REPORT

NORMAN DISNEY & YOUNG

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Dolphin Blue Development

INFRASTRUCTURE PROVISIONS

Yamba NSW

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NDY QA SYSTEM

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1. INTRODUCTION

1.1. PURPOSE

Rider Hunt Terotech has commissioned NDY to analyse, detail and recommend necessary infrastructure requirements for the proposed Dolphin Blue Development. This report will outline existing services and their ability to satisfy the additional capacity required due to the redevelopment of the site.

This report has also been produced to offer a range of alternatives for the various building services on site. The proposal allow for systems outlines, comparisons and recommendations relating to the most appropriate systems to be implemented.

1.2. OBJECTIVES OF STUDY

The objectives of the study were to:

- Assess the existing services infrastructure to site
- Assess the requirements to satisfy the proposed redevelopment
- Make recommendations and provide cost estimates for alterations to the existing infrastructure services
- Offer alternate building service solutions highlighting advantages and disadvantages of each system for use in the project
- Make recommendations and provide cost estimates for the proposed services for use in the project

1.3. AUTHORITY

Authority to undertake this report was provided by Jimmy Ling of Jones Lang La Salle on 18 October 2006.

1.4. INFORMATION SOURCES

Survey Drawings	Gulaptis & Smith – Drawings MC052964 Gas/Sewer/Stormwater/Water
Potable Water	North Coast Water
Hot Water	Energy Technologies Pty Ltd
	Rheem Hot Water Heaters
Gas Reticulation	Elgas
Rainwater Harvesting	H_2Enviro Rainwater Tanks
Clarence Valley Council	Sustainable Water Development (Adopted 20 July 2004)

1.5. OUTLINE

This report provides an assessment of:

- An overview of the existing service infrastructure
- An analysis of the existing service infrastructure
- An overview of the proposed service system
- Recommendations relating to the systems proposed for implementation

1.6. TERMINOLOGY

The abbreviations and notations referred to within this report relate to the following:

LPG	Liquefied Petroleum Gas

1.7. REVISION HISTORY

Revision		Date Issued	Comment
First Issue	A	05/05/06	Draft
Second Issue	B	08/06/06	Revised Draft
Third Issue	C	10/07/06	Final
Fourth Issue	D	10/08/06	Final

2. HYDRAULIC SERVICES

2.1. EXISTING INFRASTRUCTURE

2.1.1. Potable Water Services

Potable water is supplied to the site by North Coast Water. At present there are two water mains within Yamba Rd. The first main is 300 mm diameter. This main also carries the three (3) current connection points to the Dolphin Blue Holiday Resort. This main also services the road hydrant points along Yamba Rd.

A second main water supply is also available in Yamba Rd. The second supply is a 375 diameter main which was commissioned in 1986.

Current Capacity

At present the site is serviced by three (3) connection points. These points correspond with the proposed staging lines of the development. The point sizes and meter nominations are as follows:

Meter No.	Water Connection Point	Meter Reference	Meter Size	Pipe size
1	Eastern side of site	MC7442	32mm	50mm
2	Central location along Yamba Rd frontage	D736	40mm	50mm
3	Western side of site	MD8950	40mm	40mm

From initial information these water connection points will require further upgrades in size in order to meet the increased demand on the site.

These connections are tapped from the 300 diameter main located in Yamba Rd.

The connection locations of these points meet the staging requirements proposed for the Dolphin Blue Development.

Pressure and flow enquiries conducted were conducted at the site on 15 May 2006. The available pressure at designated flows is as follows:

Flow (L/s)	Flow (L/min)	Available Pressure (m head)
5	300	65
10	600	63
15	900	57
20	1200	52
23 (maximum)	1400 (maximum)	50

The maximum demand will satisfy the requirements of flow in relation to the fire services for hydrants and hose reels so long as:

- Unsprinklered area fire compartments remain under 5,000m^2
- Open yard storage remains less than 9,000m^2 of yard

Additional pumping will be required for the fire and potable water services to overcome pressure loss in the pipework across the site.

On discussion with Jim Fear of North Coast Water the existing main and the water volume available will be sufficient for the Dolphin Blue Development.

Application to North Coast Water will be made on finalisation of the architectural plans.

2.1.2. Sewer Services

Sewer is supplied to the site by North Coast Water. At present there is a 150 diameter sewer mains within Yamba Rd. This main also carries two (2) current connection points to the Blue Dolphin Holiday Resort.

The existing sewer service drains from points servicing the van, amenities and facilities within the park. The drainage is undertaken via a gravity system and falls to meet the board sewer which is located in Yamba Rd.

At present there are two connections points to the board sewer.

- Stage 1 Residential
- Stage 2 Residential

Current Capacity

Due to the proposed layout of the development, all on site drainage would require rectification and re-routing. It is recommended that the existing system be disused and replaced with new. Application to North Coast Water for the proposed connection will need to be undertaken to determine if there is the necessity to upgrade the existing sewer service. On discussion with Greg Mashiah of North Coast Water the existing main and the volume available should be sufficient for the Dolphin Blue Development. At present the sanitary peak load accommodates approximately 1,200 people within the caravan park. As the project currently stands, there is an expected peak load of 1,300 people on site once the works are completed. This additional load should not have a major effect on the infrastructure requirements.

An additional connection will be required to satisfy the Resort area. Connection is subject to final building layouts and sufficient invert levels to obtain gravity connections.

Application to North Coast Water will be made on finalisation of the architectural plans. Confirmation of the service requirements will be made at this time.

2.1.3. Gas Services

LPG is currently reticulated through the site via a tank supply. At present a one storage tank supplies gas to the various sites located throughout the Blue Dolphin caravan park. The LPG is reticulated to barbecue areas, communal areas and hot water plant servicing the amenities. The existing tank is leased from Elgas. This tank is used for personal LPG bottle filling in addition to the reticulation.

The survey of the gas system nominates the in-ground gas reticulation as polyethylene.

There is no natural gas reticulation provided by a utility within Yamba for possible connection.

Current Capacity

The existing capacity has been designed to accommodate the current demand required by the caravan park. LPG is supplied to site via Elgas. Gas is supplied to the Yamba area by Elgas from their Grafton depot.

The existing reticulation system would not satisfy the proposed development for the site. Additional capacity would be required to ensure that the additional load is met. Alternate use for the Elgas storage tank could be arranged for the resort section of the development for the use of the facilities. Gas supply would be beneficial to areas such as commercial kitchens, spas and catering facilities.

2.1.4. Grey Water

A proposal by North Coast is in early design phase for a sewerage treatment plant which will provide non-potable water to the surrounding properties. The Dolphin Blue Redevelopment has been touted for initial connection to this system. As such all toilet flushing and irrigation will be via the non-potable water system. No further details are available at present.

2.2. PROPOSED INFRASTRUCTURE

2.2.1. Potable Water System

Cold Water System – Local connection supply

Local connection supply will utilise the three existing connection points servicing three distinct areas:

- Residential Stage 1 – (Meter 1)
- Holiday Apartments Stage 2 – (Meter 2)
- Residential Stage 3 – (Meter 3)

The proposed main water connections for potable water are as follows:

Meter No.	Water Connection Point	Proposed connection size	Existing connection size
1	Eastern side of site	100mm	TBC
2	Central location along Yamba Rd frontage	100mm	50mm 40mm (meter)
3	Western side of site	65mm	50mm 32mm (meter)

Cold water will be provided to the project via three dead leg systems operating independently of each other. Each existing connection point to the authorities mains will be upsized as required to cater for proposed requirements.

Each metered section will be provided with their own pumping equipment, isolation valves and branch lines.

Hot Water System

Hot water will be provided via a Gas hot water system. Stage one hot water will be provided by instantaneous gas units located with in plant rooms, hot water will reticulate from each unit to the fixtures within the apartment. A separate unit will be provided for each apartment.

2.2.2. Gas

Gas is provided to the entire site through the use of on site LPG storage tanks. Two (2) storage tanks will be located throughout the site as required (see Figure 2). From each storage tank, a gas reticulation network is buried in ground and piped to each apartment block and villa. Connections from the main reticulation systems will be metered and the gas charged on a user pays basis.

Figure 2. Elgas Bulk Storage System

The storage tank network system is available through the local supplier Elgas. Housing estates within the region have utilised Elgas to provide the infrastructure at Elgas' expense. This system is available where the sale of gas will be profitable for Elgas to act as a utility. In order to achieve this basis of installation:

- All apartments must sign on as gas users
- The number of apartments must be great enough for the sale to be profitable for Elgas

If the above criteria is not met for Elgas to carry out the design and installation of the infrastructure pipework, this would be designed and installed as part of the project works.

2.2.3. Sewer

There is the possibility of two styles of system. These systems are:

- General Sanitary System
- Grey Water System
- Black Water System

Whilst black and grey water systems are currently available, they are not deemed as feasible for this project. As such a sanitary system designed to AS3500.2 will be recommended for design.

2.2.4. Stormwater (Roof drainage only)

Drainage from all of the roof areas will generally be via an eaves gutters and downpipe system. All water captured from rainwater will be directed via the downpipes to a localised rainwater harvesting tank for re-use located within the basement areas. The tanks will be sized to the requirements of

BASIX for non potable water reuse within the residential areas. Water obtained via rainwater harvesting will be re-used within the apartments for toilet flushing.

Harvested rainwater water will be drawn from the tank through a pump system located within the basement parking area of each building. From this point rising mains will transport the non potable water to the proposed amenities to be supplied with non-potable water. These amenities include toilet flushing and washing machine facilities.

In the event of low water volume within the rainwater tanks, a mains water diverter will divert the supply from the rainwater tank to mains water. The mains water supply will remain in effect until there is adequate supplies of harvested rainwater.

3. ELECTRICAL SERVICES

3.1. EXISTING INFRASTRUCTURE

At present the current facility is provided with 3 separate low voltage supplies from Country Energy's local low voltage network on the Yamba road as detailed below:

- 250A, 3 phase supply from 200kVA pole mounted substation supplying power to the main switch board A located near the manager's residence
- 200A, 3 phase overhead supply form Yamba road to the main switch board B and C
- 125A, 3 phase underground supply to Switch board D

This total capacity is much below our projected maximum demand of the new facility.

The switch boards A, B and D are comparatively new and in reasonably good condition. However, due to the location and size/capacity of these boards, these can not be utilised in the new development. MSB C is old and in a poor condition.

Switch board A is located in the Stage 1 Eastern end development area, near the existing manager's residence. This switch board supplies majority of the load of the existing caravan park which is proposed to be retained during the stage 1 development. To maintain the supply to this existing facility, it is proposed to relocate this main switch board adjacent to building in stage 2 development area, as part of the enabling works.

Switch board D can be removed during the demolition work for stage 1.

3.2. PROPOSED INFRASTRUCTURE

The preliminary maximum demand calculation indicates a total load (including resort and residential facilities of stage 1 and 2 together) of approximately 2880kVA. The preliminary maximum demand calculation has been submitted to Country Energy. From our discussion with Country Energy and as per Country Energy's network standards, we understand that this load can not be supplied from Country Energy's low voltage network in the area. A high voltage feeder will be required to be installed from Country Energy's high voltage network to site and then distribute by installing substation(s).

Based on the preliminary load calculation, we propose to install 2 off 1500kVA Kiosk substations within the facility to supply this load, pending Country Energy's final approval.

High voltage cable will be installed under ground from the Yamba road to the two substations. It is proposed to connect the substations by ring main connection to increase the reliability of supply.

Two separate main switch boards will be installed in building adjacent to the substations to reticulate power through the facility by underground low voltage cables. Electrical meter rooms will be installed in each of the residential blocks.

All the new roads internal to the development will be provided complying with AS 1158 requirement. Energy efficient lighting will be considered for both internal and external lighting. Use of solar panels for external lighting will be evaluated during the detail design stage to check feasibility.

3.2.1. Metering Arrangement

It is intended to keep the reticulation system and the metering for the resort facilities and residential areas separate (even though a common substation may be utilised to supply power to the resort and part of the residential development).

Resort

It is envisaged that one Electricity Retailer's meter will be installed in the resort main switch room which will measure all the power consumed by the resort including those for the villas/units and retail shops/restaurants, i.e. the entire resort will be treated as a single entity. The resort owner/operator

would be able to buy bulk electricity. They will also be able to select the preferred retailer from a wide range, based on the lowest tariff.

In this case, the retail shops and restaurants within the resort will have to be provided with the check/private meters and the resort operator will be required to regularly read the meters and charge the tenant's accordingly.

However, if preferred by the resort operator, Energy retailers meters (in lieu of private meters) can be provided for these shops. In that case, the retailer will send the bills directly to the tenants without any involvement of the resort operator.

We haven't envisaged any private/check meters for the individual villas/units in the resort as these will be maintained and operated by the resort operator. If however, any such meters are required , these can be easily incorporated within the design.

Residential Development

Two different options are available for the electricity metering for the residential development

Option 1

Provide separate electricity retailers meters for each unit/villa/penthouse etc and separate meters for the common areas (which is payable by the body corporate). This is the conventional arrangement adopted for majority of the residential development. In this case each owner/tenant can select their preferred retailer and pay the electricity bill directly to the retailer. However, each owner/tenant and body corporate will be charged at a higher tariff as applicable for small consumers of electricity.

Option 2

Provide electricity retailer's meter at the main switch board to measure total power consumption for the entire residential precinct. Private meters will be required to be installed for each of the units/villas/penthouses to measure their consumption. In this case the Body corporate will have to buy the total electricity consumed by all units/villas/penthouses and common areas (which belongs to the body corporate) from the body corporate's preferred electricity retailer. This electricity bill can then be divided among the various units/villas etc according to the private/check meter reading.

The advantage for this arrangement is that due to bulk buying of electricity, lower rate will be applied. Therefore the individual owners/tenant's will have to pay less per unit of electricity consumption.

The disadvantage is that Body corporate will either have to read all the individual meters (in this case approximately 240 odd meters on a regular basis and then have to split the bills accordingly or they will have to employ an independent party/company to carry out this work for them. It is envisaged that the electricity consumption for the common areas (e.g. corridors lighting, external lighting, lifts, pool plants etc) is not going to be substantial for this development, therefore the total saving due to this arrangement may be nominal for the body corporate.
Smart meters can be installed along with relevant software so that all the meters in different blocks/units can be connected to a central computer and all the meter readings can be collected by a communications network. In this case the body corporate will be able to down load the meter readings over the network and will be able to produce the bills from this software. However, the initial cost of installation of all communications cables, procurement of intelligent meters and soft ware will be substantial.
The electricity supply regulations prohibits “on selling” of electricity by building owners (in this case - body corporate) to make a profit. Therefore, an accurate split of the electricity bills among the various unit owners will be required without making any profit from this by the body corporate. (However, our understanding is that electricity retailers are not subject to these regulations.) Also, disputes may cause by inaccurate meter readings (if calibration of meters are not carried out in regular intervals) and if high quality/accuracy CTs and meters are not used.

We therefore recommend that individual residential units be installed with electricity retailers meters in lieu of check/private meters. The metering arrangement for the residential development can be finalised during the detail design stage.

3.2.2. Alternative Power

In addition to the power received from Country energy the Renewable energy generation e.g solar or windy energy will be further investigated for suitability:

3.2.2.1.Solar power

Yamba has a reasonable level of solar energy incident upon it. This resource can be utilised by a solar panel system to input energy into the grid. Alternatively, the solar resource can be used to power a standalone electrical equipment (e.g external pole lighting) independent of the grid.

It should be noted that incident solar energy is not constant throughout the year (i.e hours of available solar energy varies from summer to winter months). Hence, the level of energy required from a solar system is dependant upon the period that requires the most energy. For a grid connected system, this item is not of great importance since the grid can be used as a back up supply if required. However, the season upon which the greatest energy is required is of importance for a standalone system. This issue is generally overcome by increasing the battery back up requirements within a standalone system and by aiming the photovoltaic panels to generate peak energy during the critical seasons.

To achieve maximum energy output from a solar panel system, it needs to be placed in an area that faces due north and does not have shadow upon it throughout the year. Hence, a sun study would need to be performed to ensure that trees etc do not cast shadows over the system.

Utilisation of solar panels for external lighting (e.g street lighting and pathway lighting) will be further reviewed in the detail design stage and lighting calculations will be carried out to check compliance with AS1158 for selected areas.

Solar panels can be installed onto individual pole lights along with battery and charging system, effectively allowing the pole lights to be standalone i.e. not connected to the main electricity supply.

The solar panels mounted at the top of the pole, converts solar energy to electricity and charge the batteries during the day and the batteries supply power to the pole lights during night. Generally, the batteries for pole lights, which provide power to the light for a period of up to six (6) days with no effective sunlight. Based on the NASA information, the worst period for Yamba with very little effective sunlight is April which has approximately 6.65 days of little sun in April. Hence, the battery back up ties up quite well with the worst month.

The panels can support a maximum of 35w of lamp per pole. The light output per pole is adequate for pathways only (with low lux requirement) based on the current Public Lighting Standard AS1158. The use of these lights should therefore be limited to high visibility areas in order to have maximum impact with limited cost. It is not cost effective to install solar lighting poles for **all** external areas, especially in areas requiring a high light output, (due to low wattage of lamps and therefore low illumination output, shorter spacing of poles would be required)

A solar panel system can also be implemented within the site (e.g roof of buildings) with grid connection.

This system generates electricity and feeds it back into the Supply Authority grid or the excess energy is consumed on site. When the excess energy is returned to the grid, it is effectively credited to the generator which is the site and the power bill decreases.

The cost of installation of a grid connected solar power system is considerably high - at present for a kw of power generation and requires approximately $10m^2$ of area/kW of solar panel system .

Note that solar panel systems can be installed in many ways. For example, they can be installed in a field or can be installed on a roof. Roof systems have the added financial advantage of taking the place of roof coverings, effectively decreasing the system cost.

Based on the NASA information, Yamba has a wind resource of approximately 3 – 6 m/s present for approximately 60% of the year , 7-10 m/s for 22% of the year and winds in excess of 10m/s for approximately 6% of the year. This appears to be a promising from a wind energy perspective.

However, it can not be inferred from this information that the proposed development site has an equal wind resource. Wind is highly dependant on the terrain and may not blow in all areas evenly. Terrain can influence wind speed and can create high wind turbulence areas that cannot be effectively utilized by a wind turbine.

Wind energy is also directly proportional to the cube of the wind speed i.e. wind speed doubles, energy output goes up by eight times. Hence, a relatively constant high wind speed is preferred for wind power generation. Any drop is wind velocity, affects the output energy substantially.

Unlike a solar resource, which effectively is present even on the cloudiest of days, albeit a low levels, a wind resource, may at times be not present at all. Based on this, detailed and lengthy site measurements would be required to ensure the adequacy of the wind resource at the site and to review suitability of wind power generation at site.

One option that is available to avoid this is to review the site, perform short term wind speed measurements and install a small wind turbine to limit the initial wind turbine capital outlay but to initially install adequate footings for the possible final tower size and adequate underground cables to accept the possible final increased power if the wind turbine is increased in size at a later date. Logging instruments can be installed on the initial turbine to track conditions etc to allow consideration of upgrading the installed turbine at a later date.

3.2.2.2.Rebates

Discussions can be entered into with SEDA for possible Community rebates that may be applicable to any selected renewable energy resource implemented. Further rebates can be obtained from the purchase of Renewable Energy Certificates from the Supply Authorities.

4. COMMUNICATIONS SERVICES

4.1. EXISTING INFRASTRUCTURE

At present the current facility is provided with lead-in copper cables from Telstra's local network on the Yamba road. This is not sufficient for the number of proposed apartments in future.

No Satellite facility was located in the existing installation during our inspection.

4.2. PROPOSED INFRASTRUCTURE

It is proposed to install a building distributor for the resort facilities with a lead-in cable from the local Telstra network. From the distribution frame, cables will be distributed to each of the resort buildings and villas.

The Building distributor room will also accommodate the fibre lead-ins including frames and racks, SMATV (Satellite Master Antenna Television System) headend, Video on Demand headend, PABX and TPF, POS Headend and Property Management System headend. The room should be ideally located central to the site (as all services emanate from this point). An alternative location would be near the road for lead-in services.

Communications system for the resort and residential facilities will be kept separate.

It is proposed at this stage to install separate copper and/or Fibre lead-in cables for each residential block from the Telstra local network. This will finally be decided based on detailed discussion with Telstra. Each block will require a building distributor room to install the copper and/or fibre frames and racks.

Separate MATV/SMATV system will be installed for each block. The head end for this system is proposed to be installed in the building distributor room for that building.

Video intercom facilities are proposed to be installed for the apartment blocks.