HEAVEN, EARTH + HUMANS
CONCEPT AND PROCESSES OF URBAN
VERTICAL REGENERATION

BY

LOH TZE WEI

A 120 points thesis submitted in partial fulfilment of the
requirements for the Master of Architecture (Prof.)

School of Architecture and Design
Victoria University of Wellington

2012

ABSTRACT

Rapid urbanisation, industrialisation, and capitalist developments have changed human values to be driven by materialistic developments instead of ecological developments. This has caused ecological and social crises visible in the urban fabric. There is an urgent need for us to address the question of how can we develop lifestyles that are truly holistic and able to regenerate well-being of humans and it's environments without external helps.

This thesis explores the interrelationships of feng shui and regenerative development. It attempts to show the recognition of feng shui as an integral to regenerative development that can regenerate urban environment and achieves humans' well-being and harmony with nature. The thesis believes it will need to first remedy urban areas in order to regenerate the rest of the earth. It will explore the process of regeneration from micro to macro levels using feng shui and regenerative development, where it seeks to regenerate the city holistically as a whole.

I propose that feng shui becomes an intrinsic model for regenerative development. This discipline is able to solve ecology degradation issues, to provide awareness and realisations of the intrinsic values of cities, and act as a paradigm shift towards achieving regenerative development. This thesis also propose that medium-rises compact city model, which integrate regenerative development and feng shui principles, as a better solution to solve densification of urbanisation compared to building high-rises and skyscrapers.

ACKNOWLEDGEMENTS

Firstly, I would like to thank my supervisor, Philippe Campays, for his constant guidance, support and speedy feedbacks.

Secondly, I would like to thank all the advisors from Victoria University Student Learning Support who has assisted me with my writing throughout the year. They have given clarity to the structure of my thesis.

Finally, I would like to thank my family and friends for their continuous supports and encouragements, as well as their faiths and endurances with me in accomplishing this thesis.

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INTRODUCTION

Rapid urbanisation, industrialisation and present capitalist developments have changed human value systems drastically within a relatively short period of time. These issues are most evident in urban areas. Originally motivated by a belief of power over nature and a fascination for technological solutions urban inhabitant have progressively concentrated on materialistic development while increasingly ignoring their inner growth. Toffler mentioned that these rapid developments and the acceleration of social changes have created a "new throw-away culture", where our relationships with things are becoming temporary; with humans becoming transient; and with our environment becoming "nomadic". Human values are neglected by establishing concerns with self-interests only. The institution's choices and decisions are mainly influenced by efficiency and conspicuous wealth rather than the quality of life of humans and environment (Toffler, 1970, pp. 49-177). Hence, the well-being of humans and nature are greatly affected.

The focus on materialistic development has caused an overuse of natural resources. Research shows that cities today take up only two percent of the world's surface but consume more than 75 percent of its resources (Mang, 2009b). This is unsustainable as urban areas cannot unilaterally continue to grow and support these patterns of consumption. This is an environmental crisis which must be recognised of its danger and to find out the thread, which can connect humans to their roots again and allow them to grow and regenerate as humans with nature.

The ecological disturbances in the urban areas are brought about through the depletion of natural resources, increasing degradation of the environment, extinction of flora and fauna, degradation of ethical values and so on. Many cities have pushed many ecological systems out of their boundaries. The challenge before us is as Taylor questioned- how can we avoid humanity's negative ecological impact while providing good quality of life for everyone (Taylor, 1996). This demands a rethink and re-evaluation of the purpose, essence and need of life in the today's contemporary society. Thus, I propose that we need to re-examine our spiritual beliefs and more specifically our relationship to nature.

This thesis explores the connections between feng shui and regenerative development. Both feng shui and regenerative development raise similar questions at the level of human existence. They ask how humans can exist in harmony with nature to achieve well-being. This thesis attempts to show that feng shui is an intrinsic model for regenerative development; which cultivates the well-being of humans and nature; that can juxtapose contemporary urban development and architecture, without having to uproot the balance of nature. It seeks to address the problems of present contemporary urban development by asking: What role do urban buildings play in human's and nature's well-being? How can we

create a regenerative relationship between humans and nature in the urban setting? Hence, the final objective is to apply feng shui and regenerative development principles in re-developing urban areas.

This thesis is presented in two sections. The first section consists of three chapters, which discuss the principles of feng shui; its relationship with regenerative development; the present urban issues that need to be changed to achieve a regenerative future; and finally the infusion of feng shui and regenerative development in the urban built-environment to establish a connection between humans and nature. The second section explores the framework formed from section one in the form of a design for urban architecture. It is a building designed to act as an acupuncture point which revitalises the well-being of its immediate site and to achieve a regenerative future, without having to rely on external factors for humans and the environment to reproduce.

I would like to emphasise that feng shui is a very broad study which covers many areas that are beyond the limits of this thesis. For the purpose of this research, I will only explore the fundamental knowledge of the traditional feng shui and the Form School study of feng shui, which is more relevant and scientifically proven from a scholarly perspective. The inclusion of feng shui into this research as an integral of regenerative development is not to undermine the potential of other spiritual beliefs to contribute and be integrated into regenerative development. Feng shui has been selected for this research because of its design and planning philosophy is closely relating to understanding nature.

The existence of feng shui beliefs and its influences are strong in many Asian countries. This beliefs also reverberates in westernised places where Chinese people have migrated. Feng shui plays a strong role in Asia's architecture especially in Hong Kong, China,

Singapore, Malaysia, Korean, Vietnam, and Taiwan. These countries are presently experiencing a rapid explosion of populations in the cities, where the demands for skyscrapers and high-rises are increasing due to limitation of ground spaces. The urban built-forms are mostly adaptations of modernist design, or unprecedented contemporary design, with an unconscious disregard for nature and their social values. As a result, many people to lose their sense of place with nature and their existing local cultures. As of the consequences of such loss, these new urban dwellers attempt to re-collect old traditional concepts. And such it has been noted that feng shui principles have been superficially applied where it is often found on the mere surface of each space without integrating the principle as a whole with its built environment. These applications create demeaning paradoxical designs within the cities.

The ancient feng shui was developed to include detailed observations of the living and the way earth's energy affects daily lives. Feng shui had remained an integral part of Chinese culture until recent times when the Western influences and Communism relegates feng shui to a more superstitious and mystical practice. It is noteworthy that the Chinese in Hong Kong had reduced its essence to just help businesses to thrive. The impacts are devastating as the ancient feng shui practices were debunked as stereotypes of "geomancy", superstition and pseudo-sciences.

In fact, feng shui was devised through the cultural paradigm of China, with its unique geography and a rather stable social structure, and varies little from generation to generation. However, despite these origins, its core truth still centralises on human awareness and the experience of human with nature. When it is stripped of other cultures and rituals, and is synthesised with other bodies of knowledge to meet the specific requirements of culture, geography

climate, and human uniqueness, the essence of feng shui can be applied to any space and time (Bradbury, 2004, p. 41).

I believe that the essence of feng shui shows great similarities with the understanding of regenerative, which shall be explore in this thesis. Regenerative takes a further step from sustainability, where it believes that buildings can be more than just 'neutral' in relation to the living world but rather always in regenerating cycles with earth system. This approach implies that built environments could be designed to produce more energy and resources than they consume, and to transform and filter waste into health giving resources (Pedersen Zari & Jenkin, 2008, pp. 3-1) . It seeks to repair the capacity of ecosystems to function at optimum levels without ongoing human intervention.

A significant benefit of regenerative approach to development is its positive outcomes for human's communities and cultures. The built-environment is not responsible for all factors to contribute to a healthy community. A regenerative approach, however, may positively affect many aspects such as increased cultural identity, satisfaction and psychological health (Pedersen Zari & Jenkin, 2008, p. 3). These positive outcomes are also shared by the application of feng shui. This thesis helps to re-examine feng shui as an integral of regenerative development to be a thread to solve the urbanisation issues and make its way towards a holistic regenerative future. In this research, it consciously or unconsciously argues that a balance and well-integrated design with nature would naturally demonstrate feng shui principles.

SECTION ONE: DISCOVERING REGENERATIVE DESIGN

1.0 FENG SHUI, ITS APPLICATION AND PRINCIPLES

The Chinese regard the universe as a living organ sustained by "Qi", the Yin and Yang are opposed state of Qi that keeps the environment in harmony, and the five elements provide ecological techniques for approaching and appreciating nature. During the Imperialism period of China, everyone relies on the knowledge of "Yi Jing" (The Book of Changes) for survival. YiJing is believed to have originated from Emperor Fu Xi in 3322 B.C (Van, 1971) as the first book of divination. It is through this book that the knowledge about the cosmos and nature were passed down. As a result, the general welfare of China relied much on the "naturalistic fate" of nature (Lung, 1978, pp. 22-23). Naturalistic fate is understood as the understanding of changes in seasons, the consciousness of time, earth movement, etc. The rugged topographic features, constant flooding of the Yellow River of China and compounded natural disasters have caused difficulties for the people. Everyone's

ultimate goal was to achieve another good year by avoiding disasters and sufferings. Such goal required a cooperative and humanistic approach to existence in the universe (Needham, 1954, pp. 22, 90). Hence, feng shui was developed for the nation of China so they can understand the connection between them and the environment in order to protect themselves from natural disasters and to live in harmony with the environment. This chapter will explore the fundamental applications and principles of feng shui. However, for the purpose of this thesis, I will only attempt to explore and discuss feng shui principles that are connected to the context of ecology and environment of the intrinsic realm. The research below will discuss the foundation of feng shui which consists of the concept of Qi, the Yin and Yang, and the five elements, as describe in the YiJing.

Feng shui was originally being called "kan-yu", which literally means to cover and support people, and it refers to "Heaven and Earth or "land's pattern". Feng shui is developed as the study of interaction between people and the natural systems. Its basis is to achieve harmonisation between heaven, earth and humans. This is done by providing equilibrium between nature, buildings and people. It embraces Taoism and Confucian thoughts. Taoism's cultic forms are mostly influenced from Buddhism (Weber, 1951, pp. 204-205), which pursues balance and harmony with natural environment. While Confucianism, emphasizes the whole social values, proprieties and sense of place (Weber, 1951, p. 152). The harmony between humans, society and nature can be achieved by finding the right amount of "Qi" in a location. Thus, feng shui was a knowledge used in planning and selecting ideal locations for human habitation.

The term feng shui literally means wind and water. These two elements are seen as the two most fundamental forms for life's energy. Both air and water are vital to human survival and existence.

The Burial Book, attribute to Gou Pu (276-324) states that "Qi", a cosmic current literally means breath, could be scattered when it meets wind and stopped and gathered when it meets water (Weber, 1951, p. 111). The key issue is then how to obtain Qi?

Based on the law of nature, feng shui's theory provides guidance principles for organising man-made elements and natural elements in a harmonious way at micro and macro scales. Throughout the evolutions of China's history, feng shui practitioners made increasingly subtle discoveries in both philosophical and practical nature. They are able to identify ways in which the natural energy around them behaves and affects them (Lam, 1866, pp. 14-15). According to Chinese beliefs, placing oneself in a favourable feng shui environment will bring peace, longer life and positive well-being.

The techniques employed by feng shui are based on the principle of harmonising dwellings for both the living and dead with the immediate physical environment as well as the larger cosmic scheme. That is based on a belief that the world itself is intrinsically in harmony. According to Lam, existing harmonies of a place will be disturbed when something is built on the land without holistic space planning (Lam, 1866). The study of feng shui of a place is to understand such disturbance, what can be done to heal the injuries and obtain maximum benefit from such natural forces. Thus, feng shui, in ancient China, is viewed as a divination - that is able to manipulate the cosmic forces to influence a place well-being.

1.1 THE CONCEPT OF QI

"The engine of life is linkage,
everything is linked.

Nothing is self sufficient,
water and air is inseparable,
united in life and for our life on earth.

Sharing is everything."(Arthus-Bertrand, 2009)

Qi is the most important component in feng shui, where it is distinguished by three types of Qi; the cosmic Qi, the earth Qi and the human Qi (Rossbach, 1987, p. 21). Qi is a life force or energy that creates, directs and determines nature's forms on earth; such as mountains, volcanoes, streams, rivers, trees, and plants. Qi also is referred to as activities of living being as well as moods of active influences, such as sound, atmosphere, taste or chemical reactions. According to Xu, the ancient Chinese metaphorically relates the earth to be a living organism like human body, with mountains for bones, water for blood, and vegetation for hair. They imagined the flow of Qi on (or in) earth is similar to the flow of Qi of the acupuncture points of a human body. Qi is believed to be created from the sky, carried by the rain and water and moved by the wind (Xu, 1997, p. 176). All beings inhale and exhale Qi, thus affecting each other and create invisible consciousness of spaces. Thus, Qi is regarded as being responsible for all activities in the physical world. Most of all, it is the main force that drives humans along their life course. The ancient Chinese believes that Qi will bring health, peace and luck.

In Hean-Tatt Ong's research of analysing feng shui through science perspective, Qi is associated with negative ions, which are produced by green plants during photosynthesis process and water evaporation process. Medical researchers have shown that negative ions have proven to be beneficial for humans and the environment

health and well-being (Hean-Tatt & Leyau, 2009). Ong also adds that Qi are also influenced by sun's energy. The sun provides "Yang" energies for photosynthesis process of plants, which the plant in turn produces negative ions, which are "Sheng Qi", to balance the environment's positive ions. Positive ions, also known as "Sha Qi", are associated with unhealthy energy and sometimes are associated with radioactive elements (Hean-Tatt & Leyau, 2009) that are harmful to humans' well-being if it is not neutralised by the negative ions. Indeed, the accumulations of positive ions in shady areas are considered overly "Yin" and can cause harmful effects to inhabitants on a long term basis. During photosynthesis process, water evaporates through the surface of the leaves. It is through these evaporations that negative ions are produced. He explains that the leaves of green plants act as a tool to absorb the positive ions, thereby removing them from the air. Smaller leaves which have greater total surface areas produce more negative ions compared to larger leaves giving less total surface areas for ions productions. Thus, sunlight and green plants are essentials for the productions of beneficial Qi for the well-being of an environment.

The goal of feng shui is to tap into the earth's Qi, where it is adept to find a place where the Qi flows smoothly and where there is a balance between the Yin and the Yang. When this situation does not exist in some place, feng shui manipulates with nature to remedy the balance between the Yin and Yang. According to feng shui, light Qi floats like air and relates to Yang, while heavy Qi sinks like a heavy object into the ocean and relates to the Yin (Rossbach, 1987, p. 23). According to Bary, Qi is extensive and vague. "It ascends and descends, and moves in all ways without ever ceasing." (Bary, 1970, p. 468) A place with abundance of earth's Qi can provide proper circulations of fresh air and clean water. The Chinese claims that lands that are highly influenced by Qi are the most habitable. For example, places where the greens flourishes provide more comfort

livings. While places where there are difficulties for living beings to survive are places where Qi are too far away from the land as shown in illustration 1 (Rossbach, 1987, pp. 23-24).

Illustration 1: Qi and the world (Rossbach, 1987, p. 24).

Qi is modified by the ground conditions of earth, but is produced by time pattern indicated by the sky. Hence, one can determine the effects of an environment on humans using time to track Qi.

Qi is interminably linked with the water systems. However, wind also provides strong support in retaining Qi accumulated in a place. When the wind is strong, Qi is carried away dispersed to other areas before it had any time to accumulate. When the wind is mellow, then Qi is retained. Hence, it is undesirable for a site to be in a very windy area, where Qi is not retainable.

According to Rossbach, there are variations of earth Qi between urban, suburban and rural area. Rural area such as country side has calmer and stable life because the Qi is calm and smooth. While in a city, Qi fluctuates more frequently because the city will have greater variations and occurrences for activities to happen, whether it is good or bad. However, an area that is classified to have balanced earth's Qi does not necessarily mean it has good Feng Shui (Rossbach, 1987, p. 87). This is because man-made elements such as buildings, roads, constructions works, and pollutions produce

harmful Qi that may destroy the harmony of the place. Hence, awareness of the urban environment is important in city planning and urban design.

1.2 THEORY OF YIN AND YANG

The theory of Yin and Yang describes how opposing forces are interconnected and interdependent in the natural world, giving rise to each other in turn (Rossbach, 1987, pp. 19-20). The Yin and Yang theory claims that all phenomena in the universe are the result of endless interaction between the two opposing cosmic currents of Yin and Yang.

Illustration 2: The wave successions particle (Capra, 1999).

Illustration 3: Geometric interpretation of the 8 Trigrams (Sung, 2003).

Illustration 4: The Yin and Yang vibration line is governed by the 8 Trigrams is similar to a wave line (Sung, 2003).

Needham describes the Yin and Yang as a wave-like succession (illustration 2) and is detectable in the cosmogonic genesis of Yin and Yang (Needham, 1954, p. 362). This logic is also explained by Z. D. Sung using algebraic and geometry representations. Fritjof Capra, a contemporary physicist researching in high-energy theories also supports this logic. According to Sung, the eight trigrams from Yin and Yang forms a cube, four emblematic symbols a square, two elements a line, and the grand terminus a point (illustration 3). He further explains that the symbol is also an “imaginary gauge” in form of a wave line (illustration 4) (Sung, 2003, pp. 104,129). Such a concept of wave line is found in the relativity theory in modern physics. Capra further enhances this point quoting, “at the atomic level, matter has a dual aspect: it appears as particles and as waves.” He meant that wave pattern as whole is a manifestation of the particle where the manifestation is in a mutual exclusive activity (Capra, 1999, pp. 151-152).

The Yin and Yang consist of two stages of a cyclical, continually changing relationship in relation to the intrinsic contradictions of natural objects or phenomena. It is used with the five elements theory to understand and interpret nature with the stated goal of harmonisation.

Illustration 5: Wu Qi

According to Yin and Yang, the "Great Beginning" of existence was in a state of Non-being. "Wu Qi" is where all primal energy are expressed and contained within a circle that is full and empty at the

same time (Roszbach, 1987, p. 17). It also implies the beginning of everything is nothing, not in the sense of non-existence, but in sense that existence gets materialised out of what was clear and empty (Legge, 1997, p. 45).

Illustration 6: Birth of Yin and Yang

The materialisation of livings is what gives birth to Yin and Yang (Lam, 1866, p. 16). This is represented as a dot in the centre of Wu Qi diagram.

Illustration 7: Division of Yin and Yang

The circle spreads and divides into half, where two fundamentals interact with forces of the universe (Lam, 1866, p. 17). Some examples that best represents this stage are male and female, heaven and earth, inside and outside, light and dark, etc.

Illustration 8: The Tai Qi

The twin forces act upon each other and movement is initiated. The forces are so finely balanced and interdependent that their movement resembles two fish gliding together in water. This final stage forms the Yin and Yang symbol, which is also known as Tai Qi, where it represents all things and events grow and develop unceasingly, expressing the perpetual exchange of Yin and Yang. The outer circle continues to represent the totality of the universe (Lam, 1866, p. 17). A notable feature is that neither yin nor yang is complete or pure in itself, for each must include the other's nature. There is a dot of opposing colour in the middle of each current (illustration 6). These dots symbolises the inherent incompleteness of Yin and Yang without the other half. Harmony is achieved only when the two currents are combined as one. This oneness is called Tao and according to YiJing it represents a harmonious mode of existence as well as the ultimate truth. In Tao-Te-Ching, Lao-Tzu quotes “knowing the ancient beginning is the essence of the Way (Tao).”

The Tai Qi draws upon the concept of Wu Wei. It is often described as performing a selfless act and can only be performed by someone who is in an egoless state when they are spiritually engaged within themselves. Tai Qi describes that to act by means of Wu Wei (non-attachments) is the act of Nature, where it combines human and nature as one (Lung, 1978, p. 26). It is also a state of doing without doing (Guo, Vale, & Vale, 2009, p. 2). According to Taoism, acts that are perform with intentions behind contain physical or emotional attachments; such as financial, power, love, status or just feeling good about oneself; are ego-reinforcing. The consequences of having ego projections will cause disharmony and harm to the environment. To perform selfless act, one must let go of ego and passed into an altered-state of consciousness. Here every act is selfless for the ego has ceased to exist. There is no “I” that makes decisions and the outcome will always be in balance and harmony

with everything. The Tai Qi is recognised to be able to evolve and manipulate as it grows. It first evolved into four symbolic images as illustrated in illustration 9.

Illustration 9: Evolution of Yin and Yang (Bramble, 2003, p. 21)

These four symbolic images, in turn, evolved into eight trigrams or "Bagua", and from eight trigram which in turn evolved into sixty-four hexagrams. The eight trigrams represent eight fundamental subdivisions of human behaviours that are paralleled and affected by eight major subdivisions of space and time. These eight major subdivisions are associated with eight major influential geographical weather and directions that will have effects on humans' behaviour that will in turn affect their well-being. The eight subdivisions are Qian as Heaven, Kun as soil, Zhen as thunder, Xun as wind, Kan as water, Li as fire, Gen as mountain (Fung, 1953, p. 32).

In fact, the Chinese explains the seasonal variations' shadows cast by sundial are the origin of the Yin and Yang symbol (Hean-Tatt & Leyau, 2009). In ancient times, the Chinese geomancers and astrologers used gnomon stick to determine the variations of the solar shadow and from this they determined the compass directions (Bramble, 2003). The variations of solar shadows are also measured throughout every season to track the variations of Qi throughout the year. Hence, the recorded shadows diagram formed sequential

patterns of the Yin and Yang, four cardinal directions and the eight trigrams (illustration 12 & 13). The recorded solar shadow diagram indicates that the feng shui north is the polar north and not the magnetic north. However, this was recorded in the northern hemisphere where the Sun's position will be reversed for southern hemisphere. Hence, the Yin and Yang diagram needs to be reversed when applied in the southern hemisphere.

Illustration 10: Ancient Chinese astronomers using gnomon stick to measure solar shadow (Hean-Tatt & Leyau, 2009).

Illustration 11: Cross-section of measuring solar shadows throughout the year to create the Yin and Yang diagram (Hean-Tatt & Leyau, 2009).

Illustration 12: The measurement of shadow cast by sundial (Hean-Tatt & Leyau, 2009).

The ancient Chinese divided a year's cycles into an even of 24-segments. They then used six concentric circles and marked 24-segment points on the divided circles into 24 sectors. Variations of shadow's lengths are recorded everyday on the shadow chart. After connecting each lines and dimming the Yin time of Summer Solstice and Winter Solstice, the result reveals the Yin and Yang symbol. The result shows the shortest shadow is found on the day of Summer Solstice and the longest shadow is found on the Winter Solstice (Tsai, 1999).

Illustration 13: The eight trigrams manifested from Yin and Yang
(Hean-Tatt & Leyau, 2009).

Thus, the trigrams were symbolic representations of the ordering device of universe. The trigrams also indicate a full family relationship in the Great Appendices of Confucius. Confucius believes balance and harmony starts from a family that respects each other as well as when the children practices filial-piety. Such a step is important in as it draws human closer to nature.

Yin and Yang are interdependent and inter-transformative. In Feng Shui, phenomena are readily accepted as inherently paradoxical. It is a dynamic balance where Yin and Yang constantly counter and complement because they exist in oscillating flux (Bramble, 2003, p. 19). This tension between opposites express unity as described in the Tai Qi theory. This theory can be applied in macro and micro scale planning and design of forms and buildings. It also forms the underlying structure of the space, time, and motion theory of with the five elements, which is further discussed below. In feng shui, the ultimate goal for building or urban design is to achieve balance between Yin and Yang so that the place exists in harmony with heaven and earth.

1.3 THE FIVE ELEMENT PRINCIPLE

The term "element" has been literally translated into English, but the original meaning of "Wu Hsing" is lost. The original Chinese term, "wu" means five, but "hsing" connotes movements of a dynamic

force. Hence, the five elements are not considered the permanent embodiment of substances, but rather a symbolic representation of natural cycles such as the seasonal cycle. The five elements are five movers of things which continuously run in cyclic motions, one succeeding another, mutually producing and overcoming, in order to achieve a state of equilibrium (Hwangbo, 2002, p. 114; Lung, 1978, p. 30).

A Chinese analogy map of five element theory

	Wood/vegetation	Fire	Earth/soil	Metal	Water
Earthly branches ¹	Yin, Mao	Si, Wu	Four seasons	Shen, You	Hai, Zi
Seasonal marker ²	Spring equinox	Summer solstice	Between	Autumnal equinox	Winter solstice
Colour	Bluegreen	Red	Yellow	White, metallic	Black, plum-black
Constellation ³	Bluegreen dragon, Canglong	Red bird, Zhuque	Celestial north pole, Beiji	White tiger, Baihu	Mysterious Turtle-warrior, Xuanwu ⁴
Compass point ⁵	East	South	Centre (or 'here')	West	North
Lunar lodges (xiu) ⁶	Jue, Kang, Di, Fang, Xin, Wei, Ji	Donjing, Yuguai, Liu, Qixing, Zhang, Yi, Zhen		Kui, Lou, Wei, Mao, Bi, Zixi, Shen	Nandou, Niu, Xunu, Xu, Wei, Yingshi, Dongbi ⁷
Organ	Liver	Heart	Spleen	Lung	Kidney
Planet	Year Star, Sui (Jupiter)	Sparkling Deluder, Ronghuo (Mars)	Quelling Star, Zheng (Saturn)	Great White, Tai bai or Executioner's Star (Venus)	Chronograph Star, Chen (Mercury)
Process/activity	Increasing yang, realized wood	Maximum yang, realized fire	Potential and realized Earth/soil	Increasing yin, realized metal	Maximum yin, realized water
Celestial stems ⁸	Jia, Yi	Bing, Ding	Wu, Chi	Geng, Xin	Ren, Gui
Time	Sunrise	Noon	Between	Sunset	Midnight
Weather (and pathogenic factors)	Windy	Hot	Humid	Dry	Cold
Wind	Bright abundance, Mingshu	Brilliant, Jing		Gate of Heaven, Changhe	Broad dimness, Guangmo
Yin yang theory	Yang within yin	Yang within yang	Buffer or neutral	Yin within yang	Yin within yin

Chart 1: The five elements characteristics (Bramble, 2003)

The five elements are Wood, Fire, Earth, Metal and Water. Wood is associated with spring, the colour green, and East direction; Fire is

associated with summer, red, and south; Earth is associated with centre, yellow, and the sixth month of the year; Metal is associated with autumn, white, and west; while Water is associated with winter, black and north. Since the theory is originated from China, it directly refers to the northern hemisphere, where the solar heat (fire) comes from the south. However, in the southern hemisphere this theory is applied with modifications, where fire element is assigned to the North and water element is assigned to the South, while the rest of the elements remained unchanged (Green, 2010; Yuen, 1998).

Illustration 14: The synthesis of Yin and Yang, the five elements, and the eight trigrams (Hwangbo, 2002).

Illustration 15: The five elements productive and destructive cycles

There are two chains of cycles, productive and destructive (illustration 15). Both can be identified by simply changing

permutation. The metaphorical connotation of the productive cycle (water-wood-fire-earth-metal) is that an element will give birth to the next one, i.e., water to wood, wood to fire, fire to earth, etc. The destructive cycle (water-wood-fire-earth-metal), on the other hand, denotes that an element is destroyed by preceding one, i.e., fire by water, metal by fire, etc. Feuchtwang explains this most clearly:

“Wood is understood to be all vegetation, which is fed by water, and swallows, covers, binds earth, is cut down metal implements and ignites; water is understood to be all forms of fluid including the liquefaction of metal by fire, and which can be solidified by being staunched with earth and earth is understood to mean all mixed up, impure and inanimate substances including the ash produced by fire.” (Teh, 1988, p. 30)

This implies that the five elements not only refer to the quantitative aspects of things but also to their compositional characteristics. It may therefore suggest that some form of physical-relational diagram may be drawn up as an aid to harmonise architectural compositions.

The five elements are applied for all things that occur in the universe. Teh explains that this system can be categorised; in decreasing order of perception; according to form, orientation, placement, colour, material, texture and numbers. Such orders gives planners or architects a high degree of flexibility in confirming with the five elements aspect of feng shui, allowing application of another manifestation down the hierarchy if the most preferred one is inadmissible (Teh, 1988, pp. 30-31). This cyclic correlation plays a significant role in the creation of built environment, as it is applied to shape built form and to balance spatial organisations with nature to achieve harmonious living in long run.

1.4 PRACTICE OF FENG SHUI

There are two schools of approach in feng shui, namely Form School and the Compass School. However, in contemporary practices, most feng shui masters use both schools simultaneously. The form school study solid forms while the compass school study void matters. These two schools can be applied from micro to macro built environments using commonly adopted feng shui model as described below. The Form School is commonly found to be applied on exterior settings, while the Compass School is commonly found applied in interior settings.

1.4.1 THE FORM SCHOOL OF FENG SHUI

The Form School is recognised as the oldest method used in feng shui practice. Its theory is based on the understanding of physical configuration of geographical features, with emphasises on land formations, watercourse and terrain, thereby determining position and orientation of a built environment. The four emblems theory is one of the most important concepts in Form School. They are metaphors of animals named azure dragon, red bird, white tiger, and black tortoise representing east, south, west and north, according to their orientation. However, its underlying practice consists of applying the Qi, Yin and Yang, and the five elements principles. This could be considered as an intuitive approach but it has been well recognised as to contain the scientific basis to analyse the built environment (Mak, 2002, p. 17; Teh, 1988, p. 27).

The assessment based on Form School consists of three phases. The first phase is to assess the physical environment of a site. This consists of land mass; namely the "dragon"; open space and water. Next phase is to assess the topography, which consist of specific effects on a site such as the directions, positions and flows of water and land. The final step is to analyse its directional and vicinity influences. (Lam, 1866, pp. 30,36; Lip, 1979; Mak, 2002, p. 17)

Illustration 16: Classification of mountains according to the five elements (Stark, 2010b).

Mountains, volcanoes, and other hilly features are the youngest features on the surface of earth and is an important feature in the Form School study. The Chinese viewed the mountains as the birth of the earth and they are associated with the dragon, a mystical animal that represents virile and power (Teh, 1988, p. 29). The Himalaya Mountain for example, is still growing, formed out of an enormous collision between the Indian Peninsular and Asia. In feng shui, mountains are classified according to the five elements (illustration 16). Hence, desirable sites in hilly areas can be located in places where the forms of mountains are arranged in accordance with the constructive cycle of the five elements. It is also ideal for a building to be constructed on gentle and well-drained slope with its back against the slope or screens of trees, for building on a flat land, to protect them from Sha Qi.

Water is the main instrument for sculpting landscapes. It not only carries mountains and valleys physically but also a conveyor of Qi. In Chinese town, planners attempt to introduce "natural" curves into water course at first opportunity. This is in contrary with the western preference for straight water courses. As mentioned earlier, water retained and carries a significant amount flow of Qi. It is undesirable for water to flow in fast and straight line because this

creates rapid conduction of Qi, removing Qi accumulations. Slow, sinuous, and deep water courses on the other hand, are conducive to the accumulation of Qi especially if they form a pool in front of the site in consideration.

The confluence of water courses should form a graceful curve rather than a union of conflict. In general, confluences are beneficial because of the concentration of Qi. While, branching out of water courses, such as delta of a river, disperse Qi (Teh, 1988, p. 29). According to Skinner, water that flows through areas of uniform sediment would automatically meander and straight streams of river indicate inherent faults in the structure of land, which can be physically dangerous (Skinner, 1982). Artificial confluences can be created from the main watercourse if the watercourse is undesirable. However, it is preferably the allocation of site is attached amongst smaller confluences rather than from the main watercourse.

The ideal model from Form School has been interpreted graphically in ancient feng shui literature and commonly reproduced into a simple 3-D sketch (illustration 17). This model is described as "back by a mountain and belted with water in front"(Mak, 2002, p. 17). It explains the relationships between the key elements of the mountain and water are being considered and how they are integrated into an ideal feng shui model. This model signifies on the importance of a site to be shielded from cold wind (Sha Qi) coming from north for northern hemisphere and south for southern hemisphere. A site must also embraces slow moving water features, where meandering Qi are able to enter into the site slowly. Another graphical representation suggests the model appears similar to a female's reproduction section, a womb. Thus, an ideal feng shui site also symbolically represents a womb of earth suggesting fertility and a Chinese version of "axis mundi" (Hwangbo, 2002, p. 120).

Illustration 17: The ideal feng shui model (Yi, Yu, & Hong, 1996).

Illustration 18: The armchair formation (Stark, 2010a).

Illustration 19: The annual Yin and Yang cycle in relation to the four emblems (Feuchtwang, 1974)

In illustration 17 and 18, the left hill- azure dragon and the right hill- white tiger on the landscape symbolises the presence of Yin Qi and Yang Qi. It is most desirable when they form a complete horseshoe or the armchair shape (Illustration 18). The tiger is in the west and the dragon is in the east. The point of transition is seen as the point where the greatest concentration of beneficial Qi. Earth formations that are rising boldly are termed as yang, while the gentle and undulating elevations, such as river are termed as yin. It is best for a site to prevail Yin characteristics when it is predominated with Yang characters and otherwise on a Yin predominant site. It is important for the site to find a balance of Yin and Yang in order it to prosper in harmony for the well-being of the inhabitants and the environment.

The centre of the model is referred to as "Hsueh", where Qi flows from the higher terrains and gathers in the centre. Hsueh is an ideal place for Ming Tang. A Ming Tang, which literally translated as "bright hall", is a vast open area in a middle of a land. This model is normally found in a Chinese traditional courtyard house; where the central opening, enclosed by buildings, is known as the Ming Tang space. It is also known as the "Nothing" of a room where the space

is designated to gather Qi from all eight directions. The Qi are then transcended into inhabitant's body for the auspiciousness and well-being. Hence, Ming Tang is affected by time changes and Qi from eight directions. It is important that a Ming Tang is a wide area where it can accommodate many people, receives solar energy throughout that day, as well as has ideal microclimate for plants and life to grow. This is so that community events can be held on the site and people can activate and harvest the accumulated beneficial Qi from there. The Ming Tang is a great example that shows the importance of to not only live in harmony with nature but also with other people as a whole as well. The traditional Chinese also believes that through community gathering, Qi within the spot will be amplifies and condensed because of humans body's Qi emerges with the environment Qi. Hence, the Ming Tang is a space that embraces community living within self-developing spaces.

1.4.2 THE COMPASS SCHOOL OF FENG SHUI

The Compass School is originated from Fujian, China, where it is also being called the Fujian School (Hwangbo, 2002, p. 120). The theory relies heavily on using a feng shui compass, the Lou Pan, where the needle of the compass always south-pointing as compared to a western compass is north-pointing (illustration 20). Hence, this is called the "Zinanzhen"(Skinner, 1982). The Fujian put strong emphasis on the compass is perhaps because the area is lacked of mountains in their natural surroundings (Hwangbo, 2002, p. 121). In the feng shui compass, the central swinging needle is surrounded by a circular plate with many larger numbers of inscribed rings. The characters that are inscribed on the rings contains characters and orderings referring to yin and yang- the eight trigrams-, the five elements, Ho-Tu, Lo-Shu, and the two arrangements of trigrams - the early heaven trigrams and the late heaven trigrams.

Illustration 20: The feng shui compass, Lou Pan (Hwangbo, 2002).

The difference between the Compass School study and the Form School study is the Compass School measure directions and time according to magnitude north instead of true north. Hence, a feng shui master needs to always adjust the degree of magnitude in the compass when he is in different places because magnitude varies from place to place. Teh explains that the compass school has more mechanical approach towards analysing a site but its principle show lack of clarity of latter (Teh, 1988). Hence, this gives the Compass School a disadvantage as compared to the Form School approach, where scholars and researchers are more in favour of it.

1.5 THE LO-SHU DIAGRAM

The ancient Chinese developed the Chinese courtyard dwelling to represent a miniature universe within their space. They believe the earth is square in shape and the sky forms a dome covering the earth. The earth was believed to reflect the heaven above, where mountains represent stars and rivers reflects the Milky Way. The

Chinese left the central court open so they can observe the changing paths of the sun, moon, and stars. This dwelling model is in a form of square and is divided into nine sections grid system. The central open court is a representation of the Ming Tang. This design concept is linked to the Lo-Shu diagram used during the Later Heaven Sequence of YiJing. Hence, the Lo-Shu is use to determine the Time changes and effects on the Ming Tang.

Illustration 21: The Lo-Shu diagram (Skinner, 1982).

The Lo-Shu diagram consist of nine positions that formed a square grid where each grid is associated with a number. Within the Lo-Shu grid, the Yin and Yang is being applied to further determine the square's numbers and positioning. The odd numbers are classified as Yang and are positioned facing each cardinal direction, while the even numbers are Yin and are places on four corners of the square. The sum of the three numbers in each direction crossing this diagram is always fifteen. The sum of the two opposing number is always ten. The ancient Chinese believes that the number five is a number of "origins", hence it is placed right in the middle of the grid. The number ten is never used in the grid because it signifies perfection and completion. Completions means it comes to a final which contradicts with the idea of the earth is in constant flux and

change. However, the total of square means a perfect unit as a whole, where the Lo-Shu model signifies for harmony, cooperation, and unity for the inhabitants.

The arrangement of the numbers in the Lo-Shu diagram is also associated with the five elements theory. The arrangements of numbers are presented according to the productive cycle of the five elements. Hence, in the northern hemisphere, north is associated with water and number one, east is associated with wood and number three, west is metal and seven, south is fire and nine, while central is earth and five. These positioning will then determine uses of each space in the architectural programme when designing the spaces. The eight directions, the cardinal and inter-cardinal directions, within the Lo-Shu grids are also a reflection of the eight-trigram. It is use to judge the positioning of entrances that will direct different types of Qi into each spaces, which determines the quality of life for the inhabitants. Hence, the Lo-Shu diagram is an ideal feng shui model for arranging Qi with respect to orientations and positions.

1.6 CHAPTER CONCLUSION

In summary, feng shui is an ancient knowledge, developed by the Chinese, which is structured systematically to understand the intrinsic values of humans and nature. I believe that applying feng shui study in understanding nature and inhabitant provides awareness of our surroundings. This is done through thorough examinations of the built environment. It also heightens our awareness on the subtleties in our surrounding environment, such as acknowledging minor interactions within a place which can affect the immediate living system.

The understanding of feng shui allows people to become more responsive to their environment and take a holistic approach in planning and designing places and buildings. One must first

understand the principles of Qi, Yin and Yang, and the five elements in order to think holistically and realises the intrinsic values of nature. Each of the theory and principles above are interrelated to each other. This is because our living systems, consist of different Qi, are intertwined with each other. It will be ideal if buildings are able to incorporate feng shui principles into their design. The next chapter will explore the connections and interrelationship of feng shui and regenerative development. This will be the key towards testifying the hypothesis of feng shui is an integral of regenerative development to achieve well-being of human and nature.

2.0 FENG SHUI AND REGENERATIVE DEVELOPMENT AS COUNTERPARTS

This chapter will demonstrate the symbiotic relationships that may exist between feng shui and regenerative development. Many sustainable and spiritual connectivity theories have been raised by ecologists and researchers before regenerative development was pioneered by Regenesys group. Fritjof Capra argues that there is a deep connection between spirituality and ecology. He explains, "Deep ecology does not see the world as a collection of isolated objects, but rather as a network of phenomena that are fundamentally interconnected and interdependent. It recognises the intrinsic value of living beings and views humans as just one particular strand in the web of life." (Capra, 1999, p. 7) Also, according to Reed, regenerative development is not a new practice but just a forgotten one (Reed, 2006, p. 3). It is inspired by bringing

people closer to nature by incorporating traditional ideas, which have a deep connection to spirituality, with technology.

The concept of regenerative development often shows surprising parallels and intersections within the ideas expressed in feng shui. Although these parallels and intersections have not yet been extensively researched, they were noticed by some western researchers since the early 20th century when they came into contact with Chinese and eastern cultures. Feng shui and regenerative development are both concepts and processes that reached deep into human existence. They recapture human sensitivities and re-orientate us to nature's order and so achieve well-being.

Understanding these parallels and differences will illustrate key aspects of feng shui that could complement and contribute towards regenerative development and design. This chapter will explore different aspects of interrelationship between feng shui and regenerative development that will help define their symbiotic relationship.

2.1 THE EARTH IS CONNECTED AS ONE

Regenerative development draws upon developing two modes of consciousness involving the rationale (scientific modes), or the intuitive (spiritual mode), which the Chinese name Yin and Yang. Both theories understand man and nature as being an integrated holistic system. This system is a web of dynamic interconnections and processes, which continually structure and restructure the environment.

This holistic and integrated approach is expressed in the Chinese saying "Tian Ren He Yi" or "Man and Heaven combined as One". Hong (Hong, 1994) summarised this philosophical concept and concluded that there are three relevant implications to consider.

First, man is part of nature; therefore they are responsible to each other. Second, nature has its universal laws and man should follow them. Third, man's nature and the Tao are the same, so we should be 'Ziran', natural, (Choy, 2009, p. 110) or by the act of 'WuWei', be unselfish by being oriented to nature, in our behaviour. This means that we should not only consider individual parts but instead the individual's relationship to others and to the whole. Our actions are always integrated and holistic in principle and practice.

In feng shui, everything is connected. It sees this connectivity by relating heaven, earth and man with the concept of Qi, the theory of Yin and Yang, and the five elements principle. It also observes and describes the relationships between the parts and the whole of our system. This is often done by blurring the boundary of quantifiable and unquantifiable in order to achieve a holistic view of harmony, well-being and prosperity. Storey and Pedersen Zari explain that well-being relates to the holistic perception of physical, intellectual and emotional health of the individual. Well-being is often difficult to measure due to its state of being in constant flux (Maibritt Pedersen-Zari & Storey, 2006).

Jain (2001) suggests that western societies often tend to develop systems that separate physical from intellectual and emotional well-being. On the other hand, the concept of regenerative development has adopted the idea that Earth's web-system is interconnected leading to well-being. However, regenerative development may still tend to separate the two modes out at times to quantify its understanding to the market. Jenkin and Pedersen Zari's research points out that there are barriers to regenerative development, such as time and cost, which require further quantifiable proofs for them to be adopted in projects (Mairbitt Pedersen-Zari & Jenkin, 2008). In other words, regenerative development still favours the 'Yang' market from a feng shui point of view. I believe it is important

for us to realise that the intuition mode is just as important as the rational mode in order to achieve balance of the nature and human system.

Feng shui offers a new perspective for Westerners and regenerative development in further understanding the idea of 'whole system thinking'. It also acknowledges that our ecosystem relates to the cosmos by conducting critical time analysis against man and his surroundings. Regenerative development can certainly learn a great deal from the accumulated knowledge and wisdom of feng shui, which concern humans and nature's well-being that are intricately interwoven and interdependent.

2.2 IDENTIFYING THE VISIBLE AND INVISIBLE ELEMENTS

The concept of regenerative development begins with assessing the visible natural elements, such as the surrounding trees, micro-habitats, hydrology, and so on to understand the master pattern and discern the 'core of the place' (Haggard, March/April 2002). The core gives the place and its dynamic nature a recognizable character. Hence, organizing the visible master pattern of development creates successful and mutually beneficial relationships between people and place. (Haggard, March/April 2002; Reed, 2007)

Feng shui analysis also starts with identifying the visible elements but its end focus is on identifying a place's invisible elements that will affect the harmony of the place. This is done by using the above mentioned theories to identify if the place is suitable for habitation and how to live harmoniously with the existing system without disturbing the balance of nature. Feng shui believes that each identified element has its own analogy with its own rules for its actions that defines the results for an event. The elements also change in a natural progression from one to the other.

Nature works continuously at developing a site in harmony with its unique character to create an optimum condition for generating and sustaining life. I propose that adapting feng shui skills of identifying the invisible elements will provide a comprehensive method for regenerative development, where the aim of feng shui and regenerative development principles are to learn from nature which is the "master developer".

2.3 CONSERVATION, RESTORATION AND REGENERATION

The recognition of the fundamental importance of a healthy and regenerative environment for the well-being of people is important in feng shui. This is reflected in feng shui's theories of Qi and Yin and Yang using natural and local resources. When there is synergy between these, it is said that 'Sheng Qi' or 'vital energy' is in the environment. A confusing and dangerously built environment constitutes the very antithesis of feng shui. Pollution is suggested by feng shui to be one of the sources of 'negative or blocked energy' also known as 'Sha Qi', which halts the growth of life, and people should avoid it. For example, today, the depletion of the natural resources such as the cutting rate of hardwood trees from forests far exceeds the growth rate. According to the Yin and Yang principle, this has caused imbalance in nature by having more Yang (the land) than Yin (the trees). The Chinese believe that when a situation develops to its extreme, it will inevitably turn around, hence become the opposite as explained in the Yin-Yang theory (Bramble, 2003, pp. 87-92). Hence, living system must be conserved in order to keep the balance of ecosystem.

Reflecting on the feng shui belief system, the habitat of the forest will collapse due to over exploitation of the natural resources. Such disaster can be avoided by, ideally, understanding and developing the point of balance between Yin and Yang. In promoting well-being for the environment and nature, trees can deflect the flow of 'Sha

Qi' — such as environmental pollution — to protect human and the environment. The ultimate aim is to cultivate 'Sheng Qi' by adjusting the Yin and Yang balance of a place, so that they are in harmony with, and mutually support each other. The five elements analysis will also be able to identify the constructive and destructive forces of the ecosystem that will guide the development process. This prevents destruction of the balance of the ecosystem and provides regeneration of nature within our ecosystem.

The principle of regenerative development is to avoid pollution and depletion of natural resources by providing a regenerative system that enables waste to be converted back to a form of resources for life. Feng shui principles may suggest to regenerative development another method of looking at the intrinsic side of conserving, restoring and regenerating nature. As the saying goes, "prevention is better than cure".

2.4 REALITY RATHER THAN THEORY

Feng shui philosophies are based on an understanding of the human context and its physical world. It is based on thousands of years of observing their surroundings and the accumulated experience for survival. This is attained through a simultaneous consideration of the context of both ecological and cultural elements and by searching for suitable sites of settlement and maintained harmony between people and nature as well as among people.

According to Salingaros and Masden, modern urban planning and building designs tend to ignore or contradict the physical living processes of the world. They further explain that there is a separation between design based on a response to physical context, and design based on human derived experience itself, such as temporary fashion trend (Salingaros & Masden, 2006). They say this form of separation has created "inhumane cities and buildings" that will not increase or sustain human well-being. Pedersen Zari further

supports this criticism by acknowledging the importance of a comprehensive understanding of the physical realm of ecology and the cultural context of design to support regenerative design and development (Maibritt Pedersen-Zari, 2009, p. 5).

This correlation of understanding between feng shui and bio-inspired design may suggest that regenerative development should also be based on a comprehensive understanding of the physical reality of the ecological and cultural context of a design and development.

2.5 BE LOCAL AND PLACE SPECIFIC

The concept of wuwei is described by Venketesh as to allow nature to follow in their natural course so the nature and built environment will be in harmony (Venketesh, 1999, p. 42). Feng shui strongly emphasises on place-based planning and design. It subsumes the techniques and principles of optimum site selection, which simultaneously consider both natural and cultural elements (Han, 2001; Hu, 1994). Analyses by a variety of researchers say that good feng shui locations contain highly suitable microclimates for habitations. The Form School puts this principle into practice by designing forms and structural entities in favours of the natural land form. Ancient feng shui experts say being place specific also provides the ability to accumulate “creative potentials”, which enable humans to thrive with nature (Bramble, 2003, p. 72; Walters, Dec 2007). Such positioning also promotes the integration of human construction and natural infrastructures.

Nidhi Jain, in her research, explains a good design cannot be drawn but is generated from requirements, possibilities and constraints provided by the place, “its spirits” and the users (Hale, 1994, p. 174; Jain, 2001, p. 47). She further explains that present contemporary architecture faces a problem from the result of designer’s asserting their ego in the building’s design. This creates barriers to realising

the true meaning and essence of a built-form. Very often the building’s forms are egoistic expressions of designers that were based on some abstracted meaning of their conjectures. These conjectures fail to connect with the environment and ecosystem at a common and deeper ground which leads to failure in communicating its meaning to the users (Jain, 2001, p. 47).

Orians and Heerwagen, who are ecologists, also support this understanding by explaining that by selecting proper places in which to live is a fundamental and necessary activity for both humans and animals (Orians & Heerwagen, 1992).

Regenerative development's ultimate aim is to provide connection and partnership between people and place. Its approach is to “build to place, not formula” (Haggard, Reed, & Mang, January 2006, p. 26). Starting with formulas to adapt to site might mean that creative opportunities to use natural infrastructure are missed. The principles of regenerative development suggest that we can achieve continuous improvement of living conditions on Earth by developing harmoniously with nature. This can be done by allowing the infrastructures to develop according to particularities of a given place as parameters for determining the kind of engineering and design solutions that are appropriate. Hence, appropriate proportions, forms and shapes result from the given parameters. Bringing the understandings of feng shui and regenerative development together will create a comprehensive and widely relevant regenerative architecture.

2.6 DESIGN TO ALLOW COMPLEXITY

Feng shui resists simplified systems and forms with its understanding that everything is interconnected (Jain, 2001, p. 102). Although its principles — the concept of Qi, Yin and Yang, and five elements — is a manifestation of one creative force, its ultimate understanding of nature is based on the importance of the

coexistence of these principles to generate complexity of our ecosystem. This complexity will thus create multi-functional, robust, self-organising systems, where emergent effects for harmony and well-being of humans and nature is possible.

Salingaros and Masden, researchers in Biophilia, explain that “human beings connect physiologically and psychologically to structures embodying organised complexity more strongly than to environments that are either too plain, or which present disorganised complexity” (Salingaros & Masden, 2006, p. 6). They also add that fractal patterns are attractive to humans because they mimic human cerebral organisation. Well-being has also been linked to the complexity and variability of a constantly changing natural environment through time (Heerwagen, 1998, p. 4). Regenerative development may learn from this by embracing complexity and leverage it to create positive feedbacks or self-reinforcing effects, both ecologically and psychologically.

2.7 DESIGN TO MAXIMISE THE USE OF FREE ENERGY

Responding to climate is important in both feng shui and regenerative development. One of regenerative principle is to “orient[s] all aspects of design towards maximizing the use of “free” energies available on the site” (Haggard, March/April 2002, p. 28). Buildings in regenerative development have been designed carefully with regards to energy by intensively adopting passive solar systems as well as other means of regenerative energy from nearby without causing harm to the environment.

Feng shui constantly works with climates by analysing the orientation of a place. The way it works with the climate is reflected in the Form School methods of analysis. According to these principles, a building should be oriented towards the mid day sun to gain maximum solar heat in winter. It should be sheltered from cold winds either with artificial or natural features to minimize heat loss

and energy consumption. Choy explains that one can maximise the cultivation of 'Sheng Qi' by orientating and designing the building so the form and the openings can receive 'Sheng Qi' in the most efficient way to nourish the occupants (Choy, 2009, p. 103). Bramble also elaborates that orientating the front of a building towards the sun will save the occupants more than 30 percent on their energy bills, and by planning and calculating the time and year of construction according to the season can increase efficiency and productivity of work (Bramble, 2003, p. 104). With regards to respect the natural system, feng shui emphasises that the placement of the building must not disturb the balance flow of Qi within the site. This is so it will not cause disharmonies to the natural system.

2.8 THE POSITION OF MAN IN ITS CONTEXT

According to feng shui, Man plays an active part in the coexistence of building and its context, and they are related to each other with a flexible structure in their relationships (Anders, 2009). Man and nature cannot be separated from each other to achieve harmony.

“Human activities also have an effect. As part of the triad, Man cannot be divided from the capacity of Heaven and Earth, the capacity of “the three potentials/gifts”, San Cai. He participates in the permanent renewal of reality.” (Jullien, 2004)

In feng shui, various concepts – the Form School and the Compass School- are used to judge and explain a situation according to the quality of Qi, the position and orientation in the universal structure. Although each concept uses different methods, both aim at the ability to judge and improve a situation according to the natural universal structure; in other words, according to human needs in relationship to space and time. The context of the site is not placed in the background, but it is an integral part of place making with Man being in Nature and not observing her as an outsider. The

dweller being in the context of a site becomes the focal point for obtaining good feng shui.

The condition of Man and nature is also represented in the relationship between inside and outside. The inside is represented with forms and configurations of a house, while the outside is represented with the configuration of landscape. There is neither separation of inside and outside of a context because Man is placed in the situation alternating between inside and outside (Anders, 2009). This belief is very different from contextual architecture perspective*, where the position of Man is outside, separated from place and buildings.

By including Man as an active part of the context, Man, building and context become equal parts, where their relationships are mutual and influence on each other. This non-fragmentation concept of human being part of the context leads to an architecture that understands itself as a “holistic, complex phenomenon, embedded in a multilayer and instable environment of multiple forces, a dynamic phenomenon, that follows non static pattern and forms, appearing in the lapse of time”(Kuhnert & Tausch, 1993).

This understanding between Man and its context in feng shui is also reflected in regenerative development. The concept of regenerative development places strong emphasis on the existence of a "Place"(Reed, 2007). It involves continuous participation of Man with nature to produce regenerative living conditions on earth for human and nature. It constantly questions what role would nature wants Man to play so that it can better realise the full potential of its nature? Regenerative development argues that this is not a rhetoric question. It can be successfully answered when Man is responsive within the context of a given place and not depend on the conventional methods of evaluation by separating human and its context (Mang, 2009a; Regenesi, 2008). John Ehrenfeld explains

that actions to include human dimension is equally as important as taking care of nature. He believes that human cannot and will not take care of nature and the world until they become whole themselves (Ehrenfeld, 2008).

2.9 ASPIRE, BELIEVE, AND UNDERSTAND

Feng shui has been profoundly interwoven with many aspects of Chinese life through its endurance in the Chinese community for more than 3000 years. The Chinese cultures who believe in feng shui seldom question and challenge it because they have subconsciously accepted that there is an existence of potential higher order in the system through past experiences and continuous trials, which have been established through generations for more than 3000 years ago. According to Han and Xu (1997), it is not appropriate to label feng shui as superstitious because of its oversimplified documentation and a lack of understanding, as well as lack of systematic research (Han, 2001). It is those who profoundly practice feng shui who understand that it can further uncover its implicit value. Feng shui is a systematic approach towards understanding the matter of life and can be scientifically proven through a matter of time.

Choy, a feng shui analyst and an architect, explains that being 'timely and affectionate' creates an intimate relationship between nature, mountains and rivers, and humans. This is the root towards achieving harmony and well-being between human, earth, and heaven. Master Tan, a feng shui practitioner, further explains that the unchanging principles underlying the Form School in feng shui are human feelings and affections, which enabled us to connect our body and soul to the environment we live and work in.

In regenerative development, the principle requires the participants to envision the higher order of potential that exists in the system as well as how integration of project and place can bring that into

being (Reed, 2007, p. 678). It also contains some form of intimate relationships with nature. As Beatley (2004) puts it, “Landscapes and places are embedded with memories, and the nature of these memories affect how we value and treat places” (p.33).

Feng shui and regenerative development are similar in that they both starts with some form of aspiration and a sense of relationship before proceeding with understanding and developing a place. Both require one to make a paradigm shift in order to allow the course of nature to reveal itself to human and the environment. This is the key towards creating a regenerative development incorporating feng shui principles in the contemporary built environment. It is these values that are conducive to people’s self-actualization towards achieving regenerative future.

2.10 CHAPTER CONCLUSION

Feng shui and regenerative development are very similar in nature. Both of them are derived from the attitude of care and nurture towards nature. Their ultimate holistic philosophies aim to design in harmoniously with nature, and to attain peace for the spirit and health for the body. Their principles are very much based on the natural systems such as orientation of the sun, movement of the wind, human commonsense and experiences. Regenerative development takes into account the importance of delivering new capabilities into the communities that surround a project while feng shui provide practicality in realizing regenerative development. I propose that both are necessary to move human civilisation forward. The present contemporary urbanisation and civilisation poses some major ecological issues. In the following chapters, I will explore these urban ecological issues and discuss how to achieve holistic urbanisation and vertical regeneration. I shall also explore how feng shui can be applied in urban planning and designing without having to uproot the integration of regenerative

development towards achieving harmony and well-being in the contemporary urban fabric.

3.0 TOWARDS HOLISTIC URBAN REGENERATION

According to data collected by Thomas Brinkhoff in 2006, more than half the world's population were living in an urban habitat. From then on, more than 50 percent of the world's populations would live in cities (Brinkhoff, 2010). The incremental growth of cities signifies that expansions of cities are irreversible and inevitable, and that demands for more land to accommodate these expansions are needed for human development. The demand for more land and resources may produce negative consequences if planning for these expansions fails to consider and integrate the system (nature ecosystem) that exists to support life. Some cities may have begun to use a sustainable approach for developing their cities but they may still need to rely on external remedy factors to counter-balance some of the negative impacts the cities have had on the ecology.

This chapter will explore issues that cause ecological degradation in the urban fabric and how to amend these damages through some holistic urbanisation solutions, so that humans and nature can live in harmony with each other and achieve well-being. It will also explore models produced by ecological urban planners in their research to solve urban ecology issues through sustainable and

regenerative development practices. It will also look into whether building higher in the urban area to accommodate for densification is appropriate for achieving regenerative future. The question is how high can a building get before it starts to become unsustainable? The domain of this research is vast and this chapter will solely focus on a few strategies that resonate with the discipline of feng shui. The overall aim of this exploration is to develop a conceptual ground of understanding on the existing urbanisation problems. It is also to develop a holistic framework of regenerating cities towards harmony and well-being, without having to rely on external factors to reproduce humans and their environment. This chapter will be the key towards the design section of this thesis, which the findings may further justify the reason for applying feng shui and regenerative development in an urban setting.

Today, sprawl is one of the major causes of degradation in ecology. The development of cities signifies for the need of advancement in technologies and mechanical productivities. Sprawl is caused by vehicles and automobiles which enable humans to travel in comfort, faster and further away from their cities. According to Salingaros, sprawl has become an event in the 21st century from human development and technology advancement (Salingaros, 2006). Sprawl has caused wastage of natural resources and is unsustainable, for the amount large of footprints that spread across the land causing imbalance of nature.

Another cause of degradation in ecology is found in the development of high-rise and ultra-high rise apartments and offices. The serious threat of high energy costs makes both ultra-high-density environments based on skyscrapers, and low-density suburban sprawl financially and ecologically unfeasible for the environment. This unfeasibility is in the form of energy reliance that

draws on enormous resources from the surrounding region and its dependence on the supply of oil to build and develop. Salingaros believes that ultra-high-density urbanism creates more problems than it solves (Salingaros, 2006).

The final factor that causes a loss of balance and degradation of ecology in urban areas is found in the homogenisation of cultural place through consumerism (Mang, 2009a, p. 29). According to Mang, the fundamental ecological principle shows us that living systems grow in health and viability through increased bio-diversification, complexity, and richness of interrelationships within and between bioregions (Mang, 2009a). However, homogenisations of global development in cities have completely countered what the regenerative development principle has shown. It is the localities that exist within a place that provide the liveliness, well-being and balance between humans and nature.

Thus, sprawl, high-rises and skyscrapers, as well as homogenisation of culture have all contributed to the degradation of ecology and imbalance of humans and nature. Regenerative development can be a solution that is able to restore and regenerate the identified issues. It sees the need of development to be a source of ecological health. Its ultimate achievement is to re-integrate human systems with nature in all areas. This is a mutually beneficial partnership between humans and the living earth. Regenerative development consists of four fundamental principles. Firstly, it needs to inspire humans to participate to contribute towards creating a healthier regenerative place. Secondly, it needs to nourish and support the authenticity of a place by growing out the cultural and ecological uniqueness of place. Thirdly, regenerative development uses "natural intelligence" to achieve elegant and economical results within a place. For example, a development of a place integrates wild ecosystems to the benefit of both humans and local existences. Lastly,

regenerative development requires paradigm shifts. This asks for all participants of the place to be proactive members in healing the place they inhabit and eventually evolving into the co-evolution for natural and human communities (Mang, 2010). It will be ideal when a city is able to move from sustainable to regenerative development to allow human and nature to reproduce by themselves without any dependence on external factors to sustain them. These fundamental principles are also in aligned with feng shui philosophy.

According to feng shui, urban area's Qi or energy fluctuates more frequently compared to suburban and rural areas' Qi (Rossbach, 1999, pp. 86-87). Rossbach explains that the high fluctuations of Qi in the city are generated by the intensity of interactions between the high density built environment, human and their activities, and life forms from the natural environment. These Qi fluctuations provide greater unusual occurrences, where they can have positive or negative effects on the well-being and harmony of human and the environment. Aldo Leopold also supports this understanding by explaining that land is more than just the ground we live upon but rather it is a complex living energy system that includes soils, plants, and animals in a circulating flow of nutrients (Mang, 2009a). Hence, it is important to understand the complexities of the immediate urban neighbourhood as a whole before design to achieve holistic and balance in urban form that cultivates harmony physically and psychologically in all beings.

3.1 HEIGHT AND SCALE

According to Ong, a feng shui practitioner and researcher, high-rises can be inauspicious to the immediate neighbouring sites. He explains that they should not replace mountains to symbolise higher terrains in the urban setting (Hean-Tatt & Leyau, 2009). Mountains are formed from nature that contain wildlife, which completes nature's ecological system, while high-rises are man-made and are

not part of the ecological system to support the complete cycle of nature.

Capra explains that the fragmentations of our environment can be seen as the essential reason for the present series of social, ecological and cultural crisis (Capra, 1999). In the urban fabric, fragmentations occur on a vertical scale where buildings are built without considering its immediate neighbours' heights. In feng shui, high rises that are too tall from its neighbours are inauspicious because they will suppress the immediate small buildings' Qi. They will also create imbalance of the Yin and Yang caused by the extreme heights of buildings that contradict each other. As buildings get taller, it will cast longer shadows (yin) over the neighbouring sites and causes them to receive less sunlight during the day. As explained in chapter one, the sun plays an important role in production of qi within a site as it provides yang energy and regulates photosynthesis process, which produces negative ions that are essentials for a place's well-being (Hean-Tatt & Leyau, 2009). Hence, I propose that it is important to regulate buildings' heights and sizes so that they grow progressively throughout an area to achieve harmonious integrations of urban form.

This idea is supported by Salingaros's research, where he explains that an urban component should follow the universal distribution of sizes (Salingaros, 2005b). It should consist of many small buildings, structures, sidewalks and parks, that commensurate to the size of human being; a medium number of intermediate sizes and heights, and only a few of large ones. He also proposes that most of the buildings should be less than 10 stories in order to be environmental and cost-effective.

Illustration 22: Universal distribution of sizes (Salingaros, 2005b).

Illustration 23: A typical Rural-Urban Transect, with Transect Zones (Plater-Zyberk, 2005).

Salingaros proposes to build medium-rises in a compacted area according to transects zones instead of building higher to cope with the population growth and to control suburban sprawls (Salingaros, 2006). Salingaros and Duany explain that most of the present urban forms are based on a single-use zoning. This has led cities into the crisis of creating taller edifices and moving further away from the city centre (Plater-Zyberk, 2005; Salingaros, 2006). Even the compact and low-density cities are unsustainable because they require a larger footprint and deplete vast regions that are kept at distance. They proposed to use a form-based code to plan a human-scale community. Using a pragmatic approach to urban form, Duany classifies different zones according to "Transects" (i.e. a cross-

section of a continuum) of built environment, which are developed according to intensity and density of urban components. The communities can ensure their desired urban character by adopting written codes that prescribe it. The Transects have a total of six zones, which are T1 (Natural), T2 (Rural), T3 (Sub-Urban), T4 (General Urban), T5 (Urban Centre), and T6 (Urban).

Out of the six Transects zones, Salingaros proposes to use a compact model consists of T3, T4 and T5 as a substitute for suburban sprawl. T3, T4 and T5 are areas that are compact, mixed-use zone, connective, and walkable neighbourhoods, which are more responsive to human and the environment (Salingaros, 2006). The mixed functions intensities increases as each zone become denser in populations. The Transects model emphasizes on the importance of mixed functions in each zone to allow for inward-focus, human-scale connectivity. Each transects are connected and adjoined to each other intimately to prevent repetitions of one single zone over a wide area. Thus, it allows for walkable connections which reduce inhabitants' reliance on cars and transportations for their daily needs. This then prevents monoculture of sprawl. The height limit for each transect is reflected on their transect number; where T3 limit is three, while T4 is four and T5 is five. However, T6 urban zone limit varies from approximately six to fifteen. This places a ceiling that protects the urban fabric from negative consequences of having high-rises and skyscrapers. However, the T6 limit can be an exception to smaller scale countries, where the areas need to accommodate for the densities are much higher and consist of the whole country. The examples are countries such as Hong Kong and Singapore where the high-rises are similar in heights within its area.

3.2 LOW SPEED ENCOURAGES HEALTHY URBAN LIFE

Sprawl exists due to misunderstanding of urban morphology (Salingaros, 2006). It occurs when buildings are erected with no regards for which connective geometries encourages walking. Sprawl relies on automobiles and the demand for them creates "dendritic" geometry of roads (Salingaros, 2005a). Salingaros explains that these dendritic geometries are good for automobiles but are inappropriate for human beings (Salingaros, 2006). Humans are link to work, school, medical and other activities areas but are not connected to road. However, present residential neighbourhoods are link mostly with houses and roads but activities centres. Hence, zoning code needs to prevent dendritic growth of building along roads, and instead promotes an urban geometry that concentrates on human clusters and connections that focus inwardly on local urban nodes. The transect-based zoning codes allow this to happen by replacing anti-urban zoning codes with human-scale walking distance zones.

Fast speed roads; such as straight, wide roads, motorways and highways; which are generated by automobiles are also the antithesis of feng shui. Feng shui believes that fast speed roads will carry fast moving Qi that will transcend into human and its environment creating disharmony within and between them consciously and unconsciously (Hean-Tatt & Leyau, 2009). However, Salingaros also adds that it is impossible to eliminate the automobiles because of the present economy, which feeds on its production (Salingaros, 2006). It can however be controlled with narrower roads and regulate vehicles' speed. Vehicles roads with gravels, bricks and grass surfaces will also slow down their speed of movement. This allows pathways to carry slow meandering Qi throughout the urban fabric. It also gives pedestrians the priorities to move at ease and comfort. Thoroughfares and parking lots

should also conform to a compact urban structure and not the other way round.

3.3 GREEN COMMUNITY BASED LIVING IN THE URBAN FABRIC

Regenerative development and feng shui places high importance on living in a community-based environment to achieve holistic living between humans and nature as previously mentioned. Alfred North Whitehead explains, "A community is an environment that is responsible for the survival of the separate individual which composed it; and these separate individual are responsible for their contributions to the environment" (Whitehead, 1928).

Regenerative development emphasises that a community based environment defines the attributes and character of the Place (Appendix I) as a living whole (Regenesi, 2008). It explains that the development process for sustaining and evolving the Place in multiple dimensions - cultural, ecological, historical, economical, and political - requires on-going participations from the developer and the local inhabitants. This is done through community activities to achieve a holistic outcome and evolution. It includes exploring the processes of growing authentic sense of Place as a source of unifying meaning, purpose and identity across and between communities, which is in contrast to the past expected course where a sense of Place was used to isolate and divide.

In feng shui, Ming Tang (bright hall) is used as a community gathering point allowing ceremonies and events to be held throughout the year. As explained earlier in chapter one, it is believe that Ming Tang allows inhabitants to capture the essence of Qi from all directions in an ideal feng shui site thus creating harmony and well-being in their living. An ideal Ming Tang can only exist in an environment where there is water and green plants (Hean-Tatt & Leyau, 2009). Hence, a garden or a vast open space that is in the middle, shielded at the back and sides with mountain

and trees, and fronted by river or water is always associated with Ming Tang. Thus, it is essential for community gardens to spread across the urban fabric in order to transform cities into holistic places. These gardens should act as global acupuncture points which the present urban fabric with the regenerative future. This is done by regenerating the elemental basis of life which re-connects human and nature through interactions and learning supports. It will then restore earth's capacity to regenerate itself and human's capacity to live in harmony with nature.

This belief is supported by Alma Clavin's idea that a community garden can provide opportunities for surrounding neighbours to come together and cultivate ecological and environmental consciousness as well as maintaining their health and well-beings (Clavin, 2009). He defines community gardens as urban plots of lands which provide opportunities for learners and educators to work together with the local communities to design spaces according to goals, such as creating aesthetics for the urban fabric, demonstrating permaculture principles, building resilient communities, providing food, health, and environmental education.

Clavin uses permaculture and well-being approach to encourage the community to be learners and to think positively about cultivating the ecology since they have something to gain directly for themselves. At the same time, they can learn how environmental impacts are related to everyday choices and values (Clavin, 2009). This approach demonstrates that well-being of the environment and learners are interlinked, where the natural environment generates conditions for organic life; of which human life is form; to exist in dependence with other forms of life.

Community garden promotes bio-diversification, where each garden is unique on its own because the activities need to adapt its own microclimate. These gardens provide food and resources for the

local communities thus reduce their reliance on homogenised external resources. He also proposes that the each garden has to be designed according to ecological principles and to be in compact size so that it is reachable in human scale (Clavin, 2009). This will allow the inhabitants to see the negative consequences of wasted resources, and the positive impacts of recycling and reusing the site's resources. Such immediate involvement of activities within the community allows the garden to demonstrate how individual actions made within the site can enable or undermine conditions for other choices to be made in the future. It also allow for cultural complexities and richness of interrelationships between places when connecting these point of activities. Urban inhabitants will be able to experience sense of places while travelling around the urban areas.

Community garden are also associated with spaces which allows for intrinsic and spirituality values to develop, allowing each inhabitant to progress for well-being at a deeper level. Flavia D'Andreamatteo describe garden as an ideal subject to use describing the connection between soul and earth. According to Venturi Ferraiolo, it also bears witness to the inner life of a community and becomes a cultural container (D'Andreamatteo, 2009). Through participations in the community garden, the inhabitants can develop the important quality of mindfulness. This allows them to become aware of how their actions affect and are constrained by natural processes around them across the changing seasons (Clavin, 2009). They are also able to evoke sensory stimulations making their leaning experience enjoyable which leads to emotional well-being. This lies parallel with feng shui's Ming Tang - the community garden, where the inhabitants of Ming Tang are exposed to the continuous seasonal changes of earth. This exposure is further reinforced through purposeful and meaningful participations of events and festivals in the space.

The community garden focus on human's active role in communicating and participating with its environment, which is also reflected on the Ming Tang concept. It allows them to think holistically and realise their role as active agents of change both within the site and in their daily lives. Clavin (2009) defines agency as "the ability to exercise choice and live according to deeply held values and is enabled or constrained by physical health, social structure and environmental limits." He criticised the twenty-first century urban environments do not have the "enabling structures" to practice sustainability and regenerative values. (Clavin, 2009) It has restricted people's choice to be actively engaged to ecological-conscious activities; such as recycling opportunities may be restricted in an area, low supply of local organic food that leads to expensive cost, or greywater systems may be impractical, given constraints on building alteration; which in turn lead to higher consumption of resources. The active participations in a community garden provide "enabling structures" (Clavin, 2009) and allow participants to become free from those artificial and rigid constraints by exercising their agency within a different constraint of community and environment. Hence, it allows participants to enjoy their daily life which do not demand for high consumption of resources.

The environment provides the resources required for human life, while the activities and experiences within the site helps inhabitants to understand natural processes that make life possible for all life-forms. Goodin describes how these larger ecological cycles and processes provide a continuity and context in which humans understand their own individual plans and projects, and hence shape their own well-being (Goodin, 1992). However, in an artificially built-up urban environment, inhabitants are not aware of such cycles of life because of homogenisation of cultural place through consumerism. The community garden allows inhabitants of

such realisations through ecologically designed space, where the inhabitants play an integral part. Hence, the community garden can be use as a tool to mitigate and ultimately eradicate the problem of homogenisation of place and consumerism. It can be the first step needed to allow for a paradigm shifts in the urban society, which enable holistic ways of thinking and making choices for humans and their environments. It also helps the inhabitants to realise both humans and environment limits, and focus on the intrinsic values of natural environment.

3.4 CHAPTER CONCLUSION

This chapter has sought to understand the solutions around the urbanisation issues that cause ecology degradation by identifying the extrinsic and intrinsic characters and qualities of the urban fabric. It has also developed a framework that is able to shift paradigm of the contemporary urban populations to think holistically in developing their cities towards a regenerative future. It is urgent for human to address these negative impacts due to urbanisation, where human survivals in the future are still in dependence on the reproduction of natural ecosystems. I believe that people need to start to acknowledge and incorporate these intrinsic values of environment in order to achieve regenerative urbanisation that is holistic in nature. The compact city model can be the first steps towards resolving the urban issues, of suburban sprawl and unfeasibility of developing high-rises and skyscrapers, at a macro level. Salingaros explains that the compact city model is ready for immediate use so that an ideal regenerative city can be implemented from now (Salingaros, 2006). The community garden model provides an ecology remedy at a smaller scale. It will help the urban inhabitants to regain their sense of place in city, which are mostly lost due to homogenisation of culture. It also helps to regenerate urban environment to achieve well-being and harmony of humans and nature. These community gardens in the urban area

become resource hubs, which are places for regenerating resources and learning about the process of nature (Clavin, 2009). When working on the community garden, feng shui principles are applied to identify the intrinsic values of the site and its immediate environment. The skills involved in the community garden reaches far beyond gardening but include a wide range of skills such as community-building, health knowledge, and ecological consciousness skills, which can be transferred to other spheres of life. It is a route that ultimately reaches for well-being, community resilience, and the health of the ecosystem that supports life. Next chapter is a new section of this thesis that explores the practical applicability in architecture design from these researches. It shall explore and test the above researches onto a design that will encompass these texts. Furthermore, it shall reveal how feng shui principle becomes the intrinsic core for regenerative development can be applied into an urban architecture, which consists of high densifications, to achieve urban regeneration, well-being and prevent sprawls.

SECTION TWO: MANIFESTING THE REGENERATIVE DESIGN

4.0 THE DESIGN BRIEF

This chapter is a design proposal that embodies all research findings from the previous chapters and reveals a workable regenerative environment building within the city of Auckland. As a developed city, one of Auckland's major characteristic is associated with urban sprawl (Arbury, 2005). The main concern with urban sprawl is the loss of surrounding natural lands and habitats as developments spread rapidly into the environmentally significant land. Another increase in concern is the environmental effects of automobile emissions, particularly in relation to climate change. Hence, this design proposal will look at using existing lands within Auckland city centre more efficiently instead of the peripheral of urban area. The objective is to create a regenerative building using feng shui and regenerative development principles. This design will act as a point of acupuncture to regenerate a depleting section of the city. I believe the design concept can remedy the populations' acceptance to recentralise themselves to live harmoniously in the city with nature. I also believe that the regenerative effects will reverberate to other parts of the city in the future toward becoming a

regenerative city. Hence, this design proposal is a regenerative architecture consists of mixed-use medium-rise building, which contains commercial units, offices, residential units and community spaces. It will serves as a departing point for transforming Auckland CBD into a holistic city, where people can live in harmony with the urban environment and well-being can be achieved.

THE SITE: THE CROSS OF FORT STREET AND SHORTLAND STREET

An empty land located right on the cross of Fort Street and Shortland Street has been chosen as an exploratory design process. The preliminary reason that this site was chosen among many other available lands in the city centre was because of its orientation that faces almost directly towards North (17 degree from North). This position is an ideal orientation from feng shui's perspective. Feng shui preliminary site analysis requires multiple scales observations. These encompass from macro topography and terrain study of the whole Auckland to human-scaled micro-observations of the existing site.

As explained in earlier chapter one, an ideal feng shui site is positioned so that it is backed by mountains and fronted by water and gentle hills. The topography analysis shown on the next page reveals Auckland CBD sits right on the Hsueh spot, the ideal feng shui site. This feng shui analysis is use to determine the site's earth

Qi creation and directions. The concentration of the earth Qi on the site will be responsible for all natural life forms on the site. The city's North orientation allows the site to flourish, prosper and grow in harmony when holistic plannings and developments are made. The earth Qi that flows from the back hill is supported by a few generations of hills and mountains. These connective ancestral mountains and hills becomes the filters and layers of protections against Sha Qi and strong southerly winds from getting into the site.

The five elements principle is also applied into studying the intrinsic characters of the site. These five elements exists within the creation of Qi, with one or more elements to dominate over the other elements at different places. Using CAD software, the connective mountains and hills contours are sectioned (image below) in order to study the relationships of their forms with the five elements. The forms are estimated according to their resemblance with the classifications of mountains accodring to the five elements (see chapter one, page 25). Hence, the form of CBD's back hill is driven by the water element Qi, which is a combination of ranges and other elemental forms rather than single peak. This may suggest that any developments within the city may correspond to the productive cycle of the five elements that generate the water element, which is either wood, metal or equally mutual water element. If other elements such as fire or earth are used as the main elements in their developments, it may cause intrinsic destrutions, which disturb the harmony of the site and its immediate environment. This step of analysis will prepare for the next stage of smaller scale analysis, which prescribes the site as a potential Qi regenerative site .

REFER ILLUSTRATION 17: THE IDEAL FENG SHUI MODEL (YI, YU, & HONG, 1996)

HILL OF PARENTS AND BACK HILL - AUCKLAND CBD

HILL OF GRANDFATHER - GRAFTON

MOUNTAIN OF FOREFATHER - MT. EDEN

PEAK OF ANCESTOR - ONE TREE HILL

ILLUSTRATION 26: IDEAL FENG SHUI MACRO SITE ANALYSIS
SCALE 1:50 000

This stage of analysis will examine the immediate neighbours' effects to the site's balance and harmony.

The earth's Qi from higher terrains will flow toward lower flat lands. Hence, there will be greater concentrations of Qi when the lower land is surrounded with higher terrains. A U-shaped hill is an ideal feng shui form for earth Qi to gather, which is a Sheng Qi site. The greater the concentrations of Qi, the greater the chance for the land to flourish with life forms. The proposed site has two points of high concentration Sheng Qi spots. These Sheng Qi spots will be ideal for living systems to grow in harmony and achieve well-being.

Although there are spots of Sheng Qi concentrations, the site's harmony is also affected with Sha Qi. From observations, the site is confronted with two major T-junctions, which bring in direct Sha Qi to the site. These junctions are straight roads of Commerce Street and Chancery Street with fast traffic flows.

Traffic flows intensities mapping (illustration 30) shown on the next page reveals that the Commerce Street has a higher flow of traffics compared to Chancery Street. Feng shui believes that Sha Qi from fast moving traffics will unconsciously project fast moving energies of Sha Qi. Continuous projection will lead to the space to be in disharmony and inhabitants will not be in peace with its immediate environment, which lead to loss of well-being. I propose that the Sha Qi can be filter with the use of screens and plants. As explained in chapter one (cf. page 6), plants are natural Sha Qi neutraliser.

Another concern is the location of the site that sits right next to a police station, which occasionally creates noise pollutions to the environment due to police car's siren effect and unsettling criminals moving in and out of the site. Feng shui believes that harmful Qi are projected from there due to crimes occupancies. Buildings' activities survey (illustration 30) shows that the neighbouring buildings are mostly offices, car parks buildings, and shop-lots. This shows that

this area is mostly daytime temporary inhabitations, where peoples travel to this place via mostly cars to work or for other types of activities in the city. Night time occupancies are minimal, which consist mainly of temporary accommodations for tourists and gentlemen clubs. The types of buildings' activities (illustration 30) show little or no sense of Place in this area. This is due to the lack of community existence caused by transient inhabitations. As explained in previous chapters, it is a community-based environment that defines the attributes and characters of a Place as a living whole in order to create harmony and well-being in a site (cf. chapter three).

ILLUSTRATION 30: SITE PLAN

SCALE 1:2500

TRAFFIC FLOW INTENSITIES

abstracted source from <http://www.aucklandcity.govt.nz/auckland/transport/flow/default.asp>

SITE PLAN

SCALE 1:2500

PLACES WITH HIGH CONCENTRATION OF SHENG QI

SITE PLAN
SCALE 1:2500

QI FLOW FROM HIGHER TERRAIN MAPPING

ILLUSTRATION 30: SITE PLAN

SCALE 1:2500

BUILDINGS' HEIGHTS SURVEY

The determination of the heights of the proposed building's are assessed according to Salingaros's (refer to chapter four, page 46) concept of Universal Distribution of Sizes as well as according to the continuation pattern of neighbour buildings' heights. He also explained that medium rises buildings arranged in compacted forms around the city are more ideal than intensifying the city's densities into high-rises and skyscrapers. The statistic in illustrations 31 and 32 reveals that the immediate neighbourhood buildings have 3 high-rises that are approximately more than 20 stories, about 7 medium high-rises that are more than ten stories, and more than 27 buildings that are low-rises, which are less than 10 stories. In order to achieve a balance in heights distributions in the area, I proposed that the design to be a medium-rise building, which is approximately 11-15 stories, considering its neighbours' height of 9 and 16 stories. The proposed building's shadows are also recorded and mapped to ensure the determined height would not overcast to its immediate neighbours, especially on the South side where they are all low-rises (refer illustration 68).

ILLUSTRATION 31: SECTION THROUGH FORT STREET SHOWING BUILDINGS' NUMBER OF STOREYS
(The red numbers are indications of buildings' number of storeys)

ILLUSTRATION 32: PLAN OF BUILDINGS' HEIGHTS SURVEY
(The red numbers are indications of buildings' number of storeys)

ILLUSTRATION 33: BIRD EYES VIEW OF NORTH SIDE

ILLUSTRATION 34: BIRD EYES VIEW FROM SOUTH SIDE

NEXT PAGE ILLUSTRATION 37: CONCEPTUAL SITE PLAN [SCALE 1:250]

Traditionally, the ideal feng shui model has only been applied on a single plane owing to the low-rise nature of ancient and traditional structures. The predominance of building vertically in order to accommodate for densifications in city centre has provide an opportunity for manipulating the "armchair formation" model (see Chapter One, page28) and the Lo-Shu diagram.

The floor plans of the building are designed entirely around the Lo-Shu grid diagram and the armchair formation model, where they are influenced by seasonal and time changes. This model of design allows humans to acknowledge their habitations are part of nature's cycles, which directly influence their physiological and psychological well-being to live in harmony with nature.

The Lo Shu grid is based on multiples of 430mm (Teh, 1988, p.23). This is considered the basic desirable feng shui dimension, where it is an ideal human scale dimension. Human-scaled inhabitations are intensified and connections between humans and nature are drawn closer as they interact with each spaces, which are multiplicity of the 430mm human-scaled dimension (illustration 35).

ILLUSTRATION 35: MULTIPLICATION OF 430MM GRIDS

The illustration below (illustration 36) reveals possible combinations and permutations of the five elements in Lo-Shu diagram. The combinations of mutually productive, mutually destructive and mutually equal cycles produce 36 possible combinations and permutations of the five elements. This correlation plays a significant role in the creation of built environment, as it is applied to shape the built-form and to make the spatial organisations symbolically auspicious.

ILLUSTRATION 36: INTERPRETATION OF THE LO-SHU DIAGRAM ACCORDING TO THE FIVE ELEMENTS CYCLES

ILLUSTRATION 38: VIEW FROM STREET LEVEL

ILLUSTRATION 39: VIEW TO WATER COURTYARD

ILLUSTRATION 40: VIEW FROM CAFE

NEXT PAGE ILLUSTRATION 42 : LEVEL ONE FLOOR PLAN [SCALE 1:250]

Yin & Yang Influence: Yang

The Five Elements Influence: Water

Min Tang Courtyard Influences: Solid, Yang, Water

Occupancies: Public Communities, Bio-retention Pool, Commercial Shops

The first step towards enhancing the site's Qi flows and concentrations is to allow for the building and the ground floor layout to blend into the site's elemental Qi. Hence, it is composed of water element qualities (refer Appendix 2) and yang energy. Yang energy is represented as a ming tang courtyard, which allows humans and other living beings to gather within centre of the courtyard. This will generate enough yang energies to circulate upwards. The ming tang courtyard opens towards the northern side and is surrounded by a bio-retention pool (13), which represents the water element. The pool connects Qi from heaven to earth through a vertical green screen wall (18) on the southern end. Thus, allows water carrying Qi towards the courtyard and is activated from the northern side. It is use to filter storm water and grey water collected from the site before being stored to re-use as on-site irrigations and toilet flushes. The centre of the courtyards forms two inter-connected islands (11) which allow the pool to create a water confluence. This is an ideal feng shui form, where it embraces the armchair model and the confluence and islands are beneficial in receiving and concentrating Qi. The pool stream is slowed down by densely planted native sedges and reeds, which allows the water to meander and allow Qi to move slowly.

The ground floor's main entrance (4) is access from Fort Street. It is also the building's front entrance as there are more pedestrians' footpaths along Fort Street as compared to Shortland Street. The entrance is located on the Northwest alignment, which is the gate of heaven alignment in the Lo-Shu diagram. This alignment correlates with the site's prevailing wind chart, where the Northwest and Southeast direction have the least strong prevailing winds. As explained, strong and cold prevailing winds carry fast moving Qi which can be harmful to the site's well-being.

ILLUSTRATION 41: SITE'S PREVAILING WIND CHART

The main entrance is also faces a green screen wall (5). The green wall act as sha Qi neutraliser using leaves in photosynthesis process to convert negative energies to become positive energies which is beneficial to the site.

There is also a large green screen wall (6) at the centre of northern front facade, facing directly towards the T-junction of Fort Street and Commerce Street, to filter sha Qi that comes directly from the T-junction. I also propose to replace the T-junction's road surface (1) to brick in order to control the traffics' speeds. This will allow slower Qi to transcend through the water courtyard.

The main vertical circulation (14) is located on the west, the metal element side. This elemental corner will embrace the water element thus allowing the ground floor Qi to be generated upwards with human movement.

The Southwest direction of the building is confronted with the most frequent strong and cold prevailing wind, which carries harmful (sha) Qi to the site. This Qi is diffused off with a city green pocket landscape (28); consist of large trees that grow more than 10 meters tall. In feng shui, it is suggest that ideal trees to diffuse sha Qi would forms of trees that resemble the form of pine trees (Chen, 2008).

1. T-JUNCTION BRICK ROAD
2. PIEZOELECTRIC TILES PEDESTRIANS PATHWAY
3. NOISE AND QI NEUTRALISATION GARDEN
4. NORTH WEST MAIN ENTRANCE
5. GREEN SCREEN WALL
6. NORTHERN VERTICAL GREEN SCREEN WALL
7. COMMERCIAL SHOPS
8. CAFE SHOP
9. CAFE'S KITCHEN
10. CAFE'S TOILETS
11. COURTYARD QI ISLAND
12. GABION WALLS FOR POOL'S FILTER MECHANISM
13. GREY AND STORM WATER FILTRATION POOL
14. MAIN ACCESS STAIRWAY
15. RESTAURANT
16. RESTAURANT'S KITCHEN
17. RESTAURANT'S TOILETS
18. STORM WATER FILTRATION WALL
19. TIMBER BENCHES
20. LIFTS CORE
21. SECONDARY STAIRS (FIRE-ESCAPE STAIRWAY)
22. SERVICES CORE
23. WATER PUMP CORE
24. MECHANICAL WASTE AND RECYCLING SEPARATOR
25. GREY AND STORM WATER FINAL STAGE FILTERS AND STORAGE TANKS
26. PUBLIC TOILETS
27. SERVICES AND GENERATOR ROOM
28. CITY GREEN POCKET CONNECTOR

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ILLUSTRATION 43: VIEW FROM COMMERCE ST.

ILLUSTRATION 44: VIEW FROM LEVEL 2 ENTRANCE

NEXT PAGE ILLUSTRATION 45 : LEVEL TWO FLOOR PLAN [SCALE 1:250]

Yin & Yang Influence: Yin

The Five Elements Influence: Water

Min Tang Courtyard Influences: Void, Yin, Water

Occupancies: Public Communities, Commercial Shops, Offices

Level two connects directly to Commerce Street on the Southern side. Its access is located on the Southeast side (13) and is also the back door of the building, which is considerably hidden from street's view. Level two is also confronted with a T-junction between Commerce Street and O'Connell Street. The strategy of diffusing sha Qi from this direction is to block the Qi with walls from the waste and recycling cores, which have least humans' occupancies. The waste and harmful Qi are then being process and convert into mutual Qi.

Level two's element is a continuation of water element activated Qi. It is the yin level, which has a void on the Northern side that overlooks down to level one courtyard. Activated Qi concentration from level one is transfer through the main stairway located on west side. Upon landing on level two, there is a large landing point for collective human Qi before moving one step higher to another level.

-
1. COMMERCIAL SHOPS / OFFICES
 2. TOILETS
 3. MAIN STAIR ACCESS TO GROUND FLOOR
 4. MAIN STAIR ACCESS TO LEVEL 3
 5. LIFTS CORE
 6. WASTE AND RECYCLING DISPOSAL ROOM
 7. SECONDARY STAIRS (FIRE ESCAPE STAIRS)
 8. LOADING ZONE
 9. PUBLIC TOILETS
 10. GREEN POCKET
 11. GREEN ROOF
 12. SKYLIGHT
 13. ACCESS TO GROUND FLOOR RESTAURANT
 14. SOUTHEAST BACK DOOR ACCESS
 15. RAINWATER FILTER + GREEN SCREEN WALL
 16. THE YIN VOID OF WATER COURTYARD
- 18B-C, 1A-6A/18
- 18
- 1A
- N

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ILLUSTRATION 46: VIEW FROM WOOD COURTYARD

ILLUSTRATION 47: VIEW FROM LIBRARY

ILLUSTRATION 48: VIEW FROM FOOTPATHS TO LEVEL 4

NEXT PAGE ILLUSTRATION 49: LEVEL THREE FLOOR PLAN [SCALE 1:250]

Yin & Yang Influence: Yang

The Five Elements Influence: Wood

Min Tang Courtyard Influences: Solid, Yang, Wood

Occupancies: Public Communities, Community Library, Offices

Level three is design based on wood element qualities (appendix 2 and chart1, p.11) and it is a production of water element. A wood courtyard is allocated on the northeast side. Wood element signifies for growth, verticality, and is associated with “visions” of human senses (Appendix 2). I proposed that a library, a place for the development wisdom, is ideal for this level. The library spaces also permeates through the courtyard through a semi-open space to allow the Qi concentration to carry into the interior of library spaces. Here, users are able to experience optimum Qi while inhabiting the spaces to read. Three trees are planted on the courtyard to allow concentrated Qi to slowly meander on the level. The main stairway that connects to level four is located right on the wood courtyard and carries wood activated Qi upwards.

1. OFFICES
2. TOILETS
3. MAIN STAIR TO LEVEL 2
4. MAIN STAIR TO LEVEL 4
5. SEMI-INDOOR READING SPACE
7. THE READING GARDEN
8. COMMUNITY LIBRARY
9. LIFTS CORE
10. WASTE AND RECYCLING DISPOSAL ROOM
11. GREEN ROOF
12. SKYLIGHTS
13. RAINWATER FILTER + GREEN SCREEN WALL
14. GLASS ROOF

NEXT PAGE ILLUSTRATION 50: LEVEL FOUR FLOOR PLAN [SCALE 1:250]

Yin & Yang Influence: Yin
The Five Elements Influence: Wood
Min Tang Courtyard Influences: Void, Yin, Wood
Occupancies: Semi Public Communities, Offices, Residential

Level four is a yin level of wood element. It embraces the Qi from wood courtyard. The yin level allows minimal community collection because Qi concentrations are focused on the courtyard level.

1. OFFICES
2. RESIDENTIAL UNITS
3. THE YIN VOID OF WOOD COURTYARD
4. MAIN STAIRWAY TO LEVEL 3
5. MAIN STAIRWAY TO LEVEL 5
6. GLASS ROOF
7. LIFTS CORE
8. WASTE AND RECYCLING DISPOSAL ROOM
9. GREEN ROOF
10. RAINWATER FILTER + GREEN SCREEN WALL
11. TOILETS

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ILLUSTRATION 51: VIEW FROM FIRE COURTYARD

ILLUSTRATION 52: VIEW FROM COMMUNITY GYM

NEXT PAGE ILLUSTRATION 53: LEVEL FIVE FLOOR PLAN [SCALE 1:250]

Yin & Yang Influence: Yang

The Five Elements Influence: Fire

Min Tang Courtyard Influences: Solid, Yang, Fire

Occupancies: Semi Public Communities, Offices, Residential, Gym and Activities Centre

Level five is based on fire element qualities (Appendix2) and it is a production of wood element. Fire elements qualities are related to ascending, burning, hot, noon, and heart. Hence, I proposed that the courtyard is designed for physically active activities, which can activate humans' heart pulses. The courtyard sits right next to a community gym, which allows people to move between spaces to work out. It is consists of multiple heights to allow the Qi to move in fire element formation. In this level, well-being is achieved when people re-connect their body with nature through movements.

1. RESIDENTIAL UNIT
2. OFFICES
3. TOILETS
4. SPORTS AND ACTIVITIES GARDEN
5. COMMUNITY GYM
6. GYM'S SHOWERS AND TOILETS
7. LIFT CORES
8. WASTE AND RECYCLING DISPOSAL ROOM
9. GREEN ROOF
10. RAINWATER FILTER + GREEN SCREEN WALL
11. MAIN STAIRWAY TO LEVEL 4
12. MAIN STAIRWAY TO LEVEL 6

NEXT PAGE ILLUSTRATION 54: LEVEL SIX FLOOR PLAN [SCALE 1:250]

Yin & Yang Influence: Yin
The Five Elements Influence: Fire
Min Tang Courtyard Influences: Void, Yin, Fire
Occupancies: Semi-Public Communities, Offices, Residential

Level six is the yin of fire element. There is a void at the centre, which overlooks to the fire courtyard and allows activated fire Qi from level five to move upward and completes the fire element levels. This level is a semi-private space compared to the lower floors, which suggest smaller collective landing spaces for the main stairways

1. RESIDENTIAL UNIT
2. OFFICES
3. TOILETS
4. YIN VOID OF FIRE COURTYARD
5. MAIN STAIRWAY TO LEVEL 5
6. MAIN STAIRWAY TO LEVEL 7
7. LIFTS CORE
8. WASTE AND RECYCLING DISPOSAL ROOM
9. GREEN ROOF
10. RAINWATER FILTER + GREEN SCREEN WALL

ILLUSTRATION 55: VIEW FROM VEGE GARDEN

ILLUSTRATION 56: VIEW FROM LEVEL 7 STAIRWAY LANDING AREA

NEXT PAGE ILLUSTRATION 57: LEVEL SEVEN FLOOR PLAN [SCALE 1:250]

Yin & Yang Influence: Yang

The Five Elements Influence: Earth

Min Tang Courtyard Influences: Solid, Yang, Earth

Occupancies: Semi Public Communities, Perennial-Vege Garden, Offices, Residential

Level seven is designed based on earth element. It is generated from fire element. Earth element qualities are associated with centre, always producing, consumable, point of transitions (Appendix 2). Hence, I proposed that the earth courtyard is a community perennial garden. This garden encourages urban agriculture allows city inhabitants to source food from inside the city. Perennial gardening creates crop rotations which allow for maximum productivity. It also provides education for the community to re-connect with nature and ecology.

1. RESIDENTIAL UNIT
2. OFFICES
3. TOILETS
4. VEGETABLES GARDEN
5. MAIN STAIRWAY TO LEVEL 6
6. MAIN STAIRWAY TO LEVEL 8
7. LIFTS CORE
8. WASTE AND RECYCLING DISPOSAL ROOM
9. GREEN ROOF BALCONY
10. RAINWATER FILTER + GREEN SCREEN WALL

NEXT PAGE ILLUSTRATION 58: LEVEL EIGHT FLOOR PLAN [SCALE 1:250]

Yin & Yang Influence: Yin
The Five Elements Influence: Earth
Min Tang Courtyard Influences: Void, Yin, Earth
Occupancies: Semi Private, Offices, Residential

Level eight is the yin of earth element. It is a semi-private level, which have higher ratio of residential units and one office unit.

-
1. RESIDENTIAL UNIT
2. OFFICE
3. TOILETS
4. YIN VOID OF EARTH COURTYARD
5. MAIN STAIRWAY TO LEVEL 7
6. MAIN STAIRWAY TO LEVEL 9
6. RAINWATER FILTER + GREEN SCREEN WALL
7. LIFTS CORE
8. WASTE AND RECYCLING DISPOSAL ROOM
9. GREEN ROOF
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NEXT PAGE ILLUSTRATION 59: LEVEL NINE FLOOR PLAN [SCALE 1:250]

Yin & Yang Influence: Yin
The Five Elements Influence: Earth
Min Tang Courtyard Influences: Void, Yin, Earth
Occupancies: Semi Private, Residential

Level nine is also another yin of earth element. Since earth is a centre of all elements, it can be use to balance the additional floor the building has after level ten. This level is mainly private spaces, which houses residential units only.

1. RESIDENTIAL UNIT
2. MAIN STAIRWAY TO LEVEL 8
3. MAIN STAIRWAY TO LEVEL 10
4. RAINWATER FILTER + GREEN SCREEN WALL
5. LIFTS CORE
7. WASTE AND RECYCLING DISPOSAL ROOM
8. GREEN ROOF
9. YIN VOID OF EARTH COURTYARD

ILLUSTRATION 60: VIEW TOWARDS METAL COURTYARD

ILLUSTRATION 61: VIEW TOWARDS HERBS GARDEN

ILLUSTRATION 62: VIEW FROM HERBS GARDEN

NEXT PAGE ILLUSTRATION 63: LEVEL TEN FLOOR PLAN [SCALE 1:250]

Yin & Yang Influence: Yang
 The Five Elements Influence: Metal
 Min Tang Courtyard Influences: Solid, Yang, Metal
 Occupancies: Semi Public, Herbs Garden, Residential

Level ten is based on metal element. Metal element qualities are malleable, changeable, dry, and is connected to smell in the five senses. I propose that the metal element courtyard as a herbs garden. This proposal suggest for a continuation of perennial planting from the earth courtyard. Herbs planting allows for medicinal and culinary use, which enhances human understanding of nature with lifestyle in pursue of well-being. The courtyard raised terrains are based on hydroponic planting system, which uses harvested rain water to sustain the herbs garden. It raised platforms are also use to divert sha Qi away from Southwest's strong southerly wind. This level is a semi-private area, where it is for the residential use.

1. RESIDENTIAL STUDIO
2. RESIDENTIAL UNIT
3. HERBS GARDEN
4. MAIN STAIRWAY TO LEVEL 9
5. MAIN STAIRWAY TO LEVEL 11
6. LIFTS CORE
7. RAINWATER FILTER + GREEN SCREEN WALL
8. WASTE AND RECYCLING DISPOSAL ROOM
9. GREEN ROOF

NEXT PAGE ILLUSTRATION 64: LEVEL ELEVEN FLOOR PLAN [SCALE 1:250]

Yin & Yang Influence: Yin
The Five Elements Influence: Metal
Min Tang Courtyard Influences: Void, Yin, Metal
Occupancies: Private, Residential

Level eleventh is the yin of metal element. This level is also the last floor that completes the productive cycles of the five elements. This in turn creates a holistic regenerative cycle between the building and its environment.

1. RESIDENTIAL UNIT
2. MAIN STAIRWAY TO LEVEL 10
3. YIN VOID TO METAL COURTYARD
4. RAINWATER FILTER + GREEN SCREEN WALL
5. LIFTS CORE
6. WASTE AND RECYCLING DISPOSAL ROOM
7. GREEN ROOF

NEXT PAGE ILLUSTRATION 65: ROOF PLAN [SCALE 1:250]

Yin & Yang Influence: Yang
The Five Elements Influence: Water
Occupancies: Green Roofs

The building's roofs are green roof, which consist mostly of turfs and New Zealand native small plants. This will encourage other life forms, such as birds and insects, to adapt themselves to the urban ecosystem. It will completes the chain dependent cycle for Qi to circulate harmoniously with the environment. The green roof is also use as passive heating and thermal insulation for the building as well as to allow storm water to filter through it before treatment and re-use the water again.

DESIGNED PLANS OVERVIEW

The key features of this building design are the collective and intrinsic role designed on each courtyard while connecting verticality upwards. Each level of courtyard space is designed with a consciousness for providing a paradigm shift for users to understand the intrinsic values of Place (Appendix 1) in regenerative spaces while living in vertical spaces. This direct shift would be impacted on user's consumption patterns and user's life-patterns, where consumerist instincts are reduced by providing them a sense of contentment through other means of activities. Stronger consciousnesses are created toward humans and nature, by allowing users to participate in natural activities, rather than materialistic activities. Each courtyard will create appropriate sense of Place that will soothe user's aspirations, elevate spiritualisation, and provide them a sense of security and peace. Hence, sense of Place, balance and harmony, and well-being are achieved without having to move out of the city in search of these qualities.

The main vertical stair circulations are strategically placed according to the five elements productive cycle on the Lo-Shu diagram. Residential units and offices are distributed across level two to eight to allow for active occupancies between these spaces. This is so that there is a continuation of Qi flows to be activated by human movement throughout the day. It will also provide constant surveillance and involvement through community activities to generate a healthy urban community living. The use of stairways are used as the main vertical circulation as opposed to lifts is a passive mean of regenerative design that utilises user's own body to move. This instils deeper connections between the conscious of their body with the immediate environment. Qi activated through human's movements honours the balance of nature. Thus, a human-scaled connection is achieved in verticality.

Next page illustrations reveal recordings on seasonal changes that are affecting the building's form. Although feng shui suggests that an ideal plan is symmetrical in form, Rossbach argues that symmetrically shaped building does not necessary provides balance and harmony to its environment. She explains this is because nature is not symmetrical itself (Rossbach, 1999, p.59). In order to achieve balance and harmony between built forms and its environment, building's form should be designed according to nature's forms. Hence, the built-form of the proposed design is measured according to the city's built and natural forms in order to achieve a balance environment.

The southern side of the building is recessed accordingly to avoid from creating long overcast shadows over its neighbour, which will harm their well-being. Illustration 68 shows the amount of Yin shadows overcast on its neighbour throughout every season.

ILLUSTRATION 66: BUILDING IN RESPONSE TO SEASONAL PREVAILING WIND CHART

ILLUSTRATION 67: BUILDING IN RESPONSE TO SEASONAL SUN PATHS

ILLUSTRATION 68: BUILDING RESPONSE TO EFFECTS OF OVERCAST OF YIN SHADOW ON NEIGHBOURS

Facade materials: Prefabricated timber sandwiched panels, laminated high density stratified timber panels installed on Xpressclad system finished with a layer of real timber veneer

The medium high rise is a best representation for re-connecting human scale in terms of creating comfortable vertical walking distances for humans, which is an alternative to using mechanical solutions such as lifts. According to McLaughlin (2001), a comfortable walking distance is best represented as one quarter miles, approximately 400 meters, or a five-minute walk. This is a traditional pedestrian continuity pattern of integrating human activities through a rich mixture of landscape and spaces, allowing the walk from one destination to another to be a pleasant and educative.

The facade reflects a balance and harmonious dialogue between its environments. It reflects water element in its form and wood element in its materials. This forms a mutual and productive cycle in the five elements principle. It uses the 430mm multiples to reduce the effect of mass on site and to allow a more human-scaled elevation. Consequently, this will not give the public an impression of an oversized building, which separates human with spaces in perception, but rather a more approachable and comfortable architecture to interact with. Although the building's form is driven by water element as the main element, which is based on the site's element, the presence of all other elements are necessary in order to experience a holistic environment. The larger openings, which are angled to receive direct sun penetration at specific times, located on the northern facade are for activating the Qi in the space. This runs according to the Lo-Shu diagram and provides solar therapy for the users of the spaces to achieve well-being for their mind and body.

ROOF LEVEL
FFL+44000

LEVEL 11
FFL+40000

LEVEL 10
FFL+36000

LEVEL 9
FFL+32000

LEVEL 8
FFL+28000

LEVEL 7
FFL+24000

LEVEL 6
FFL+20000

LEVEL 5
FFL+16000

LEVEL 4
FFL+12000

LEVEL 3
FFL+8000

LEVEL 2
FFL+4000

LEVEL 1
FFL+0.00

ILLUSTRATION 69: NORTH ELEVATION
SCALE 1:250

The needs for human survival and for natural processes are considered side by side at the design stage in order to develop a regenerative ecosystem. In the early stages of regenerative development, it is important that cultivations of natural systems in the building can create an environment for the natural processes to evolve without external human influences so that they will eventually regenerate well-being of humankind in the future.

Plants are planted according tiers and vary according to height to encourage diversities of life-forms, such as pollinating insects and birds, to co-habit with humans. This blends the built and natural ecology system as one, allowing regeneration to perform on its own.

According to Pete Melby (2002, p.18), there are five occurring activities in the process of regeneration in order to create and maintain healthy and self-renewing life forms within the natural ecosystem. They are:

- 1. conversion
- 2. distribution
- 3. filtration
- 4. assimilation
- 5. storage

They are the main influences for the flow of water, nutrients and energy within the ecosystem. I suggest that this process can also be manipulated by humans into the built environment to blend development with the natural environment. When a building has all the above activities running, then the building will be in regeneration.

The illustration reveals the flow of energies, water and nutrients that use passive technologies for the development of regenerative design of the building ecosystem. The lines illustrate the paths of flow for the sun's energy, rainfall, and nutrients necessary for a regenerative environment's survival and growth. Note that the paths of flow form loops where all energy and contents are re-used for continuous growth.

The recycling mechanism is located in the building's ground floor, while waste and bio-compost for food waste take place underground of the building. The bio-compost is then recycled as plant fertilisers on all the green areas in the building.

Apart from that, the building's main structures are constructed from steel, creating metal moment resisting frames, rather than using concrete as material. This is to avoid meeting the five elements destructive cycle affecting the Qi flow, where metal is the supporting element of water.

The built-ecosystem is able to provide support system for all life-forms, especially humans. When more life forms flourish on site, it indicates that the architecture has successfully allowed Qi to balance and concentrate on the site.

ILLUSTRATION 74: WALL SECTION OF NORTHERN GREEN SCREEN WALL
SCALE 1:50

ILLUSTRATION 75: WALL SECTION OF SOUTHERN GREEN SCREEN WALL
SCALE 1:50

ILLUSTRATION 76: VIEW FROM EAST OF NORTH FACADE

ILLUSTRATION 77: VIEW FROM WEST OF NORTH FACADE

ILLUSTRATION 78: VIEW FROM GROUND FLOOR LIFTS

ILLUSTRATION 79: SECTION THROUGH 49° ANGLED FROM TRUE NORTH SOLAR WALL
SCALE 1:50

ILLUSTRATION 80: SECTION THROUGH 0° ANGLED FROM TRUE NORTH SOLAR WALL
SCALE 1:50

ILLUSTRATION 81: SECTION 1 THROUGH 343° ANGLED FROM TRUE NORTH SOLAR WALL
SCALE 1:50

ILLUSTRATION 82: SECTION 2 THROUGH 45° ANGLED FROM TRUE NORTH SOLAR WALL
SCALE 1:50

ILLUSTRATION 83: VIEW FROM LEVEL 7 INTERIOR BUILDING

ILLUSTRATION 84: VIEW FROM LEVEL 7 GREENROOF BALCONY

DESIGN REFLECTION

This chapter has sought to test the research and ideas of regeneration development and design by designing a holistic architecture, acting as an urban-acupuncture while allowing regenerative development to grow across the city. It is important for architecture to acknowledge the existence of the intrinsic values within a Place. Thereby, this allows a holistic understanding on the importance of the interdependence between humans, nature, and their environment for survival and well-being.

Incorporating feng shui and passive modes design, which uses “natural intelligence”, has allowed a creative exploration of regenerative systems. The focus is to avoid overuse of natural resources and to protect the earth from degradation caused by present urban issues (cf. chapter one). As a result, the developed design mimics some natural ecosystems while it helps to realise uniqueness of the Place. The architecture design uses the Place to its optimum potential. Furthermore it encourages slow to medium mode of movements in all forms rather than fast movements. This reflects the understanding of Qi in the creation of paths.

The proposed architecture supports urban community living with the aim of allowing occupants to live harmoniously within their societies. This process of socialisation facilitates development of social behaviours towards the unfolding of the essences of each unique person. It is only through such inner development and unfolding humans can aspire towards the higher reaches of humanity. The need to consider other life forms such as trees and plants is essential to realise a symbiotic relationship between humans and nature in the urban context. It is only through such relationships that a holistic development can be achieved.

FINAL CONCLUSION

The thesis has set out to resolve some of the main issues surrounding urban architecture in regard to ecosystem degradation, through feng shui and regenerative development. It has sought to develop an understanding of feng shui as the intrinsic solution for regenerative development in urban architecture design to achieve well-being. Feng shui can be an act for spiritualising life forms by becoming a medium for architecture and humans to realise nature's pleromic (cosmic) field that regenerates life within living systems. Without the continuous renewal of spiritual will, all living systems face entropy and eventual degeneration (Bohm, 2003). Humans and architecture can become instruments for realising this spiritual source and, in doing so; regenerative understanding is formed to allow continuous growth in humankind.

UNDERSTANDING THE ANCIENT KNOWLEDGE OF NATURE

Chapter one introduces and discusses the principles of feng shui to gain insight of this ancient knowledge developed by the Chinese. It is systematically structured to understand the intrinsic values of humans and nature. These understandings are compacted into basic, symbolically presented ideas; such as the Qi, the Yin and Yang, the five elements principles, and other diagrams mentioned in Chapter One. The form school approach to feng shui shows a great significance in relating their studies towards understanding how natural ecology works with time, space, and humans. On the other hand, the compass school has a more mechanical approach towards analysing nature. Both schools of studies are essential towards creating a holistic architecture and development. Each of these principles is related to each other. This understanding has successfully acknowledged that the existence of humans and nature are intertwined with each other. Feng shui has shown that it allows people to be more responsive to their environment and to take a holistic approach in planning places. One must first experience the

subtleties that lie within nature, which are the Qi, the Yin and Yang variations and the five elements, in order to gain understanding of the spiritualities and the intrinsic values of nature. Rather than abandoning this accessible wisdom, contemporary architectures and developments can utilise this knowledge. This would guide people to further develop and evolve with nature, rather than acting against nature.

FENG SHUI BECOMES AN INTRINSIC SUPPORT FOR REGENERATIVE DEVELOPMENT

Chapter Two demonstrates the symbiotic relationships that exist between feng shui and regenerative development. It argues that both principles share great similarities and feng shui can complete the understanding of regenerative development into another spectrum level. Regenerative development explains that one needs to make a paradigm shift in order to allow the course of nature to reveal itself. Feng shui can support this paradigm shift in allowing the transition of understanding to progress by creating points of realisations and paths toward understanding the intrinsic values that exist within regenerative development. In the end, it sums up that both principles aim to inspire, nourish, and blend developments, humans and the ecosystem as one. It is these values that create conducive environments for people to have self-actualisation and achieve well-being and holistic living.

CREATING A HOLISTIC UNDERSTANDING OF URBAN DENSIFICATION THROUGH FENG SHUI AND REGENERATIVE DEVELOPMENT

Chapter Three explores issues that cause ecological degradation in the urban fabric and seeks solutions through holistic urbanisation theories, feng shui and regenerative development. It also explores models produced by ecological urban planners that share similar perspectives with feng shui and regenerative development

principles. This chapter raises questions on the ecological feasibility of building high-rises in order to solve densifications and urban sprawl. It concludes that high-rises may not be ecologically viable to prevent ecological degradation and promote regenerative development. Instead, a compact city model, comprising of high ratios of medium rises, is a better option to create a regenerative environment.

This chapter argues that human-scaled connections are important to create the self-actualisation in humankind, which then encourages the realisation of spirituality of its place. Human-scaled connectivity leads to the encouragement of having low speed movements to create a healthy urban life. It is through low speed movement that beneficial Qi is able to sustain in places and generate healthy environments.

Self-actualisation and spiritual realisation are also found within community gardens, which incorporate feng shui and regenerative development principles. Community living is as important as self-development within a place. The gardens become resource hubs regenerating natural resources that are use for humans' needs and to re-connect the society with nature as well as themselves. It will also help the urban inhabitants to regain their sense of place in the city, which is mostly lost due to homogenisation of culture, and regain well-being and harmony between humans and nature.

With these frameworks, a holistic and regenerative urban environment is achieved. These frameworks can act as a case study and provide guidelines for future urban planners and architects in developing regenerative cities.

THE URBAN REGENERATIVE DESIGN

In the final chapter, the devised researches are tested through a design case study in the Auckland city centre. The resulting urban architecture has an aesthetic inspired by community and ecology. The architecture becomes a holistic integrated network centre for reconnecting humans and nature; regenerating balance, harmony and well-being amongst the urban inhabitants. It is arguable that the success of the design can only be fully measured when one inhabits and experiences the spaces.

In the design, feng shui has become the main intrinsic support system for developing the architecture. It resolves the spiritualisation and actualisation of psychologies in living systems issues that lead to well-being through the understanding of the relationships between heaven, earth and humans. This is where architecture, humans and nature system have unified as one in the continuous field of regenerative development.

As previously mentioned, the proposed architecture supports urban community living through community gardens. It proposes that a process of socialisation occurs to create education, opportunities, and skills that unfold the essences of each unique human being. It is only through such inner development and unfolding humans can aspire towards the higher reaches of humanity. However, individual development is ultimately dependent upon the larger cosmic system of which they are a part, where time, space and seasons are the drivers. According to Mang (2009a), it is a Place which is teamed with lives that feed humans, both spiritually and physically, to achieve regeneration and well-being. Therefore, it is important that architecture which supports the development of high densities of people in cities must enable such actualisation of life within the greater systems of which humans are a part. According to feng shui, ultimately all life exists within a universal field of energy. It is when

the architecture can facilitate such realisation humans as individuals and collectives can help to regenerate the spirit of the city. Hence, the systems that they live within will continue to evolve and regenerate in balance with nature. It was once said by an anthropologist, Frederic Apffel-Margin (1994, p.9), the aim of life is to "generate and regenerate the world and be generated and regenerate by it in the process".

LIMITATIONS & FURTHER INVESTIGATIONS

The scopes of research placed on this thesis is limited to some fundamental knowledge of the traditional feng shui, of regenerative principles and only some selective works of urban planners that shows distinct relations between these two disciplines. These limitations provoke the need to broaden the field of understanding in regenerative and holistic design in the urban context. Indeed there are many other issues surrounding the research and design in this intersection of feng shui and regenerative urban architecture such as the applicability to the context of city densification. Further investigations may also include:

- The compass school teachings and He-Tu chart in relationship to regenerative development.
- Research into time, seasons and star constellations, a deeper understanding of the earth and cosmos in feng shui, in relation to regenerative architecture that effect humans' and the earth's well-being.
- Research into types of bio-diversities in relations to feng shui, which affects the effectiveness of the implemented feng shui framework on regenerative development.
- Further investigation on the processes and responses of human interactions with Ming Tang, also known as the community garden spaces.
- Further explorations on detailing of the design in relations to feng shui principles.

These are a few suggestions for future explorations and investigations in this field. The answers to these questions will

further enhance the success and effectiveness of integrating feng shui into regenerative development in urban areas. It may also devise another set of frameworks and ideas for architectural intervention to establish a regenerative urbanisation.

In the meantime, this thesis opens the door to the domain of intersection between an ancient discipline (feng Shui) and the contemporary concern for regenerative development.

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APPENDICES

APPENDIX 1

Extracted from Chapter 2: The Rediscovery of Place & Our Human Role in it, a dissertation for Saybrook Graduate School and Research Center by Nicholas Stephen Mang, Towards a regenerative psychology of urban planning, San Francisco, California, May 2009, page 32.

"What is the phenomenon of place? The word place is used in the English language to connote a number of contextual meanings. We speak geographically of places we have been to or visited. We also use the word place to speak of a state of order or disorder with such phrases as "putting things in place" or being "out of place" or even something being "all over the place." Place also speaks to having a meaningful position and role in the world (e.g., "I have found my place in the world"). In this sense place also speaks to authenticity and naturalness, of being "in-place" in the world as opposed to "out of place." Place also speaks to a distinctive quality and experience (e.g., "there's something about this place"). In the literature on place, this is often referred to as "sense of place."¹ In qualitatively experiencing places, we may find ourselves attracted to some places and repelled by others (e.g., "I love this place" or "this place is creepy, let's get out of here").

Etymologically speaking, place stems from the Latin words *placea*, *platea*, and *planta*.² *Placea* means a specific or localized spot. *Platea*, which is the same root for plaza, means courtyard, open space, or broad street. *Planta* means sole of the foot. In each case, place refers to a particular space in which one is situated, in which one plants one's feet and stands."

¹ Beatley, T., *Native to nowhere: Sustaining home and community in a global age*. London: Island Press, 2004

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² Online Etymology Dictionary, 2006; Webster Online Dictionary, 2007

APPENDIX 2

Extracted from Chapter 4: The living earth manual of feng shui by Stephen Skinner, Routledge & Kegan Paul Ltd, Great Britain. 1982, page. 58 & 59

Table 5 The five elements according to the Former Heaven Sequence

ELEMENT	Wood	Fire	Earth	Metal	Water
DIRECTION	East	South	Centre	West	North
COLOUR	Blue/green	Red	Yellow	White	Black
SEASON	Spring	Summer		Autumn	Winter
NUMBERS AND TEN HEAVENLY STEMS					
(Yin)	8 i	2 ting	10 chi	4 hsin	6 kuei
(Yang)	3 chia	7 ping	5 wu	9 keng	1 jen
CLIMATE	Windy	Hot	Humid	Dry	Cold
MOUNTAINS	T'ai-shan	Heng-shan (in Hunan)	Sung-shan	Hua-shan	Heng-shan (in Hopei)
PLANETS	Jupiter	Mars	Saturn	Venus	Mercury
ANIMALS	Azure Dragon	Phoenix/ Red Bird	Ox or Buffalo/ Yellow Dragon	White Tiger	Snake and/or Tortoise/ Dark Warrior
ORIFICES	Eyes	Ears	Mouth	Nose	Anus and Vulva
EMPERORS	Fu-Hsi	Shen-Nung	Huang-ti	Shao-hao	Chüan-hsü
THEIR ASSISTANTS	Chü Mang	Chu Jung	Hou-t'u	Ju-shou	Hsüan-ming
QUALITIES	Formable	Burning and ascending	Producing edible vegetation	Malleable and changeable	Soaking and descending
FIVE CLASSES OF ANIMAL	Scaly (fishes)	Feathered (birds)	Naked (man)	Hairy (mammals)	Shell-covered (invertebrates)
FIVE DOMESTIC ANIMALS	Sheep	Fowl	Ox	Dog	Pig
NUMBER	8	7	5	9	6
YIN/YANG	lesser Yang	greater Yang		lesser Yin	greater Yin
WEATHER CH'I	Wind	Heat	Sunshine	Cold	Rain

APPENDIX 3

Tabulated Daily Solar Data

Latitude: -37.0°
Longitude: 174.8°
Timezone: 180.0° [+12.0hrs]
Orientation: 17.0°

Date: 22nd December
Julian Date: 356
Sunrise: 05:02
Sunset: 19:35

Local Correction: -19.2 mins
Equation of Time: 1.6 mins
Declination: -23.5°

Local	(Solar)	Azimuth	Altitude	HSA	VSA
05:30	(05:10)	115.9°	4.8°	98.9°	151.6°
06:00	(05:40)	111.7°	10.3°	94.7°	114.5°
06:30	(06:10)	107.7°	15.9°	90.7°	92.4°
07:00	(06:40)	103.7°	21.7°	86.7°	81.8°
07:30	(07:10)	99.8°	27.6°	82.8°	76.4°
08:00	(07:40)	95.7°	33.5°	78.7°	73.5°
08:30	(08:10)	91.5°	39.5°	74.5°	72.0°
09:00	(08:40)	86.9°	45.4°	69.9°	71.3°
09:30	(09:10)	81.7°	51.4°	64.7°	71.2°
10:00	(09:40)	75.5°	57.3°	58.5°	71.5°
10:30	(10:10)	67.7°	63.0°	50.7°	72.1°
11:00	(10:40)	57.1°	68.3°	40.1°	73.0°
11:30	(11:10)	41.5°	72.8°	24.5°	74.3°
12:00	(11:40)	18.3°	75.9°	1.3°	75.9°
12:30	(12:10)	-10.5°	76.3°	-27.5°	77.8°
13:00	(12:40)	-35.8°	73.9°	-52.8°	80.1°
13:30	(13:10)	-53.3°	69.7°	-70.3°	82.9°
14:00	(13:40)	-65.1°	64.5°	-82.1°	86.3°
14:30	(14:10)	-73.6°	58.9°	-90.6°	90.3°
15:00	(14:40)	-80.1°	53.1°	-97.1°	95.3°
15:30	(15:10)	-85.5°	47.1°	-102.5°	101.4°
16:00	(15:40)	-89.8°	41.1°	-106.8°	108.3°
16:30	(16:10)	-94.6°	35.2°	-111.6°	117.6°
17:00	(16:40)	-98.7°	29.2°	-115.7°	127.8°
17:30	(17:10)	-102.6°	23.3°	-119.6°	138.9°
18:00	(17:40)	-106.6°	17.5°	-123.6°	150.3°
18:30	(18:10)	-110.6°	11.8°	-127.6°	161.0°
19:00	(18:40)	-114.7°	6.3°	-131.7°	170.6°
19:30	(19:10)	-119.1°	1.0°	-136.1°	178.6°

Tabulated Daily Solar Data

Latitude: -37.0°
Longitude: 174.8°
Timezone: 180.0° [+12.0hrs]
Orientation: 17.0°

Date: 22nd June
Julian Date: 173
Sunrise: 07:38
Sunset: 17:06

Local Correction: -22.6 mins
Equation of Time: -1.8 mins
Declination: 23.4°

Local	(Solar)	Azimuth	Altitude	HSA	VSA
08:00	(07:37)	56.9°	3.6°	39.9°	4.7°
08:30	(08:07)	52.0°	8.5°	35.0°	10.3°
09:00	(08:37)	46.7°	13.0°	29.7°	14.9°
09:30	(09:07)	41.0°	17.2°	24.0°	18.7°
10:00	(09:37)	34.9°	20.9°	17.9°	21.8°
10:30	(10:07)	28.3°	24.0°	11.3°	24.4°
11:00	(10:37)	21.2°	26.5°	4.2°	26.6°
11:30	(11:07)	13.7°	28.3°	-3.3°	28.3°
12:00	(11:37)	5.9°	29.3°	-11.1°	29.8°
12:30	(12:07)	-2.0°	29.5°	-19.0°	30.9°
13:00	(12:37)	-9.8°	28.9°	-26.8°	31.8°
13:30	(13:07)	-17.5°	27.5°	-34.5°	32.3°
14:00	(13:37)	-24.7°	25.3°	-41.7°	32.4°
14:30	(14:07)	-31.6°	22.5°	-48.6°	32.1°
15:00	(14:37)	-38.0°	19.1°	-55.0°	31.1°
15:30	(15:07)	-43.9°	15.2°	-60.9°	29.2°
16:00	(15:37)	-49.4°	10.8°	-66.4°	25.5°
16:30	(16:07)	-54.4°	6.1°	-71.4°	18.6°
17:00	(16:37)	-59.2°	1.1°	-76.2°	4.5°

APPENDIX 4
ECOTECT ANALYSIS ON THE DESIGN SITE

Comfort Percentages

NAME: AUCKLAND
LOCATION: NZL
WEEKDAYS: 00:00 - 24:00 Hrs
WEEKENDS: 00:00 - 24:00 Hrs
POSITION: -37.0°, 174.8°
© Weather Tool

CLIMATE: Cfb
Moist mid-latitude climate with mild winters.
Marine climates found on the western coast of most continents.
High humidity with short dry summers. Heavy precipitation in winter.
Warmest month below 22 °C.

- SELECTED DESIGN TECHNIQUES:
- 1. passive solar heating
 - 2. thermal mass effects
 - 3. natural ventilation
 - 4. direct evaporative cooling
 - 5. indirect evaporative cooling