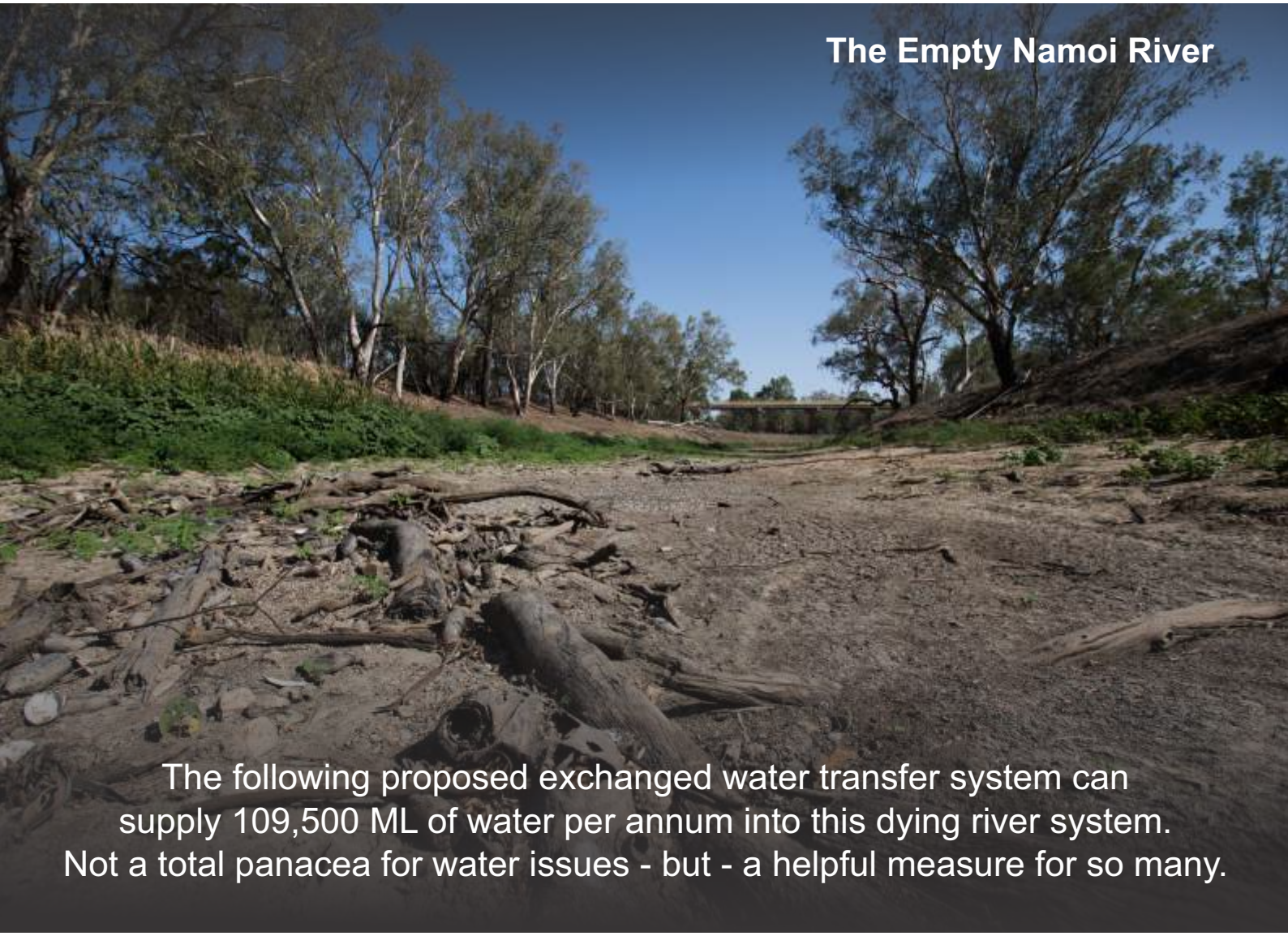
Universal Water Recycling

EVERY DROP COUNTS!

UWR

SCHEME 2 & SCHEME 3



Carly Earl/ © Guardian / eyevine

Presented By: Joe Taranto

Universal Water Recycling
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waterforthebasin@outlook.com.au

EVERY DROP COUNTS!

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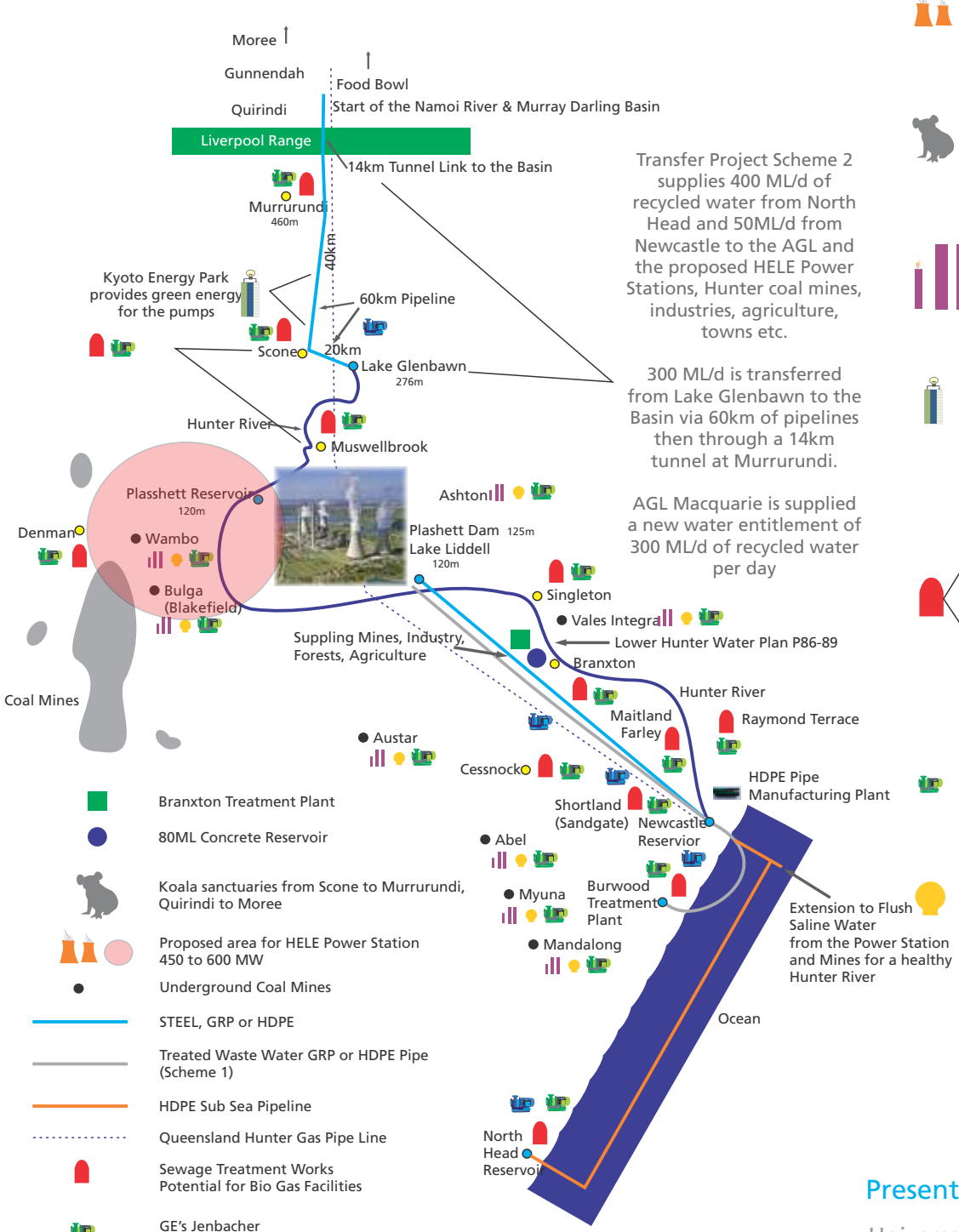
Moving Water Long Distances: Grand Schemes or Pipe Dreams? are viably possible!

Scheme 2
Vision for the Hunter

NORTH HEADS OCEAN OUTFALLS TRANSFER SYSTEM FOR THE HUNTER AND MURRAY DARLING BASIN



Transfer Project Scheme 2 supplies 400 ML/d of recycled water from North Head and 50ML/d from Newcastle to the AGL and the proposed HELE Power Stations, Hunter coal mines, industries, agriculture, towns etc.

300 ML/d is transferred from Lake Glenbawn to the Basin via 60km of pipelines then through a 14km tunnel at Murrurundi.

AGL Macquarie is supplied a new water entitlement of 300 ML/d of recycled water per day

Proposed new regional cities Sites to be determined

Proposed 450 to 600 MW Gas Fired Power Station

Carbon capture offset system to counterbalance emissions

Underground Coal Mine Ventilation Air Methane (VAM)

Kyoto Energy Park

Sewage Treatment Works

Biogas Facilities

GE's Jenbacher Gas Engine

Methane Gas Storage

It is envisaged for the Hunter River in Newcastle to establish a new industry to manufacture HDPE pipes, powered by excess methane energy

Presented By: Joe Taranto

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www.uwr.com.au

EVERY DROP COUNTS!

Universal Water Recycling

> “The following Sustainable Water Recycling Project for the Hunter and the Murray Darling Basin, I believe with a passion, is of National Importance. Servicing communities and the environment for the next century.”

EVERY DROP COUNTS!

Universal Water Recycling

UWR

Index

Index - Continued

Future Water Options

Option One Tillegra Dam

Option Two Desalination Plant

Option Three Harvesting North Heads Ocean Outfalls

One of the above three options will be needed to secure water for the long term future for the Hunter, Central Coast, Sydney or the Murray Darling Basin.

I am trying to encourage both State and Federal governments and our Water Utilities to put option three on the table with option one and two to compare, evaluate and study to find the most viable option, the least impact on the environment option, sustainable source and community support.

Option 3

1. Will create a new pipe manufacturing industry for Newcastle.
2. Newcastle has ample industrial land with River and Harbour access.
3. Newcastle has the largest rail freight infrastructure on the east coast.
4. The economic benefit to Newcastle from manufacturing jobs and the flow on effect servicing this industry will be immeasurable.
5. This new pipe manufacturing industry can be financed from the $10 billion Murray Darling Basin Fund, $5 billion set aside for irrigation and infrastructure.
6. This project can supply large diameter High Density Polyethelene Pipes (HDPE) in long lengths delivered by rail within hours to the basin or any other projects cost effectively in Australia.
7. Australia being the driest inhabited continent on earth, Pipe Manufacturing in Newcastle once commenced will always be in production.
8. The (HDPE) machines can produce a continuous pipe line klms in length
9. With harbour access pipes can be floated to projects in Brisbane, Sydney, Melbourne etc.
10. Newcastle would be in an excellent position to export these pipes cost efficiently, using coal, cargo and frieght ships to tow pipes as a backload to their base country.

The Lower Hunter

The volumes of water the lower Hunter uses domestically and industrially is around 80 GL per annum.

Macquarie Generation, our power station just north of Singleton which powers 40% of NSW, also uses around 80 GL per annum. Most of its water supply is from Glenbawn Dam. This water is released from the Dam and flows down stream and then is pumped into Plasshett Reservoir, from there to the Power Station for cooling purposes. The majority of this water, with a little treatment, is of potable grade.

Plasshett Reservoir and Lake Liddell, which service the Power Station, is approximately 120 metres above sea level.

North Head Sydney

North Heads Sewage Treatment Works discharge around 400 ML/Day. This grey water has had secondary treatment with nutrient removal.

North head is 90 metres above sea level.

Sydney's 3 major ocean outfalls volume discharged are...

North Head	Secondary with nutrient removal	400 ML/Day
Ben Buckler	Screened only	165 ML'Day
Long Bay	Screened only	490 ML/Day

Proposed Pipeline Route

The proposed pipeline route from Newcastle to the Power Station at Lake Liddell, I believe would best be along the Minmi Flats near Hexham and follow the John Renshaw Drive beside the existing Hunter Water pipe line and just before Kurri Kurri follow the power grid wherever possible to Lake Liddell. By following the grid, on land that can never be built on, there would be ample room underneath for the pipeline and will require no land to be purchased beneath the grid route.

This project's main purpose is to exchange the grey water from North Head for the 80 gigalitres potable water the power station uses per annum.

The pumping infrastructure from the Hunter River to Plasshett Reservoir is already in place. The proposed system would supply the Power Station with a new sustainable water source to Lake Liddell. Then Plassett reservoir becomes available for this project.

Water from the Hunter River could be pumped to the reservoir using off peak energy. With little treatment this water would be potable. Gravity will then take this water to the lower Hunter, Central Coast or Sydney.

It could also be connected to the existing Hunter Water pipes infrastructure at either Branxton, Cessnock or Kurri Kurri. This could also save Hunter Water pumping up hill to supply these towns. Refer to front page.

Water restrictions, (for example when the Central Coast had water restrictions) constitute a lost water market. This project if implemented would put Hunter water in a position to negotiate a deal with Gosford and Wyong's water utilities which would be mutually beneficial, to lift water restrictions and supply a sustainable water source.

Cutting Coal Mine Methane Could Cool Global Warming

Below are two extracts obtained from the internet from two different countries, both with two different methods of opinions on how to cut methane emissions from Coal Mines.

America

One. Utilizing a major energy source. Clean Air Task Force (CATF)
Jonathan Banks Senior Climate Advisor at CFTF.

Capturing a major energy source.

The CATF report describes how existing technologies could capture methane gas during coal extraction and offer benefits beyond mine safety and environmental improvements. “When methane is released, its a waste of energy.

It's a product of value. It can be burnt quite cleanly,” Banks said.
Depending on the quality of the gas, he said, mine companies could use captured methane to power equipment or generate electricity. Methane - powered burners might be used to dry coal or companies could trap the gas and sell it directly to the pipeline.

Australia

Two. Convert Methane Emissions - into Carbon Dioxide.

Professor Behdad Moghtaderi Newcastle University.

The Newcastle University have received a $30 million research grant towards cutting methane emissions.

Based at the University's Newcastle Institute for Energy and Resources,
Professor Moghtaderi will lead the research.
It involves converting methane emissions- which escape when coal is mined - into carbon dioxide.
The carbon dioxide would be released to the air, as technology to store it underground had not proved viable.
Professor Moghtaderi said methane and carbon dioxide were green house gases but the latter was the lesser of two evils as methane was 25 times more potent than carbon dioxide, he said.

Professor Moghtaderi said the technology - called “ventilation air methane abatement “ - could reduce emissions from the sector by up to 90 per cent and decrease Australia's annual greenhouse gases by 3 per cent.

Everyone has the right to express their opinion, I believe the American option is by far the best, to utilize methane as an energy source by using gas engines, to generate power, gas engines run cleaner, unlike diesel or petrol which generate more carbon dioxide, also this project involves using this methane energy with other energy sources as part of a system to move large volumes of water, if you take the time to look at this project in its entirety you will clearly see this, the project needs that water supply for the plantation of vast forest, trees absorb and store carbon in their trunks, not only that, trees produce oxygen, shade, birdlife etc.

NSW is at present in one of the worst droughts in its history.

Water is the life blood of any country, benefitting the environment, the economy the towns and its people, with out it there only the abyss.

The Australian option is a waste of a major energy source, and it is counterproductive.

Harvesting North Heads water would result in the following:

1. Secure an additional 80 gigalitres of potable water per annum, for the Hunter.

2. North Heads water is a more sustainable water source than a dam.

3. 80 gigalitres of potable water per annum for our future population will be worth millions of dollars per annum to our water utilities or the State Government.

4. The 2000mm HDPE pipeline to Lake Liddell could be used on occasions to flush by gravity saline water from Lake Liddell and coal mines to the ocean. Refer to front page..

5. Suppling the Power Station with a sustainable water source will also unlock the extra 30% of water held in reserve in Glenbawn Dam for the Power Station.

6. Industries, Mines and agriculture could also tap into this grey water.

7. This project would have a far less impact on the environment than building a Dam or Desalination Plant.

8. Recycling large volumes of water from North Head would have public support.

9. A new Pipe Manufacturing Industry would be created at Newcastle with jobs suppling large cost efficient pipes for Australia and export.

10. In times when the Hunter, Central Coast, or Sydney have ample water, water from Glenbawn Dam which is 276m above sea level, a 60km pipeline from Glenbawn to Murrurundi through a 14kml tunnel on the Liverpool range will have this water into the Namoi, Barwon and the Darling river systems. In times of drought Glenbawn Dam could be a lifeline to the towns on the Murray River system delivering 80 gigalitres per annum. Refer to front page.

North Head Ocean Transfer System for the
Hunter & Murray Darling Basin
Intellectual Property Matters

I recommend that the Federal Minister for Environment and Water, the NSW Minister for Finance and Services, the Metropolitan Water Directorate and the Independent Panel conduct a comprehensive feasibility study of this proposal before proceeding. In my view, the study will conclude that the project will provide a viable new water source for the Lower Hunter Water Plan, Upper Hunter and the Murray Darling Basin.

However, I require that should the feasibility study be conducted, the parties agree to provide me with a copy as soon as reasonably practicable.

All parties who use the my work in conducting any studies, planning, or in connection with any other purpose whatsoever, acknowledge that all intellectual property contained in this document is owned by Joseph Taranto. All parties who have access to this intellectual property acknowledge and agree that the information contained herein shall not be used without the consent of the intellectual property owner. The parties with access to the intellectual property contained herein acknowledge and agree that a commercial intellectual property arrangement must be entered into with the intellectual property owner prior to any party using any of the information contained herein. The parties, and all parties who review this document acknowledge and expressly agree that Joseph Taranto retains ownership of its Intellectual Property Rights in the information contained herein until such time as any assignment of Intellectual Property takes place.

Information on Water Level

This information mentioned will make it easier to understand this project.

Does it shock you to hear that a water level is more accurate than a Laser Level or a Transit? After some explanation I believe you will feel the same way too. For one thing, the earth is not flat. Shocking? I know, but it's true. So what about a lake, is it flat? Nope. Let's say you were to setup a transit at one end of a bridge span of, say, 2 miles--something like the Evergreen Point Bridge in Seattle Washington. If a laser level, a transit or a 2-mile long spirit level were used to determine the level across the lake it would be off by over 26 inches on the other side of the lake. (Bowditch) Whose wrong the water in the lake or the laser level, the transit or the spirit level?
If its 2miles or 100km Pascal's law applies, No Water Engineer can dispute this.

The accuracy of a water level is based upon Pascal's law
“Water seeks its own level”
A water level is both accurate and versatile and can be used to set grades where grade points are separated by distance.

MyBIGIDEA

My idea is to transfer 400ML of grey water per day gravity assisted from North Head (Sydney)to the Hunter,providing a new water entitlement supply to our Power Station enabling water suitable for agriculture to be transferred to our food bowl.

A new large diameter HDPE pipeline industry will be created at Newcastle,supplying this project and others.Water is the key,jobs investment,economic growth,powered by greenhouse gasses,NSW has abundant gas reserves,to view project www.uwr.com.au (Scheme 2)

Production Output and Manufacturing Costs

From: eagleco001 (eagleco001@gmail.com)
Sent: Tuesday, 16 march 2010 5:12:47 PM
To: Joe Taranto (univeralwaterrecycling@hotmail.com)

Dear Joe Taranto,
How are you?
Please the answer as follows
1. For example. SDR21, HDPE-100, Pressure is 8BAR, production line output is 1600kg/h.
1600mm:pipe weight, 328kg/m, the output is 0.09 meters per minute, 5.4m per hour, 129.6m per day.
2000mm: pipe weight, 512kg/m, the output is 0.06 meters per minute, 3.6m per hour, 86.4m per day.

2. Now the HDPE-100 raw material is about USD1700 per ton, the manufacturing cost is about 10-15% including the labour the cost, power, etc
So the pipe cost is as follows
1600mm: 641USD/M
2000mm: 1000USD/M

The shipping cost is very low, it can be 1% or 2%, I think
3. Normally, the water pressure should be 3bar to 8bar for big diameter pipe.

4. The water quality depends on the water flow speed and the pipe friction is very very small compared to other pipe, so we can leave this matter to side, for example, if the water flow speed is 1m/s

1600mm SDR21: area 16458cm2, water flow capacity 1645.880KG/S, 98ton per minute, 5925ton per hour, 142204ton per day
2000mm SDR21: area 25716cm2, water flow capacity 2571kg/s, 154ton per minute, 9258ton per hour, 222193 ton per day

5. The life expectancy is 50 years, it should be more, for this kind of raw material, it can work 100 years, if there is no sun, no damage.

6. This kind of pipe should be put underground or make the protection to avoid the sun.

Best regards!

Sincerely yours
Zhou Maozhen
Manager.
2010-03-16

Earth Co
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SKYPE: ZHOUMAOZHEN2
http://eagle-machinery.com

Mechanical Engineer, Andrew Tuxford

From: atuxford@typac.com.au
To: universalwaterrecycling@hotmail.com
Date: Sun, 1st Aug 2010 21:40:15
Subject: RE: Water Recycling Project

Hi Joe,

Working 2x 2000m ID pipes, I get friction loss of about 20m, neglecting valves and other fittings. This loss jumps up to 60m if you try and only use a single pipe like Jane calculated. It's difficult to say if the pipe would flow at its full rate just under the effect of gravity alone. If there is out-gassing of the treated effluent then this could easily reduce the available flow area of the water and increase the loss to a point where the flow will be reduced.

The pipe line will always flow some water as long as there is a difference of head between start and finish, the variable will be the flow. If there is insufficient head to equal the loss in the system, the flow rate will reduce until the system is in equilibrium with the friction loss matching the available head. This is what you see when you siphon things, if you try to siphon through a long hose you'll only get a trickle out of it compared to if it was very short.

To try and size a pump system to boost the water would be a bit of a waste of time at the moment because without knowing exactly what the head loss will be the pump types can't be chosen. We can pretty easily produce a pump capable of a pumping at 195ML/day and generating 20 to 30 m of head, and you'd just need two of those if the head loss was only 20 to 30m. if the head loss was higher due to gas build up or losses through valves increased the head too much we might need to look at another solution.

I believe that you'll definitely get some sort of gravity driven flow at Newcastle, but I wouldn't want to try and predict what the flow rate would be without a proper system design.

Regards
Andrew Tuxford
Mechanical Engineer
Tyco Pumping Systems
(07) 46884111

Re:RE: Notification: Business Message from Mr.Joseph Taranto

From: **eagleco001** (eagleco001@gmail.com)
Sent: Monday, 15 March 2010 6:11:02 PM
To: Joe Taranto (universalwaterrecycling@hotmail.com)
Dear sir,
How are you?
The 1600mm HDPE pipe machine is about USD 1.1 MILLION. If the pipe line is from 1600mm to 2000mm, the production line is about USD 1.5 million.
To operate this machine, 3 or 5 persons required.

Best regards
Sincerely yours,
Zhou Maozhen
Manager

RE: sea floor from Sydney to Newcastle [SEC=UNCLASSIFIED]

From: Tanya.Whiteway@ga.gov.au
Sent: Monday 21, December 2009 3:25:54 PM
To: universalwaterrecycling@hotmail.com

Hi Joe,
As promised:
The Bathymetry Grid is now available via the GA Sales Centre. Please follow the link for more information:
https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=67703

Cheers

Tanya

Tanya Whiteway
Law of the Sea and Maritime Boundaries Advice /
Seabed Mapping and Characterisation
Geoscience Australia
Phone: +61 2 6249 9249
Address: GPO Box 378, Canberra ACT 2601, Australia

Reservoirs

Re: Water Project NSW
6/10/2011
Reply

Jim Hammond
jimhammondd@hornick.com.au

To :universalwaterrecycling@hotmail.com
From: Jim Hammond (jimhammondd@hornick.com.au)
Sent: Thursday, 6th October 2011 11:01:36 AM
To: universalwaterrecycling@hotmail.com

Good morning Joe,

Our expertise is in the construction of large reservoirs but not the engineering or functional system design associated with them. We would typically build to the clients requirements and details i.e., size, height, diameter, roof type, pipe size all nominated by the client to suit their system requirements. So a reservoir of the size you are proposing could be nominated as 60m dia and 18m high for example, or 80m dia and 10m high. Every reservoir will be different in this and other respects.

Regards
Jim Hammond
HORNICK CONSTRUCTIONS PTY LTD

Hornick Constructions Pty Ltd

Reservoirs envisaged for this project at North Head and Newcastle

"Vision"

1. To Help Save the Murray
2. To create a new pipe manufacturing industry for Newcastle.
3. To supply the power station at Lake Liddell with 80 gigalitres of grey water in exchange for the 80 gigalitres of potable water it uses.

My vision is not mine alone. For the past 2 centuries many Australians have visualized turning rivers that flow into the ocean from the eastern side of the Great Dividing Range, "inland"

I believe with a passion that my concept of capturing and transferring grey water from North Head to the power station at Lake Liddell will benefit both the Hunter Murray Darling River basin and the Hunter for the next century. I visualize a HDPE pipeline manufacturing industry in Newcastle manufacturing pipes for both sub sea and on land use.

I visualize Australia's future Governments will encourage farmers to reforest their land with the help of this water and be paid for it to help tackle climate change.

I visualize farmers planting crops for Australia and feeding the world and knowing they can plan their future by having a reliable sustainable water source.

I visualize the economic benefit this project would deliver to the towns suffering from centuries of drought.

I visualize the environment flourishing from environmental flows from the vast volumes of water that this project can achieve.

This optimum project will become the arteries of future developments in industry, agriculture, new towns, bio fuels and power generation.It would be fair to say this project will attract World Wide Attention and will make Australia one of the leading countries as an example for others to follow in water recycling and climate change.

"THAT IS MY VISION"

Vision for the Hunter and Murray Darling Basin 2016

This vital proposed water project will transfer large volumes into the Basin, 300ML per day, 2,100ML per week (2.1 GL) 109,200ML per year (109.2 GL)

It is envisaged this water will be transferred from Lake Glenbawn 276 meters above sea level via a 60 klm GPR or HDPE pipelines to Murrurundi 460 meters, a lift of 184 meters, then through a proposed 14 klm tunnel into the start of a tributary of the Namoi river system that leads to the Murray Darling Basin Food Bowl.

The majority or all the energy needed for this project to run the Clarke Jenbackher gas engines to generate electricity for the pumping stations will be run on green house gases, bio gas from Sewage Treatment Works throughout the Hunter Valley, bio gas from animal waste in the Dairy Industry and Methane
Gas from under ground coal mines. The methane removed from working mines
Is known as Ventilation Air Methane (VAM) Clarke Energy can provide power generation technologies that can harness the energy production potential of these resources.

Alternatively some of the energy needed for the Pumping Stations for the above 60 klm section could be taken from the Kyoto Energy Park near Scone currently under construction, this will make the project run totally on green energy.

The 106 GL annual water entitlement for the Bayswater Power Station from Lake Glenbawn could be replaced with a new 106GL annual water entitlement from a new sustainable recycled water source.

Queensland Redbank Power Station uses recycled water, it's wrong for Power Stations and coal mines and industries to use water of a potable grade or water suitable for agriculture when grey water that is suitable for these industries exist and is currently being pumped into our oceans.

It is proposed this project would supply the entire Power Station with recycled water.

The transfer of 400ML of secondary grey water from North Head Sydney, via a subsea HDPE pipeline to Newcastle which is gravity assisted, the Turkey to Cyprus subsea water pipeline is similar in length to this proposed project, it is also envisaged that new bio gas facilities' be built at sewage treatment works to turn green house gases into a power source, to capture methane that's generated during sewage treatment and directs this gas into a commercial pipeline to be used as an energy source for electricity generation to power the pumps for this water transfer system.

Vision for the Hunter and Murray Darling Basin
2016 Continued

There is no problem in obtaining this water transfer as there is more than enough energy to power the whole water transfer from methane from underground coal mine currently being flared (refer to index methane energy volumes and energy outputs).

Bio gas as a power source can and has already been proven in Sewage Treatment Works here in Australia (at Melbourne Water's Western Treatment Plant in Werribee, and also in San Antonio and Dallas in Texas, see index.

This project if looked at by positive forward thinking can do people, will be made viable and is of National Importance.

The economic benefit for the Australian agriculture industry, Towns, communities and the environment of supplying 109 plus GL of water from a sustainable source annually through a pipeline infrastructure which would last for a century into the Murray Darling food bowl is immeasurable.

The project will also provide for an additional 36 GL of recycled water from North Head and a further 16 plus GL of recycled water from the Burwood Treatment Plant a total water supply of 52 plus GL annually to the Hunter Valley.

This sustainable water source will attract investments in the Hunter for future developments, in Agriculture, Industries, Forests, Tourism, and the Environment.

Vision by Joe Taranto 2016

Summary

Sydney's Water Recycling Solution.

A factory to be built on the Hunter River (Newcastle) to produce HDPE (high density polyethylene pipes).

Production of large diameter HDPE pipes up to 2000mm in diameter and 550 Metres in length.

Pipe line being manufactured on location on the Hunter River Newcastle. This factor increases viability as length of pipes at sea for this project could be many kilometres.

A new piping manufacturing industry creating jobs for Australia.

Pipe line manufacturing next to rail infrastructure at Newcastle can service other projects in NSW or Victoria delivering by rail large diameter pipes up to 2000 mm in diameter and lengths as long as required.

Water to be treated to an agriculture grade and returned to the driest continent.

Capital Costs.

The capital costs of this project cannot be obtained without the implementation of a comprehensive feasibility study.

The HDPE pipe machine costs in USD $1.1 million.

The production line costs in USD $ 1.5 million.

The costs in Australia to manufacture HDPE pipes are.

2000mm diameter pipe = in USD $1000 per meter ($ 1million per klm)

1600mm diameter pipe = in USD $641 per meter ($641,000 per klm)

The number of HDPE pipe machines and production lines to manufacture large diameter pipes depends on the time frame allocated for this and other projects.

Example: Ten HDPE pipe machines and production lines would cost around USD $ 26 million,

Twenty around USD $ 52 million.

Ten would be capable of manufacturing around 314 klms of 2000mm pipes per annum, or around 470 klms of 1600 mm pipes per annum.

Twenty would be capable of manufacturing around 628 klms of 2000mm pipes per annum or around 940 klms of 1600mm pipes per annum.

It would also create around 50 to 100 full time jobs and more in spin offs associated with this project.

Tunnels

California Inland feeder Project

Delivering water from Northern California to a new reservoir between San Diego and Los Angeles. The Riverside Badlands Tunnel Project was a 12716m long tunnel constructed from Moreno Valley to Redlands, California as part of the metropolitan Water District of Southern California's Inland Feeder Project. The US $119 million project consisted of excavation of a 4.8m diameter tunnel with a hard rock TBM and segmental precast initial liner and the installation of a 3.5m diameter welded steel cylinder pipe inside the tunnel with cellular concrete backfill. The project also involved construction of two portal cuts with permanent concrete structures and two deep construction access shafts as well as buried 3.6m diameter pipe at each portal.

The tunnel excavation involved various types of ground treatment and ground control including chemical grouting pr-excavation grounding with miscrofine cements and dewatering alluvium canyons as well as ground support techniques such as steel ribs, shotcrete and concrete segments. Pre- excavation grouting was utilised to stabilize the ground and reduce groundwater inflow and chemical grouting and dewatering used to mitigate flowing ground conditions. A numerical monitoring programe was designed to determine safe cellular concrete backfill placement to avoid pipe flotation.

Our North American company Hatch Mott MacDonald provided construction management and tunnel inspection services for the project. We were responsible for the daily resident engineers tasks including office and inspection staff management, correspondence co-ordination with the contractor an client, reviewing and processing of monthly pay requests, preparing monthly reports and cost estimates for change order work, reviewing construction schedules and co-ordinating with third party entities.

The project was completed in 2003 a year ahead of schedule

The envisaged tunnel machine to excavate a 14km tunnel at Murrurundi

FW: Water Project Australia

From: **Gutteridge, David R** (David.Gutteridge@mottmac.com)
You many not know this sender. Mark as safe Mark as junk
Sent: Wednesday, 11 March 2009 11:11:39 PM
To: universalwaterrecycling@hotmail.com
2 attachments Download all attachments (83.7 KB)
img179.jpg (24.0 KB), img178.jpg (59.7 KB)

Joe,

Thank you for your email. I lead the Mott MacDonald Tunnels Division. I have looked at the attached sketches. I would be grateful if you could advise if you would like any further action.

Regards

David Gutteridge
Divisional Director
Mott MacDonald Ltd
St Anne House
Wellesley Road
Croydon
Cr9 2UL
020 8774 2417
www.tunnels.mottmac.com
www.mottmac.com

Year 2003
Tunnel 12.7km costs $119million USD = $165 million AUD

Estimated costs 2019
14km tunnel $200million to $300million AUD

Dear Sir,

Thank you for the email. Regarding your questions:

1. Would red gypsum be readily available in Australia, preferably Sydney or Newcastle?

In the investigation we carried in our labs, we did prove the basic concept of using insoluble additives (powders) as drag reducing agents. The benefit behind that is to use a product that is not toxic (like the polymers) and never change the physical properties of the transported liquid. The red gypsum was used for two reasons, the first reason is that it is a waste from the titanium dioxide manufacturing process and the second reason is because of its properties. We do strongly believe (and that was proved experimentally) that we can use many types of powders (most of them available everywhere) as drag reducing agents depending on the type and powder properties.

2. When the water transfer is complete is there a method of extracting the red gypsum from the water through some filtering system?

The addition percentage is very low and its effect is very high if you choose the right powder. The separation process is very simple where the use of settling systems or even filtration is a good example.

3. Would there be any technical or environmental reason to remove the additive?

The additives investigated and used are environmentaly friendly and non toxic; as you know; it is insoluble in the transported liquid and that will not effect the liquid properties.

4. It is proposed to transfer water from North Head (90 metres above seas level) to Newcastle (less than 10 metres above sea level) a height difference of over 80 metres, North Head to Newcastle is 110kms. A few klms off shore at North Head the ocean depth is 60 metres, a few klms off shore Newcastle the ocean depth is 30 metres. Using the 2000mm pipeline if we were to pump 222193 tons per day and if we added 200 ppm of red gypsum to the water is it possible for you to provide an estimate of the percentage of drag reduction that could be achieved?

We did do the experiment in lab scale liquid circulation system. We strongly believe that the product can act efficently with large pipelines but we don't have the experimental evidence for it. (experimental Data).

Waiting for your reply .... Best regards

hayder

hayder bari
To Joe Taranto
From: hayder bari (hayder.bari@gmail.com)
Sent: Sunday, 15 July 2012 1:45:46 PM
To: Joe Taranto (universalwaterrecycling@hotmail.com)
Dear Sir;

Yes , we can test our products in large pipelines but that depends on the grant weather it is meant for testing only or building a pipeline for testing. The first choice is faster and cheaper if the pipeline is available for testing. We are ready to perform the test whenever there is a chance and possibility for it. I am confident that the insoluble additive can perform well even in commercial scale pipelines. Waiting for your reply

Regards;
Hayder

ABSTRACT

Pipe is a common channel to transport fluid from one location to another. Skin frictions formed by turbulent flow in pipe become the main aspect for researchers to explore the field of fluid mechanics. Frictional drag formed in pipelines transporting water can be reduced spectacularly by adding minute amount of drag reducing agents (DRA). Experiments have been conducted to test the performance of titanium dioxide manufacturing wastes (red gypsum) as DRA. The purpose of using an industrial waste is to reduce the amount of waste land filled (waste to wealth) as well as the capability of red gypsum which doesn't influence or change the properties of water. Investigated parameters for this study are solid concentrations (50ppm-200ppm), pipe diameter (0.0127m, 0.0254m and 0.0381m), length of testing section and Reynolds number (Re) or known as fluid flow rate. The results showed that, percentage drag reduction (%DR) increases by increasing the solid concentration at larger pipe with higher water flow rate (Re). A maximum drag reduction of 56.44% has been achieved in 0.0381m pipe diameter at Re=149648.3 and 200 ppm solid concentrations. On the other hand, while testing the effect of pipe length, effective %DR (40.18%) accomplished at 2m (for 200ppm solid concentration). With demonstrated experimental results, it can be concluded that red gypsum regarded as DRA.

Upper Hunter wind farm undergoes energy assessment

Posted Thu Jul 12, 2012 7:50am AEST

Photo: An Upper Hunter wind farm undergoes an energy assessment in a bid to attract more investors. (ABC TV News)
Map: Scone 2337

The company behind a $200 million wind farm in the Upper Hunter says a detailed energy assessment is underway, bringing together 13 years worth of data.

There are plans for the installation of 34 wind turbines at the Kyoto Energy Park, west of Scone.

Some members of the community are concerned the turbines will cause property devaluation, noise problems and visual pollution.

Project Manager, Ben Merven says the company is in the process of crunching the numbers in a bid to attract investors.

"So we've had the fifth mast put in and we've collected over six months of data and we're just in the process of getting a detailed energy assessment," he said.

"Some of the masts are at different heights and that's just to get more accurate pictures of the wind speeds at the different heights.

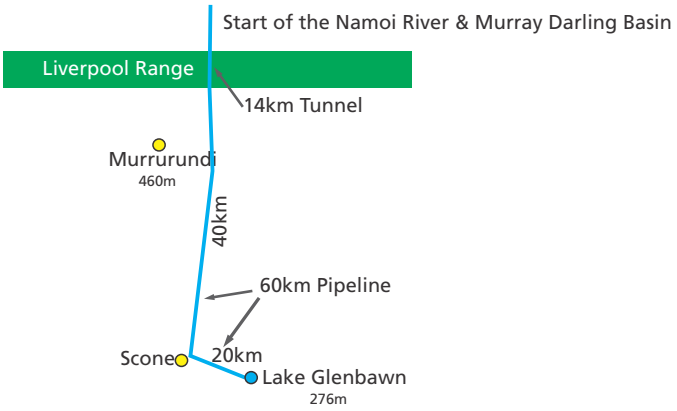
"So if you take all the raw wind data you can run it through various computer modelling programs.

"And that will extrapolate and give more site specific data over the entire site.

"The grid will be very interested in (the data), as would a bank, when you go to get finance.

"The CSIRO were involved in putting up the first mast back in 1999 and since then we've added four just to create more certainty on the wind resource."

Kyoto Energy Park



The Above sketch shows the proposed 60 klm pipeline route from Glenbawn Dam to the proposed 14 klm tunnel at Murrurundi.

Green Energy Water Transfer

If the Kyoto Energy Park is established part of that energy could power the water transfer from Glenbawn Dam to Murrurundi.

Also if this water had a bio degradable (DRA) Drag Reduction Additive added, it would reduce the friction in the pipeline it will also reduce the energy needed for the transfer.

By supplying the Power Station with 80 gigaliters of grey water from a sustainable water source it allows us to access and transfer 80 gigaliters from Glenbawn Dam to the Murray Darling Basin annually , it also unlocks the 40% of water from this Dam that is kept in reserve for the Power Station.

The Hunter Bayswater Recycling Water Scheme and also Scheme 2
Intellectual Property Matters

I recommend that the Federal Minister for Environment and Water, the NSW Minister for Finance and Services, the Metropolitan Water Directorate and the Independent Panel conduct a comprehensive feasibility study of this proposal before proceeding. In my view, the study will conclude that the project will provide a viable new water source for the Lower Hunter Water Plan and is of national importance.

However, I require that should the feasibility study be conducted, the parties agree to provide me with a copy as soon as reasonably practicable.

All parties who use my work in conducting any studies, planning, or in connection with any other purpose whatsoever, acknowledge that all intellectual property contained in this document is owned by Joseph Taranto. All parties who have access to this intellectual property acknowledge and agree that the information contained herein shall not be used without the consent of the intellectual property owner. The parties with access to the intellectual property contained herein acknowledge and agree that a commercial intellectual property arrangement must be entered into with the intellectual property owner prior to any party using any of the information contained herein. The parties, and all parties who review this document acknowledge and expressly agree that Joseph Taranto retains ownership of its Intellectual Property Rights in the information contained herein until such time as any assignment of Intellectual Property takes place.

A PROPOSAL FOR

A PRELIMINARY COST ANALYSIS

FOR A

FRESHWATER TRANSMISSION SUBMARINE PIPELINE

FOR THE

HUNTER BAYSWATER RECYCLING WATER SCHEME

Prepared For

UNIVERSAL WATER RECYCLING

Attn: Joe Taranto
37 Moon Mountain Drive
Mt View NSW 2325
AUSTRALIA

Prepared By

MAKAI OCEAN ENGINEERING, INC.

PO Box 1206, Kailua, Hawaii 96734

Signature and Date of Corporate Official:

Printed Name: Jose Andres Title: President

Signature: Jose Andres Digitally signed by Jose Andres Dn: cn=Jose Andres, o=Makai Ocean Engineering, ou, email=jose.andres@makai.com, c=US Date: 2013.10.23 10:59:47 -10'00' Date: Oct. 23, 2013

October 21, 2013

INTRODUCTION

Makai Ocean Engineering, Inc. ("Makai") has been in contact with Mr. Joe Taranto ("Client") of Universal Water Recycling during the months of June to October, 2013. Mr. Taranto provided a request for proposal for a preliminary cost analysis, dated August 8, 2013. This proposal is a response to that request.

The Client is in the planning phase of a treated wastewater recycling system in the Hunter Valley, New South Wales, Australia. This project will exchange 45,000,000 liters of treated wastewater per day to the Bayswater power station and draw 45,000,000 liters per day of potable grade water from the Hunter River near Braxton. There is to be a 22-kilometer long subsea high density polyethylene (HDPE) pipe originating at the Burwood Waste Water Treatment Plant (located on the coast in Newcastle), extending into the ocean, traveling up the Hunter River to Ironbark Creek, and terminating at an onshore location on the bank of the Ironbark Creek ("Ironbark Creek end").

The Client has requested that Makai restrict this proposal to the engineering works associated with the subsea HDPE pipeline that connects the Burwood Waste Water Treatment Plant with the Ironbark Creek end.

PURPOSE OF STUDY

The purpose of the proposed study is to provide the Client with a description of the engineering and construction work required for this subsea pipeline, including an estimate of the requirements, schedule, and cost.

Statement of Work

Makai will perform the following work:

- A discussion of the general requirements of submarine pipeline projects such as this. This will include a description of:
    - The typical consultants required to complete the work
    - The information required by Makai to complete a final design
- A preliminary project development schedule for the subsea pipeline design, fabrication, and installation
- A conceptual design and sizing of the system components including the pumps, pump station, HDPE pipeline and the shore crossing and anchoring required.
- A preliminary cost estimate of the engineering and construction pipeline

Important Assumptions

In order to perform the above work, Makai must make some important assumptions, as follows:

- Makai's work will be restricted to the technical/engineering/construction aspects of this pipeline. Makai does not know the specific Australian laws (environmental or other) that may apply to this job, and thus we will not consider the effect that any laws or regulations may have on the cost, schedule, or feasibility of this project.
- Construction and labor costs will be based on Hawaii costs, and other relevant Makai projects.

Client Supplied Information

Makai assumes that the Client will supply certain necessary information to Makai. If the client does not have this information available, Makai will collect the best publically available information. However, the quality and level of certainty of Makai's cost estimates will depend largely on the quality of data provided by the client. In order for Makai to perform this work, we assume that the Client will provide requested information in a timely manner.

Makai assumes that the Client will provide the following information to Makai:

REQUIRED:

- HDPE Pipeline parameters required:
  - Flow rate: Makai will assume a flow rate of 45,000,000 liters per day of water thru this pipeline, unless otherwise instructed
  - Design life
- Offshore information required:
  - Bathymetry charts along the intended pipe route
  - Maps identifying any regulated or restricted areas where the pipeline may not be laid
- Onshore information required:
  - Maps identifying pipeline landing sites
  - Maps identifying pump station location

OPTIONAL:
Makai recognizes that much of this information may not be readily available, but the following information would be very helpful for this work.

- Offshore information:
  - Historical wave data for the area
  - Historical seasonal storm data for the area
  - Information about the condition of the seabed along the pipe route (rock, reef, sand, silt, depth, stability, etc.)

    - Maps identifying marine uses and activities in the areas along the pipeline route (fishing, anchoring, quantity and type of vessel traffic)
- Onshore information:
    - Restrictions on certain pipeline shore crossing methods (exposed pipeline, trenching, tunneling).

Note on Costs:

Makai will size and price out the cost of a freshwater transmission subsea pipeline system. The cost will be based upon Hawaii costs, which we will assume will be similar to costs in Australia. Any site-specific adjustment of Makai's cost estimates to match the actual costs at the site shall be done by the Client.

Deliverables

Makai will provide a Final Report that includes:

- A discussion of the general requirements of submarine pipeline projects such as this. This will include a description of:
    - The typical consultants required to complete the work
    - The information required by Makai to complete a final design
- A preliminary project development schedule for the subsea pipeline design, fabrication, and installation
- A conceptual design and sizing of the system components including the pumps, pump station, HDPE pipeline and the shore crossing and anchoring required.
- A preliminary cost estimate of the engineering and construction pipeline
- Recommendations on how to proceed with the next phase of development. These recommendations will also include requirements for further data collection and how to gather these data. In particular, data requirements will include information on collection of detailed bathymetry survey data, bottom roughness and currents in the area.

BACKGROUND: MAKAI OCEAN ENGINEERING, INC.

Makai Ocean Engineering has been in business for over 30 years providing ocean engineering services on deep water systems, naval architecture, aquaculture, pipelines, OTEC, cable laying control systems, and underwater vehicles. The most critical technical aspect of a seawater air conditioning is the cold water intake pipeline. Makai has been designing and working with deep water pipelines since 1979, starting with the design and installation of the 2,000' deep Mini-OTEC demonstration. Since that time, Makai has designed numerous deepwater down-the-slope pipelines, four of which have been installed at Keahole Point, Hawaii, and has been involved in a variety of large diameter OTEC pipeline design studies and research programs. One of these pipelines is 40" diameter, deployed to a depth of 2,200'. It currently provides air conditioning for the administration

building and the research laboratory at the Natural Energy Laboratory of Hawaii (NELH) and is the major source of water for the cold water aquaculture projects located there. If this particular pipeline was solely dedicated to providing air conditioning, it could provide cooling for approximately 5000 hotel rooms.

Another Makai pipeline at NELHA is a 55" diameter pipeline installed to a depth of 3,000'. This is the largest and deepest pipeline of its type in the world. This project was selected by the American Society of Civil Engineers as a 2003 Merit Finalist, one of six most outstanding Civil Engineering Projects of 2002.

Other Makai SWAC Projects:

- Makai engineered and designed a 63" diameter HDPE pipeline, 2 miles in length, for Cornell University. This pipeline provides cold water from Lake Cayuga to air condition the entire Cornell campus.
- In a similar project, Makai designed 3 each 63" diameter pipelines, each 18,000 feet long, for the Toronto, Canada. Cold water from Lake Ontario is now being used to cool downtown Toronto buildings and for high quality drinking water.
- A SWAC project completed by Makai in 2006 was for the InterContinental Resort and Thalasso Spa, Bora Bora. We engineered and designed a 400 mm HDPE intake pipeline which was deployed down a very steep submarine slope to a depth of 900m. The SWAC system is currently in operation.
- Currently, Makai is designing a seawater air conditioning system for downtown Honolulu. When completed, total project cost will be approximately $250 million.
- Makai completed a SWAC intake and return seawater pipeline design for a project in the Piscadera region of Curacao. This project to connect a series of hotels via cold seawater district cooling system is currently on hold due to the financial failure of the developer in the 2008 financial crisis.
- Other technical feasibility and economic studies on seawater air conditioning systems have been conducted by Makai include: Tumon Bay in Guam, the University of California San Diego, the Caribbean, the Philippines and Hawaii. In addition, Makai has made several technical presentations on seawater air conditioning at national conferences and has written several feature articles in marine technical journals.

For further details on Makai Ocean Engineering, please visit our webpage at www.makai.com.

PERSONNEL

The lead engineers Makai Ocean Engineering proposes to use for this work are the same engineers who have worked on our recent and past deep seawater intake pipeline designs. These engineers are familiar with both US and international standards. Newer members of Makai's pipeline design group will be used to provide analysis and support on the various tasks associated with this work.

The following are the key individuals that will work on this project:

- Dale Jensen, P.E., Ocean Engineer with 30 years experience at Makai in pipeline design including several intake and outfall pipelines in various locations around the Pacific. Mr. Jensen will lead Makai's team.
- Nick Reese, an MS Mechanical Engineer, is an expert in finite element analysis and has been a primary design analyst on several large diameter HDPE pipeline projects. Mr. Reese will provide route analysis and will lay out the required pipe anchoring scheme.
- Greg Rocheleau, an MS Oceanographer and BS Chemical Engineer, is an expert in 3-dimensional structural analysis of pipeline systems using ORCAFLEX software. He has experience in ocean hydrodynamic modeling of submerged pipelines using SWAN software. As an oceanographer, he will lead Makai's group in specification of metocean and bathymetric requirements to pipe analysis.

COST

USD $38,000 to complete this work.

SCHEDULE

Three months from the first payment are required to complete this work. Our earliest starting date would be January 1, 2014.

COST PROPOSAL

1. **Payment Schedule:**

   Notice to Proceed = $15,000

   Monthly Invoices (2 each) = $9,500

   Upon Acceptance of Final Deliverables = $4,000

2. **Rates:** The employee rates used to arrive at the quoted lump sum price are effective until April 1, 2014. If the work is contracted after that time, Makai reserves the right to re-bid the work and include any changes in our billable rates.
3. **Limitation of Professional Liability:** Makai is insured with general professional liability insurance to cover against damages due to our errors or omissions in design work. Makai also includes a Limitation of Liability clause in all our Owner-Engineer Agreements for deep water pipeline work. This clause protects Makai from being sued for full project responsibility due to an accident or installation failure which might lead to costs out of proportion with the fees we have received for our services.
4. **Exemption from Hawaii General Excise Tax:** The State of Hawaii currently waives 4.712% excise tax requirements for professional services exported from the State. Appropriate documentation will be required from the client to qualify

for this exemption. In the event that Makai is required pay this tax, for lack of documentation, our fee shall increase accordingly.

5. **Standard Makai Agreement:** Makai has supplied a copy of Makai's standard engineering form agreement that we use for projects of this nature and request that this be used to form the contractual basis for this feasibility study.

6. **Electronic Transfer of Funds:** Makai assumes that payments will be by electronic transfer of funds. Instructions for electronic transfer of funds are as follows:

   Account Number: 0010019036
   Bank: Bank of Hawaii
   Address: 636 Kailua Road, Kailua Hawaii 96734 USA
   ABA Routing Number 121301028
   SWIFT Code BOHIUS77

This proposal agreed upon by:

Makai Ocean Engineering, Inc

Jose Andres Digitally signed by Jose Andres DN: cn=Jose Andres, o=Makai Ocean Engineering, ou, email=jose.andres@makai.com, c=US Date: 2013.10.23 10:40:14 -10'00'

Jose Andres
President

Date: Oct. 23, 2013

Universal Water Recycling

Joe Taranto
Director

Date: _____

GreenPower
Accredited Renewable Energy

CASE STUDY
GENERATOR

FROM WASTEWATER TO GREENPOWER

AGL's $16 million biogas utilisation project at Melbourne Water's Western Treatment Plant in Werribee is the largest biogas power station in the southern hemisphere.

The plant produces approximately 50,000 megawatt hours of renewable energy per annum and cuts Australia's greenhouse gas emissions by 50,000 tonnes a year.

That's enough electricity to power over 7000 households for an entire year - the equivalent of a town the size of Victoria's Traralgon, Tasmania's Burnie or Broken Hill in New South Wales.*

Melbourne Water Western Treatment Plant

GreenPower–It's a gas

Every day, about 460 million litres of sewage and industrial waste flows into Western Treatment plant.

The biogas, mostly made up of methane, which is released during the waste water treatment process is captured to produce renewable energy which is GreenPower accredited.

Melbourne Water purchases this electricity in the form of GreenPower and uses it on site to operate the pumps, fans and aeration processes it uses in the waste water treatment facility.

How it works

At a Glance

Energy fuel:
Biogas from treated waste water

Owner/Operator:
AGL

Host:
Melbourne Water

Location:
Werribee Treatment Plant,
30 kms south-west of Melbourne

Energy Output:
50,000 megawatt hours - equivalent to powering 7000 homes

Greenhouse Gas Abatement:
50,000 tonnes, equivalent to removing 11,500 cars from the road for one year

The problem

It's the heat trapped in the atmosphere by greenhouse gases like carbon dioxide and methane that causes global warming. When it comes to the individual impact of greenhouse gases methane is more harmful as it traps 21 times more heat than carbon dioxide.

The solution

Instead of the methane being released into the atmosphere as a gas AGL transforms it into a valuable resource.

Removing the methane gas and using it to produce renewable GreenPower, instead of traditional electricity made from burning fossil fuels like coal, is cutting greenhouse gas emissions by the equivalent of 50,000 tonnes of greenhouse gas emissions per annum, equal to removing more than 11,500 cars from the road each year.

GreenPower is driving renewable energy

AGL's biomass plant is an accredited energy supplier for the GreenPower program.

GreenPower approved generators comply with stringent environmental standards and the GreenPower accredited component of electricity products must be 100 per cent 'new' renewable energy ('new' renewable energy is sourced from generators which have been built after 1 January 1997.)

GreenPower accreditation provides assurance that the renewable energy a customer purchases is reducing greenhouse gas pollution and helping to develop a robust renewable energy industry in Australia.

Renewable energy is part of the solution

"Ethical investment is an important part of our mandate," explains Neil Cooke, AGL Asset Manager for eight sites and $50m worth of green assets. "It's renewable energy where we see the most long-term potential. It's about providing a total energy solution as well as reducing greenhouse gas emissions."

A greener future for all

Sewage treatment plants are just one of the ways biomass can be used to create accredited GreenPower. Australia is leading the way in terms of the technology needed to convert waste to clean, green energy. But if the environmental impact of these pollutants is going to be reduced long-term, then more Australian households and businesses need to purchase accredited GreenPower to fund the long-term development of clean, renewable energy. The result will be a better, brighter future for all Australians.

*Calculations: One mega watt hour of electricity equivalent to one tonne of greenhouse gas emissions. Each car generates 4.33 tonnes of greenhouse gas each year. Household numbers based on an average household's use of 6.47 megawatt hours per year, with an average 2.6 people.

Turn Dairy Waste to Profit

Toby Price
Friday, 28 October 2011

Despite surging energy prices and ever-spreading carbon taxes to counter global warming, many sections of the dairy industry are still pouring potential profit down the drain by overlooking the green energy potential of waste water. However one company in Australia, CST Wastewater Solutions, has found the answer to unlocking potential profit for the industry: biogas.

Traditionally, the dairy industry has tended to treat its waste water as a cost. "If there were spills or if a production product was out of specification, it would be flushed down the drain into the waste water," says waste water and green energy specialist Mike Bambridge, Managing Director of CST Wastewater Solutions. "Such outdated approaches have resulted in bigger and bigger lagoons that are both ground water hazards and big consumers of expensive energy and fossil fuel because of the large energy-intensive aeration systems needed to treat their contents. They also create a lot of sludge and disposal problems."

In fact there lies a huge, often hidden, potential in using wastewater as a source of renewable energy, rather than seeing it as a cost, says Mr Bambridge, whose company has more than 20 years' experience in Australasia and which represents the clean water and green energy technologies of Global Water Engineering (GWE).

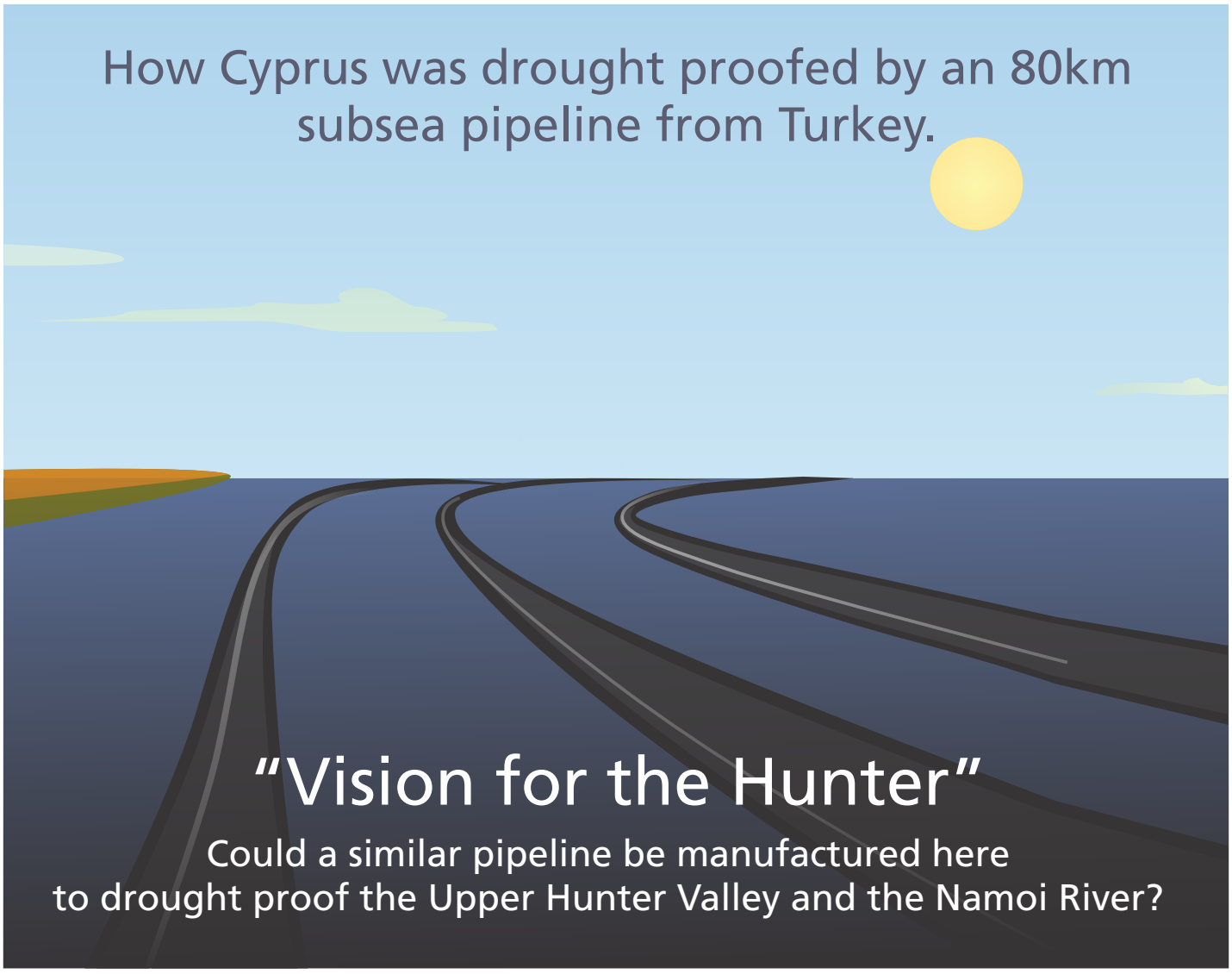
GWE has built successfully more than 250 plants producing biogas as part of the industrial effluent clean-up system, of which more than 75 were supplied with subsequent biogas utilization systems for clients worldwide. Users of GWE technologies extend from the new $A120 million Bluetongue Brewery in Australia to global concerns such as Budweiser, Chang, Carlsberg, Coca Cola, Corn Products Int'l., Danone, Fosters, Heineken, Interbrew, Kraft, National Starch & Chemicals, Nestlé, Pepsi Cola, SAB-Miller, San Miguel, Singha, Sunkist and Tsingtao, Cadbury Schweppes.

Many of the latest installations use advanced technologies – including anaerobic pre-treatment of water and aerobic polishing – to enhance water discharge purities while converting waste to methane to be burned to power boiler and hot water systems, for example, or to power generators and permanently replace fossil fuels. On average the removal efficiency of GWE's anaerobic wastewater treatment installations is as high as 90-95%, easily bringing the organic load down to regulatory discharge standards for most types of wastewater.

GWE CEO Mr Jean Pierre Ombregt says the concept of using wastewater to create green energy is much more widely applicable than often realized. "Any factory with a biological waste stream or wastewater with high COD (Chemical Oxygen Demand) can easily use this model to generate energy – particularly the dairy industry, for which GWE technologies such as its Flotamet™ system combined with its proprietary Dissolved Biogas Flotator (DBF) are specifically designed to take the high levels of fats and oils prevalent in dairy factory effluents," says Mr Ombregt.

So far, most industries have mainly been focusing on treating their effluent to meet local discharge standards. By doing so, wastewater treatment installations have only generated additional costs and have never been seen as revenue generators. "However, applying anaerobic wastewater treatment sheds a whole different light on the cost structure of wastewater treatment infrastructure. It can now actually become a substantial additional source of

Similar Length Project From Turkey to North Cyprus



A similar subsea pipeline is envisaged for the following Australian proposed project.

Energy Scale

How to convert kilowatts to megawatts

$$1\text{MW} = 1000\text{kW}$$

$$1\text{kW} = 0.001\text{MW}$$

Kilowatts to megawatts conversion formula

The power in megawatts $P_{(\text{MW})}$ is equal to the power in kilowatts $P_{(\text{kW})}$ divided by 1000:

$$P_{(\text{MW})} = P_{(\text{kW})} / 1000$$

Example

Convert 5kW to megawatts:

$$P_{(\text{MW})} = 5\text{kW} / 1000 = 0.005\text{MW}$$

Kilowatts to watts conversion table

Power (kilowatts)	Power (megawatts)
0 kW	0 MW
1 kW	0.001 MW
10 kW	0.01 MW
100 kW	0.1 MW
1000 kW	1 MW
10000 kW	10 MW
100000 kW	100 MW
1000000 kW	1000 MW

UWR

EVERY DROP COUNTS!

Universal Water Recycling

THE HUNTER BAYSWATER RECYCLING WATER SCHEME

Transfer project will exchange 45 megalitres of treated waste water per day to the Power Station and draw 45 megalitres of potable grade water from the Hunter River near Branxton.

The Western Corridor Recycling Water Scheme, Queensland over 200km of large diameter pipeline supplying purified recycled water to 3 Power Stations.

This Lower Hunter Water option has approximately 130kms of a smaller diameter pipeline that will supply purified recycled water to our Power Station.

Bayswater Power Station

120 metres above sea level

To Glenbawn Dam

Muswellbrook

Singleton

Pipeline 100klm via the Power Grid Easement

8km pipeline from river to reservoir. Reservoir connected to Hunter Water Infrastructure

Branxton

Huntlee (New Town)

Dual Reticulation Reservoir

Hunter River

Maitland

Cessnock

Hexham

Ironbark Creek

Subsea Pipeline

Burwood Waste Water Treatment Plant

Newcastle

22km HDPE

Pumping Station

Reservoir if needed Size yet to be confirmed

Water Treatment Plant - would be needed to treat water to drinking standards

Treated Waste Water GRP Pipe or HDPE

50 Megalitre Reservoir Recycled Purified Water Town, Vineyards, Industry

Hunter River Potable Grade Water

50 Megalitre Reservoir Potable Grade Water

High Density Polyethelene Pipeline (HDPE)

3.3.3 System Operation

Longwall goaf gas drainage from the Blakefield South area is expected to be at a rate of between 2000L/sec and 4000L/sec (depending on coal production rates).

Each power generation unit will have the capacity to utilise approximately 90 L/sec of methane per MW of generating capacity. With eight operational generator units generating 25 MW of power, approximately 2,250 L/sec of gas would be required.

Based on the proposed capacity of the generator units, at 25MW of installed capacity the system will have capacity to utilise much of the gas drained from the longwall. The excess gas will be flared in the gas flares to be installed within the power generation compound.

It is expected that the flares will have an availability of approximately 95% with only 5% unavailability due to maintenance, power fluctuations or other unplanned events. This will result in most of the excess gas being flared, considerably reducing the amount which would otherwise be free vented.

3.4 VAM Abatement System

The ventilation air exhausting from underground workings in coal seams with moderate to high methane content typically contains only 0.3 to 0.8% methane, but high total volumes of air. At Beltana No. 1 and Blakefield South, mine VAM is normally maintained below 1% and is often as low as 0.3%. At present this exhaust stream is emitted to the atmosphere via the ventilation shafts. Beltana is proposing to install a VAM abatement system utilising a RFTR technology which is capable of handling large volumes of ventilation air and oxidising the low concentrations of methane to carbon dioxide (CO_2) and water vapour.

The RFTRs use an in-bed regenerative heat exchange principle such that there is no burner or combustion chamber. The oxidation reactions which destroy the methane in the air stream occurs entirely within the heat exchange media without the need for any flaming.

GE Energy
Gas Engines

Jenbacher type 6

cutting-edge technology

Continuously refined based on our extensive experience, the Jenbacher type 6 engines are reliable, advanced products serving the 1.5 to 4.4 MW power range. Its 1,500 rpm engine speed results in a high power density and low installation costs. The type 6 pre-combustion chamber achieves maximum efficiency with low emissions. Proven design and optimized components enable a service life of 60,000 operating hours before the first major overhaul. The new J624 model is available with the new technology of 2-stage turbocharging, which offers high electrical efficiency combined with maximized flexibility regarding ambient conditions.

reference installations

model, plant	key technical data	description	
J612 GS **Beretta, industry; Gardone, Italy**	Fuel ..... Natural gas Engine type ..... 1 x JMS 612 GS-N.L Electrical output ..... 1,457 kW Thermal output ..... 1,536 kW Commissioning ..... December 1998	The generated electricity covers the entire electricity requirement of the Beretta factory, while the heat is used for the production process. By using our cogeneration system, Beretta was able to reduce the energy supply costs for the factory by 30%.	
J616 GS **Mussafah Industrial City, residential area; Abu Dhabi, UAE**	Fuel ..... Natural gas Engine type ..... 3 x JGS 616 GS-N.L Electrical output ..... 6,018 kW Commissioning ..... June 2003	Three Jenbacher generator sets supply power generation for continuous operation of compressor chillers to provide chilled water for cooling to a residential area that incorporates apartments, shopping centres, mosques, a police station, and a cinema complex.	
J620 GS **Wijnen Paprika; Egchel, The Netherlands**	Fuel ..... Natural gas Engine type ..... 3 x JMS 620 GS-N.LC Electrical output ..... 9,123 kW Thermal output ..... 10,773 kW Commissioning ..... June 2006 (1st, 2nd enginel, March 2007 (3rd enginel	The Jenbacher cogeneration systems provide power, heat and CO_2 to increase the Wijnen greenhouse paprika production. The CO_2 produced from the exhaust gas of the engines is cleaned and used for fertilization in the greenhouse.	
J624 GS 2-stage turbocharged **Serres Vinet greenhouse, Forclum Machecoul, France**	Fuel ..... Natural gas Engine type ..... 2 x J624 GS-N. ..... 2-stage turbocharged Electrical output ..... 8,800 kW Thermal output ..... 8,024 kW Commissioning ..... January 2011	At this greenhouse facility, two Jenbacher J624 2-stage turbocharged gas engines enable French grower Serres Vinet to generate all of the hot water and electricity required for its extensive tomato and lettuce greenhouse operations. These are the first 2-stage turbocharged gas engines in France and give Serres Vinet the flexibility to switch among electrical energy, thermal energy and fuel sources as economics dictate.	
J620 GS **Barakatullah Electro Dynamics Ltd. (BEDL), Fenchuganj, Bangladesh**	Fuel ..... Natural gas Engine type ..... 19 x J620 GS-N. Electrical output ..... 51 MW Commissioning ..... October 2009	The plant in the town of Fenchuganj is the first of several emergency "rental" power plants that the Bangladesh government installed to help end widespread chronic energy shortages occurring throughout the Southeast Asian nation. The plant features 19 of GE's low-emission, J620 Jenbacher gas engine generator sets that run on natural gas. The electricity produced by the power plant, which was commissioned in October 2009, is sold to the national grid.	

GE imagination at work

technical features

feature	description	advantages
Four-valve cylinder head	Centrally located purged pre-combustion chamber, developed using advanced calculation and simulation methods (CFD)	Minimized charge-exchange losses, highly efficient and stable combustion, optimal ignition conditions
Heat recovery	Flexible arrangement of heat exchanger, two stage oil plate heat exchanger on demand	Maximum thermal efficiency, even at high and fluctuating return temperatures
Air/fuel mixture charging	Fuel gas and combustion air are mixed at low pressure before entering the turbocharger	Main gas supply with low gas pressure, mixture homogenized in the turbocharger
Pre-combustion chamber	The ignition energy of the spark plug is amplified in the pre-combustion chamber	Highest efficiency, lowest NOx emission values, stable and reliable combustion
Gas dosing valve	Electronically controlled gas dosing valve with high degree of control accuracy (for natural gas)	Very quick response time, rapid adjustment of air/gas ratio, large adjustable calorific value range
Miller valve timing	Camshaft with special inlet cam profile (for natural gas)	Reduced maximum compression temperature and increased safety margin to knocking limits, high efficiency through optimized ignition timing
2-stage turbocharging	Next generation turbo charging technology concept (for J624 only)	Improved performance in terms of output and efficiency, increased flexibility regarding ambient conditions
Steel piston	Strong design and material properties for high peak pressure	Increased output, reduced emissions, increased efficiency

technical data

Configuration				V 60°
Bore (mm)				190
Stroke (mm)				220
Displacement/cylinder (lit)				6.24
Speed (rpm)				1,500 (50 Hz); 1,500 with gearbox (60 Hz)
Mean piston speed (m/s)				11 (1,500 1/min)
Scope of supply				Generator set, cogeneration system, containerized package
Applicable gas types				Natural gas, flare gas, biogas, landfill gas, sewage gas. Special gases (e.g., coal mine gas, coke gas, wood gas, pyrolysis gas)
Engine type	J612 GS	J616 GS	J620 GS	J624 GS*
No. of cylinders	12	16	20	24
Total displacement (lit)	74.9	99.8	124.8	149.7

Dimensions l x w x h (mm)[1]

Containerized package	J612 - J620	15,000 x 6,000 x 7,300
Generator set	J612 GS	7,600 x 2,200 x 2,800
	J616 GS	8,300 x 2,200 x 2,800
	J620 GS	8,900 x 2,200 x 2,800
	J624 GS*	12,100 x 2,450 x 2,900
Cogeneration system	J612 GS	7,600 x 2,200 x 2,800
	J616 GS	8,300 x 2,200 x 2,800
	J620 GS	8,900 x 2,200 x 2,800
	J624 GS*	12,100 x 2,450 x 2,900

Weights empty (kg)[1]

	J612 GS	J616 GS	J620 GS	J624 GS*
Generator set	20,600	26,000	30,700	49,900
Cogeneration system	21,100	26,500	31,300	49,500

1) Dimensions and weights are valid for 50 Hz applications.
*J624 with 2-stage turbocharging

outputs and efficiencies

Natural Gas

1,500 rpm | 50 Hz

NOx <	Type	Pel (kW)[1]	ηel (%)	Pth (kW)	ηth (%)	ηtot (%)
500 mg/m³ₙ	612	2,004	44.8	1,883	42.0	86.8
	616	2,679	44.9	2,510	42.0	86.9
	620	3,352	44.9	3,110	41.7	86.6
	624*	4,357	46.1	3,892	41.2	87.3
250 mg/m³ₙ	612	2,004	43.5	1,932	42.0	85.5
	616	2,679	43.6	2,575	41.9	85.6
	620	3,352	43.7	3,211	41.8	85.5
	624*	4,357	44.7	4,060	41.7	86.4

1,500 rpm | 60 Hz

NOx <	Type	Pel (kW)[1]	ηel (%)	Pth (kW)	ηth (%)	ηtot (%)
500 mg/m³ₙ	612	1,984	44.3	1,902	42.5	86.8
	616	2,652	44.4	2,535	42.5	86.9
	620	3,319	44.5	3,141	42.1	86.6
	624*					
250 mg/m³ₙ	612	1,984	43.1	1,952	42.4	85.5
	616	2,652	43.2	2,601	42.4	85.6
	620	3,319	43.2	3,244	42.3	85.5
	624*					

*J624 with 2-stage turbocharging

Biogas

1,500 rpm | 50 Hz

NOx <	Type	Pel (kW)[1]	ηel (%)	Pth (kW)	ηth (%)	ηtot (%)
500 mg/m³ₙ	612	1,818	42.8	1,787	42.1	84.9
	616	2,433	42.9	2,385	42.1	85.0
	620	3,044	43.0	2,982	42.1	85.1
250mg/m³ₙ	612	1,818	42.3	1,805	42.0	84.3
	616	2,433	42.4	2,405	42.0	84.4
	620	3,044	42.5	3,008	42.0	84.5

1,500 rpm | 60 Hz

NOx <	Type	Pel (kW)[1]	ηel (%)	Pth (kW)	ηth (%)	ηtot (%)
500 mg/m³ₙ	612	1,800	42.4	1,805	42.5	84.8
	616	2,408	42.5	2,409	42.5	85.0
	620	3,013	42.6	3,012	42.5	85.1
250mg/m³ₙ	612	1,800	41.9	1,823	42.4	84.3
	616	2,408	42.0	2,429	42.4	84.4
	620	3,013	42.1	3,038	42.4	84.5

1) Electrical output based on ISO standard output and standard reference conditions according to ISO 3046/I-1991 and p.f. = 1.0 according to VDE 0530 REM with respective tolerance; minimum methane number 80 for natural gas

All data according to full load and subject to technical development and modification.

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Markets | Thu Jul 28, 2011 1:45am EDT

Related: BASIC MATERIALS, ENERGY, INDUSTRIALS

Vale closes Australia coal mine after methane levels too high

SYDNEY, JULY 28

Global miner Vale was forced to close a 2.4 million-tonne-per-year coking coal mine in Australia after high levels of methane gas were detected, and the company could not estimate when the mine may reopen, a Vale spokesman said on Thursday.

The closure could put further pressure on coking coal prices as Australia, which accounts for 60 percent of the global metallurgical coal trade, struggles to ramp up production after floods earlier this year crippled the sector.

Vale said it was working with local safety officials after it vacated the underground section of its Integra colliery in New South Wales state due to high levels of the deadly gas.

"We're not prepared to jeopardise the ongoing safety of our employees. We are working with coal mine inspectors to remedy the situation," a Vale spokesman said.

There were no injuries, according to the spokesman.

The price of metallurgical coal used in steel production hit a record-high $330 a tonne in the second quarter and has since continued to sell for close to that price, according to coal traders.

The Vale spokesman declined to comment on whether a declaration of force majeure -- a clause that frees an operator of liability on delays in shipments -- had been invoked in the wake of the closure.

Some workers have been allowed to re-enter the mine following the July 11 closing to assist in the inspection and conduct some maintenance work, though the majority of the 280-person workforce had been redeployed for training exercises until the mine can reopen, the spokesman said.

The underground operation produces around 2.4 million tonnes of semi-hard and semi-soft metallurgical coals used for steel production.

Australia in total mined about 159 million tonnes of coking coals last year, according to government data.

Methane Energy Volumes and Energy Outputs

1000L/s = 1m3/s = 3,600m3/hr = 5,538kWe (5.5MW) = 2 x J616 gas engines

2000L/s = 2m3/s = 7,200m3/hr = 11,076kW (11MW) = 4 x J616 gas engines

3000L/s = 3m3/s = 10,800m3/hr = 16,615kW (16.6MW) = 6 x J616 gas engines

4000L/s = 4m3/s = 14,400m3/hr = 22,153kW (22.1MW) = 8 x J616 gas engines.

The gas engine I have used is a J616 which produces 2,679kW (2.6MW)
Please see the attached information on the engine.

Power Requirements for the Hunter Bayswater Water Scheme

Table 1: Pump Station Power Requirement and Capital Cost for Peak Flow of 565 L/s

Pump Station	Flow (L/s)	Head (m)	Power Requirement (kW)	Pumping Hours per Day (h)	Energy Consumed per Day (kWh/d)	Capital Cost of Pump Station	Gas Engine Model	Gas engine electrical output	Gas volume required each Nm³/h 100% load
Burwood WWTP	565	15	132	22	2900	$0.9 mil	Not available	N/A	N/A
Ironbark Creek	565	84	738	22	16242	$2.2 mil	1 x J316	861kWe	465
Huntlee	565	84	738	22	16242	$2.2 mil	1 x J316	861kWe	465

Table 2: Pump Station Power Requirement and Capital Cost for Peak Flow of 623 L/s

Pump Station	Flow (L/s)	Head (m)	Power Requirement (kW)	Pumping Hours per Day (h)	Electrical Energy Consumed per Day (kWh/d)	Capital Cost of Pump Station	Gas Engine Model	Gas engine electrical output	Gas volume required each Nm³/h 100% load
Burwood WWTP	623	18	174	20	3489	$1.2 mil	Not available	N/A	N/A
Ironbark Creek	623	89	863	20	17250	$2.7 mil	1 x J316	861kWe	465
Huntlee	623	89	863	20	17250	$2.7 mil	1 x J316	861kWe	465

Table 3: Pump Station Power Requirement and Capital Cost for Peak Flow of 942 L/s

Pump Station	Flow (L/s)	Head (m)	Power Requirement (kW)	Pumping Hours per Day (h)	Electrical Energy Consumed per Day (kWh/d)	Capital Cost of Pump Station	Gas Engine Model	Gas engine electrical output each	Gas volume required each Nm³/h 100% load
Burwood WWTP	942	40	586	13.3	7796	$4.1 mil	1 x J312	637kWe	353
Ironbark Creek	942	120	1758	13.3	23387	$5.4 mil	2 x J320	1067kWe	580
Huntlee	942	120	1758	13.3	23387	$5.4 mil	2 x J320	1067kWe	580

Methane Energy Production From Closed Coal Mines.

In NSW and Queensland there are more than 50 underground gassy coal mines which have ceased coal mining operations since after 1954.

When an underground coal mine ceases coal production methane continues to flow through the underground workings through a process of desorption from residual coal within strata disturbed by mining activity.

For gassy mines this desorption will continue for many years and resume when flooded mines are dewatered. (This information was written by Les Lunarzewski Sept 2010)

We have the technology using fibre optic sensing to detect and accurately calculate the volumes of methane some of these closed mines would have. I believe we can deliver small gas power generating units to these sites similar to the Blakefield Bulga Mine.

These generating units can be brought in on low loaders, craned and installed they are approximately 24 meters in length, the number of units will depend on the amount of methane detected, the generating units may be there for 6 months or even a year, when the methane is depleted the units are then moved on to another location, leaving pipe works to the mine capped and intact, the methane may continue to flow into the workings, the generating units may be required back a few year latter to harvest more methane.
The energy is transferred to the grid and even if these mines are anywhere in Australia they could be used as an offset energy source to support a project in another region.

NSW Gas Reserves
ournaturaladvantage.com.au

What is natural gas?
Natural gas is methane. It is found in several different types of rocks, including sandstone, coal seams and shales.

Natural gas is a reliable, cleaner-burning fuel. It is flexible and plentiful and underpins growing domestic and export production sectors.

Gas is used to generate electricity and to power appliances such as heaters and stoves.Unlike renewable energy, gas is reliable and flexible - unaffected by weather or the time of day, it can provide constant power. Unlike coal, gas produces relatively low emissions and can be easily turned on and off to meet spikes in demand or to fill gaps in other forms of power production (such as renewables).

Gas is also important in many industrial processes, including making fertilisers, glass, steel, plastics, paint, fabrics and many other products.

Where does NSW get its natural gas supplies?
More than 95% of gas used in NSW is imported from other states linked to the eastern Australian gas pipeline network (i.e. Victoria and South Australia).

How long has natural gas been produced in NSW?
NSW has been producing natural gas since 2001. The Camden Gas Project in south-west Sydney produces gas from coal seams and supplies almost 5% of the state's gas needs. However, other gas projects have been earmarked for development in NSW.

How much natural gas is there in NSW?
NSW has abundant gas resources, but the exact amount is not known for certain. More exploration and appraisal is needed to develop a clear estimate.

However, a 2012 study undertaken for the Australian Energy Market Operator (AEMO) found that the state could have up to 85,950 petajoules of undeveloped gas resources. This would supply enough gas to meet more than 500 years of NSW's current demand.

Does Australia have enough natural gas for both export and domestic use?
Australia has more than enough gas for both domestic and export markets.

The country's supply is growing as new technology allows companies to produce from large reserves that were too difficult to access until recently.

Australia has an estimated 819 trillion cubic feet (TCF) of gas reserves (enough to power a city of 1 million people for 16,000 years).

In 2013, the entire Australian economy consumed only 1.1 TCF, with a further 1.1 TCF exported.

Why are gas prices rising?
Gas prices are now rising for several reasons, including increased development costs, transmission (pipeline) costs and restrictions on the ability of companies to access gas resources.

The cost of producing natural gas has risen, partly because Australia has become a high-cost economy in which to do business, and partly because once easily developed gas fields have been depleted, newer, more expensive ones must be developed.

Downward pressure cannot be placed on rising gas prices without expanding the natural gas industry.

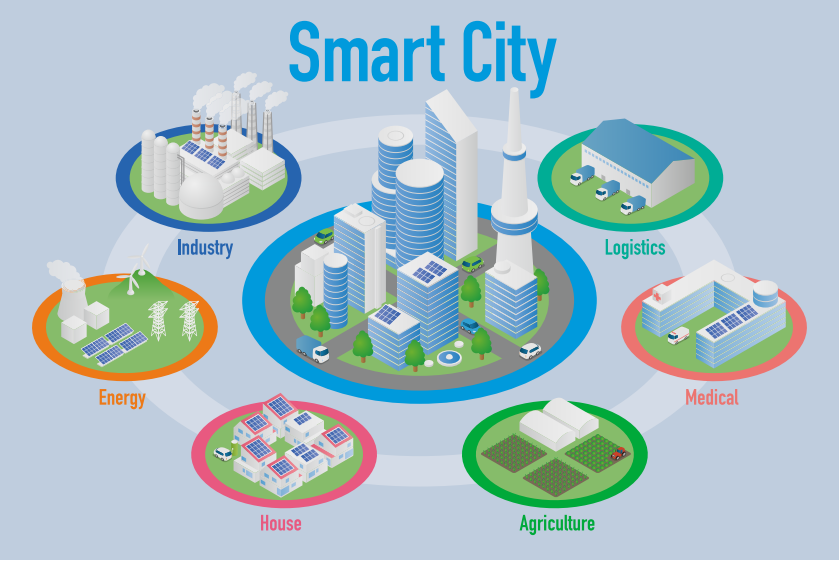
Additional Executive Summary

Proposed Projects

New regional cities for the Hunter, pages 51 to 55
Method to supply potable water for 600,000 pages 56 to 58
Method to encourage manufacturing Industries with affordable energy and land, page 55
A water transfer system of 450ML/d from North Head Sydney and Newcastle for these projects.
Construction of a 14 klm tunnel through the Dividing Range, pages 23 and 24
A system to put 300 ML/d of water into the Basin, page 1.
A conservation plan to increase the Koala numbers on both sides of the range, page 61
A new 450 MW to 600 MW HELE Power Station supplied with recycled water.
A Carbon Capture Offset System to Counterbalance Emissions page 61
A new HDPE Pipe Manufacturing Industry for Newcastle, page 13 and 14
Water for agriculture and forest farming, page 57 and 58

Vision

A proposal and sustainable system that will enable the building of New Regional 21st Century Smart Cities to the Hunter and the transition of Upper Hunter Towns into New 21st Century Regional Centre's with potable water to service a population of 600,000.



Above is a picture of a Smart City, utilizing a mix of energy from renewable to coal, a system that lowers energy costs and is beneficial to the economy.
High density buildings to accommodate more people rather than the current urban sprawl that encroaches on agriculture land.

Australia's population projections by the middle of this century will be an additional 12 million people, most of these will be in our major Cities adding more congestion to our already overcrowded transport systems.
I believe that part of the solution is to create new inland Smart Cities as described in the Department of Infrastructure, Regional Development and
Cities.

The framework set out regarding Smart Plan Cities and the 21st Century Smart plan manufacturing leadership coalition is a fantastic concept.
But to bring this from the drawing board to reality the following questions must be addressed with a viable solution.

HOW can we attract industries and investment to a New Regional City? LOCATION, where would be a suitable site to build it?

It would have to be sustainable and it would also need the following;

Access to a main highway infrastructure
Access to a main rail infrastructure
Design an appealing functional 21st century city

How to attract people to move there.
Incentives for industries to relocate there.
Contribute to the economy in creating jobs in Manufacturing, Agriculture, Energy, Mining, etc.

Energy at a cost that will attract investment.
Industrial land at an affordable cost to attract industries.

Water, from a reliable source to sustain the following,
Potable water for a population of 600,000.
Water for industries.
Water for Power Generation.
Water for Agriculture.
Water for Forestry.

I believe the Hunter Valley has the room with many locations that can successfully achieve all of the above with several New 21st Century Regional Smart Cities designed appealingly, functional and a livability envied by larger cities, each with a population designed to have an efficient transport system.

The number of New Regional Cities would be based on its population size.
We have a potable water storage capacity to sustain a total population of 600,000.

Highway Infrastructure.

The Hunter expressway links the M1 at the Newcastle Interchange and continues a few Klms past Branxton a distance of around 40Klms, plans have already been approved for a by pass at Singleton and Scone, by continuing this dual carriageway freeway all the way to Murrurundi and the towns beyond will give us more options for a series of suitable sites linking it to this freeway.

The site for these New Regional cities would have to be close to this major duel carriage way, or at an appealing site 5 to 10 klms with a link freeway to join the major carriage way.

Each City will need an industrial park, these could be located a few Klms with an access Interchange from the freeway.

Rail infrastructure

Each City would have to be close to this rail infrastructure or have link line to it. Duel Rail infrastructure is already in place for most of the Hunter but would require upgrading in the Upper Hunter.

It is envisaged that each City would have an efficient light rail system as well, a system to take in as much of the Central sections of the City but also a looping section to the industrial parks located nearby to decrease the volumes of vehicles on our transport infrastructure.

Incentives for Industries, Agriculture and people to relocate.

Affordable Energy.

These New cities could be built incorporating green energy from a range of options including solar, wind, battery storage etc and also be connected to the proposed Kyoto energy park near Scone.

We have to be realistic, if we want incentives to attract industries and manufacturing we need affordable reliable base load energy, it would be delusional to leave coal fired power stations out of the equation.

We need to build a new high- efficiency low emission coal fired power station similar in design to the Isogo plant in Japan, which uses Australian coal, the power station envisaged for this project would be a 450 to 600 MW unit to cover the shortfalls of energy needed for a population of 600.000.

Even though it has low emissions it still has emissions.
This project has an offset carbon system, (please refer to Carbon Capture Offset System to counterbalance emissions page 61.)

My personal views on this would be as follows,
First find out the cost to build a 450 to 600MW unit here in the Hunter Valley.
The Isogo Power Plant in Japan is built on just 30 acres of land.
I believe the Government should invite all mines with an opportunity to tender to supply coal to this 450 to 600MW unit, this will give us the best price per ton possible.

The tender process would have to be transparent and would depend on the years of coal reserves available at each mine.

The Power Station is envisaged to be built at the mine site; coal could then be transferred by conveyor directly to the power station as required.

The energy generated from this small Power Station would be one of the most affordable in the world, there are no rail freight to the port, no loading and unloading at the coal loaders, no shipping costs, etc.

Affordable low cost energy will attract manufacturing industries large and small to invest here, giving them a chance of competing with offshore competitors where labor costs are less.

It may even bring back car manufacturing to our shores.

I believe the Government should own A 51% share of this Power Station.

A Government majority owned power station that is not sold off by future Governments would give the Government greater control in the energy market keeping prices at a rate for the economic benefit of the nation.

Green groups and members of other parties will try to oppose a new HELE coal fired power plant, concerned about meeting energy targets.

To these groups all that I ask is to take the time and look at this project in its entirety.

I believe that once they have looked at how green this project is to include native flora and fauna plus the carbon capture offset system to counterbalance emissions they would support it.

Affordable land for Industries.

Each City will have industrial Parks to attract industries, we need incentives, we need a system that will achieve this.

In the mid 70s Maitland City Council came up with a successful program that attracted industries and jobs to the industrial area at Rutherford.

It offered industrial land for $1 per acre to industries and small business provided that they could commence, build and set up manufacturing industries in a certain time frame to create Jobs.

Sure this incentive will cost in the beginning but once established the potential benefits will be immense. Affordable energy, affordable lands is the right formula to attract investment.

Power Stations require large volumes of water, this project has the solution.

Water

With out water none of the above would be possible.

The ACT and Queanbeyan has a population of around 400.0000 people.
Their water consumption per day is between 150 to 200 ML/d as shown (see page 66) based on these figures = around 100 ML/d for 200.000 people, therefore 300ML/d could support a population of 600.000 people.

The AGL Macquarie Power Station between Singleton and Muswellbrook consumes around 300ML/d for cooling and power generation, this water comes from Glenbawn Dam, this water with little treatment would be suitable for potable use.
I believe by replacing this 300 ML/d of water with recycled water treated to a grade that is suitable for the power station.

This will then allow a new potable water source available for a population of 600.000

Solution

Water is the key to the entire project.

If we transfer 400ml per day from the North Head sewage treatment plant
via a subsea HDPE pipeline to Newcastle exiting the Hunter River and also transfer 50 ML per day from the Burwood treatment plant exiting at the same location from the Hunter River, (see cover page)
Total volumes = 450 ML/d of recycled water.

Whilst these proposed New Cities are being constructed using recycled water in all the concrete foundations, mortars and road construction, landscaping etc ,and the AGL Macquarie Power Station is receiving 300 ML/d of recycled water from North Head, plus the proposed 450 to 600MW high efficient low emissions Power Station is also receiving recycled water, this energy can be put strait into the grid to bring down energy prices until these proposed cities are built.

We must not forget the Basin.

Also it is envisaged that a proposed 14 klm tunnel to be constructed at Murrurundi simultaneously at the start of these projects.This tunnel is needed as part of the carbon capture offset system to counterbalance emissions.
Rather than leave 300ML/d of water in Glenbawn Dam that would have been going to the AGL Macquarie power station, we can transfer it via a 60 Klm pipeline to Murrurundi and through the dividing range by this proposed 14klm tunnel, from there it is in a river system that leads to the Namoi

Green energy from the proposed Kyoto energy park near Scone could assist with the pumping transfer also off peak surplus energy from the proposed 450 to 600MW power station could also contribute, we also have the Queensland Hunter gas pipeline that is right next to this proposed pipeline route, we can access this energy if necessary to power Jenbacher gas engines for pumping.

It is envisaged this proposed tunnel should be made larger for future larger transfers, it is the only water link from the eastern side of the great dividing range to the western side, (see cover page and pages 23 and 24.)

Sydney's waste water Sewage Treatment Plants discharges every dry day into our oceans 974 ML/d, it is inevitable that in the foreseeable future with the population predictions we will need to harvest the extra 574 ML/d, (see page 42)

I believe the entire amount of this water could be transferred to the Hunter, the solids can be used as an energy source as bio gas, off peak surplus energy from the proposed HELE Power Station, methane from coal mines and smaller sewage treatment works, to treat this water to a grade suitable for agriculture or Power Generation

The economic potential for this huge amount of water every single day is immeasurable.
Earring Power Station, Swanbank Power Stations all use a percentage of recycled water, in the US there are more than 50 Power Stations using recycled water.

The Australian Governments Department of Sustainability, Environment, Water, Population and Communities put out a booklet in 2010 titled, " Moving Water Long distances Grande Scheme or Pipedreams, basically it was stating that the costs in moving Water long distances was too expensive.

This is true by using conventional energy for pumping, however, if we look at this with a positive can do attitude by using many different types of energy sources it can be achieved, (Please look at cover page.)

There would also be surplus off-peak energy from the proposed 450 to 600 MW Power Station, Bio Gas from sewage, methane gas is a powerful green house gas and is a natural by product of the sewage treatment process.

In San Antonio has commercial bio gas from Municipal Sewage (cleantechnica.com) This energy source if captured from our sewage treatment plants has immense potential in powering the pumps to move water.
Many of our mines have methane some mines just flare it off.
Vales closed a mine in the Hunter Valley because Methane levels were too high.
See page 45

With the current cost of electricity it makes commonsense to utilize methane vented from coal mines.

For the sake of the country decisions have to be made now!

The current cost of energy is crippling the whole economy.
On one hand you have politicians whose mindset is on green energy;
on the other hand you have politicians who are realist and their mindset is on keeping coal as part of the energy mix.

They would view the following.

Green Energy.

A clean energy source that in the future will eventually replace coal.
This may eventuate but it will be many decades away, AGL has recently stated they will close down Liddell in 2022 and would not sell the power station off.
There will now be a short fall of energy, with no competition prices will most probably remain high being counter productive to our economy.
Green energy would not be able to generate the base load required.

Coal.

Carbon capture storage, a system of using liquid solvents that absorbs carbon dioxide, heating, compressing and sending it underground, this may eventuate but it's still decades away.

Carbon Capture Offset System to Counterbalance Emissions.

There are 4 HELE coal fired Power Stations in Australia, Callide C , Tarong North, Millmerran and Kogan Creek, these were completed in 2001 to 2007. The Isogo plant in Japan would be more efficient regarding emissions being newer using more advanced technology.
Let's use Tarong North as a guide to an offset carbon capture system to counterbalance emissions.
Completed 2003, 443 MW, 2499 GWh Electricity Production 2015-16
Emissions 2015 – 16 2.2 Mt Intensity kg CO2 - e / Mwh. See page 66.
Above is our objective to counterbalance a carbon capture system to suit the size of the proposed HELE Power Station.

What we do know at this present time is that trees are the best way to store carbon, multi purpose forest where the timber is used for construction of buildings, timber products, furniture, etc.

Eucalyptus trees are one of the most hardiest trees on the planet, these trees would require water as they are planted as saplings, but once they are established they could adapt with little water, they could be used as carbon sinks or Koala sanctuaries using the native eucalyptus species common to that region.

The Koala population is in the Gunnedah region is declining, it is envisaged that this project would establish 50 Koala sanctuaries from Quirindi to Moree.

Young eucalyptus trees to 20 years of age can hold between 2 to 17 tonnes of carbon dioxide per hectare, older trees can hold between 86 tonnes to 860 tonnes of carbon dioxide per hectare (see page 66).
100 hectares young trees = 200 to 1700 tonnes of carbon stored.
100 hectares older trees = 8600 to 170,000 tonnes of carbon stored.
50 separate properties of 100 hectares of young trees = 10,000 to 85,000 tonnes of carbon stored.
50 separate properties of 100 hectares of older trees = 430,000 to 4,300,000 tonnes of carbon stored.

Now we can double these figures by the plantation of a further 50 properties on the eastern side of the range in the upper Hunter, different species of eucalyptus trees, different rainfalls etc.

These plantations for Koala Sanctuaries could be planted on hillsides on both sides of the range, saving agriculture land for a wide range of food crops.

Separated properties for fire protection will ensure other forests and koalas survive, also if a fire burns a eucalyptus forest most of the carbon is still stored in the trunks, plus at the first rains 80 to 90 % will regenerate, as fire is part of their environment.

The labor costs to establish these sanctuaries would be minable, incentives and collaboration with farmers, conservation groups, green groups, volunteers, crowd funding here and offshore and the media would also support a worthy cause.

This section of providing a combination of carbon sinks together with koala sanctuaries is just a fraction of the overall plan of this project to store carbon.

There are also multi purpose forests, plantations for farm forestry, for house construction and furniture; again plantations can be planted on both sides of the ranges.

The Forestry Sector would know the most appropriate species for either side of the dividing range, with the advances in silviculture they can produce better strains of timber that enables them to grow more quickly.
In some parts of Australia, plantations yield up to 14 times more wood per hectare than native forests.

They could easily calculate the number of hectares of the many different species of trees suitable for each region to form a Carbon Offset System to counterbalance emissions to the size of the proposed HELE Power Station.
They could also calculate the potential jobs and economic value of these timber plantations to our economy.
We have the land, we have ample water, all that is needed is a can do attitude and we can achieve our objective.

To really appreciate this project, consider the following,

New regional Cities for the Hunter.
Pipeline infrastructure will last 50 to 100 years.
A reliable water source unaffected by drought.
Will operate 24/7.
Creation of thousands of jobs.
A proposed 14klm tunnel linking a Dam on the eastern side of the divide to
transfer 300ML/d into the basin for many years until these regional cities are built.
A kilolitre = 1000 litres = a cubic meter 1x1 meter.
A ML = 1000 cubic meters = 1 klm in length
450 ML/d = 450,000 cubic meters = 450 klms in length.
Distance from Sydney to Narrabri, strait line = 426 klms
450 ML/d x 7 days = 3,150,000 cubic meters = 3150 klms
Distance from Sydney to Perth strait line = 3280 klms
300 ML/d of potable Water can support a population of 600,000
Water for agriculture crops.
Water for Power Generations.
Water to establish Trees, for forest farming and Koala Sanctuaries.
Water for mines and industries.
A Carbon Offset System to counterbalance emissions that can be duplicated in many other countries around the world.
The creation of a new pipe manufacturing industry.

Regional cities

With the population growth projections for the middle of this century, the demand for water will only increase and so will the costs.

Currently the cost for potable water is around $2 to $4 per kilo litre depending on which state you are in and different tier levels.
$2 per kilo litre = $2000 per ML x 300ML/d = $600.K / day / $219 Million per year
$3 per kilo litre = $3000 per ML x 300ML/d = $900. K / day / $328 Million per year
$4 per kilo litre = $4000 per ML x 300ML/d = $1.2 M / day/ $360 Million per year

Also this leaves 150 ML/d of recycled water, current costs $2 per kilo litre
$2 per kilo litre = $2000 per ML x 150ML/d = $300.k / day / $109 MM per year

We have to subtract from these figures the transfer costs from North Head and the Burwood Treatment Plant and also the treatment costs to get this water to a suitable grade for the power Station and agriculture.
There will only be a minable cost to provide 300 ML/d of potable water to the proposed New Cities, some treatment costs, transfer would be gravity fed, Glenbawn Dam is 276 meters above sea level.

Water and Energy Calculations.

Let's assume we have New Regional Cities to be constructed from now and until the middle of this century with a population of 600.000.

To have affordable energy we would need a mix of renewable and a small HELE coal fired Power Station.
Assume one third of the energy needs for a population of 600.000 people comes from renewable energy.
By using this method we know we need a Small Power Station built for the energy needs of 400.000 people, plus an estimation of energy needs for Industries associated with this project.

The ACT and Queanbeyan have a combined population of 400.000, we know their water usage is around 150 to 200 ML/d so if we can obtain the data of their energy use together with estimation of Industries energy needs associated with this project we can calculate the exact MW size of the Power Station required.
Japan's Isogo Power Plant is regarded as the cleanest in the world;
Even though it has low emissions it still generates emissions

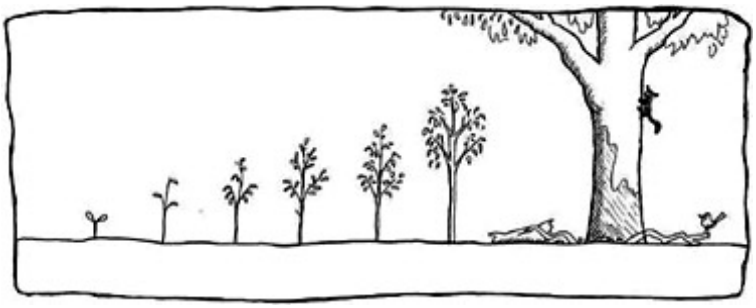
By obtaining information on one of their HELE 600 MW units regarding population and industries it supply's, the water it consumes and the tonnage of emissions it vents.

This information will determine the size of the Small Power Station needed the tonnage of emissions it will vent and the ML/d of recycled water it would need.
Water is the key to the entire project.
If we transfer 400ML/d from the North Head sewage treatment plant
via a subsea HDPE pipeline to Newcastle exiting the Hunter River and also transfer 50 ML per day from the Burwood treatment plant exiting at the same location from the Hunter River, (see cover page)
Total volumes = 450 ML/d of recycled water.

Assume 300 ML/d of recycled water supplies the AGL Macquarie Power Station of its water needs thus Water banking 300 ML/d in Glenbawn Dam.
This leaves 150 ML/d of recycled water for this project, also when these Proposed Cities are built with a population of 600,000 they will be using 300ML/d of potable Water from Glenbawn Dam.

The grey water generated by a population of this size could also be added.
If we could recycle just one third of this water this will give us an additional 100ML/d giving us a total of 250 ML/d for Power Generation, agriculture, mines, industries, etc.

Using trees as a carbon capture offset system to counterbalance emissions people,industries,mining,the environment,using a range of energy can co exist with a neutral carbon footprint, if so this can be duplicated on a larger scale here in Australia and in other countries as well.



Farming carbon

Illustration showing the different stages of growth
Potential to store carbon

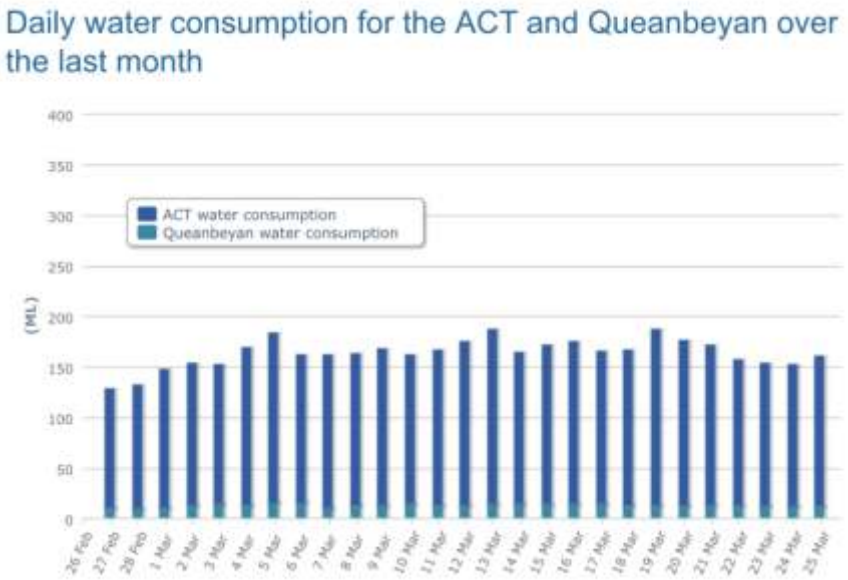
It is estimated that there are between 50 and 500 tonnes per hectare of living above-ground biomass in eucalypt open-forests.

The above ground parts of woody plants in eucalypt open-forests can hold about 86 to 860 tonnes of carbon dioxide equivalent per hectare.

Above-ground carbon in eucalypt open-forests is stored in living trees and shrubs, and also in dead standing trees, fallen timber and litter.

The estimated living biomass accumulation rate of young regrowing eucalypt open-forest (for example the first 20 years) ranges from 1 to10 tonnes per hectare per year, which equates to between 2 and 17 tonnes of carbon dioxide equivalent per hectare per year.

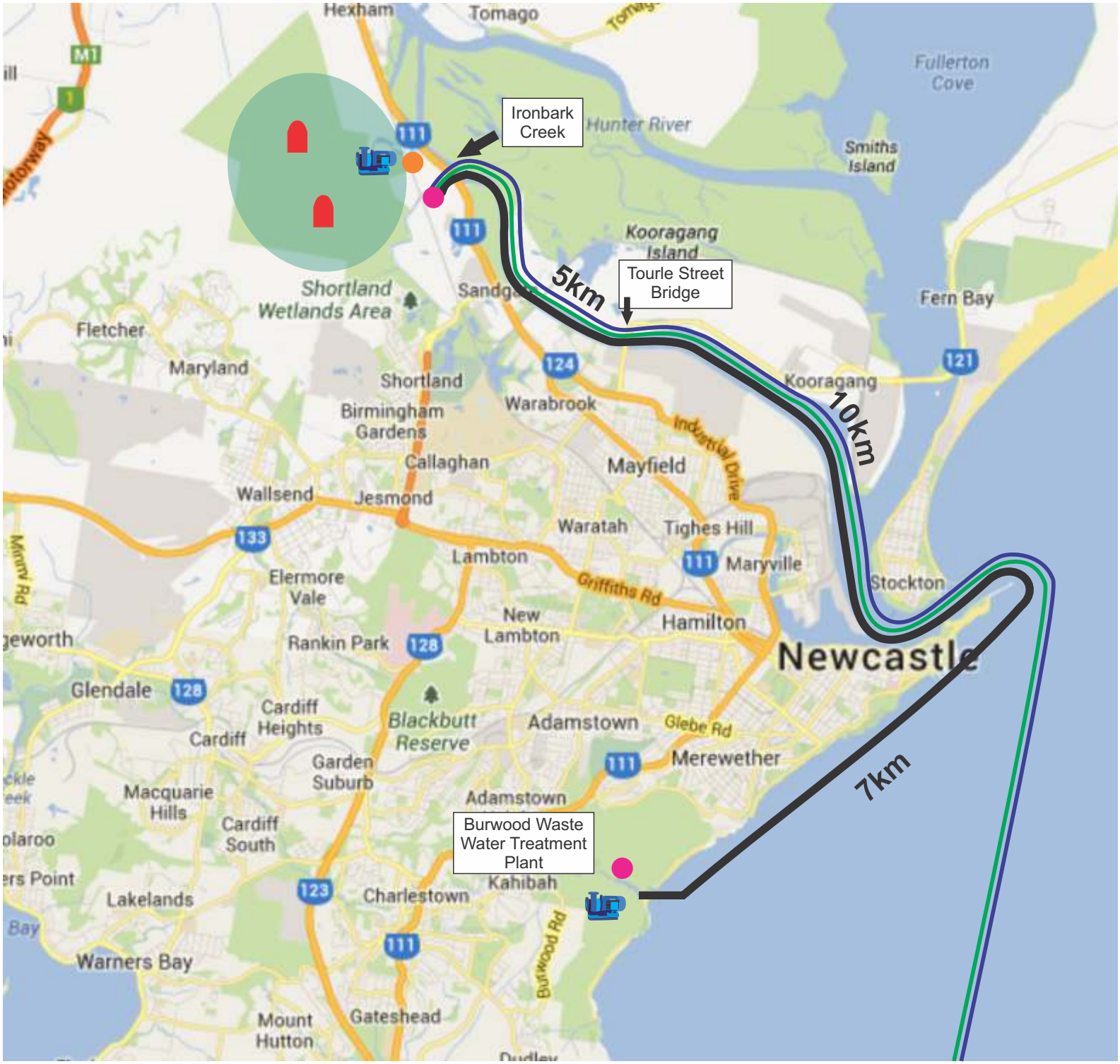
Name	Completed	Registered Capacity	2015-16 Electricity Production	2015-16 Emissions	Intensity kg CO2-e/MWh
Callide C	2001	840 MW	6,036 GWh	5.4 Mt	937
Tarong North	2003	443 MW	2,499 GWh	2.2 Mt	907
Millmerran	2003	852 MW	6,654 GWh	5.5 Mt	891
Kogan Creek	2007	744 MW	4,478 GWh	3.8 Mt	945



UWR

EVERY DROP COUNTS!

Universal Water Recycling



- Proposed Reservoir sites
- Rail infrastructure for nutrient removal and arrival
- Bio Gas Power Station
- 2 Pump Station
- HDPE sub sea pipe line
- Scheme 2
- Scheme 3
- Green Power similar in size to the Werribee Plant Melbourne See pg. 37-38. To service scheme 3

Pont Du Gard

The aqueduct bridge is part of the Nîmes aqueduct, a 50-kilometre (31 mi) system built in the first century AD to carry water from a spring at Uzès to the Roman colony of Nemausus (Nîmes).while the whole aqueduct descends in height by only 12.6 m (41 ft) over its entire length, which is indicative of the great precision that Roman engineers were able to achieve using simple technology. The aqueduct formerly carried an estimated 40,000 m^3 (8,800,000 imp gal) of water a day to the fountains, baths and homes of the citizens of Nîmes.

Chichester Dam

A Gravity Dam

Chichester Dam 156.2 meters (AHD) Australian Height Datum. or 156 .2 meters above sea level.

The Dam holds 18,356 megalitres of water, with a 90 kilometres long gravitation main transporting water from the Dam to the major city reservoirs in Maitland, Cessnock and Newcastle.

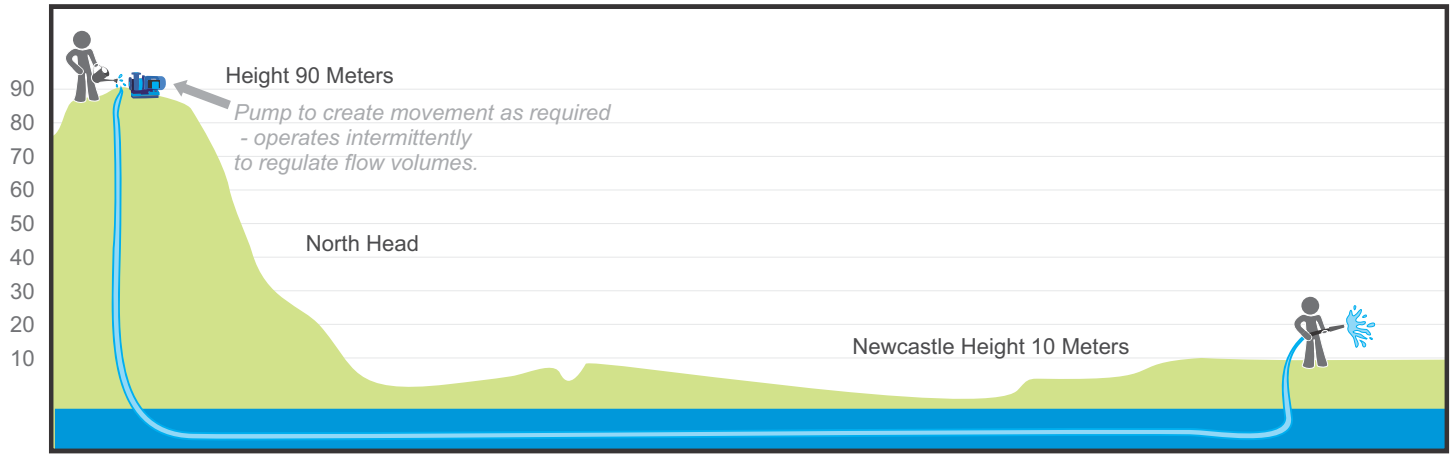
Water supply from Chichester Dam is used as much as possible due to its reliability and costs. The cost of supplying water from Chichester Dam is the lowest of all Hunter Water sources, largely because it feeds into the tank distribution system by gravity. Water from Chichester Dam is dosed with chlorine at the Dam and then transported via a gravity pipe to Dungog, where it is further treated at the Dungog Water Treatment Plant.

North Heads Sewage Treatment Plant

North Head is 80 to 90 meters above sea level.
It is proposed to build further infrastructure at this site to service Scheme 2
(a) There is ample room to construct new reservoirs.
(b) The network of the Northside Tunnel System can store up to 500 ML of water, I believe we could take advantage off this storage capacity be adding additional capture and diversion of stormwater into this Tunnel System when it could handle extra volumes of water, we can than store this additional captured water in extra reservoirs on the Headland at North Head to have backup water to keep the gravity volumes flowing at full capacity.
(c) The pumping station beneath the (STP) and the height and volumes pumped daily is staggering, it is envisaged another pumping station would be required to pump water once treated from the (STP) to the proposed reservoirs.
(d) It is envisaged the reservoirs to be built are to be of a taller elevation or raised fill beneath them, this will increase the gravity flow rates to the proposed reservoirs at Ironbark Creek near Hexham, a height of 5.19 meters above sea level,(see page 9 Scheme 2)
(e) The proposed reservoirs at North Head would be connected with a twin 2 meter in diameter pipeline, it is envisaged it will empty at a rate similar to the filling rate.
(f) The Hydro Plant May be able to be incorporated in this project, if not it is insignificant to the energy generated from the volumes of water supplied to a proposed new Coal or Gas fired Power Station in the Hunter Valley.
(g) Sydney Water will now have a new water market supplying different grades of treated water in the Hunter Valley for Industries, Mining, forestry, Power Generation, Agriculture etc, by supplying around 300ML/d of recycled water to the AGL Power Station and Industries this will now give Sydney Water ownership of 300 ML/d of water in Glenbawn Dam, with little treatment is of a potable grade at 276 meters above sea level.
(h) Sydney Water can also in the future expand this to incorporate Scheme 3 (see page 73)

Sketch 1

Gravity Transfer



Key

Syphon =

Pump =

Definition

Syphon
A tube placed with one end at a certain level in a vessel of liquid and the other end outside the vessel below this level, so that liquid pressure forces the liquid through the tube and out of the vessel by gravity

Pump
Pump to operate intermittently to increase syphoning effect

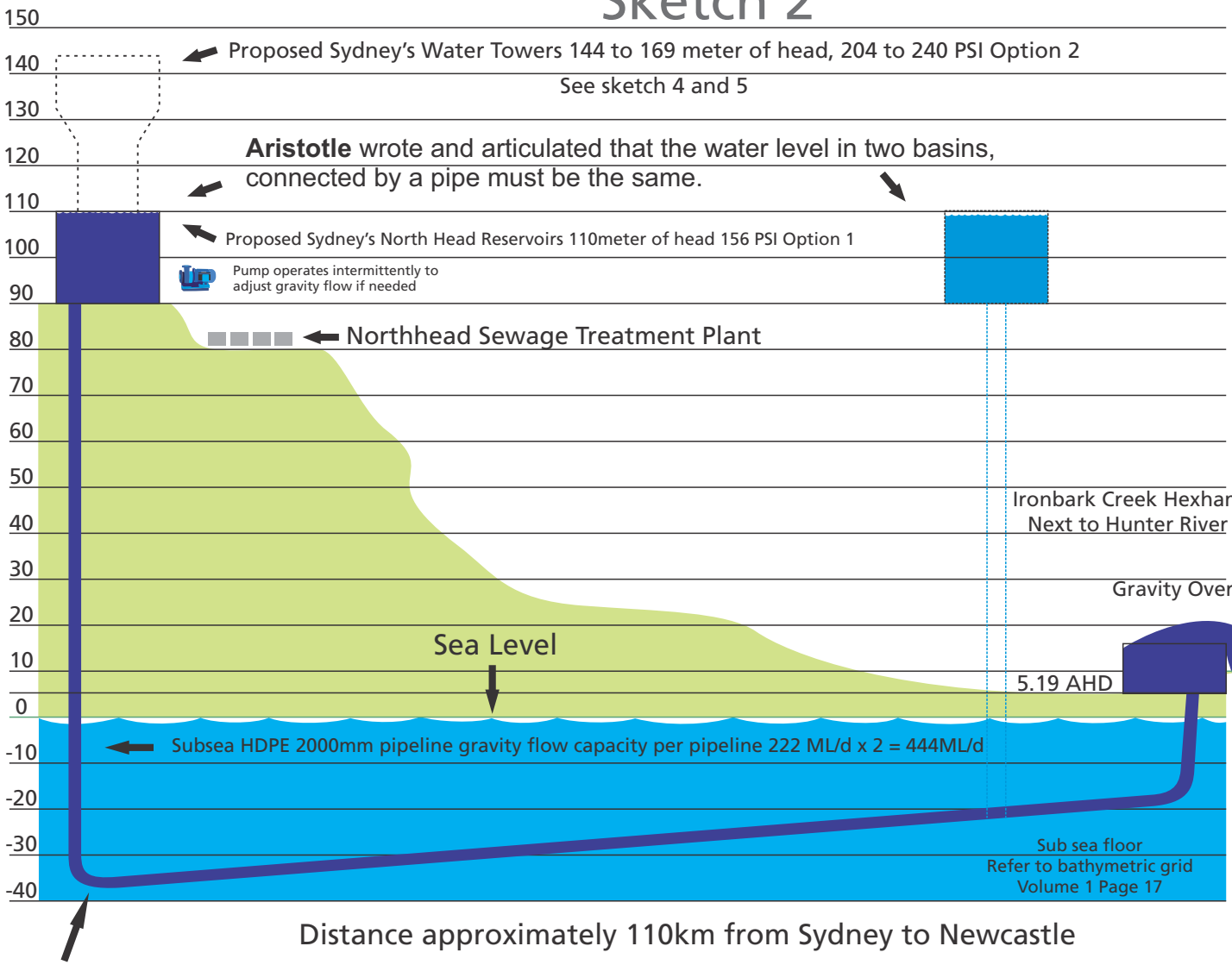
The accuracy of a water level is based upon Pascal's Law
"Water seeks its own level"
A water level is both accurate and versatile and can be used to set grades where grade points are separated by distance.

EVERY DROP COUNTS!

Universal Water Recycling

UWR

Sketch 2



Distance approximately 110km from Sydney to Newcastle

2000mm SDR21: area 25716cm2, water flow capacity 2571kg/s, 154ton per minute, 9258ton per hour, 222193ton per day
2000mm HDPE costs $1500 per meter $1.5 million per km x 110 km = $165 million x 2 pipelines = $330 million

The accuracy of a water level is based upon Pascal's Law "Water seeks its own level"

A water level is both accurate and versatile and can be used to set grades where grade points are separated by distance.

Curvature of the earth, 11cm per km x 110km = 1210cm = 12.1meters

EVERY DROP COUNTS!

Universal Water Recycling

UWR

Scheme 3

Water Level Sketch

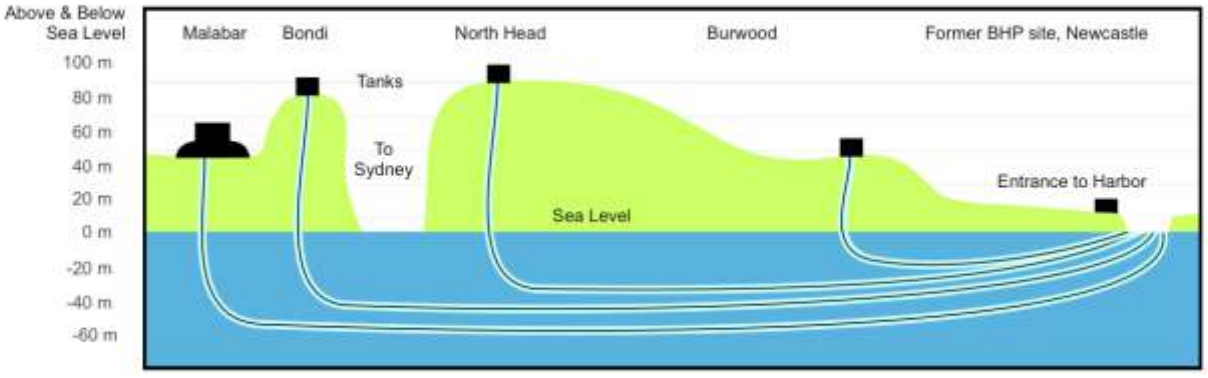
Hydrology Gravity System to capture over one Million Tons Daily (370 Gigalitres Per Annum)

• Twin 2000mm HDPE pipelines from Malabar to Newcastle.	444 ML/D
•Twin 2000mm HDPE pipelines from North Head to Newcastle.	400 ML/D
•Single 1600mm HDPE pipeline from Bondi to Newcastle.	130 ML/D
•Single 1200mm HDPE pipeline from Burwood to Newcastle.	44 ML/D
	Total= 1018 ML/D

← Refer to Sketches 4 and 5, Pages 74 and 75

If the majority of solids are removed from Malabar, Bondi and the Burwood treatment plant a water tower could add an extra 54m of elevation to increase gravity flow rates.

Ground elevation level raised under tank at Malabar



Information towards sub sea floor refer to bathymetric map in index

2009 Scheme

Aristotle wrote and articulated that the water level in two basins, connected by a pipe must be the same.

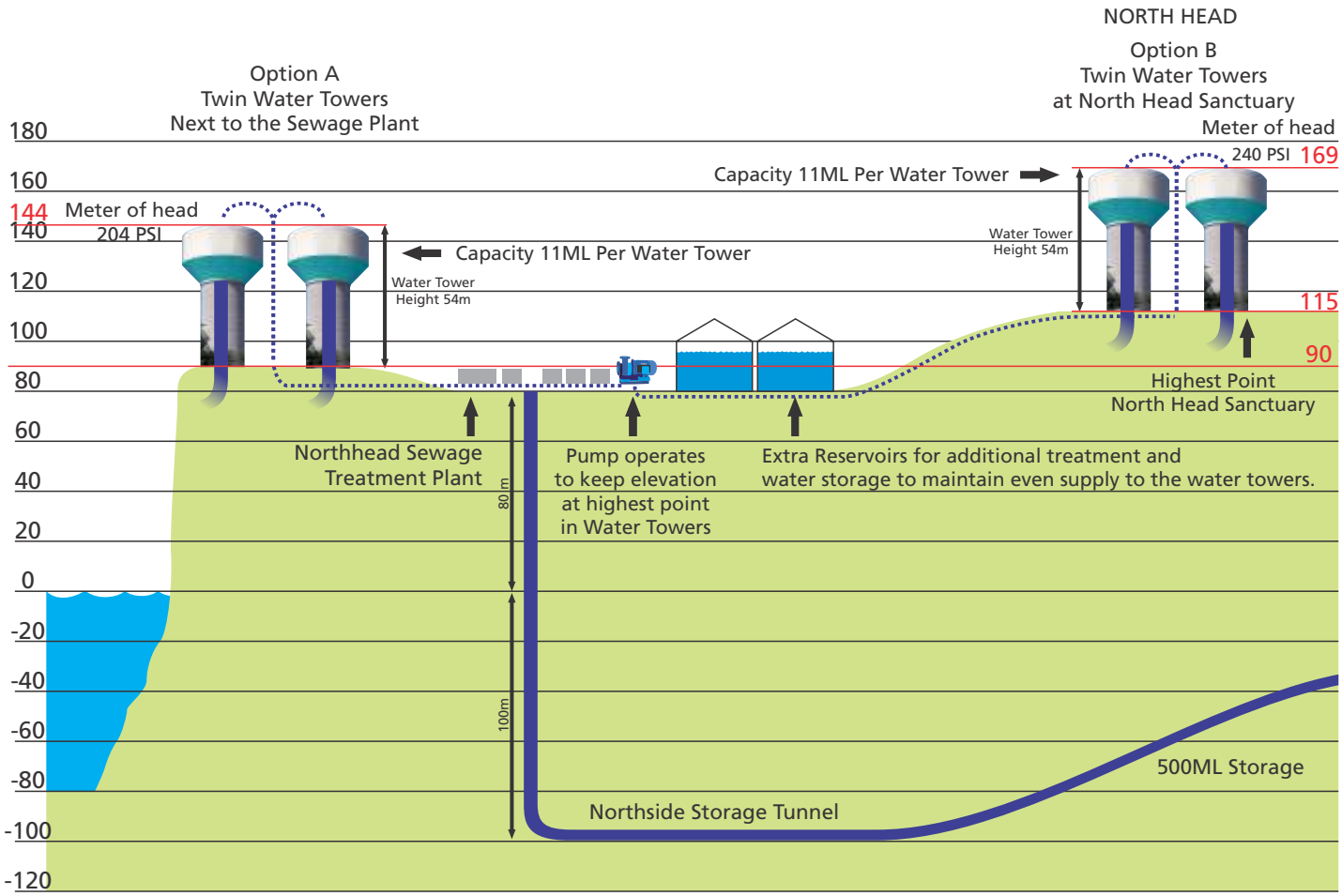
2000mm SDR21: area 25716cm2, water flow capacity 2571kg/s, 154ton per minute, 9258ton per hour, 222193 ton per day

The accuracy of a water level is based upon Pascal's Law "Water seeks its own level"
A water level is both accurate and versatile and can be used to set grades where grade points are separated by distance.
Curvature of the earth, 11cm per km x 110km = 1210cm = 12.1meters

Sketch 4

Gravity Transfer System From Sydney's North Headland

It is envisaged the filling rate per Water Tower would be 9.2ML per hour to match the siphoning rate at 9.2ML per hour.
Each tower would have one 2meter in diameter pipe at base level.



EVERY DROP COUNTS!

Universal Water Recycling

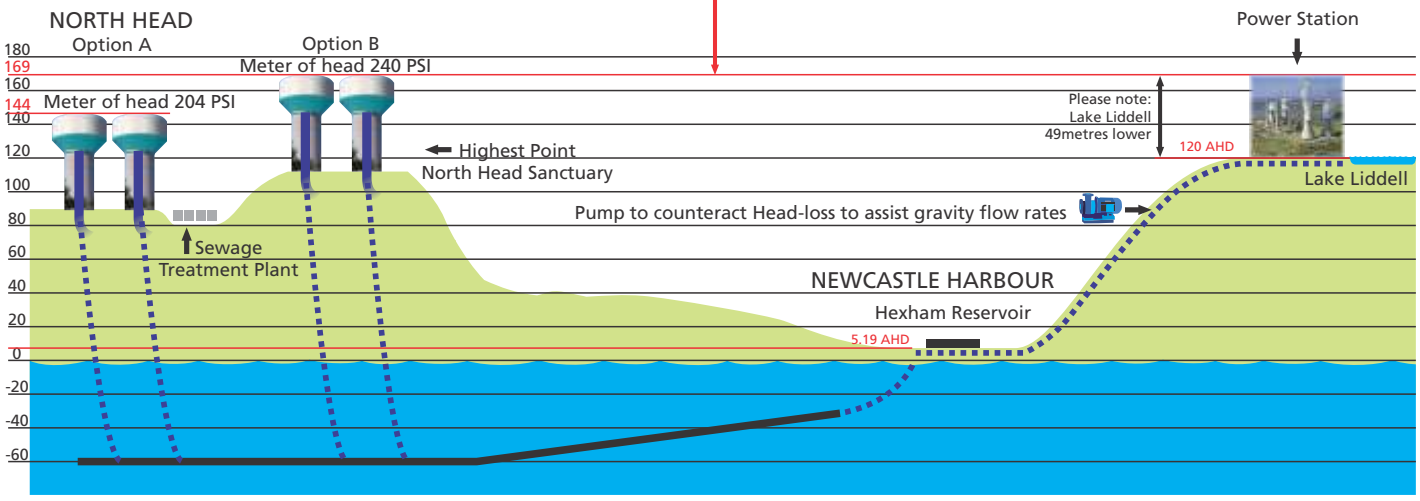
UWR

Sketch 5

The accuracy of a water level is based upon Pascal's Law

"Water seeks its own level"

Aristotle wrote and articulated that the water level in two Basins connected by a pipe must be the same



EVERY DROP COUNTS!

Universal Water Recycling

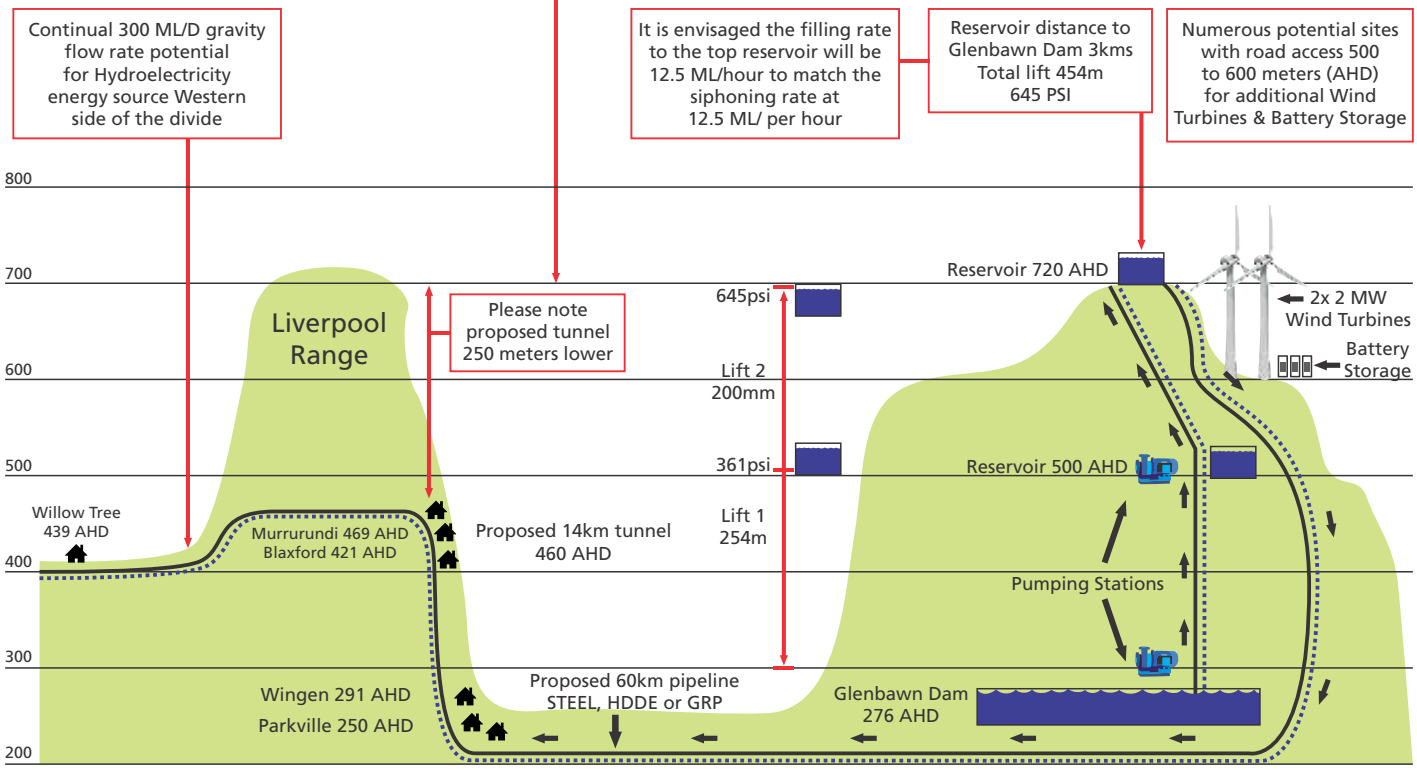
UWR

Sketch 6

The accuracy of a water level is based upon Pascal's Law

"Water seeks its own level"

Aristotle wrote and articulated that the water level in two Basins connected by a pipe must be the same



UWR

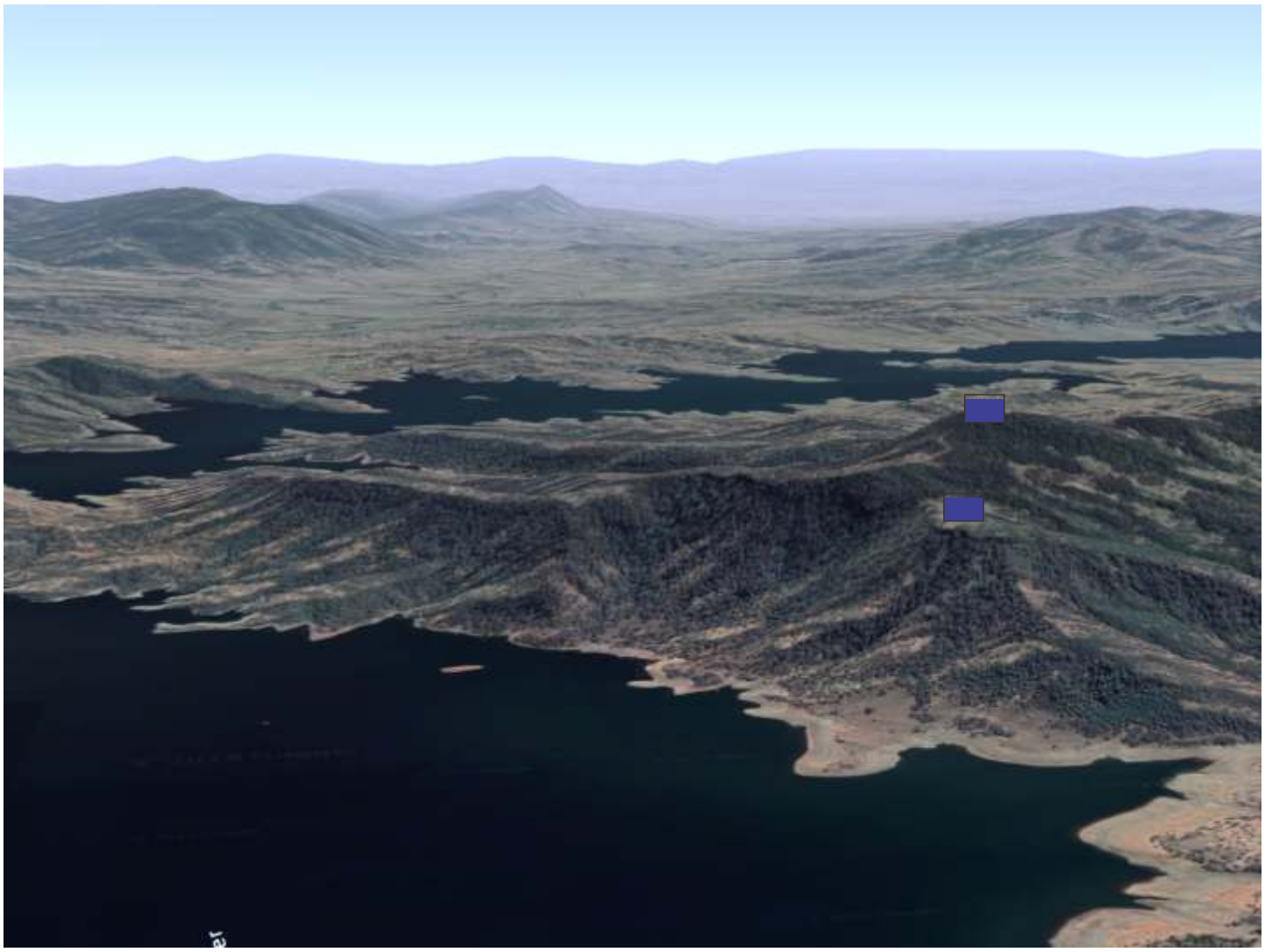
EVERY DROP COUNTS!

Universal Water Recycling

UWR

EVERY DROP COUNTS!

Universal Water Recycling



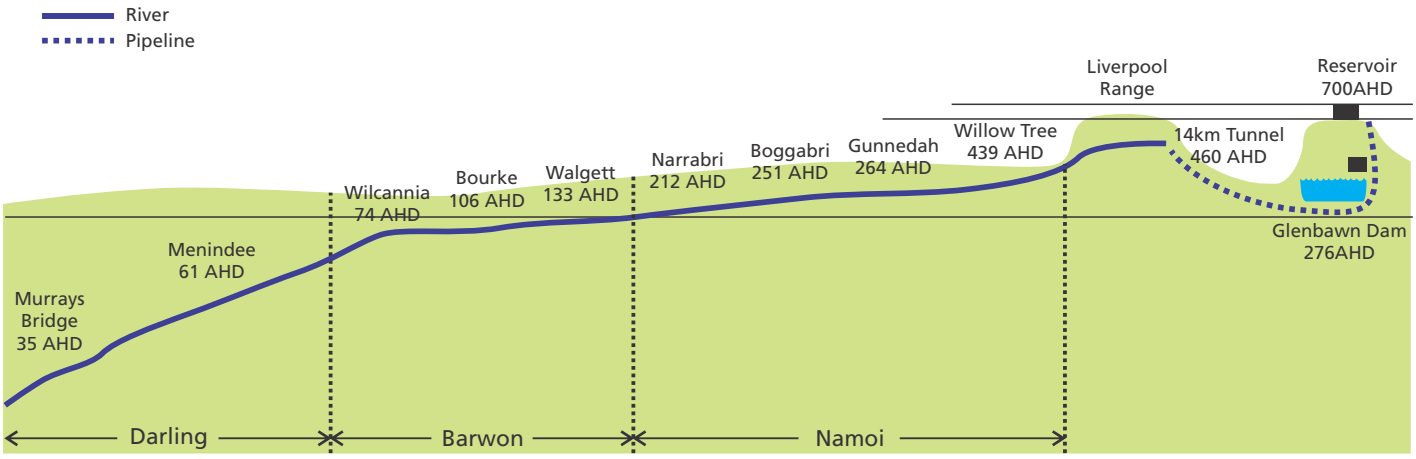
Proposed Pipeline Route

EVERY DROP COUNTS!

Universal Water Recycling

Sketch 7

A Gravity Flow System into the Basin, 109, 500ML of water
Per annum into this dying river system



GREEN ENERGY GRAVITY TRANSFER SYSTEM
FROM GLENBAWN DAM TO MURRURUNDI

Pages 76 to 80 shows what I believe is the most viable method to transfer 300ML/d of water from Glenbawn Dam via a proposed 60 km pipeline to the proposed 14 km Tunnel at Murrurundi.

The sketch on page 76 shows in detail a gravity transfer system, It involves using renewable energy to pump in two lifts 12.5 ML/ per hour of water to a reservoir, only 3 km from the Dam
No other pumping is required for the proposed 60 km transfer of this water to enter the proposed tunnel at Murrurundi, from there it is into the tributary river that leads to the Namoi.

The two lifts that are required for this project and the volumes of water involved are very similar to the North Head Sewage Treatment Plant, it pumps 350 ML/d from the Northside StorageTunnel 180 meters strait up, if we could obtain this information from their engineering department regarding its pump size and the energy required for their lift, this information would assist in this project to determine pump sizes and the number of Wind Turbines needed for energy to power the pumps.

Battery Storage has been a real game changer in energy, Wind Turbines and Solar Panels on the nearby North facing ridge could all contribute to the energy requirements needed for this project.
Meter of Head Loss would not apply, the reservoir water level at 720 meters above sea level and the proposed tunnel is 250 meters lower.
Engineers could easily establish a proper system design for the Reservoirs and pipeline sizes.

Proposed Tunnel

The proposed Tunnel envisaged is only 1300 meter longer then the Riverland Badlands Tunnel Project in Southern California, pages 23 and 24.
It is envisaged that the proposed Tunnel at Murrurundi should be of a larger diameter to allow greater water transfers than just 300ML/d.
Glenbawn Dam is on the eastern side of the Divide, where rainfall is much higher, there could be a rain event where the Dam is full and the Basin is still in Drought.
Also in the future the Government of the day may decide to incorporate all of Sydney's grey water into this project, Scheme 3 page 73.

Bradfield Scheme

Bradfield's scheme and others have been criticized because they are not practical.
This Scheme has been criticized because of high capital and ongoing running costs which would make the project uneconomical.

Question.

Was the feasibility study of the Bradfield Scheme looked at in a positive can do attitude or the opposite.
The Romans managed to move 40,000 cubic meters of water 50 km a day by gravity (no pumps) the whole Aqueduct descends in height by only 12.6 m over its entire length. Page 68.

Ongoing running costs were criticized in the study, pages 76 to 80 of my proposed project shows that by using Wind Turbines, Solar Panels and Battery Storage we can lift water and let gravity do the rest.

The establishment of the number of wind turbines and solar panels and the battery storage required would be the main cost, ongoing running costs after that would be mineable, wind and sunlight is free.

The lift plus gravity transfer system from Glenbawn Dam to Murrurundi shown here on pages 76 to 80, if looked at by people with a positive can do attitude, could be duplicated in some sections of the Bradfield Scheme.

HDPE PIPE MANUFACTURING

The subsea pipeline required for this project could be transferred here by sea from the AGRU Pipe Production Facility in Charleston South Carolina or the Stathelle Pipe Production Facility In Norway, usually in 600 meter lengths, then joined here.
It's hard to believe that the driest inhabited continent on earth hasn't a large diameter Pipe Facility here.
It is envisaged that a Pipe Production Facility should be established on the Hunter River at Newcastle.
Not just to service this project but all others around Australia.

The Australian Government could purchase the design and manufacturing know how from either the Stathelle Pipe Production Facility in Norway or the AGRU Pipe Production Facility in Charleston South Carolina.

Alternatively the Australian Government could enter into a joint agreement to encourage any of the above Pipe Production Facilities with their years of knowledge and expertise to establish a Facility here.
The benefits are that the production of large Diameter HDPE can manufactured here many km in length on site, no transportation costs and less joints means less installation costs.

VOLUMES OF WATER

Scheme 1 and Scheme 2 of my projects involves the harvesting of 450 ML/day of grey water, in layman's terms the following information will give you an indication of just how much water that is.
A cubic meter of water is 1meter x 1meter = 1000 litres and weights a ton,
A megalitre is 1000 cubic meters, if these cubes are placed together in a straight line it would = 1km.
450 ML = 450,000 cubes placed together in a straight line = 450 km.
Distance from Sydney to Narrabri strait line = 415 km
In 1 week and 7 hours the project can harvest 3,280,000 cubic meters (Three million two hundred and eighty thousand cubic meters.)
Distance from Sydney to Perth strait line 3280 km

HOW WATER CAN CHANGE OUR ECONOMY

The biggest problem in this country is that energy costs are crippling the entire economy, manufacturing, domestic, retail, etc, the impact is obvious, energy companies through lack of competition are exploiting the entire population.

NSW has abundant Coal and Gas reserve's, I believe a Gas Fired Power Station should be built in the Hunter Valley, it will have emissions but it will have an offset system that will more than just counterbalance those emissions, please read pages, 61,65,66,84,85, if we want these volumes of water to create the thousands of jobs In forestry we need part of this energy from this proposed Power Station to assist in this water transfer.

Millions of dollars has been spent researching Carbon Capture and Storage (CCS) with little results.
The best way to store carbon is to plant trees, Millable and for environmental habitats, Carbon is stored in the trunks, this project has a Carbon Capture Offset System to Counterbalance Emissions, pages 61, 62, and 66.

WATER

It is the key for the creation of thousands of jobs.
The construction of a Gas Fired Power Station in the Upper Hunter would result in hundreds of jobs during construction and also when completed.
The economic benefit to the Upper Hunter Towns and the Basin would be immeasurable.
Millions of acres of forests millable and for environmental habitat could be planted in the Upper Hunter and on the other side of the range in the Namoi Valley.

The Namoi River will flow from a reliable water source.
Thousands of jobs in forestry and agriculture will be the result of building a Power Station in the Upper Hunter.

All this would require large volumes of water from a reliable source.

This Project can transfer with gravity assistance 400ML/d of grey water from North Head Sydney to the Hunter, why not bring all of Sydney's grey water up page 73 (Scheme 3)
That's around 1,000 ML/d = 1 gigalitres (GL) which also is 1,000,000,000 litres.
365 gigalitres (GL) per annum.

The water transfer from the Bondi Treatment Plant to the Hunter has a similar gravity transfer system as North Heads, Malabar could also utilize gravity.
The most important thing of all regarding energy to assist a gravity water transfer system is that we have a Power Station, any energy requirements including off peak, surplus electricity etc would only be a fraction of what energy a Power Station could provide.
The grey water from Sydney could be treated at different levels; water for forestry would benefit more with less treatment to take advantage of any nutrient matter.
Please note that grey water running over rocks and gravel and exposed to sunlight dose not have to travel far before it is suitable for most uses.
And as for any emissions from a Gas Fired Power Station, 365 GL water per annum will not only offset emissions it will be beneficial to the environment the economy and our future generations.

NONE OF THE ABOVE IS POSSIBLE WITH OUT THIS GREY WATER FROM SYDNEY

The Lower Hunter Water Plan

There are only 3 long term options available.

Revisit the Tillegra Dam
OR
A Temporary, Emergency or Permanent Desalination
OR
The Hunter Bayswater Recycling Water Scheme

The following is the most viable option for the Lower Hunter Water Plan.
The majority of this project is pipelines, it is envisaged that a new Pipeline Production Facility will be established on the Hunter River similar to the AGRU Facility in Charleston South Carolina or the Stathelle Pipeline Production Facility in Norway to manufacture large diameter HDPE here in the Hunter Valley, not just for this project but others needing to transfer large volumes of water.
Continues long lengths of HDPE pipelines Kms in length can float on sections of the Hunter River where there is no shipping, longer lengths = less joins = less installation costs.

Funding Options

The $4.2 billion fund created by the Federal Governments buy-out of NSW,s of Snowy Hydro.

The Miners Rehabilitation Funds

Mine Rehabilitation Assurance held by the NSW State Government is $2.36 b
The majority of the Mines in NSW are in the Upper Hunter, the pipeline will last 50 to 100 years, as coal is depleted rehabilitation can commence immediately,
(you can't rehabilitate without water)

The supply of water to Lower Hunter is only a small part of the overall project and is so simple and cost efficient compared to the Tillegra Option.
The proposed pipelines from Newcastle to Lake Liddell and Plashett Reservoir will be a duel purpose line, Lake Liddell has issues with bacteria and salinity, the Hunter Valley Coal Mines at times are looking to discharge saline water into the Hunter River when there is high river flows.

This pipeline option will flush this saline water from both by gravity straight into the ocean resulting in a healthier Hunter River.
Scheme 1 (The Hunter Bayswater Recycling Water Scheme) shows a schematic map with a cost effective system of supplying water to the lower Hunter.
The construction of a 45 ML reservoir at north of Branxton has now been upgraded to a 80 ML in Scheme 2, water would be pumped from the Hunter River at Elderslie to fill this proposed reservoir.
The reservoir would be on a hill less than 3km from the river over looking Branxton.

This water would be treated to a potable grade before it is connected to Hunter Water Infrastructure at Branxton.
Grahamstown Dam is an off- stream Dam, water is pumped from the Williams River,
The reservoir at Branxton would be an off-stream reservoir pumping water from the Hunter River.
The cost to treat river water to a potable is mineable.

The Tillegra Dam option, $500 million to build the Dam
Repurchasing the land needed that was all sold off $ 100 million? $200million?
Acquisition of land by the Government for those who do not wish to sell.
Drawn out court processes, Green groups demonstrations
Seven years to fill the Dam under normal weather conditions.
It has been also documented that this will destroy a whole Eco System including the prawns, oysters, fishing etc.
The whole process to bring back the Tillegra option could take many years.

Universal Water Recycling Is ready now.
Plenty of industrial sites along the Hunter River for a major Pipeline Production Facility.

Some Cost Estimates

A similar in size Large Diameter Pipe Production Facility that AGRU has established in Charleston South Carolina $ 40 million USD. (Please note that this Pipeline Production Facility is for Scheme 1 and Scheme 2)	$57 million
Build a 80 ML Concrete Reservoir (Ellenbrook Water Tank)	$14 million
North of Branxton	
Pumping infrastructure plus pipe works to connect the Hunter River to the Reservoir and the Reservoir to Hunter Waters infrastructure	$6 million
Filtration system to achieve potable grade	$4 million
Purchase suitable property	$2 million
Site preparation and works	$1 million
Fencing contractors to fence sections of the Hunter River to keep cattle nutrients from entering the river	$5 million
Earthmoving contractors to build small Dams for cattle and livestock fenced of from the river plus piping and pumps to fill these Dams.	$5 million
A Preliminary Cost Analysis for a survey for a fresh water submarine Pipeline from the ocean to Iron Bark Creek Hexham from Makai Ocean Engineering, page 30 to 37 $38,000 USD	$55 thousand
100 km pipeline infrastructure costs (see pages 44 & 45)	$70 million

Total $164,055,000
One hundred and sixty four million and fifty five thousand dollars.

80 ML of water is approximately one fifth of the water transfer project.

Future population growths in the Lower Hunter is no problem, another 80 ML Reservoir could easily be built in the same area, project has a water exchange transfer system with 300ML/d available from Glenbawn Dam, this water with little treatment is of a potable grade.

Dear Joseph,

I refer to your letter of the 22nd July requesting a quote for the hydraulic analysis, indicative capital costs and energy requirements for your proposed recycled water transfer scheme.

Our proposed fee structure is as follows.

Preliminary assessment of North Head to Hexham (via ocean pipeline) - $15,000. Activities include:

- Confirmation of the locations of sites and proposed route.
- Consideration of any issues
- Hydraulic analysis of pipelines
- Presentation of the hydraulics
- Cost estimates for construction
- Preparation of a report.

Please note that ocean pipelines are outside of our normal activities so it may be difficult to get accurate costings.
W3Plus will make preliminary enquiries into these estimates only.

Preliminary assessment Pumping to Elevated Towers at North Head and tie in to North Head - Hexham Line - $8,000.
Activities include:

- Confirmation of the locations of sites and proposed route.
- Consideration of any issues
- Hydraulic analysis of pipelines
- Presentation of the hydraulics
- Pump sizing and power estimates
- Cost estimates for construction
- Inclusion into the report.

Preliminary assessment of Glenbawn Dam to Tunnel - $13,000

- Confirmation of the locations of sites and proposed route.
- Consideration of any issues
- Hydraulic analysis of pipelines
- Presentation of the hydraulics
- Pump sizing and power estimates
- Cost estimates for construction
- Inclusion into the report, including any comments on other options

Our staff has been involved in other works in the Singleton area recently and have some first-hand experience of the area.
This should assist us when considering the alignment from Glenbawn to the proposed Tunnel Site.

Please advise if you think there are any other requirements or if the above is not what you had envisaged.
Also please see attached response to your letter dated 23rd July

Regards
Michael Maries
Engineer

W3 Plus Consulting
world wide water plus

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Tel: +61 3 52151333 | Fax: +61 3 5215 1413
Mob: +61 (0) 421969068

Email: michaelm@w3plusconsult.com

Thank you for getting in touch regarding your project to take recycled water from North Head to Newcastle and water from Glenbawn Dam to Murrurundi and beyond.

Based on your investigations, it seems that there is the potential significant gravity flows in the system. Without completing a hydraulic analysis, I cannot specify the expected flow rates, power requirements and cost of pumping into elevated storages and the requirement, or lack thereof, of any booster pump stations along the route. I can say, however, that I believe the project has merit and is deserving of further investigations into its feasibility.

Please feel free to call any time to discuss.

Sincerely
Michael Maries
Engineer

W3 Plus Consulting
world wide water plus

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Volumes of Water Which Can Be Harvested

This picture represents a cubic meter of water.
1 meter by 1 meter = 1000 liters
1 bucket = 10 liters
100 buckets x 10 liters = 1000 liters or 1 cube.
1 ML = 1000 cubes x 100 bucket = 100,000 buckets
10 ML = 10 x 100,000 buckets = 1,000,000 (1 million buckets)
50 ML = 5 x 10 ML = 5,000,000 (5 million buckets every day)
50 ML/day x 365 days = 18,250 ML per annum
Chichester Dam = 18,356 ML

The Lower Hunter Water Plan
"The Hunter Bayswater Recycling Water Scheme"

50 ML/d of potable water drawn from the Hunter River and added to the system would result in the majority of this water being recycled many times.

When our dams are levels are healthy, the Emergency, Temporary or Permanent Desalination Plant at Belmont will be mothballed because it is too expensive to run; a burden on Hunter water uses. This water exchange project will not shut down, resulting in water banking of one Chichester Dam per annum, stored in Glenbawn Dam.

Volumes that can be harvested = 450 ML/ day

1 Meter By 1 Meter = 1 Cubic Meter or 1 Cube

1 ML = 1000 Cubic Meters or 1000 Cubes

Placed Next to One Another in a Straight Line = 1 Km

450 ML/ D = 450,000 Cubes in a Straight Line = 450 Km

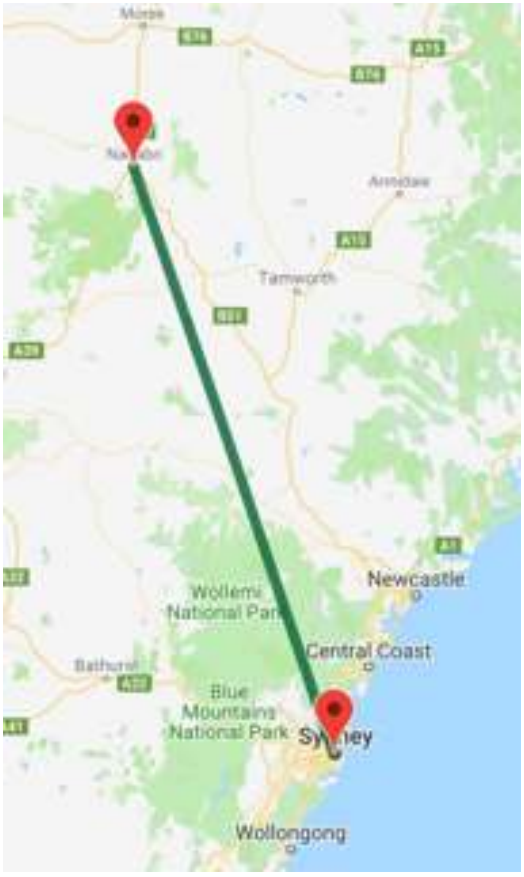
Distance Straight Line Sydney to Narrabri = 415 Km

EVERY DROP COUNTS!

Universal Water Recycling

UWR

Volumes of Water Which Can Be Harvested



North Head Sewage Treatment discharges 400 ML/d
The Burwood Treatment Plant discharges 50 ML/d (Total 450 ML/d)
1 meter by 1 meter = 1 cubic meter or 1 cube
1 ML = 1000 cubic meters or 1000 cubes
Placed next to one another in a straight line = 1 km
450 ML/ d = 450,000 cubes in a straight line = 450 km
Distance straight line Sydney to Narrabri = 415 km
In one week and 7 hours the project can harvest 3,280,000 cubic meters
(Three million two hundred eighty thousand cubic metres.)
Distance from Sydney to Perth strait line = 3280 km

UWR

EVERY DROP COUNTS!

Universal Water Recycling

Project Measured in Dam Numbers By Harvesting North Head and Burwood

This is an untapped reliable guaranteed water source

Pipeline infrastructure will last 50 to 100 years

Long term water transfer projections

Chichester Dam = 18,356 ML

Chaffey Dam = 100,000 ML

Glenbawn Dam = 750,000 ML or 1.5 x Sydney Harbors

Tillegra Dam = 450,000ML

Cameron's Dam = 450,000ML

North Head Sewage Treatment Plant Sydney = 400ML/d.

The Burwood Sewage Treatment Plant Newcastle = 50ML/d

450 ML/d x 375 days = 164,250 ML per annum

164,250 ML per annum

= Approximately

- **9 x Chichester Dams**
- **1.6 x Chaffey Dams**

164, 250 ML X 10 Years = 1,642,500 ML = Approximately

- 90 x Chichester Dams
- 16.4 x Chaffey Dams
- 2.1 x Glenbawn Dams
- More than 3 x Sydney Harbours
- 3.6 x Tillegra Dams
- 3.6 x Cameron's Dams

164,250 ML X 50 Years = 8,212,500 ML = Approximately

- **450 x Chichester Dams**
- **82 x Chaffey Dams**
- **10.95 x Glenbawn Dams**
- **16 x Sydney Harbors**
- **18 x Cameron's Dams**
- **18 x Tillegra Dams**

A solution to drought proof the following, The Hunter Valley Vineyards, The Mines and The Lower Hunter Water Plan.

The subsea pipelines in Scheme 1 and 2 will leave Iron Bark Creek and follow the Chichester pipeline north towards Tarro, (see map of the proposed 40 km pipeline route on page 99.

The proposed project has a total of 4 pipelines,one will seperate and follow the power line grid to Abermain, Lovedale, etc to the Power Station, the other 3 pipelines will pass Elrington and end approximately 2 km south of Abernethy (90 AHD) or 2km South of Kitchener (100AHD) the water will exit the pipeline in 3 seperate locations to enter into Coney Creek which is a tributary Creek of the Ellalong Lagoon Catchment Boundary (see page 100).

This water will receive more treatment before it reaches the Ellalong Lagoon.

Running water exposed to sunlight running over different sized gravels and aggregates dose not have to travel far to be used for most purposes, gabion's filled with large sized gravel will slow and spread the water over a wider area (please note Hunter Water releases treated effluent water from its sewage treatment plants at Paxton and Millfield.)

It is recommended that Dr. Daniel Martens from Martens Consulting Engineers could provide all the environmental, construction engineering to design a wetland area system to meet all Hunter Water requirements.

It is envisaged the empty Ellalong Lagoon would require cleaning it out and earthworks to deepen it, maintaining the protected forests and slopes on it's shoreline.

The 50 ML/d of treated water from the Burwood Treatment Plant entering into the Ellalong Lagoon Catchment Boundary is only part of this proposal, an additional 400 ML/d of North Heads treated water will also have the same 40 km on land pipeline route.

Further treatment of this water entering and leaving the Ellalong Lagoon can meet all guide lines.

A total of 450 ML/d will the flow into the river system by gravity to Millfield, Wollombi, Paynes Crossing,Broke,Bulga,Warkworth before reaching the Hunter River.

It will supply all water from a guaranteed source to the following, The entire Broke PID which consists of which consist of 242 consumers, it will also save them on pumping costs from the Hunter River, pipeline infrastructure will remain the same only now the pump site will be on their doorstep.

It will service all the mining industries such as Bulga, Wambo, Mt Thorley, Hunter Valley Number 1, just to name a few, it is assumed 50ML/d to service these mines and the Broke PID.

A Pumping Station and 20km of pipelines from Wollombi Brook would direct approximately 200ML/d to the Power Stations Lake Liddell and other mines and agriculture to the North West.

The remaining 200 ML/d of water will enter into the Hunter River above Singleton servicing agriculture and industries the entire length down stream including the entire Hunter Wine Country PID.

This proposal will result in not drawing 450 ML/d from Glenbawn Dam to service all of the above.

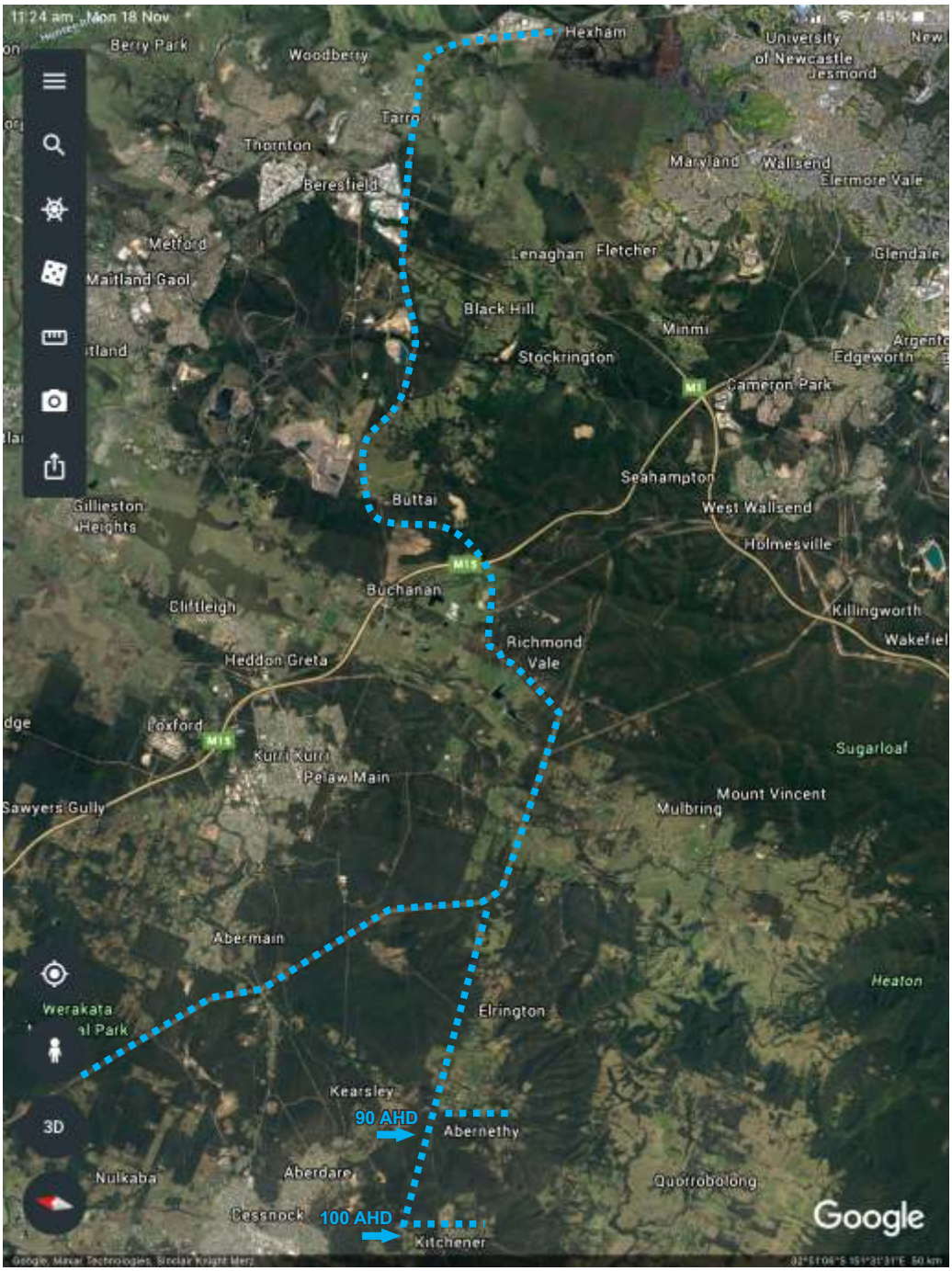
The forth proposed pipeline will be a meter in diameter, it will follow the Power Line Grid towards Lake Liddell, South of this lake it will branch off to 3 different locations, one to Lake Liddell, one to Plashett Reservoir and one to the mining sector, this is not to move water up the valley but the opposite, it will be a duel purpose system, Mines and the Power Station have saline water and need high river flows to flush it, this pipeline can flush this water strait into the ocean by following the same pipeline route via Hexham to the ocean a few km offshore by gravity resulting in a healthier Hunter River, but the majority of the time, this same pipeline will bring down by gravity water drawn from the Hunter River from the most appropriate loation, which with little treatment is of a potable grade to connect and supply the towns Singleton and also could be connected to Hunter Water infrastructure any where from Branxton to Newcastle thus supplying 50ML/day plus of potable grade water saving $100 million dollars on a totally unnecessary desalination Plant.

A viable solution to solve the Lower Hunter Water Plan.

EVERY DROP COUNTS!

Universal Water Recycling

Pipeline Route



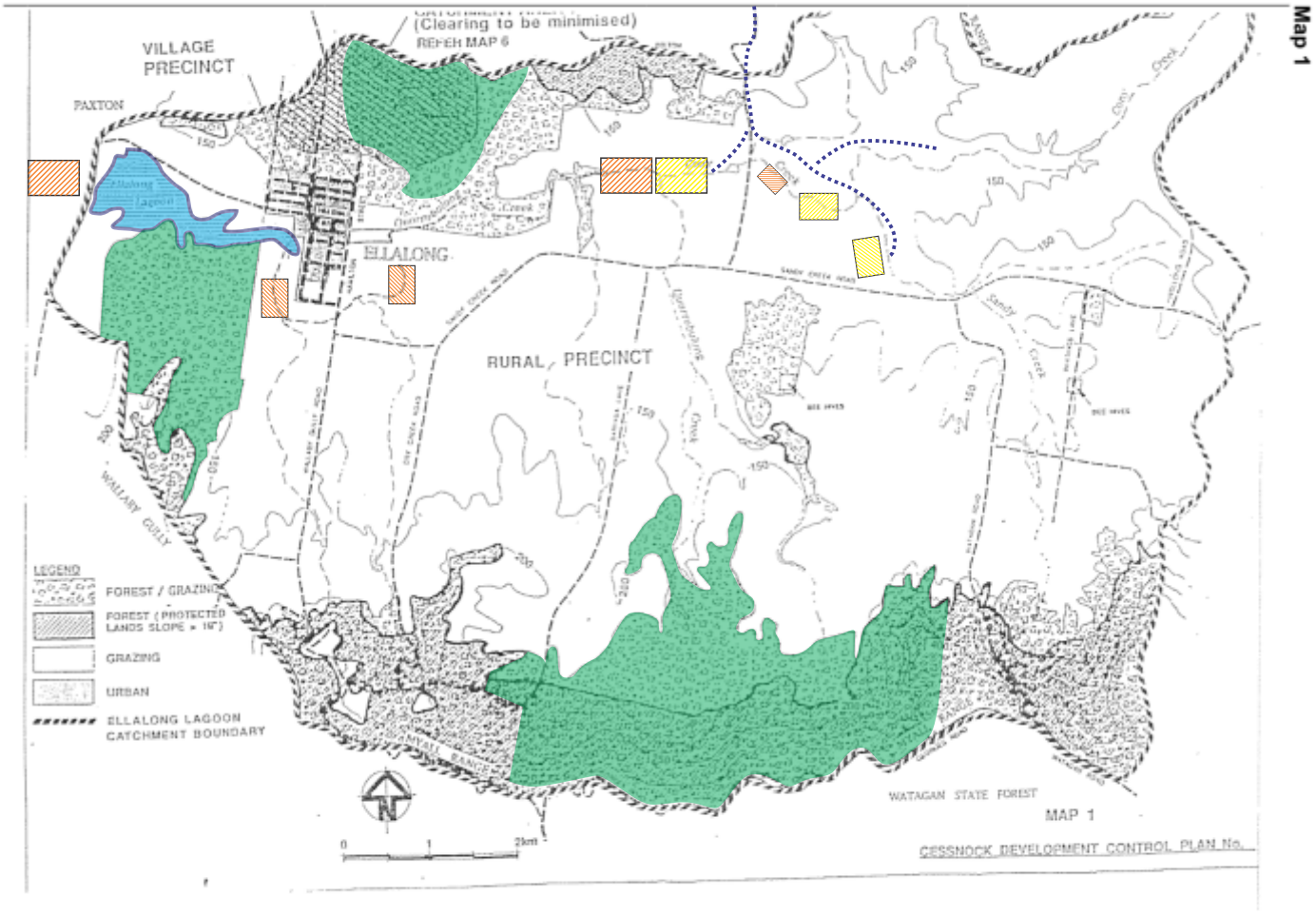
EVERY DROP COUNTS!

Universal Water Recycling

UWR

Ellalong Lagoon
Catchment Boundary

Project will provide 18.75 ML/ per hour
x24 hours = 450 ML/ day

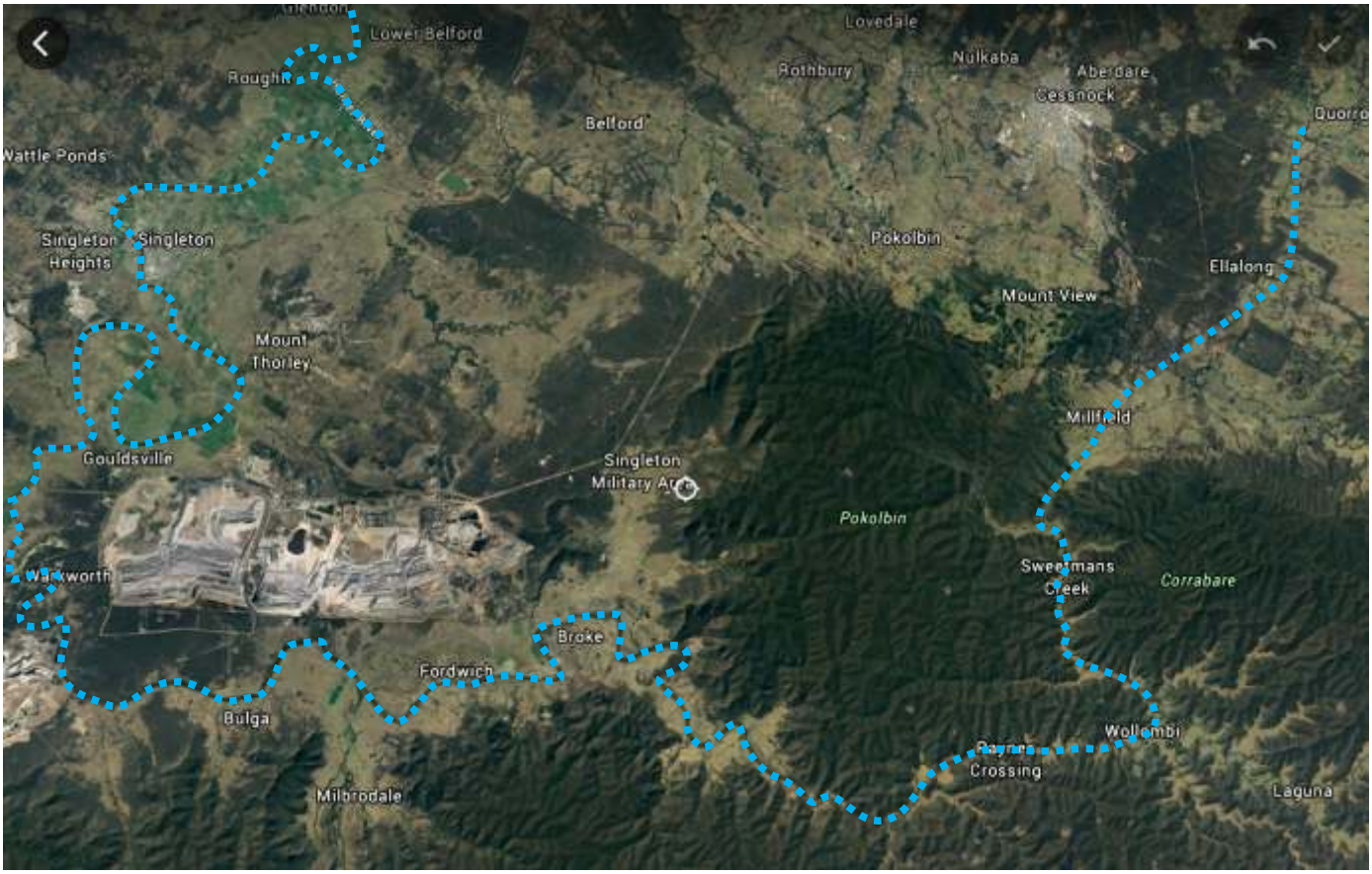


Running water exposed to sunlight running
over different sized gravels and stones
does not have to travel far to be suitable for most purposes

Different sized gravels and stones

Gabions filled with stones to slow down water

River Route



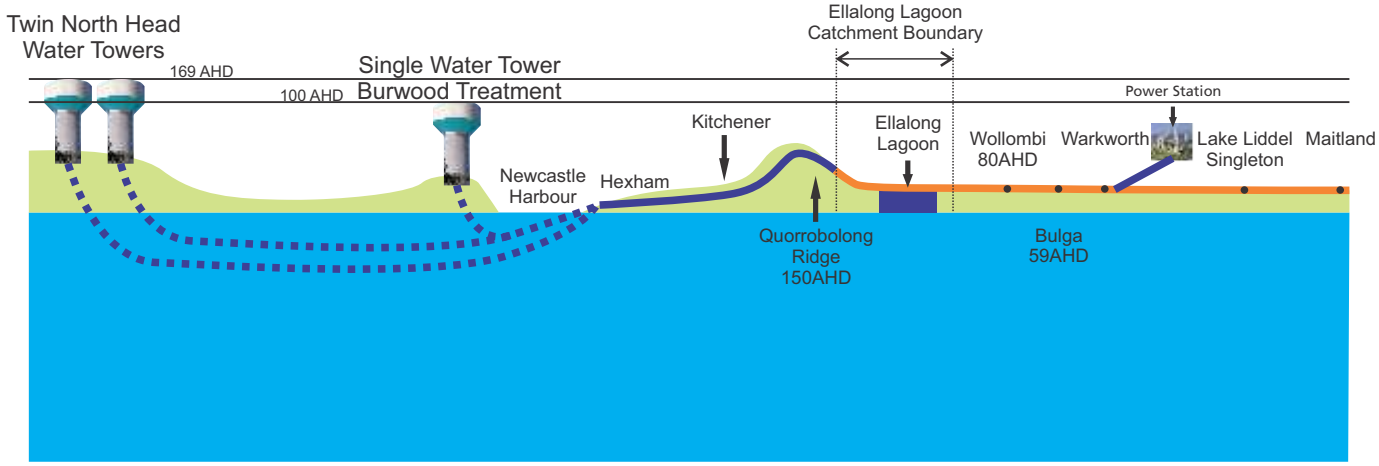
Sketch 8

Gravity Flow system from North Head Plus the Burwood Treatment Plant 450 ML/d into a river system via Quorrobolong

Subsea Pipeline

On Land Pipeline (Hexham to Quorrobolong 45km)
(Wollombi Brook to Lake Liddell 20km)

450ML/d Gravity River Flow



Long Term Water Projections

Israel harvests 90% of its waste water, Sydney is less than 10%, if we follow their system we can match it by harvesting the remaining 2 major Sewage Treatment Plants, Malabar and Bond it would result in the following additional volumes of water being added to the project.

Project measured in Dam numbers of North Head, Bondi, Malabar and The Burwood Sewage Treatment Plants.

This is an untapped reliable water source

Pipeline infrastructure will last 50 to 100 years

Long term water transfer projections

If implemented the economic and environmental benefits to the Nation would be immeasurable.

Projections

Dam Sizes
Chichester Dam. 18,356 ML
Chaffey Dam 100,000 ML
Glenbawn Dam 750,000 ML or
1.5 Sydney Harbors

Tillegra Dam = 450,000 ML
Cameron's Dam = 450,000 ML

North Head = 400ML/d
Malabar = 450 ML/d
Bondi = 130 ML/d
Burwood. = 50 ML/ d
Total = 1,030 ML/d

1 YEAR
= 365 days x 1,030ML/d = 375,950 ML
= Approximately

20.5 x Chichester Dams
3.75 x Chaffey Dams
.8 Tillegra Dams
.8 Cameron's Dams

1O YEARS
375,950 x 10 years = 3,759,500 ML
per decade
= Approximately

205 Chichester Dams
37.5 x Chaffey Dams
5 x Glenbawn Dams
7.5 Sydney Harbors
8.35 Tillegra Dams
8.35 Camerons's Dams

50 YEARS
375,950 ML x 50 years = 18,797,500 ML
per half century

= Approximately
1,025 x Chichester Dams
187 x Chaffey Dams
25 Glenbawn Dams
37.5 x Sydney Harbors
41.7 Tillegra Dams
41.7 Cameron's Dams

Pumped Hydro Energy Storage (PHES)

Small Scale

The above picture show's Plasshett Reservoir and pipe works, Pumping Station at the base next to the Hunter River.

Plasshett Reservoir water volumes is 67 GL at 125 AHD.

The Hunter River next to the Pumping Station is approximately 70 to 75 AHD.

I believe this is a potential site for a small scale PHES project.

We have a head height to Plasshett Reservoir of around 50 meters to provide a form of gravitational potential energy; it has a generation capacity having a large - scale water storage.

Using the same principles as Snowy 2 utilising surplus energy, off peak energy and renewable,s to pump water uphill from the river to this reservoir, this will enable the network to react to fluctuations and generate output into the grid in the shortest possible time.

I believe between 50 to 100 ML/day could be achieved flowing through a turbine for power generation to the grid, any more could effect environmental river flows and down stream water uses.

Information regarding the above Google map and the proposed water exchange scheme, showing proposed pipeline route to either choice of reservoirs for a potential PHES project, for further information please read pages 108 and 109.

Proposed Pipeline Route

- Power Grid
- Existing Pipeline Infrastructure
- Proposed Pumping Station

Proposed new water source for the Bayswater Power Station, enabling one reservoir to solely support a potential future Pumped Hydro Energy Storage (PHES)

The previous page is a Google map showing the Bayswater Power Station, Lake Liddell,Plasshett Reservoir, Mining Voids, the Hunter River and Wollombi Brook.

It also shows a proposed pipeline route following the Power grid from Wollombi Brook to either Plasshett Reservoir or alternatively to be connected to the existing pipeline infrastructure to provide water to Lake Liddell.

I know AGL and others are researching using open cut mining voids for potential future PHES.

This proposal offers a guaranteed water supply from a currently untapped reliable drought independent source.

The proposed project would supply 70 GL of water to the Bayswater Power Station, also there will be water for mines in coal production and rehabilitation, enough water to enable either Plasshett Reservoir or Lake Liddell to be utilised solely for a upper reservoir for PHES.

A PHES using an upper reservoir and lower mining voids without this proposed new water source could not proceed, the next drought could bring Glenbawn Dam below 40%, this would seriously impact on other water uses such as in agricultural, livestock and the Hunter Valley vineyards.

Plasshett Reservoir 125 AHD and has a water storage capacity of 67 GL, (volumes more than 3 Chichester Dams.)

Lake Liddell 120 AHD and has a water storage capacity of 150 GL, (volumes more than 8 Chichester Dams.)

Both have a form of gravitational potential energy and both could provide a generation capacity having a large - scale water storage, by utilising either reservoir connected by multiple designed pipelines to a lower mining void, or several lower water storage voids, this system will essentially convert either Plasshett Reservoir or Lake Liddell into a giant battery.

Page 96 shows the projections in Dam volumes if the North Head Sewage Treatment Plant and the Burwood Sewage Treatment Plant we're harvested.

Please note the proposed subsea HDPE pipelines from North Head to Hexham is low friction and is gravity assisted, also gravity will move this water free of charge from the Ellalong Catchment Boundary to Warkworth before reaching the Hunter River, see pages 97 to 102.

Continued from previous page.

A proposed Pumping Station would be required near Warkworth on the North side and connected to the Wollombi Brook river system, widening and deepening of this river system in this area would be needed to maximum pumping volumes.

Please read further info below.

A) Small proposed PHES 50 to 100 ML/d for Plasshett Reservoir, see Page 106.

B) Google map showing mining voids, proposed pumping station and pipeline infrastructure from Wollombi Brook to either Plasshett Reservoir or Lake Liddell, see page 107.

C) I believe this is an opportunity for AGL in collaboration with the mining sector to investigate the potential benefits of being involved in a Water Scheme that can generate electricity and to be in a position to enter into the NSW water market.

D) The economic benefits from the volumes of water in this proposed project is immeasurable.

E) This water proposal can provide 70 GL to the Power Station per annum.

F) By supplying a new climate- independent water source to the Bayswater Power Station would result in water banking 70 GL per annum remaining in Glenbawn Dam, which is in a gravity position for distribution at 276 meters above sea level.

G) What would 70 GL of water be worth on the NSW water market, suitable for domestic,agricultural and industrial purposes ?

H) Funding for the proposed pipeline could be obtained by using part of the

$2.6 billion in the Miners Rehabilitations Assurance Fund.

H) Some open cut mines are using a method of dump in pit, (backfilling), saving transport costs, with PHES in mind it may in the long term be more beneficial to move this fill out of the void, for every thousand cubic meters moved would result in an extra one ML of water passing through the turbines for power generation.

I) Plasshett Reservoir has a Water capacity of 67 GL, Lake Liddell has a water capacity of 150 GL, essentially a PHES system will turn either Plasshett Reservior or Lake Liddell into a giant battery

J) This water exchange proposal also has a system of transferring water into the Basin. see pages 76 to 83.

EVERY DROP COUNTS!

Universal Water Recycling

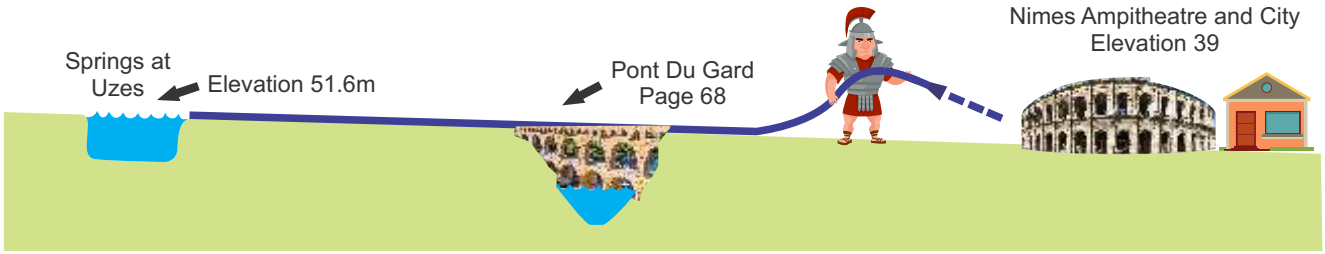
UWR

The accuracy of a water level is based upon Pascal's Law "Water seeks its own level"
Aristotle wrote and articulated that the water level in two Basins connected by a pipe must be the same

Almost 2000 Years Ago - Roman Water Transfer Pont Du Gard

Distance 50km

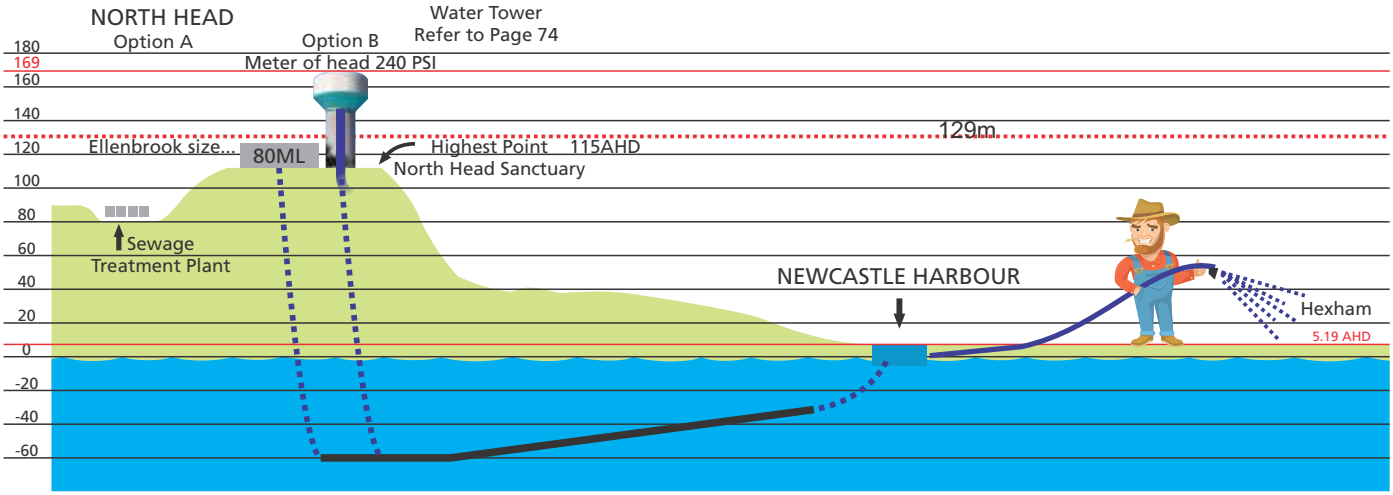
Descends in height by only 12.6m over entire length
Estimated water transfer 40,000m^3 (40ML/d)



Proposed Water Transfer North Head to the Hunter Valley

Distance 115km

Descends in height by between 124 to 163 metres over entire length
Estimated water transfer 400,000m^3 (400ML/d)



Please Note: This proposed 115km water transfer is just over twice the distance of the Roman transfer (Pont Du Gard Page 68). But it is 10 to 13 times higher and will flow through large Diameter low friction HDPE pipelines.
Also, the water transfer is 10 times greater at 400,000m^3 (400ML/day).

"Hydrogen Valley"

Below I believe is the best system to transform the Hunter into a climate leader in the production of hydrogen.

Facts; The reality to produce hydrogen as a fuel demands large volumes of fresh distilled water.

Production of Hydrogen requires 9 litres of water to produce 1kg of Hydrogen. 9000 litres of water to produce 1000kg of Hydrogen, 9 ML (9 million litres of water) to produce 1 million kg of Hydrogen.

For the Hunter to achieve a new sustainable hydrogen export industry and gain recognition as a climate technology super power is only a **pipe dream** unless it changes its water structure.

Our population is growing, the demand for potable water will only increase each year, Hunter Water is currently looking at wide range of future water options.

Total demand will outstrip supply around 2036, a hydrogen production industry for export will only add strain to our water resources bringing this date forward.

Solution is to change our water structure, "Water Security is the key."

The Bayswater Power Station uses around 70 Gigalitres of water per annum, the Mining Industries also uses large volumes of water per annum, both these industries use large volumes of water that with little treatment is of a potable grade.

We have the technology to design low - energy and low - filtration systems that can produce fit - for - purpose water, from waste water and storm water.

By implementing my proposal of supplying non potable water, from a sustainable water source, independent from drought, fit - for - purpose to industries such as Mining, Forestry, Mine Rehabilitation, Power Stations, Agriculture etc, we are **Water Banking** large volumes of a potable, higher grade water in Glenbawn Dam that can be gravity fed downstream via the Hunter River and used for both domestic and also for Hydrogen production.

Scheme 1 and Scheme 2 of my proposed water exchange project can provide all water needed to support all the above viably.

These two proposed water projects also eliminates the need of building expensive Dams and Desalination Plants which are both out of step with the Paris agreement, it also provides all water needed for the entire Hunter Valley.

Please read the volumes measured in Dam numbers on page 96 (Scheme 2) to verify this statement.

Twin 2000 HDPE Subsea Pipeline

The above proposed sub-sea pipeline route I believe would be a straightforward process of laying long lengths of HDPE pipelines along the sub-sea floor, stabilising, and maintaining this pipeline would not be an issue, the ocean depth offshore Sydney is only 60 metres in depth, offshore Newcastle is only 30 meters in depth.

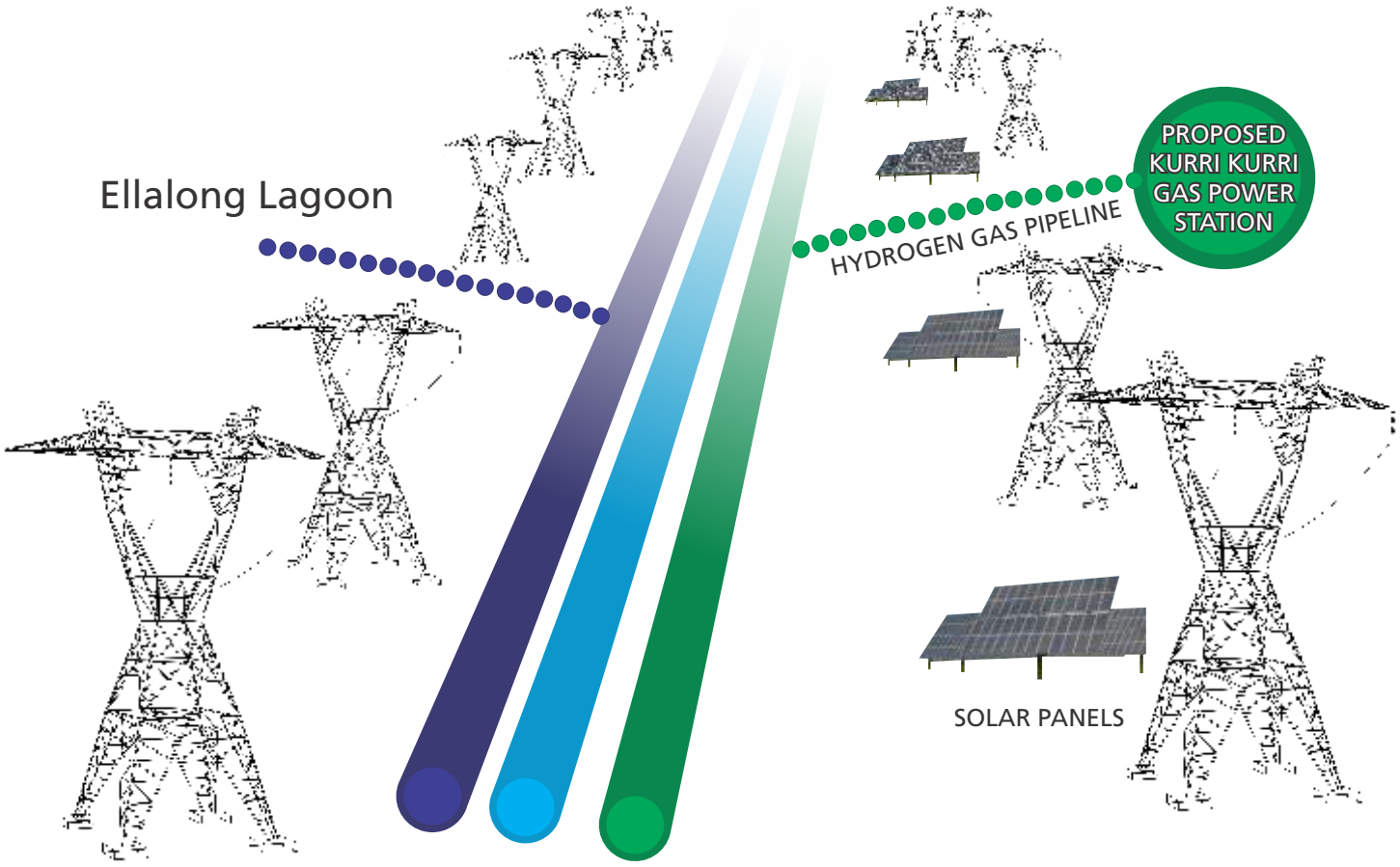
Please note, the 80 km sub-sea water pipeline from Turkey to Cyprus required engineers to design suspending it, tethering their HDPE pipeline to float 250 meters below the sea because ocean depths in some areas were 1,400 meters.

UWR

EVERY DROP COUNTS!

Universal Water Recycling

Green Hydrogen Utilising the Grid Corridor Water, Plus Renewable Energy 9 Litres of Water = 1kg of Hydrogen



- Fit-for-Purpose Water Pipeline
- Potable Water Pipeline
- Hydrogen Pipeline
- Alternative Gravity River Route Pipeline

Utilising Land Beneath the Grid Corridor for Renewable Energy

"Solar Farms Proposal Utilising The Energy Grid Corridor."

Utilising the land beneath the pylons on the energy grid for solar energy farms I believe this is an opportunity to achieve large volumes of green energy towards the production of hydrogen.

The NSW Government has a scheme to encourage home owners with incentives to place solar panels on their roofs, this results in cost savings on their energy bills.

A similar scheme could be implemented for the people that own units, business's, shops, manufacturing industries etc.

The NSW Government could offer incentives to the above group with costs savings on their energy bills by encouraging new investments in solar farms on land along or beside the grid corridor.

The NSW Government could also provide large tracks of land to large Energy Corporations to build, maintain large solar farms and battery storage in return for dividends for investors in green energy to the grid and in hydrogen production.

This proposal could also provide enough green energy to transform the proposed Kurri Kurri Gas Generator to run solely on hydrogen.

Pipelines Utilising the Energy Grid Corridor.

The sketch on the previous page shows 3 pipelines, one represents transferring hydrogen for export and to the proposed Gas Powered Plant at Kurri Kurri.

The second pipeline shows a potable grade water transfer pipeline providing water for domestic use and for hydrogen production.

The third pipeline transfers secondary treated water (fit-for-purpose water)

for the Power Station, Mining and Agriculture, etc.

Please note: This fit-for-purpose water pipeline on the previous page sketch has an option to detour from the Power Grid.

This alternative pipeline route has a gravity river system that will reduce energy costs and pipeline infrastructure costs by approximately 50 %.

Pages 97 to 102 shows a gravity river system, that can transfer this water up the valley to where it is needed north of Singleton to the Power Station, Mining and Agriculture sector.

UWR

EVERY DROP COUNTS!

Universal Water Recycling

Our Inland Rivers are Dying

- Our Farmers, Our Towns, and Our Environment are all in Crisis
- The Hunter Valley Wine Industry is a $500 Million Dollar Tourist Industry
- The Hunter Mining Industry Is Worth Billions to the Economy
- They Both Generate Thousands of Jobs

Conclusion

This is more than just a plan!

It is a solution.

It is an insurance policy.

It is a vision of what can be achieved.

It is a system that guarantees food security.

Vision

The establishment of a large Diameter Pipe Manufacturing Industry at Newcastle.

The Building of a 14 km tunnel at Murrurundi is the only transfer link from a dam on the eastern side of the divide.

Tree plantations, millable and for the environment on a massive scale.

Opex = Operating Expenditures

Gravity assisted sections x the volumes transferred plus the multiple energy options available, PHES, wind, solar, methane etc.

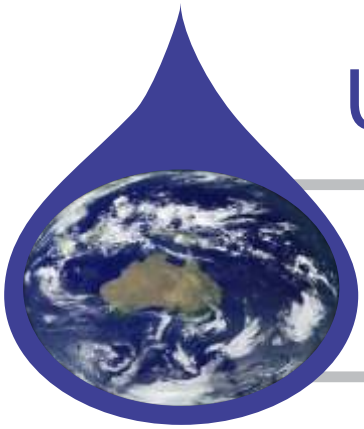
Capex = Capital Expenditures

Fixed assets.

The majority of the pipeline infrastructure costs already exist, in the $2.6 billion Assurance Miners Rehabilitations Funds, you can't rehabilitate mines without water.

Future benefits (Pipeline infrastructure will last 50 to 100 years)

Follow Israel's Lead in Recycling Water to 90%
OR
Wait for the Rains



Universal Water Recycling

EVERY DROP COUNTS!

UWR SCHEME 3

The following pages incorporates a two part flood mitigation system to reduce the impact of flooding along the Hawkesbury - Nepean River systems.

Part 1.

This proposal utilises the 27 km gravity twin pipeline from Warragamba Dam to Prospect Reservoir and diverts this water to Sydney Harbour which has a 55 square km area at sea level connected to the ocean.

Please note ; (this drainage system proposal would only be used in short periods of times to reduce water levels in Warragamba Dam prior to rain events, length of time will be governed by the height and water usage of Prospects Reservoirs 33,330 ML capacity.

Part 2.

This proposal also involves flood mitigation by transferring water from Warragamba Dam to Mangrove Creek Dam.

It also encourages support to raise the Mangrove Creek Dam wall by 25 meters.

This would increase the storage capacity in Mangrove Creek Dam from 190,000 ML to 420.000 ML.

Warragamba Dams large catchment area of 9,050 square kilometers would also now in this proposal be linked to the Mangrove Creek Dams catchment.

This water proposal is also envisaged as an interregional water sharing system between Sydney, the Central Coast and the Hunter.

Part 1.

I have enclosed in the following pages, google map pictures of a proposed twin pipeline route.

This proposed pipeline route would start near the end of the existing 27 km pipeline at Prospect Reservoir marked on the following pages.

Infrastructure would be needed in the way of a twin pipe diversion system to divert the existing twin pipeline to the proposed twin pipeline in times when flood mitigation is necessary.

This proposed twin pipeline route I believe takes a less evasive and less costly route by laying pipelines beneath park lands and corridors, and following the creeks, (for example the Girraween Creek travels under the M4 and the Great Western Highway) , by laying the twin pipeline on the floor of the Parramatta River travels under many bridges, it may not be a strait line with more pipeline required, but the construction time frame and costs are less than tunnelling under streets and houses.

The proposed on land pipeline could be Steel or GRP, the sub sea section would be HDPE.

I believe a twin two meter in diameter pipeline would be the best option, with a water flow capacity per pipeline of 154 cubic meters per minute, 9258 cubic meters per hour, 222193 cubic meters per day, please refer these flow rates to the bottom of page 72.

Please note, water flow rates may need to be reduced during high tide.

The proposed sub sea pipeline route will follow the Parramatta River under all bridges as far as needed towards Sydney Harbour.

This is needed to allow this water to disperse without causing flooding.

I believe a suitable location on land would be needed at the end of these 2 proposed pipeline.

It is envisaged that the proposed twin 2000 mm diameter pipeline would continue along the Parramatta River towards the harbour approximately 10 to 15 km down stream from the Parramatta wharf.

It is also envisaged that these pipelines will emerge out of the water kilometres apart and re - enter the water through a concrete spillway to separate, Chanel and spread to dissipate the water.

Part 2.

One 2000 mm HDPE pipeline before entering the spillway would require a separate connection point to divert water when flood mitigation is not needed to a reduced smaller 1.2 or 1000 mm HDPE pipeline.

It is proposed that this pipeline will continue under the Sydney Harbour Bridge and continue to the harbour entrance around North Head and travel to The Entrance, a total distance of around 70 km.

Please note that laying HDPE on the sea can be laid in long lengths and is the most cost efficient system, float, fill, sink.

From The Entrance the proposed pipeline will travel approximately 15 km, along the floor of Tuggerah Lakes and then follow a green corridor to Mardi Dam.

Infrastructure would be required to connect this proposed pipeline to the 1000 mm 19 km existing pipeline to Mangrove Creek Dam.

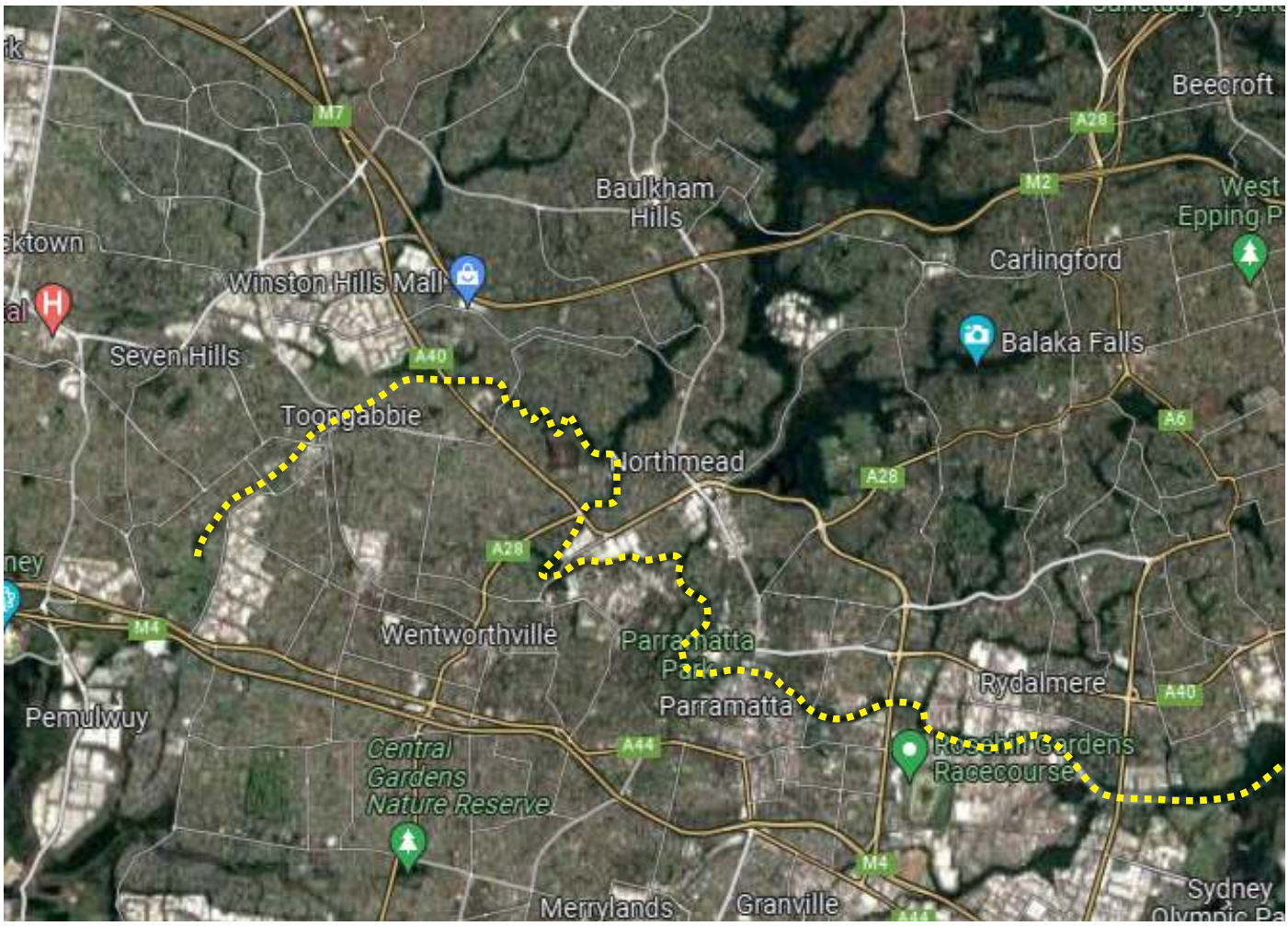
Please examine the 4 following google maps showing the proposed pipeline route.

Please also examine the last page showing a sketch of this proposal.

The benefit for Sydney is that water stored in Mangrove Creek Dam once needed in a drought event, by closing the existing twin 27 km pipeline from Warragamba at Prospect Reservoir, water gravity fed from Mangrove Creek Dam is already right there flowing into Prospect Reservoir.

Benefits for the Central Coast and the Hunter, access is already connected that can provide extra water in a drought event in our region.

Proposed Pipeline Route

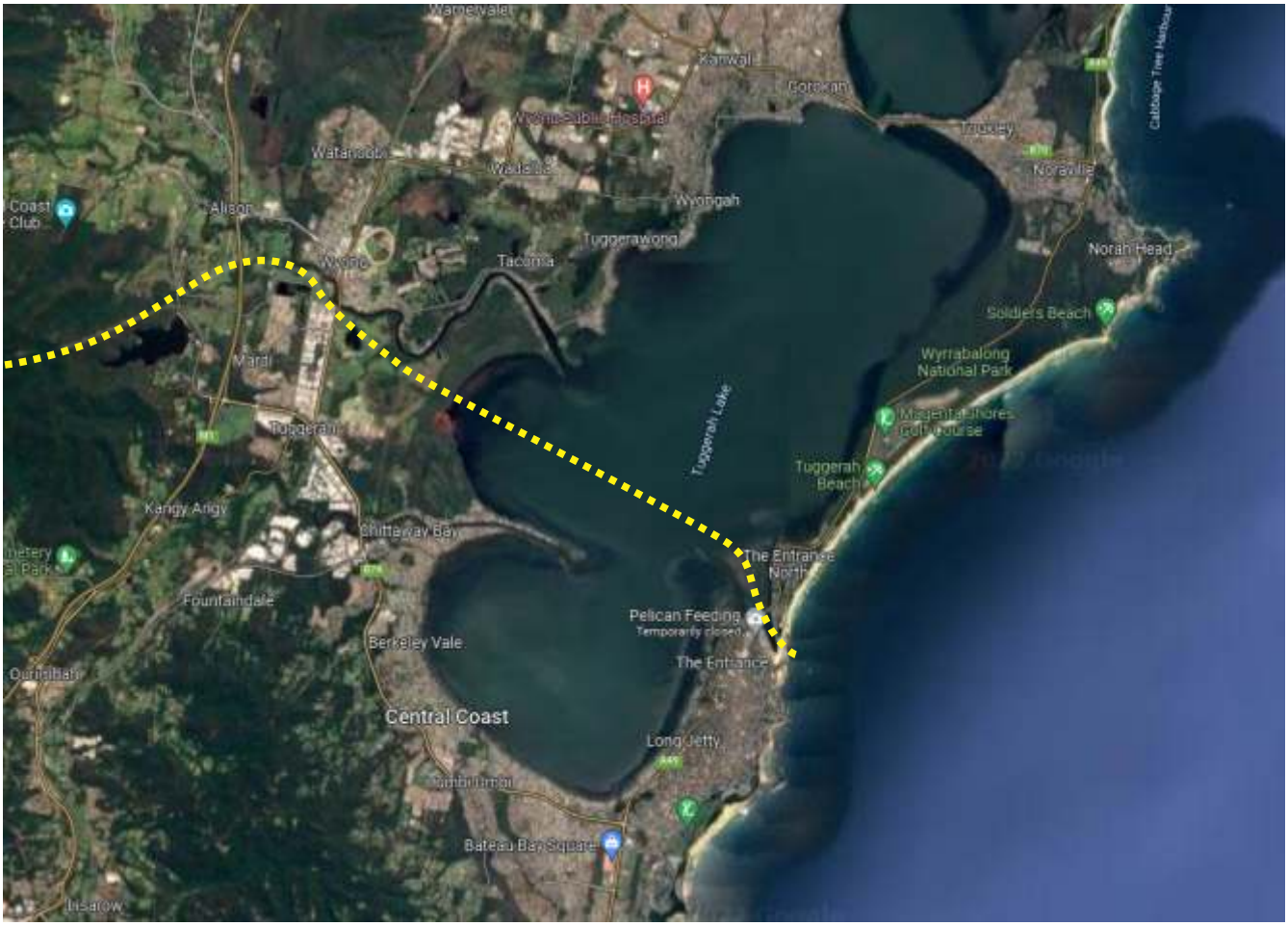


Proposed Pipeline Route

EVERY DROP COUNTS!

Universal Water Recycling

Proposed Pipeline Route



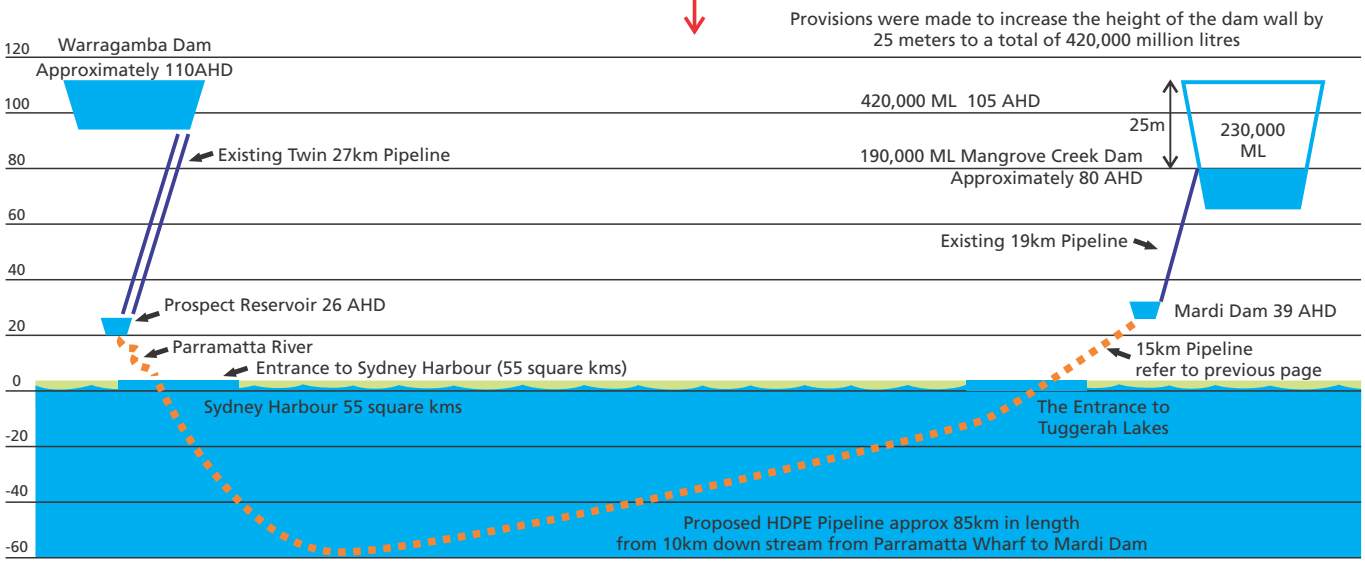
Proposed Pipeline Route

EVERY DROP COUNTS!

Universal Water Recycling

The accuracy of a water level is based upon Pascal's Law "Water seeks its own level"

Aristotle wrote and articulated that the water level in two Basins connected by a pipe must be the same



Facts on the above joining of Warragamba Dam to Mangrove Creek Dam by a single pipeline would result in an inter-regional water sharing proposal between Sydney, the Central Coast and the Hunter.

Provisions are already in place to raise the Dam wall by 25 meters.

This will increase the volumes by 230,000 ML.

Please note Chichester Dam Volumes = 18,356 ML

This increase represents 12.5 Chichester Dam in volumes.

Mangrove Creek Dam has a small catchment area of 101 square kms the pipeline joining will provide access to Warragamba Dams catchment of 9,050 square km.

Turkey laid a 80 km sub-sea HDPE to provide water to Cyprus with ocean depths in some areas more than a km, our ocean depths shallow around 30 meters to 60 meters.

The advantages of this water sharing proposal by a single pipeline joining Sydney to the Central Coast which has a pipeline to the Hunter offers real water security and would save the NSW Government and the NSW taxpayer wasting $ 200 million because the Belmont Desalination Plant would not be needed, in a severe drought water from the Sydney Desalination Plant can provide water to the Central Coast and the Hunter via this pipeline.

Open Letter

from Joseph Taranto

November 9 2022

RE : " A flood mitigation system for Warragamba Dam to reduce flooding in the Hawksbury and Nepean River system."

To Whom It May Concern :

There is a solution to lowering the maximum capacity of Warragamba Dam to reduce the immediate risk of flooding, while ensuring a way forward of replacing the lost capacity in Sydney's drinking water.

This proposal would result in protecting the Aboriginal Cultural Heritage Sites and The Blue Mountains World Heritage, UNESCO – protected bushland, at a cost far less then raising the Warragamba Dam Wall.

The NSW Premier Mr. Dominic Perrottet and his team was on the news recently pushing forward to raising the Warragamba Dam Wall.

The Leader of the Opposition Mr. Chris Minns was looking at all potential suggestions regarding flood mitigation in the Hawksbury - Nepean River." (smh,October 4 2022)

Below is an alternative that you may not be aware of, it would result in the flooding of many hectares of native forests in the Mangrove Creek catchment area, however this is not world heritage listed, also this could be offset by the planting of new forests (preferably for Koala Habitat) as a condition of this proposal.

As for Aboriginal sites, there are some in the upper Mangrove Catchment, I am unable to find information regarding these sites, are they above or below a water increase height of 25 meters.

At present we are now into our third La Nina weather event.

Warragamba Dam has flooded again in the Hawksbury and Nepean River Systems.

My goal is to gain support to have this alternative proposal with all other alternative options placed on the table to be evaluated by an independent panel off water experts and engineering analysis to determine the best flood mitigation solution.

This proposal utilises what Aristotle has written and Pascal's Law.

The proposed water transfer concept would result in 230,000 ML of water storage transferred from Warragamba Dam to Mangrove Creek Dam without pumping.

This proposed **missing single 2 way pipeline link** which joins both dams is connected to the twin 27km pipeline from Warragamba Dam at Prospect Reservoir and can provide 230,000 ML of drinking water to Sydney when needed by gravity from Mangrove Creek Dam via a pipeline connection to the 19 km Mardi Dam pipeline.

This would allow a lowering **adjustment** of the water height in Warragamba Dam by 230,000 ML.

Please note that provisions are in place to raise Mangrove Creek Dam wall by 25 meters, bringing its volume capacity from 190,000 ML to 420,000 ML.

Please also note Sydney Harbour has a volume capacity of approximately 500 GL, this water transfer flood mitigation **buffer solution** proposal of 230 GL of water from Warragamba Dam to Mangrove Creek Dam represents in volumes almost half the water capacity of Sydney harbour.

Please further note the Mangrove Creek Dam has a catchment of just 101 square kms, by the linking of the two Dams via this single pipeline proposal, Mangrove Creek Dam, will now have access to Warragamba's Dams catchment of 9,050 square kms.

A connection of these two dams will result in water seeking its own level, when Mangrove Creek Dam is full the pipeline is closed at Mardi Dam, resulting in 420,000 ML stored until needed.

Furthermore I believe with collaboration between Sydney Water, Gosford / Wyong

Council' Water Authority and Hunter Water this proposed pipeline link would join Sydney,the Central Coast and the Hunter to a inter-regional water sharing strategy.

Lowering of Warragamba Dam can now commence.

There are several options to achieve this.

One.

The Central Coast and the Hunter are connected via the Mardi to Warnervale pipeline to transfer water from one region to the next during drought events, the Warragamba to Mangrove Creek pipeline proposal can also provide water to the population of the Central Coast and parts of the Hunter, this proposal will result in water security, keeping the Central Coasts and the Hunter Dams with more volumes of storage water in their Dams, Warragamba Dam would now not only be servicing Sydney but the Central Coast and parts of the Hunter with its water.

I also believe with a passion that this water sharing proposal would also help support water security for the Hunter and the Central Coast's population and could also support the production of Hydrogen in the Hunter – Central Coast Renewable Energy Zone.

This is a system of lowering the water level in Warragamba Dam by utilising its water wisely.

Two.

Another alternative to lowering the water level in Warragamba Dam fast (if needed) is to close the adjoining pipeline at the Central Coast leaving the pipeline open and draining it directly into the ocean at sea level at an appropriate location any where from the Entrance on the Central Coast to Sydney Harbour without the risk of flooding.

To see a sketch of this proposal by looking at just one page please go to page 124 is a sketch of this proposal.

I have been researching water projects for more then a decade and have been in correspondence with large corporations and engineers, here in Australia and overseas.

Please examine my website, Scheme One and Scheme Two will show the scope of my research.

Just a few facts

There is a 80 km HDPE sub sea pipeline supplying water from Turkey to Cyprus.

A water level is the most accurate levelling system over long distances.

Please note, the distance between Warragamba Dam and Mangrove Creek Dam in a straight line is approximately 88 km, please refer to information on a water level on page 12.

The water in Sydney Harbour is the same height as the water in Newcastle Harbour.

The earth is not flat.

No engineer can dispute what Aristotle and Blaise Pascal have written.

I would like the opportunity to meet or correspond with Councils, the Community,or Groups to discuss this water transfer proposal in more detail, my email is waterforthebasin@outlook.com.au

Looking forward to your reply.

Yours Sincerely
Joseph Taranto
Manager
Universal Water Recycling