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INT

## Water Servicing Strategy

**Job Number:**  
190057E

**Property:**  
Black Hill Development Site

**Applicant:**  
Coal and Allied

**Date:**  
November 2014

project management • town planning • engineering • surveying  
visualisation • economic analysis • social impact • urban planning

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## Document Control

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Issue No.	Amendment	Date	Prepared By	Checked By
A	Draft Issue to HWC	14/03/2014	JY	HW/ACA
B	HWC comments amended	23/04/2014	JY	HW/ACA
C	HWC comments amended	04/11/2014	JY	HW/ACA
D	Final Issue	23/01/2015	JY	HW/ACA

## Executive Summary

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ADW Johnson has been engaged by Coal and Allied (C&A) to prepare a local water servicing strategy for C&A's Black Hill Development Site to determine the water infrastructure required to service the development.

The proposed development is located south west corner of the intersection of the Sydney-Newcastle Freeway (M1) and John Renshaw Drive, Black Hill. The study area for the strategy includes C&A's proposed development site and a potential development site adjoining to the west. Ground elevations within the site range from approximately RL 12.0 m to RL 42.0 m AHD.

C&A's proposed development site is 183 ha in size which consists of approximately 154 ha of industrial development, with the remainder proposed as environmental conservation area. The proposed environmental conservation area will enable the existing creek and natural flow regime through the site to be maintained.

The development to the west of C&A's site is approximately 300 ha in size with approximately 191 ha of the site proposed industrial development. The total study area is therefore approximately 483 ha in size.

Water supply for the development will come predominantly from the Stoney Pinch Reservoir; however the area, which includes the site, is interlinked with the South Wallsend system. This strategy details two possible options for water supply to the study area, being Option A and Option B.

From the two options considered, Option B was discounted due to the significantly higher costs, complexity and the extended approval time, which would be required by RMS for an under bore of the Sydney-Newcastle Freeway (M1), to proceed with this option. The preferred option, Option A, proposes the following infrastructure and operation:

- Approximately 2,188 m of DN300 water main from the existing offtake from the DN1200 main located in the vicinity of John Renshaw Drive, to the south west of C&A's proposed development site
- Gravity fed single pressure zone (including two pressure reducing valves) water supply from the existing DN1200 main offtake and the proposed DN300 main

A Net Present Value (NPV) analysis of this infrastructure indicated the works have an NPV of \$1.63 million over a period of 30 years.

It is anticipated the DN300 water main within C&A's proposed development site will be required for any development to occur, and all other infrastructure within the potential adjoining western development will be required at a later stage. Construction of the DN300 water main will significantly improve security of supply for the downstream Maryland/Minmi area and ensure the existing level of service is maintained.



The loop created by the construction of the DN300 water main ensures that in the event of a break in the main, C&A's proposed industrial development and the potential adjoining western development will continue to be supplied by pressures exceeding 12 m. Further system redundancy and improved security of supply will be achieved by looping where practical, the internal reticulation water network.



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### APPENDICES

Appendix A	Correspondence with Hunter Water
Appendix B	Exhibits
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### EXHIBITS

Exhibit A	– Regional Plan
Exhibit B	– Local Plan with Aerial Photo
Exhibit C	– Zoning Plan
Exhibit D	– Environmental Plan
Exhibit E	– Option A Proposed Infrastructure
Exhibit F	– Option B Proposed Infrastructure

## 1.0 Background

ADW Johnson has been engaged by Coal and Allied to prepare a water servicing strategy for the Coal and Allied Black Hill development site.

### 1.1 DEVELOPMENT DESCRIPTION

Coal and Allied's (C&A) Black Hill development site is approximately 183 hectares (ha) in size, 154 ha of which is to be developed as industrial land. The proposed development site is situated to the south west of the Sydney-Newcastle Freeway (M1) and John Renshaw Drive intersection. Adjoining to the west is a proposed development which is approximately 300 ha in size, 191 ha of which is to be developed as industrial land. The C&A proposed development site and the proposed western development have been included in this strategy.

Figure 1 below shows the proposed Coal and Allied Black Hill development site.



*Figure 1: Proposed Black Hill Development Site*

C&A's proposed site is bound to the east by the Sydney-Newcastle Freeway (M1), to the south by existing rural land, to the west by rural landscape which is currently proposed to be rezoned as a mix of industrial and environmental conservation, and to the north by John Renshaw Drive. Appendix B contains Exhibit A which shows an overall regional plan, and Exhibit B which highlights the two developable areas.



## 1.2 PLANNING CONTEXT

C&A's proposed development is currently zoned pursuant to the Newcastle Local Environmental Plan (LEP) 2012 as a combination of IN2 (light industrial) and E2 (environmental conservation).

The rural land to the south of the site falls within the coverage of the Newcastle LEP, and has not been proposed to change from the current E4 (environmental living) zoning within the near future.

The land adjoining to the west of the C&A site is currently in the process of being rezoned to a combination of IN1 (general industrial) and E2 (environmental conservation). Appendix B contains Exhibit C which depicts zoning plan of the proposed site and the surrounding area.

## 1.3 STUDY AREA

The study area is located to the south west of the Sydney-Newcastle Freeway (M1) and John Renshaw Drive intersection. The site is bound to the east by the Sydney-Newcastle Freeway (M1), to the south by existing rural land, to the west by rural landscape land and to the north by John Renshaw Drive.

The topography of C&A's proposed development site is undulating with a valley and creek located through the centre of the proposed development. Ground elevations within C&A's study area range from approximately RL 12.0 m to RL 42.0 m AHD.

The study area includes both C&A's proposed development site in addition to the potential development adjoining to the west of C&A's site. The proposed western development is approximately 300 ha in size, with approximately 191 ha of land to be developed as future industrial land.

C&A's proposed development site and the potential western development site are shown on a regional plan in Exhibit A located in Appendix B, with a local plan providing an aerial photo of the site in Exhibit B.

## 1.4 PROJECTED DEVELOPMENT IN THE STUDY AREA

At present it is understood that Coal and Allied's site is the only proposed development which is zoned to be developed within the study area. It is noted however, the potential adjoining development to the west of C&A's site is currently undergoing a rezoning process to enable development of a similar nature to proceed.

As such, for the purposes of this strategy it is assumed that the development will be rezoned to the proposed combination of IN1 (general industrial) and E2 (environmental conservation) similar to the existing zoning of C&A's development site.

Development staging proposed for C&A's development site is in accordance with Section B3 of the approved concept plan – "Indicative Staging Plan". The modelling contained in this report has been based on the ultimate development as the construction of the development will occur as one stage.

It has been assumed that the potential western development site will not be constructed until 10 years after the construction of C&A's proposed development. As such this strategy





has been completed considering a Stage 1 which includes only the construction of C&A's proposed development and an ultimate Stage where both C&A's development and the adjoining western development by others have been constructed.

## 2.0 Options Development

### 2.1 POINTS OF CONNECTION AND AVAILABLE CAPACITY

C&A's proposed development site is located within the Chichester Trunk Gravity Main Water Supply System and is supplied predominantly from the Stoney Pinch Reservoir; however the area, which includes the site, is interlinked with the South Wallsend system. The Stoney Pinch Reservoir is located to the north west of the proposed site, approximately 2.9 km away. The existing water supply system is shown in Exhibit E which is located in Appendix B.

HWC has recommended two potential points of connection for the proposed study area. The first is a DN500 main located on to the north of the proposed development on John Renshaw Drive, the second a DN500 main located to the south of the proposed development located on Lenaghans Drive. There is an existing DN200 main linking these points which traverses the western development site. The existing DN500 on John Renshaw Drive joins into an existing DN900 to the east which joins into an existing DN1200 further to the east. The existing DN1200 runs on the southern side of John Renshaw Drive to the North of the proposed development. It is proposed to connect into the DN1200 main as there is an existing offtake which currently services this site.

HWC have indicated that as per the Maryland Minmi Water Servicing Strategy (HWC, 2006), a DN450 main is required to provide a second link between the main in John Renshaw Drive and the main in Lenaghans Drive. The second main is required to provide security of supply to the proposed development site and downstream stakeholders and ensure the existing level of service is maintained for the Maryland and Minmi areas. The preliminary servicing advice and relevant correspondence with HWC can be found in Appendix A.

In addition to the preliminary servicing advice, HWC have provided the information in Table 1 in regard to pressures within the vicinity of the development. These pressures have been adopted as the boundary conditions within the hydraulic model assembled for this strategy.

Table 1: HWC Supplied Water Pressures for the Study Area

Location	Ground Elevation (m)	Average Day Max Pressure (m)	Peak Day Min Pressure (m)	95 <sup>th</sup> percentile Min Pressure (m)
Near John Renshaw Drive	34.08	63.92	63.91	63.91
Near Black Hill Road	34.14	60.05	55.19	56.45

*Note: Refer to Appendix A for a plan showing the plan which was used to acquire the pressures at the two above locations.*

### 2.2 DESIGN WATER DEMANDS

Design water demands have been determined in accordance with *Water Supply Code of Australia, Hunter Water Edition Version 1* (WSA 03-2002-03).

The adopted water consumption for a light industrial development is as follows:  
 Light Industrial – 4,200 kL/ha/year (Table HW 2.1)

The water consumption values were applied to the estimated development yields to determine the design water demands for the study area. A summary of design water demands can be seen in Table 2.

Table 2: Water Supply Design Demands

Category	Base Annual Demand (kL/ha/yr)	Devel. Area (ha)	Diversity Factor	Peak Day Factor	Average Day Demand (kL/day)	Peak Day Demand (kL/day)	Extreme Day Demand (kL/day)
Light Industrial	4200	345	N/A	1.2	3975	4770	5485

Demands and factors presented in Table 2 are based on the anticipated ultimate development of C&A's proposed development site and the potential adjacent western development site which consist of 2419 ET over 345 ha of developable industrial land. The average day demand (ADD) and the peak day demand (PDD) for the ultimate development are 46 L/s and 55.2 L/s respectively. Appendix C contains detailed calculations of the demands in each category.

### 2.3 DESIGN CODE / OPTIONS ASSUMPTIONS

In developing options the design requirements specified in the *Water Supply Code of Australia, Hunter Water Edition Version 1* (WSA 03-2002-03) have been adhered to unless otherwise stated.

The number of ET for C&A's proposed development site and the adjoining western development site was calculated based on an allowance of 7ET/ha of developable industrial land.

Civil infrastructure has been sized for ultimate demands.

The proposed western development will be zoned light industrial and environmental conservation.

This strategy is limited to trunk and distribution pipework. Minor reticulation pipework has not been considered and may require additional hydraulic modelling as part of the staged development and once a layout has been determined.



## 3.0 Servicing Options

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Preliminary servicing advice has been received from HWC outlining two possible servicing options, for the supply of potable water to the study area.

From the preliminary servicing advice, two possible options were developed and examined as part of this servicing strategy. These options include:

- Option A: Construction of a DN300 main which is connected at two locations, one being an existing DN200 main traversing the western development site and one being an existing offtake from the DN1200 main located near John Renshaw Drive; and
- Option B: Construction of a DN300 main, connected to the DN500 main located near John Renshaw Drive and running parallel to the existing DN200 main traversing the western development site, with a cross connection into the existing DN500 main located in Lenaghans Drive.

Although both options require the construction of a DN300 trunk main, Option B will require approximately double the length of main resulting in a significantly higher cost compared to Option A. Furthermore, the connection point of the DN500 main is in Lenaghans Drive which is on the eastern side of the Sydney-Newcastle Freeway (M1). This has a substantially higher difficulty in construction, requiring an under bore beneath the carriageway and consultation with Roads and Maritime Services (RMS). As a result, Option B has not been further assessed as part of this strategy due to the difficulty and duration required for design acceptance, construction and exorbitant costs associated with this proposal.

Due to the available pressures at the points of connection and limited range of ground elevations throughout the study area, a single gravity fed pressure zone will provide service pressures exceeding a minimum of 20 m as specified in HWC guidelines. The ultimate development has been assessed on the basis of a 2419 ET demand.

Option A is detailed in the following section.

### 3.1 OPTION A – CONNECTION TO EXISTING DN200 MAIN

Option A proposes the following infrastructure to service the study area:

- Construction of a DN300 trunk water main connected to the existing offtake of the DN1200 water main near John Renshaw Drive
- Construction of a looping DN150 internal reticulation main connected to the DN300 trunk main

There are numerous options available for the alignment of the DN300 trunk main which is to be connected to the existing offtake of the DN1200 main which currently services the site. The existing DN1200 is located in the vicinity of John Renshaw Drive, and it is understood that the offtake from the DN1200 is located approximately in the middle of the frontage of the site. For the purposes of this strategy, a typical alignment has been chosen for the

DN300 trunk water main. This alignment would be subject to further assessment at the detailed design stage. A change in the alignment would have negligible effect on service pressures or water main sizes, but will affect the length of the DN300 trunk main and therefore construction costs. Exhibit D in Appendix B details the infrastructure proposed for Option A.

A summary of the pipe diameters and lengths required for Option A are presented below in Table 3. The quantities of each diameter are estimates based on the current development layout and main alignments shown on Exhibit D.

Table 3: Option A Pipe Quantities

Nominal Diameter (mm)	Length (m)
150	2530
300	2188

Option A is discussed in further detail below.

### 3.1.1 Trunk servicing of proposed development sites

An existing DN200 water main currently transverses the proposed adjacent western development site. The existing DN200 water main is primarily fed from South Wallsend Reservoir. HWC have advised that the DN200 main will have to be relocated to street alignments and contained within an easement once the adjoining development occurs. HWC have also advised that a DN450 main be connected to the existing DN500 main to the north in the vicinity of John Renshaw Drive and to a DN200 main to the south of C&A's proposed development site in order to provide security of supply for the study area and ensure the existing level of service is maintained in the Maryland and Minmi areas.

Under Option A, the advised DN450 trunk main has been substituted for a DN300 trunk main which better satisfies HWC guidelines for losses and reduces the cost of the construction of the main. The DN300 will connect to the existing offtake from the DN1200 main in the vicinity of the frontage of the site as this will provide a shorter length of DN300 main when compared to connecting to the existing DN500 main located to the west of the site in John Renshaw Drive. The alignment of the DN300 trunk main from the DN1200 offtake runs to the south through the site, then to the west to the western boundary of the proposed development, then to the south parallel to the western boundary of the proposed development site. The alignment then intersects the existing DN200 to the south of the proposed development site where the second connection point is to be constructed.

### 3.1.2 Internal servicing of proposed development sites

The proposed alignment of the DN300 trunk main is along the shared boundary between the western development and C&A's development sites. To service C&A development site, a DN150 distribution main is required to provide adequate service pressures during peak demands. The DN150 main will connect to the DN300 main at a minimum of two locations,



thus creating a loop to address security of supply and improve water turn over. Additional DN150 mains will be required to service the full extent of the development site however the location and alignment of these will be established at a later stage during the design of the reticulation network.

To service the western development, a DN200 distribution main is required to provide adequate service pressures during peak demands. The DN200 main should be connected to the DN300 trunk main at a minimum of two locations. Due to the uncertainty regarding timing and limited information pertaining to development layout, the DN200 main has not been included in quantities or costings within this strategy.

The DN150 and the DN200 distribution mains have been sized to limit pipe losses to 3 m/km whilst providing the developments a minimum of 20 m pressure during peak day demand.

Table 4 provides a summary of the modelled pressure results within the proposed development and the adjacent western development during average and peak day demands.

Table 4: Study Area Pressures

Option	Site	Minimum ADD Pressure (m)	Maximum ADD pressure (m)	Minimum PDD Pressure (m)	Maximum PDD pressure (m)	Minimum 95PDD + FF Pressure (m)	Maximum 95PDD + FF pressure (m)
Option A	Western Development	42.1 (RL52 m)	71.2 (RL26 m)	40.6 (RL52 m)	70.9 (RL26 m)	29.4 (RL52 m)	69.6 (RL26 m)
	C&A's Development	59.7 (RL36 m)	82.9 (RL14 m)	58.8 (RL36 m)	82.6 (RL14 m)	67.4 (RL36 m)	77.1 (RL14 m)

Option A is considered adequate as it supplies the study area with pressures exceeding those required in HWC's guidelines. However at ground levels approximately below RL36 m, pressures exceed 60 m. Pressures above 60 m of pressure are not recommended by HWC and as a result a pressure reduced zone is required. In order to produce a pressure reduced zone two PRV's are required.

There are two alternatives to create the pressure reduced zone using pressure reducing valves (PRV), Alternative One and Alternative Two as shown on Exhibit E. Alternative One has two PRV locations, one at the connection point between the existing DN1200 main offtake located near John Renshaw Drive and the proposed DN300 main and a second at the connection point to the south of the site between the proposed DN300 main and the existing DN200 main. Alternative Two has two PRV locations, both at the connection point between the proposed DN300 main and the internal DN150 main. If Alternative Two is the preferred option then PRV's will be required at the connection points between the proposed DN300 main and any mains within the Western Development. The alternative and all details



associated with the alternative are to be determined at the detailed design stage. The two alternatives are shown in Exhibit E within Appendix B.

The two PRV's are to have a nominal hydraulic grade line (HGL) set point of 80 m on the downstream side. The two PRV's ensure a minimum PDD pressure within the study area of 27.1 m and a maximum PDD pressure within the study area of 65.4 m. A maximum PDD pressure of 65.4 m is not ideal, however in order to meet the minimum required firefighting pressure of 15 m this is inevitable. The minimum fire flow pressure in the adjacent western site is 15.7 m when the fire flow is applied at that location (RL 52m), the pressure of 15.7 m and all other fire flow pressures within the study area are deemed adequate.

In a failure scenario where the main between Stoney Pinch Reservoir and the site breaks, the site will be supplied from the DN200 at the southern end of the development. HWC have advised that in this failure scenario the minimum HGL will be approximately 81 m. As a result the site will still receive a minimum of 12 m of pressure; however a PRV would be required to reduce pressures as they would be too high. The proposed PRV and valving arrangement shown on Exhibit E allows for this back feed scenario.

### **3.2 OPTION CONSTRAINTS**

#### **3.2.1 Technical Constraints**

The infrastructure proposed can be constructed and operated within Hunter Water's design and operating guidelines. All of the study area will receive adequate service pressure in accordance with Hunter Water guidelines during average and peak day demands if two PRV's are introduced along the DN300 trunk main to create a reduced pressure zone. Option A proposes two alternative locations for the PRV's which will be required for ground levels below approximately RL36 in order to reduce pressures above 60 m. The sizing of each water main modelled and reported upon has been optimised to limit head losses throughout the system and reduce the opportunity for water age. Security of supply is considered adequate through the looping of the trunk and reticulation mains.

#### **3.2.2 Community/Stakeholder Constraints**

Option A requires the construction of a DN300 trunk main which is to be connected into an existing offtake from the DN1200 and an existing DN200 water main at separate locations. Making the connection to the existing DN200 main will require a shutdown of the existing DN200 water main where the connection is being made, or the hot tapping of the main. The shutdown will affect the water supply for the Maryland and Minmi areas during the shutdown, however hot tapping the mains would not. The connection type is to be determined during the detailed design.

#### **3.2.3 Environmental Constraints**

The proposed water infrastructure, which can be seen in Exhibit D, will be constructed within future development sites and future road reserves, and is therefore not considered to have any significant impact on the environment external of the proposed development works. In

accordance with the Part 4 approval process, the preparation of a Review of Environmental Factors is required to address environmental constraints prior to detail design approval. This will be undertaken at a later stage.

### 3.3 COST ESTIMATES

A cost comparison of the investigated options was made by estimating the capital cost of the required infrastructure using Hunter Water's Estimating Guidelines and carrying out a Net Present Value (NPV) assessment. Appendix E contains the capital cost estimates for Option A. The NPV assessment considered the following:

- Capital cost of the infrastructure;
- Staging of the infrastructure dependent on the anticipated rate of development;
- Operation and maintenance costs of the infrastructure;
- Replacement costs of infrastructure with a finite lifespan.

Based on the above, Option A was assessed over a 30 year period at a discount rate of 7%. A sensitivity analysis was also undertaken for discount rates of 4% and 10%. A NPV summary is shown in Table 5 and an assessment can be found in detail from within Appendix F.

Table 5: Summary of cost estimates and NPV

Option	Infrastructure	Year required	Capital Cost	NPV (at 7%)
Option A	DN300 DICL trunk main (3572m) and internal DN150 PVC distribution main (2527m)	Year 1	\$1,601,080	\$1,631,524

For the purposes of this strategy, it is assumed that all infrastructure required for Option A will be built upfront in year 1, as a result the capital cost and the NPV prices are very similar.

### 3.4 SOCIAL IMPACT

The infrastructure proposed provides accessible water services to all developable lands within the study area.

Consideration has been given in the strategic design to promote cycling of water throughout the network, thus minimising the risk of water age and improving the quality of water provided throughout the network.

### 3.5 ENVIRONMENTAL IMPACT

The construction of the proposed infrastructure will have minimal impact on the surrounding environment provided adequate environmental controls are considered/implemented during design and construction.

### 3.6 TECHNICAL ASSESSMENT

An assessment of technical matters for Option A is provided below:

- **Performance:** Option A provides both an adequate water service to the study area in addition to an acceptable security of supply to the area. The internal infrastructure has been sized to provide a minimum of 20 m of pressure during PDD whilst minimising pipe losses to 3 m/km. Sections of the study area experienced pressures above 60 m during PDD and as a result it has been proposed the two PRV's are required. All water supply categories including ADD, PDD, EDD and 95PDD + FF have all met HWC's requirements.
- **Failure Scenario:** In the event of a failure to the DN200 main to the south of the site or a failure of the DN1200 main to the north of the site, the site would still receive a minimum of 12 m of pressure through one of the two mentioned mains.
- **System Reliability:** The proposed infrastructure incorporates security of supply both externally and internally through looping of the DN300 trunk main and looping of the internal DN150 distribution mains.
- **Flexibility and Adaptability:** Capacity exists within the system for additional connections including that of the proposed adjacent western development.
- **Constructability:** The proposed infrastructure will utilise standard construction techniques and is therefore expected to have a high level of constructability.
- **Maintainability:** The proposed infrastructure is similar to that which exists throughout Hunter Water's existing water supply network and is therefore expected to have a high level of maintainability.



## 4.0 Recommended Option

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The assessment of the considered option detailed throughout section 3.0 has shown that it provides an effective solution to supply water services to the proposed industrial development and total study area. It meets the technical requirements as specified in the Water Supply Code of Australia, Hunter Water Edition Version 1 (WSA 03-2002-03).

The infrastructure required for Option A has flexibility which enables future connections to be made and has minimal impact on the environment.

In conclusion, Option A provides the overall best outcome when assessing the infrastructure holistically.

## Appendix A – Correspondence with Hunter Water

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Hunter Water Review Comments					Table 1 – Review of Black Hill Water Servicing Strategy Issue B		Consultant Response	Hunter Water Response
1	Operations	4	2.1		Second paragraph makes it unclear which of the two DN500s joins to a DN900 then a DN1200. Make it clear this is the Northern DN500.		Ok will amend in the strategy and drawings.	
2	Operations	7	3.1.1		The DN200 is primarily gravity fed from South Wallsend, not Stoney.		Ok will amend in the strategy.	
3	Operations	7	3.1.1		The connection points to the existing network are not clear including in the exhibits. Please reword for better clarity and redo the exhibits clearly showing the location of connections to the existing system.		Ok will amend in the strategy and drawings.	
4	Operations	General	General		Connecting to the DN1200 represents an unacceptable risk to a critical asset as well as introducing variable pressures from Beresfield WPS into the system. The original DN500 connection point should be used and the entire report updated.		As discussed with Greg Williams the connection will be off the existing offtake currently servicing this site.	
5	Operations	8	Table 4		Minimum fire flow pressures should be measured at the most impacted location. This is likely at the highest elevation and not the lowest as shown.		Ok will amend in the strategy.	
6	Operations	9	3.2.1		Badly written paragraph that appears to assume an option has been selected for PRV location. Rewrite.		Ok will amend in the strategy.	
7	Planning	9	3.1.2		The minimum required firefighting pressure is 15m. Anything less than that is not acceptable.		Ok modelling amended.	





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28 January 2014

Our Ref: 2007-842/2

Coal and Allied  
C/- ADW Johnson  
2 Bounty Close  
Tuggerah 2259

Attention: Allison Cameron

Dear Allison

#### **PRELIMINARY SERVICING ADVICE FOR PROPOSED DEVELOPMENT – BLACK HILL**

Thank you for your request for Hunter Water's preliminary servicing advice for the provision of water and sewer services to a proposed industrial development at Lot 30 DP 870411, Lenaghans Drive, Black Hill.

The preliminary servicing advice offered in this correspondence is based on an estimated development loading of approximately 2,150 Equivalent Tenements (ET) on the water supply system and 910 ET on the wastewater system. Noted elsewhere in this correspondence is the need to complete developer funded water and wastewater servicing strategies. The completion of servicing strategies will be the most appropriate means to ascertain likely connection arrangements, staging, necessary augmentation works and required system configuration.

General information on water and sewer issues relevant to the proposal is included in this correspondence. This information is based on Hunter Water's knowledge of its system performance and other potential development in the area at the present time.

Preliminary servicing advice is not a commitment by Hunter Water and may be subject to significant change prior to the development proceeding. General information on the provision of Hunter Water funded and delivered infrastructure may also be provided. This advice may also change substantially due to a range of factors.

If you proceed with a development application you will need to lodge a further application with Hunter Water to then determine the formal requirements that shall apply. Hunter Water will then issue a **Notice of Formal Requirements**. You will need to comply with each of the requirements in this Notice for the issue of a Section 50 Compliance Certificate for the specific development.

In this instance, Hunter Water's preliminary advice is as follows:

#### **Water**

The site of the proposed development falls within the Chichester Trunk Gravity Main Water Supply System. The development may be serviced by the DN500 main on John Renshaw Drive or the DN500 CICL main in Lenaghans Drive.

As identified in the Maryland Minmi Water Servicing Strategy (*Hunter Water Corporation, 2006*), approximately 2,900m of DN450mm trunk main from John Renshaw Drive to Lenaghans Drive will have to be constructed in order to provide security of supply to the development and maintain service levels in the Maryland and Minmi area. The lead-in developer would be required to fund the upgrade and any subsequent developments following the construction of the trunk main would be liable to pay a reimbursement.

**Figure 1** shows possible connection points that may be suitable, however, these would have to be confirmed as part of a developer-funded water strategy as mentioned elsewhere in this correspondence.

A developer - funded strategy will be required to investigate the infrastructure required to service this development and confirm necessary augmentations to Hunter Water's existing water supply system. This strategy should consider the outcomes of the servicing strategy mentioned above, and should address, but not be limited to, the following matters:

- Estimate water demands for the development;
- Development staging and timing;
- Security of supply for the development;
- Investigate various servicing options;
- Adjacent development areas;
- Existing asset constraints;
- Alternative connection points;
- Present preliminary design and costing of the water distribution infrastructure proposed to service this development; and
- Present capital, operational and life cycle costs.

#### **Wastewater Transportation**

The site of the proposed development is located remote from existing wastewater infrastructure. The nearest possible sewer connection point is in the Beresfield 21 Wastewater Pumping Station (WWPS) catchment area, which pumps to Morpeth Wastewater Treatment Works (WWTW) via Beresfield 16A WWPS, Berry Park 1 WWPS and Thornton 1 WWPS.

There is very limited opportunity within this system to connect initial development loading. These assets were configured at the time to cater for the known development and would require significant augmentation to cater for the likely loading derived from the development lot in question. Accordingly it may become necessary to upgrade this system or pump directly to the treatment works. The optimal staging and configuration should be ascertained via completion of a wastewater servicing strategy discussed below. Detailed asset data can be provided in the future as an input for the servicing strategy.

It will be necessary to complete a developer funded sewer servicing strategy to ascertain the optimal means to connect to Hunter Water's sewer system and any system augmentations required. The strategy should address, but not be limited to, the following matters:

- Estimate loads from this development and any other surrounding developments that can potentially transfer flows to the future wastewater transportation infrastructure associated with the subject development;
- Existing asset constraints;
- Development sub-catchments and how the full development area is to be serviced;
- Staging and timing of the development;
- Self-cleansing and odour control in the interim before full development is realized, and ultimate development;
- Impacts on the downstream wastewater transportation system;
- Preliminary design and costing of the wastewater transport infrastructure proposed to service this development; and
- Capital, operational and life cycle costs (NPV 7% - 30 years).



**Wastewater Treatment**

The development lot is likely to connect to the Morpeth Waste Water Treatment Works (WWTW), however, due to the location of the development lot, other wastewater treatment catchments may present an opportunity for servicing.

Beside Morpeth WWTW, the nearest WWTW is Shortland WWTW. Any assessment of capacity at this WWTW can be provided in the future as an input for the servicing strategy.

Hunter Water's treatment facilities are upgraded over time to meet growth in the catchment.

**Financial Contribution**

Dependent on the connection points and utilisation of infrastructure, it may be necessary to pay a reimbursement towards capacity uptake in infrastructure assets constructed by other developers. Hunter Water administers reimbursements for a maximum period of 15 years following hand over to Hunter Water.

It is not possible to calculate reimbursement values at this time due to the tentative nature of information, connection points etc, and accordingly such calculations are usually deferred until definitive information is available.

**Environmental Assessment**

Please note that a Review of Environmental Factors will be required for any works external to a particular development site, or where the service design includes infrastructure or activities that may have environmental impacts that would not have been specifically addressed in the consent authorities assessment and determination of the proposed development. Examples may be the construction of new or augmented water and sewer pump stations, sewer vents, trunk mains, reservoirs, development in a Wastewater Treatment Plant buffer zone, or development in a water reserve. Furthermore, a Controlled Activity Approval will be required from the NSW Office of Water for any excavation within 40m of a water body or should groundwater be present.

Prior to commencement of environmental assessment please contact the Hunter Water Developer Services Group to confirm the scope and need for such an assessment. It is recommended to meet and agree these matters prior to the developer engaging the services of a design or environmental consultant.

Should you require further clarification or assistance please do not hesitate to contact me on 4979 9545.

Yours Sincerely

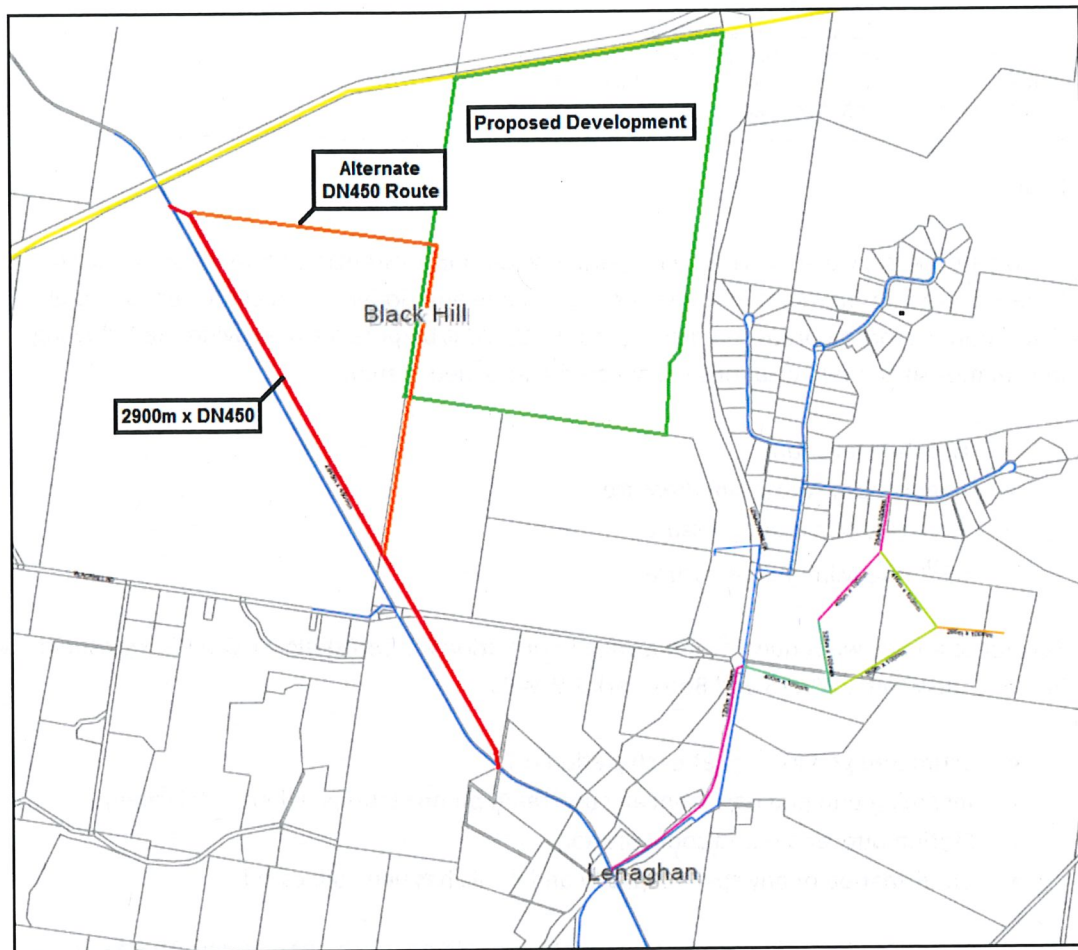


**Malcolm Withers**  
**Senior Developer Services Engineer**

Attention: **Figure 1** – Water connection points and lead in trunk mains.



**Figure 1** – Water connection points and lead in trunk mains.



**From:** [Ben Everitt](#)  
**To:** [Paul McKay](#)  
**Cc:** [Jason Yeo](#); [Allison Cameron](#)  
**Subject:** Black Hill Water and Wastewater Strategies  
**Date:** Tuesday, 25 February 2014 10:01:29 AM  
**Attachments:** [DOC250214.pdf](#)

---

Paul,

As you are aware, we are currently preparing water and wastewater servicing strategies in the Black Hill area. At this point in time we require some additional info to enable us to model water options for the proposed development. Would it be possible to provide the following information at the two locations shown on the attached sketch:

- Ground Elevation
- Average Day Maximum Pressure
- Peak Day Minimum Pressure
- 95<sup>th</sup> %ile Minimum Pressure

Further to above, we require the following information for Beresfield 21 WWPS, Beresfield 16A WWPS, Thornton 1 WWPS and Berry Park 1 WWPS.

- Estimated gravity load at each station (ET)
- Incoming pumped flow from any upstream pump stations (where applicable)
- Station duty and pump configuration
- Confirmation of any spare capacity and if this has been allocated

If you can provide this info as soon as possible it would be much appreciated. Thanks in advance.

Regards,

Ben Everitt

Civil Engineer

ADW Johnson Pty Ltd - Central Coast Office

2 Bounty Close, Tuggerah

PO Box 3717 Tuggerah N.S.W. 2259

Ph: (02) 4305 4300

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Email : [bene@adwjohnson.com.au](mailto:bene@adwjohnson.com.au)

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# LEGEND:

- SITE BOUNDARY
- DN200 LOW LEVEL SYSTEM
- DN450 LOW LEVEL SYSTEM
- EXISTING DN100 LOW LEVEL MAIN
- EXISTING DN150 LOW LEVEL MAIN
- EXISTING DN200 LOW LEVEL MAIN
- EXISTING DN500 LOW LEVEL MAIN
- EXISTING DN900 LOW LEVEL MAIN
- EXISTING DN1200 LOW LEVEL MAIN



PRELIMINARY ISSUE

PROJECT		BLACKHILL- WATER SERVICING STRATEGY	
PLAN TITLE		EXHIBIT D: OPTION A: PROPOSED INFRASTRUCTURE	
PROJECT No		190057E - REP - 004	
SUBMITTED		DATE	
CLIENT		PROPERTY DESCRIPTION	
Central Coast 2 Bounty Close, P.O. Box 2177, Tuggerah NSW 2250 Phone: (02) 4305 4300 Fax: (02) 4305 4309 www.centralcoastwater.com.au ADN 02 430 445 336		"BLACKHILL SITE" LOT 30 D.P. 870411 JOHN RENSHAW DRIVE, BLACKHILL	
DESIGN		CHECKED	
REV	DATE	AMENDMENT	APPROVED
A	08/2014	Dist Water Servicing Strategy	
Bar Scale 1: 6000 (A1), 1: 12000 (A3)		ALL DIMENSIONS ARE IN METRES. DO NOT SCALE	
DESIGN FILE: 5		100mm AT FULL SIZE	

STONEY PINCH RESERVOIR

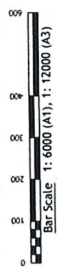
BLACKHILL

JOHN RENSHAW DRIVE

Sydney - Newcastle Freeway (M1)  
LENAGHAN DRIVE

\* Elevation  
\* Average Day Maximum pressure  
\* Peak Day Minimum pressure  
\* 95th %ile Minimum pressure

\* Elevation  
\* Average Day Maximum pressure  
\* Peak Day Minimum pressure  
\* 95th %ile Minimum pressure





**From:** [Hugh Williams](#)  
**To:** [Jason Yao](#)  
**Subject:** FW: Hunter Water to ADWJ - response to queries regarding Hunter Water comments  
**Date:** Thursday, 22 May 2014 1:10:27 PM  
**Attachments:** [image001.png](#)  
[image002.png](#)

**From:** Malcolm Withers [<mailto:malcolm.withers@hunterwater.com.au>]  
**Sent:** Monday, 12 May 2014 10:44 AM  
**To:** Hugh Williams  
**Subject:** Hunter Water to ADWJ - response to queries regarding Hunter Water comments

Hi Hugh,

Please see responses to the queries you raised.

#### MINMI - Water

1. Stoney Pinch does not dominate South Wallsend Reservoir during normal operation. South Wallsend reservoir is supplied by Wallsend WPS with the majority of flows provided via Shortland Junction. Please disregard the comment "Stoney Pinch may dominate during minimum night flows/very low demands."
6. As above, Stoney Pinch does not dominate this area during normal operation. Please use a minimum HGL of 84m supplied from South Wallsend.

There is sufficient capacity in the water network to supply the dual reservoirs at Cameron Park for the Minmi development. Cameron Park 2 WPS will require a developer-funded pump station upgrade at a future date (yet to be determined) to provide peak day capacity at ultimate development of Minmi. This should be allowed for as part of this option study.

#### MINMI - Sewer

1. Emergency storage upgrades for the existing customers will be provided by Hunter Water. The developer must include sufficient emergency storage for any future connections.

#### BLACK HILL - Water

2. Boundary conditions on the DN200 at the southern end of the development can be found in the table below. These values are based on zero flow being received from the Beresfield/Stoney Pinch system.

Location	Height of Node (m)	Maximum Residual Pressure (m)	Minimum Residual Pressure (m)
Southern Boundary (DN200)	34	57	47

3. Hunter Water accepts that the impact on the Outlook Estate during a failure in Maryland is likely to be negligible, if not improving the current situation.

Regards



**Malcolm Withers**  
Senior Developer Services Engineer | Hunter Water Corporation  
36 Honeysuckle Drive Newcastle NSW 2300 | PO Box 5171 HRMC NSW 2310  
T 02 4979 9545 | F 02 4979 9711 | M 0429 372 449  
[malcolm.withers@hunterwater.com.au](mailto:malcolm.withers@hunterwater.com.au)  
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**From:** Hugh Williams [<mailto:hughw@adwjohnson.com.au>]  
**Sent:** Thursday, 1 May 2014 12:55 PM  
**To:** Malcolm Withers  
**Cc:** Allison Cameron  
**Subject:** Minmi and Blackhill servicing

Mal

Further to our discussion this morning can you please confirm the following noting that the PHF from the entire development area for Minmi is of the order of 150l/s and 71l/s for Blackhill;

#### Minmi

1	General		It is noted that the Developer preferred the option of connecting the Minmi area from the 500mm (Walka) main that runs through the wetlands. This main is predominantly fed from the South Wallsend system, not Stoney Pinch.			Stoney Pinch may dominate during minimum night flows /very low demands. As stated above, Stoney Pinch will only supplied to HGL of 32m during the day.		Stoney Pinch has a site level of about RL90. How can Stoney dominate South Wallsend yet only supply at HGL32 given the reservoir levels are comparable?
6	7	3.1.2	The minimum HGL assumed (90m) is too high. South Wallsend provides a minimum HGL of 84m at this location on a peak day.	Higher areas will receive less pressure from this connection point. Lower section of high pressure system may need to be extended.	Determine if any changes are required to system levels, reservoir sizes, etc.			As per 1 above how can Stoney dominate at HGL32?

1	14	Table 16	Minmi 2 WWPS currently has only 1.8 hrs (6 m <sup>3</sup> ) emergency storage	Additional emergency storage is required to achieve 4 hours	Increase emergency storage allowance	Please confirm our discussion that the ES requirement relates to the development only and that any existing system inadequacies will be addressed separately by HWC
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Blackhill

2	General		In the event of a failure or shutdown of the trunk main between Beresfield and Stoney Pinch for maintenance or other work (note: the mine has in the past has carried out diversions), the main supply could be out of service for longer than 5 hours. Is the supply from South Wallsend (through a 200mm) sufficient?			If the failure scenario requires modelling, can HWC please provide the pressure boundary condition to be adopted noting that the DN200 appears to connect to a DN500 south of the M1 at Lenaghan
3	General		What are the impacts on supply to the Maryland / Fletcher / Minmi area's in the event of failure of the 500mm from South Wallsend through Maryland? Note currently the supply from Stoney Pinch only provides water to a HGL of 32m. Will the increased demand from the new development impact this contingency. Any reduction in 32m will result in no supply to the Outlook Estate subdivision.			Refer to items in the Minmi comments. Also, the demand area for the Blackhill site is supplied off the DN500 offtake of the DN900 to the North of John Renshaw drive and not off the DN200 thus the friction losses will be negligible. The proposal is to also duplicate the DN200 with a DN300 through the site that will better connect the DN500 north of Lenaghans Drive to the DN500 south of the M1 at Lenaghan.

Regards,

Hugh Williams  
Senior Civil Engineer  
ADW Johnson - Central Coast Office

2 Bounty Close, Tuggerah  
PO Box 3717 Tuggerah N.S.W. 2259  
Ph: (02) 4305 4300  
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Website: [www.adwjohanson.com.au](http://www.adwjohanson.com.au)

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## Jason Yeo

**From:** Malcolm Withers [<mailto:malcolm.withers@hunterwater.com.au>]  
**Sent:** Wednesday, 5 March 2014 12:32 PM  
**To:** Ben Everitt  
**Cc:** Jason Yeo; Allison Cameron; Hugh Williams; Paul McKoy  
**Subject:** Response to information request - Black Hill Water and Wastewater Strategies

Good afternoon Ben,

Please see below Hunter Water's response to your information request.

Regards



### Malcolm Withers

Senior Developer Services Engineer | Hunter Water Corporation  
36 Honeysuckle Drive Newcastle NSW 2300 | PO Box 5171 HRMC NSW 2310  
T 02 4979 9545 | F 02 4979 9711 | M 0429 372 449  
[malcolm.withers@hunterwater.com.au](mailto:malcolm.withers@hunterwater.com.au)  
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### Water

Location	Ground Elevation (m)	Average Day Max Pressure	Peak Day Min Pressure	95 <sup>th</sup> %ile Min Pressure
Near John Renshaw Dr	34.08	63.92	63.91	63.91
Near Black Hill Rd	34.14	60.05	55.19	56.45

### Wastewater

	Beresfield 21 WWPS	Beresfield 16A WWPS	Thornton 1 WWPS	Berry Park 1 WWPS	
	SSBER389	SSBER399	SSTHO424	SSBEP425	
Current gravity load (ET)	118	658	395	194	
Incoming Pumped inflow (L/s)	0	92 L/s (54+38)	138 L/s (54+84)	250	
Current Station Duty & Pump Configuration	38 L/s	137 L/s Beresfield No. 16A WWPS will be a duplex series pumping station configuration comprising of two sets of two pumps	500 L/s – Dual Pump Operation The station uses one pump during normal dry weather operation, and during wet weather or increased flow conditions the station has the capability to operate more than one pump.	545 L/s – Single Pump Operation The station uses one pump during normal dry weather operation, and during wet weather or increased flow conditions the station has the capability to operate more than one pump.	Most stations within Hunter Water's area of operations generally require 1 pump set to convey max PDWF flows. There is however the possibility that PLC codes could be changed at each Waste Water pumping station.



Ultimate Station Capacity (L/s)	54 L/s	237 L/s	1160 L/s	1640 L/s	To achieve Ultimate capacity the stations will need to be modified.
Unallocated Spare Capacity (ET)	0	0	0	0	As the stations were not sized to accommodate this development they may need to be augmented beyond the ultimate sizing identified above. There may be some spare capacity to permit interim connections, but this would need to be coordinated with Hunter Water to determine the most suitable staging plan to accommodate catchment wide development

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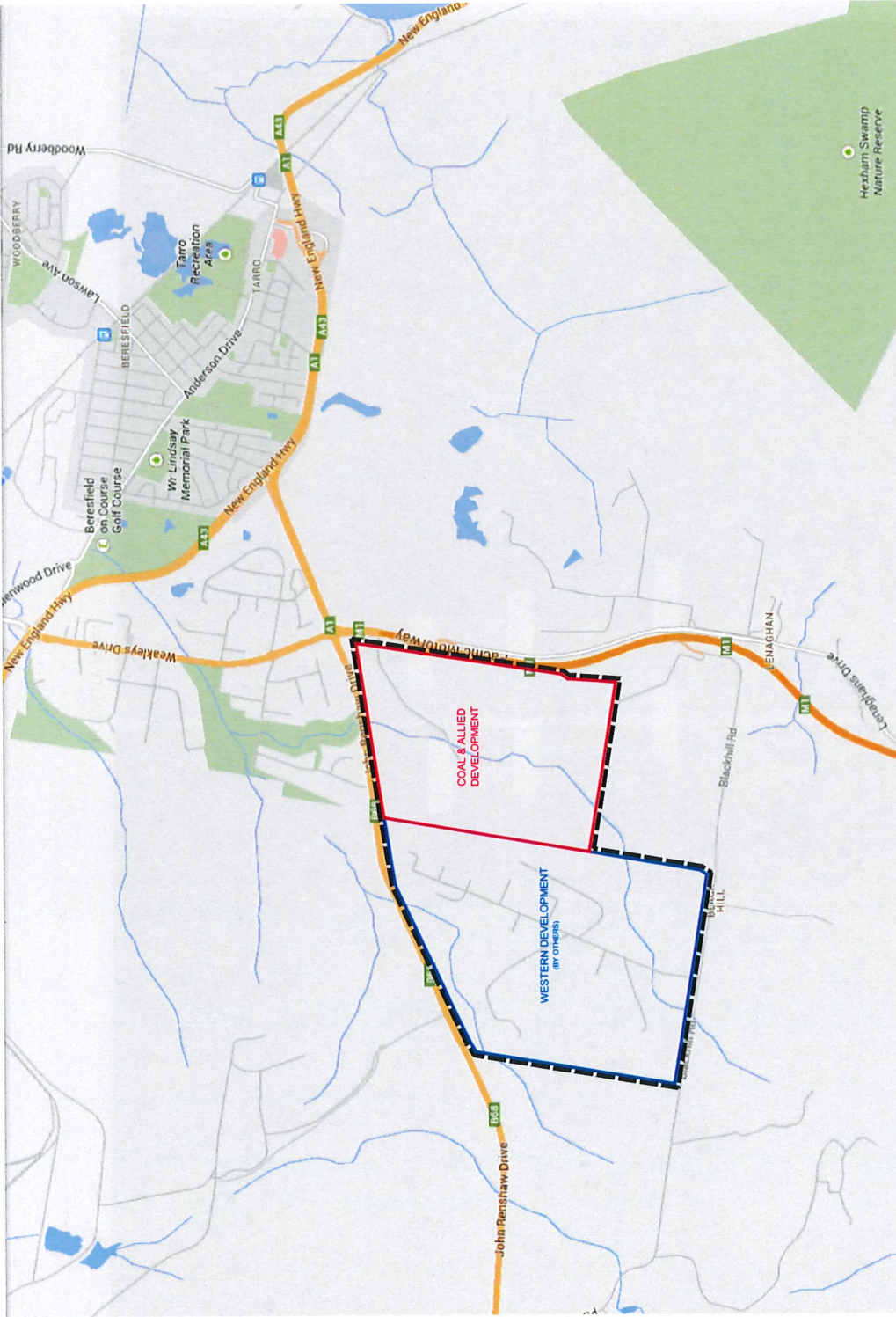
## Appendix B – Exhibits

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- Exhibit A – Regional Plan
- Exhibit B – Local Plan with Aerial Photo
- Exhibit C – Zoning Plan
- Exhibit D – Environmental Plan
- Exhibit E – Option A Proposed Infrastructure
- Exhibit F – Option B Proposed Infrastructure



MGA



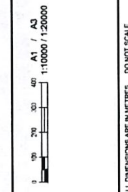
LEGEND:  
COAL AND ALLIED  
SITE BOUNDARY  
SITE BOUNDARY  
SITE BOUNDARY  
STUDY AREA



LOCALITY PLAN  
SCALE 1:10000

REV	DATE	AMENDMENT	DESIGN	DRAWN	CHECKED	APPROVED	CLIENT	PROPERTY DESCRIPTION	PROJECT	BLACK HILL - WATER SERVICING STRATEGY		
										PLAN TITLE	EXHIBIT A:	REGIONAL PLAN
A	14.03.2014	Don't Your Servicing Strategy	JY	JY	AC	HW	COAL & ALLIED	"BLACK HILL SITE" LOT 30 D.P. 870411 JOHN RENSHAW DRIVE, BLACK HILL	190057E	REP	-	001
DESIGN FILE 51							ALL DIMENSIONS ARE IN METRES. DO NOT SCALE			REV. A		

Central Coast  
2 Bony Court,  
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email: centralcoast@adw.com.au  
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ADW  
Johnson



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LEGEND:

- COAL AND ALLIED DEVELOPMENT
- ADJACENT WESTERN DEVELOPMENT
- SITE BOUNDARY
- STUDY AREA

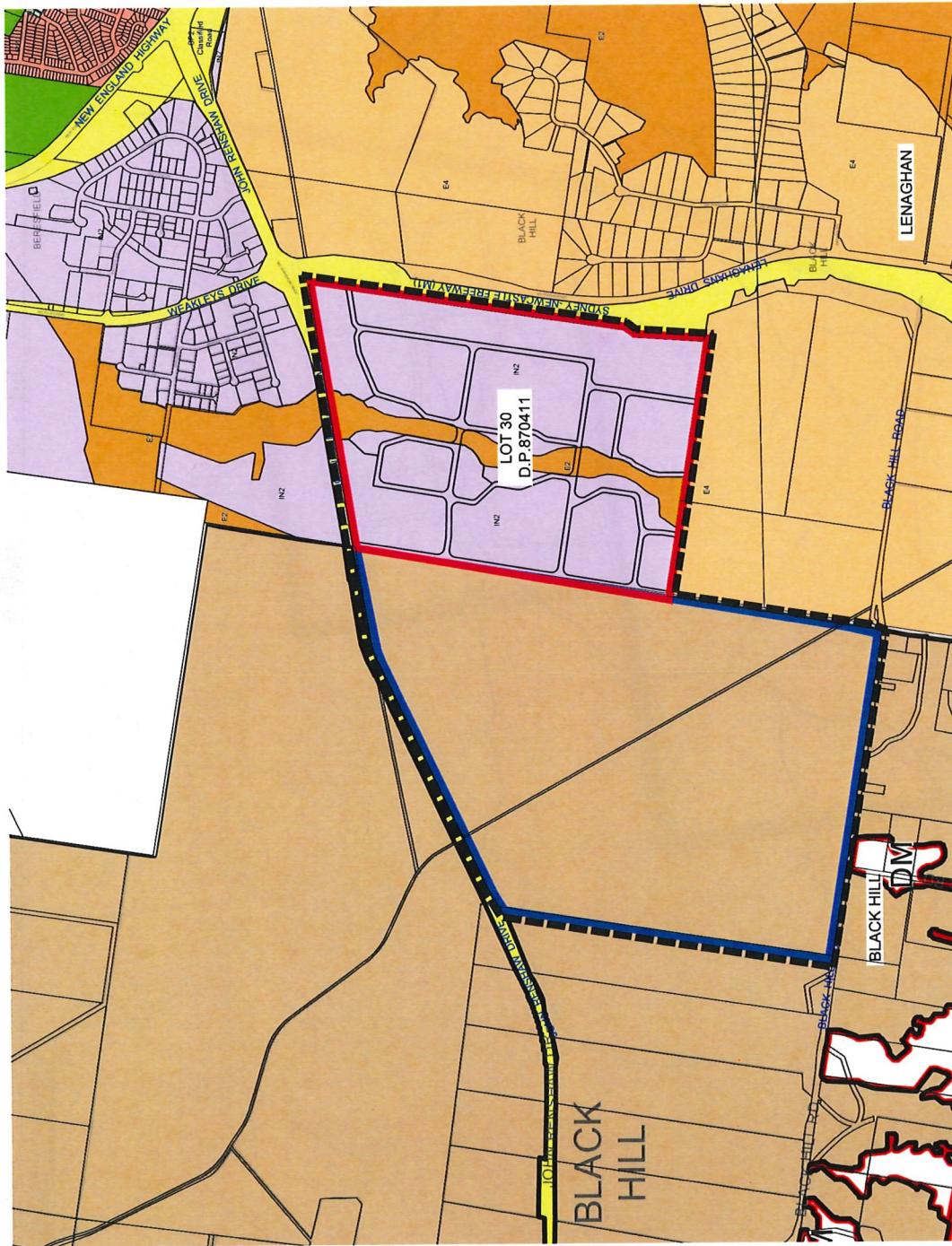
Contour Interval 2m



LOCALITY PLAN  
SCALE 1:10000

REV	DATE	AMENDMENT	DESIGN	DRAWN	CHECKED	APPROVED	CLIENT	PROPERTY DESCRIPTION	PROJECT NO	PROJECT TITLE	EXHIBIT B:	LOCAL PLAN & AERIAL	DESIGN NO	DESIGN LINE	REP	NUMBER	REV
A	14.03.2014	Dist Water Servicing Strategy	JT	JT	JT	JT	COAL & ALLIED	"BLACK HILL SITE" LOT 30 D.P. 870411 JOHN RENSHAW DRIVE, BLACK HILL	190057E	190057E	EXHIBIT B:	LOCAL PLAN & AERIAL	190057E	REP	-	002	B
B	22.05.2014	Slipway Asset	JT	JT	JT	JT	Central Coast 2 Bunn Close, P.O. Box 3717, Tuggerah NSW 2250 Phone: (02) 4305 4300 Fax: (02) 4305 4309 www.centralcoast.nsw.gov.au www.centralcoast.nsw.gov.au	Central Coast 2 Bunn Close, P.O. Box 3717, Tuggerah NSW 2250 Phone: (02) 4305 4300 Fax: (02) 4305 4309 www.centralcoast.nsw.gov.au www.centralcoast.nsw.gov.au	190057E	190057E	EXHIBIT B:	LOCAL PLAN & AERIAL	190057E	REP	-	002	B





LOCALITY PLAN  
SCALE 1:10000

# LEGEND:

COAL AND ALLIED  
SITE BOUNDARY  
ADJACENT WESTERN DEVELOPMENT  
SITE BOUNDARY  
STUDY AREA

Zone	
E1	Neighbourhood Centre
E2	Local Centre
E3	Commercial Core
E4	Mixed Use
E5	Business Park
E6	National Parks and Nature Reserves
E7	Environmental Conservation
E8	General Industrial
E9	Light Industrial
E10	Heavy Industrial
E11	Low Density Residential
E12	Medium Density Residential
E13	Large Lot Residential
E14	Public Recreation
E15	Private Recreation
E16	Rural Landscape
E17	Forestry
E18	Primary Production Small Lots
E19	Village
E20	Infrastructure
E21	Unzoned Land
E22	SEPP (Major Development) 2005

REV.	DATE	AMENDMENT	DESIGN	DRAWN	CHECKED	APPROVED	CLIENT	PROPERTY DESCRIPTION	PROJECT	EXHIBIT C:	REVISION	NUMBER	REVISION
A	14.02.2014	Draft Water Servicing Strategy	JY	ZY	AC	RW	COAL & ALLIED	"BLACK HILL SITE" LOT 30 D.P. 870411 JOHN RENSHAW DRIVE, BLACK HILL	BLACK HILL - WATER SERVICING STRATEGY	ZONING PLAN	REP	003	A
									PROJECT NO	DISCIPLINE	NUMBER	REVISION	
									190057E	REP	003	A	

**adw**  
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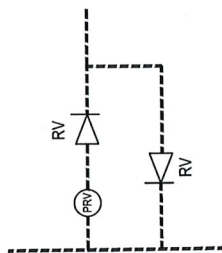






- LEGEND:**
- COAL AND ALLIED SITE BOUNDARY
  - ADJACENT WESTERN DEVELOPMENT SITE BOUNDARY
  - STUDY AREA
  - PROPOSED DN150 RETICULATION MAIN
  - PROPOSED DN300 TRUNK MAIN
  - EXISTING DN100 WATER MAIN
  - EXISTING DN150 WATER MAIN
  - EXISTING DN200 WATER MAIN
  - EXISTING DN500 WATER MAIN
  - EXISTING DN900 WATER MAIN
  - EXISTING DN1200 WATER MAIN

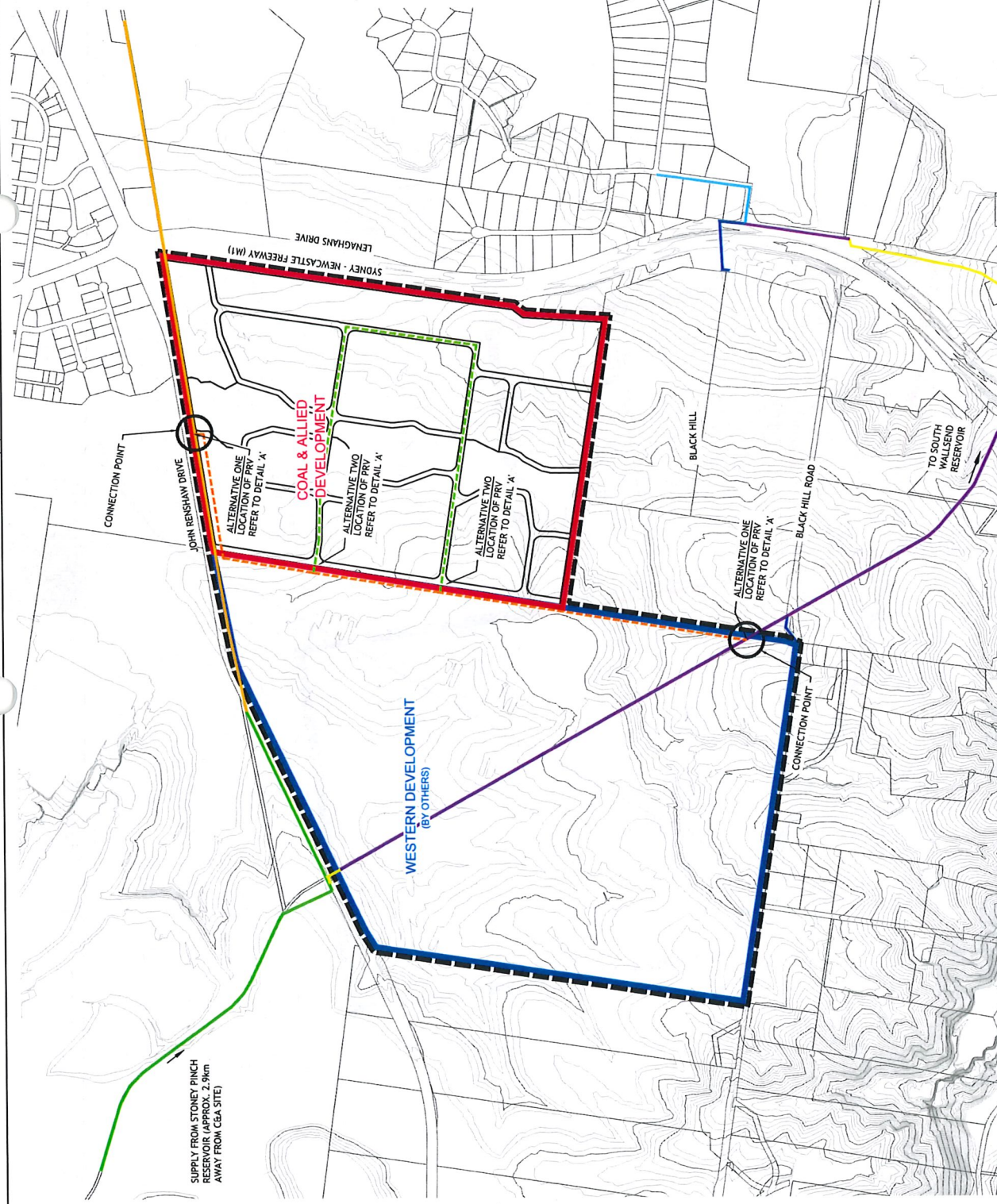
**NOTES:**  
1. LAYOUT SHOWN ON COAL AND ALLIED SITE IS PRELIMINARY ONLY AND SUBJECT TO FUTURE ASSESSMENT



DETAIL 'A'

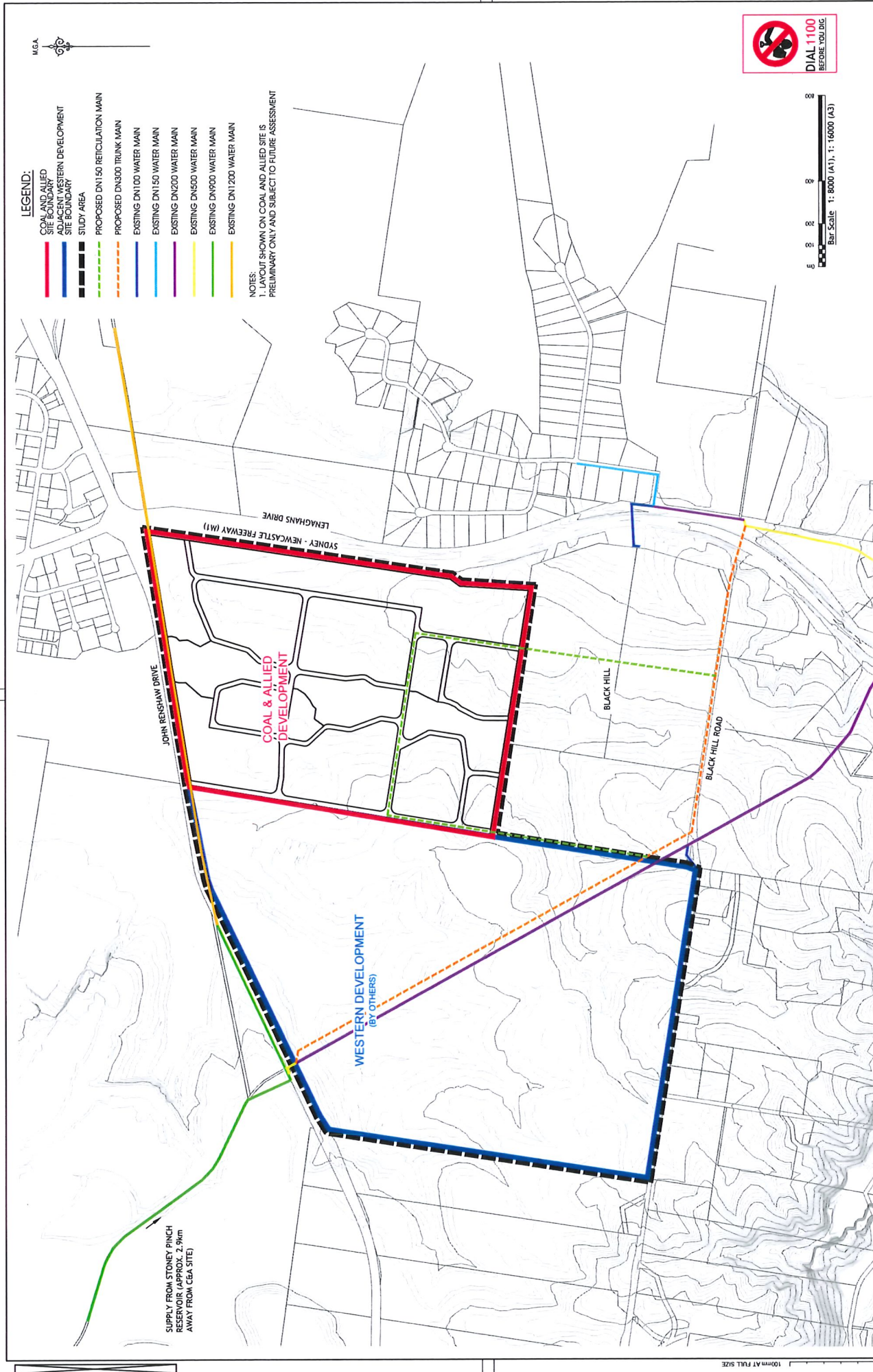


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<div>AMENDMENT</div> <div>REV</div> <div>DATE</div>				<div>DESIGN</div> <div>Y</div> <div>Y</div> <div>Y</div>				<div>DRAWN</div> <div>Y</div> <div>Y</div> <div>Y</div>				<div>CHECKED</div> <div>Y</div> <div>Y</div> <div>Y</div>				<div>APPROVED</div> <div>HW</div> <div>HW</div> <div>HW</div>				<div>COAL &amp; ALLIED</div>												<div>CLIENT</div> <div>Central Coast</div> <div>2 Bionity Close,</div> <div>PO Box 31, S.S.W. 2200</div> <div>Phone: (02) 4305 4300</div> <div>Fax: (02) 4305 4399</div> <div>centralcoast@phoenix.com.au</div> <div>www.centralcoast.nsw.gov.au</div> <div>ABN 82 129 445 398</div>												<div>PROPERTY DESCRIPTION</div> <div>"BLACK HILL SITE"</div> <div>LOT 30 D.P. 870411</div> <div>JOHN RENSHAW DRIVE, BLACK HILL</div>												<div>PROJECT</div> <div>BLACK HILL- WATER SERVICING STRATEGY</div> <div>PLAN TITLE</div> <div>EXHIBIT E:</div> <div>PROPOSED INFRASTRUCTURE</div>												<div>PROPOSED NO.</div> <div>190057E</div> <div>REVISIONS</div> 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- LEGEND:**
- COAL AND ALLIED SITE BOUNDARY
  - ADJACENT WESTERN DEVELOPMENT SITE BOUNDARY
  - STUDY AREA
  - PROPOSED DN150 RETICULATION MAIN
  - PROPOSED DN300 TRUNK MAIN
  - EXISTING DN100 WATER MAIN
  - EXISTING DN150 WATER MAIN
  - EXISTING DN200 WATER MAIN
  - EXISTING DN500 WATER MAIN
  - EXISTING DN900 WATER MAIN
  - EXISTING DN1200 WATER MAIN
- NOTES:**
- 1. ROUTE SHOWN ON COAL AND ALLIED SITE IS PRELIMINARY ONLY AND SUBJECT TO FUTURE ASSESSMENT

REV. DATE		AMENDMENT		DESIGN		DRAWN		CHECKED		APPROVED	
A		14.03.2014		D&M Water Servicing Strategy		ZY		ZY		AC	

## Appendix C – Water Demand Calculations

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	Proposed Western Development by		Total
	C&A Site	Others	
Developable Area (ha)	154	191	345
ET (Assuming 7ET/ha)	1079	1340	2419

TYPE	ET	AREA (ha)	AVERAGE			PEAK			EXTREME		95th PERCENTILE (FIRE FLOWS)						
			AVERAGE ANNUAL DEMAND (kL/yr/ET)	TOTAL ANNUAL CONSUMPTION (kL/yr)	AVERAGE DAY DEMAND (kL/day)	PEAK DAY DEMAND (kL/day)	PEAK HOUR DEMAND (kL/day)	PEAK HOUR PHD	EXTREME DAY FACTOR EDF	EXTREME DAY DEMAND (kL/day)	95th % PEAK DAY FACTOR 95F	95th % PEAK DEMAND (kL/day)	95th % PEAK DEMAND 95PDD	ADD Base Demand (L/s)	PDD Base Demand (L/s)	95PDD Base Demand (L/s)	Extreme Base Demand (L/s)
			AD	AD	ADD	PDD	PHF	PHD		EDD		95PDD	95PHD				
									1.15	5478	1.14	4526	5883	0.0190	0.0228	0.0217	0.0028
Light Industrial	2419	345	599	1449000	3970	4764	1.30	6193						0.0028	0.0028	0.0028	0.0028
Unaccounted Water		(Based on 15% of ADD base demand)															

- Notes:
1. Average Annual Demand taken from Table HW2.1-WSA03-2002-2.3, light industrial 4200 kL/yr/ha
  2. Fire Flow adequacy checked assuming flow of 20 L/s required during 95th percentile PDD

## Appendix D – Output from HWC Estimating Guidelines

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Option A – Year 1

PROJECT DESCRIPTION: 190057E Water Option A (Rev B)

Item No.	Item Description	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	\$ 13,266.00	\$ 13,266.00	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HW0002	Site Establishment <Insert Max \$>	Item	Lump Sum	\$ 15,000.00	\$ 15,000.00	Payment: 100% after completion.
HW0003	Site Disestablishment <Insert Min \$>	Item	Lump Sum	\$ 15,000.00	\$ 15,000.00	Payment: 100% after completion.
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	\$ 8,000.00	\$ 8,000.00	Payment: Maximum of 30% on submission of complying Construction EMP, then 10% per month up to maximum of 80%. Remainder at Practical Completion. Submit: Construction EMP.
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	\$ 18,000.00	\$ 18,000.00	Payment: Maximum of 30% on submission of complying plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion. Submit: Safety Management Plan.
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	\$ 4,000.00	\$ 4,000.00	Payment: Maximum of 30% on submission of complying Traffic Control Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	\$ 7,432.91	\$ 7,432.91	Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.

**Water Pipeline - Reticulation** - section will be present if one or more reticulation watermain are specified

Item	Construction of Reticulation Watermain	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW0001	Service Location	Item	Lump Sum	\$ 961.40	\$ 961.40	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HW0004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:					Measurement: Actual metres (effective length) of pipe delivered to site. Submit: Relevant Quality Records including Compliance Certificates. Note: Limits of Accuracy to be inserted for each pipe size.
20FVSS	Nominal DN150 PVC pipe	2530	m	\$ 28.00	\$ 70,840.00	
HW0005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation up to and including 1.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>
20FVSS	Nominal DN150 PVC (Trench type B)	2530	m	\$ 56.40	\$ 142,692.00	
HW0015	Supply & place ballast			\$ 90.00		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>
HW0027	Preparation of line sheets	2530	m	\$ 1.00	\$ 2,530.00	Measurement: Length of pipelines constructed as per design. Limits of Accuracy: <To be inserted>
HW0029	Miscellaneous					
HW0000	Sub Total				\$217,023	

**Water Pipeline - Trunk** - section will be present if one or more trunk watermain are specified

Item	Construction of Trunk Mains	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	\$ 1,641.00	\$ 1,641.00	Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.
HWT004	Supply all pipes materials, including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:					Measurement: Actual metres (effective length) of pipe delivered to site. Submit: Relevant Quality Records including Compliance Certificates. Note: Limits of Accuracy to be inserted for each pipe size.
31EVSS	Nominal DN300 PVC pipe	2188	m	\$ 90.00	\$ 196,920.00	
HWT005	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Up to 1.5 m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation up to and including 1.5m. Retention: 10% <or other appropriate percentage> until satisfactory testing. Submit: Relevant Quality Records including as constructed lengths, levels and coordinates. Limits of Accuracy: <To be inserted>
31EVSS	Nominal DN300 PVC (Trench type B)	2188	m	\$ 81.25	\$ 177,775.00	
HWT027	Preparation of line sheets	2188	m	\$ 1.00	\$ 2,188.00	Measurement: Length of pipelines constructed as per design. Limits of Accuracy: <To be inserted>
HWT029	Miscellaneous					
HWT000	Sub Total				\$378,524	

Item No.	Item Description	Qty	Unit	Rate \$/Unit	Amount \$	Application of Schedule of Rates
HW0013	Work as Constructed Information <Insert Min \$>	Item	Lump Sum	\$ 37,744.00	\$ 37,744.00	Payment: 100% at Practical Completion.

A. TOTAL ESTIMATED CONTRACT AWARD SUM \$ 713,990.31

B.	PRE-CONSTRUCTION COST (Table 10)				
HW0016	Design			\$	107,098.55
HW0017	Project Management of Design			\$	31,419.71
HW0024	Community Consultation				
	Sub Total(B1)			\$	138,518.26
	Pre construction contingency (30% of B1)			\$	41,555.48
	TOTAL PRE-CONSTRUCTION COST (B)			\$	180,073.73

C.	CONSTRUCTION COST				
	Total Estimated Contract Award Sum (A)			\$	713,990.31
HW0023	Construction Management (Table 11)			\$	71,399.03



Sub Total (C1)		\$	785,389.34
Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	\$	235,616.80
TOTAL CONSTRUCTION COST (C)		\$	1,021,006.14
TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)		\$	1,201,079.88

## Appendix E — Net Present Value Analysis

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### Summary of options

Option	NET PRESENT VALUE (30yrs 7% Discount)		NET PRESENT VALUE (30yrs 4% Discount)		NET PRESENT VALUE (30yrs 10% Discount)	
OPTION A	\$	1,631,523.73	\$	1,643,503.46	\$	1,624,207.49

Option	CAPITAL COST	
OPTION A	\$	1,601,079.88



Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Discount Rate	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Period	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
CAPITAL COSTS																																
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