SUBMISSION TO STANDING COMMITTEE ON INFRASTRUCTURE TRANSPORT AND CITIES – TRANSPORT CONNECTIVITY ECONOMIC DEVELOPMENT AND VALUE-CAPTURE

The submission on the above will be made in two parts, Parts A and B

PART A

The purpose of this initial submission is to give some explanation of the Expanding Nodular Development (END) concept, and to show how it can be an effective blueprint for the future urbanisation of Australia – to avoid the exorbitant costs of infrastructure, to put a circuit breaker on the stifling effects of congestion, to make housing affordable, to minimise environmental impact including emissions, to enable the development of regional Australia, to enable the efficient utilization of limited natural resources, and to generate industry and jobs for the growth of a healthy economy. Part B will deal with value capture to finance infrastructure in relation to the END concept

The following attachments are part of this submission:-

1. Summary of the Concept Paper
2. Article recently published by the Institution of Engineers in their magazine Engineers Australia, entitled 'Big ideas are needed to break the cycle of urban sprawl'
3. Submission made to the Victorian Government for the strategic planning of Melbourne
4. Weekly Times article entitled 'Sprawling threat to Future Melbourne's Food Supply'
5. Schematic layout of an END city
6. Schematic layout of water, waste and energy systems for an END city
7. Schematic layout of END city pattern of growth

Further articles and information are available on the website www.managedurbanisation.com . The full Concept Paper can be forwarded on request.

URBANISATION STRATEGY

The mode of urbanisation for Melbourne, and indeed for most Australian cities has been 'urban sprawl'. As discussed in the Concept Paper, urban sprawl is expensive in terms of infrastructure which must be continually upgraded to cater for ever expanding needs. Roads, water supplies, waste services, electrical supplies etc which were adequate at the time of design, become inadequate ten to twenty years later, and must be upgraded, generally at great cost to acquire land and to increase capacity. As infrastructure costs increase, housing affordability decreases and this is now a major problem in Australian cities, generally requiring two income families to service a mortgage and pay living expenses.

The most impacting result of urban sprawl is congestion. For Melbourne, a study made by the Commonwealth Department of Transport and Regional Services shows that by 2020, the cost of congestion to the community will be over $6 billion per year in loss of time, extra vehicle operating costs and extra air pollution abatement costs. And this figure does not include implementation costs of alleviation measures such as road and freeway construction, traffic accidents and additional health care costs due to stress and air pollution. If health costs are included, the annual cost of congestion for Melbourne is estimated to be $7.5 billion and for Sydney $9.3 billion by 2021. One of the easily perceived adverse effects of congestion is mean travel time to work. In Melbourne

anecdotal evidence indicates that on average, it is about one hour, leading to a loss of about two hours per day for each worker, as well as producing a great deal of stress, which often spills over into the work place and family and social life.

Urbanisation strategy should consider the development of regional Australia. At present regional Victoria is not expanding at the same rate as Melbourne and is actually reducing relative to Melbourne. In 2010 the rise in population in regional Victoria was 1.4%, while for Victoria as a whole it was 1.8%. The Melbourne rate of population increase is about 2%. This shows there is a net drain into Melbourne from the regions. Because of the larger population base, (73.5% of Victorians live in Melbourne), migration from interstate and overseas, and the drain from the regions, the population of Melbourne is increasing at about four times the rate of that of regional Victoria. This trend will not change unless economic drivers exerting a modifying influence are put into place. At present there are no such drivers, and people will move to wherever job opportunities exist, which are predominantly in Melbourne.

An alternative to urban sprawl is what I have termed in the Concept Paper 'Expanding Nodular Development' or END. The basic idea of this development mode is to build successive waves of new compact satellite cities around the major city Melbourne, absorbing growth which would otherwise go into urban sprawl. The new zoning of land in Melbourne would be stopped, and instead new zoning would occur in the END cities. As discussed in the Concept Paper, separation of cities and waves of cities would be 30-150 km, far enough to ensure separate identities, but close enough to facilitate support and easy transfer of resources during development stages. END cities would be planned for an approximate maximum population, depending on the economic potential of the region in which they are located. They would be located in the proximity of existing small 'seed' towns which would provide initial labour and facilities to build them. END cities should be economically and socially self sustaining, and ideally would be from about 100,000 to 700,000 in size. Refer to Sections 1 and 2 of the Concept Paper for a more complete discussion on END cities.

GOALS AND BASIC CRITERIA

The END concept has as its primary object, the halting of the relentless advance of urban sprawl in Australian capital cities, with all of its negative impacts. It proposes a halt to the expansion of capital cities, and to direct growth in an ordered and sustainable way to satellite cities surrounding them. The key characteristics of these satellites are that

(a) They should be of a minimum size of about 100,000 to enable them to be economically and culturally self sustaining
(b) They should have a maximum population of about 700,000 to one million to avoid the problems of congestion and high infrastructure costs
(c) They must be planned for an approximate maximum population to avoid duplication of infrastructure
(d) They must be compact to minimise costs of land and infrastructure

END cities are not dormitory suburbs. They must contain industry and commerce for economic sustainability. The key functional attribute of END cities is their ability to enable people to live in close proximity to their place of work. The implications of a policy based on the maxim 'live where you work' on infrastructure costs and congestion are obvious. No longer would people have to travel

long distances to work. The compact nature of the cities combined with a limited maximum population does not require great freeways. An area of about 50 square kilometres, which includes for industrial, commercial and residential development, as well as intensive primary industry, is approximately all that is required for a compact city of 100,000 people. As a point of comparison, the regional conventional and unplanned city of Ballarat in Victoria has a population of 100,000, and encompasses an area of 114 square kilometres. All transport requirements for a compact city of 50 square kilometres could easily be met with a road network, supplemented perhaps with light rail. Refer to the schematic diagrams for indications of areas allocated to various functions in a compact city.

ENERGY AND THE ENVIRONMENT

A major feature of the END model is the distribution of waste heat from the electrical generation process, through a process known as co-generation. This is commonly used in Europe and the US and could replace the present practice of burning gas directly for heating and process. Thus there could be a reduction of about 25% of overall emissions, taking into account the higher efficiency of generation of Combined Cycle Gas Turbine (CCGT) technology, and reduction of electrical transmission losses resulting from generation taking place close to point of use as in the END model, rather than remotely as is current practice. CCGT is fairly common and has an electrical efficiency of 50-55%, as opposed to conventional generation of about 35%. CCGT generation utilizes both a gas turbine (which drives an electrical generator), and a steam turbine where the exhaust from the gas turbine heats a boiler to generate steam which then supplies a steam turbine for additional electrical generation. The steam exhaust from the steam turbine is then used to heat water for thermal distribution to the END city. If the nature of the compact cities with reduced travel and transport requirements is considered, overall emissions could be reduced by the order of 40%. This is a very significant reduction and would contribute greatly to Australian emission reduction obligations. The utilisation of heat from the electrical generation process, heat which is normally wasted to atmosphere, provides END cities with an abundant supply of thermal energy which can be used for industrial process heat, and the heating of green houses and buildings. A more complete discussion of energy usage and electrical generation is given in Section 4 of the Concept Paper.

WATER, STORM WATER, IRRIGATION AND WASTEWATER

The adoption of the END model enables much greater use of scarce water resources. Because an END city must be planned and build on essentially greenfield sites, provision can be made for grey water recycling, storm water harvesting, and water conservation, all of which reduce impact on the environment, especially rivers and streams. As Australia's population increases there will be ever increasing demands on our water supplies, and this should be addressed as soon as possible to avoid the deterioration of rivers and streams with accompanying damage to wildlife.

Wastewater is a resource which is mostly being wasted. It contains an abundance of nutrients which are mainly disposed of in ocean outfalls. The END model plans for wastewater to be biologically treated so that nutrients can be harvested and utilised to produce animal food and fertilisers. For a more complete discussion of water usage, refer to Section 3 of the Concept Paper.

EMPLOYMENT AND THE ECONOMY

The underlying premise of the END model is that **people live where they work**. Hence it is important to create jobs which will support large communities. One of the 'kickstarter' industries for END cities is the horticulture industry. In Victoria large deficits in horticultural products are predicted by 2030. A recent (December 2015) report entitled 'Melbourne Foodbowl Now and at Seven Million' by VEIL (Victorian Eco Innovation Lab) in conjunction with Melbourne University and the CSIRO shows that Melbourne's foodbowl now supplies 41 per cent of all fresh fruit and vegetables to the city, but this is expected to drop to 18 per cent by the time the city's population reaches seven million people in 2050. This is due to urban development encroaching on prime agricultural land. A summary of the report is given by the Weekly Times and is included as part of this submission. END cities with abundant supplies of low cost energy would be ideal for the establishment of green houses which can be heated with this energy. The potential for heating can provide green house capacity much greater than the cities would need for their own consumption, thus enabling the supply deficit to be overhauled and food made available for export. Much of the produce would be processed, and again the availability of abundant low cost energy facilitates this. The abundance of irrigation water brought about by stormwater collection and waste water recycling would allow general agriculture and intensive farming such as animal husbandry including piggeries and poultry, to prosper. The recycling of nutrients from waste water to animal fodder through biological treatment is a further resource which can be exploited for industries such as poultry and pig farming to assist in establishing and growing them. Low cost energy also helps establish aquaculture to provide high quality protein for local and export markets. Aquaculture can be operated symbiotically with green houses, with plants purifying the water polluted with fish waste, and so gaining valuable nutrients.

Low cost energy and abundant water facilitate the establishment of industries generally, especially those which are energy intensive such as milk and dairy products, textiles, general food processing, and the chemical and pharmaceutical industries. If IGCC technology, (which is similar to CCGT, but uses gasified coal instead of natural gas), is used to produce energy, by-products from the gasification process provide feed stock for chemical industries, thus encouraging their establishment. All of the above industries are excellent candidates for the generation of jobs, and once a small number of businesses are established in a 'seed' community, a small established town, more would follow. The multiplier effect of primary jobs in agriculture and manufacturing would quickly generate more jobs as retailing, health, financial, building and educational services are needed. The multiplier effect is about 7.5, i.e. for every primary/secondary job created, 6.5 other jobs are created in service industries. For a more complete discussion of this refer to Sub-section 3.11 of the Concept Paper.

APPLICATION OF THE END MODEL

As mentioned, the END concept was developed primarily to curtail the growth of capital cities and to rationalise growth in sustainable economical ways. However, the concept can be applied to a linear model of growth as for example to a possible high speed rail link between Melbourne and Sydney. The basic ideas of size, compactness, economic and cultural self sustainability, energy and water efficiency, minimal environmental impact etc can still apply. However, this application would do little to relieve pressures on capital cities, which in terms of infrastructure first and operating costs, congestion costs, and amenity, are bearing the bulk of the national burden. The first priority should

be to relieve our capital cities, where most of the national growth is occurring, and to establish a pattern for future growth. The present pattern can continue only at great cost both economical and societal, and must be stopped. To stop this urban sprawl pattern, planning cannot continue in the same ad-hock way as it has in the past, and a new direction is needed. Expansion pressures on our capital cities, when combined with good planning of the END model will give the impetus for the establishment of this required new direction.

The adoption of expanding nodular development as proposed in the Concept Paper is not 'rocket science'. It requires good planning, good engineering, good governance and good management to facilitate its implementation. As a nation we are good at these things. There are no extra costs to the community - in fact there are very substantial savings. Buildings need to be built, power stations need to be provided, as do water, sewerage and waste management services. Why not provide them in an efficient low cost way rather than in traditional development? Once the pattern that the Concept Paper proposes is established, its benefits to our cities, States and nation will be enormous.

The shift to de-centralised urban development as offered by the END model does not require new technologies; it is immanently doable. We have the 'hands on' skills – the knowhow, and the management and governance skills. We have the land, the sunshine and fresh air. What we need now in addition, is the political will to take a bold step, and to 'think outside the box'. The Prime Minister talks about innovation as being the new currency for the future. The END model is innovative, and certainly its adoption can set the path, clear the way, for a future of economic prosperity. The time to do it is now, as we plan the future of our great cities and nation. The time has come to adopt big ideas, and to advance confidently into the future.

Part B of this submission will deal with value capture and related topics as applicable to the END model. The financing of infrastructure must be efficient and fair, with costs borne by those who benefit most. Systems which afford windfall profits to developers at the expense of the public purse must be avoided. For these reasons, and considering the large infrastructure investments required over a period of 15–20 years, for large projects such as water, waste and energy generation and distribution systems, it is likely that the basis for value capture systems will be Land Value Taxation (LVT).