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Andrew McGowan, Inquiry Secretary  
Standing Committee on  
Infrastructure and  
Communications  
PO Box 6021  
Parliament House, Canberra ACT 2600

Dear Mr McGowan

**NEW ENQUIRY INTO THE NATIONAL BROADBAND NETWORK**

Please find attached the City of Geraldton-Greenough's submission for the above enquiry.

The City thanks the House of Representatives Standing Committee on Infrastructure and Communications for giving us the opportunity to contribute our views on the National Broadband Network.

If you need any further information please contact my office on

~~Yours sincerely~~

~~Tony Brun~~  
**CHIEF EXECUTIVE OFFICER**



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**Geraldton-Greenough**  
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**SUBMISSION**

**NEW ENQUIRY INTO THE NATIONAL BROADBAND NETWORK**

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Disclaimer

The City of Geraldton-Greenough's submission to the Australian House of Representatives Standing Committee on Infrastructure and Communications New Inquiry Into The National Broadband Network is in response to an invitation to the Mayor of Geraldton-Greenough from the Chair of the inquiry.

The City of Geraldton-Greenough shall not be liable for any loss or damages howsoever caused as a result of reliance upon information contained in this text.

### Executive Summary

The City of Geraldton-Greenough (CGG) has significant advantages to offer the Commonwealth with the implementation of the NBN

- Isolated location, manageable size of population and mixed demographic of the Mid-West means the region is ideal for social and economic study to model and measure intervention by different applications of the NBN
- Willingness of community and organisations for collaboration and resource sharing
- Active and educated community
- Local infrastructure in place and projected will enhance NBN
- Proximity and relationships with Asian markets
- Economic drivers are in place
- Pro-active and E-ready council facilitating digital economy
- Major science projects will encourage research locally
- Major sustainable energy initiatives are in construction or planning

Priorities of the City of Geraldton-Greenough with the NBN implementation

- Expand the City owned optical fibre CGG network through the CBD, to the Geraldton Regional Airport and to Mullewa and connect this to the NBN
- Create a technology park on CGG land connected with high speed optical fibre to the NBN
- Assist education, health and emergency services in the region to overcome the tyrannies of distance (cost, unsustainability, inefficiencies) by expanding the NBN and services to the region thus bringing more opportunity and improving standard of living to disadvantaged communities
- Spreading the NBN out to the other 8000 properties in Geraldton after initial implementation
- Gaining access to Nextgen optical fibre from Blackspot funding for provision of peering for Geraldton Internet Exchange and connection to WAIX, universities, Pawsey Centre, medical facilities and community use.
- Connect Moonyoonooka and Mullewa exchanges to AARNET optical fibre courtesy of Department of Science, Industry Innovation and Research

The Commonwealth can assist in achieving these priorities by funding, partnering with State and Local Government and even trialling Commonwealth services so as to use Geraldton and the Mid West as a model for the successful introduction of the NBN.

## Introduction

The City of Geraldton-Greenough is pleased to submit views on the New Inquiry Into the National Broadband Network to the House of Representatives Standing Committee On Infrastructure And Communications.

The City of Geraldton-Greenough recognises the value of the NBN for the city and the Mid-West region of WA. The City of Geraldton-Greenough and the Mid-West Development Commission have endeavoured, through an unsuccessful Digital Regions Initiative Application, to bring some of the benefits of the NBN to the region in a short time frame with a relevant and sustainable proposal. Please see [Appendix A](#).

The community interest and participation in this project was unprecedented with over 10 different government, educational, indigenous, medical and environmental groups combining to create a submission which if successful, would have laid the foundation for a connected, sustainable, regional community. Some of the sub projects within the DRI application will be completed, albeit at a slower pace and with less resourcing without the support of the Commonwealth Government.

With the right support, financial and technical from the Commonwealth Government, The City of Geraldton-Greenough and the Mid-West region could be a model for the successful implementation of the NBN and demonstrate outstanding outcomes in the fields of community participation, smart city development, economic growth, positive indigenous outcomes in the fields of education and health, and many more areas as detailed within this submission.

## Overview

The City of Geraldton-Greenough is located on the Mid-West coast of Western Australia. With a population approaching 40,000 the City is the regional hub for professional services and commerce, light industry, for rail, road, sea and air transport, and for business and community support services. Its hinterland has rich agricultural lands, and its seaport hosts a valuable fishing industry, as well as exporting millions of tons of grain and minerals to global markets.

Offshore, the Abrolhos Islands host a valuable rock lobster fishery, and a burgeoning cultured pearls industry. The islands offer tourists access to stunning, unspoiled coral reefs and sea life – an untapped natural wonder just beginning to receive global tourism interest. Geraldton is located on the Coral Coast, which runs south from Exmouth and the world renowned Ningaloo Reef and the world heritage area of Shark Bay to our north.

The Mid-West region is currently undergoing very rapid economic expansion, with accelerating growth of exports of iron ore and other minerals through the seaport of Geraldton. New inland iron ore mines currently under development will be serviced by new rail infrastructure, developing the Mid-West as a mining province of global significance. Apart from iron, the region is rich in uranium, gold, nickel, platinum and rare earth metals.

Population projections see the city growing to between 60,000-80,000 people as early as 2020 and to 100,000 people by 2030, depending on the rate of development of new mines, and establishment of their essential supporting industries.

Coordinated activity between State Government and the City is ramping up, to ensure appropriate land use planning, and provision of essential utilities infrastructure and human services to meet growth projections – energy, water, sewerage, roads, airport expansion, local public transport, hospitals, schools, tertiary education, recreation and community facilities.

As well, in 2011 voluntary municipal amalgamation will see the City boundaries extended to include the nearby rural Shire of Mullewa, with its economy largely based on agriculture and centred on the rural township of Mullewa, some 100 kilometres inland from Geraldton.

In addition to planning for and experiencing significant economic growth and diversification, with associated rapid population growth, the service delivery and governance responsibilities of the City administration are about to expand, offering challenges for not just maintaining but enhancing access to and the quality and range of services available to inland citizens living remote from the coastal city hub.

Geraldton is well positioned to become global, servicing Australia's international needs through what may become its primary portal to the world through the Oakajee deep-water port and industry precinct.

This unique zone offers a unique confluence, so much so that a new deep-water port, capable of handling larger Cape class vessels for bulk commodity exports, is in advanced stages of planning at Oakajee, some 20 kilometres to the north of the existing port (with a potential to cater for the 300,000 'mega-ship category).

Connection of the City region to the national and global marketplace, and to the blossoming world of virtual information resources and web based services, is currently being enhanced. Geraldton was selected by the Federal Government as a site for early rollout of the National Broadband Network (NBN). There is a synergy between this selection, and the Australian Square Kilometre Array Pilot (ASKAP) project, currently being developed as part of the process for selection of the global site for the proposed Square Kilometre Array (SKA) international radio telescope initiative, in the Murchison subregion, to the north east of Geraldton.

Broadband optical fibre rollout from the Murchison site to Geraldton is well advanced, and the fibre rollout between Geraldton and Perth, the State Capital, is in progress. The fibre connections will enable ASKAP data to be fed to super computer facilities located in Perth. More significantly, in regional terms the NBN fibre will open many business enhancement and growth opportunities. The City has already secured access to fibre, for development of a Technology Park, as well as for connection to inland Mullewa, which will become a satellite services centre for rural citizens. Planning at detail level, for NBN rollout to the first group of households in Geraldton, has commenced.

- Geraldton announced as a second release site for National Broadband Network (NBN) rollout of fibre to the premises to 3000 locations for speeds up to 100Mbps;

- Being the location of the ASKAP/SKA projects and having twice the capacity of new fibre being installed for the Regional Backbone Blackspots Program (RBBP) as other locations in Australia - in support of SKA.
- Guaranteed collocation of fibre optic cable in Geraldton on the ASKAP fibre route with connection points across the city.
- Guaranteed access to ASKAP fibre Mullewa-Geraldton.
- Guaranteed 1% free access to the world leading \$80 Million dollar Pawsey High Performance Computing( HPC) facility in Perth

### **Economy and Technology**

The City has embarked on development of a Technology Park located within its wholly freehold-owned Airport precinct. The Technology Park will benefit from guaranteed connection to ASKAP/NBN broadband fibre.

Located within ten minutes of the CBD, and with high quality land available away from flight path areas, the Park creates opportunities for establishment of new City region technology capabilities to enable and support accelerating economic development, driven by explosion in growth of the mineral resources extraction and export industry in the Mid-West.

The Mid-West mining province for which Geraldton is the communications, commerce and services hub, like most regional areas in Australia, has sparse and dispersed ICT capabilities, most entities – including Government branch offices - typically creating relatively small scale standalone server rooms and telecommunications interfaces. There is very limited Disaster Recovery/ Business Continuity (DR/BC) capacity.

Confronted with accelerating economic development driven largely by the resources industry, with a growing number of significant new mines in development stages, targeting export of ores either raw or beneficiated through Port of Geraldton (and later, Oakajee Port), there is clear opportunity for development of data centre capabilities that would:

- Enable scale economies to be achieved in processing capacity and storage, for Government agencies, the City, educational institutions, companies and small business entities;
- Enable local entities to exploit opportunities for Cloud solutions;
- Provide DR/BC capabilities for the region.

There are several scenarios worthy of investigation:

- A primary data centre located within the Education/Health/Training precinct of the City, and a DR/BC data centre located at the Technology Park;
- A primary data centre located at the Technology Park (with broadband fibre access from the CBD and the Education/Health/Training precinct enabled by advantageously planned routing of the ASKAP/NBN fibre), and a DR/BC data centre located remotely – perhaps at Mullewa, on Council owned/vested land – accessible via fibre and planned upgrade of connection for the Mullewa exchange.



The former scenario has a public sector and community services emphasis, with necessary collaboration/funding support from the State. Investigation work would focus on scope, capacity, design and costing. The latter scenario, embracing a substantially larger concept of regional capability building, leveraging broadband fibre investment by the Commonwealth, lends itself to stronger private sector utilisation, attractive to the resources industry - and greater ICT sector investment participation, in a sole or joint venture arrangement with the City. Investigation would focus on scope, capacity (and the market scale), and scalable design for staged growth

Another avenue that The City of Geraldton-Greenough is proposing to explore with the assistance of the Commonwealth Government is the establishment of a peering station in Geraldton which would keep Geraldton local traffic within Geraldton. The establishment of the Geraldton Internet Exchange (GIX) with connection to WAIX would enable many of the projects discussed throughout this document.

A significant number of companies – mostly ISPs - currently enjoy commercial and operational benefits from being connected to the Western Australian Internet Exchange (WAIX).

This allows free peer data interchange between members of WAIX. The City is keen to establish the viability of establishing a GIX connected to the WAIX.

With the investment by the City in optical fibre networks, there is a sound platform developing for a fast (10gb/s) private City owned network connecting the Health Education and Training Precinct, the City's Central Business District, the sporting precinct, technology park and many points between. In all likelihood, industry will also connect the Oakajee Port and industrial park. There is a growing community need and desire for collaboration within the City of Geraldton-Greenough.

Sustainability initiatives, realtime monitoring smart city transport, deliberative democracy could be served efficiently and effectively with a peered exchange such as GIX connected to a local regional data centre. So rather than all internet traffic routing to Perth or Sydney, members of GIX would see peer traffic contained locally across a low cost private network..

Could we set up an internet exchange connected to WAIX? On initial exploration, this may be feasible. It could be achieved by a topology as simple as setting up a single point like a router at a central point e.g. the Geraldton Universities Centre (GUC) in the Health Education and Training Precinct adjacent to the Nextgen fibre connection point..

Through private (or public – i.e. NBN) network (wireless or fibre), members would connect to this router. Routes could be set up so that when an internal member site is requested through a browser or other app, the request is routed locally. Members set routes at gateway so that if request is to member then request would go to GIX point, otherwise straight to the Internet.

Routes could be set up on previously mentioned router so that whenever a WAIX connection is requested, it routes down Nextgen cores. Technical advice is required to establish a viable design.

Preliminary exploration indicates that unallocated Nextgen cores may be available. This requires both business and technical investigation, and consultation with Nextgen and or Commonwealth Government.

The establishment of such a peering network for NBN customers would enable free or low cost transfer of large data sets between

- internal members e.g. health and medical
- services, law and order, emergency services,
- anybody utilising GIS with large spatial datasets,
- researchers active in the region (marine science and aquaculture, agriculture, bio-fuels etc),
- climate change and environmental monitoring,

A GIX would enhance City capacity to introduce smart transport monitoring and management systems, including Smart Parking systems. Connection to AARNet and WAIX would establish connection to Metropolitan Universities, and a number of medical research institutes. Establishing a GIX would enhance planned development of the Health, Education and Training precinct, centred around Durack Institute and the GUC.

Who could immediately be part of this GIX? The City, local ISPs and ICT organisations, GUC, Durack Institute TAFE, CUCRH, Skin Cancer Clinic (remote pathology), Schools, anybody requiring video conferencing between local and WAIX members.

### **Social Benefits**

With the amalgamation with Mullewa in 2011, The City of Geraldton-Greenough, will become the City of Greater Geraldton.

Mullewa has a 50% indigenous population. It is early days, but the City intends to connect Mullewa via optical fibre (running at 1gb/s) so as to bring the NBN to this community. This will address some real equity issues and may help to revitalise the town, economically, socially and assist in the presentation of the town and its long cultural heritage to the world.

### **Government Services**

The NBN will assist the City Of Geraldton-Greenough to implement deliberative democracy and realtime community consultation and expand these services to the region. . The City has introduced a model for community interaction in 2010, the 2029 and beyond project. Aspects of this project will expand significantly throughout the region with the introduction of the NBN.

In October 2010, City of Geraldton- Greenough and the collaborative and deliberative democracy themes of its Sustainable Future City Region Project – 2029 and Beyond was shortlisted for the prestigious Reinhard Mohn Prize 2011, “Vitalising Democracy through Participation”.

A total of 123 projects from 36 countries were nominated for the prize, which carries a value of €150,000 (or about AUD 212,000). Many of the projects submitted have received worldwide acclaim as being pioneers in democratic reform.

The fact that the Geraldton 2029 project was selected in the final 20 short list was a real tribute to the Mid-West region, and its innovative approach to including ordinary citizens in the future of the region.

Formerly known as the Carl Bertelsmann Prize, the Reinhard Mohn Prize, administered by private foundation Bertelsmann Stiftung in Germany, is open to government organisations worldwide, and the 2029 and Beyond project fits the criteria of the crucial issue of “Vitalising Democracy through Participation”.

The criteria require governments, working in partnerships with others, to initiate a successful project to vitalise democracy, establishing new forms of democratic problem solving through participation, meeting new expectations of democracy for people to participate more directly in issues of importance to them, and integrating underrepresented citizens

The City of Geraldton-Greenough is developing a strong partnership with Curtin University to utilise contemporary technologies to dramatically enhance communication with the regional community, and achieve a quantum leap in community engagement in City region future planning. Professor Mark Balnaves is Senior Research Fellow in New Media at Curtin University in Perth.

His role in the 2029 and Beyond project is to create innovative social media tools, and facilitate adoption of the Civic Evolution platform for direct development of ideas and initiatives by community groups.

Professor Balnaves focus is use of interactive media platforms - leveraging supercomputer facilities - that can:

- Assist in the deliberative discussions among diverse citizen groups, by providing a virtual (GIS-based) model of Geraldton for visualisation and scenario building on climate change and sustainability. The project will do this in stages.
- The first application, already running, is designed to allow households to measure energy use in their household and to compare it with others in the region. Link discussions about issues in the Geraldton-Greenough community to more structure deliberative approaches, including use of Civic Evolution (see below). This includes integration of the different online elements together, from RSS feeds to Twitter;
- Translate scientific findings into easy to understand formats for policy makers and citizens that might assist in decision making;
- Provide digital means by which local governments can disseminate information and seek feedback from citizens in a comprehensive way. The first application for this part of the project is a social reader, designed to assess the social networks used by citizens in Geraldton and the region and to provide indications of mood.

#### Medical

One of the most exciting sub-projects outlined in the DRI application was the establishment of a WAISCMRH West Australian Institute of Skin Cancer Medicine and Rural Health.

This would be enabled by the NBN and The City of Geraldton-Greenough infrastructure. This project will still be undertaken but with some considerable delay and perhaps difficulties with integration between different services.

A stand alone, not for profit research organization will be established in Geraldton Western Australia. The West Australian Institute of Skin Cancer Medicine and Rural Health will principally undertake epidemiological and clinical research into the management and treatment of skin cancer (melanoma and non-melanoma skin cancer). It will also encompass research into other significant and related dermopathies. Also, best practices for dermal health will be advanced and published in the medical literature, with the support of visiting regional and international researchers. This will be Australia's first independent, regionally based skin cancer research establishment in the country.

To better implement this mission from a Geraldton base, a project to establish a Non Melanoma Skin Cancer (NMSC) Registry, which leverages the new IT infrastructure in Geraldton as well as the growing health care competencies in regional and skin cancer medicine is being developed. NMSC is a \$300 million problem nationally, with skin cancer incidences rising rapidly, and rural areas and fast-growing natural mineral resource projects are often the hardest hit, with unique and at risk regional behaviour patterns. The Midwest Region, including Geraldton, has one of the highest rates of skin cancer anywhere in Australia and indeed the world, thus the rationale for establishing the Institute, and the NMSC registry, in Geraldton. Costs to the community are high, as skin cancer rates of both melanoma and non-melanoma have exceeded 40% over the past decade (costs have accelerated as well). Information from such database initiatives can help reduce costs to the community, and bring more attention (and funding) to the region to overcome this growing health challenge.

The Registry will attract researchers to Geraldton from interstate and overseas, create a recognised centre of medical research excellence, lead to additional and sustainable grant and commercial funding opportunities, as well as related innovations (remote dermoscopy) with much of the value chain of new health care technologies and initiatives residing in Geraldton and also form alliances to generate sustainable revenue opportunities from training in the skin health and health care IT areas. The NMSC registry and Institute will also foster healthier communities, and attention on this area of medical need.

This will be a key project for the Institute, and generate further and sustainable health care and IT employment, national and international recognition through publications and research grant cooperation, and world class competencies in dermal and rural health, marrying best rural health practices with an IT infrastructure for the benefit of doctors, health practitioners, patients, and the economic development of the region. The project has commercial revenues offered already, and

This project will lead to employment growth, in both the set-up and maintenance of the NMSC database and ongoing digital delivery of services. This data is very valuable to both Australian (Australia has the highest skin cancer rate globally) and international medical researchers. It requires IT and medical experts to set up and maintain. It develops a competency in marrying

IT with rural health care technologies and data collection practices which can be leveraged into additional projects, grants and revenue partnerships.

This project will improve IT links and educational links, already via Griffith and Bond Universities, UWA, Curtin and CUCRH. Rural and regional medicine needs to incorporate patient compliance, utilization of allied health medical workers where doctors are scarce, and additional programs for prevention and data collection. This leverages the Durack Institute of Technology, Geraldton Universities Centre and IT infrastructures in Geraldton.

This project will have improved facilities, as many of the technologies required can be used to collect data from a Geraldton base to international best practices standards, and will also be available to the local community improving diagnostics and treatment for skin cancer. It will also create jobs in Geraldton and the region. In specific, the remote-dermoscopy distance-medicine technologies will also be a basis of additional training and research generated from a Geraldton base.

This project will also create a best practices centre in Geraldton which can be leveraged into a sustainable, non profit but revenue-generating research centre undertaking dermal and rural health training, expanding linkages, attracting researchers in areas where IT and health can benefit regions.

The type of jobs created will be in health care IT, medical data collection and support, medical research, and 'social marketing' or patient-centred macro-marketing to improve patient compliance and acceptance of new treatment modalities.

The Institute has met with the Hon Minister N Roxon about Federal programs, and the various medical colleges which can sponsor doctors, doctors who wish to undertake rural medical research.

A strong, vital and diversified economy requires an increasingly nationally-recognised health care infrastructure, with specialties in the areas impacting the Midwest population. Attracting top quality research, and the various IT, medical research, doctors and nurses to the regions requires a certain amount of unique infrastructure, such as a NMSC Registry. To set this Registry up will require IT and medical researchers, research students, visiting doctors and experts. Maintaining and expanding the registry will require ongoing training and support. Leveraging this unique competency will give rise to the opportunity for training conferences held in Geraldton, additional regional grant opportunities, and changes to add innovations around data collection (remote dermoscopy) utilising new IT infrastructure. 6 jobs would be created in the set up, and 4 of these would be maintained to run the Registry, and expected related training and research projects. This is aligned with the City of Geraldton Greenough and regional strategic plans for healthy communities.

Skin cancer is currently an economic challenge to the region, and also a disease which was often referred to Perth or other state capitals for treatment, when in actual fact many of the best doctors now service Geraldton, and the best skin cancer research studies were historically done in Geraldton in the 1980's period. Geraldton now has the IT infrastructure to support voice, data and high quality images required for best practices NMSC Registry.

In tangible terms, it will put

- important medical and diagnostic equipment into Geraldton at a non profit Institute
- make this available to research and to the community
- collect data on a fast growing skin cancer health problem
- lead to additional researchers travelling to Geraldton for research cooperation and seminar
- this is expected to include degree and research degree students via CUCRH and medical training institutes
- strengthening of regional TAFE curriculum on IT and rural health care
- attraction of further grant funding
- attraction of additional corporate funding
- publications and publicity for best practices
- Registry and medical IT competencies
- additional valuable competencies in marrying rural medicine and IT.

Considerable feasibility study work has been done, in cooperation with the WA Cancer Council, WA Cancer Registry, and state based pathology companies, and CUCRH has done research with a similar pilot project in Tasmania, and consultative projects with stakeholders. The key need identified is a high bandwidth, high quality video linkage (researchers need to discuss classification of images, for the database project and for new innovations and commercial opportunities)

#### **Environmental sustainability**

ARMS is a real time monitoring and modelling system in which The City of Geraldton-Greenough is partnering with Centre for Water Research from the University of WA. This monitoring system will only be possible with spread of the NBN for data collection and presentation.

The Aquatic Realtime Management System (AMS) is a decision support system that aids managers and operators of surface water bodies (reservoirs, lakes, rivers, estuaries, coastal oceans). Its underlying philosophy is to provide an automated software system that requires minimal maintenance to monitor and forecast the conditions of surface water resources, and to notify relevant staff of current conditions on a regular basis.

ARMS is an automated software package that manages historical and real-time water resource data, has a user friendly visualisation interface, posts information on the internet, provides real-time and forecast numerical modelling capabilities, sends messages via email on the status of water resources, and computes decision support indices to aid in operational management. ARMS provides decision support over a variety of surface water resources (lakes, reservoirs, rivers, estuaries, marine coasts) to aid in the management of water supply, water quality, pollutant spills, flooding, and environmental lows. ARMS is an excellent decision support tool for water authorities, hydropower operators, and environmental regulators. It was designed to require

minimal human interaction and to provide useful information to water resource managers in a real-time manner. ARMS provides the following functionality:

- Real-time data management from automated monitoring
- Management of historical water resource databases
- Real-time simulations of current conditions
- Up-to-date forecast simulations
- Email alerts of monitoring failures, incidents, and events
- Web posting of summary status reports, simulations, and alerts
- Quality control for data consistency
- User-friendly visualisation of data and simulations

Whilst economic indicators for the country show an upward trend, environmental and social indicators show, mostly, a downward negative trend. For example “the number of terrestrial bird and mammal species assessed as extinct, endangered or vulnerable rose by 14%; about one-quarter of Australia's surface water management areas were classed as highly used or overused; there was an increase in the number of fish species in Commonwealth fisheries classified as overfished” and land clearing continued in a negative direction (Australian Bureau of Statistics, Measures of Australia's Progress, 2009). Social indicators show an increase in youth suicide and drug induced deaths particularly among men, increase in one parent families and increase in mental health (Measures of Australia's Progress: Summary Indicators, 2009, Australian Bureau of Statistics).

Development in the Mid-West is taking place in a piece meal fashion, driven mainly by the needs of individual and large developments advocated and carried out largely by global resource companies. Currently, the whole region experiences increasing problems brought about by wealth inequity, short term exploitation of finite natural resources, increased foreign ownership of both industrial capacity and private land, loss of income to foreign companies and countries, disowning of indigenous rights and property, displacement of both terrestrial and marine biodiversity and distortion of salary scales due to the resource boom leading to artificial labour shortages in other industries and small business (Andrich et al (in preparation) 2010). These problems exert huge stresses on the average West

Australian, some of which are reflected in the high rate of risky behaviour (alcohol, smoking, prescription drugs and illicit drugs), high rates of crime and an almost dysfunctional health system (Measures of Australia's Progress: Summary Indicators, 2009, Australian Bureau of Statistics).

The Centre for Water Research will provide the Mid-West community with a real-time indicator on how well the community is functioning from different community perspectives; economically poor, median and rich stakeholders, resource companies, indigenous sector and the environment. This Index of Sustainable Functionality (ISF) incorporates weightings of the importance of individual indicators and is the sum of the product of all the indicator values and the weightings; the weightings are derived from surveys of all community stakeholders and reflect the importance of the functions measured by the individual indicators (Imberger et al, 2007). The

indicators of the individual functionality are obtained from a diverse set of sources, such as the Australian Bureau of Statistics, real time sensors that measure environmental indicators and time series computed by three-dimensional models. The whole data flow and modelling is coordinated by the software package Adaptive Real-time Management System or ARMS and rendered on the web by the Real-time Managements System Online or RMSO. The RMSO provides all stakeholders ranging from primary school students through to politicians, community and business leaders with information on the impact of our past actions , current actions, climate change, land changes and large scale developments. The information provided by RMSO enables each and everyone of us to participate in the management decisions that impact on the quality of our environment.

We will provide communities with information that will raise awareness of the consequences of life style choices and connect them to their environment thus enabling a greater understanding of the consequences of wealth inequity and unbridled development and the impact this has, not only on the current generation, but also on future generations. The underlying philosophy of what we propose here is to reconnect people to their local natural environment.



The Vision of the Mid-West (reference) is

*“A uniquely Western Australian resources region linked into the global economy, Geraldton will strive to become a sustainable community, offering a high quality of life, focused on balancing environmental, social, economic and export needs. As the capital of the Mid-West, Geraldton will aspire to promote the region as one of the most diverse and sustainable in Australia, recognized both the coastal ocean and inland terrestrial desert ecosystems, the traditional low rainfall agriculture, the enormous resource wealth and the potential for a deep water port”.*

The proposed project will set up an adaptive real-time management system (ARMS) throughout the domain that will provide information to make informed choices and decisions for the following stakeholders.

**Individuals:** Will have access to information about the current status of the environment, impact of future developments and impact of climate change through an easy to use public web portal. Individuals will also be able to access information on the governance of the locality through the Index of Sustainable Functionality.

**Community:** The community as a whole via a simple query system will be able to ask simple questions and schedule model runs in order to gain insight into the current status of the environment and also schedule model runs for future scenarios e.g. a new development, climate change impacts.

This will empower the community to ask appropriate informed questions of its decision makers and understand the impact of their actions on the environment.

**Education Tool:** Schools and Universities will be able to use the website for teaching English, History, Geography, Environmental science and Mathematics, replacing pen and paper. Search engines will instead allow retrieval of, not just existing information from web archives, but also allow model scenario simulation requests to address specific questions relevant to a specific subject area

**Education Network.** The web portal will enable schools to share information across the network. Schools will thus not be disadvantaged by location.

**Agriculture:** The agricultural sector will be able to make informed decisions about crop planting.

The data collected and the real time information will enable farmers to quantify the sustainability of particular crops in the face of local climate change and changing market prices.

**Fisheries:** The fishing industry will be able to carry out fish production modelling on seasonal and inter-annual time scales thus enabling the Fisheries industry to quantify the impact of the cross over of nutrients and synthetic organics from land to the coastal ocean.

**Port Authority :** The Port Authority will be able to better manage their shipping channels and ship movement which will optimize shipping and response to accidental spills.

**Businesses** will become more accountable as the impact of their activities will be available for all to monitor. They will also be able to explore the feasibility of business opportunities.

**Local government** will become more informed decision makers, as they will be able to assess information on the impact of new development applications and monitor impacts by existing businesses on the environment. They will thus be able to make holistic decisions about future developments.

**Department of Conservation and Environment:** The DCE and other environmental agencies will be able to develop appropriate monitoring programs as they will have access to the domain's assimilative capacity with respect to land use changes and ocean usage. In particular, tracking levels of dust from mining activities, as a function of weather conditions, present and future will be a focus.

### Education

With the introduction of the NBN, the connectivity between schools will enable programs such as the Schools Program from the ARMS project, as described below, to be rolled out. Although this program is aimed at primary and secondary education, there should be a similar expansion of tertiary studies throughout the region by local facilities such as Durack TAFE, Geraldton Universities Centre and Combined Centre for Rural Health.

The Schools' Program is the initiative of the Centre for Water Research and Millennium Kids Inc. MK is a not for profit youth organisation, established in Perth in 1996, run by young people for young people. It identifies projects that give young people a voice in their community about the things that concern them and help them find ways to solve these challenges.

The Schools' Program aims to invest in the future of Western Australia by stimulating young minds, investing scientific and technological knowledge in young people so that they will be excited by science and are well equipped to manage important natural resources into the future.

This project recognises the value of involving young people in the care of the environment; raises their awareness and understanding of environmental issues; demonstrates the value of science and acknowledges the dexterity of youth in the use of technological tools to connect, to collect, share and disseminate information locally and globally.

The Schools Program is modelled in order to

- Provide each school community with access to and training on how to use the Centre for Water Research's data management system so that they can upload their research, report on the practical activities undertaken in partnership with river stakeholders, and share their school projects and their river stories. We discovered during the pilot project that there is a huge amount of work (Science and Society and Environment curriculum) that has been undertaken by schools that sits in school cupboards. With this project, schools will share information through their web pages located on Google Earth with other schools about their river activities and interact with other schools that are not located near the river or river catchment. This does not disadvantage schools because of location.
- Train each school community in the use of new Web 2.0 technological tools such as Animoto, Ning, Xtimeline, and Glogster.

- Provide training and resources to teachers and students so they know how to incorporate into Science lessons real time data outputs, produce their own graphs and charts with the data and make comparisons to field observations they undertake. These reports will then be uploaded onto the website for access by other schools.
- Provide leadership training to students.
- Provide examples for teachers from all disciplines on how they can utilise the proposed web portal.

The partnership is a vehicle to bring together a number of youth driven environmental education initiatives. It would create links with cutting edge scientific research and provide ongoing, meaningful and exciting exchange of information between young people.

The program aims to Raise Awareness in

- Sustainability of environmental systems
- Agricultural practices
- Fisheries
- Marine ecosystems
- Water quality monitoring
- Foreshore and land revegetation
- Wildlife habitat protection
- Impact of climate change and local actions to combat it
- Social context of environmental intervention – sense of place, history, economic development
- International connectivity

Through the NBN, communications technology will enable the

- Introduction and use of technology such as multimedia and web-based products that transform teaching and student learning.
- Establishment of an online education network of schools.
- Incorporation of real time and historical data into subject plans to assist students to evaluate and understand the implications of climate change, development, and changes in physical conditions, temperature and human activity on the environment. This knowledge will be applicable to other domains nationally and internationally.
- Creation of a meaningful interface between scientists, environmental managers and young people that showcases practical examples of science in action.
- Potential development of future environmental leaders and scientists.
- Development of a collaborative and responsive environment that engages with young people.

**Conclusion**

The NBN will provide opportunities for Geraldton and the Mid-West. The City of Geraldton-Greenough would and can take this further.

This region, in its isolation, its economic growth, community passion and involvement, and communication and technology infrastructure will provide years of study and research. With a demonstrated public and private will to collaborate with other organisations for the benefit of the region, support from the Commonwealth should ensure that we get it right.

## Appendix A - Bring IT on – Light up the Mid-west

The Mid-West Region of Western Australia is one of the emerging powerhouses within Australia. The predictions of growth in population, industry, technology, and focus in this region are the envy of many regions. The key drivers for this growth are large mineral deposits that are now commercially viable and subsequent major port and rail services. On top of that there is huge potential in alternative energy sources of solar, wind and geothermal and the City of Geraldton-Greenough is pushing a vision to create the city and the Mid-West a global leader at the forefront of Australia in the 21<sup>st</sup> century by becoming a carbon neutral industry region. On the global technical front the projected implementation of the Australian Square Kilometre Array Pathfinder project (ASKAP) in conjunction with CSIRO and Swinburne University is providing a diversification for growth of services throughout the region.

The City of Geraldton-Greenough (The City of Geraldton-Greenough), the Mid-West Development Commission, and our partners are committed to ensure the communities of the region will enjoy social, educational, health and environmental benefits from that will flow from these initiatives. The partners include health, education, training, research, indigenous health groups, resource management and academic.

The Geraldton-Greenough Health, Education and Training Precinct (HETP) (Appendix A) is seen as the future hub of local and remote services for the region. The National Broadband Network (NBN) trunk will connect to the CSIRO optical fibre coming from the Australian Square Kilometre Array Pathfinder project (ASKAP) and the Murchison Radio Observatory (MRO) in December 2010. The termination junction for this communications links will be located at the Geraldton University Centre (GUC). CSIRO have committed to providing access to the fibre from Mullewa to Geraldton, with access to dark fibre and deviation to the route from Geraldton Regional Airport to enable easier interconnection between strategic locations as identified by The City of Geraldton-Greenough. This line will traverse past The City of Geraldton-Greenough civic centre and up to the GUC site in the HETP (Appendix B). Access to High Powered Computing facility (IVEC) at Curtin University will also be available for appropriate research as indicated by the Minister for Science, Industry and Innovation and Research (Appendix C).

It is proposed that with the success of this application, a data centre be constructed within the HETP. This will be directly connected to the NBN and networked via fast high speed, robust, private (free) IP network to the various partners. The data centre will offer processing and storage to the partners and other NFP organisations on an as needs basis and at significantly discounted rates. This will contribute to considerable savings in the need for capital funding for traditional IT infrastructure.

A secondary, low cost data centre is also proposed to be built at Mullewa with access through the low cost ASKAP fibre providing disaster recovery and business continuity to not only The City of Geraldton-Greenough and partners but also to emergency services for the region. Geraldton Airport, with a 250kva backup power supply with data connections to Mullewa will be able

provide a resilient emergency services ops centre in case of catastrophic power failure with full failover facilities.

The Mid-West will benefit from improved delivery health and education services with significant cost and time reductions across the whole spectrum from the data centre delivered through Telstra ADSL and Nextg services, microwave, satellite and optical fibre to communities throughout the region.

The provision of data centre and a robust, high speed network will enable the delivery of applications to and for Mid-West communities such as

- High Quality video conferencing for community interactivity, education and health
- On-line real-time and interactive training and applications from Durack College (TAFE) including amongst other initiatives
  - Safety and Emergency Response Training
  - Mobile Computing in Workplace Assessment
  - Health and Community Services Training
  - Aboriginal Training
- Aquatic Realtime Management System (ARMS) ARMS is an automated software package that manages historical and real-time water resource data. It has a user friendly visualisation interface, posts information on the internet, provides real-time and forecast numerical modelling capabilities, and sends messages via email on the status of water resources. All this provides compute based decision support indices to aid in operational management
- The Schools' Program is the initiative of the Centre for Water Research and Millennium Kids Inc. MK is a not for profit youth organisation, established in Perth in 1996, run by young people for young people. It identifies projects that give young people a voice in their community about the things that concern them and help them find ways to solve these challenges. Working with ARMS each school community will be provided with access to and training on how to use the Centre for Water Research's data management system
- Batavia Coast Maritime Institute (BCMI) will work with the UWA Centre for Water Research (CWR), Northern Agricultural Catchments Council (NACC), Millennium Kids, and the Mid-West Development Commission to establish monitoring stations in the marine waters, river systems and key terrestrial systems in the region to monitor and record environmental quality using real time sensors. Geraldton Port Authority will soon sign up to a revised MOU which agrees to make available live data from their monitoring stations.
- Training for Country - training program in which 12 Indigenous people from throughout the Northern Agricultural Region (NAR) will participate in a Certificate II in Conservation and Land Management, which will include training and on ground works linked to the outcomes of rabbit suppression, coastal engagement and indigenous engagement in natural resource management. Participants will use Banjar and ARMS to record data from the region and interact in an online collaborative environment.

- The Balconi tracker is an award winning product that provides fast affordable broadband voice and data connectivity to remote areas. The Balconi tracker extends the coverage of the existing mobile network by more than 150km, helping to minimise blackspots. Ngangganawili Aboriginal Health Service (NAHS) provides the ambulance service to the Wiluna region. The tracker enables emergency workers responding to an incident to be connected to coordinate activities.
- A stand alone, not for profit research organization will be established in Geraldton Western Australia. Titled the West Australian Institute of Skin Cancer Medicine and Rural Health its role will be to principally undertake epidemiological and clinical research into the management and treatment of skin cancer (melanoma and non-melanoma skin cancer). It will also encompass research into other significant and related dermopathies.

The change management, marketing, delivery and uptake of these services will be a significant challenge. Using web 2.0 technologies, viral marketing will be a key component for the delivery of the message for new services for the community. Platforms to be used include

- CivicEvolution is an online tool from San Francisco based company Practical Evolution. CivicEvolution provides a novel approach to engaging citizens in truly collaborative and deliberative decision making by using technology to provide a link between the community and decision makers. It does this by empowering the community identify changes they would like to see in their community and assisting them to develop proposals which are then taken to decision making bodies for potential action. The tool has been used frequently in the USA has also been used with great success in the Australian Citizen's Online Parliament in 2009. This is a world first leading program
- BANJAR – Social networking to join people to create communities of common interest
- Social networking visualisation to determine community mood
- City Forward is a collaboration with IBM to join only 40 cities around the world to provide community with data with which to compare and provide a basis for knowledge

The collaborative environment that has been created for the delivery of this proposal, through our partner network, will deliver improvements throughout the local communities whom derive services from these entities. This collaboration also brings about a high level of expertise in managing and delivering projects of this size and complexity.

It is anticipated that future sustainability of these programs will be complimented by commercial use of data centre and high speed network to provide services such as

- Data and compute resources as a service (Cloud Computing Services)
- DR/BCP recovery points for enterprises operating in this region
- Data facilities
- Bridge points for Tele Presence and other video based collaborative services

The requirement for these services has already been identified and some key organisations have indicated an interest in using these facilities if there were available within the region.

As part of the governance and compliance within State and Federal legislation, a trust will be established to manage and authorise disbursement of funds. Trustees will comprise of CEOs of appropriate organisations (or CEO appointed delegates). This management committee will include, but not limited to City of Geraldton - Greenough, Durack (TAFE), and the Mid-West Development Committee. Using solid project management principles (Prince2 methodology) all projects will be developed and managed within a rigorous framework to ensure compliance, sound risk management and achievement of outcomes.

The potential of enormous spin offs for the whole region is evident. The cost savings, adaptation to climate change, raising awareness and education of community, leaps in communication will be foundations that will ensure the sustainability and growth of the Mid-West.

We believe that this collaborative effort is unique in Australia and will be a model for future development that should be studied and adopted