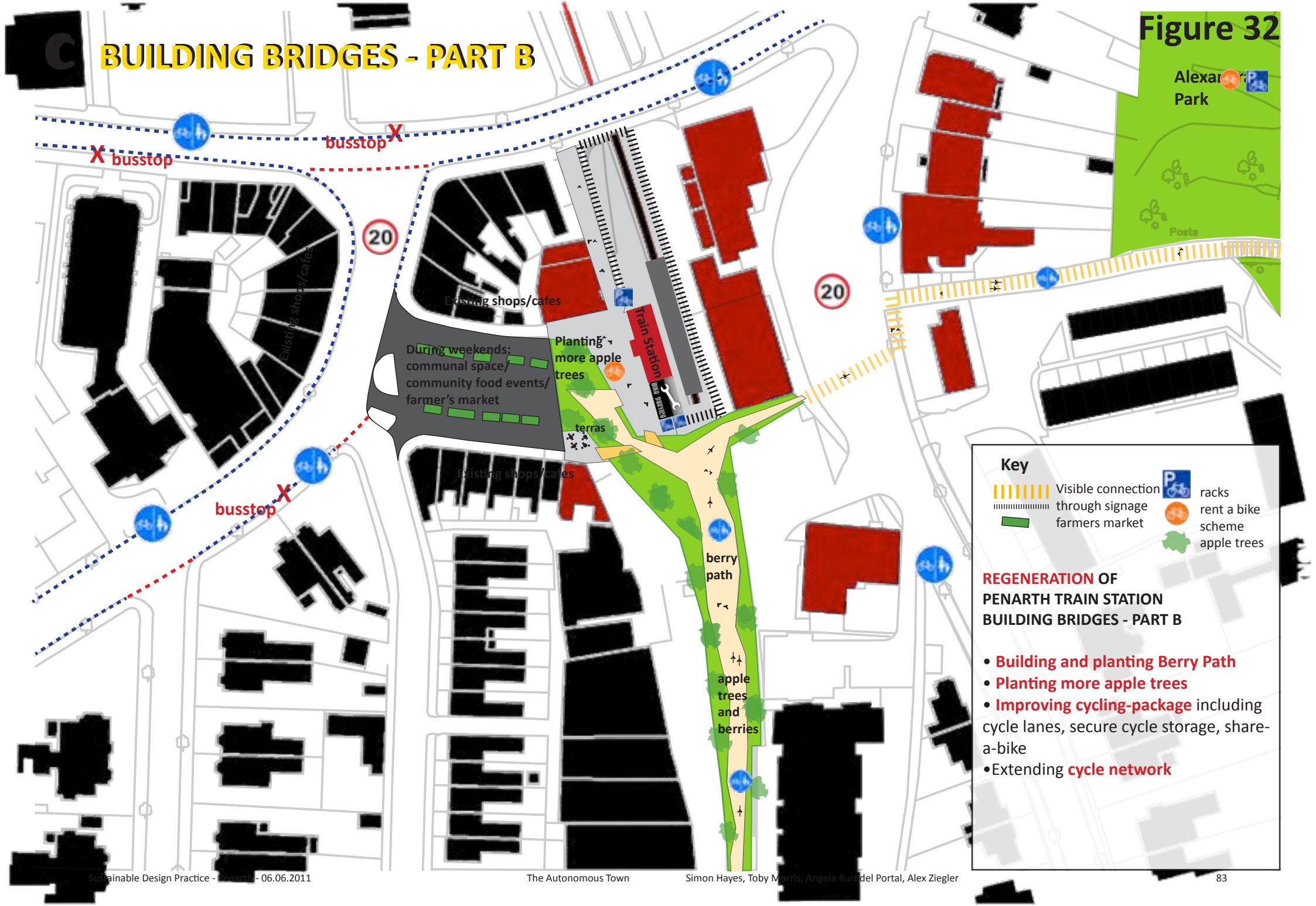


Figure 32

Third Stage

Chequered Flag (Figure 34 and 35)

Taking the final steps towards the finish line and 'the vision'

At this final stage will finalize the building of this green town square. Planted areas with apple trees, will surround a central open space for community events, including the now weekly farmer's market. The organic shape of the planted area will leave an irregular stripe on the edges with wider zones where cafes may lay their terrace any day, and shops will be able to set stalls during weekend's market if they want to. Benches underlying some corners will provide a meeting space for youngsters and elderly, encouraging social interrelation (Figure 36).

The connection from this point with Alexandra Park and beyond, arriving to the Pier becomes a well established route

The substitution of the original car park with this green town square and the connection from this point to the Pier and the Cosmeston Park will encourage the shift from polluting car use to cycling and walking, with the environmental benefits that this means, by providing a well established and convenient network. Socially, the regeneration of this area will provide a space for social events like the farmer's market, boosting social interrelation. And at the same time, the lively character of this new space will attract locals and visitors in a space for stay and relax, enjoying local products in the cafés and shops of the surroundings, boosting the economy of the area.

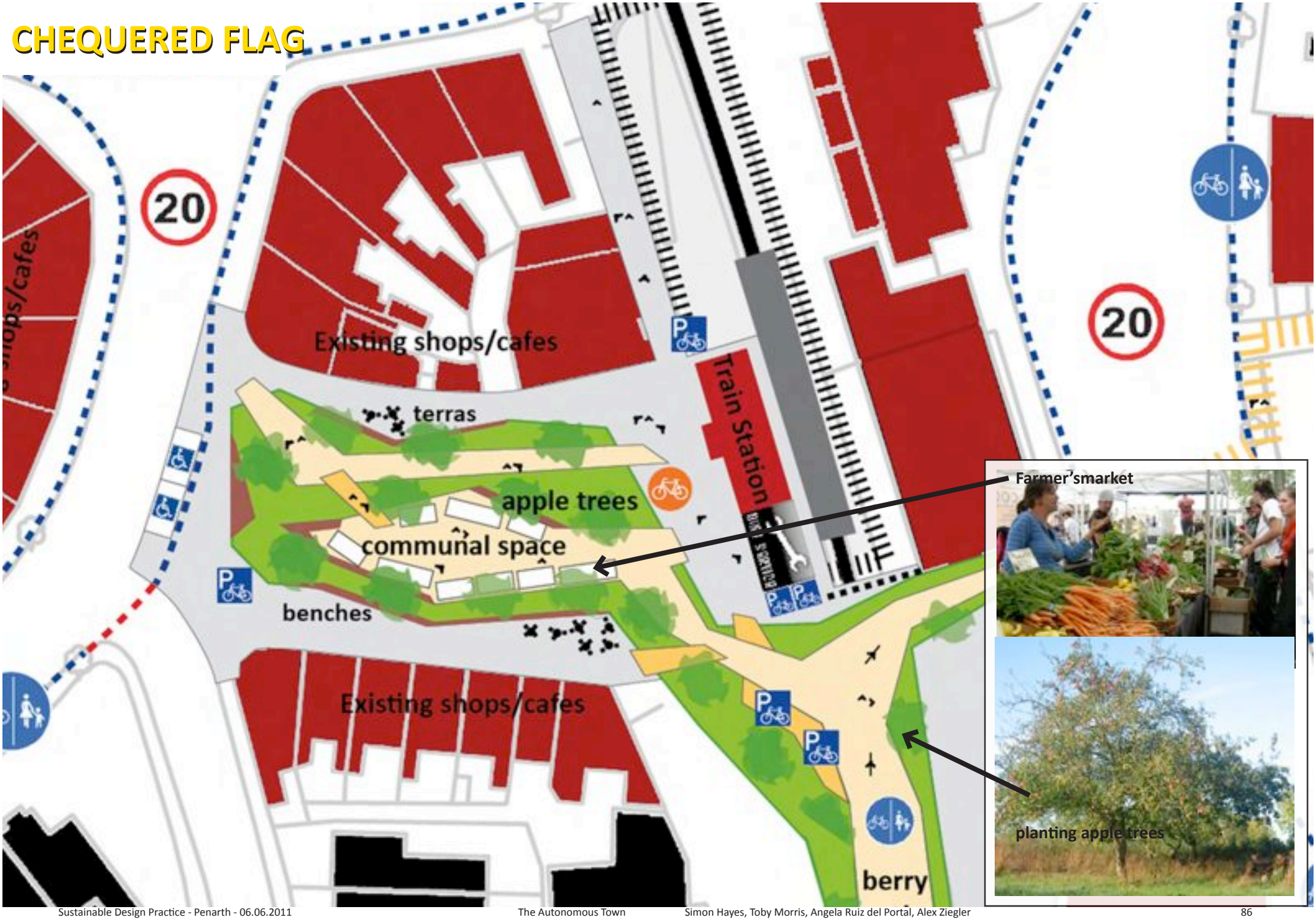


Figure 36: Design Proposal - **CHEQUERED FLAG**

CHEQUERED FLAG



CHEQUERED FLAG



Chapter 6
Conclusion

The aim of the project has been to provide the people of Penarth with a method of progressing to a sustainable lifestyle, through becoming more self-sufficient. There has been an emphasis put on creating a strong sense of community and social cohesion within Penarth, so that they can cope with possible environmental and economic problems of the future. To make Penarth more resilient to problems such as resource depletion, climate change, and economic contraction, the aim of the project has been to promote a more self-sufficient life style. This has been across seven main topic areas; Food, Transport, Employment, Energy, Waste, Water, and Governance. The initial sections of the report summarises background research on the concept of 'autonomy', as well as the findings from the first stage of the Penarth live project, so that a basis for our study could be grounded.

At this point in the project there was much discussion as to how to progress forward and what the end product would be. In other words, what would be given to the community that could help them in their journey. It was agreed that the kind of changes needed could not happen in quick succession, or all at once. There needed to be a stepped guide that would take them through the process in stages. This is where the decision was made to produce a 'toolkit', with our three stepping stones; low hanging fruit, building bridges, and chequered flag. Again, there was much discussion over whether to develop a toolkit for each individual subject, or use a few as examples so that they could be covered in more depth. It was decided that in the time frame available it would be more beneficial to do justice to the subjects taken forward, and then to use them as examples. To do this a set of generic goals for each stepping stone was developed that could be applied to any of the seven subjects. These generic goals were then used as a template to create the goals for the individual subjects; food and transport. The specific goals for the subject were laid out in the toolkits, and then an explanation given for each of how to achieve them.

To illustrate how these toolkits could be put into practice, a particular area of the town was chosen, and then illustrations of how the stepping stones would develop in these areas was carried out. Sites with high potential were chosen, as well as areas in need of development. This process was aided by the community meeting where sites were suggested by the public, for example the train station.

The toolkits are designed to be given to GPG, and then implementation is in their hands. As community groups develop throughout the town, in relation to the given subjects, the toolkits, or just the principles, can be distributed through these groups. However, it should be understood that these toolkits are not strict frameworks that must be adhered to at all costs. They are a set of guidelines suggesting the subjects that should be considered and how they might be achieved. The main point to take from this is being able to look at your community and see the opportunities, and to adapt and develop in this ever-changing world. Penarth needs to be flexible and reflect on the issues facing communities, and make changes to secure a sustainable future.

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THE AUTONOMOUS TOWN

With the world's natural resources depleting rapidly it is increasingly important for towns and communities to develop resilience to the challenges presented by the resulting social, economic and environmental climate. One approach to improving resilience is to reduce the dependency of the community on external resources and to increase self-sufficiency.





Our vision of Penarth as the Autonomous Town illustrates a community that has achieved this self-sufficiency; it illustrates a modern town that continues to think globally whilst prioritising and acting locally.

THE VISION

Penarth becomes a town:

- With car free zones for social interaction.
- With Community facilities and workplaces within easy walking and cycling distance.
- With a local resource database
- With farmers markets, meeting places and general community activities.
- With renewable energy production
- With 'Zero Waste'
- With low unemployment
- With a high quality of life



COMMON PRINCIPLES

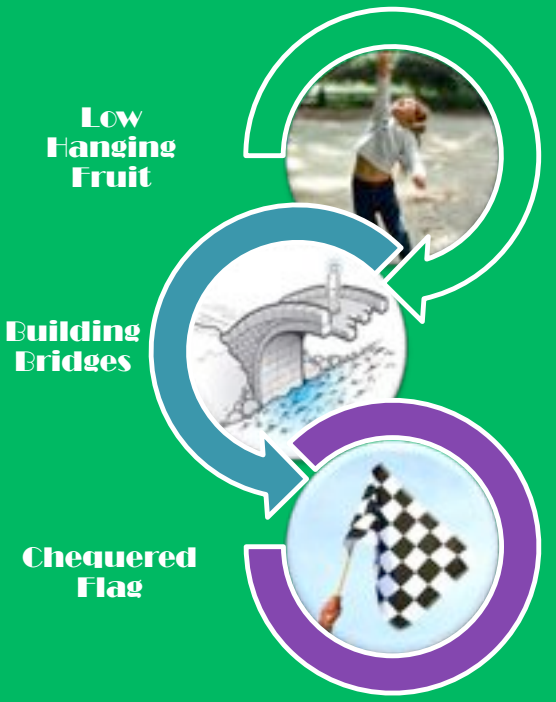
The following principles are fundamental to this vision:

- Increased community awareness and participation
- Increased focus on sustainability in schools
- Existing plans and strategies strengthened rather than forgotten.
- All plans and strategies clearly defined
- Disadvantaged/vulnerable groups identified and considered within all plans
- CO_2 emissions reduced
- Only what is available locally is used
- Reuse, recycling and alternative disposal methods encouraged
- Minimum standards defined and strictly adhered to.

STEPPING STONES

The scale of the journey is so great that Penarth is likely to require a "step change" rather than incremental improvement alone. A step change which must be divided into a number of "stepping stones" so as to provide something of a "breathing space" whilst the community readies itself for the significant changes to come.

The following steeping stones have been identified for Penarth's journey towards sustainability and greater self-sufficiency



FOOD















Low Hanging Fruit

"Selecting small achievable steps which set the foundation for Penarth's transition to a sustainable town"

Increasing Community Awareness and Participation
Introducing principles of sustainability and self-sufficiency within existing school curriculum
Building upon existing plans, policies, and projects
Identifying disadvantaged or more vulnerable groups
Allocating locations for specific projects and plans
Engaging with Council to drive the introduction of new plans, policies, and projects
Mapping local resources
Creating community groups/events

Building Bridges

"Providing the necessary space, freedom and funding to allow projects, plans and strategies to come to fruition"

Increasing Community Awareness and Participation
Expanding school curriculum and adding new subjects directed purely at issues of sustainability
Introducing fines and/or taxes on unsustainable practices
Taking resource mapping further to enable local networks
Providing technical training and education to community
Enabling meeting space for spontaneous interaction
Encouraging partnerships and collaborations between stakeholders
Adapting legislation

Chequered Flag

"Taking the final steps towards the finish line and the vision"

Increasing Community Awareness and Participation
Strengthening plans, polices and projects already in place
Encouraging entire community to sign up to resource network and mapping database so that all resources are sourced locally where possible
Encouraging 'lifelong learning' and community interaction
Always seeking to improve

THINK GLOBALLY ACT LOCALLY

TRAVEL













Community Workshop









APPENDIX B

The energy consumption for transport has risen 65% since 1980
(UK energy in brief 2010. http://www.decc.gov.uk/assets/decc/Statistics/publications/brief/78-energyinbrief2009.pdf)

"Food production and distribution contributes up to 22% of the UK's total greenhouse emissions."
(ENERGY BULLETIN. http://www.energybulletin.net/node/5045)

"The highway network remains the most widely used of the transport infrastructure and accounts for some 72% of journeys made to work."
(The Local Transport Plan The Vale of Glamorgan)

"Every £1 spent with a local shop is worth £1.76 to the local economy, but only 36p if it is spent with a supermarket chain."
(www.neweconomics.org/gen/newsbuying localworth400percentmore.aspx)

"Approximately 1/3 of all food bought in the UK is thrown away"
(www.lovefoodhatewaste.com)

"The oil supplies that fuel the food system could be exhausted by 2040."
(ENERGY BULLETIN. http://www.energybulletin.net/node/5045)

"Almost half of the UK's greenhouse gas emissions are from the energy used to generate heat [for buildings]"
(http://www.decc.gov.uk/assets/decc/What%20we%20do/A%20low%20carbon%20UK/1358-the-carbon-plan.pdf)

DID YOU KNOW?

"UK largest net importer of food & drink among the EU states"
(www.cattlenetwork.com/Dairy-Carbon-Footprint-Dropping/2008-10-13/article.aspx?oid=566561)

"95% of fruit & 50% of vegetables eaten in UK are imported"
(MAFF 2001. Energy use in organic farming systems)

"At present, while there are more cycles owned in the UK than cars, only 2% of journeys are made by cycle"
(Brian Richards, Future Transport in Cities. 2001)

"By the end of 2007 the remaining landfill capacity for Wales was estimated to be down to 7.8 years"
(http://www.environment-agency.gov.uk/static/documents/Research/EWLfillLifeMapFinal.pdf)

"Britain imported 125,000 tonnes of lamb, while at the same time exporting 102,000 tonnes of lamb respectively"
(The Crazy Logic of the Continental Food Swap. 2001. http://www.sovereignty.org.uk/features/footnmouth/lucas1.html)

"127 calories of energy (aviation fuel) are needed to transport 1 calorie of lettuce across the Atlantic"
(ENERGY BULLETIN. http://www.energybulletin.net/node/5045)

"Transport accounts for around 35% of the total NOx [and CO2] emissions in Wales in 2008"
(State of the Environment. http://www.statswales.wales.gov.uk/TableViewer/document.aspx?ReportId=5802)

"£1 billion is spent by the National Health Service in the UK on ill-health related to physical inactivity"
One Planet Communities. Desai 2010

"Since 31st March 2011 the Sustainable Development Commission have ceased advising Government of the UK, for lack of funding"
(Sustainable Development Commission. http://www.sd-commission.org.uk/)

PENARTH 2050

"All goods and materials used - for construction or consumer goods - are made from renewable or waste resources with low embodied energy and, wherever possible, sourced locally."
(one planet communities. International Targets)

"Reduction of energy demand and local production of renewable energy"

"All residents and Food industries signed up to Local Food Network and Mapping database - Enabling all food to be produced and sourced locally"

"Penarth Central Station - redevelopment as town square which can be used for farmers markets, meeting place and general community activities"

"Penarth reduces its CO2 emissions by a tonne for every tonne of food waste it diverts from landfill to anaerobic digestion"

"Continuous network of cycle lanes throughout Penarth, bike racks and/ or secure cycle parking, construction of changing facilities for active commuters at transit stations, shops and offices"

"Zero Waste: resources are used efficiently, waste levels are close to zero and ultimately zero waste is sent to landfill"
(one planet communities. International Targets)

"Everything you need within a 30 minute radius by active or public transport"

"80% of employment within walking, cycling or public transport distance, with one local job or workplace for each household"

"People are able to eat diets high in local, seasonal and organic produce"
(one planet communities. International Targets)

"Car free zones for social interaction. Community facilities and workplaces within easy walking and cycling distance"

"Penarth illustrates a community that has achieved self-sufficiency"

""By 2050, all transport in Penarth is carbon neutral"

"Penarth, a modern town that continues to think globally whilst prioritising and acting locally"

"99% of food (vegetables & fruits) is produced in Penarth and other food (meat and grain) sourced from local farmers"

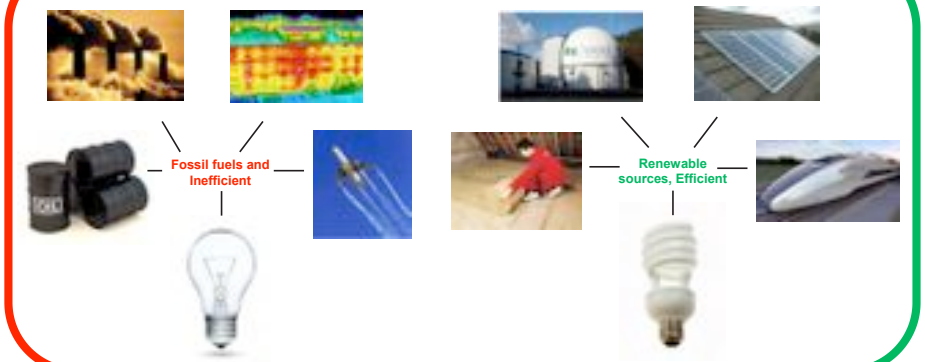
Food



Waste



Energy



Water



Transport



Employment



APPENDIX C
LOW HANGING FRUIT
CYCLING PACKAGE



Cycle lane,
not separated, on road
(on major roads)



Cycle parking (racks)
infront of all train stations
and public buildings
(schools, library etc)



street based bike rental

Speed Limit on busy roads



APPENDIX C
BUILDING BRIDGES
CYCLING PACKAGE





Cycle lane,
not separated, on road
(on major roads)





Cycle parking (racks)
infront of all train stations
and public buildings
(schools, library etc)



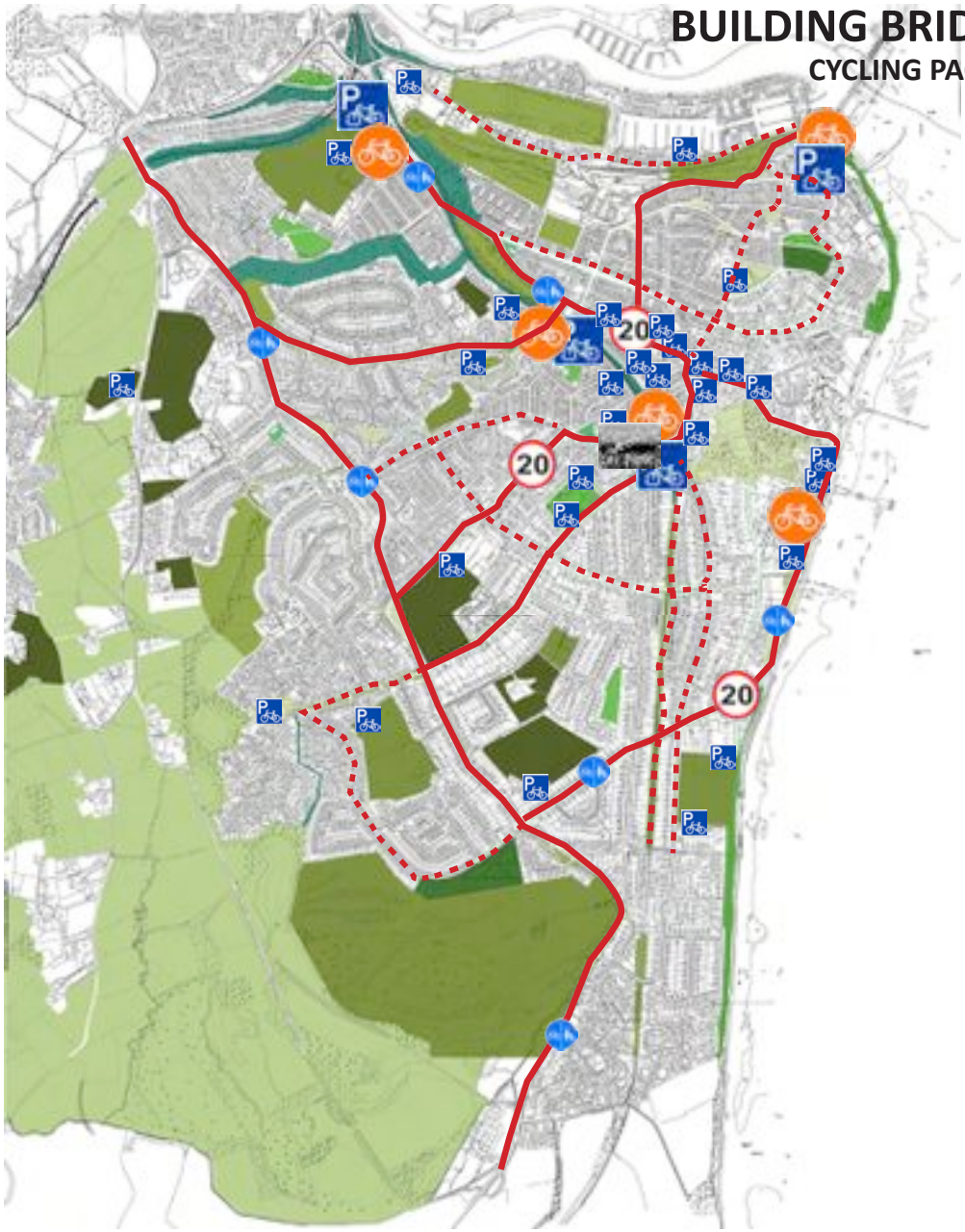
street based bike rental



Speed Limit on busy roads



Bike Service infront of train station



APPENDIX C
CHEQUERED FLAG
CYCLING PACKAGE



Cycle lane,
not separated, on road
(on major roads)



Cycle parking (racks)
infront of all train stations
and public buildings
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