Kings Hill Development

Water Servicing Strategy – FINAL

September 2017

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PREPARATION, REVIEW AND AUTHORISATION

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ABBREVIATIONS

ADWF	Average Dry Weather Flow
AHD	Australian Height Datum
ASS	Acid Sulphate Soils
BWL	Bottom Water Level
CTGM	Chichester Trunk Gravity Main
ET	Equivalent Tenement
HWC	Hunter Water Corporation
kL	Kilolitre
LEP	Local Environmental Plan
ML	Megalitre
NPV	Net Present Value
PDWF	Peak Dry Weather Flow
PV	Present Value
PWWF	Peak Wet Weather Flow
TWL	Top Water Level
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

DEVELOPMENT BACKGROUND

The Kings Hill development was identified in the 2006 Lower Hunter Regional Strategy and covers approximately 810 hectares and incorporates 15 existing allotments in the Port Stephens Local Government Area. The current concept plan (Deike Richards, March 2007) will see Kings Hill ultimately developed into approximately 4,500 residential dwellings.

SMEC has been commissioned by Kings Hill Development (KHD) to prepare this wastewater servicing strategy for the Kings Hill Release Area as the major landowner and lead proponent.

This servicing strategy is intended to address Hunter Water Corporation (HWC) strategic planning requirements and determine infrastructure requirements to connect the site to the Hunter Water wastewater network.

This report was originally produced in 2012 and costings have not been updated since the original version. The costings in this report are for the purpose of options analysis only.

RECOMMENDED TRUNK SERVICING OPTION

The recommended option for water servicing is Option 3, which is presented on **Exhibit G6** and represents the most efficient and cost effective servicing option for lead-in wastewater and water services. The infrastructure required for this option would be:-

Stage 1 – 0-100 ET

7.8km of DN300 watermain. Connection of low-level lots to the delivery side of the Raymond Terrace Water Pump Station (WPS), including cross connection of this main to the existing DN250 watermain at approximately 1km intervals.

Adjustment to pump set points, and minor modification to surrounding pipework.

It is noted that this work hydraulically releases approximately 400ET, but that supply in the early stages is governed by security of supply which means the reservoir is required after 100ET.

It is noted that subsequent to this report, further analysis was undertaken by Northrop at the request of Hunter Water Corporation. This analysis further considered the route alignment and concluded that the Eastern Corridor for the lead in watermain was preferred. This is the concept alignment shown on Exhibits in this report, noting further refinement of the alignment may be required at the concept and detailed design stages when additional engineering inputs are available (geotechnical, survey etc). This analysis is included in **Appendix G**. This servicing supplement has been conditionally approved by Hunter Water in their correspondence of 14 August 2017.

Stage 1a – 100-400 ET

Construction of 2.5ML reservoir

Stage 2 – 400-1,500ET

1.2km of DN375 watermain. Augmentation to suction pipework - extend DN375 watermain to existing DN500 watermain adjacent to the intersection of Elizabeth Ave & Tod St.

Construction of new pump unit at Raymond Terrace WPS, (approximate duty 99.5L/s @ 54m).

It is noted that the feasibility of upgraded pump capacity at the existing Raymond Terrace WPS to 99.5L/s will require confirmation as part of the concept design phase for these works. If upgrade at this site is not possible, the Stage 3 lead in watermain below will need to be brought forward.

Stage 3 – 1,500-4,500 ET

7.05km of DN375 watermain. Continue augmentation of suction pipework from previous point to existing DN1350 watermain near Tomago WPS.

It is noted this option is situated favourably with regard to the first interim connection point nominated by Hunter Water (shown on **Exhibit F**). It may be possible to split the initial stage into two substages, pending negotiation with Hunter Water at Concept Design Stage.

Internal to the site, two reservoirs will be required to provide security of supply and pressure to the higher lots. Due to the range of developable land being between RL10 and RL60m AHD, two pressure zones are required.

The recommended option costs, benefits and risks are summarised in the table below.

Option Description	Cost Effectiveness Analysis	Pros	Cons	Risks
Option 3 **Staged connection of the site to the Tomago WTP, via the Irrawang WPS.**	Total Capital Cost (pre construction + construction) : $14.8M O&M Costs, 30 yr NPV @ 7%: $1.2M Lifecycle cost, 30 yr NPV @ 7%: $13.6M	Removes operational risk associated with connection to the CTGM. Most cost-effective option, not connecting to the CTGM.	Construction through a relatively developed area. Concept design to consider alternative pipeline alignments to minimise disturbance.	Acid sulphate soils High groundwater table River crossing Crossing of HWC Special Area

It is noted these costs only include trunk water works to the site, and not the reservoir costs which were common to all options. The reservoir costs are included in the staged approach below.

PROPOSED WORKS

The infrastructure is proposed in stages, to minimise upfront capital costs. Stage 1 consists of construction of the watermain. After 100 lots, the reservoir is required to provide security of supply to the low-level lots. The high-level reservoir will be required once development is planned for the high-level lots (above approximately RL35m AHD).

Staging for this option is presented in **Table 1**.

Table 1 – Option 3 – Staging

Year	Trigger Point	Recommended Infrastructure	Budget Cost
2018	0-100	7.8km of DN300 watermain ** Adjustment to pump set points, and minor modification to surrounding pipework at the existing Raymond Terrace WPS.	$7.6M
2019	100-400	Construction of 2.5ML reservoir, (BWL = 60m AHD; TWL = 70m AHD, approx. 20m diameter). Required after 100 ET are released, for security of supply.	$3.3M*
2020	400-1500	1.2km of DN375 watermain	$1.3M
		Construction of new pump unit or upgrade at Raymond Terrace WPS, approximately 99.5L/s @ 54m	$400K
2025	1500-4500	7.05km of DN375 watermain	$5.5M
		Construction of 2.5ML reservoir (BWL = 85m AHD; TWL = 95m AHD, approx 20m diameter	$3.3M*
		Construction of water pump station from low-level reservoir to high-level reservoir (approx. duty 50L/s @ 40m, approx. 88kW/pump	$1.6M
		Approx 500m DN250 watermain connecting low-level and high-level reservoirs	
		TOTAL	**$22.6M**

* Note: This does not include allowance for access roads, earthworks to generate a flat pad etc, which may be required at this site.

** Note: Further negotiation with Hunter Water at concept design stage may see this stage split into two substages, with an interim connection point as nominated on **Exhibit F**.

*** Note: The high level reservoir is required once development is undertaken above approximately RL 35m AHD.

1 INTRODUCTION

1.1 Background

SMEC has been commissioned by Kings Hill Development to prepare a water servicing strategy for the Kings Hill development, located north of Raymond Terrace (***Exhibit A***). KHD are the major land owners and lead proponent for development of the Kings Hill Release Area.

The Kings Hill development was identified in the 2006 Lower Hunter Regional Strategy and covers approximately 810 hectares and incorporates 15 existing allotments in the Port Stephens Local Government Area. The current concept plan will see Kings Hill ultimately developed into approximately 4,500 residential dwellings.

This servicing strategy is intended to address Hunter Water Corporation (HWC) strategic planning requirements and determine infrastructure requirements to connect the site to the Hunter Water network.

1.2 Scope of Work

As required by the Hunter Water Servicing Strategy Template, the tasks undertaken in the preparation of this servicing strategy have included the following:-

- **Development Description** – including a brief synopsis of the proposed development, anticipated staging and timing ***(Section 2.1*)**.
- **Planning Context** – details of land zonings with reference to Council Local Environment Plans (LEPs), Settlement Strategies and associated planning instruments ***(Section 2.2*)**.
- **Development Assumptions** – an assessment of assumptions associated with the development, including growth rates and an assessment of the potential for development of all land within the natural catchment boundaries adjoining the site ***(Section 2.3*)**.
- **Study Area –** The agreed extent of the servicing area, including the existing land use of the site, details of constraints to development such as flood plains, wetlands, national parks, topography, flora and fauna ***(Section 2.4*)**.
- Projected Development in the Study Area – an assessment of projected development to be considered in the strategy ***(Section 2.5*)**.
- **Liaison with Hunter Water–** including written correspondence and summaries of meetings with HWC ***(Section 2.6***).
- **Options Development** ***(Section*** 3).
- **Regional Servicing Options** ***(Section*** 4**).**
- **Local Servicing Options (Section** 5**).**
- **Plan documentation** including cadastral, zoning, topographical, development layout and preliminary design ***(Appendix B – Exhibits).***

1.3 A Note on Cost Estimates in the Study

Cost estimates within this study are based on the Hunter Water Cost Estimating Manual. Cost estimates cannot be guaranteed as SMEC has no control over contractor's prices, market forces and competitive bids from tenderers. The cost estimates may exclude items which should be considered in a cost plan. Examples

of such items are design fees, project management fees, authority approval fees, contractors risk and project contingencies (e.g. to account for construction and site conditions, weather conditions, ground conditions and unknown services). Cost estimates are not to be relied upon in any way. If reliable cost estimates are required, then an appropriately qualified Quantity Surveyor should be engaged.

2 BACKGROUND

2.1 Development Description

The proposed Kings Hill development is bounded to the east by the Pacific Highway, to the north by Six Mile Road, to the west by Newline Road and the Williams River and to the south by a SEPP 14 wetland, which is located downstream of the spillway from nearby Grahamstown Lake. The site is shown in ***Exhibit B***.

The topography of the site varies from low wetland areas in the south (RL<10m) through cleared undulating pasture to a series of wooded hills to the north. The highest of these hills is Kings Hill, with an elevation of 137m AHD.

Residential development will mainly take place on the flat areas and lower slopes. It is anticipated that developed areas will reach a maximum height of 60m AHD, however some isolated developments may be higher than this.

The proposed development is primarily residential, with some medium density lots located in the town centre areas, adjacent to a small commercial area. The development breakup is summarised below in **Table 2**.

Table 2 – King Hill Development Rollout

	Area (ha)
Village and Town Centre	4.9
Medium Density Residential	72
Residential	328
Community uses, Schools etc	18.2
Mixed Use	8
Parks & Open Space	20.5
TOTAL	**451.6**

2.2 Planning Context

The local planning instrument applicable to the study area is the Port Stephens Local Environmental Plan (LEP) (Kings Hill, North Raymond Terrace) 2010. This plan rezones certain land at Kings Hill, North Raymond Terrace to enable the development of this land to achieve the objectives of the Port Stephens Community Settlement and Infrastructure Strategy (published by the Council in 2007) and the Lower Hunter Regional Strategy (published by the NSW Government in 2006).

Under this LEP, the study area is zoned as follows:

- B2 Local centre
- B4 Mixed use
- E2 Environmental conservation
- E3 Environmental management
- R1 General residential

The proposal is permissible under the current zoning. The site zoning plan is shown in ***Exhibit C***.

2.3 Development Assumptions

As is the case for all developments of this magnitude, development rollout is somewhat uncertain, depending on many externalities, such as market demand and constraints on other critical infrastructure. A preliminary lot rollout has been adopted, as summarised below in **Table 3**.

Table 3 – Kings Hill Development Rollout

Year	ET Released	Cumulative ET
2018	200	200
2019	200	400
2020	200	600
2021	200	800
2022	200	1000
2023	200	1200
2024	200	1400
2025	200	1600
2026	200	1800
2027	200	2000
2028	200	2200
2029	200	2400
2030	200	2600
2031	200	2800
2032	200	3000
2033	200	3200
2034	200	3400
2035	200	3600
2036	200	3800
2037	200	4000
2038	200	4200
2039	200	4400
2040	100	4500

2.4 Study Area

2.4.1 Definition of Proposed Study Area

The study area for this servicing strategy was agreed with Hunter Water during preparation of this strategy.

This strategy investigates provision of water services to the Kings Hill development site shown on **Exhibit B**. The lands surrounding the study area are all zoned 1a - Rural Agriculture and 7c Environmental Protection – Water Catchment.

The development is located on the edge of the existing Raymond Terrace Water Supply System. The site is not included in Hunter Water's current area of operations.

2.4.2 Stormwater / Hunter Water Special Area

It is noted that a portion of the proposed development is located within a Hunter Water "Special Area", as it is in the catchment of Grahamstown Dam. Meetings have been held between Kings Hill Development and the Water Resources staff at Hunter Water. The stormwater treatment of the site is being considered as part of a study separate from this servicing strategy.

2.4.3 Existing Land Use

The Kings Hill development site has been rezoned to allow a new town centre and new homes to be built over the next 25 years.

The site is surrounded by low lying agricultural land that drains to the Willams River to the west of the site (this river joins the Hunter River west of Raymond Terrace), SEPP 14 wetland to the south of the site or to the Grahamstown Lake to the east of the site.

The existing Raymond Terrace township with the current local population of approximately 12,600 people is located south of the site and the wetlands.

The topography of the site varies from low wetland areas in the south (RL<10) through cleared undulating pasture to a series of wooded hills to the north. The highest of these hills is Kings Hill, with an elevation of 137m AHD.

The study area is not located within a proclaimed Mine Subsidence District.

It is not anticipated that the past land uses will impact the development of new assets.

2.5 Projected Development in the Study Area

The proposed development was the only development identified within the agreed study area.

The surrounding lands are zoned 1a - Rural Agriculture and 7c Environmental Protection – Water Catchment.

2.6 Liaison with Hunter Water

Significant / recent liaison to date with Hunter Water is summarised below, correspondence is provided in **Appendix A**.

Table 4 – Liaison with Hunter Water

Date	Correspondence / Meeting	Significant Details
23 July 2010	Letter from HWC to JW Planning	**Water Delivery** • There is currently no infrastructure capable of servicing the Kings Hill site. • Options for staged augmentation works necessary to service the North Raymond Terrace Development area are proposed in the existing Raymond Terrace Water Supply Servicing Strategy. • This strategy includes augmentation of watermains and extension of the watermain from the Pacific Highway to the site. • Security of supply will ultimately be provided by 2x 3.5ML reservoirs at North Raymond Terrace and a DN450 delivery pipeline from Tomago Water Pump Station. • A developer-funded water servicing strategy is required to determine suitable servicing options.
24 Aug 2011	Preliminary Servicing Advice	**Water Delivery** • The ultimate connection point for this development will be Tomago WPS, however interim arrangements may be made for early stages. • Regarding the nominated initial connection point, Hunter Water does not support connecting into the Raymond Terrace High Level system. It is considered preferable that the connection point is into the low level system (i.e. supplied directly from Tomago WPS). • Connection Point 1 has capacity for 200 ET. The minimum HGL at the connection point with the 200 ET on a peak day will be approximately 55 m. • 500ET will require a cross connection to Newline Rd, for security of supply. • Beyond 500ET, connection to Tomago WTP is required.
8 Sep 2011	Inception Meeting	**Water Delivery** As outlined in the Preliminary Servicing Advice, the proposed ultimate water connection point is the Tomago Water Pumping Station (WPS).

Date	Correspondence / Meeting	Significant Details
		Several water main alignments will be considered through the existing Raymond terrace area. As outlined in the PSA there is some initial capacity in the existing Raymond Terrace water system.
21 Sep 2011	Progress Meeting 1	There are two broad options being considered for water servicing – connection to the Tomago system, or the Chichester Trunk Gravity Main. It is likely that both options would require a reservoir for pressure and security of supply requirements.
2 Nov 2011	Letter from Hunter Water to SMEC	Hunter Water have prepared a draft strategy developed to gain an understanding of Hunter Water's costs to service this growth area in the future. This includes a plan for staged upgrades within the system to service growth, including upgrades at the Raymond Terrace WPS.

23 April 2013	Meeting – ASF Group, Hunter Land, Hunter Water	**Wastewater**
		• KHD advised they do NOT support the options for wastewater documented in HWC memo ref. 2010-678 3.005 dated 22/4/13.
		• KHD advised they are moving forward with planning and design to progress development as a priority.
		• KHD are finalising the preferred wastewater and servicing strategy and will submit to HWC shortly. The preferred servicing strategy will be based on a service corridor (wastewater and water) south to Raymond Terrace traversing the eastern side of the wetland through HWC land holdings. This is the preferred option for KHD considering:
		  ○ Shortest distance to service eastern development area as likely first stage
		  ○ Constraints on corridor alignment.
		  ○ Cost efficient solution considering HWC life cycle costing.
		• HWC confirmed that the eastern corridor is a feasible and acceptable solution for water and wastewater.
		• APP (MG) queried the interim capacity for wastewater. HWC (WJ) indicated approx. 200 ET nominally available at Raymond Terrace WWPS No. 8. HWC confirmed that constraining factor at WWPS No. 8 was the pump capacity. Additional interim capacity may be possible if pumps upgraded. Also, potential upgrade of WWPS 4 may provide additional interim capacity.
		• HWC confirmed that any future upgrade to the inlet works at the WWTP at Raymond Tce would be the responsibility of HWC and undertaken as required to meet demand.
		• HWC confirmed no objection to staging of wastewater rising mains and that twin smaller diameter mains feasible in place of single large rising main.
		• APP queried option of tanker pump-out for early stages of development as cost effective interim solution. HWC acknowledged that this is a feasible option but advised this would ultimately require HWC Board approval.
		
		Water
		• APP advised that the option for water documented in HWC memo ref. 20110-678 3.005 dated 22/4/13 is NOT preferred for Kings Hill Development (KHD).
		• APP are finalising the preferred water servicing option and will submit to HWC shortly. The preferred option for water is likely to be a co-located service corridor / trench with the wastewater (refer point s above) traversing the eastern side of the wetland through HWC land holdings.
		• HWC confirmed the eastern corridor is a feasible and acceptable solution for water.
		• APP queried whether the water main sizing considered off-peak 'trickle' top-up of the proposed reservoir from the Raymond Terrace WPS. HWC confirmed they will investigate further and also advised that the Raymond Terrace WPS may be upgraded in the future by HWC.

3 OPTIONS DEVELOPMENT

3.1 Points of Connection

The proposed development is located on the edge of the existing Raymond Terrace Water Supply system. The site is not included in Hunter Water's current area of operations. A plan including Hunter Water's infrastructure in the area is included as **Exhibit F**.

Water is supplied to the existing township of Raymond Terrace via a directly pumped system, with the pumps located at the Tomago Water Treatment works. There is a pressure booster pump which services a small area in the north of the town.

The Chichester to Tomago Gravity Main (CTGM) is the main potable water supply conduit between Chichester Dam and Newcastle. This large above-ground pipeline runs parallel to the Williams River, approximately 7km to the west of the Kings Hill site. The pipeline conveys treated potable water directly to the Newcastle metropolitan area.

This study investigates two main approaches for providing potable water from Hunter Water system to the Kings Hill development site:

- Connection to CTGM; and
- Connection to the Tomago Water Treatment Works.

For more details refer **Section** 4.

3.2 Available Capacity

Both, the CTGM and Tomago Water Treatment Works have the capacity to supply potable water to the Kings Hill development area.

3.3 Existing and Planned Hunter Water Assets

Hunter Water Asset Description	Asset Type	Asset Conditions and Restrictions
Tomago WPS	Water Pump Station	Nominated connection point for ultimate development
Richardson Rd, approx 100m west of Pacific Highway	Reticulation	Capacity for connection for up to 200ET
Newline Rd, approx 250m north of Beaton Ave	Reticulation	Capacity for connection for up to 200ET
Raymond Terrace WPS	Water Pump Station	Capacity for approx 400 ET, with adjustment to pump set points, and minor modification to surrounding pipework.

		Capacity for up to 1,500 ET, with augmentation to suction pipework (extend DN375 to existing DN500 adjacent to the intersection of Elizabeth Ave & Tod St). Capacity for up to 4,500 ET with augmentation to suction pipework (extend from previous extension, to Tomago WPS).
Chichester Trunk Gravity Main	Trunk Reticulation	Alternate connection point for ultimate development

3.4 Design Water Demand

Previous investigations have assumed that the development will yield approximately 4,500 ET. **Table 5** summarises a first-principles calculations based on the latest Master Plan.

Table 5 – Equivalent Tenement Estimation

Description	Development Area (ha)	Development Density (ET/ha)	Ultimate Tenements (ET)
Village and Town Centre	4.9	15	74
Medium Density Residential	72	15	1,080
Residential	328	10	3,280
Community uses, Schools etc	18.2	10	182
Mixed Use	8	10	80
Parks & Open Space	20.5	0	0
TOTAL	451.6		4,696

Planning for the area is still in early stages and has been undertaken utilising a lot yield of 4,500 ET. Due to the nature of the site it is currently anticipated that per hectare loadings will be slightly lower than the conventional per hectare loading rates.

As such, calculations in this report are based on a lot yield of 4,500 ET.

The water supply design demands calculations are included in **Appendix F** and summarised in **Table 6**.

Table 6 – Kings Hill Development Water Supply Design Demands

Description	Equivalent Tenements	Average Day Demand (kL/yr/ET)	Average Day Demand (ML/day)	Peak Day Demand (ML/day)	Peak Hour Demand (L/s)
Village and Town Centre	70.4	270	0.05	0.13	2.96
Medium Density Residential	1034.9	270	0.77	1.86	43.55
Normal Residential Lots	3143.1	270	2.33	5.66	132.25
Community Use	174.4	270	0.13	0.31	7.34
Mixed Use	76.7	270	0.06	0.14	3.23
Unaccounted for Water			0.50	0.50	5.78
TOTAL	**4500.0**		**3.8**	**8.6**	**195.1**

3.5 Option Assumptions

The following parameters have been utilised in assessment of the servicing options.

Table 7 – Option Assessment Parameters

Item	Source
Engineering Requirements	WSA 03-2002-2.3 Water Code of Australia Hunter Water Edition
Discount rates	Assessment of 7%, with sensitivity at 4% and 10%
Energy prices and inflation rates	As per "Operating and Maintenance Cost Estimating Guideline", Hunter Water Corporation, September 2010
Greenhouse gas abatement emission factors and certificate prices and inflation rates	As per "Operating and Maintenance Cost Estimating Guideline", Hunter Water Corporation, September 2010
Connection points nominated by Hunter Water	As discussed in **Section 3.1**
Maintenance and operating costs from guidance and information provided by Hunter Water manuals and guidelines	As per "Operating and Maintenance Cost Estimating Guideline", Hunter Water Corporation, September 2010.
Capital costs	As per HWC Cost Estimating Spreadsheet, provided by HWC via email (21/7/11)

4 SERVICING OPTIONS - REGIONAL

4.1 Previous Investigations

The following servicing strategies have been previously prepared for the site:

- North Raymond Terrace Draft Initial Water and Wastewater Servicing Options; Patterson Britton & Partners; August 2003.
- Kings Hill Water and Wastewater Servicing Study; Patterson Britton & Partners; August 2004.
- North Raymond Terrace Water and Wastewater Servicing Study Additional Investigations; Patterson Britton & Partners; December 2004.
- Kings Hill North West Village Water and Wastewater Servicing Study; Patterson Britton & Partners; February 2005.

The previous strategies considered six potential sources of water for the Kings Hill Development:-

1. Potable water from Tomago WTW, located approximately 12km to the south
2. Potable water from the CTGM pipeline, located approximately 4km to the west
3. Non-potable water sourced from Grahamstown Lake, located 2km to the east.
4. Non-potable water sourced from the Williams River, located less than 1km to the west
5. Non-potable water reclaimed from treated wastewater from Kings Hill development
6. Non-potable water from rainwater tanks connected to the roofs of Kings Hill houses.

Options 1 and 2 were considered traditional servicing options and therefore have a higher confidence in terms of feasibility.

Options 3 and 4 were alternative sources that would require additional discussions and investigation to assess if they would be feasible. These options outline new water sources and thus a new water supply scheme to be implemented, requiring environmental and regulatory approvals, treatment facilities and ancillary infrastructure. It is noted that these options could be pursued with both Hunter Water and privately. These options have a high risk of issues arising that would affect their feasibility. These options are not investigated as part of this report.

Options 5 and 6 were complementary water sources for the above options 1-4. These water sources would be considered as recycled water and would be suitable for restricted household uses such as outdoor use and toilet flushing. These options require additional infrastructure to treat the recycled water, but offer a reduction in the potable water requirement to the site. The reduction in potable water requirements would need to be determined on the basis of long-term water balances.

Typically installation of a dual-reticulation system could see potable water reductions in the order of 30-40%. However, this report noted that as the minimum reticulation pipe size in residential streets is governed by fire-fighting requirements, the savings in potable infrastructure costs are less than this. Additional costs are also incurred by the second set of reticulation. The site is remote from wastewater treatment facilities which is likely to see the implementation of dual reticulation to be unfavourable. At this stage of development planning dual reticulation is not proposed and therefore these options were not investigated as part of this report.

4.2 Constraints

A desktop constraints analysis has been undertaken for the options to be assessed, this covers technical constraints, community / stakeholder constraints and environmental constraints.

4.2.1 Technical Constraints

The proposed Kings Hill Development broadly requires a new water supply system and thus there are limited technical constraints above the requirements of the Water Supply Code of Australia WSA – 2002-2.3 Hunter Water Edition. The major technical constraints include provision of a sufficient pressure and security of supply.

4.2.2 Community / Stakeholder Constraints

The majority of the watermains options would be constructed in the existing road easements. Option 1A would require crossing private land. Community/ stakeholders consultation would need to be undertaken and land matters resolved prior its construction.

Part of the development area drains into Hunter Water Special Area for Grahamstown Dam. As a result HWC approval in conjunction with Council will be required.

4.2.3 Environmental Constraints

A review of ecological investigation at the site by PEA Consulting (May, 2013) indicates that comprehensive ecological studies have been undertaken on the Kings Hill site and whilst there are areas of ecological significance within Kings Hill, these will only be slightly impacted by the servicing internal to the site. The extent of environmental impacts to be further defined at concept stage, with the outcome of environmental studies utilised in determining optimum infrastructure location.

The lands outside of the Kings Hill project area that are within the proposed options for servicing include a mixture of remnant vegetation and cleared areas with minimal ecological value. Ecological habitats identified in preliminary ecological constraint mapping identified three communities that have the greatest ecological value, these include:

- Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions
- Seaham Spotted. Gum - Ironbark Forest (LCHREMMS Map Unit 16)
- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

The habitats that will become the interest for future ecological surveys (including a buffer of 50 metres) are:

- 16 Hectares of She Oak forests and similar non-eucalypt wetland forests, such as Melaleuca forest;
- 20 Hectares of Eucalypt forest including Seaham Spotted gum Ironbark forest;
- 17 Hectares of Wetland that includes manmade dams and drains.

Only a small percentage of these habitats would be impacted, and at the concept design stage, re-alignment can be considered to minimise impacts.

A Search of the NPWS Atlas database for local significant species, populations, and communities identified that the local area supports a range of significant ecological issues that will require further research and

possibly management. A comparison of these with the habitats identified in the constraint mapping shows that a range of species could potentially be present within the proposal area, including:

She Oak forests and similar non-eucalypt wetland forests, such as Melaleuca forest	**Fauna** Grey-crowned Babbler (Eastern Subspecies) All local bats **Flora** Tall Knotweed
Eucalypt forest including Seaham Spotted gum Ironbark forest	**Fauna** All local bats Glossy Black-cockatoo Grey-crowned Babbler (Eastern Subspecies) Spotted-tailed Quoll Varied Sittella Swift Parrot Squirrel Glider Brush-tailed Phascogale Koala **Flora** Dwarf Kerrawang and
Wetland that includes manmade dams and drains	**Fauna** Black-necked Stork All local bats Green And Golden Bell Frog Spotted Harrier (very marginal habitat) **Flora** Tall Knotweed

Whilst records of significant species at a locality provide background information on the habitat of the area it does not prove that there is not habitat for additional species, or that the distribution of species is not different to the historical records. This absence of evidence can only be rectified by detailed ecological survey of the proposed service alignments prior to undertaking concept design.

The potential for harm is considered to be a low to moderate risk, and the opportunity for realignment further reduces this risk. Future surveys may reduce the potential for impacts on significant ecological issues even further. Notwithstanding, the impact is small in nature and largely avoids areas containing important ecological habitats.

The proposed alignments cross lands which have generally been cleared for agriculture, roads or residential properties. Parts of the site (generally above RL60m AHD) will be zoned E2 – Environmental Conservation, refer **Exhibit C**).

SEPP 14 Wetlands are located to the south of the proposed development. It is not proposed to construct infrastructure within the SEPP 14 wetlands. Part of the development area drains into Hunter Water Special Area for Grahamstown Lake. Surface water management and management of potential contaminants is to be investigated in the Environmental Assessment undertaken at DA stage to ensure the water source is not compromised.

Other potential environmental constraints include high ground levels, acid sulphate soils (ASS) and river crossings.

Searches were undertaken of the NPWS Atlas for endangered and threatened flora and fauna. Whilst some flora and fauna were identified (**Exhibit D2**), none were close to the proposed infrastructure, and all options were considered to be similarly encumbered. It is considered that these risks could be appropriately managed at the design and/or construction phases.

A search of the Aboriginal Heritage Information Management System (AHIMS) database was undertaken to identify any known artefacts in the area. The results of this search are presented on **Exhibit D1**. It is noted that some proposed trunk alignments are in the vicinity of a known artefact site within the Kings Hill Development Area. The development proponent is actively engaging with the Aboriginal Land Council for the area, and further consideration will be given to the treatment for any artefacts uncovered during construction by the Review of Environmental Factors (REF) which will be prepared during concept design stage.

4.3 Options Description

The options investigated in this report are based on two main approaches:

- The subset of Option 1 include a direct connection to the CTGM.
- The subset of Option 2 are based on direct connection to Tomago Water Treatment Works.
- Option 3 is a staged option developed by Hunter Water, to make use of existing infrastructure.

Based on these approaches six options for the lead-in main alignment have been developed. These options are summarised below, and shown on ***Exhibit G1-G6***.

Pipeline sizes have been adopted from Hunter Water advice. It is noted that depending on the ultimate configuration of the system, there may be potential to optimise pipeline sizes, for example utilising the reservoir to buffer flows may allow for some reduction in lead-in pipework size.

4.3.1 Option 1A

This option consists of a trunk watermain connection to the Chichester Trunk Gravity Main, to the west of the site. This option would require a trenchless crossing under the Williams River. This option is shown on **Exhibit G1**.

It is noted this option would require acquisition of private land, but that there are several cadastral parcels which would be suitable.

Acid sulphate soil risk mapping indicates approximately 4.8km of the alignment has a high probability of encountering ASS.

The infrastructure required for the option would be :-

- 7.5km of DN450 watermain

4.3.2 Option 1B

This option consists of a trunk watermain connection to the Chichester Trunk Gravity Main, to the west of the site. This option is longer than Option 1A, but utilises existing road corridors to access the CTGM. This option is shown on Exhibit G2.

This option would require a trenchless crossing under the Williams River. Acid sulphate soil risk mapping indicates approximately 2.5km of the alignment has a high probability of encountering ASS.

The infrastructure required for the option would be :-

- 11.7km of DN450 watermain

It is noted that there is an alternate alignment which follows Newline Rd to the south, and then traverses east to meet the CTGM. This alignment has two river crossings - the Williams River at Seaham Rd, then the Hunter River at Raymond Terrace Rd. This alignment is also approximately 2km longer, and connects at a more hydraulically disadvantaged location than Option 1B. As such, it has not been considered further.

4.3.3 Option 2A

This option connects the site to the Tomago WPS and is shown on **Exhibit G3**. The alignment follows Masonite Rd & Newline Rd with a route which takes advantage of parks. It is noted that there are several options for this alignment through the Raymond Terrace urban area which could be considered at concept stage, pending the location of services etc.

Acid sulphate soil risk mapping indicates approximately 6.6km of the alignment has a high probability of encountering ASS.

This option requires a trenchless crossing under the Pacific Highway. The watermain will be constructed within the Hunter Water Special Area for both Grahamstown Dam and Tomago Sandbeds.

This option is situated favourably with regard to the second interim connection point nominated by Hunter Water. This would allow for connection of 100 low-level lots directly after construction of the lead-in main, with the potential to extend this following construction of the low-level reservoir due to the reservoir buffering capacity.

The infrastructure required for the option would be:-

- 15.7km of DN450 watermain

4.3.4 Option 2B

This option connects the site to the Tomago WPS and is shown on **Exhibit G4**. The watermain route follows the boundary between HWC land and a private pine plantation through the Tomago Sandbeds, crosses the Pacific Highway at Richardson Rd and then follows Rees James Rd and the proposed walking/bike path to the eastern corner of the site.

Acid sulphate soil risk mapping indicates approximately 500m of the alignment has a high probability of encountering ASS.

This option requires a trenchless crossing under the Pacific Highway and Irrawang Spillway. The watermain will be constructed within the Hunter Water Special Area for both Grahamstown Dam and Tomago Sandbeds.

This option is situated favourably with regard to the first interim connection point nominated by Hunter Water. This would allow for connection of 100 low-level lots directly after construction of the lead-in main, with the potential to extend this following construction of the low-level reservoir due to the reservoir buffering capacity.

The infrastructure required for the option would be:-

- 12.8km of DN450 watermain

4.3.5 Option 2C

This option connects the site to the Tomago WPS and is shown on **Exhibit G5**.

The route follows the Grahamstown raw water pipeline easement then along Richardson Rd and runs parallel to the Pacific Highway along Rees James Rd and the proposed walking/bike path to the eastern corner of the site.

Acid sulphate soil risk mapping indicates approximately 500m of the alignment has a high probability of ASS.

This option requires a trenchless crossing under the Pacific Highway and Irrawang Spillway. The watermain will be constructed within the Hunter Water Special Area for both Grahamstown Dam and Tomago Sandbeds.

This option is situated favourably with regard to the first interim connection point nominated by Hunter Water. This would allow for connection of 100 low-level lots directly after construction of the lead-in main, with the potential to extend this following construction of the low-level reservoir due to the reservoir buffering capacity.

The infrastructure required for the option would be :-

- 14.4km of DN450 watermain

4.3.6 Option 3

This option is a staged option prepared by Hunter Water utilising available capacity within the existing water network. This option is shown on Exhibit G6. The watermain will be constructed within the Hunter Water Special Area for both Grahamstown Dam and Tomago Sandbeds.

The works would consist of:-

Stage 1 – 0-100 ET

- 7.8km of DN300 watermain - Connection of low-level lots to the delivery side of the Raymond Terrace WPS, including cross connection of this main to the existing DN250 watermain at approximately 1km intervals.
- Adjustment to pump set points, and minor modification to surrounding pipework.
- It is noted that this work hydraulically releases approximately 400ET, but that supply in the early stages is governed by security of supply which means the reservoir is required after 100ET.

Stage 1a – 100-400 ET

- Construction of 2.5ML reservoir (Note: this reservoir is the low-level reservoir further discussed in Section 5. A further high-level reservoir is also proposed, refer to Section 5.) This reservoir can buffer incoming flows, allowing for connection of additional ET.

Stage 2 – 400-1,500ET

- 1.2km of DN375 watermain - Augmentation to suction pipework - extend DN375 to existing DN500 adjacent to the intersection of Elizabeth Ave & Tod St.
- Construction of new pump unit at Raymond Terrace WPS, approximately 99.5L/s @ 54m.

It is noted that the feasibility of upgraded pump capacity at the existing Raymond Terrace WPS to 99.5L/s will require confirmation as part of the concept design phase for these works. If upgrade at this site is not possible, the Stage 3 lead in watermain below will need to be brought forward.

Stage 3 – 1,500-4,500 ET

- 7.05km of DN375 watermain. Continue augmentation of suction pipework from previous point to existing DN1350 near Tomago WPS.

It is noted this option is situated favourably with regard to the first interim connection point nominated by Hunter Water. It may be possible to split the initial stage into two substages, pending negotiation with Hunter Water at Concept Design Stage.

If this option is preferred, further work would be required at concept design stage to clearly define the available capacity for each stage of water infrastructure with regard to integration of the two sets of Hunter Water advice.

4.4 Preliminary Non-Price Options Assessment

The preliminary non-price assessment of each option is summarised below in **Table 8**.

Table 8 – Non-Price Options Comparison Table

Option	Description	Loading Assessment	Technical Constraints	Performance	Flexibility & Adaptability	Reliability & Maintainability	Security of Supply	Community / Stakeholder Constraints	Environmental Constraints	OH&S	Recommendation
1A	CTGM – Direct Route (crosses private land)	Capacity for all development within the study area	The shortest alignment. River crossing required. HWC have indicated operational concerns.	Standard infrastructure type within HWC's Area of Operations. Infrastructure will be designed to comply with relevant HWC design manuals / guidelines, to ensure that performance is within HWC's Operating License.	Options 1 and 2 considered to have similar flexibility and adaptability with regard to additional growth in the area.	Hunter Water have expressed concern with regard to reliability of the CTGM to directly service the site.	Security of supply for the proposed Kings Hill development area will be provided by the reservoirs.	Located within private properties. Some land acquisition or easements would be required.	Construction near environmentally sensitive areas. Acid sulphate soils. High groundwater levels.	OH&S matters considered comparable between options. Reservoirs required for all options. Alignments for 1A and 1B are in less developed areas, with less OH&S risk during construction and maintenance.	Proceed with detailed analysis
1B	CTGM – alignment follows roads		River crossing required. HWC have indicated operational concerns.						Construction near environmentally sensitive areas. Acid sulphate soils. High groundwater levels.		Proceed with detailed analysis
2A	Tomago WTP - Western Route.		Route takes advantage of parks close to river, only small section would be constructed within the built-up area. Highway crossing would be required.			Standard infrastructure type within HWC's Area of Operations. Infrastructure will be designed to comply with relevant HWC design manuals / guidelines, to ensure that performance is within HWC's Operating License. Reservoir & pump station require ongoing maintenance (i.e. painting, cleaning, servicing)		Crossing of Pacific Highway and possibly Adelaide St would require RTA consultation.	Construction near environmentally sensitive areas. Acid sulphate soils. High groundwater levels.		Proceed with detailed analysis

Option	Description	Loading Assessment	Technical Constraints	Performance	Flexibility & Adaptability	Reliability & Maintainability	Security of Supply	Community / Stakeholder Constraints	Environmental Constraints	OH&S	Recommendation
2B	Tomago WTP - Central Route.	Capacity for all development within the study area	Highway crossing would be required. Walking/ bike path crossing.	Standard infrastructure type within HWC's Area of Operations. Infrastructure will be designed to comply with relevant HWC design manuals / guidelines, to ensure that performance is within HWC's Operating License.	Options 1 and 2 considered to have similar flexibility and adaptability with regard to additional growth in the area.	**Standard infrastructure type within HWC's Area of Operations.** **Infrastructure will be designed to comply with relevant HWC design manuals / guidelines, to ensure that performance is within HWC's Operating License.** **Reservoir & pump station require ongoing maintenance (i.e. painting, cleaning, servicing)**	**Security of supply for the proposed Kings Hill development area will be provided by the reservoirs.**	Construction near HWC Special Area for Grahamstown dam – HWC approval in conjunction with Council required. Thrustbore under Irrawang Spillway or strapping watermain to Pacific highway bridge required. Crossing of Pacific Highway and possibly Adelaide St would require RTA consultation.	Construction near environmentally sensitive areas. Acid sulphate soils. High groundwater levels.	OH&S matters considered comparable between options. Reservoirs required for all options.	Proceed with detailed analysis
2C	Tomago WTP - Eastern Route.		Highway crossing would be required. Walking/ bike path crossing. Alignment at the back of the built-up area.			**Standard infrastructure type within HWC's Area of Operations.** **Infrastructure will be designed to comply with relevant HWC design manuals / guidelines, to ensure that performance is within HWC's Operating License.** **Reservoir & pump station require ongoing maintenance (i.e. painting, cleaning, servicing)**		Construction near HWC Special Area for Grahamstown dam – HWC approval in conjunction with Council required. Thrustbore under Irrawang Spillway or strapping watermain to Pacific highway bridge required. Crossing of Pacific Highway and possibly Adelaide St would require RTA consultation.	Construction near environmentally sensitive areas. Acid sulphate soils. High groundwater levels.		Proceed with detailed analysis
3	Tomago WTP - Staged option		Highway crossing would be required. Alignment traverses developed area.		Pumped solution is less flexible with regard to external changes in flow regime e.g. additional development			Construction near HWC Special Area for Grahamstown dam – HWC approval in conjunction with Council required. Thrustbore under Irrawang Spillway or strapping watermain to Pacific highway bridge required. Crossing of Pacific Highway and possibly Adelaide St would require RTA consultation.	Construction near environmentally sensitive areas. Acid sulphate soils. High groundwater levels.		Proceed with detailed analysis

4.5 Financial Analysis of Short-Listed Options

Cost estimates of the options have been recalculated using the latest Hunter Water Cost Estimating Manual. Full cost estimates can be found in **Appendix D**, and are summarised below in **Table 9**. It is noted these cost estimates only compare the infrastructure external to the site. The reservoirs and WPS to fill the high-level reservoir are common to all trunk servicing options, and are discussed further and costed in **Section** 5. It is noted no allowance has been made for the cost of reticulation in these cost estimates.

Cost estimates have only allowed for trenchless technologies at crossing of significant structures.

Table 9 – Estimated Capital Cost – Water Infrastructure

	Infrastructure Requirements		Capital Costs					Lifecycle Costs (30 yr NPV @ 7%)				
	Watermains	**Pump Station**	**Watermains**	**Pump Station**	**Land Acquisition**	**Developer Capital Cost PV**	**HWC Capital Cost PV**	**Energy Cost PV**	**GHG Cost PV**	**Maintenance PV**	**Total O&M PV**	**NPV**
Option 1A	7.5km DN450	Nil	$7,500,000	$0	$500,000*	$8,000,000	$0	$0	$0	$50,000	$50,000	$8,050,000
Option 1B	11.7km DN450	Nil	$11,850,000	$0	$0	$11,850,000	$0	$0	$0	$50,000	$50,000	$11,900,000
Option 2A	15.7km DN450	Nil	$14,700,000	$0	$0	$14,700,000	$0	$0	$0	$100,000	$100,000	$14,800,000
Option 2B**	12.8km DN450	Nil	$13,200,000	$0	$0	$13,200,000	$0	$0	$0	$100,000	$100,000	$13,300,000
Option 2C**	14.4km DN450	Nil	$14,400,000	$0	$0	$14,400,000	$0	$0	$0	$100,000	$100,000	$14,500,000
Option 3	7.8km DN300 1.2km DN375 7.05km DN375	Construction of new pump unit at Raymond Terrace WPS, approximately 99.5L/s @ 54m, approx 88kW/pump	$14,400,000	$400,000	$0	$12,350,000	$50,000	$950,000	$150,000	$100,000	$1,050,000	$13,550,000

* Land acquisition estimated at $40/m^2

** It is noted these alignments cross private land, but it is understood that these lands are owned by Hunter Water.

4.6 Options Discussion

The lowest lifecycle cost option is Option 1A (direct connection to CTGM), which is also the lowest capital cost. This option has an estimated lifecycle cost of $8.05M.

The next cheapest option is Option 1B, which also connects to the CTGM, but utilises a less direct route which is contained within existing road reserves. This option has an estimated lifecycle cost of $11.9M.

Hunter Water have indicated operational concerns with regard to connection of the development to the CTGM. Concerns include security of supply, hydraulic impact on existing customers and impact on emergency storage at the Dungog Clearwater Tank. As such, it is not proposed to further pursue this option.

Options which also connect to the Tomago WTP have also been considered (Option 2 subset), but have higher capital and lifecycle costs (in the range of $13-15M). These options have alignments which traverse more developed areas than the Option 1 subset, resulting in higher disruption to the community during construction. It is noted that depending on the adopted wastewater servicing option that there is potential for common trenching, if Option 2 subset is adopted. It is considered that common trenching may realise cost savings in the order of 30% for approximately 20-40% of the alignment of Option 2A. This yields a total saving of 6-12% overall, making them still less cost effective than Option 1B.

It is noted that all proposed water alignments of the Option 2 subset cross the Hunter Water Special Area. This area has legislated land use restrictions, to protect the catchment of the Tomago Sandbeds (one of Hunter Water's bulk water supplies). Hunter Water have previously indicated that they are not opposed to another water main crossing the Special Area.

Option 3 is a staged option has also been prepare by Hunter Water, to utilise available capacity within the system.

The capital cost and net present value (NPV) of Option 3 is higher than the capital costs of the Option 2 subset, but the present value (PV) costs are similar, as the capital cost is deferred. The overall alignment is longer to connect to existing infrastructure, and also passes through a more developed area. Refinement of this option as part of the concept design may locate the main in less developed roads, however there is not an obvious less developed road running parallel to Adelaide St or Irrawang St. It is recommended that common trenching is considered as part of the concept design, depending on the preferred alignment of the sewer rising main.

The lifecycle costs for Option 3 and Option 2B are essentially the same. As Option 3 presents more a more staged rollout with regard to flexibility, it is recommended as the preferred option. It is recommended that the pipeline alignment is further refined as part of the concept design.

4.7 Staging

The infrastructure is proposed in stages, to minimise upfront capital costs. Stage 1 consists of construction of the watermain. After 100 lots, the reservoir is required to provide security of supply to the low-level lots. The high-level reservoir will be required one development is planned for the high-level lots (above approximately RL35m AHD).

Staging for this option is presented in **Table 10**.

Table 10 – Option 3 – Staging

Year	Trigger Pojnt	Recommended Infrastructure	Budget Cost
2018	0-100	7.8km of DN300 watermain ** Adjustment to pump set points, and minor modification to surrounding pipework at the existing Raymond Terrace WPS.	$7.6M
2019	100-400	Construction of 2.5ML reservoir, (BWL = 60m AHD; TWL = 70m AHD, approx. 20m diameter). Required after 100 ET are released, for security of supply.	$3.3M*
2020	400-1500	1.2km of DN375 watermain	$1.3M
		Construction of new pump unit at Raymond Terrace WPS, approximately 99.5L/s @ 54m	$400K
2025	1500-4500	7.05km of DN375 watermain	$5.5M
		Construction of 2.5ML reservoir (BWL = 85m AHD; TWL = 95m AHD, approx 20m diameter	$3.3M*
		Construction of water pump station from low-level reservoir to high-level reservoir (approx. duty 50L/s @ 40m, approx 88kW/pump	$1.6M
		Approx 500m DN250 watermain connecting low-level and high-level reservoirs	
		TOTAL	**$22.6M**

* Note: This does not include allowance for access roads, earthworks to generate a flat pad etc, which may be required at this site.

** Note: Further negotiation with Hunter Water at concept design stage may see this stage split into two substages, with an interim connection point as nominated on **Exhibit F**.

*** Note: The high level reservoir is required once development is undertaken above approximately RL 35m AHD.

5 SERVICING OPTIONS – INTERNAL

To meet security of supply requirements for the site, either a reservoir or second lead-in pipeline is required. Due to the length of pipeline required to provide a trunk connection for the site, a reservoir is a more cost-effective option. Additionally, the high-level lots require a reservoir to meet minimum pressure requirements.

The developable land at Kings Hill is between RL 10m AHD and RL 60m AHD. This is more than can be serviced within one pressure zone, whilst meeting both minimum and maximum pressure requirements of the current HWC design code.

To meet HWC design criteria for minimum and maximum pressure, two reservoirs are required to provide two pressure zones, with bottom water levels of approximately 60m AHD and 85m AHD. Each pressure zone will service approximately half the development area.

Alternatively, the reservoir could be sited to provide sufficient pressure for the high-level lots and approximately five pressure reducing valves could be installed to reduce pressure for the low-level system. This would have an approximate capital cost of $250K. This would also require additional pipework to create separate zones and additional maintenance of a number of valves.

This option would significantly increase the ongoing lifecycle costs, as all the water for the development would be lifted to the high-level reservoir, rather than only lifting the water required for the high-level lots. The system would also be more operationally complex, due to the presence of multiple pressure reduction valves.

As such, for the purposes of this report, we have assumed two reservoirs will be utilised to provide pressure and emergency storage requirements at Kings Hill. Water will be delivered to the low-level reservoir, and then water for the high-level lots boosted to the high-level reservoir. This option also has advantages with regard to staging of capital works, with it possible to construct the low-level reservoir initially and only construct the high-level reservoir once high-level lots are to be developed. To provide 10 hours extreme day demand for the development area, 5 ML would be required.

The trunk infrastructure described in **Section** 4 would deliver water to the low-level reservoir. From here, the water for the high-level zone would be boosted to the high-level reservoir, utilising a pump station which would deliver 50L/s @ 40m, approximately 33kW/pump.

Table 11 – Reservoir Details

	Details	Cost*	Service Zone
Low-Level Reservoir	2.5ML BWL = 60m AHD TWL = 70m AHD Approx. 20m diameter	$3.3M	10-35m AHD
High-Level Reservoir	2.5ML BWL = 85m AHD TWL = 95m AHD Approx. 20m diameter	$3.3M	35-60m AHD

* Note: This does not include allowance for access roads, earthworks to generate a flat pad etc, which may be required at this site.

For the purpose of this investigation, it has been assumed that the reservoirs can be located on ground of suitable elevation within the Kings Hill site. It is noted that construction of a reservoir can produce significant engineering difficulties, when located on steep land. It is recommended that a reservoir location study is undertaken to determine the most suitable location, with regard to hydraulics, access, visual amenity, land acquisition etc. The cost estimates above do not allow for significant access roads or earthworks to generate a flat pad.

6 RECOMMENDED OPTION

The recommended option for water servicing is Option 3, which is presented on **Exhibit G6** and represents the most efficient and cost effective servicing option for lead-in wastewater and water services. The infrastructure required for this option would be:-

Stage 1 – 0-100 ET

7.8km of DN300 watermain. Connection of low-level lots to the delivery side of the Raymond Terrace Water Pump Station (WPS), including cross connection of this main to the existing DN250 watermain at approximately 1km intervals.

Adjustment to pump set points, and minor modification to surrounding pipework.

It is noted that this work hydraulically releases approximately 400ET, but that supply in the early stages is governed by security of supply which means the reservoir is required after 100ET.

Stage 1a – 100-400 ET

Construction of 2.5ML reservoir

Stage 2 – 400-1,500ET

1.2km of DN375 watermain. Augmentation to suction pipework - extend DN375 watermain to existing DN500 watermain adjacent to the intersection of Elizabeth Ave & Tod St.

Construction of new pump unit at Raymond Terrace WPS, (approximate duty 99.5L/s @ 54m).

It is noted that the feasibility of upgraded pump capacity at the existing Raymond Terrace WPS to 99.5L/s will require confirmation as part of the concept design phase for these works. If upgrade at this site is not possible, the Stage 3 lead in watermain below will need to be brought forward.

Stage 3 – 1,500-4,500 ET

7.05km of DN375 watermain. Continue augmentation of suction pipework from previous point to existing DN1350 watermain near Tomago WPS.

It is noted this option is situated favourably with regard to the first interim connection point nominated by Hunter Water. It may be possible to split the initial stage into two substages, pending negotiation with Hunter Water at Concept Design Stage.

It is recommended that as part of the concept design that the proposed alignment is further refined, when more information is available on all constraints including geotechnical conditions, land ownership, flora / fauna, heritage etc. Depending on the adopted sewer servicing option, there may be potential to co-locate the water and sewer infrastructure, and reduce establishment / trenching costs etc.

Internal to the site, two reservoirs will be required to provide security of supply and pressure to the higher lots. Due to the range of developable land being between RL10 and RL60m AHD, two pressure zones are required.

The infrastructure is proposed in stages, to minimise upfront capital costs. Stage 1 consists of construction of the watermain. After 100 lots, the reservoir is required to provide security of supply to the low-level lots. The high-level reservoir will be required one development is planned for the high-level lots (above approximately RL35m AHD).

Staging for this option is presented in **Table 12**.

Table 12 – Option 3 – Staging

Year	Trigger Point	Recommended Infrastructure	Budget Cost
2018	**0-100**	7.8km of DN300 watermain ** Adjustment to pump set points, and minor modification to surrounding pipework at the existing Raymond Terrace WPS.	$7.6M
2019	**100-400**	Construction of 2.5ML reservoir, (BWL = 60m AHD; TWL = 70m AHD, approx. 20m diameter). Required after 100 ET are released, for security of supply.	$3.3M*
2020	**400-1500**	1.2km of DN375 watermain	$1.3M
		Construction of new pump unit or upgrade at Raymond Terrace WPS, approximately 99.5L/s @ 54m	$400K
2025	**1500-4500**	7.05km of DN375 watermain	$5.5M
		Construction of 2.5ML reservoir (BWL = 85m AHD; TWL = 95m AHD, approx 20m diameter	$3.3M*
		Construction of water pump station from low-level reservoir to high-level reservoir (approx. duty 50L/s @ 40m, approx 88kW/pump	$1.6M
		Approx 500m DN250 watermain connecting low-level and high-level reservoirs	
		TOTAL	**$22.6M**

* Note: This does not include allowance for access roads, earthworks to generate a flat pad etc, which may be required at this site.

** Note: Further negotiation with Hunter Water at concept design stage may see this stage split into two substages, with an interim connection point as nominated on Exhibit F.

*** Note: The high level reservoir is required once development is undertaken above approximately RL 35m AHD.

7 REFERENCES

- Kings Hill Development Preliminary Water and Wastewater Servicing Advice; SMEC; April 2011.
- Kings Hill North West Village Water and Wastewater Servicing Study; Patterson Britton & Partners; February 2005.
- North Raymond Terrace Water and Wastewater Servicing Study Additional Investigations; Patterson Britton & Partners; December 2004.
- Kings Hill Water and Wastewater Servicing Study; Patterson Britton & Partners; August 2004.
- North Raymond Terrace Draft Initial Water and Wastewater Servicing Options; Patterson Britton & Partners; August 2003.
- Operating and Maintenance Cost Estimating Guideline, Hunter Water Corporation, September 2010.
- Wastewater Supply Code of Australia (WSA02) – Hunter Water Edition, Version 1.
- Water Supply Code of Australia (WSA03) – Hunter Water Edition, Version 1.

APPENDIX A – CORRESPONDENCE WITH HWC

Hunter Water Corporation
ABN 46 228 513 446

PO Box 5171
HRMC NSW 2310
36 Honeysuckle Drive
NEWCASTLE NSW 2300
1300 657 657 (T)
hunterwater.com.au

14 August 2017

Our Ref: 2010-678/6/13

APP Corporation Pty Limited
Level 7, 116 Miller Street
North Sydney NSW 2060

Attention: Adam Smith

Dear Adam

CONDITIONAL APPROVAL
KINGS HILL WATER SERVICING STRATEGY REVISION (H)

Hunter Water acknowledges the submission of the Kings Hill Water Servicing Strategy Revision (H) – May 2017 and Kings Hill Water Servicing Strategy Supplement (Rev 2).

The Water Servicing Strategy Supplement was prepared at the request of Hunter Water to explore the relative merits of the various lead-in water main corridor options supporting the Kings Hill Urban Release Area (URA). This was primarily to ascertain whether an option would emerge as a clear preference. To supplement this Hunter Water has also undertaken a value management workshop.

As a result of the workshop a third servicing option was put forward requiring a lead-in water main be constructed in each corridor. Hunter Water accepts the analysis provided by Northrop that this is an uneconomical option although its main advantage is one of equity between URA developers in supporting their own development interests and timeframes.

The Eastern and Western corridors appear to present equally satisfactory service solutions to the URA provided that the developer who takes the lead in designing and constructing the works does not unreasonably withhold access to the infrastructure or delay its delivery.

Given that the Eastern corridor aligns with other proposed NSW Government investment in the road interchange, Hunter Water is prepared to conditionally approve this water main corridor on the basis that KHD is the lead developer and must size and configure the infrastructure to serve the entire URA and meet the following conditions: -

1. Timely and reasonable access is to be provided to the proposed reservoir and lead-in water mains to all URA land holders.
2. Contracts are to be awarded for the first stages of development within a two year timeframe from the date of this letter, or as agreed with Hunter Water, to satisfy the overall URA needs.
3. If the lead developer is not KHD, or KHD are unable to materially progress the design and construction of the assets in the Water Servicing Strategy within the two

year timeframe nominated in point 2 above, Hunter Water reserves the right to amend the strategy to meet the needs of the URA.

4. Further, Hunter Water reserves the right to require revision of the strategy should any one of the following occur within the two year conditional approval:
    - Significant changes in development profile (ie yield, timing, staging or additional development potential);
    - Significant changes in development yield within the contributing catchment(s);
    - Hunter Water Design Standards or criteria are revised impacting the loading / demand derived from the URA;
    - Operation circumstances change;
    - You elect to use a Private Network Operator under the Water Industry Competition Act, as amended; or
    - Legislative or regulatory changes are imposed on Hunter Water**.**

Should the strategy need to be reviewed, the revised servicing strategy shall apply only to those development stages not already completed, or for which detail designs have not yet been approved. The revision of the servicing strategy shall be completed by the developer and again be reviewed and approved by Hunter Water. Any costs associated with these reviews shall be borne by the developer.

Please note that approval of a strategy is not a commitment by Hunter Water to fund or deliver infrastructure, nor is it a commitment for capacity being allocated to a particular development. Connection and/or capacity availability will only be confirmed by submission and determination of a Section 50 application and a valid development consent being issued by the relevant consent authority. Please also note the legal disclaimer attached (Appendix A) with respect to the use of Hunter Water's Servicing Strategy Template for the development of this strategy.

Please also note that the preparation of servicing strategies is a specialist design consultancy area and Hunter Water relies on your competency in these matters. If errors or other over sights are revealed at a later time Hunter Water will refer these to Kings Hill Development for rectification.

Once a servicing strategy is approved it becomes intellectual property of Hunter Water and may be passed on to third parties (including developer/consultants and members of the public under freedom of information laws). Hunter Water will use reasonable endeavours not to disclose private personal information or information which is commercial in confidence when providing a servicing strategy to third parties.

Please submit one electronic copy of the final strategy incorporating the supplement (in PDF format). Please ensure there is a version history in the document and a clear notation on the front cover that the strategy is "Final".

If you have any questions, please do not hesitate to contact me on 4979 9545.

Yours faithfully

Malcolm Withers
Senior Developer Services Engineer

Hunter Water Corporation
ABN 46 228 513 446
Customer Enquiries 1300 657 657
enquiries@hunterwater.com.au

PO Box 5171
HRMC NSW 2310
36 Honeysuckle Drive
NEWCASTLE NSW 2300

23 September 2013

Ref: 2010-678/7/8.012

Kings Hill Development
C/- APP Corporation Pty Limited
PO Box 1573
North Sydney 2060

Attention: Kith Clark

Dear Kith

RE: AMMENDMENT OF CONDITIONAL APPROVAL STATUS OF KINGS HILL WATER AND WASTEWATER SERVICING STRATEGIES – REVISION D

I refer to Hunter Water's previous letter dated 29 August 2013 providing conditional approval of the Kings Hill Water and Wastewater Servicing Strategies Revision D – June 2013. The essential and primary item of the conditional approval was that;

1. *Evidence of Hunter Land involvement in selection of the preferred arrangements for both waste water and water servicing strategies is to be provided.*

This requirement was included in order to ensure that the water and wastewater servicing strategies are based on a balanced view of growth within the Kings Hill Release Area and provides an efficient arrangement of infrastructure to service growth on a number of development fronts.

On Wednesday 19 September 2013, Hunter Water received correspondence from Hunter Land raising concerns about the strategy including:

- Hunter Land was not consulted in the development of the strategy
- The proposed timing and sequencing of both water and sewer lead in infrastructure is unbalanced across the development areas and incorrectly assumes that development requiring the western connection will commence after 2028.

Upon assessing Hunter Land's concerns, Hunter Water has withdrawn the conditional approval of the servicing strategies and requires that both parties give consideration to growth occurring on two development fronts concurrently and encourages further discussion between both parties with a view to achieving a more equitable outcome.

Hunter Water remains available should you wish to meet to discuss this further. There would be benefit in including Hunter Land in any such meeting to confirm mutually agreeable outcomes and the pathway forward for finalising the water and wastewater servicing strategies for the Kings Hill Release Area.

Please do not hesitate to contact us to arrange a meeting or to raise any questions you may have. I will be on leave between 01 October, 2013 and 02 December, 2013. In my absence, please contact Senior Developer Services Engineer Malcolm Withers on 4979 9545.

Yours faithfully

Paul McKoy
Developer Services Engineer

Copy to: 1. Hunter Land Pty. Ltd

2. SMEC

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enquiries@hunterwater.com.au

PO Box 5171
HRMC NSW 2310
36 Honeysuckle Drive
NEWCASTLE NSW 2300

24 August 2011 Ref:2010-678

SMEC
PO Box 1346
NEWCASTLE NSW 2300

Att: Kate Beard

Dear Kate

RE: PRELIMINARY SERVICING ADVICE FOR PROPOSED DEVELOPMENT at KINGS HILL

Thank you for your request for Hunter Water's preliminary advice for the provision of water and sewer services to your proposed development at Kings Hill (as described on your application).

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.

As you will appreciate, there may be significant changes that occur by the time the development proceeds to the lodging of a development application, therefore this preliminary advice is not a commitment by Hunter Water and may be subject to significant change prior to the development proceeding.

When 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.

Hunter Water has assumed that the proposed development will place an additional loading of 5000ET on the water system and 5000ET on the wastewater system. As a result the following information is offered.

Water
The proposed development is located in the Raymond Terrace Water Supply System and is expected to result in an additional water demand of 5000ET.

Currently, the development site is remote from the existing infrastructure. As previously advised, the ultimate connection point for this development will be Tomago WPS, however interim arrangements may be made for early stages. It should be noted that Hunter Water currently considers all upgrades required for this development to be developer funded, therefore timing of the upgrade works will be determined entirely by this development.

Regarding the nominated initial connection point, Hunter Water does not support connecting into the Raymond Terrace High Level system. It is considered preferable that the connection point is into the low level system (i.e. supplied directly from Tomago WPS).

In response to the specific questions asked in your letter dated 6 July 2011, the following advice is offered:

1. Based on a staged approach, can HWC indicate estimated timeframe of when the reservoir would be required?

   It will be the objective of the developer funded strategy to determine the timeframe for the reservoir. The strategy will need to ensure sufficient security such that no more than 100 properties are left without security of supply, even in the initial stages. This may be achieved in the form of dual mains or a reservoir. In practice, Hunter Water may allow a relatively small number of properties to exceed the 100 lot security of supply requirement subject to the assessment of potential risk, however, the strategy should assume that this requirement must be met at all times.

2. Capacity of the water main in the Pacific Highway at Connection Point 1 to service initial lots, prior to construction of the reservoir?

   As stated above, the preference is for the initial stages to not be connected to the existing high level system, therefore the nominated connection point 1 is considered unacceptable. The suggested interim connection point is to the DN200 in Richardson Rd (see attachment 1). It may be possible to allow an initial 20 ET from this connection point, however this is not considered preferable as further lots will not be able to connect into this high level system, therefore, any lead-in main from this connection point will only be able to serve 20 ET.

3&4. Location and capacity of nearest trunk main for initial stage release of 200 lots.

   It can be confirmed that the nominated connection point above has capacity for 200 ET. The minimum HGL at the connection point with the 200 ET on a peak day will be approximately 55 m.

5. Location and capacity of nearest trunk main for stage release of 500 lots.

   500 ET has been modelled at the same connection point above and shown that there is still capacity. The modelling also shows that even in the event of a break in the DN200 in Richardson Rd, there will still be sufficient capacity with the HGL dropping to 38m. However, it is considered that a second connection should be made. The suggestion is that the DN150 in Newline Rd should be able to provide additional security.

Wastewater Transportation

The Kings Hill site is located within the Raymond Terrace WWTW catchment and is expected to yield an additional loading of 5000ET which will ultimately be delivered directly to the treatment works.

Due to the size of the North Raymond Terrace Development Area, existing infrastructure will not be able to cater for flows from development in the area without significant upgrade. However, there is some spare capacity in the existing system which can be utilized in the initial stages of the development. As such, the above proposal will not significantly impact on existing wastewater collection and transfer systems.

In response to the specific questions asked in your letter dated 6 July 2011, the following advice is offered:

1. Capacity of the wastewater network at the nominated Connection Points 1-4.
    - Raymond Terrace 8 WWPS – this pump station currently has spare capacity for approximately 15.5L/s until upgrade works at an upstream WWPS. These are not scheduled to take place until after the next price path (ending 2016/17) and could be a temporary connection point during initial stages of the development.
    - MH F105 – this is the receiving manhole of Raymond Terrace 8 WWPS which is part of the Raymond Terrace 4 catchment. Connection at this point will be subject to the outcomes of the risk assessment of RT4 WWPS.
    - MH C2133 – this section is in the Raymond Terrace 3 catchment which has no spare capacity. Connection at this point is not an option.
    - Raymond Terrace 4 WWPS – connection directly to RT4 will be subject to the outcomes of the risk assessment.

2. Location and capacity of nearest point for initial stage release of 200 lots.

    Connection Point 1, Raymond Terrace 8 WWPS, is the nearest point with spare capacity for initial flows.

3. Location and capacity of nearest point for stage release of 500 lots.

    There are no available locations in the existing pumping stations within Raymond Terrace to receive these additional flows. Connection of a pump station directly to Raymond Terrace WWTW would be required at this stage. There are restrictions on the biological and hydraulic capacity at the WWTW and Hunter Water does not guarantee capacity prior to completion of upgrade works in 2017. More detail can be found below.

Wastewater Treatment
Raymond Terrace WWTW had an intermediate upgrade of the plant is which was commissioned in 2010 (35,000ET). Biological capacity for this development may be available depending upon the staging and timing of the development. However, due to hydraulic capacity restrictions at the plant, the current inlet works are not capable of accepting the ultimate development flows directly from the Kings Hill area via the anticipated independent WWPS and carrier main. Future plant upgrades at Raymond Terrace will address these restrictions and, upon commissioning expected in 2017, will provide sufficient capacity to cater for the ultimate development potential of the Kings Hill site.
At this stage, Raymond Terrace WWTW is not capable of catering for the entirety of the proposed rezoning prior to 2017/18. Any available capacity at the WWTW prior to 2017 will be given on a first come first served basis. It should be noted however, that a number of

major developments at Williamtown and Tomago are planned for completion in the near future. Hunter Water does not guarantee capacity at Raymond Terrace WWTW prior to the completion of upgrade works in 2017. The developer should liaise with Hunter Water, as necessary, to determine interim servicing options for the Kings Hill site.

A developer funded servicing strategy will be required to identify the optimal method of providing water and sewerage services the proposed development. These strategies, although being prepared for the eastern portion of the Kings Hill site, should consider opportunities for a common solution to servicing the overall site (including the western catchment). It will be a necessary part of development of these strategies for consultation to take place with the consultant preparing servicing strategies for the western portion of this site. Hunter Water will be happy to facilitate this consultation.

It should be noted that the expected dates of upgrade completion are indicative only and may be subject to change at any time.

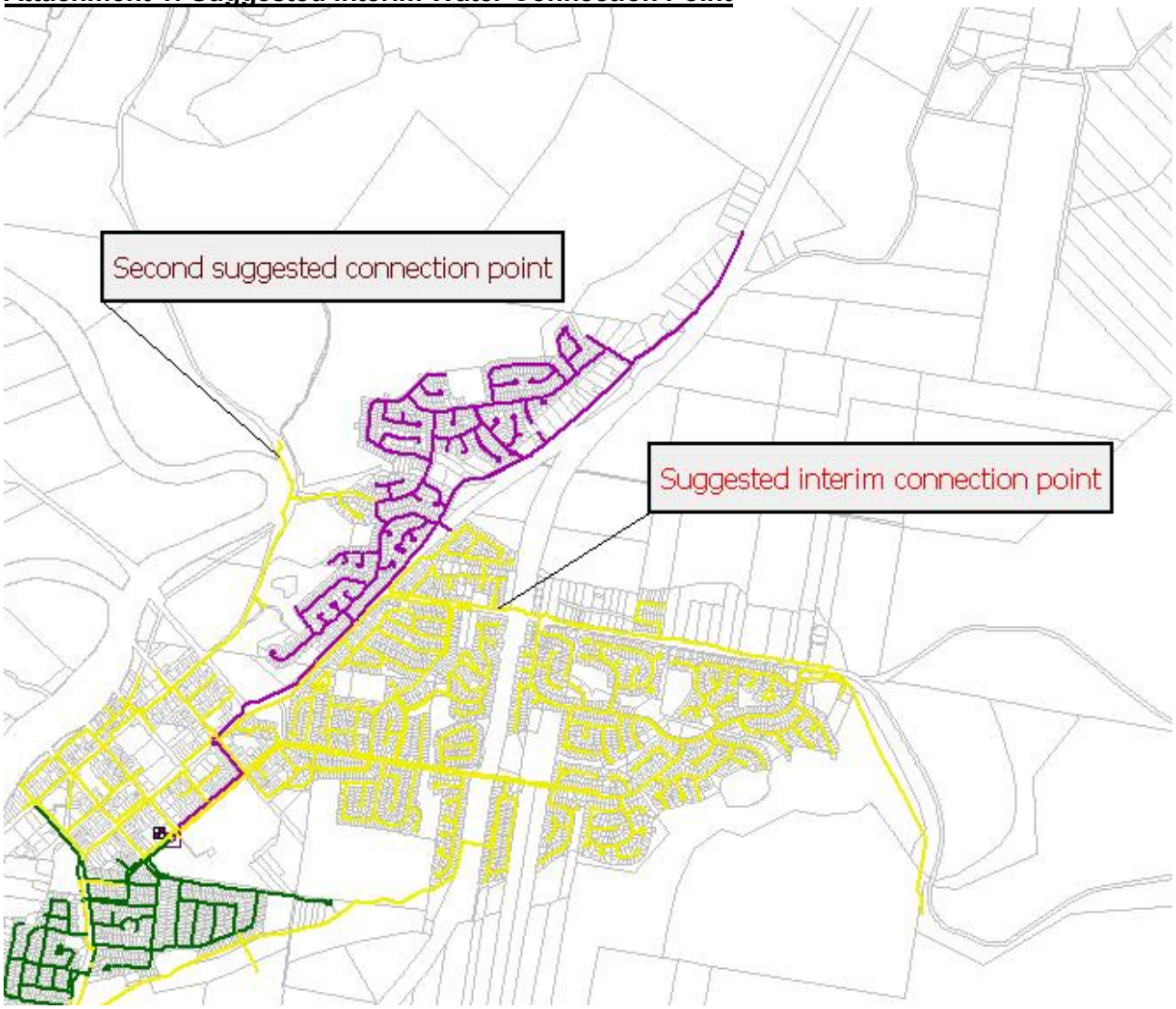
Should you require further clarification or assistance please do not hesitate to contact me on 4979 9545.

Yours Sincerely

MALCOLM WITHERS
Senior Account Executive Major Development

Att: Suggested Interim Water Connection Point

Attachment 1: Suggested Interim Water Connection Point



Hunter Water Corporation
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enquiries@hunterwater.com.au

PO Box 5171
HRMC NSW 2310
36 Honeysuckle Drive
NEWCASTLE NSW 2300

2 November 2011 Ref:2010-678

SMEC
PO Box 1346
NEWCASTLE NSW 2300

Att: Kate Beard

Dear Kate

RE: Raymond Terrace (Kings Hill) System Strategy Analysis

The purpose of this letter is to update you with Hunter Water's investigations that have been undertaken with respect to the Kings Hill development. A draft strategy has been determined to allow capacity in the Raymond Terrace trunk network for the Kings Hill development. It is expected that you will consider these upgrades; however, this does not restrict you from determining an alternate strategy.

The draft strategy has been developed to gain an understanding of Hunter Water's costs to service this growth area in the future. It is expected that the strategy will be refined and amended as necessary in consultation with the developer-funded strategy. Internal servicing options have not been considered in the draft strategy. The impacts of the internal servicing options on the regional strategy will need to be considered further.

Analysis of the system augmentation and staging is summarised in the table on the following page. Please also see attached schematics for details.

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

Yours Sincerely

MALCOLM WITHERS
Senior Account Executive Major Development

Att: Table – System Augmentation Summary
Figure 1: Concept Design of Raymond Terrace Augmentation
Figure 2: Schematic of Raymond Terrace Augmentation

Period	Capital Works Description	Size	Material	Length (m)	Additional ET from 2011		
					D/stream Tomago	HL system	Kings Hill
2011	No Augmentation Required				184	**15**	-
2013	No Augmentation Required				363	76	-
2017	Connect the DN150 and DN250 from the delivering end of Raymond Terrace WPS to the suction main of the pumping station.	300mm	PVC	75	733	259	400
	Connect a DN300 from the suction side of Raymond Terrace WPS along the existing DN200/DN250/DN300 to the Conner of Adelaide St and Bellevue St	300mm	PVC	2,850			
	Continue the DN300 main from the Conner of Adelaide St and Bellevue St along Ress James Rd to Kings Hill Development	300mm	PVC	4,900			
	Cross-connect the existing main to the new main with a DN 250 at every 1 kilometre	250mm	PVC	195			
??	Construct a new Reservoir at the location of Kings Hill development	3.5Ml					
	Construct a PS at Kings Hill development to service the high elevated areas						
2025	Construct a DN375 main from the existing DN500 (close to Elizabeth St) to the suction main of Raymond Terrace WPS	375mm	DICL-PN20	1,210	1,298	476	1,500
	Construct a new pump unit at Raymond Terrace WPS	2 duty one standby pump. Delivery set point 54m HGL.					
2035	Connect a new DN375 from the existing DN1350 to the DN500 close to Elizabeth St.	375mm	DICL-PN20	7,050	1,653	476	4,000
2040	Ultimate Development assessed in strategy				1,853	476	4,500

Figure 1: Concept Design of Raymond Terrace Augmentation

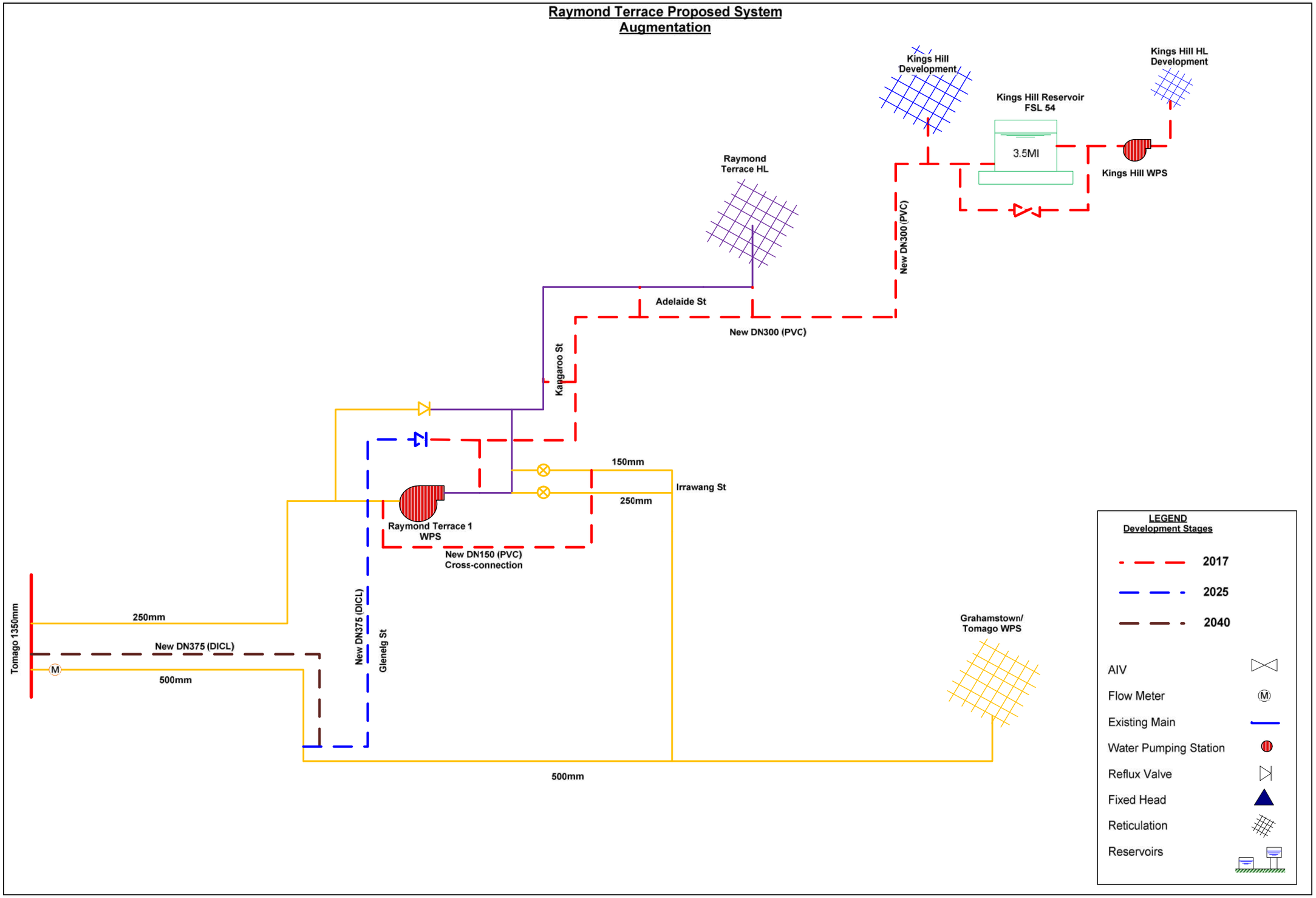
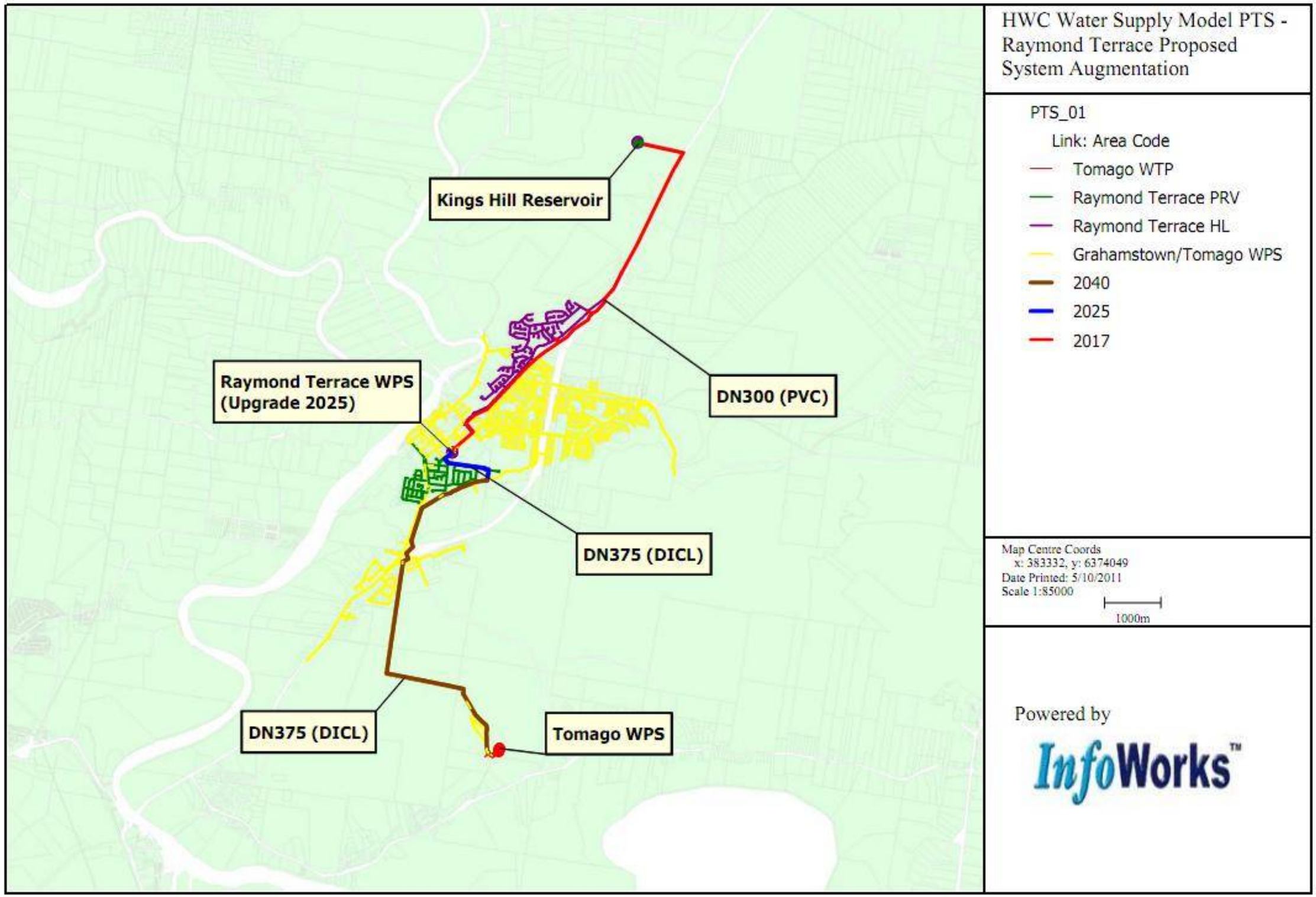


Figure 2: Schematic of Raymond Terrace Augmentation



Meeting:			
Meeting Title:	Kings Hill Development Area Water and Wastewater Servicing Strategy	**Date:**	21 September 2011
Subject:	Progress Meeting 1	**Time:**	2.00pm
Location:	Hunter Water Head Office		
Copies:	File HWC Mondell Property Group		
Project No:	30011097		
HWC TRIM No:	2010-678		
Attendees:	Malcolm Withers (HWC) Anthony Gentle (HWC) Peter Smith (HWC) Wesley Jones (HWC) Michael Breedon (HWC) Kate Beard (SMEC) Marketa McCarthy (SMEC)		
Apologies:	Nil		

Agenda/Minutes:		
Item	**Item Details**	**Actions (by who & date)**
1.	***Welcome, Introduction of Attendees, Apologies & Meeting Agenda***	
2.	***Background to development***	
	Calculations have been undertaken to determine the anticipated lot yield along with corresponding water and wastewater demands/loads.	For information
	The total lot yield of the Kings Hill Urban Development Area is anticipated to be 4500 lots. Flow and demand calculations are attached to these minutes for review by HWC to ensure that the factors include HWC's latest requirements.	HWC; 14 Oct, 2011
	Staging is still to be as previously advised, with a rollout of approximately 200 lots per year anticipated, with development commencing in 2013.	For information
	Two individual servicing strategies are being prepared by two consultants – SMEC and HSO for two sites adjacent to each other.	For information
	HWC will organise a meeting between HWC and both consultants before the second progress meeting.	For information

	Potential development of land south of the proposal was discussed (Rees James Rd development, identified by the HWC water servicing strategy). HWC is to provide loadings from this land for inclusion in the strategy.	HWC; 14 Oct, 2011
3.	***Wastewater***	
	Internal Servicing	
	SMEC outlined options for the new sewer transportation system. Two bigger pump stations pumping into a common rising main have been proposed. The system would also include a number of internal pump stations pumping into these two regional pump stations.	**For information**
	External Servicing	
	Raymond Terrace WWTW is the nominated discharge point for the new sewer system. HWC to confirm spare capacity available in this WWTW.	HWC; 14 Oct, 2011
	HWC requested two options for the rising main configuration to be included in the strategy: • Transfer from the western side of the development to the eastern, with one regional pump station • Transfer from the eastern side of the development to the western, with one regional pump station • A common rising main, connecting two regional stations located on the east and west of the ridge that divides the site.	**For information**
	HWC is to confirm if there is a spare capacity in Raymond Terrace No. 4 WWPS, for an interim connection.	HWC; 14 Oct, 2011
	HWC noted that there will be a barometric loop required on the new sewer transportation system	For information
4.	***Water***	
	There are two broad options being considered for water servicing – connection to the Tomago system, or the Chichester Trunk Gravity Main. It is likely that both options would require a reservoir for pressure and security of supply requirements.	For information
	HWC to check the overall impact of the proposed developments on the existing system and provide flow rates in the existing water main.	HWC; 14 Oct, 2011
	SMEC to work collaboratively with HWC to undertake water modelling for the site, to determine required upgrades for development scenarios.	For information
5.	***Recycled Water***	
	Inclusion of the recycled water system in the servicing strategy was discussed. It was agreed that due to the distance of the site from the nearest treatment plant (7 km) there is no real opportunity for water recycling.	

6.	***Water Resources***	
	HWC questioned draining of the site – specifically if the stormwater system proposed for the site will have any impact on the nearby Grahamstown Dam. SMEC noted that part of the site is within the Grahamstown Special Area. SMEC is to provide a plan of the proposed development to HWC. HWC's Water Resources Department will look at this issue.	SMEC, 22 Sept 2011
	Pending discussions with the Water Resources team, a decision will be made if the stormwater component will be included in the water and wastewater servicing strategy, or if the matter will be considered separately.	For information
7.	***General***	
	HWC has recently built a bound to protect a new road south of the proposed development against flooding. HWC offered SMEC the survey plans issued for these works.	HWC; 14 Oct, 2011
8.	***Next meeting date and location***	
	TBA	
9.	***Close Meeting***	

Meeting:			
Meeting Title:	Kings Hill Development Area Water and Wastewater Servicing Strategy	**Date:**	8 September 2011
Subject:	Inception Meeting	**Time:**	10:00am
Location:	Hunter Water Head Office		
Copies:	File HWC Morgan Banks / Mondell Property Group		
Project No:	30011097		
HWC TRIM No:	2010-678		
Attendees:	Malcolm Withers (HWC) Anthony Gentle (HWC) Wesley Jones (HWC) Chris Russell (Mondell Property Group) Emily Scivetti (Morgan Banks) Graham Brand (Morgan Banks) Ross Blancato (Property Advisory Pty Ltd) Matthew Rose (SMEC) Kate Beard (SMEC)		
Apologies:	Peter Smith (HWC)		

Agenda/Minutes:		
Item	**Item Details**	**Actions (by who & date)**
1.	***Welcome, Introduction of Attendees, Apologies & Meeting Agenda***	
2.	***Background to development***	
	The proposed Kings Hill development area is located north of the existing Raymond Terrace area and is anticipated to yield in the order of 5,000 lots.	For information
	The Kings Hill development area rezoning was gazetted by Port Stephens Council in December 2010.	For information
	The proposed Kings Hill development area is made up of a number of land owners, Morgan Banks / Mondell Property Group to forward land ownership plan to Hunter Water	Attached

	MW noted that one of the land owners on the western side of the development area had already commenced the preparation of a water and sewer servicing strategy for their portion of the development. CR noted that this decision was made by that particular land owner, not the overall landowner group. CR noted that MB/MPG own land on both the eastern and western portion of the site, as such it is their desired approach to develop a strategy that ensure the lowest life cycle cost for the overall site and that would be the objective of this strategy.	For information
	MW noted that as the strategy study's progress it may be beneficial for both landholders and Hunter Water to meet in order to discuss the proposed strategies to ensure a consistent outcome for Hunter Water.	For information
	Staging is still being investigated, broadly a rollout of approximately 200 lots per year anticipated.	For information
3.	***Wastewater***	
	Internal Servicing	
	SMEC plan to investigate options of a single regional WWPS with single rising main, along with dual regional WWPS (east and west) with the rising main joining in common along the alignment.	For information
	External Servicing	
	As outlined in the Preliminary Servicing Advice (PSA) the proposed ultimate wastewater connection point is the Raymond Terrace WWTW.	For information
	Several rising main alignments will be considered through the existing Raymond terrace area.	For information
	There are no other wastewater connection points that warrant investigation.	For information
	As outlined in the PSA there is some initial capacity in the existing Raymond Terrace wastewater catchment within the Raymond Terrace WWPS #8 catchment, along with possible capacity in the Raymond Terrace #4 catchment pending outcomes of a risk assessment.	For information
	Option of onsite treatment is being explored by the developer. MW indicated that HWC are not opposed to the idea of decentralised treatment, where it presents the lowest lifecycle cost to the community. Hunter Water noted that they are investigating approaches for Hunter Water (or subsidiaries) to be involved in the development of wastewater treatment infrastructure through the WICA approach, if interested it would be worthwhile discussing further with Geoff Stevenson from HWC.	For information
	As part of the strategy if innovative initial servicing measures appear feasible these can be presented in the servicing strategy with pros, cons, risks, costs for consideration by Hunter Water, these could include flow balancing via detention structures, etc.	For information
4.	***Water***	
	As outlined in the PSA the proposed ultimate water connection point is the Tomago Water Pumping Station (WPS).	For information

	Several rising main alignments will be considered through the existing Raymond terrace area.	For information
	As outlined in the PSA there is some initial capacity in the existing Raymond Terrace water system.	For information
5.	***Servicing Strategy Inputs***	
	Lands covered in the servicing strategy will be the rezoned areas of the Kings Hill development area.	For information.
	Hunter Water provided a hard copy of the regional water servicing strategy for information. This will be reviewed and returned by SMEC.	KB, 14/9/11.
	Discount rate for life-cycle analysis - agreed at 7%, with sensitivities at 4 and 10% to be performed	For information.
	Energy price series over the life of the project – agreed to be as per HWC Operating and Maintenance Cost Estimating Guideline (Sept 2010). Costs require escalating via CPI to 2011 dollars.	For information.
	GHG conversion factors over the life of the project – agreed to be as per HWC Operating and Maintenance Cost Estimating Guideline (Sept 2010).	For information.
	Cost effectiveness analysis period conversion factors over the life of the project. – Agreed to be 30 years.	For information.
	Cost estimating manual Agreed that HWC would provide most recent cost manual	HWC, 23/9/11
	O & M costs (e.g. chemical dosing, pump station & pipeline maintenance Agreed to be as per HWC Operating and Maintenance Cost Estimating Guideline (Sept 2010).	For information.
6.	***Next meeting date and location***	
	TBA	
7.	***Close Meeting***	

Attachment E

Hunter Water Corporation
ABN 46 228 513 446
Customer Enquiries 1300 657 657
enquiries@hunterwater.com.au

PO Box 5171
HRMC NSW 2310
36 Honeysuckle Drive
NEWCASTLE NSW 2300

23 July 2010 Ref:2010-678

Various Ownerships
C/- J W Planning Pty Ltd
P O Box 3252
Valentine NSW 2280

Dear Sir/Madam

RE INDICATIVE REQUIREMENTS FOR PROPOSED DEVELOPMENT subdivision of 16 lots into 5000 lots at Lot 41 DP 1037411, Lot 51 DP 839722, Lot 4821 DP 852073 etc, Pacific Highway , Ferodale

Hunter Water has considered your request for our requirements for the provision of water and sewer services to your proposed development.

As the development is subject to rezoning and approval by Local Council, any information at this point is indicative only and maybe subject to significant change prior to your development proceeding.

These indicative requirements are not commitments by Hunter Water. Once rezoning has been approved and the decision is made to proceed with the development application you will need to lodge an Application under Section 49 with Hunter Water.

On receipt of the Section 49 Application Hunter Water will forward a **Notice of Formal Requirements**. You will need to comply with each of the requirements for the issue of a Section 50 compliance certificate.

Hunter Water's Indicative Requirements provide general information on water and sewer issues relevant to the proposed development. The information provided is based on Hunter Water's knowledge of its system performance and other potential development in the area at the present time. As you will appreciate there could be significant change by the time the development proceeds to the lodging of a Development Application and therefore these indicative requirements maybe different to the Notice of Formal Requirements provided in the future.

Hunter Water's Indicative Requirements for the provision of water and sewerage facilities to the preliminary enquiry are as follows:

WATER DELIVERY
The proposed development is located in the Raymond Terrace Water Supply System and is expected to result in an additional water demand of 5000ET.

Currently there is no infrastructure capable of servicing the Kings Hill site. However, options for staged augmentation works necessary to service the North Raymond Terrace Development area are proposed in the existing Raymond Terrace Water Supply Servicing Strategy.

It is expected that the North Raymond Terrace Development Area will be serviced via proposed lead in mains located to the south-east of the site. Augmentation works detailed in

the current Servicing Strategy include the upsizing of an existing DN150mm watermain, located in the Pacific Highway, to DN250mm and extension of the main along the Pacific Highway to the boundary of the site. The Strategy also proposes that security of supply will ultimately be provided via the construction of a DN450 delivery pipeline from Tomago WPS to two 3.5ML reservoirs at North Raymond Terrace.

It is anticipated that development within the Kings Hill area will be serviced from these lead in trunk mains. However, due to the size of the proposed rezoning a developer funded Water Supply Servicing Strategy will be required to determine suitable servicing options.

The developer will be required to submit a Servicing Strategy addressing, but not limited to, the following: Lot layout; Staging of development; Investigation of alternative options ; Identification of least community cost option; Security of supply; Minimum pressure requirement; Fire – fighting flow requirement.

WASTEWATER TRANSPORTATION

The Kings Hill site is located within the Raymond Terrace WWTW catchment and is expected to yield an additional loading of 5000ET which will be delivered directly to the treatment works.

Due to the size of the North Raymond Terrace Development Area, existing infrastructure will not be able to cater for flows from development in the area without significant works. The Strategy identifies no advantage in augmenting the existing infrastructure within Raymond Terrace and proposes that development within the North Raymond Terrace area be serviced by infrastructure independent of the existing Raymond Terrace wastewater transportation system. As such, the above proposal will not impact on existing wastewater collection and transfer systems.

The proposed rezoning will ultimately yield an additional residential loading of 5000 ET. It is anticipated that development within the Kings Hill area will also be serviced independently via pumping stations, rising main and a carrier main, feeding directly to Raymond Terrace WWTW. A developer funded Wastewater Servicing Strategy will be required to determine the infrastructure necessary to service development in the area.

The developer will be required to submit a detailed Wastewater Servicing Strategy addressing, but not limited to, the following: Lot layout; Staging of development; Accurate loading information; Proposed Pump Station and infrastructure detail and connection options; Timing of connection; Emergency storage; Surrounding potential future developments.

WASTEWATER TREATMENT

Raymond Terrace WWTW is currently at biological and hydraulic capacity (24,500ET). An intermediate upgrade of the plant is programmed to be commissioned in 2010 (35,000ET). Therefore, biological capacity for this development is expected to be available after 2011. However, due to hydraulic capacity restrictions at the plant, the current inlet works are not capable of accepting the ultimate development flows directly from the Kings Hill area via the anticipated independent WWPS and carrier main. Future plant upgrades at Raymond Terrace will address these restrictions and, upon commissioning expected in 2017, will provide sufficient capacity to cater for the ultimate development potential of the Kings Hill site.

At this stage, Raymond Terrace WWTW is not capable of catering for the entirety of the proposed rezoning prior to 2017/18. Any available capacity at the WWTW prior to 2017 will be given on a first come first served basis. It should be noted however, that a number of major developments at Williamtown and Tomago are planned for completion in the near future. Hunter Water does not guarantee capacity at Raymond Terrace WWTW prior to the completion of upgrade works in 2017. The developer should liaise with Hunter Water, as necessary, to determine interim servicing options for the Kings Hill site.

It should be noted that the expected dates of upgrade completion are indicative only and may be subject to change at any time.

General

It is a requirement of Hunter Water that application for a Section 50 "Notice of Requirements" be made for specific development proposals. Hunter Water would then formally assess the development, determine system capacity and nominate actual connection points to water and sewer. The Notice of Requirements would also nominate a number of actions to be completed by the developer. Completion of all actions in the Notice of Requirements triggers release of the Section 50 Compliance Certificate for the development.

The completion of Hunter Water's requirements (usually works and payment of fees) is best achieved prior to issue of Subdivision Certificate by Council or private certifier for other associated construction works. To this end Hunter Water requests that Council continue to include appropriate wording in its development consent conditions to reflect our needs.

Our Sales and Business Development team is available at short notice to discuss with the Department or the development community their water and sewer servicing needs and I would encourage open communication between all stakeholders.

Should you require further clarification or assistance please contact the enquiries officer listed below. These indicative requirements are not commitments by Hunter Water and maybe subject to significant change prior to this development proceeding.

Yours faithfully

Belinda Jones
Manager Business Operations

Enquiries: Robert Daniels
Tel: 1300 657 657
Fax: (02) 4979-9711

Date: 25/06/2010 Scale: 1 : 25000

Notes: PACIFIC HIGHWAY, FERODALE

HUNTER WATER DOES NOT GUARANTEE THE ACCURACY OF THIS PLAN

Beard, Kate

From: Clark, Kith <kith.clark@app.com.au>
Sent: Tuesday, 9 July 2013 10:37 AM
To: Beard, Kate
Subject: Fwd: Kings Hill Development Area - Servicing Strategy Development - Hunter Water Responses

As discussed

Sent from my iPhone

Begin forwarded message:

> **From:** "Davis, Amanda" <amanda.davis@app.com.au>
> **Date:** 9 July 2013 10:36:30 AM AEST
> **To:** "Clark, Kith" <kith.clark@app.com.au>
> **Subject: FW: Kings Hill Development Area - Servicing Strategy Development - Hunter Water Responses**
>
> ---
>
> **From:** Paul McKoy [mailto:paul.mckoy@hunterwater.com.au]
> **Sent:** Thursday, 27 June 2013 12:02 PM
> **To:** Clark, Kith
> **Subject:** Kings Hill Development Area - Servicing Strategy Development - Hunter Water Responses
>
> Hi Kith,
>
> Please see Hunter Waters comments regarding questions raised at our meeting Held on 23 April 2013;
>
> Wastewater
> Additional interim capacity is possible at Raymond Terrace 8 WWPS if the pumps are upgraded. This would also necessitate a pump upgrade at Raymond Terrace 4 WWPS. Hunter Water has plans to upgrade Raymond Terrace 4 WWPS in 2025/26, however this may change depending on future demand and prioritisation. There is sufficient capacity within the gravity network downstream of RT8 to handle some increased flows.
>
> Water
> Water main sizing is to be confirmed as part of the Servicing Strategy. Raymond Terrace WPS currently has sufficient capacity for a maximum of 15L/s for an off-peak (12am-5am) “trickle” feed. Upgrades of the WPS are currently planned for 2019/20, however this may change depending on future demand and prioritisation. The capacity of the upgraded WPS has not yet been determined.
>
> Please let me know if you need any additional information.
>
> Regards,
>
> HUNTER WATER

Paul McKoy | Developer Services Engineer | Hunter Water Corporation
36 Honeysuckle Drive Newcastle West NSW 2300 | PO Box 5171 HRMC 2310
T 02 4979 9476 | **F** 02 4979 9711 | **M** 0448 083 426 | paul.mckoy@hunterwater.com.au

APPENDIX B – EXHIBITS

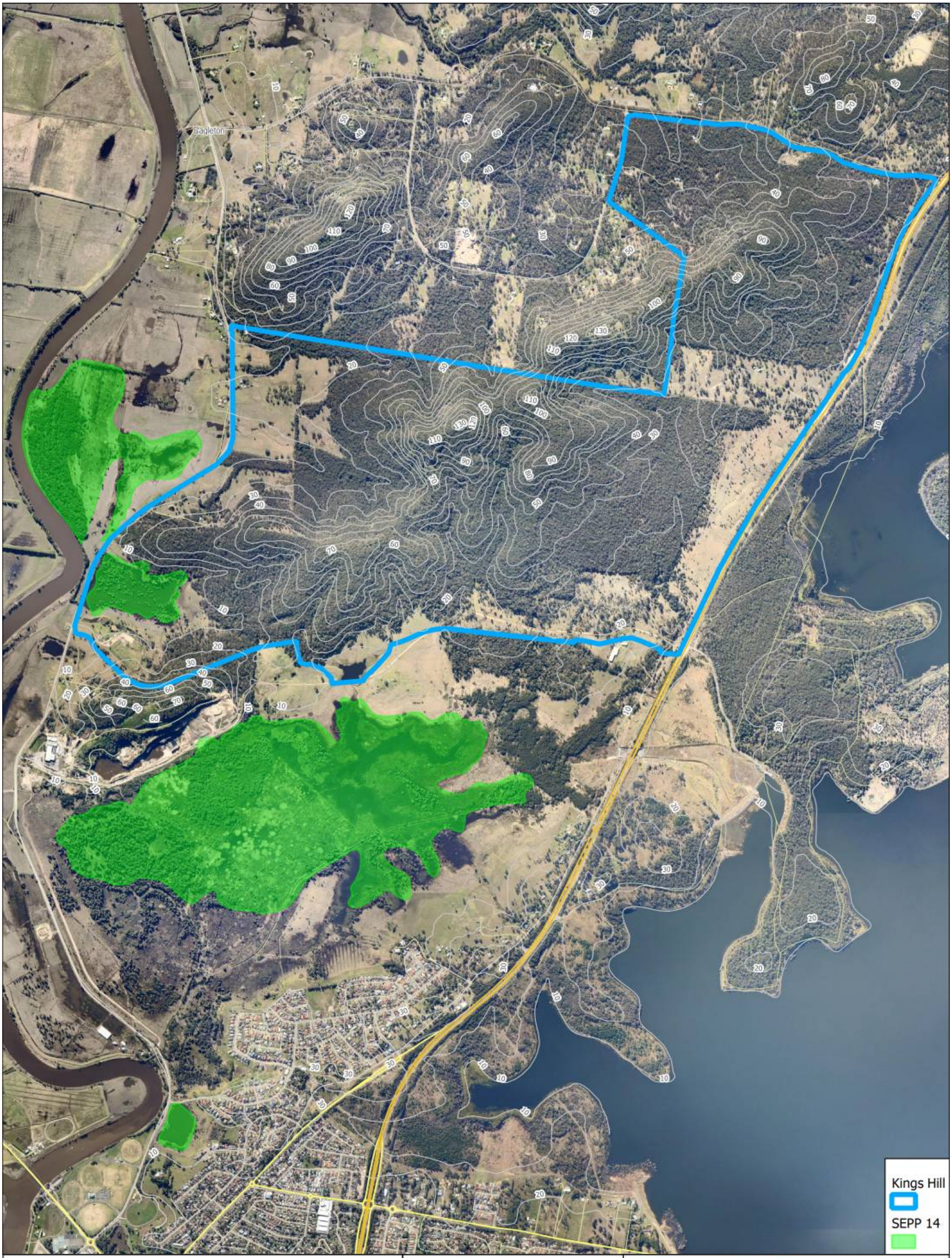
SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

EXHIBIT A
PROJECT NO. 30011056

0 2000 4000 6000 8000 m
1:150000

DATE 07-02-2012 SOURCES DEPT LANDS 2011
PAGE SIZE A3

FIGURE TITLE SITE LOCALITY
PROJECT TITLE KINGS HILL SERVICING STRATEGY



SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

EXHIBIT NO. B
PROJECT NO. 30011097

0 150 300 450 600 m

1:20000

DATE 07-02-2012 SOURCES DEPT LANDS 2011
PAGE SIZE A3

FIGURE TITLE LOCAL PLAN

PROJECT TITLE KINGS HILL WASTEWATER SERVICING STRATEGY

Seaham
East Seaham
Potential Archaeological Deposit (PAD)
Potential Archaeological Deposit (PAD)
Artefact
Artefact
Artefact
Artefact
Eagleton
Nelsons Plains
Artefact
Artefact
Burial
Osterley
Modified Tree (Carved or Scarred)
Raymond Terrace East
Millers Forest
Raymond Terrace
Potential Archaeological Deposit (PAD)
Artefact
Artefact
Earth Mound
Shell
Artefact
Artefact
Artefact
Artefact
Potential Archaeological Deposit (PAD)
Artefact
Artefact
Heatherbrae
Motto Farm
Artefact
Artefact

Infrastructure Corridor

Aboriginal Heritage

Kings Hill

SEPP 14 Wetlands

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources - no warranty is given that the information contained on this is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of all information prior to using it. This map is not a design document.

SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

EXHIBIT NO. D1
PROJECT NO. 30011097

DATE 16-02-2012 SOURCES DEPT LANDS 2011
PAGE SIZE A3

0 500 1000 1500 2000 m

1:50000

FIGURE TITLE ENVIRONMENTAL PLAN - ABORIGINAL HERITAGE AREAS
PROJECT TITLE KINGS HILL WATER SERVICING STRATEGY

Seaham
East Seaham
Balickera
Brandy Hill
Eagleton
Nelsons Plains
Osterley
Millers Forest
Raymond Terrace
Raymond Terrace East
Heatherbrae
Motto Farm
Tomago

Infrastructure Corridor

Kings Hill

SEPP 14 Wetlands

Acid Sulfate Risk
- Beach
- Disturbed
- Disturbed Terrain
- High probability of occurrence
- Low probability of occurrence
- No known occurrence

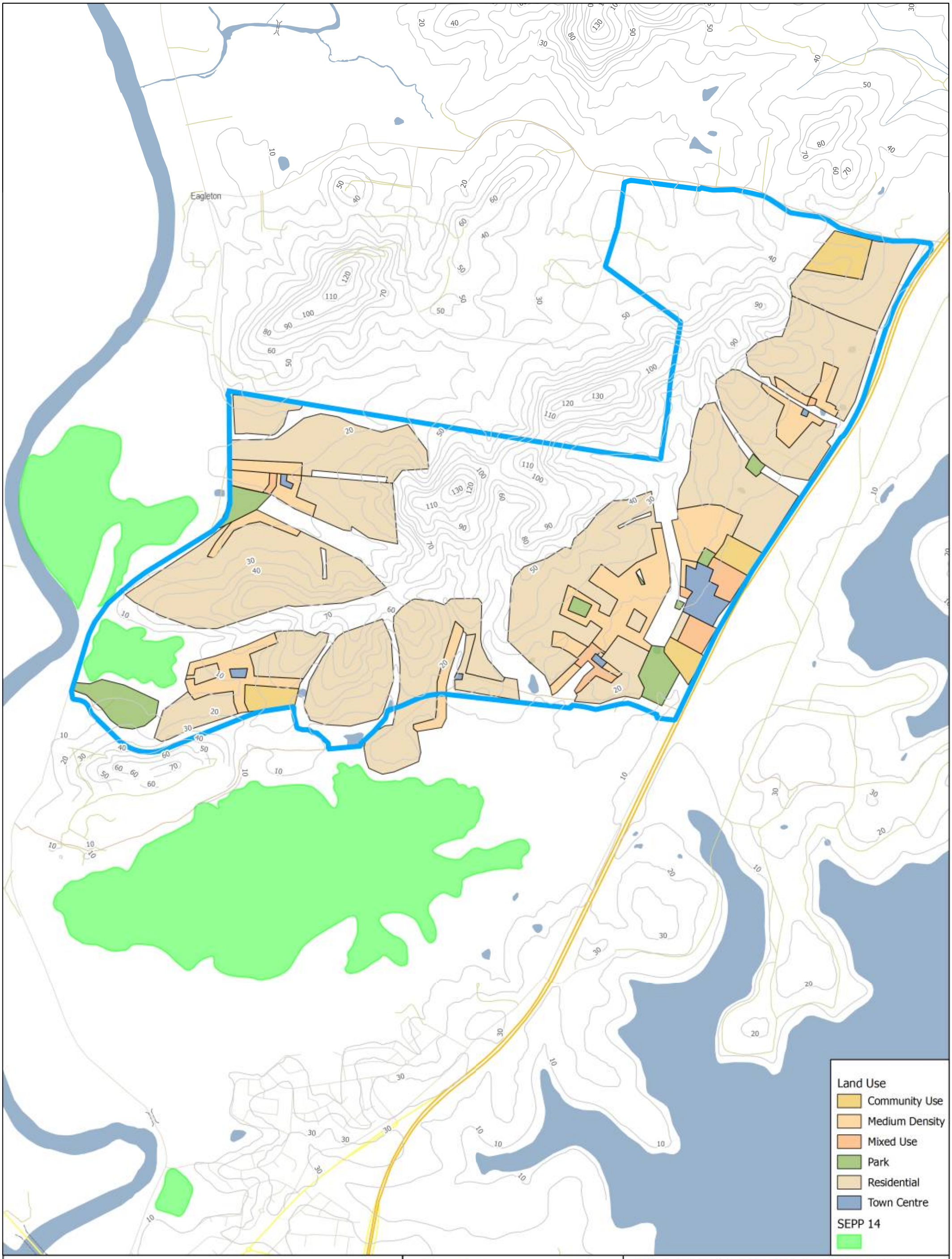
SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

EXHIBIT NO. D3
PROJECT NO. 30011097

0 500 1000 1500 2000 m
1:50000

DATE 16-02-2012 SOURCES DEPT LANDS 2011
PAGE SIZE A3

FIGURE TITLE ENVIRONMENTAL PLAN - ACID SULPHATE SOIL RISK
PROJECT TITLE KINGS HILL WATER SERVICING STRATEGY



SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

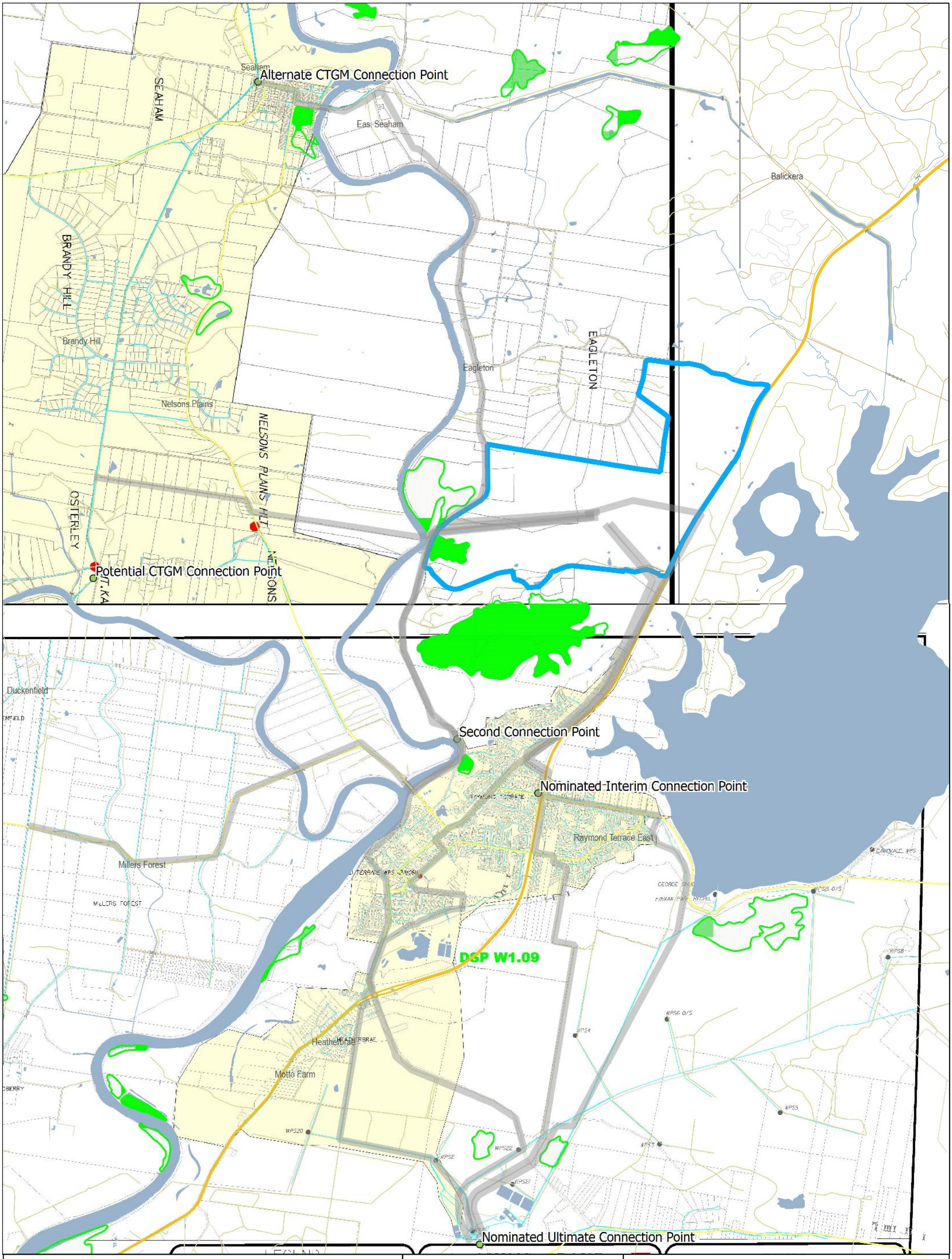
EXHIBIT NO. E
PROJECT NO. 30011097

0 150 300 450 600 m
1:20000

DATE 07-02-2012 SOURCES DEPT LANDS 2011
PAGE SIZE A3

FIGURE TITLE LAND USE PLAN

PROJECT TITLE KINGS HILL WASTEWATER SERVICING STRATEGY



SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

EXHIBIT NO. F
PROJECT NO. 30011097

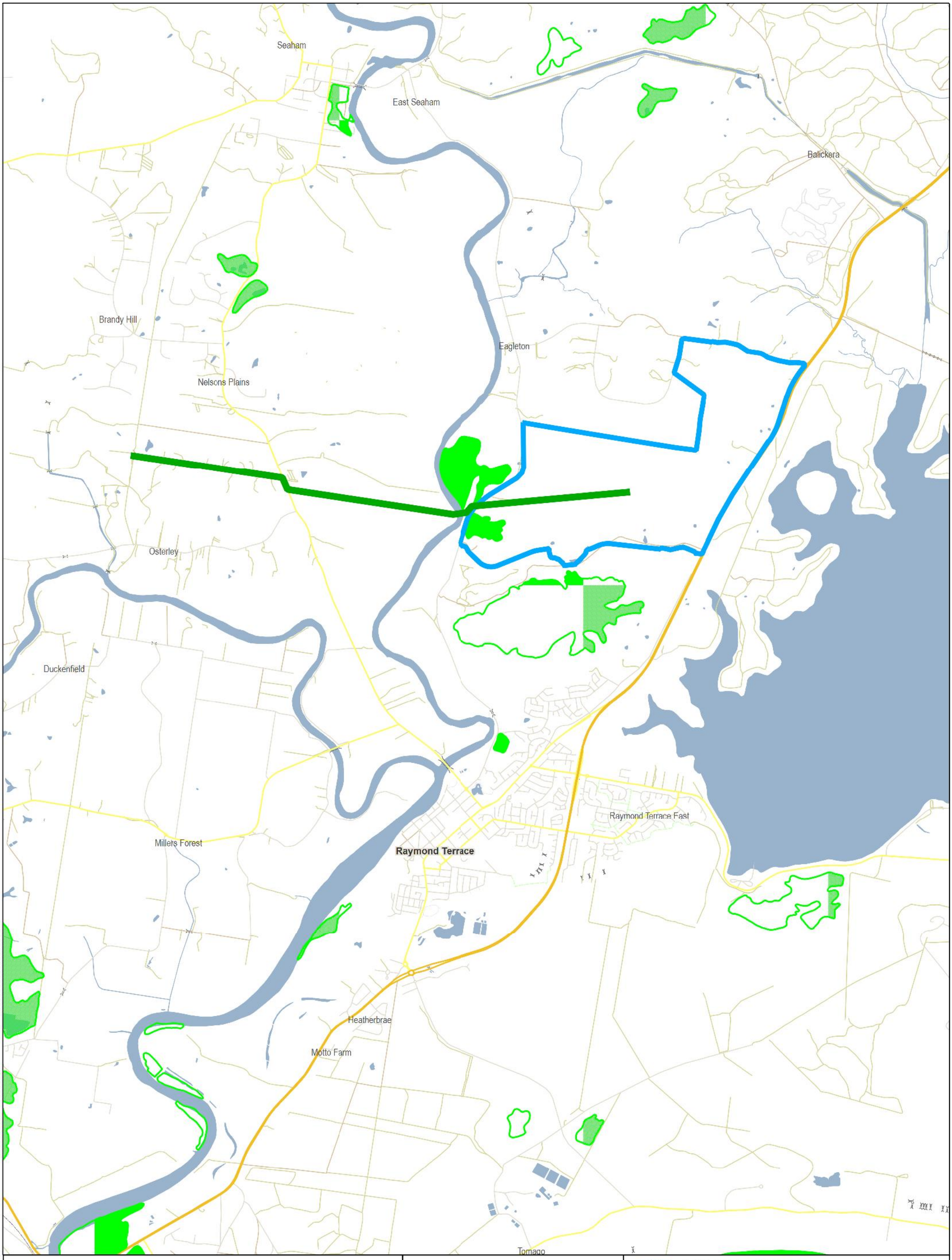
0 500 1000 1500 2000 m

1:50000

DATE 27-02-2012 SOURCES DEPT LANDS 2011
PAGE SIZE A3

FIGURE TITLE HWC INFRASTRUCTURE

PROJECT TITLE KINGS HILL WATER SERVICING STRATEGY



SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

EXHIBIT NO. G1
PROJECT NO. 30011097

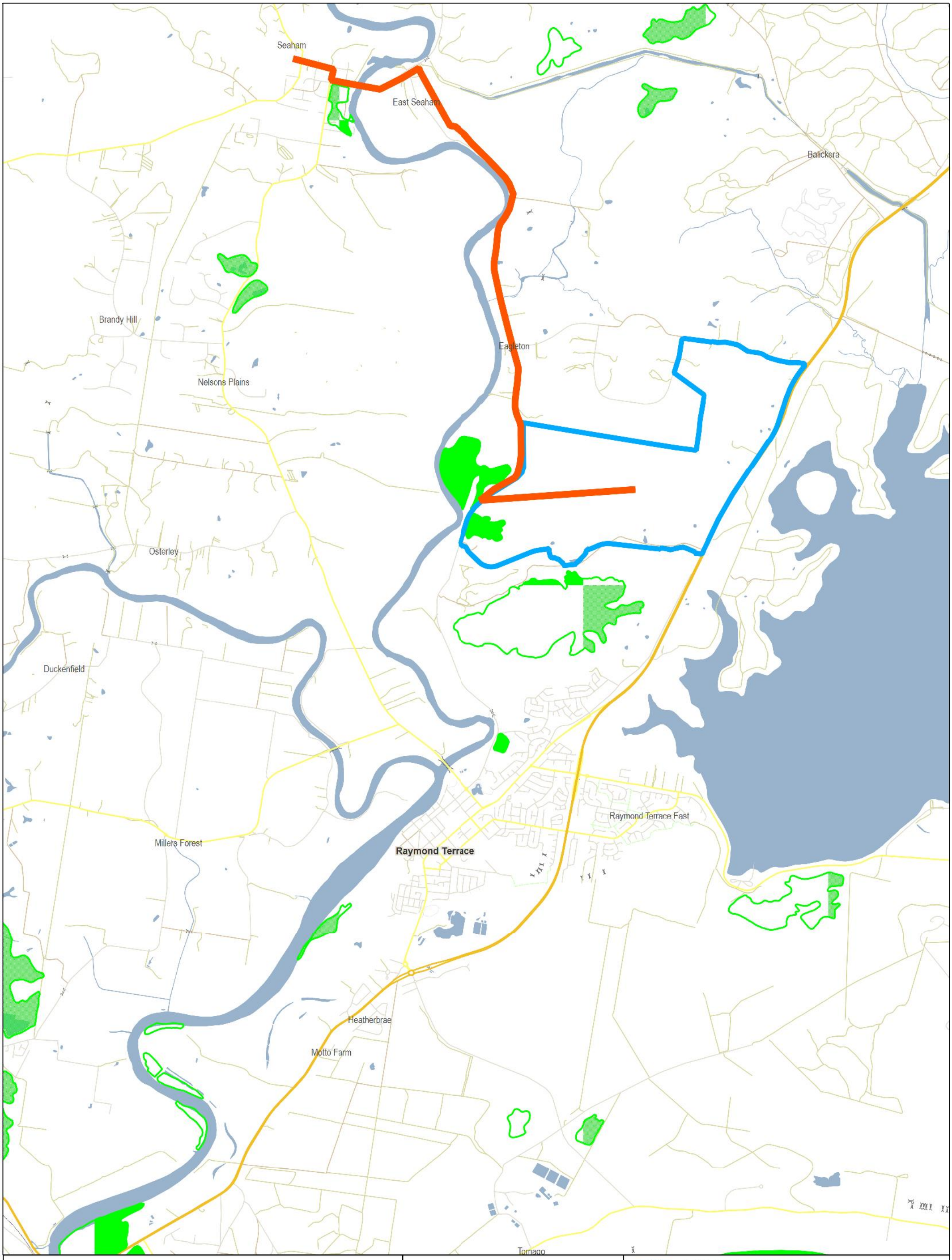
0 500 1000 1500 2000 m

1:50000

DATE 16-02-2012 SOURCES DEPT LANDS 2011
PAGE SIZE A3

FIGURE TITLE OPTION 1A

PROJECT TITLE KINGS HILL WATER SERVICING STRATEGY



SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

EXHIBIT NO. G2
PROJECT NO. 30011097

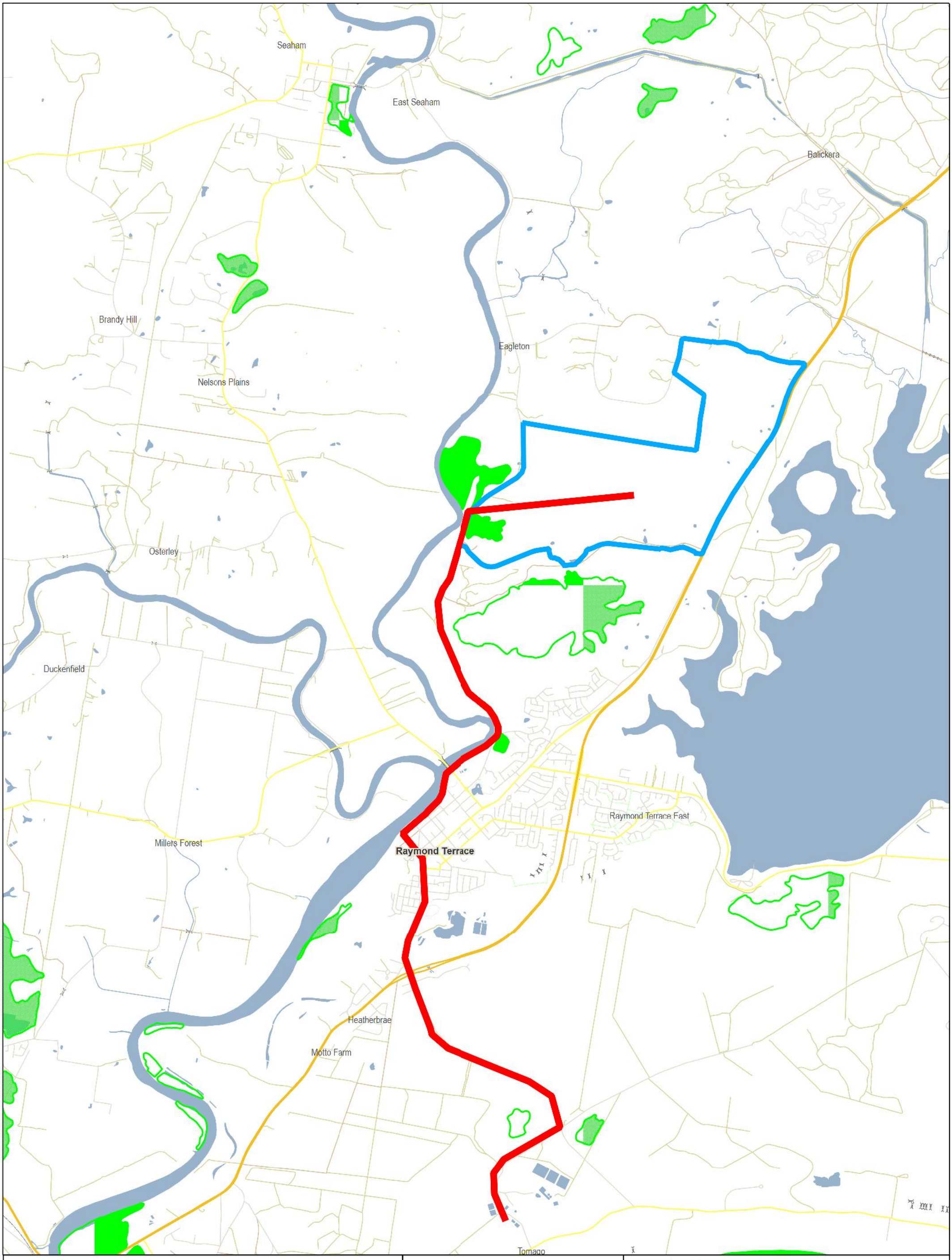
0 500 1000 1500 2000 m

1:50000

DATE 16-02-2012 SOURCES DEPT LANDS 2011
PAGE SIZE A3

FIGURE TITLE OPTION 1B

PROJECT TITLE KINGS HILL WATER SERVICING STRATEGY



SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

EXHIBIT NO. G3
PROJECT NO. 30011097

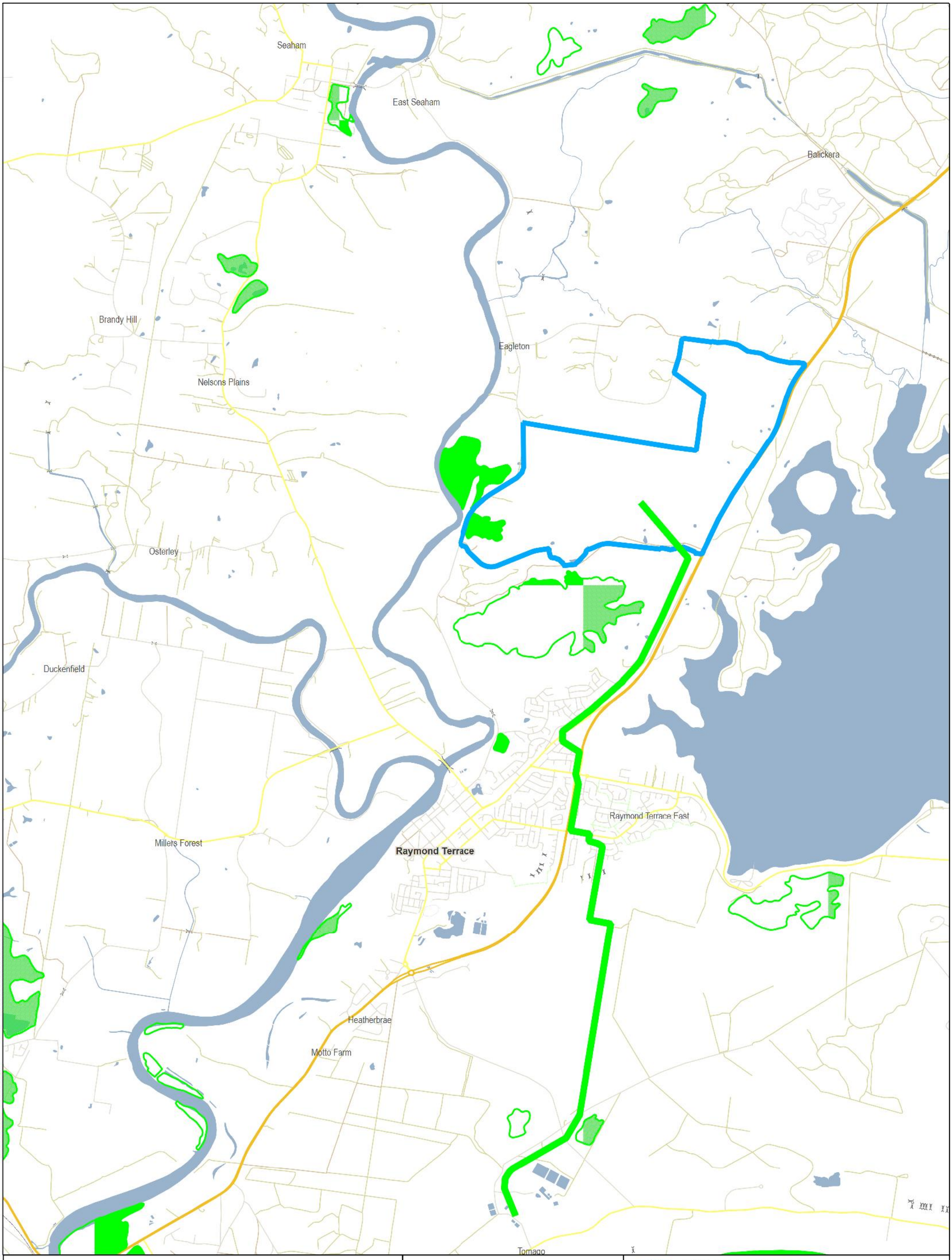
0 500 1000 1500 2000 m

1:50000

DATE 17-02-2012 SOURCES DEPT LANDS 2011
PAGE SIZE A3

FIGURE TITLE OPTION 2A

PROJECT TITLE KINGS HILL WATER SERVICING STRATEGY



SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

EXHIBIT NO. G4
PROJECT NO. 30011097

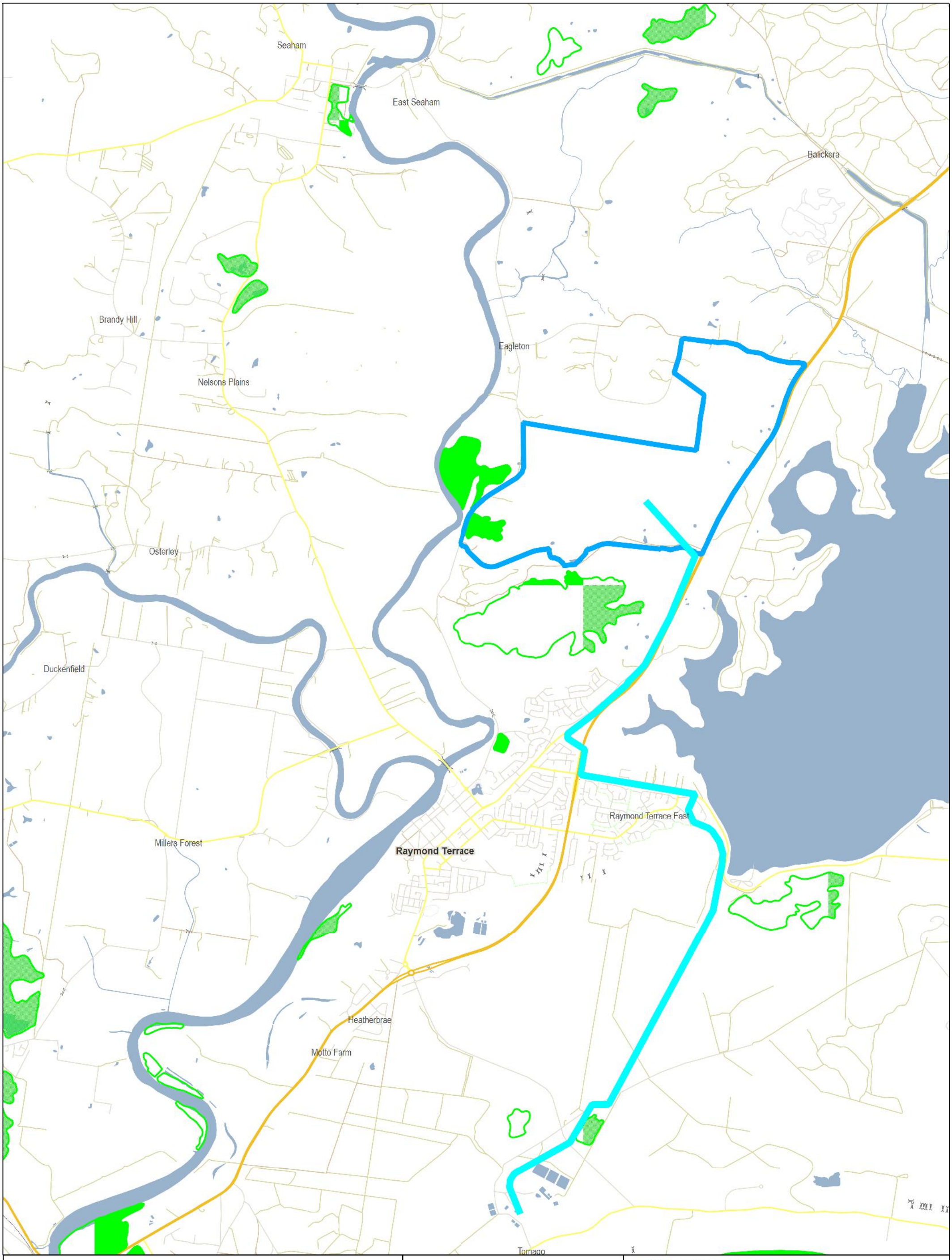
0 500 1000 1500 2000 m

1:50000

DATE 17-02-2012 SOURCES DEPT LANDS 2011
PAGE SIZE A3

FIGURE TITLE OPTION 2B

PROJECT TITLE KINGS HILL WATER SERVICING STRATEGY



SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

EXHIBIT NO. G5
PROJECT NO. 30011097

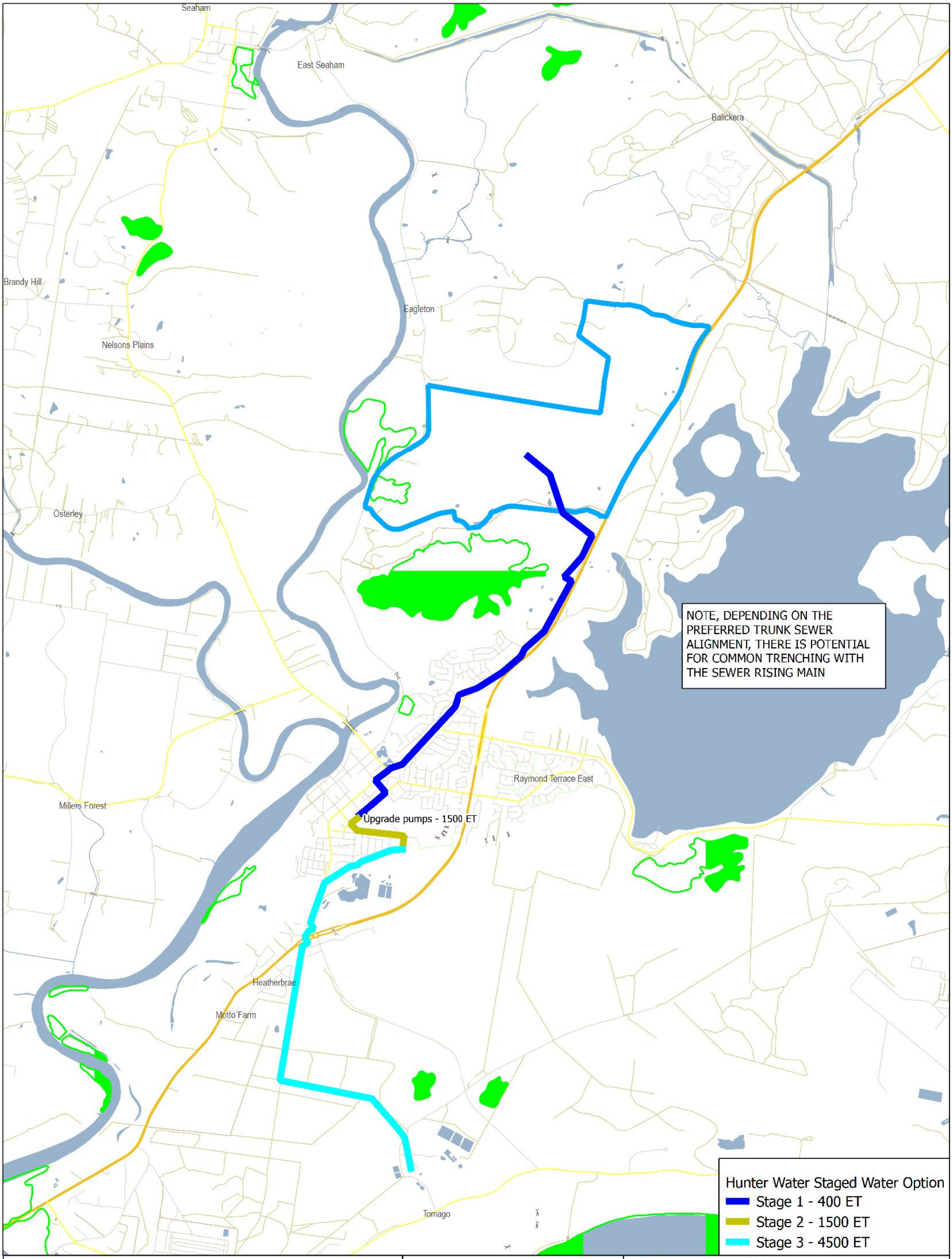
0 500 1000 1500 2000 m

1:50000

DATE 17-02-2012 SOURCES DEPT LANDS 2011
PAGE SIZE A3

FIGURE TITLE OPTION 2C

PROJECT TITLE KINGS HILL WATER SERVICING STRATEGY



SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

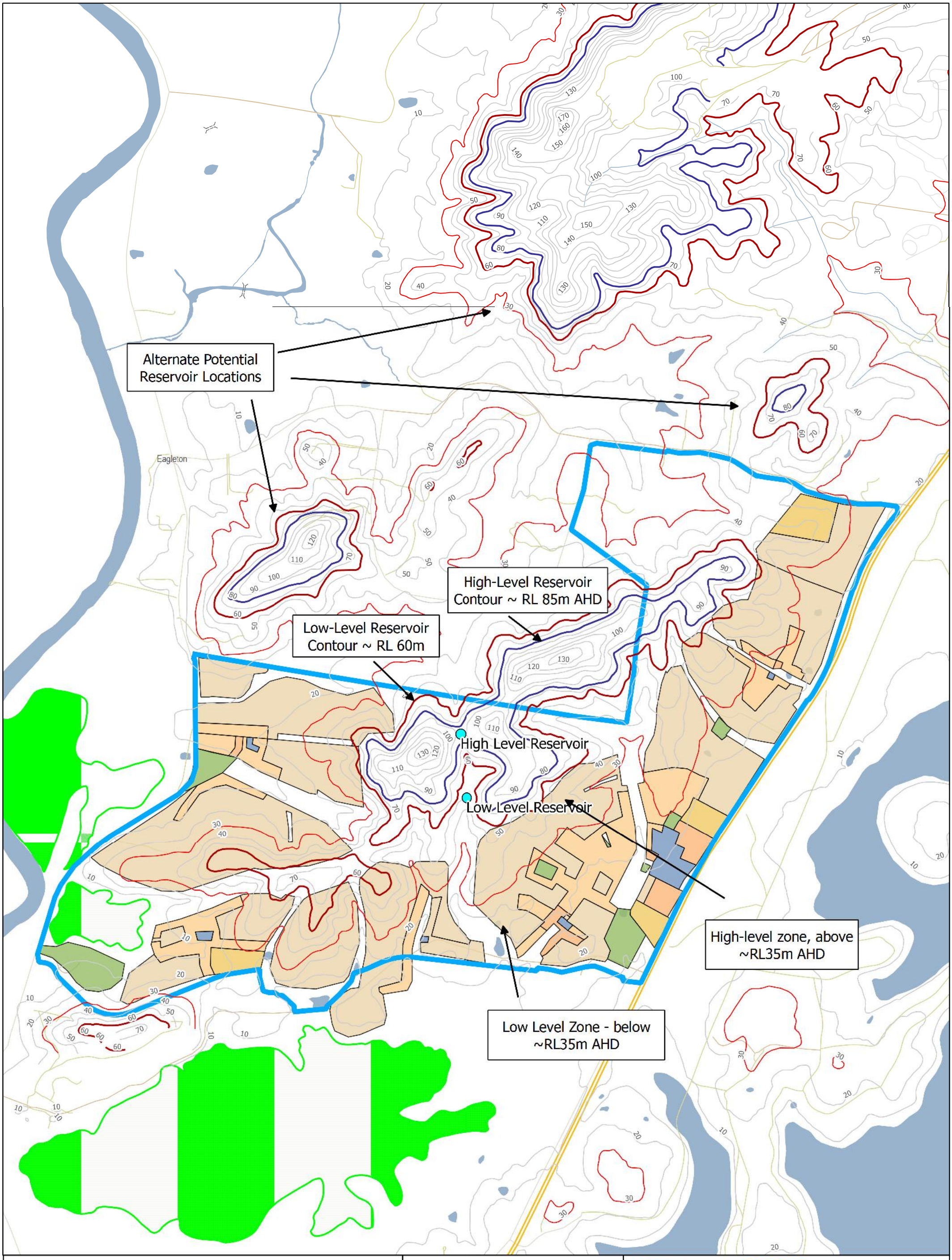
EXHIBIT NO. G6
PROJECT NO. 30011097

0 500 1000 1500 2000 m
1:50000

DATE 09-07-2013 SOURCES DEPT LANDS 2011
PAGE SIZE A3

FIGURE TITLE OPTION 3

PROJECT TITLE KINGS HILL WATER SERVICING STRATEGY



SMEC AUSTRALIA PTY LTD
ABN 47 065 475 149

EXHIBIT NO. H
PROJECT NO. 30011097

0 200 400 600 800 m

1:20000

DATE 17-02-2012 SOURCES DEPT LANDS 2011
PAGE SIZE A3

FIGURE TITLE INTERNAL SERVICING

PROJECT TITLE KINGS HILL WATER SERVICING STRATEGY

APPENDIX C – OPTIONS REVIEW

Included as Table 8

APPENDIX D – COST ESTIMATES

Preliminary Project Cost Estimate Sheet

Project No:	N/A
Project Name:	Kings Hill
Project Item:	Reservoir
Proposed Date of Construction	

Estimated Contract Award Cost

Item	UNIT	QTY	RATE	SUB-TOTAL	TOTAL (CPI Adjust
Current CPI			175.9		
Reservoir Estimate CPI			157		
Increase			13%		
Reservoir (2.5 ML)		2.5			$756,157
CPI Adjustment					$95,579
Site Preparation / Access Road					$1,250,000
Total Estimated Contract Award Sum					**$2,006,157**

Pre-Construction Cost		
Design ($M)		$240,739
Project Management of Design ($M)		$48,148
Land Matters ($M)		
Preconstruction Contingency ($M)		$86,666
Total Pre-Construction Cost ($M)		
Construction Cost		$375,553
Establishment ($M)		$30,000
Construction Management		$160,493
Quality Management Plan ($M)		$4,012
Consultation Level	Level 1	
Community Consultation ($M)		$5,000
Construction Contingency ($M)		$661,699
Diestablishment ($M)		$15,000
Preliminary Estimate ($M)		$3,257,913

ESTIMATING SHEET

PROJECT DESCRIPTION: Option 1A

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	$ 73,795.00	$ 73,795.00	**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	$ 30,000.00	$ 30,000.00	**Payment: 100% after completion.**
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 30,000.00	$ 30,000.00	**Payment: 100% after completion.**
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 4,000.00	$ 4,000.00	**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	$ 9,000.00	$ 9,000.00	**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	$ 2,000.00	$ 2,000.00	**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	$ 37,697.40	$ 37,697.40	**Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.**
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -	**Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.**

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

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 7,500.00	$ 7,500.00	**Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.**
HWT002	Supply all valves and flowmeters	Item	Lump Sum		$ -	**Payment: Percentage of valves and flowmeters supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
HWT003	Supply all fittings	Item	Lump Sum		$ -	**Payment: Percentage of fittings supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
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.**
32DDSS	Nominal DN450 DICL pipe	7500	m	$ 300.00	$ 2,250,000.00	
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>.
32DDSS	Nominal DN450 DICL (Trench type B)	7500	m	$ 107.25	$ 804,375.00	
HWT006	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >1.5m to 3.0m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. 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>.
HWT007	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. 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>.
HWT008	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. 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>.
HWT009	EMPTY					
HWT010	Extra over rate for installation for Additional compaction.		m3	$ 25.50		Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 105.00		Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT012	Extra over rate for installation for supply & place compact non cohesive material		m3			Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 450.00		Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT014	Extra over rate for installation for Supply, place and compact aggregate		m3			Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT015	Supply & place ballast		tonnes	$ 90.00		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.

HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)	7500	m		$ 750,000.00	**Measurement: Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.**
HWT017	Supply and place treated timber piling for pipe support		m			Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018.01	River	80	m	$ 1,329.06	$ 106,325.00	
HWT019	Extra over rate for installation of trenchless technique under existing rail line		m			Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT020	Supply & installation of river crossing includes supply of MSCL pipe, welding, weld testing, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation, disposal of excavated material, backfilling, lay, bed & test:					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT021	Supply and installation of pipe aerial creek crossing including supply of MSCL pipe with protection coating, internal and external welding, testing of welds. For the following MSCL pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each			Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT023	Supply and Install valve pits excluding cost of valves and fittings	0	Each	$ -	$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT024	Flow Relief Structures		Each			Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT025	EMPTY					
HWT026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	Item	Lump Sum		$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT027	Preparation of line sheets	7500	m	$ 1.00	$ 7,500.00	**Measurement: Length of pipelines constructed as per design. Limits of Accuracy: <To be inserted>.**
HWT028	Acceptance testing - trunk main		m			Measurement: Length of pipelines constructed as per design. Submit: Staisfactory test records Limits of Accuracy: <To be inserted>.
HWT029	**Miscellaneous**					
HWT000	***Sub Total***				$3,925,700	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0009	Restoration - Pipelines:					**Payment: 100% after completion.**
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -	**Measurement: Lineal metres restored within Minimum Trench Width. Limits of Accuracy: <To be inserted>.**
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.07	Bitumen pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.08	AC pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.09	Pavers		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.10	Turf		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.11	Grass seeding	12750	m2	$ 7.00	$ 89,250.00	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.12	Hydromulch		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3			**Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.**
HW0011	Acid sulphate soil					

HW0011.01	Initial testing for acid sulphate soils and prepare and submit report	64	per test	$ 110.00	$ 7,040.00	**Submit: Result for each test. Limits of Accuracy: <To be inserted>.**
HW0011.02	Establish treatment facility		Item			**Payment: 100% after completion of treatment facility.**
HW0011.03	Handling, treatment and testing of acid sulphate soils	7200	m3	$ 60.00	$ 432,000.00	**Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width. Submit: Test results confirming satisfactory treatment. Limits of Accuracy: <To be inserted>**
HW0011.04	Disposal off site of acid sulphate soil	0	tonne	$ 122.00	$ -	**Measurement: Tonnes transported from the site. Submit: Weighbridge dockets. Limits of Accuracy: <To be inserted>**
HW0012	Preconstruction record					
HW0012.01	Photographic	Item	Lump Sum		$ -	**Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.**
HW0012.02	Video	Item	Lump Sum		$ -	**Payment: 70% on submission of the Video record. Remainder at Practical Completion.**
HW0012.03	CCTV	Item	Lump Sum		$ -	**Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.**
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 60,000.00	$ 60,000.00	**Payment: 100% at Practical Completion.**

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 4,700,482.40

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 564,057.89
HW0017	Project Management of Design	$ 102,669.58
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 666,727.47
	Pre construction contingency (30% of B1)	$ 200,018.24
	TOTAL PRE-CONSTRUCTION COST (B)	$ 866,745.71

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 4,700,482.40
HW0019	Principal Supplied Pipe (as applicable)	$ -
HW0020	Principal Supplied Valves and Flowmeters (as applicable)	$ -
HW0021	Principal Supplied Fittings (as applicable)	$ -
HW0022	Pump Station HV Power Supply	$ -
HW0023	Construction Management (Table 11)	$ 376,038.59
	Sub Total (C1)	$ 5,076,520.99
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 1,522,956.30
	TOTAL CONSTRUCTION COST (C)	$ 6,599,477.29

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 7,466,222.99

ESTIMATING SHEET

PROJECT DESCRIPTION: Option 1B

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	$ 105,457.00	$ 105,457.00	**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	$ 30,000.00	$ 30,000.00	**Payment: 100% after completion.**
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 30,000.00	$ 30,000.00	**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	$ 53,528.33	$ 53,528.33	**Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.**
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -	**Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.**

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

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 12,072.00	$ 12,072.00	**Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.**
HWT002	Supply all valves and flowmeters	Item	Lump Sum		$ -	**Payment: Percentage of valves and flowmeters supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
HWT003	Supply all fittings	Item	Lump Sum		$ -	**Payment: Percentage of fittings supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
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.**
32DDSS	Nominal DN450 DICL pipe	11680	m	$ 300.00	$ 3,504,000.00	
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>.
32DDSS	Nominal DN450 DICL (Trench type B)	11680	m	$ 110.16	$ 1,286,686.00	
HWT006	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >1.5m to 3.0m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. 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>.
HWT007	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. 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>.
HWT008	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. 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>.
HWT009	EMPTY					
HWT010	Extra over rate for installation for Additional compaction.		m3	$ 25.50		Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 105.00		Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT012	Extra over rate for installation for supply & place compact non cohesive material		m3			Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 450.00		Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT014	Extra over rate for installation for Supply, place and compact aggregate		m3			Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT015	Supply & place ballast		tonnes	$ 90.00		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.
HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)	19856	m		$ 1,985,600.00	**Measurement: Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point.** **Submit: Relevant Quality Records.** **Limits of Accuracy: <To be inserted>.**

Pipeline 2 - al

HWT017	Supply and place treated timber piling for pipe support		m			Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018.01	River	80	m	$ 1,329.06	$ 106,325.00	
HWT019	Extra over rate for installation of trenchless technique under existing rail line		m			Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT020	Supply & installation of river crossing includes supply of MSCL pipe, welding, weld testing, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation, disposal of excavated material, backfilling, lay, bed & test:					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT021	Supply and installation of pipe aerial creek crossing including supply of MSCL pipe with protection coating, internal and external welding, testing of welds. For the following MSCL pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each			Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT023	Supply and Install valve pits excluding cost of valves and fittings	0	Each	$ -	$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT024	Flow Relief Structures		Each			Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT025	EMPTY					
HWT026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	Item	Lump Sum		$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT027	Preparation of line sheets	11680	m	$ 1.00	$ 11,680.00	**Measurement: Length of pipelines constructed as per design.** **Limits of Accuracy: <To be inserted>.**
HWT028	Acceptance testing - trunk main		m			Measurement: Length of pipelines constructed as per design. Submit: Staisfactory test records Limits of Accuracy: <To be inserted>.
HWT029	**Miscellaneous**					
HWT000	***Sub Total***				$6,906,363	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0009	Restoration - Pipelines:					**Payment: 100% after completion.**
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -	**Measurement: Lineal metres restored within Minimum Trench Width.** **Limits of Accuracy: <To be inserted>.**
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.07	Bitumen pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.08	AC pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.09	Pavers		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.10	Turf		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.11	Grass seeding	19856	m2	$ 7.00	$ 138,992.00	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.12	Hydromulch		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3			**Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>.**
HW0011	Acid sulphate soil					
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report	33	per test	$ 110.00	$ 3,630.00	**Submit: Result for each test.** **Limits of Accuracy: <To be inserted>.**
HW0011.02	Establish treatment facility		Item			**Payment: 100% after completion of treatment facility.**
HW0011.03	Handling, treatment and testing of acid sulphate soils	3750	m3	$ 60.00	$ 225,000.00	**Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width.** **Submit: Test results confirming satisfactory treatment.** **Limits of Accuracy: <To be inserted>**
HW0011.04	Disposal off site of acid sulphate soil	0	tonne	$ 122.00	$ -	**Measurement: Tonnes transported from the site.** **Submit: Weighbridge dockets.** **Limits of Accuracy: <To be inserted>**
HW0012	Preconstruction record					
HW0012.01	Photographic	Item	Lump Sum		$ -	**Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.**

HW0012.02	Video	Item	Lump Sum		$ -	**Payment: 70% on submission of the Video record. Remainder at Practical Completion.**
HW0012.03	CCTV	Item	Lump Sum		$ -	**Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.**
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 93,440.00	$ 93,440.00	**Payment: 100% at Practical Completion.**

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 7,616,410.33

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 761,641.03
HW0017	Project Management of Design	$ 119,836.37
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 881,477.40
	Pre construction contingency (30% of B1)	$ 264,443.22
	TOTAL PRE-CONSTRUCTION COST (B)	$ 1,145,920.62

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 7,616,410.33
HW0019	Principal Supplied Pipe (as applicable)	$ -
HW0020	Principal Supplied Valves and Flowmeters (as applicable)	$ -
HW0021	Principal Supplied Fittings (as applicable)	$ -
HW0022	Pump Station HV Power Supply	$ -
HW0023	Construction Management (Table 11)	$ 609,312.83
	Sub Total (C1)	$ 8,225,723.16
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 2,467,716.95
	TOTAL CONSTRUCTION COST (C)	$ 10,693,440.10

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 11,839,360.72

ESTIMATING SHEET

PROJECT DESCRIPTION: Option 2A

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	$ 147,666.00	$ 147,666.00	**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	$ 30,000.00	$ 30,000.00	**Payment: 100% after completion.**
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 30,000.00	$ 30,000.00	**Payment: 100% after completion.**
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 4,000.00	$ 4,000.00	**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	$ 9,000.00	$ 9,000.00	**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	$ 2,000.00	$ 2,000.00	**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	$ 74,633.05	$ 74,633.05	**Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.**
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -	**Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.**

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

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 15,700.00	$ 15,700.00	**Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.**
HWT002	Supply all valves and flowmeters	Item	Lump Sum		$ -	**Payment: Percentage of valves and flowmeters supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
HWT003	Supply all fittings	Item	Lump Sum		$ -	**Payment: Percentage of fittings supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
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.**
32DDSS	Nominal DN450 DICL pipe	15700	m	$ 300.00	$ 4,710,000.00	
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>.
32DDSS	Nominal DN450 DICL (Trench type B)	15700	m	$ 107.25	$ 1,683,825.00	
HWT006	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >1.5m to 3.0m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. 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>.
HWT007	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. 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>.
HWT008	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. 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>.
HWT009	EMPTY					
HWT010	Extra over rate for installation for Additional compaction.		m3	$ 25.50		Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 105.00		Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT012	Extra over rate for installation for supply & place compact non cohesive material		m3			Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 450.00		Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT014	Extra over rate for installation for Supply, place and compact aggregate		m3			Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT015	Supply & place ballast		tonnes	$ 90.00		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.

HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)	15700	m		$ 1,570,000.00	**Measurement: Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.**
HWT017	Supply and place treated timber piling for pipe support		m			Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018.01	Seaham Rd	80	m	$ 1,329.06	$ 106,325.00	
HWT018.02	Pac Hwy	80	m	$ 1,329.06	$ 106,325.00	
HWT019	Extra over rate for installation of trenchless technique under existing rail line		m			Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT020	Supply & installation of river crossing includes supply of MSCL pipe, welding, weld testing, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation, disposal of excavated material, backfilling, lay, bed & test:					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT021	Supply and installation of pipe aerial creek crossing including supply of MSCL pipe with protection coating, internal and external welding, testing of welds. For the following MSCL pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each			Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT023	Supply and Install valve pits excluding cost of valves and fittings	0	Each	$ -	$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT024	Flow Relief Structures		Each			Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT025	EMPTY					
HWT026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	Item	Lump Sum		$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT027	Preparation of line sheets	15700	m	$ 1.00	$ 15,700.00	**Measurement: Length of pipelines constructed as per design. Limits of Accuracy: <To be inserted>.**
HWT028	Acceptance testing - trunk main		m			Measurement: Length of pipelines constructed as per design. Submit: Staisfactory test records Limits of Accuracy: <To be inserted>.
HWT029	**Miscellaneous**					
HWT000	***Sub Total***				$8,207,875	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0009	Restoration - Pipelines:					**Payment: 100% after completion.**
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -	**Measurement: Lineal metres restored within Minimum Trench Width. Limits of Accuracy: <To be inserted>.**
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.07	Bitumen pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.08	AC pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.09	Pavers		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.10	Turf		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.11	Grass seeding	26690	m2	$ 7.00	$ 186,830.00	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.12	Hydromulch		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3			**Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.**
HW0011	Acid sulphate soil					

HW0011.01	Initial testing for acid sulphate soils and prepare and submit report	88	per test	$ 110.00	$ 9,680.00	**Submit: Result for each test. Limits of Accuracy: <To be inserted>.**
HW0011.02	Establish treatment facility		Item			**Payment: 100% after completion of treatment facility.**
HW0011.03	Handling, treatment and testing of acid sulphate soils	9900	m3	$ 60.00	$ 594,000.00	**Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width. Submit: Test results confirming satisfactory treatment. Limits of Accuracy: <To be inserted>**
HW0011.04	Disposal off site of acid sulphate soil	0	tonne	$ 122.00	$ -	**Measurement: Tonnes transported from the site. Submit: Weighbridge dockets. Limits of Accuracy: <To be inserted>**
HW0012	Preconstruction record					
HW0012.01	Photographic	Item	Lump Sum		$ -	**Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.**
HW0012.02	Video	Item	Lump Sum		$ -	**Payment: 70% on submission of the Video record. Remainder at Practical Completion.**
HW0012.03	CCTV	Item	Lump Sum		$ -	**Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.**
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 125,600.00	$ 125,600.00	**Payment: 100% at Practical Completion.**

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 9,421,284.05

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 942,128.41
HW0017	Project Management of Design	$ 163,312.08
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 1,105,440.49
	Pre construction contingency (30% of B1)	$ 331,632.15
	TOTAL PRE-CONSTRUCTION COST (B)	$ 1,437,072.63

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 9,421,284.05
HW0019	Principal Supplied Pipe (as applicable)		$ -
HW0020	Principal Supplied Valves and Flowmeters (as applicable)		$ -
HW0021	Principal Supplied Fittings (as applicable)		$ -
HW0022	Pump Station HV Power Supply		$ -
HW0023	Construction Management (Table 11)		$ 753,702.72
	Sub Total (C1)		$ 10,174,986.77
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 3,052,496.03
	TOTAL CONSTRUCTION COST (C)		$ 13,227,482.81

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 14,664,555.44

ESTIMATING SHEET

PROJECT DESCRIPTION: Option 2B

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	$ 662,923.00	$ 662,923.00	**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	$ 30,000.00	$ 30,000.00	**Payment: 100% after completion.**
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 30,000.00	$ 30,000.00	**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	$ 332,261.44	$ 332,261.44	**Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.**
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -	**Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.**

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

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 16,200.00	$ 16,200.00	**Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.**
HWT002	Supply all valves and flowmeters	Item	Lump Sum		$ -	**Payment: Percentage of valves and flowmeters supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
HWT003	Supply all fittings	Item	Lump Sum		$ -	**Payment: Percentage of fittings supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
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.**
32DDSS	Nominal DN450 DICL pipe	12800	m	$ 300.00	$ 3,840,000.00	
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>.
32DDSS	Nominal DN450 DICL (Trench type B)	12800	m	$ 133.35	$ 1,706,850.00	
HWT006	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >1.5m to 3.0m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. 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>.
HWT007	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. 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>.
HWT008	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. 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>.
HWT009	EMPTY					
HWT010	Extra over rate for installation for Additional compaction.		m3	$ 25.50		Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 105.00		Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT012	Extra over rate for installation for supply & place compact non cohesive material		m3			Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 450.00		Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT014	Extra over rate for installation for Supply, place and compact aggregate		m3			Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT015	Supply & place ballast		tonnes	$ 90.00		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.
HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)	9400	m		$ 940,000.00	**Measurement: Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point.** **Submit: Relevant Quality Records.** **Limits of Accuracy: <To be inserted>.**
HWT017	Supply and place treated timber piling for pipe support		m			Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018.01	Pacific Highway	80	m	$ 1,329.06	$ 106,325.00	
HWT018.02	Adelaide St	80	m	$ 1,329.06	$ 106,325.00	
HWT018.03	Irrawang Spillway	80	m	$ 1,329.06	$ 106,325.00	

Pipeline 2 - area allowance,

HWT019	Extra over rate for installation of trenchless technique under existing rail line		m			Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT020	Supply & installation of river crossing includes supply of MSCL pipe, welding, weld testing, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation, disposal of excavated material, backfilling, lay, bed & test:					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT021	Supply and installation of pipe aerial creek crossing including supply of MSCL pipe with protection coating, internal and external welding, testing of welds. For the following MSCL pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each			Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT023	Supply and Install valve pits excluding cost of valves and fittings	0	Each	$ -	$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT024	Flow Relief Structures		Each			Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT025	EMPTY					
HWT026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	Item	Lump Sum		$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT027	Preparation of line sheets	12800	m	$ 1.00	$ 12,800.00	**Measurement: Length of pipelines constructed as per design. Limits of Accuracy: <To be inserted>.**
HWT028	Acceptance testing - trunk main		m			Measurement: Length of pipelines constructed as per design. Submit: Staisfactory test records Limits of Accuracy: <To be inserted>.
HWT029	**Miscellaneous**					
HWT000	***Sub Total***				$6,834,825	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0009	Restoration - Pipelines:					**Payment: 100% after completion.**
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -	**Measurement: Lineal metres restored within Minimum Trench Width. Limits of Accuracy: <To be inserted>.**
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.07	Bitumen pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.08	AC pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.09	Pavers		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.10	Turf		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.11	Grass seeding	21760	m2	$ 7.00	$ 152,320.00	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.12	Hydromulch		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3			**Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.**
HW0011	Acid sulphate soil					
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report	7	per test	$ 110.00	$ 770.00	**Submit: Result for each test. Limits of Accuracy: <To be inserted>.**
HW0011.02	Establish treatment facility		Item			**Payment: 100% after completion of treatment facility.**
HW0011.03	Handling, treatment and testing of acid sulphate soils	750	m3	$ 60.00	$ 45,000.00	**Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width. Submit: Test results confirming satisfactory treatment. Limits of Accuracy: <To be inserted>**
HW0011.04	Disposal off site of acid sulphate soil	0	tonne	$ 122.00	$ -	**Measurement: Tonnes transported from the site. Submit: Weighbridge dockets. Limits of Accuracy: <To be inserted>**
HW0012	Preconstruction record					
HW0012.01	Photographic	Item	Lump Sum		$ -	**Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.**
HW0012.02	Video	Item	Lump Sum		$ -	**Payment: 70% on submission of the Video record. Remainder at Practical Completion.**
HW0012.03	CCTV	Item	Lump Sum		$ -	**Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.**
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 102,400.00	$ 102,400.00	**Payment: 100% at Practical Completion.**

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 8,220,499.44

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 822,049.94
HW0017	Project Management of Design	$ 420,415.95
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 1,242,465.90
	Pre construction contingency (30% of B1)	$ 372,739.77

	TOTAL PRE-CONSTRUCTION COST (B)		$ 1,615,205.67

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 8,220,499.44
HW0019	Principal Supplied Pipe (as applicable)		$ -
HW0020	Principal Supplied Valves and Flowmeters (as applicable)		$ -
HW0021	Principal Supplied Fittings (as applicable)		$ -
HW0022	Pump Station HV Power Supply		$ -
HW0023	Construction Management (Table 11)		$ 657,639.96
	Sub Total (C1)		$ 8,878,139.40
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 2,663,441.82
	TOTAL CONSTRUCTION COST (C)		$ 11,541,581.21

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)		$ 13,156,786.88

ESTIMATING SHEET

PROJECT DESCRIPTION: Option 2C

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	$ 479,952.00	$ 479,952.00	**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	$ 30,000.00	$ 30,000.00	**Payment: 100% after completion.**
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 30,000.00	$ 30,000.00	**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	$ 240,776.12	$ 240,776.12	**Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.**
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -	**Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.**

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

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 18,600.00	$ 18,600.00	**Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.**
HWT002	Supply all valves and flowmeters	Item	Lump Sum		$ -	**Payment: Percentage of valves and flowmeters supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
HWT003	Supply all fittings	Item	Lump Sum		$ -	**Payment: Percentage of fittings supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
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.**
32DDSS	Nominal DN450 DICL pipe	14400	m	$ 300.00	$ 4,320,000.00	
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>.
32DDSS	Nominal DN450 DICL (Trench type B)	14400	m	$ 135.91	$ 1,957,050.00	
HWT006	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >1.5m to 3.0m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. 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>.
HWT007	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. 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>.
HWT008	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. 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>.
HWT009	EMPTY					
HWT010	Extra over rate for installation for Additional compaction.		m3	$ 25.50		Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 105.00		Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT012	Extra over rate for installation for supply & place compact non cohesive material		m3			Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 450.00		Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT014	Extra over rate for installation for Supply, place and compact aggregate		m3			Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT015	Supply & place ballast		tonnes	$ 90.00		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.
HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)	14400	m		$ 1,440,000.00	**Measurement: Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point.** **Submit: Relevant Quality Records.** **Limits of Accuracy: <To be inserted>.**

Pipeline 2 - al

HWT017	Supply and place treated timber piling for pipe support		m			Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018.01	Pac Hwy	80	m	$ 1,329.06	$ 106,325.00	
HWT018.02	Irrawang Spillway	80	m	$ 1,329.06	$ 106,325.00	
HWT019	Extra over rate for installation of trenchless technique under existing rail line		m			Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT020	Supply & installation of river crossing includes supply of MSCL pipe, welding, weld testing, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation, disposal of excavated material, backfilling, lay, bed & test:					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT021	Supply and installation of pipe aerial creek crossing including supply of MSCL pipe with protection coating, internal and external welding, testing of welds. For the following MSCL pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each			Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT023	Supply and Install valve pits excluding cost of valves and fittings	0	Each	$ -	$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT024	Flow Relief Structures		Each			Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT025	EMPTY					
HWT026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	Item	Lump Sum		$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT027	Preparation of line sheets	14400	m	$ 1.00	$ 14,400.00	**Measurement: Length of pipelines constructed as per design.** **Limits of Accuracy: <To be inserted>.**
HWT028	Acceptance testing - trunk main		m			Measurement: Length of pipelines constructed as per design. Submit: Staisfactory test records Limits of Accuracy: <To be inserted>.
HWT029	**Miscellaneous**					
HWT000	***Sub Total***				$7,962,700	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0009	Restoration - Pipelines:					**Payment: 100% after completion.**
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -	**Measurement: Lineal metres restored within Minimum Trench Width.** **Limits of Accuracy: <To be inserted>.**
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.07	Bitumen pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.08	AC pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.09	Pavers		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.10	Turf		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.11	Grass seeding	24480	m2	$ 7.00	$ 171,360.00	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.12	Hydromulch		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3			**Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>.**
HW0011	Acid sulphate soil					
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report	7	per test	$ 110.00	$ 770.00	**Submit: Result for each test.** **Limits of Accuracy: <To be inserted>.**
HW0011.02	Establish treatment facility		Item			**Payment: 100% after completion of treatment facility.**
HW0011.03	Handling, treatment and testing of acid sulphate soils	750	m3	$ 60.00	$ 45,000.00	**Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width.** **Submit: Test results confirming satisfactory treatment.** **Limits of Accuracy: <To be inserted>**
HW0011.04	Disposal off site of acid sulphate soil	0	tonne	$ 122.00	$ -	**Measurement: Tonnes transported from the site.** **Submit: Weighbridge dockets.** **Limits of Accuracy: <To be inserted>**
HW0012	Preconstruction record					

HW0012.01	Photographic	Item	Lump Sum		$ -	**Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.**
HW0012.02	Video	Item	Lump Sum		$ -	**Payment: 70% on submission of the Video record. Remainder at Practical Completion.**
HW0012.03	CCTV	Item	Lump Sum		$ -	**Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.**
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 115,200.00	$ 115,200.00	**Payment: 100% at Practical Completion.**

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 9,105,758.12

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 910,575.81
HW0017	Project Management of Design	$ 307,340.09
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 1,217,915.90
	Pre construction contingency (30% of B1)	$ 365,374.77
	TOTAL PRE-CONSTRUCTION COST (B)	$ 1,583,290.67

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 9,105,758.12
HW0019	Principal Supplied Pipe (as applicable)	$ -
HW0020	Principal Supplied Valves and Flowmeters (as applicable)	$ -
HW0021	Principal Supplied Fittings (as applicable)	$ -
HW0022	Pump Station HV Power Supply	$ -
HW0023	Construction Management (Table 11)	$ 728,460.65
	Sub Total (C1)	$ 9,834,218.77
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 2,950,265.63
	TOTAL CONSTRUCTION COST (C)	$ 12,784,484.40

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 14,367,775.08

ESTIMATING SHEET

PROJECT DESCRIPTION: Option 3 - Stage 1

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	$ 62,896.00	$ 62,896.00	**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	$ 30,000.00	$ 30,000.00	**Payment: 100% after completion.**
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 30,000.00	$ 30,000.00	**Payment: 100% after completion.**
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 16,000.00	$ 16,000.00	**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	$ 36,000.00	$ 36,000.00	**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	$ 8,000.00	$ 8,000.00	**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	$ 32,248.01	$ 32,248.01	**Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.**
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -	**Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.**

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

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 23,488.50	$ 23,488.50	**Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.**
HWT002	Supply all valves and flowmeters	Item	Lump Sum		$ -	**Payment: Percentage of valves and flowmeters supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
HWT003	Supply all fittings	Item	Lump Sum		$ -	**Payment: Percentage of fittings supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
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.**
31EDSS	Nominal DN300 DICL pipe	8894	m	$ 150.00	$ 1,334,100.00	
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>.
31EDSS	Nominal DN300 DICL (Trench type B)	8894	m	$ 172.24	$ 1,531,921.50	
HWT006	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >1.5m to 3.0m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. 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>.
HWT007	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. 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>.
HWT008	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. 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>.
HWT009	EMPTY					
HWT010	Extra over rate for installation for Additional compaction.		m3	$ 19.13		Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 78.75		Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT012	Extra over rate for installation for supply & place compact non cohesive material		m3			Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 337.50		Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT014	Extra over rate for installation for Supply, place and compact aggregate		m3			Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.

Pipeline 2 - area allowance, Pipeline 3 - area allowance, Pipeline 4 - area allowance,

HWT015	Supply & place ballast		tonnes	$ 90.00		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.
HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)	8900	m		$ 890,000.00	**Measurement: Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.**
HWT017	Supply and place treated timber piling for pipe support		m			Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018.01	Irrawang Spillway	80	m	$ 1,009.06	$ 80,725.00	
HWT019	Extra over rate for installation of trenchless technique under existing rail line		m			Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT020	Supply & installation of river crossing includes supply of MSCL pipe, welding, weld testing, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation, disposal of excavated material, backfilling, lay, bed & test:					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT021	Supply and installation of pipe aerial creek crossing including supply of MSCL pipe with protection coating, internal and external welding, testing of welds. For the following MSCL pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each			Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT023	Supply and Install valve pits excluding cost of valves and fittings	0	Each	$ -	$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT024	Flow Relief Structures		Each			Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT025	EMPTY					
HWT026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	Item	Lump Sum		$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT027	Preparation of line sheets	8894	m	$ 1.00	$ 8,894.00	**Measurement: Length of pipelines constructed as per design. Limits of Accuracy: <To be inserted>.**
HWT028	Acceptance testing - trunk main		m			Measurement: Length of pipelines constructed as per design. Submit: Staisfactory test records Limits of Accuracy: <To be inserted>.
HWT029	**Miscellaneous**					
HWT000	***Sub Total***				$3,869,129	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0009	Restoration - Pipelines:					**Payment: 100% after completion.**
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -	**Measurement: Lineal metres restored within Minimum Trench Width. Limits of Accuracy: <To be inserted>.**
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.07	Bitumen pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.08	AC pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.09	Pavers		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.10	Turf		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.11	Grass seeding	15130	m2	$ 7.00	$ 105,910.00	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.12	Hydromulch		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3			**Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.**
HW0011	Acid sulphate soil					
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report	7	per test	$ 110.00	$ 770.00	**Submit: Result for each test. Limits of Accuracy: <To be inserted>.**
HW0011.02	Establish treatment facility		Item			**Payment: 100% after completion of treatment facility.**

HW0011.03	Handling, treatment and testing of acid sulphate soils	562.5	m3	$ 60.00	$ 33,750.00	**Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width. Submit: Test results confirming satisfactory treatment. Limits of Accuracy: <To be inserted>**
HW0011.04	Disposal off site of acid sulphate soil	0	tonne	$ 122.00	$ -	**Measurement: Tonnes transported from the site. Submit: Weighbridge dockets. Limits of Accuracy: <To be inserted>**
HW0012	Preconstruction record					
HW0012.01	Photographic	Item	Lump Sum		$ -	**Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.**
HW0012.02	Video	Item	Lump Sum		$ -	**Payment: 70% on submission of the Video record. Remainder at Practical Completion.**
HW0012.03	CCTV	Item	Lump Sum		$ -	**Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.**
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 71,152.00	$ 71,152.00	**Payment: 100% at Practical Completion.**

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 4,295,855.01

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 515,502.60
HW0017	Project Management of Design	$ 89,198.68
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 604,701.28
	Pre construction contingency (30% of B1)	$ 181,410.38
	TOTAL PRE-CONSTRUCTION COST (B)	$ 786,111.67

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 4,295,855.01
HW0019	Principal Supplied Pipe (as applicable)	$ -
HW0020	Principal Supplied Valves and Flowmeters (as applicable)	$ -
HW0021	Principal Supplied Fittings (as applicable)	$ -
HW0022	Pump Station HV Power Supply	$ -
HW0023	Construction Management (Table 11)	$ 343,668.40
	Sub Total (C1)	$ 4,639,523.41
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 1,391,857.02
	TOTAL CONSTRUCTION COST (C)	$ 6,031,380.43

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 6,817,492.10

ESTIMATING SHEET

PROJECT DESCRIPTION: Option 3 - Stage 2

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	$ 15,956.00	$ 15,956.00	**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	$ 4,000.00	$ 4,000.00	**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	$ 9,000.00	$ 9,000.00	**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	$ 2,000.00	$ 2,000.00	**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	$ 8,777.82	$ 8,777.82	**Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.**
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -	**Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.**

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

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 1,992.00	$ 1,992.00	**Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.**
HWT002	Supply all valves and flowmeters	Item	Lump Sum		$ -	**Payment: Percentage of valves and flowmeters supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
HWT003	Supply all fittings	Item	Lump Sum		$ -	**Payment: Percentage of fittings supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
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.**
326DSS	Nominal DN375 DICL pipe	1200	m	$ 250.00	$ 300,000.00	
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>.
326DSS	Nominal DN375 DICL (Trench type B)	1200	m	$ 191.50	$ 229,800.00	
HWT006	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >1.5m to 3.0m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. 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>.
HWT007	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. 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>.
HWT008	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. 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>.
HWT009	EMPTY					
HWT010	Extra over rate for installation for Additional compaction.		m3	$ 21.17		Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 87.15		Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT012	Extra over rate for installation for supply & place compact non cohesive material		m3			Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 373.50		Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT014	Extra over rate for installation for Supply, place and compact aggregate		m3			Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT015	Supply & place ballast		tonnes	$ 90.00		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.
HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)	1200	m		$ 120,000.00	**Measurement: Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point.** **Submit: Relevant Quality Records.** **Limits of Accuracy: <To be inserted>.**
HWT017	Supply and place treated timber piling for pipe support		m			Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.

Pipeline 1 - ar

HWT018	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT019	Extra over rate for installation of trenchless technique under existing rail line		m			Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT020	Supply & installation of river crossing includes supply of MSCL pipe, welding, weld testing, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation, disposal of excavated material, backfilling, lay, bed & test:					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT021	Supply and installation of pipe aerial creek crossing including supply of MSCL pipe with protection coating, internal and external welding, testing of welds. For the following MSCL pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each			Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT023	Supply and Install valve pits excluding cost of valves and fittings	0	Each	$ -	$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT024	Flow Relief Structures		Each			Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT025	EMPTY					
HWT026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	Item	Lump Sum		$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT027	Preparation of line sheets	1200	m	$ 1.00	$ 1,200.00	**Measurement: Length of pipelines constructed as per design. Limits of Accuracy: <To be inserted>.**
HWT028	Acceptance testing - trunk main		m			Measurement: Length of pipelines constructed as per design. Submit: Staisfactory test records Limits of Accuracy: <To be inserted>.
HWT029	**Miscellaneous**					
HWT000	***Sub Total***				$652,992	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0009	Restoration - Pipelines:					**Payment: 100% after completion.**
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -	**Measurement: Lineal metres restored within Minimum Trench Width. Limits of Accuracy: <To be inserted>.**
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.07	Bitumen pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.08	AC pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.09	Pavers		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.10	Turf		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.11	Grass seeding	2040	m2	$ 7.00	$ 14,280.00	**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0009.12	Hydromulch		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>**
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3			**Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. Limits of Accuracy: <To be inserted>.**
HW0011	Acid sulphate soil					
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test			**Submit: Result for each test. Limits of Accuracy: <To be inserted>.**
HW0011.02	Establish treatment facility		Item			**Payment: 100% after completion of treatment facility.**
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3			**Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width. Submit: Test results confirming satisfactory treatment. Limits of Accuracy: <To be inserted>**
HW0011.04	Disposal off site of acid sulphate soil		tonne			**Measurement: Tonnes transported from the site. Submit: Weighbridge dockets. Limits of Accuracy: <To be inserted>**
HW0012	Preconstruction record					
HW0012.01	Photographic	Item	Lump Sum		$ -	**Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.**
HW0012.02	Video	Item	Lump Sum		$ -	**Payment: 70% on submission of the Video record. Remainder at Practical Completion.**
HW0012.03	CCTV	Item	Lump Sum		$ -	**Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.**
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 9,600.00	$ 9,600.00	**Payment: 100% at Practical Completion.**

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 746,605.82

B.	**PRE-CONSTRUCTION COST (Table 10)**		
HW0016	Design	$	111,990.87
HW0017	Project Management of Design	$	35,575.47
HW0018	Land Matters	$	-
HW0024	Community Consultation		
	Sub Total(B1)	$	147,566.35
	Pre construction contingency (30% of B1)	$	44,269.90
	TOTAL PRE-CONSTRUCTION COST (B)	$	191,836.25

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)	$	746,605.82
HW0019	Principal Supplied Pipe (as applicable)	$	-
HW0020	Principal Supplied Valves and Flowmeters (as applicable)	$	-
HW0021	Principal Supplied Fittings (as applicable)	$	-
HW0022	Pump Station HV Power Supply	$	-
HW0023	Construction Management (Table 11)	$	74,660.58
	Sub Total (C1)	$	821,266.40
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$	246,379.92
	TOTAL CONSTRUCTION COST (C)	$	1,067,646.32

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$	1,259,482.57

ESTIMATING SHEET

PROJECT DESCRIPTION: Option 3 - Stage 3

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	$ 102,267.00	$ 102,267.00	**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	$ 30,000.00	$ 30,000.00	**Payment: 100% after completion.**
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 30,000.00	$ 30,000.00	**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	$ 51,933.29	$ 51,933.29	**Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.**
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -	**Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.**

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

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 6,988.60	$ 6,988.60	**Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.**
HWT002	Supply all valves and flowmeters	Item	Lump Sum		$ -	**Payment: Percentage of valves and flowmeters supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
HWT003	Supply all fittings	Item	Lump Sum		$ -	**Payment: Percentage of fittings supplied.** **Submit: Relevant Quality Records including Compliance Certificates.**
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.**
326DSS	Nominal DN375 DICL pipe	7100	m	$ 250.00	$ 1,775,000.00	
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>.
326DSS	Nominal DN375 DICL (Trench type B)	7100	m	$ 112.66	$ 799,885.00	
HWT006	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >1.5m to 3.0m depth to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. 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>.
HWT007	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. 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>.
HWT008	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth > 4.5m to invert in OTR.					Measurement: Actual metres of pipe installed to design depth of excavation > 4.5m. 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>.
HWT009	EMPTY					
HWT010	Extra over rate for installation for Additional compaction.		m3	$ 21.17		Measurement: Cubic metres of additional compaction based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 87.15		Measurement: Cubic metres of excavation directed based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT012	Extra over rate for installation for supply & place compact non cohesive material		m3			Measurement: Cubic metres of non cohesive material based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 373.50		Measurement: Cubic metres of stabilised sand cement based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT014	Extra over rate for installation for Supply, place and compact aggregate		m3			Measurement: Cubic metres of aggregate based on thickness by length by Minimum Trench Width. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT015	Supply & place ballast		tonnes	$ 90.00		Measurement: Actual tonnes placed as directed. Submit: Relevant Quality Records including certified weighbridge dockets. Limits of Accuracy: <To be inserted>.
HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)	3300	m		$ 330,000.00	**Measurement: Measurement: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point.** **Submit: Relevant Quality Records.** **Limits of Accuracy: <To be inserted>.**

Pipeline 2 - al

HWT017	Supply and place treated timber piling for pipe support		m			Measurement: Actual metres from pipe invert to toe of pile. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018	Road / creek crossings					Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT018.01	Pac Hwy	80	m	$ 1,219.06	$ 97,525.00	
HWT019	Extra over rate for installation of trenchless technique under existing rail line		m			Measurement: Length in metres of casing installed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT020	Supply & installation of river crossing includes supply of MSCL pipe, welding, weld testing, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation, disposal of excavated material, backfilling, lay, bed & test:					Measurement: Length in metres of casing installed. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT021	Supply and installation of pipe aerial creek crossing including supply of MSCL pipe with protection coating, internal and external welding, testing of welds. For the following MSCL pipe sizes:					Measurement: Length in metres of crossing installed in accordance with design. Retention: 10% <or other appropriate percentage> until satisfactory testing. Note: Consider other milestone retentions. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each			Payment: Number of bulkheads & trenchstops constructed. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT023	Supply and Install valve pits excluding cost of valves and fittings	0	Each	$ -	$ -	Payment: Number of valve pits constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT024	Flow Relief Structures		Each			Payment: Number of flow relief structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT025	EMPTY					
HWT026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	Item	Lump Sum		$ -	Payment: Number of structures constructed. Retention: <To be determined>. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HWT027	Preparation of line sheets	7100	m	$ 1.00	$ 7,100.00	**Measurement: Length of pipelines constructed as per design.** **Limits of Accuracy: <To be inserted>.**
HWT028	Acceptance testing - trunk main		m			Measurement: Length of pipelines constructed as per design. Submit: Staisfactory test records Limits of Accuracy: <To be inserted>.
HWT029	**Miscellaneous**					
HWT000	***Sub Total***				$3,016,499	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0009	Restoration - Pipelines:					**Payment: 100% after completion.**
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -	**Measurement: Lineal metres restored within Minimum Trench Width.** **Limits of Accuracy: <To be inserted>.**
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.07	Bitumen pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.08	AC pavement		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.09	Pavers		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.10	Turf		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.11	Grass seeding	11900	m2	$ 7.00	$ 83,300.00	**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.12	Hydromulch		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3			**Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>.**
HW0011	Acid sulphate soil					
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report	7	per test	$ 110.00	$ 770.00	**Submit: Result for each test.** **Limits of Accuracy: <To be inserted>.**
HW0011.02	Establish treatment facility		Item			**Payment: 100% after completion of treatment facility.**
HW0011.03	Handling, treatment and testing of acid sulphate soils	622.5	m3	$ 60.00	$ 37,350.00	**Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width.** **Submit: Test results confirming satisfactory treatment.** **Limits of Accuracy: <To be inserted>**
HW0011.04	Disposal off site of acid sulphate soil	0	tonne	$ 122.00	$ -	**Measurement: Tonnes transported from the site.** **Submit: Weighbridge dockets.** **Limits of Accuracy: <To be inserted>**
HW0012	Preconstruction record					
HW0012.01	Photographic	Item	Lump Sum		$ -	**Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.**

HW0012.02	Video	Item	Lump Sum		$ -	**Payment: 70% on submission of the Video record. Remainder at Practical Completion.**
HW0012.03	CCTV	Item	Lump Sum		$ -	**Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.**
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 56,800.00	$ 56,800.00	**Payment: 100% at Practical Completion.**

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 3,438,918.89

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 412,670.27
HW0017	Project Management of Design	$ 116,550.58
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 529,220.84
	Pre construction contingency (30% of B1)	$ 158,766.25
	TOTAL PRE-CONSTRUCTION COST (B)	$ 687,987.10

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 3,438,918.89
HW0019	Principal Supplied Pipe (as applicable)	$ -
HW0020	Principal Supplied Valves and Flowmeters (as applicable)	$ -
HW0021	Principal Supplied Fittings (as applicable)	$ -
HW0022	Pump Station HV Power Supply	$ -
HW0023	Construction Management (Table 11)	$ 275,113.51
	Sub Total (C1)	$ 3,714,032.40
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 1,114,209.72
	TOTAL CONSTRUCTION COST (C)	$ 4,828,242.12

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 5,516,229.22

ESTIMATING SHEET

PROJECT DESCRIPTION: Option 3 - Upgrade to Raymond Terrace WPS

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	$ 10,523.00	$ 10,523.00	**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	$ 3,000.00	$ 3,000.00	**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	$ 5,000.00	$ 5,000.00	**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	$ 4,200.00	$ 4,200.00	**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	$ 6,061.65	$ 6,061.65	**Payment: Maximum of 30% on submission of complying Quality Management Plan, then 10% per month up to maximum of 80%. Remainder at Practical Completion.**
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -	**Payment: 10% per month up to maximum of 70%. Remainder at Practical Completion.**

Standard Building (200kW) 2 Pumps

Item	*Pump Station - Name*	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HW0101	**Standard Building (200kW) 2 Pumps**					
	Clear, excavate & backfill in OTR conditions, supply & construct pipework including suction & discharge pipework, supply & install stop valves, reflux valves, tees, bends & fittings, lay, bed, joint & test. Supply & place thrust blocks. NO COST INCLUDED FOR SUPPLY AND INSTALLATION OF PIPE AND FITTINGS.	Item	Lump Sum	$ 109,755.00	$ 109,755.00	**Payment: <Insert appropriate percentages to reflect the value of work at key milestones eg excavation, pump well, metalwork etc>.** **Submit: Relevant Quality Records.**
HW0102	**Pumps for Pumping Stations - Supply and install pumps and associated fittings, connection to pipework, testing and commissioning.**	2	Lump Sum	$ 35,525.00	$ 71,050.00	**Payment: <Insert appropriate percentages for key milestones eg installation, precommissioning, commissioning>.** **Submit: Relevant Quality Records including those for pump test.**
HW0103	**Pumping Station Electricals**					
HW0103.01	Pit and Conduit System	Item	Lump Sum	$ 10,975.00	$ 10,975.00	**Payment: Percentage of work completed.** **Submit: Relevant Quality Records.**
HW0103.02	LV Station Power Supply	Item	Lump Sum	$ 14,375.00	$ 14,375.00	**Payment: Percentage of work completed.** **Submit: Relevant Quality Records.**
HW0103.03	Station By-Pass arrangements	Item	Lump Sum		$ -	**Payment: Percentage of work completed.** **Submit: Relevant Quality Records.**
HW0103.04	Electrical Demolition works	Item	Lump Sum		$ -	**Payment: Percentage of work completed.** **Submit: Relevant Quality Records.**
HW0103.05	Switchboard	Item	Lump Sum	$ 169,062.50	$ 169,062.50	**Payment: Percentage of work completed.** **Submit: Relevant Quality Records.**
HW0103.06	PLC / Telemetry Hardware	Item	Lump Sum	$ 19,312.50	$ 19,312.50	**Payment: Percentage of work completed.** **Submit: Relevant Quality Records.**
HW0103.07	PLC / Telemetry / Scada Engineering and Software Development	Item	Lump Sum	$ 33,500.00	$ 33,500.00	**Payment: Percentage of work completed.** **Submit: Relevant Quality Records.**
HW0103.08	Stainless Steel Generator Box Cable Tray & Metering Box	Item	Lump Sum	$ 12,437.50	$ 12,437.50	**Payment: Percentage of work completed.** **Submit: Relevant Quality Records.**
HW0103.09	Building Services (Electrical)	Item	Lump Sum	$ 11,062.50	$ 11,062.50	**Payment: Percentage of work completed.** **Submit: Relevant Quality Records.**
HW0103.10	Pressure Transmitter/Gauge Board	Item	Lump Sum	$ 11,875.00	$ 11,875.00	**Payment: Percentage of work completed.** **Submit: Relevant Quality Records.**
HW0103.11	Installation/Cabling (Electrical)	Item	Lump Sum	$ 29,750.00	$ 29,750.00	**Payment: Percentage of work completed.** **Submit: Relevant Quality Records.**
HW0104	Empty					
HW0105	Empty					
HW0106	**Service Location**	Item	Lump Sum	$ 1,760.00	$ 1,760.00	**Payment: Maximum of 10% shall be due each month until 70% of the amount has been paid. Remainder at Practical Completion.**
HW0107	Excavation below design depth including disposal of excavated material (Contingent Item)	0	m3	$ 70.00	$ -	**Measurement: Cubic metres excavated based on thickness of excavation by design cross section of the structure for which excavation has been undertaken.** **Submit: Relevant Quality Records.** **Limits of Accuracy: <To be inserted>.**
HW0108	Extra over Civil Works for excavation in rock:	0	m3	$ 120.00	$ -	**Measurement: Actual cubic metres of rock excavated within the design dimensions of the structure.** **Submit: Relevant Quality Records.** **Limits of Accuracy: <To be inserted>.**
HW0109	Cut and fill earthworks including compaction:	0	m3	$ 25.00	$ -	**Measurement: Actual cubic metres of earthworks completed in accordance with the design.** **Submit: Relevant Quality Records.** **Limits of Accuracy: <To be inserted>.**
HW0110	Supply & place ballast (Contingent Item)	0	tonne	$ 90.00	$ -	**Measurement: Actual tonnes placed as directed.** **Submit: Relevant Quality Records including certified weighbridge dockets.** **Limits of Accuracy: <To be inserted>.**
HW0111	Import and place select fill including compaction <may be Contingent Item>	0	m3	$ 65.00	$ -	**Measurement: Actual cubic metres placed as directed by the Superintendent or placed in accordance with the design.** **Submit: Relevant Quality Records.** **Limits of Accuracy: <To be inserted>.**
HW0112	Construct access road and hardstand					
HW0112.01	Prepare subgrade		m2	$ 4.20		**Measurement: Actual square metres in accordance with the design.** **Submit: Relevant Quality Records.** **Limits of Accuracy: <To be inserted>.**
HW0112.02	Supply, place and compact 150mm thick basecourse		m2	$ 37.00		Measurement: Actual square metres in accordance with the design. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0112.03	Supply, place and compact 200mm thick basecourse		m2	$ 47.00		Measurement: Actual square metres in accordance with the design. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.

Includes: Area

HW0112.04	Supply, place and compact 250mm thick basecourse		m2	$	51.00		Measurement: Actual square metres in accordance with the design. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0112.05	Supply, place and compact two coat bitumen seal		m2	$	26.00		Measurement: Actual square metres in accordance with the design. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0112.06	Supply, place and compact 30mm thick asphalt bitumen seal		m2	$	37.00		Measurement: Actual square metres in accordance with the design. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0112.07	Concrete kerb & gutter	0	m	$	110.00	$ -	Measurement: Actual metres in accordance with the design. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0112.08	Concrete driveway	0	m2	$	178.00	$ -	Measurement: Actual square metres in accordance with the design. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0113	Supply all plant, material and labour to undertake the following Piling works:						
HW0113.01	Treated timber mini piles		m				Measurement: Actual metres in accordance with the design. Submit: Relevant Quality Records. Limits of Accuracy: <To be inserted>.
HW0113.02	Reinforced concrete bored piles	Item	Lump Sum			$ -	Payment: Percentage of work completed. <Consider % payments at milestones> Submit: Relevant Quality Records.
HW0114	Supply all plant, material and labour to undertake the following Retaining Wall works:						Measurement: Actual square metres in accordance with the design. Submit: Relevant Quality Records.
HW0114.01	Timber(Koppers Log) up to 1.5m high		m2	$	300.00		**Limits of Accuracy: <To be inserted>.**
HW0114.02	Concrete Keystone up to 1m high		m2	$	380.00		**Limits of Accuracy: <To be inserted>.**
HW0114.03	Concrete Keystone between 1m and 3m high		m2	$	560.00		**Limits of Accuracy: <To be inserted>.**
HW0114.04	Concrete Keystone greater than 3m high		m2	$	560.00		**Limits of Accuracy: <To be inserted>.**
HW0114.05	Concrete Crib Block up to 2m high		m2	$	630.00		**Limits of Accuracy: <To be inserted>.**
HW0114.06	Concrete Crib Block between 2m and 3m high		m2	$	704.00		**Limits of Accuracy: <To be inserted>.**
HW0115	Acid sulphate soil						
HW0115.01	Initial testing for acid sulphate soils and prepare and submit report	5	per test	$	110.00	$ 550.00	Submit: Result for each test. Limits of Accuracy: <To be inserted>
HW0115.02	Establish treatment facility	Item	Lump Sum			$ -	**Payment: 100% after completion of treatment facility.**
HW0115.03	Handling, treatment and testing of acid sulphate soils		m3	$	60.00		Measurement: Cubic metres within the design cross section of the structure for which excavation has been undertaken. Submit: Test results confirming satisfactory treatment. Limits of Accuracy: <To be inserted>
HW0115.04	Disposal off site of acid sulphate soil		tonne	$	122.00		Measurement: Tonnes transported from the site. Submit: Weighbridge dockets. Limits of Accuracy: <To be inserted>
HW0116	Series Pump Pit Structure	Item	Lump Sum			$ -	Payment: <Insert appropriate percentages to reflect the value of work at key milestones eg excavation, reinforced concrete, metalwork etc>. Submit: Relevant Quality Records.
HW0117	Supply and Install valve pit concrete formwork, reinforced concrete complete with aluminium tread plate covers and including excavation and backfill	Item	Lump Sum	$	-	$ -	**Payment: <Insert appropriate percentages to reflect the value of work at key milestones eg excavation, reinforced concrete, metalwork etc>.** **Submit: Relevant Quality Records.**
HW0118	Supply and install pipework items inside valve pit	Item	Lump Sum	$	-	$ -	**Payment: Valued at percentage of work completed. Retention of 20% <or other percentage> until satisfactory testing.** **Submit: Relevant Quality Records.**
HW0119	Supply and Install additional pipe Items outside station	Item	Lump Sum	$	-	$ -	**Payment: Valued at percentage of work completed. Retention of 20% <or other percentage> until satisfactory testing.** **Submit: Relevant Quality Records.**
HW0120	Supply and install pipework items inside station	Item	Lump Sum	$	-	$ -	**Payment: Valued at percentage of work completed. Retention of 20% <or other percentage> until satisfactory testing.** **Submit: Relevant Quality Records.**
HW0121	Supply and install Type 2 or 4 flow relief structures in accordance with Drgs SCP-502 and SCP-505	Item	Lump Sum			$ -	**Payment: Valued at percentage of work completed. Retention of 20% <or other percentage> until satisfactory testing.** **Submit: Relevant Quality Records.**
HW0122	Supply and install emergency storage structures		L/m				**Payment: Valued at percentage of work completed. Retention of 20% <or other percentage> until satisfactory testing.** **Submit: Relevant Quality Records.**
HW0123	Supply and install fan forced ventilation	Item	Lump Sum			$ -	**Payment: Valued at percentage of work completed. Retention of 20% <or other percentage> until satisfactory testing.** **Submit: Relevant Quality Records.**
HW0124	Supply and install Soil Bed Filter	Item	Lump Sum			$ -	**Payment: Valued at percentage of work completed. Retention of 20% <or other percentage> until satisfactory testing.** **Submit: Relevant Quality Records.**
HW0125	Supply and Install Strainers	Item	Lump Sum			$ -	**Payment: Valued at percentage of work completed. Retention of 20% <or other percentage> until satisfactory testing.** **Submit: Relevant Quality Records.**
HW0126	Supply and Install Series Bypass	Item	Lump Sum			$ -	**Payment: Valued at percentage of work completed up to 80%. Remainder at Practical Completion.** **Submit: Relevant Quality Records.**
HW0127	Landscaping	Item	Lump Sum	$	-	$ -	Payment: 100% at completion. Submit: Relevant Quality Records.
HW0128	**Miscellaneous**						
HW0129	Preparation and submission of Operation and Maintenance Information	Item	Lump Sum			$ -	Payment: 100% at Practical Completion. Submit: Complying Work As Constructed Information.
HW0130	Pre commissioning and commissioning	Item	Lump Sum	$	8,000.00	$ 8,000.00	**Payment: 50% at completion of satisfactory precommissioning. Remainder at Practical Completion.** **Submit: Relevant Quality Records.**
HW0131	Preparation and submission of Work as Constructed Information	Item	Lump Sum	$	6,000.00	$ 6,000.00	Payment: 100% at Practical Completion. Submit: Complying Work As Constructed Information.
HW1WP	***Sub Total***					$509,465	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0009	Restoration - Pipelines:					**Payment: 100% after completion.**
HW0009.01	Concrete kerb & gutter		m			**Measurement: Lineal metres restored within Minimum Trench Width.** **Limits of Accuracy: <To be inserted>.**
HW0009.02	Concrete driveway		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.03	Exposed aggregate & stamped driveway		m2			**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**

HW0009.04	Concrete footpath		m2				**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.05	Bitumen footpath		m2				**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.06	Gravel pavement		m2				**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.07	Bitumen pavement		m2				**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.08	AC pavement		m2				**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.09	Pavers		m2				**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.10	Turf		m2				**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.11	Grass seeding		m2				**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0009.12	Hydromulch		m2				**Measurement: Square metres restored based on actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>**
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3				**Measurement: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width.** **Limits of Accuracy: <To be inserted>.**
HW0011	Acid sulphate soil						
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test				**Submit: Result for each test.** **Limits of Accuracy: <To be inserted>.**
HW0011.02	Establish treatment facility		Item				**Payment: 100% after completion of treatment facility.**
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3				**Measurement: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width.** **Submit: Test results confirming satisfactory treatment.** **Limits of Accuracy: <To be inserted>**
HW0011.04	Disposal off site of acid sulphate soil		tonne				**Measurement: Tonnes transported from the site.** **Submit: Weighbridge dockets.** **Limits of Accuracy: <To be inserted>**
HW0012	Preconstruction record						
HW0012.01	Photographic	Item	Lump Sum		$ -		**Payment: 70% on submission of the Photographic record. Remainder at Practical Completion.**
HW0012.02	Video	Item	Lump Sum		$ -		**Payment: 70% on submission of the Video record. Remainder at Practical Completion.**
HW0012.03	CCTV	Item	Lump Sum		$ -		**Payment: 70% on submission of the CCTV record. Remainder at Practical Completion.**
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum		$ -		**Payment: 100% at Practical Completion.**

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 568,249.65

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 85,237.45
HW0017	Project Management of Design	$ 27,047.49
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 112,284.94
	Pre construction contingency (30% of B1)	$ 33,685.48
	TOTAL PRE-CONSTRUCTION COST (B)	$ 145,970.42

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 568,249.65
HW0019	Principal Supplied Pipe (as applicable)	$ -
HW0020	Principal Supplied Valves and Flowmeters (as applicable)	$ -
HW0021	Principal Supplied Fittings (as applicable)	$ -
HW0022	Pump Station HV Power Supply	$ 187,500.00
HW0023	Construction Management (Table 11)	$ 56,824.97
	Sub Total (C1)	$ 812,574.62
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 243,772.38
	TOTAL CONSTRUCTION COST (C)	$ 1,056,347.00

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 1,202,317.42

APPENDIX E – COST EFFECTIVENESS ANALYSIS

Option Reference			Option 1A
Real Discount Rate			7.0%
Length WM (m)			7,490
Diam RM (mm)			375
Pump Duty (L/s)			
Length GM (m)			
Costs			
2010/2011 Energy Cost			0.157 / kWh
Annual Real Energy Increase			2.18%
2010/2011 GHG Cost			25.00 / tonnes CO_2-e
Real GHG Increase			3.52%

FY Ending		Units	2012	2013	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
Discount Factor			1.00	0.93	0.86	0.80	0.75	0.70	0.65	0.60	0.56	0.52	0.48	0.45	0.42	0.39	0.36	0.34	0.31	0.29	0.27	0.25	0.23	0.22	0.20	0.19	0.18	0.16	0.15	0.14	0.13	0.12
Developer Capital Costs ($ 2010/2011)																																
Water Supply																																
Mains	7,466,223	$	7,466,223																													
Water Pump Station	-	$																														
Reservoir	-	$																														
Telemetry & SCADA		$																														
Land acquisition	500,000	$	500,000																													
Total Water Supply Cost	*7,966,223*	$	7,966,223	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																
Internal Transfer																																
Gravity Mains		$																														
Rising Mains		$																														
Sewer Pump Station		$																														
Telemetry & SCADA		$																														
Chemical Dosing		$																														
Total Sewer Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Developer Capital Costs		**$**	**7,966,223**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Developer PV	**7,966,223**	**$**	**7,966,223**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Capital Costs ($ 2010/2011)																																
Water Supply																																
Mains		$																														
Pump Station		$																														
Reservoir		$																														
Telemetry & SCADA		$																														
Chemical Dosing		$																														
Total Water Supply Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																
Mains		$																														
Pump Station		$																														-
Telemetry & SCADA		$																														
Chemical Dosing		$																														
Total Sewer Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total HWC Capital Costs		**$**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total HWC Capital PV	-	**$**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Operating Costs ($ 2010/2011)																																
Water Supply																																
Mains	#DIV/0!	$																														
Pump Station	#DIV/0!	$																														
Reservoir	#DIV/0!	$																														
Chemical Dosing	#DIV/0!	$																														
Total Water Supply Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																
Mains	#DIV/0!	$																														
Pump Station	#DIV/0!	$																														
ET																																
ADWF (L/s)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADWF (ML/y)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detention Time (hr)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dose Cost Rate ($/ML)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chemical Dosing	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Sewer Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Dosing PV	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy																																
kWh/year		kWh/year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$/kWh	2.18%	$/kWh	0.156	0.162	0.169	0.176	0.183	0.191	0.199	0.207	0.215	0.230	0.233	0.246	0.252	0.254	0.250	0.254	0.256	0.261	0.262	0.265	0.265	0.269	0.271	0.282	0.281	0.282	0.281	0.291	0.280	0.287
Total Energy Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy Cost PV	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GHG Costs																																
kg CO_2-e/kWh		kg CO_2-e/kWh	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Tonnes CO_2-e		Tonnes CO_2-e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$ / tonne CO_2-e	3.52%	$	25.00	25.88	26.79	27.73	28.71	29.72	30.77	31.85	32.97	34.13	35.33	36.58	37.86	39.20	40.58	42.01	43.48	45.01	46.60	48.24	49.94	51.70	53.51	55.40	57.35	59.37	61.46	63.62	65.86	68.18
GHG Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GHG PV	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Costs		**$**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating PV	-	**$**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Maintenance Costs ($ 2010/2011)																																
Water Supply																																
Mains	0.00%	$	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895	3,895
Pump Station	#DIV/0!	$																														
Reservoir	#DIV/0!	$																														
Chemical Dosing	#DIV/0!	$																														
Total Water Supply Cost		*$*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*	*3,895*
Sewer																																
Rising Mains	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gravity Mains	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pump Station	#DIV/0!	$																														
Chemical Dosing	#DIV/0!	$																														
Total Sewer Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Maintenance Costs		**$**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**
Total Maintenance PV	**49,332**	**$**	**3,895**	**3,622**	**3,369**	**3,133**	**2,914**	**2,710**	**2,520**	**2,344**	**2,179**	**2,027**	**1,885**	**1,753**	**1,630**	**1,516**	**1,410**	**1,311**	**1,220**	**1,134**	**1,055**	**981**	**912**	**848**	**789**	**734**	**682**	**635**	**590**	**549**	**511**	**475**
Total O & M Costs		**$**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**
Total O & M PV	**49,332**	**$**	**3,895**	**3,622**	**3,369**	**3,133**	**2,914**	**2,710**	**2,520**	**2,344**	**2,179**	**2,027**	**1,885**	**1,753**	**1,630**	**1,516**	**1,410**	**1,311**	**1,220**	**1,134**	**1,055**	**981**	**912**	**848**	**789**	**734**	**682**	**635**	**590**	**549**	**511**	**475**
Lifecycle Costs		**$**	**7,970,118**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**	**3,895**
Total PV (Inc GHG)	**8,015,555**	**$**	**7,970,118**	**3,622**	**3,369**	**3,133**	**2,914**	**2,710**	**2,520**	**2,344**	**2,179**	**2,027**	**1,885**	**1,753**	**1,630**	**1,516**	**1,410**	**1,311**	**1,220**	**1,134**	**1,055**	**981**	**912**	**848**	**789**	**734**	**682**	**635**	**590**	**549**	**511**	**475**
Total PV (Ex GHG)	**8,015,555**	**$**	**7,970,118**	**3,622**	**3,369**	**3,133**	**2,914**	**2,710**	**2,520**	**2,344**	**2,179**	**2,027**	**1,885**	**1,753**	**1,630**	**1,516**	**1,410**	**1,311**	**1,220**	**1,134**	**1,055**	**981**	**912**	**848**	**789**	**734**	**682**	**635**	**590**	**549**	**511**	**475**

Option Reference			Option 1B
Real Discount Rate			7.0%
Length WM (m)			11,070
Diam RM (mm)			450
Pump Duty (L/s)			
Length GM (m)			

Costs

2010/2011 Energy Cost	0.157	/ kWh
Annual Real Energy Increase	2.18%	
2010/2011 GHG Cost	25.00	/ tonnes CO_2-e
Real GHG Increase	3.52%	

FY Ending		Units	2012	2013	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
Discount Factor			1.00	0.93	0.86	0.80	0.75	0.70	0.65	0.60	0.56	0.52	0.48	0.45	0.42	0.39	0.36	0.34	0.31	0.29	0.27	0.25	0.23	0.22	0.20	0.19	0.18	0.16	0.15	0.14	0.13	0.12
Developer Capital Costs ($ 2010/2011)																																
Water Supply																																
Mains	11,839,361	$	11,839,361																													
Water Pump Station	-	$																														
Reservoir	-	$																														
Telemetry & SCADA	-	$																														
Chemical Dosing	-	$																														
Total Water Supply Cost	*11,839,361*	$	*11,839,361*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																
Internal Transfer																																
Gravity Mains		$																														
Rising Mains		$																														
Sewer Pump Station		$																														
Telemetry & SCADA		$																														
Chemical Dosing		$																														
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Developer Capital Costs		**$**	**11,839,361**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Developer PV	**11,839,361**	**$**	**11,839,361**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Capital Costs ($ 2010/2011)																																
Water Supply																																
Mains		$																														
Pump Station		$																														
Reservoir		$																														
Telemetry & SCADA		$																														
Chemical Dosing		$																														
Total Water Supply Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																
Mains		$																														
Pump Station		$																														-
Telemetry & SCADA		$																														
Chemical Dosing		$																														
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total HWC Capital Costs		**$**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total HWC Capital PV	-	**$**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Operating Costs ($ 2010/2011)																																
Water Supply																																
Mains	#DIV/0!	$																														
Pump Station	#DIV/0!	$																														
Reservoir	#DIV/0!	$																														
Chemical Dosing	#DIV/0!	$																														
Total Water Supply Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																
Mains	#DIV/0!	$																														
Pump Station	#DIV/0!	$																														
ET																																
ADWF (L/s)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADWF (ML/y)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detention Time (hr)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dose Cost Rate ($/ML)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chemical Dosing	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Dosing PV	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy																																
kWh/year		kWh/year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$/kWh	2.18%	$/kWh	0.156	0.162	0.169	0.176	0.183	0.191	0.199	0.207	0.215	0.230	0.233	0.246	0.252	0.254	0.250	0.254	0.256	0.261	0.262	0.265	0.265	0.269	0.271	0.282	0.281	0.282	0.281	0.291	0.280	0.287
Total Energy Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy Cost PV	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GHG Costs																																
kg CO_2-e/kWh		kg CO_2-e/kWh	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Tonnes CO_2-e		Tonnes CO_2-e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$ / tonne CO_2-e	3.52%	$	25.00	25.88	26.79	27.73	28.71	29.72	30.77	31.85	32.97	34.13	35.33	36.58	37.86	39.20	40.58	42.01	43.48	45.01	46.60	48.24	49.94	51.70	53.51	55.40	57.35	59.37	61.46	63.62	65.86	68.18
GHG Cost	-	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GHG PV	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Costs		**$**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating PV	-	**$**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Maintenance Costs ($ 2010/2011)																																
Water Supply																																
Mains	0.00%	$	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756
Pump Station	#DIV/0!	$																														
Reservoir	#DIV/0!	$																														
Chemical Dosing	#DIV/0!	$																														
Total Water Supply Cost		$	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*	*5,756*
Sewer																																
Rising Mains	#DIV/0!	$																														
Gravity Mains	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pump Station	#DIV/0!	$																														
Chemical Dosing	#DIV/0!	$																														
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Maintenance Costs		**$**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**
Total Maintenance PV	**72,912**	**$**	**5,756**	**5,353**	**4,979**	**4,630**	**4,306**	**4,005**	**3,724**	**3,464**	**3,221**	**2,996**	**2,786**	**2,591**	**2,410**	**2,241**	**2,084**	**1,938**	**1,803**	**1,676**	**1,559**	**1,450**	**1,348**	**1,254**	**1,166**	**1,085**	**1,009**	**938**	**872**	**811**	**755**	**702**
Total O & M Costs		**$**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**
Total O & M PV	**72,912**	**$**	**5,756**	**5,353**	**4,979**	**4,630**	**4,306**	**4,005**	**3,724**	**3,464**	**3,221**	**2,996**	**2,786**	**2,591**	**2,410**	**2,241**	**2,084**	**1,938**	**1,803**	**1,676**	**1,559**	**1,450**	**1,348**	**1,254**	**1,166**	**1,085**	**1,009**	**938**	**872**	**811**	**755**	**702**
Lifecycle Costs		**$**	**11,845,117**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**	**5,756**
Total PV (Inc GHG)	**11,912,272**	**$**	**11,845,117**	**5,353**	**4,979**	**4,630**	**4,306**	**4,005**	**3,724**	**3,464**	**3,221**	**2,996**	**2,786**	**2,591**	**2,410**	**2,241**	**2,084**	**1,938**	**1,803**	**1,676**	**1,559**	**1,450**	**1,348**	**1,254**	**1,166**	**1,085**	**1,009**	**938**	**872**	**811**	**755**	**702**
Total PV (Ex GHG)	**11,912,272**	**$**	**11,845,117**	**5,353**	**4,979**	**4,630**	**4,306**	**4,005**	**3,724**	**3,464**	**3,221**	**2,996**	**2,786**	**2,591**	**2,410**	**2,241**	**2,084**	**1,938**	**1,803**	**1,676**	**1,559**	**1,450**	**1,348**	**1,254**	**1,166**	**1,085**	**1,009**	**938**	**872**	**811**	**755**	**702**

Option Reference			Option 2A																														
Real Discount Rate			7.0%																														
Length WM (m)			15,700																														
Diam RM (mm)			450																														
Pump Duty (L/s)																																	
Length GM (m)																																	
Costs																																	
2010/2011 Energy Cost			0.157 / kWh																														
Annual Real Energy Increase			2.18%																														
2010/2011 GHG Cost			25.00 / tonnes CO_2-e																														
Real GHG Increase			3.52%																														
FY Ending		**Units**	**2012**	**2013**	**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**
Discount Factor			1.00	0.93	0.86	0.80	0.75	0.70	0.65	0.60	0.56	0.52	0.48	0.45	0.42	0.39	0.36	0.34	0.31	0.29	0.27	0.25	0.23	0.22	0.20	0.19	0.18	0.16	0.15	0.14	0.13	0.12
Developer Capital Costs ($ 2010/2011)																																	
Water Supply																																	
Mains	14,664,555	$	14,664,555																														
Water Pump Station	-	$																															
Reservoir	-	$																															
Telemetry & SCADA	-	$																															
Chemical Dosing	-	$																															
Total Water Supply Cost	*14,664,555*	$	*14,664,555*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																	
Internal Transfer																																	
Gravity Mains		$																															
Rising Mains		$																															
Sewer Pump Station		$																															
Telemetry & SCADA		$																															
Chemical Dosing		$																															
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Developer Capital Costs		**$**	**14,664,555**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Developer PV	**14,664,555**	**$**	**14,664,555**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Capital Costs ($ 2010/2011)																																	
Water Supply																																	
Mains		$																															
Pump Station		$																															
Reservoir		$																															
Telemetry & SCADA		$																															
Chemical Dosing		$																															
Total Water Supply Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																	
Mains		$																															
Pump Station		$																															-
Telemetry & SCADA		$																															
Chemical Dosing		$																															
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total HWC Capital Costs		**$**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total HWC Capital PV	**-**	**$**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
HWC Operating Costs ($ 2010/2011)																																	
Water Supply																																	
Mains	#DIV/0!	$																															
Pump Station	#DIV/0!	$																															
Reservoir	#DIV/0!	$																															
Chemical Dosing	#DIV/0!	$																															
Total Water Supply Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																	
Mains	#DIV/0!	$																															
Pump Station	#DIV/0!	$																															
ET																																	
ADWF (L/s)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADWF (ML/y)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detention Time (hr)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dose Cost Rate ($/ML)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chemical Dosing	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Dosing PV	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Energy																																	
kWh/year		kWh/year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$/kWh	2.18%	$/kWh	0.156	0.162	0.169	0.176	0.183	0.191	0.199	0.207	0.215	0.230	0.233	0.246	0.252	0.254	0.250	0.254	0.256	0.261	0.262	0.265	0.265	0.269	0.271	0.282	0.281	0.282	0.281	0.291	0.280	0.287
Total Energy Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy Cost PV	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
GHG Costs																																	
kg CO_2-e/kWh		kg CO_2-e/kWh	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Tonnes CO_2-e		Tonnes CO_2-e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$ / tonne CO_2-e	3.52%	$	25.00	25.88	26.79	27.73	28.71	29.72	30.77	31.85	32.97	34.13	35.33	36.58	37.86	39.20	40.58	42.01	43.48	45.01	46.60	48.24	49.94	51.70	53.51	55.40	57.35	59.37	61.46	63.62	65.86	68.18	
GHG Cost	-	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GHG PV	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total Operating Costs		**$**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total Operating PV	**-**	**$**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
HWC Maintenance Costs ($ 2010/2011)																																	
Water Supply																																	
Mains	0.00%	$	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164	8,164
Pump Station	#DIV/0!	$																															
Reservoir	#DIV/0!	$																															
Chemical Dosing	#DIV/0!	$																															
Total Water Supply Cost		$	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*	*8,164*
Sewer																																	
Rising Mains	#DIV/0!	$																															
Gravity Mains	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pump Station	#DIV/0!	$																															
Chemical Dosing	#DIV/0!	$																															
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Maintenance Costs		**$**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**
Total Maintenance PV	**103,407**	**$**	**8,164**	**7,593**	**7,061**	**6,567**	**6,107**	**5,680**	**5,282**	**4,912**	**4,568**	**4,249**	**3,951**	**3,675**	**3,417**	**3,178**	**2,956**	**2,749**	**2,556**	**2,377**	**2,211**	**2,056**	**1,912**	**1,778**	**1,654**	**1,538**	**1,431**	**1,330**	**1,237**	**1,151**	**1,070**	**995**	
Total O & M Costs		**$**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**
Total O & M PV	**103,407**	**$**	**8,164**	**7,593**	**7,061**	**6,567**	**6,107**	**5,680**	**5,282**	**4,912**	**4,568**	**4,249**	**3,951**	**3,675**	**3,417**	**3,178**	**2,956**	**2,749**	**2,556**	**2,377**	**2,211**	**2,056**	**1,912**	**1,778**	**1,654**	**1,538**	**1,431**	**1,330**	**1,237**	**1,151**	**1,070**	**995**	
Lifecycle Costs		**$**	**14,672,719**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**	**8,164**
Total PV (Inc GHG)	**14,767,962**	**$**	**14,672,719**	**7,593**	**7,061**	**6,567**	**6,107**	**5,680**	**5,282**	**4,912**	**4,568**	**4,249**	**3,951**	**3,675**	**3,417**	**3,178**	**2,956**	**2,749**	**2,556**	**2,377**	**2,211**	**2,056**	**1,912**	**1,778**	**1,654**	**1,538**	**1,431**	**1,330**	**1,237**	**1,151**	**1,070**	**995**	
Total PV (Ex GHG)	**14,767,962**	**$**	**14,672,719**	**7,593**	**7,061**	**6,567**	**6,107**	**5,680**	**5,282**	**4,912**	**4,568**	**4,249**	**3,951**	**3,675**	**3,417**	**3,178**	**2,956**	**2,749**	**2,556**	**2,377**	**2,211**	**2,056**	**1,912**	**1,778**	**1,654**	**1,538**	**1,431**	**1,330**	**1,237**	**1,151**	**1,070**	**995**	

Option Reference			Option 2B
Real Discount Rate			7.0%
Length WM (m)			12,800
Diam RM (mm)			450
Pump Duty (L/s)			
Length GM (m)			

Costs

2010/2011 Energy Cost	0.157	/ kWh
Annual Real Energy Increase	2.18%	
2010/2011 GHG Cost	25.00	/ tonnes CO_2-e
Real GHG Increase	3.52%	

FY Ending		Units	2012	2013	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
Discount Factor			1.00	0.93	0.86	0.80	0.75	0.70	0.65	0.60	0.56	0.52	0.48	0.45	0.42	0.39	0.36	0.34	0.31	0.29	0.27	0.25	0.23	0.22	0.20	0.19	0.18	0.16	0.15	0.14	0.13	0.12
Developer Capital Costs ($ 2010/2011)																																
Water Supply																																
Mains	13,156,787	$	13,156,787																													
Water Pump Station	-	$																														
Reservoir	-	$																														
Telemetry & SCADA	-	$																														
Chemical Dosing	-	$																														
Total Water Supply Cost	*13,156,787*	$	*13,156,787*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																
Internal Transfer																																
Gravity Mains		$																														
Rising Mains		$																														
Sewer Pump Station		$																														
Telemetry & SCADA		$																														
Chemical Dosing		$																														
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Developer Capital Costs		**$**	**13,156,787**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Developer PV	**13,156,787**	**$**	**13,156,787**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Capital Costs ($ 2010/2011)																																
Water Supply																																
Mains		$																														
Pump Station		$																														
Reservoir		$																														
Telemetry & SCADA		$																														
Chemical Dosing		$																														
Total Water Supply Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																
Mains		$																														
Pump Station		$																														-
Telemetry & SCADA		$																														
Chemical Dosing		$																														
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total HWC Capital Costs		**$**	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total HWC Capital PV	**-**	**$**	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Operating Costs ($ 2010/2011)																																
Water Supply																																
Mains	#DIV/0!	$																														
Pump Station	#DIV/0!	$																														
Reservoir	#DIV/0!	$																														
Chemical Dosing	#DIV/0!	$																														
Total Water Supply Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																
Mains	#DIV/0!	$																														
Pump Station	#DIV/0!	$																														
ET																																
ADWF (L/s)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADWF (ML/y)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detention Time (hr)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dose Cost Rate ($/ML)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chemical Dosing	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Dosing PV	**-**		**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy																																
kWh/year		kWh/year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$/kWh	2.18%	$/kWh	0.156	0.162	0.169	0.176	0.183	0.191	0.199	0.207	0.215	0.230	0.233	0.246	0.252	0.254	0.250	0.254	0.256	0.261	0.262	0.265	0.265	0.269	0.271	0.282	0.281	0.282	0.281	0.291	0.280	0.287
Total Energy Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy Cost PV	**-**		**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GHG Costs																																
kg CO_2-e/kWh		kg CO_2-e/kWh	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Tonnes CO_2-e		Tonnes CO_2-e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$ / tonne CO_2-e	3.52%	$	25.00	25.88	26.79	27.73	28.71	29.72	30.77	31.85	32.97	34.13	35.33	36.58	37.86	39.20	40.58	42.01	43.48	45.01	46.60	48.24	49.94	51.70	53.51	55.40	57.35	59.37	61.46	63.62	65.86	68.18
GHG Cost	-	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GHG PV	**-**		**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Costs		**$**	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating PV	**-**	**$**	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Maintenance Costs ($ 2010/2011)																																
Water Supply																																
Mains	0.00%	$	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656	6,656
Pump Station	#DIV/0!	$																														
Reservoir	#DIV/0!	$																														
Chemical Dosing	#DIV/0!	$																														
Total Water Supply Cost		$	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*	*6,656*
Sewer																																
Rising Mains	#DIV/0!	$																														
Gravity Mains	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pump Station	#DIV/0!	$																														
Chemical Dosing	#DIV/0!	$																														
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Maintenance Costs		**$**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**
Total Maintenance PV	**84,306**	**$**	**6,656**	**6,190**	**5,757**	**5,354**	**4,979**	**4,631**	**4,306**	**4,005**	**3,725**	**3,464**	**3,221**	**2,996**	**2,786**	**2,591**	**2,410**	**2,241**	**2,084**	**1,938**	**1,803**	**1,676**	**1,559**	**1,450**	**1,348**	**1,254**	**1,166**	**1,085**	**1,009**	**938**	**872**	**811**
Total O & M Costs		**$**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**
Total O & M PV	**84,306**	**$**	**6,656**	**6,190**	**5,757**	**5,354**	**4,979**	**4,631**	**4,306**	**4,005**	**3,725**	**3,464**	**3,221**	**2,996**	**2,786**	**2,591**	**2,410**	**2,241**	**2,084**	**1,938**	**1,803**	**1,676**	**1,559**	**1,450**	**1,348**	**1,254**	**1,166**	**1,085**	**1,009**	**938**	**872**	**811**
Lifecycle Costs		**$**	**13,163,443**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**	**6,656**
Total PV (Inc GHG)	**13,241,093**	**$**	**13,163,443**	**6,190**	**5,757**	**5,354**	**4,979**	**4,631**	**4,306**	**4,005**	**3,725**	**3,464**	**3,221**	**2,996**	**2,786**	**2,591**	**2,410**	**2,241**	**2,084**	**1,938**	**1,803**	**1,676**	**1,559**	**1,450**	**1,348**	**1,254**	**1,166**	**1,085**	**1,009**	**938**	**872**	**811**
Total PV (Ex GHG)	**13,241,093**	**$**	**13,163,443**	**6,190**	**5,757**	**5,354**	**4,979**	**4,631**	**4,306**	**4,005**	**3,725**	**3,464**	**3,221**	**2,996**	**2,786**	**2,591**	**2,410**	**2,241**	**2,084**	**1,938**	**1,803**	**1,676**	**1,559**	**1,450**	**1,348**	**1,254**	**1,166**	**1,085**	**1,009**	**938**	**872**	**811**

Option Reference			Option 2C
Real Discount Rate			7.0%
Length WM (m)			14,400
Diam RM (mm)			450
Pump Duty (L/s)			
Length GM (m)			

Costs

2010/2011 Energy Cost	0.157	/ kWh
Annual Real Energy Increase	2.18%	
2010/2011 GHG Cost	25.00	/ tonnes CO_2-e
Real GHG Increase	3.52%	

FY Ending		Units	2012	2013	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
Discount Factor			1.00	0.93	0.86	0.80	0.75	0.70	0.65	0.60	0.56	0.52	0.48	0.45	0.42	0.39	0.36	0.34	0.31	0.29	0.27	0.25	0.23	0.22	0.20	0.19	0.18	0.16	0.15	0.14	0.13	0.12
Developer Capital Costs ($ 2010/2011)																																
Water Supply																																
Mains	14,367,775	$	14,367,775																													
Water Pump Station	-	$																														
Reservoir	-	$																														
Telemetry & SCADA	-	$																														
Chemical Dosing	-	$																														
Total Water Supply Cost	*14,367,775*	$	*14,367,775*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																
Internal Transfer																																
Gravity Mains		$																														
Rising Mains		$																														
Sewer Pump Station		$																														
Telemetry & SCADA		$																														
Chemical Dosing		$																														
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Developer Capital Costs		**$**	**14,367,775**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Developer PV	**14,367,775**	**$**	**14,367,775**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Capital Costs ($ 2010/2011)																																
Water Supply																																
Mains		$																														
Pump Station		$																														
Reservoir		$																														
Telemetry & SCADA		$																														
Chemical Dosing		$																														
Total Water Supply Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																
Mains		$																														
Pump Station		$																														-
Telemetry & SCADA		$																														
Chemical Dosing		$																														
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total HWC Capital Costs		**$**	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total HWC Capital PV	**-**	**$**	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Operating Costs ($ 2010/2011)																																
Water Supply																																
Mains	#DIV/0!	$																														
Pump Station	#DIV/0!	$																														
Reservoir	#DIV/0!	$																														
Chemical Dosing	#DIV/0!	$																														
Total Water Supply Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																
Mains	#DIV/0!	$																														
Pump Station	#DIV/0!	$																														
ET																																
ADWF (L/s)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADWF (ML/y)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detention Time (hr)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dose Cost Rate ($/ML)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chemical Dosing	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Dosing PV	**-**		**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy																																
kWh/year		kWh/year	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$/kWh	2.18%	$/kWh	0.156	0.162	0.169	0.176	0.183	0.191	0.199	0.207	0.215	0.230	0.233	0.246	0.252	0.254	0.250	0.254	0.256	0.261	0.262	0.265	0.265	0.269	0.271	0.282	0.281	0.282	0.281	0.291	0.280	0.287
Total Energy Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy Cost PV	**-**		**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GHG Costs																																
kg CO_2-e/kWh		kg CO_2-e/kWh	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Tonnes CO_2-e		Tonnes CO_2-e	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
$ / tonne CO_2-e	3.52%	$	25.00	25.88	26.79	27.73	28.71	29.72	30.77	31.85	32.97	34.13	35.33	36.58	37.86	39.20	40.58	42.01	43.48	45.01	46.60	48.24	49.94	51.70	53.51	55.40	57.35	59.37	61.46	63.62	65.86	68.18
GHG Cost	-	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GHG PV	**-**		**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating Costs		**$**	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Operating PV	**-**	**$**	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HWC Maintenance Costs ($ 2010/2011)																																
Water Supply																																
Mains	0.00%	$	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488
Pump Station	#DIV/0!	$																														
Reservoir	#DIV/0!	$																														
Chemical Dosing	#DIV/0!	$																														
Total Water Supply Cost		$	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*
Sewer																																
Rising Mains	#DIV/0!	$		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gravity Mains	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pump Station	#DIV/0!	$		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Dosing	#DIV/0!	$																														
Total Sewer Cost		$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Maintenance Costs		**$**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**
Total Maintenance PV	**94,844**	**$**	**7,488**	**6,964**	**6,476**	**6,023**	**5,601**	**5,209**	**4,845**	**4,506**	**4,190**	**3,897**	**3,624**	**3,370**	**3,134**	**2,915**	**2,711**	**2,521**	**2,345**	**2,181**	**2,028**	**1,886**	**1,754**	**1,631**	**1,517**	**1,411**	**1,312**	**1,220**	**1,135**	**1,055**	**981**	**913**
Total O & M Costs		**$**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**
Total O & M PV	**94,844**	**$**	**7,488**	**6,964**	**6,476**	**6,023**	**5,601**	**5,209**	**4,845**	**4,506**	**4,190**	**3,897**	**3,624**	**3,370**	**3,134**	**2,915**	**2,711**	**2,521**	**2,345**	**2,181**	**2,028**	**1,886**	**1,754**	**1,631**	**1,517**	**1,411**	**1,312**	**1,220**	**1,135**	**1,055**	**981**	**913**
Lifecycle Costs		**$**	**14,375,263**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**
Total PV (Inc GHG)	**14,462,619**	**$**	**14,375,263**	**6,964**	**6,476**	**6,023**	**5,601**	**5,209**	**4,845**	**4,506**	**4,190**	**3,897**	**3,624**	**3,370**	**3,134**	**2,915**	**2,711**	**2,521**	**2,345**	**2,181**	**2,028**	**1,886**	**1,754**	**1,631**	**1,517**	**1,411**	**1,312**	**1,220**	**1,135**	**1,055**	**981**	**913**
Total PV (Ex GHG)	**14,462,619**	**$**	**14,375,263**	**6,964**	**6,476**	**6,023**	**5,601**	**5,209**	**4,845**	**4,506**	**4,190**	**3,897**	**3,624**	**3,370**	**3,134**	**2,915**	**2,711**	**2,521**	**2,345**	**2,181**	**2,028**	**1,886**	**1,754**	**1,631**	**1,517**	**1,411**	**1,312**	**1,220**	**1,135**	**1,055**	**981**	**913**

Option Reference			Option 3																														
Real Discount Rate			7.0%																														
Length WM (m)			14,400																														
Diam RM (mm)			450																														
Pump Duty (L/s)																																	
Length GM (m)																																	
Costs																																	
2010/2011 Energy Cost			0.157 / kWh																														
Annual Real Energy Increase			2.18%																														
2010/2011 GHG Cost			25.00 / tonnes CO_2-e																														
Real GHG Increase			3.52%																														
FY Ending		**Units**	**2013**	**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**
Discount Factor			1.00	0.93	0.86	0.80	0.75	0.70	0.65	0.60	0.56	0.52	0.48	0.45	0.42	0.39	0.36	0.34	0.31	0.29	0.27	0.25	0.23	0.22	0.20	0.19	0.18	0.16	0.15	0.14	0.13	0.12
Developer Capital Costs ($ 2010/2011)																																	
Water Supply																																	
Mains	14,374,367	$	7,598,655		1,259,483					5,516,229																							
Water Pump Station	383,400	$			383,400																												
Reservoir	-	$																															
Telemetry & SCADA	-	$																															
Chemical Dosing	-	$																															
Total Water Supply Cost	*14,757,767*	*$*	*7,598,655*	-	*1,642,883*	-	-	-	-	*5,516,229*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																	
Internal Transfer																																	
Gravity Mains		$																															
Rising Mains		$																															
Sewer Pump Station		$																															
Telemetry & SCADA		$																															
Chemical Dosing		$																															
Total Sewer Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Developer Capital Costs		**$**	**7,598,655**	**-**	**1,642,883**	**-**	**-**	**-**	**-**	**5,516,229**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total Developer PV	**12,338,704**	**$**	**7,598,655**	**-**	**1,420,929**	**-**	**-**	**-**	**-**	**3,319,120**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
HWC Capital Costs ($ 2010/2011)																																	
Water Supply																																	
Mains		$																															
Pump Station		$																		71,050													
Reservoir		$																															
Telemetry & SCADA		$																															
Chemical Dosing		$																															
Total Water Supply Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*71,050*	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																	
Mains		$																															
Pump Station		$																															-
Telemetry & SCADA		$																															
Chemical Dosing		$																															
Total Sewer Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total HWC Capital Costs		**$**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**71,050**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Total HWC Capital PV	**20,691**	**$**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**20,691**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
HWC Operating Costs ($ 2010/2011)																																	
Water Supply																																	
Mains	#DIV/0!	$																															
Pump Station	#DIV/0!	$																															
Reservoir	#DIV/0!	$																															
Chemical Dosing	#DIV/0!	$																															
Total Water Supply Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sewer																																	
Mains	#DIV/0!	$																															
Pump Station	#DIV/0!	$																															
ET																																	
ADWF (L/s)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ADWF (ML/y)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detention Time (hr)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dose Cost Rate ($/ML)			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chemical Dosing	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Sewer Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Dosing PV	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Energy																																	
kWh/year		kWh/year	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367	342,367
$/kWh	2.18%	$/kWh	0.156	0.162	0.169	0.176	0.183	0.191	0.199	0.207	0.215	0.230	0.233	0.246	0.252	0.254	0.250	0.254	0.256	0.261	0.262	0.265	0.265	0.269	0.271	0.282	0.281	0.282	0.281	0.291	0.280	0.287	
Total Energy Cost		*$*	*53,296*	*55,501*	*57,797*	*60,187*	*62,677*	*65,269*	*67,969*	*70,780*	*73,708*	*78,714*	*79,863*	*84,151*	*86,313*	*86,921*	*85,563*	*86,884*	*87,625*	*89,429*	*89,705*	*90,567*	*90,561*	*92,013*	*92,745*	*96,582*	*96,267*	*96,679*	*96,229*	*99,732*	*95,818*	*98,402*	
Energy Cost PV	**935,754**		**53,296**	**51,616**	**49,988**	**48,412**	**46,885**	**45,407**	**43,975**	**42,588**	**41,246**	**40,964**	**38,652**	**37,877**	**36,130**	**33,838**	**30,978**	**29,254**	**27,438**	**26,043**	**24,295**	**22,811**	**21,213**	**20,044**	**18,790**	**18,197**	**16,868**	**15,754**	**14,584**	**14,056**	**12,559**	**11,995**	
GHG Costs																																	
kg CO_2-e/kWh		kg CO_2-e/kWh	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
Tonnes CO_2-e		Tonnes CO_2-e	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	305	
$ / tonne CO_2-e	3.52%	$	25.00	25.88	26.79	27.73	28.71	29.72	30.77	31.85	32.97	34.13	35.33	36.58	37.86	39.20	40.58	42.01	43.48	45.01	46.60	48.24	49.94	51.70	53.51	55.40	57.35	59.37	61.46	63.62	65.86	68.18	
GHG Cost		*$*	*7,618*	*7,886*	*8,163*	*8,451*	*8,748*	*9,056*	*9,375*	*9,705*	*10,047*	*10,400*	*10,766*	*11,145*	*11,538*	*11,944*	*12,364*	*12,799*	*13,250*	*13,716*	*14,199*	*14,699*	*15,216*	*15,752*	*16,306*	*16,880*	*17,474*	*18,090*	*18,726*	*19,386*	*20,068*	*20,774*	
GHG PV	**138,999**		**7,618**	**7,334**	**7,061**	**6,797**	**6,544**	**6,300**	**6,065**	**5,839**	**5,622**	**5,412**	**5,211**	**5,017**	**4,830**	**4,650**	**4,476**	**4,310**	**4,149**	**3,994**	**3,845**	**3,702**	**3,564**	**3,431**	**3,304**	**3,180**	**3,062**	**2,948**	**2,838**	**2,732**	**2,630**	**2,532**	
Total Operating Costs		**$**	**60,914**	**63,387**	**65,960**	**68,638**	**71,425**	**74,325**	**77,344**	**80,485**	**83,754**	**89,114**	**90,629**	**95,297**	**97,851**	**98,864**	**97,927**	**99,684**	**100,875**	**103,145**	**103,904**	**105,265**	**105,777**	**107,765**	**109,052**	**113,462**	**113,742**	**114,768**	**114,956**	**119,118**	**115,886**	**119,176**	
Total Operating PV	**1,074,753**	**$**	**60,914**	**58,950**	**57,049**	**55,209**	**53,430**	**51,707**	**50,041**	**48,428**	**46,867**	**46,376**	**43,863**	**42,893**	**40,960**	**38,487**	**35,454**	**33,564**	**31,587**	**30,037**	**28,140**	**26,513**	**24,777**	**23,476**	**22,093**	**21,378**	**19,930**	**18,702**	**17,422**	**16,789**	**15,190**	**14,528**	
HWC Maintenance Costs ($ 2010/2011)																																	
Water Supply																																	
Mains	0.00%	$	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	7,488	
Pump Station	#DIV/0!	$																															
Reservoir	#DIV/0!	$																															
Chemical Dosing	#DIV/0!	$																															
Total Water Supply Cost		*$*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	*7,488*	
Sewer																																	
Rising Mains	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Gravity Mains	#DIV/0!	$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Pump Station	#DIV/0!	$		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chemical Dosing	#DIV/0!	$																															
Total Sewer Cost		*$*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Maintenance Costs		**$**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	**7,488**	
Total Maintenance PV	**94,844**	**$**	**7,488**	**6,964**	**6,476**	**6,023**	**5,601**	**5,209**	**4,845**	**4,506**	**4,190**	**3,897**	**3,624**	**3,370**	**3,134**	**2,915**	**2,711**	**2,521**	**2,345**	**2,181**	**2,028**	**1,886**	**1,754**	**1,631**	**1,517**	**1,411**	**1,312**	**1,220**	**1,135**	**1,055**	**981**	**913**	
Total O & M Costs		**$**	**68,402**	**70,875**	**73,448**	**76,126**	**78,913**	**81,813**	**84,832**	**87,973**	**91,242**	**96,602**	**98,117**	**102,785**	**105,339**	**106,352**	**105,415**	**107,172**	**108,363**	**110,633**	**111,392**	**112,753**	**113,265**	**115,253**	**116,540**	**120,950**	**121,230**	**122,256**	**122,444**	**126,606**	**123,374**	**126,664**	
Total O & M PV	**1,169,597**	**$**	**68,402**	**65,913**	**63,525**	**61,232**	**59,031**	**56,917**	**54,885**	**52,933**	**51,058**	**50,273**	**47,487**	**46,264**	**44,094**	**41,402**	**38,165**	**36,085**	**33,932**	**32,218**	**30,168**	**28,399**	**26,531**	**25,107**	**23,610**	**22,788**	**21,242**	**19,923**	**18,556**	**17,844**	**16,171**	**15,440**	
Lifecycle Costs		**$**	**7,667,057**	**70,875**	**1,716,331**	**76,126**	**78,913**	**81,813**	**84,832**	**5,604,202**	**91,242**	**96,602**	**98,117**	**102,785**	**105,339**	**106,352**	**105,415**	**107,172**	**108,363**	**181,683**	**111,392**	**112,753**	**113,265**	**115,253**	**116,540**	**120,950**	**121,230**	**122,256**	**122,444**	**126,606**	**123,374**	**126,664**	
Total PV (inc GHG)	**13,528,992**	**$**	**7,667,057**	**65,913**	**1,484,454**	**61,232**	**59,031**	**56,917**	**54,885**	**3,372,053**	**51,058**	**50,273**	**47,487**	**46,264**	**44,094**	**41,402**	**38,165**	**36,085**	**33,932**	**52,908**	**30,168**	**28,399**	**26,531**	**25,107**	**23,610**	**22,788**	**21,242**	**19,923**	**18,556**	**17,844**	**16,171**	**15,440**	
Total PV (Ex GHG)	**13,389,994**	**$**	**7,659,440**	**58,580**	**1,477,394**	**54,435**	**52,487**	**50,616**	**48,820**	**3,366,214**	**45,436**	**44,860**	**42,276**	**41,247**	**39,265**	**36,753**	**33,689**	**31,775**	**29,783**	**48,914**	**26,322**	**24,697**	**22,967**	**21,676**	**20,307**	**19,608**	**18,180**	**16,975**	**15,718**	**15,112**	**13,541**	**12,908**	

APPENDIX F – WATER DEMAND CALCULATIONS

Kings Hill Water Servicing

1. Water Demands and Storage Requirements

Date Printed: 22/11/2012
Job Number: 30011097

Estimated Water Demands (Without Recycled Supply)

			Average Day				Peak Day Demand						Extreme Day Demand			Peak Hour Demand		
Development	**Adopted Connections**	**Design Average Consumption (kL/yr)**	**(kL/year)**	**(ML/day)**	**(kL/day)**	**(L/s)**	**Peak Day Factor**	**Diversity Factor**	**Diurnal Factor**	**Total Demand (kL/day)**	**Total Demand (ML/day)**	**Total Demand (L/s)**	**Extreme Day Factor**	**Total Demand (ML/d)**	**Total Demand (L/s)**	**Peak Hour Factor**	**Total Demand (ML/d)**	**Total Demand (L/s)**
Village and Town Centre	70	270	19,017	0.05	52	0.6	2.25	1.081	1	127	0.1	1.5	1.15	0.15	1.687	2.02	0.26	2.963
Medium Density Residential	1035	270	279,429	0.77	766	8.9	2.25	1.081	1	1,863	1.9	21.6	1.15	2.14	24.790	2.02	3.76	43.545
Normal Residential Lots	3143	270	848,637	2.33	2,325	26.9	2.25	1.081	1	5,657	5.7	65.5	1.15	6.51	75.290	2.02	11.43	132.248
Community Use	174	270	47,089	0.13	129	1.5	2.25	1.081	1	314	0.3	3.6	1.15	0.36	4.178	2.02	0.63	7.338
Mixed Use	77	270	20,698	0.06	57	0.7	2.25	1.081	1	138	0.1	1.6	1.15	0.16	1.836	2.02	0.28	3.226
Unaccounted for Water	0.0		182,231	0.50	499	5.8	1.00	1	1	499	0.5	5.8	1.00	0.50	5.778	1.00	0.50	5.778
TOTAL Ultimate	**4499.5**		**1,397,101**	**3.8**	**3,828**	**44.3**				**8,597**	**8.6**	**99.5**		**9.81**	**113.56**		**16.86**	**195.1**
	4500.0		**1,397,250**	**3.8**	**3,828**	**44.3**				**8,598**	**8.6**	**99.5**		**9.81**	**113.57**		**16.86**	**195.1**
Adopted																		
Lots	4500.0	270	1,215,000	3.3	3,329	38.5	2.25	1.081	1	8,099	8.1	93.7	1.15	9.31	107.793	2.02	16.36	189.3
Unaccounted for Water			182,250	0.50	499	5.8	1	1	1	499	0.5	5.8	1.00	0.50	5.779	1.00	0.50	5.779
TOTAL Ultimate	**4500.0**		**1,397,250**	**3.8**	**3,828**	**44.3**				**8,598**	**8.6**	**99.5**		**9.81**	**113.57**		**16.86**	**195.1**
High Level lots	2250.0	270	607,500	1.7	1,664	19.3	2.25	1.081	1	4,049	4.0	46.9	1.15	4.66	53.896	2.02	8.18	94.7
Low level lots	2250.0	270	607,500	1.7	1,664	19.3	2.25	1.081	1	4,049	4.0	46.9	1.15	4.66	53.896	2.02	8.18	94.7
Unaccounted for Water			182,250	0.50	499	5.8	1	1	1	499	0.5	5.8	1.00	0.50	5.779	1.00	0.50	5.779
TOTAL Ultimate	**4500.0**		**1,397,250**	**3.8**	**3,828**	**44.3**				**8,598**	**8.6**	**99.5**		**9.81**	**113.57**		**16.86**	**195.1**

APPENDIX G – SUPPLEMENTARY ASSESSMENT OF WATER ROUTE OPTIONS

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NL120526

3rd May 2017

Kings Hill Development
C/- APP Corporation
Mr. Adam Smith
PO Box 1573
North Sydney 2060

Dear Adam,

Re: Review of Kings Hill Development Water Servicing Strategy Staged Route Options

Northrop Engineers has been commissioned by Kings Hill Developments (KHD) to review route options for lead in water infrastructure to the Kings Hill Urban Release Area (URA). These options are being investigated based on the outcomes of a meeting held at Hunter Water Corporation (HWC) in March 2017 to discuss the *'Kings Hill Development Water Servicing Strategy (SMEC, Revision G, November 2016)'*.

The SMEC strategy has identified several options for servicing the site including providing a preferred option. The preferred option identified (Option 3) encompassed a staged approach and connection to the southern boundary of the site. The staged approach for construction of infrastructure identified in this option included:

- Stage 1 – DN300 connection from Raymond Terrace WPS to site, adjustment to pump set and minor modification to surrounding network (0 ET);
- Stage 1a - Construction of low level reservoir (100 ET);
- Stage 2 – Extension of DN375 to existing DN500 adjacent to Elizabeth Ave and Todd St and upgrade of Raymond Terrace WPS to 99.5L/s@54m. (400 ET); and
- Stage 3 – Extension of DN375 from stage 2 to existing DN1350 near Tomago WPS (1500ET).

As identified in Exhibit G of the SMEC Strategy, Stage 1 includes the construction of a new DN300 main from Raymond Terrace east of the Irrawang Wetland to the site.

Further to advice from HWC it was agreed that a western route to the site should also be considered for Stage 1 to provide further rigor to the strategy. This assessment has been prepared to review and compare these two route options from their point of divergence to the preferred area for future reservoirs within the Kings Hill URA.

In addition, Hunter Water requested an assessment be carried out on the 'internal' water infrastructure costs in providing a service to both the Kings Hill Development site and the proposed Hunter Land site located in the north western portion of the URA. As the water infrastructure required to service the Gwynville site (to the north east of the URA) will not differ between the east and west routes it is not necessary to determine the costs associated with this infrastructure for comparison purposes.

The assessment of costs for each route has been undertaken utilising the Hunter Water Corporation Network Estimating Tool. Further discussion of the results of the route analysis are contained below.

Assessment of Option 3 Stage 1 Route options from Raymond Terrace WPS

Stage 1 of Option 3 is based on bringing a DN300 to the site from the Raymond Terrace WPS. Possible routes for this main have been considered for connection to the south eastern and western borders of the URA and then the proposed location for the reservoir. As noted above and illustrated in Figure 1 below, the route comparison has been taken from a divergence point (Adelaide Street) with it assumed that works from this point back to the Pump Station will be consistent in each option.

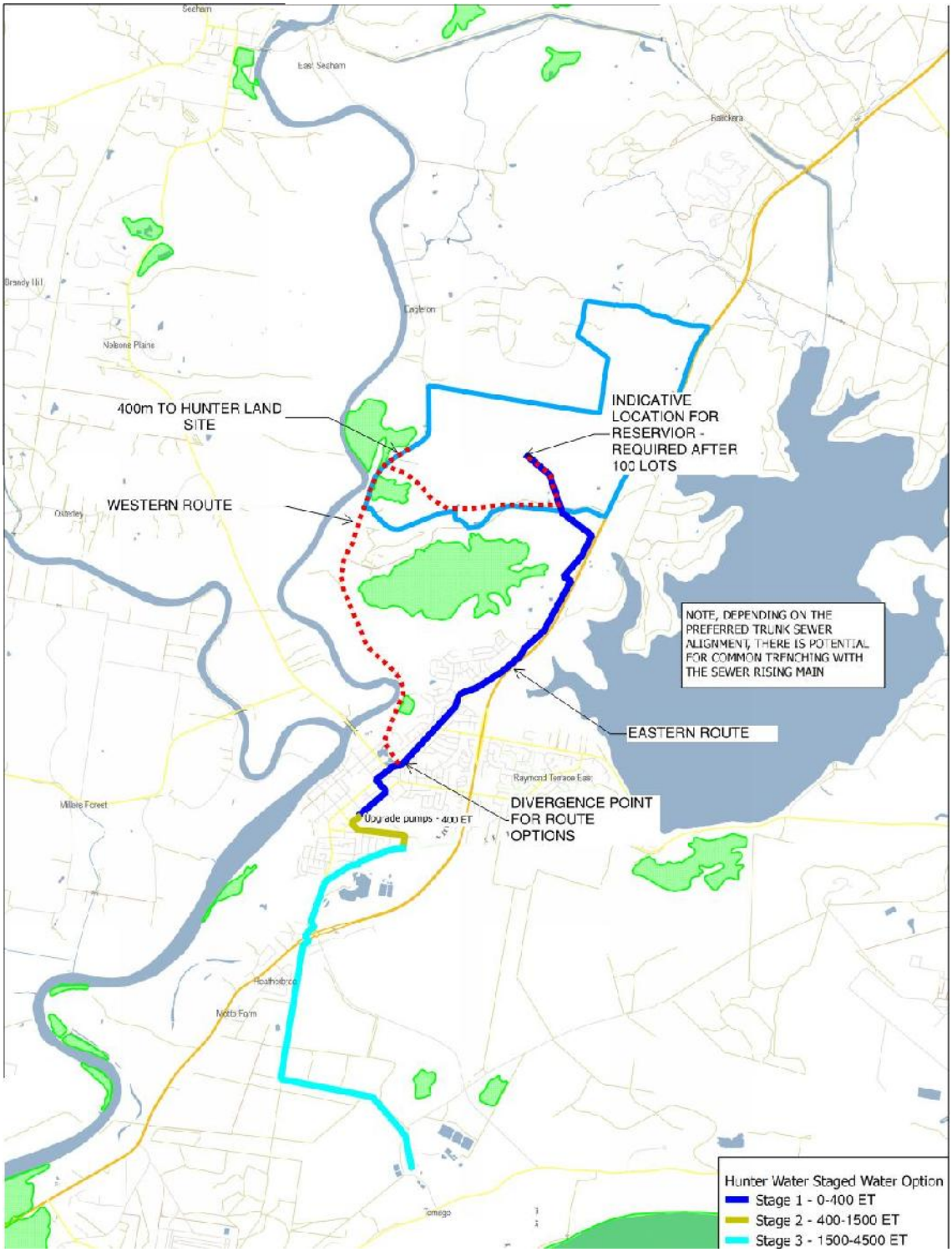

Figure 1: Overview of route options for Option 3 Stage 1 (modified extract from SMEC strategy Exhibit G6)

Preferred route options contained in Attachment 1 have been determined after undergoing a desktop investigation which considered length of run, significant infrastructure conflicts and other criteria set out in the SMEC WSS (i.e. intermediate connection points to HWC infrastructure). Each route was then inspected on site to visually confirm appropriateness. Photos at selected points along each route are contained in Attachment 2.

Where possible, the routes have been kept in Council's road reserve to minimise negotiations and potential conflicts with private land owners. Utilising existing road reserves and the potential for clashes with existing services will be one of the major risks to both routes. This is considered unavoidable especially through the established areas of Raymond Terrace. As part of the assessment we have sourced existing service plans from 'Dial-before-you-dig'. This infrastructure has been overlaid on the concept plans where possible and the location of the water main positioned to minimize conflicts with other services. It is noted that the services shown are indicative only and may not include all services or show infrastructure in exactly the correct location. Confirmation of the services and exact alignment of the main within the road reserves will be required as part of future detailed design plans and will be dependent upon detailed survey.

Environmental risks have also been considered in assessment of the preferred route. Potential Acid Sulfate Soil (PASS) mapping has been overlaid on the concept plans. Both routes can be seen to cross varying depths of PASS. Geotechnical investigation of the routes in the future should also include advice on the PASS soils and their respective depths and potential remediation measures required. The topography of the western route includes lower elevations than the eastern route. As such it is expected that this route will likely encounter greater areas of PASS and potentially ground water - particularly adjacent to wetland areas.

Table 1 outlines a description of each route to the release area as well as some of the main environmental, social and technical considerations for each option.

Table 1: Summary of Route Analysis

	Eastern Route	Western Route
Route description	• External route to edge of URA 5.3km run (300mm DICL WM) • Internal Route 1.1km to Reservoir (300mm DICL WM) • From lead in main to Hunter Land Site: 3.3km based on the main following the East / West Collector Road (250mm DICL WM)	• External route to edge of URA 4.9km run (300mm DICL WM) • Internal Route 3.9km to Reservoir based on the main following the East / West Collector Road (300mm DICL WM) • From lead in main to Hunter Land Site: 0.4km (Newline Rd) (250mm DICL WM)
Environmental Impact	• Lower risk of PASS (refer to dwg C150) • Shorter route to reservoir location resulting in reduced pumping requirements to the reservoir and reduced electricity usage and ongoing costs. • Construction near environmentally sensitive lands. SEPP 14	• Higher risk of PASS and ground water due to the lower elevations than the eastern route. • Construction near environmentally sensitive lands. SEPP 14
Social	• Longer length of watermain construction through existing residential area. Minor impact on community	• Shorter length of watermain construction through existing residential area. Lower impact on community than eastern route.

	Eastern Route	Western Route
Technical	• Additional security of supply benefits to existing Raymond Terrace development through connections to existing main with a DN250 every 1km • Shorter length of water main to reservoir with cross – connections to existing water main increasing security of supply	

The preliminary construction costs have been developed for the two routes shown in Attachment 1. It is noted that these costs have largely been developed from the HWC Estimating Tool spreadsheets. Table 2 outlines some of the main assumptions used in the costing of each option.

Table 2: Summary of cost estimate inputs

	Eastern Route	Western Route
Financial Assessment Considerations	• Traversing of old and current Grahamstown Dam spillways. Allowance has been made for under boring of current spillway in rock. Old spillway crossing will be slightly downstream of that structure and we have assumed that conventional trenching can be utilised.	• The costings have assumed that 50% of the run traversing Potential Acid Sulfate Soils (PASS) at a depth of 1-2m from surface will need treatment, while 20% of the run through PASS at 2-4m will need treatment.
	• De-watering due to groundwater. We have assumed that areas near the spillway crossings (watercourse crossings) will require de-watering	• De-watering due to groundwater. Assumptions regarding those areas requiring dewatering have been also based on the criteria used to identify PASS above
	• Road crossings included	• Road crossings included
	• Impact of working in a developed area. It has been assumed that approximately 1km of the main will require restoration of some kind (i.e footpath, driveways etc)	• Impact of working in a developed area
	• 3.3km of 250mm watermain from the lead in to Hunter Land has been allowed for. This route length may be able to be reduced in further design development.	

These costs should only be considered preliminary in nature as the full extent of costs associated with working within road reserves, dewatering and PASS will not be known until further testing and design is completed, however the costs presented are considered a good tool for the comparison of the routes identified. Spreadsheet outputs detailing the costs presented in Table 3 are contained in Attachment 3.

Table 3: Estimated costs for water main routes – Based on HWC Costing Spreadsheet

Scenario/ Route	Eastern Route	Western Route
Point of divergence to the Urban Release Area (URA)	$4.0M	$3.4M
From Boundary of Urban Release Area to reservoirs	$1.35M	$3.9M
From new lead in water main to Hunter Land site	$2.6M	$0.25M
Total Preliminary Project Estimate ($Million)	**$7.95M**	**$7.55M**

Based on the above cost estimates there appears only a minor difference between the overall costs in water infrastructure provision to the Kings Hill and Hunter Land sites. This difference could be considered less if PASS was found to be greater than that assumed on the western route or if the water main on the western route could not be located entirely in the road reserve along Newline Road. In addition, for the lead in to Hunter Land site from the eastern route, 3.3km of 250mm main has been allowed which follows the alignment of the east west collector road. This route may be able to be shortened in further design development thus offering further cost savings. Similarly, the costs associated with the eastern route may increase if significant services are encountered or need realignment through the built-up areas.

A significant difference in costs is the mains from the edge of the URA to a point which reservoirs may be located on site. As such the choice of the reservoir location (required after 100 ET for security of supply) is important to the route selection.

In reviewing the preferred location for the reservoirs identified by SMEC, the following criteria was considered:

- Elevations on site – the low level reservoir option requires elevation of approx. 60m AHD whereas the high level reservoir requires elevation of 85m AHD. Having these two reservoirs relatively close together on site is also preferred to combine access points and ensure minimum infrastructure costs associated with pumping between low and high reservoirs.
- A central location for the URA - The reservoir location should be chosen to be central to the ultimate development on site, to keep losses in mains and thus infrastructure costs efficient.
- Access – the location should be able to be accessed from fringes of the development and minimise (where possible) the infrastructure costs.

Based on the above the preferred location for the reservoirs proposed by SMEC in the strategy appears sound for the purpose of the WSS.

Conclusions and Recommendations

Based on the route analysis undertaken the benefits with regards to security of supply for both the existing Raymond Terrace community and the Kings Hill URA support selection of the eastern route. The eastern route also has less likelihood of PASS and associated financial and environmental risk. As the preliminary costs associated with the eastern and western routes to the reservoirs and proposed development sites are similar the eastern route is recommended as the preferred option.

It is noted that further refinement of the route will be undertaken during the concept and detailed design processes. This refinement will look to consider the following in more detail:

- Colocation with the Sewer lead in infrastructure;
- Consultation with local authorities – Port Stephens Council, HWC;

- Flora, Fauna, Heritage etc. issues which will need to be examined as part of the detailed REF;
- Detailed survey of the preferred route including services potholing; and
- Geotechnical information – testing of in-situ soils along the preferred route will be required to inform the design on issues such as constructability, ground water thrust block design and PASS.

Yours sincerely

Ben Clark
Principal

BE (Civil) MIEAust CPEng NPER (Civil)

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Attachment 1 – Concept Design plans

KINGS HILL URBAN RELEASE AREA,
NORTH RAYMOND TERRACE,
N.S.W. 2324
WATER SERVICING STRATEGY

NORTHROP

DRAWING SCHEDULE

DRG No.	DRAWING TITLE
C100	COVER SHEET AND DRAWING SCHEDULE
C150	WATER ALIGNMENT OPTIONS OVERALL SITE PLAN
C200	CONCEPT PLAN WATER ALIGNMENT WESTERN OPTION SHEET 1
C201	CONCEPT PLAN WATER ALIGNMENT WESTERN OPTION SHEET 2
C202	CONCEPT PLAN WATER ALIGNMENT WESTERN OPTION SHEET 3
C203	CONCEPT PLAN WATER ALIGNMENT WESTERN OPTION SHEET 4
C204	CONCEPT PLAN WATER ALIGNMENT WESTERN OPTION SHEET 5
C205	CONCEPT PLAN INTERNAL SITE WATER ALIGNMENT WESTERN OPTION
C300	CONCEPT PLAN WATER ALIGNMENT EASTERN OPTION SHEET 1
C301	CONCEPT PLAN WATER ALIGNMENT EASTERN OPTION SHEET 2
C302	CONCEPT PLAN WATER ALIGNMENT EASTERN OPTION SHEET 3
C303	CONCEPT PLAN WATER ALIGNMENT EASTERN OPTION SHEET 4
C304	CONCEPT PLAN WATER ALIGNMENT EASTERN OPTION SHEET 5
C305	CONCEPT PLAN INTERNAL SITE WATER ALIGNMENT EASTERN OPTION

VERIFIER B.CLARK
JOB MANAGER B.CLARK
DESIGNED S.SPURR
DRAWN S.SPURR

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REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR INFORMATION	WC	BC	PB	31.03.17

CLIENT: KINGS HILL DEVELOPMENTS

PLANNER: JW PLANNING

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PROJECT: KINGS HILL URBAN RELEASE AREA WATER SEVICING STRATEGY

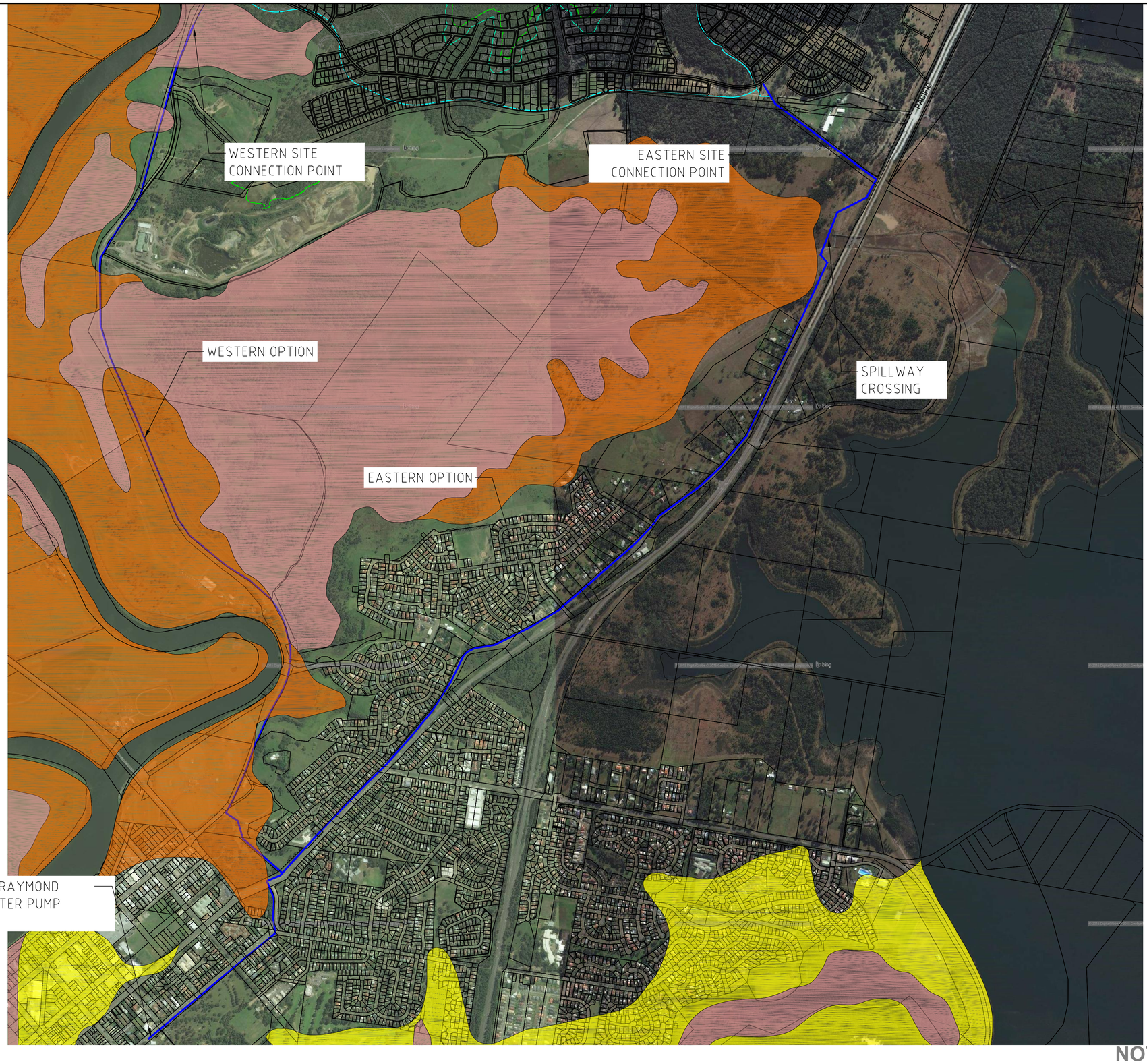
DRAWING TITLE: COVER SHEET AND DRAWING SCHEDULE

JOB NUMBER: NL120526

DRAWING NUMBER: C100

REVISION: 1

DRAWING SHEET SIZE = A1



VERIFIER B.CLARK

JOB MANAGER B.CLARK

DESIGNED S.SPURR

DRAWN S.SPURR

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0 100 200 300 400 500m

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PROJECT
KINGS HILL
URBAN RELEASE AREA
WATER SEVICING STRATEGY

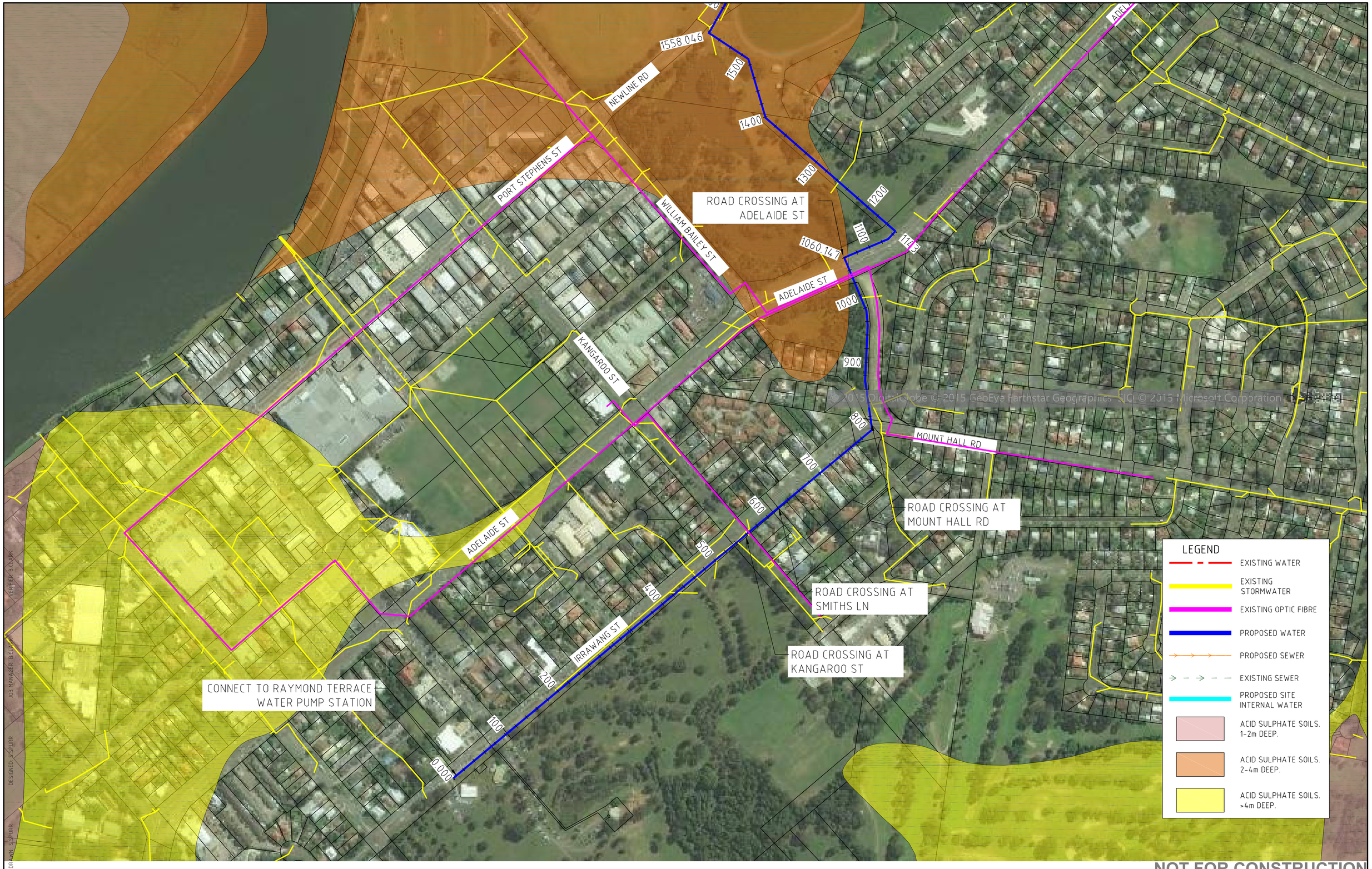
DRAWING TITLE
WATER ALIGNMENT OPTIONS
OVERALL SITE PLAN

JOB NUMBER
NL120526

DRAWING NUMBER
C150

REVISION
1

DRAWING SHEET SIZE = A1



DRAWN: S.SPURR DESIGNED: S.SPURR JOB MANAGER: B.CLARK VERIFIED: B.CLARK

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PROJECT
KINGS HILL
URBAN RELEASE AREA
WATER SEVICING STRATEGY

DRAWING TITLE
CONCEPT PLAN
WATER ALIGNMENT
WESTERN OPTION SHEET 1

JOB NUMBER **NL120526**
DRAWING NUMBER **C200**
REVISION **1**
DRAWING SHEET SIZE = A1

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SCALE 1:2500 AT ORIGINAL SIZE

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PROJECT
KINGS HILL
URBAN RELEASE AREA
WATER SEVICING STRATEGY

DRAWING TITLE
CONCEPT PLAN
WATER ALIGNMENT
WESTERN OPTION SHEET 2

JOB NUMBER **NL120526**

DRAWING NUMBER **C201**

REVISION **1**

DRAWING SHEET SIZE = A1

3800
3700
3600
NEWLINE RD
3500
3400
3300
3200
3100
3000
2900
2800
2700
2600
2500
2400
2300

POTENTIAL FOR EXCAVATIONS IN ACID SULPHATE SOILS

LEGEND

- EXISTING WATER
- EXISTING STORMWATER
- EXISTING OPTIC FIBRE
- PROPOSED WATER
- PROPOSED SEWER
- EXISTING SEWER
- PROPOSED SITE INTERNAL WATER
- ACID SULPHATE SOILS. 1-2m DEEP.
- ACID SULPHATE SOILS. 2-4m DEEP.
- ACID SULPHATE SOILS. >4m DEEP.

RAYMOND TERRACE B WPS

VERIFIER B CLARK
JOB MANAGER B CLARK
DESIGNED S SPURR
DRAWN S SPURR

NOT FOR CONSTRUCTION

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CLIENT: KINGS HILL DEVELOPMENTS

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PROJECT: KINGS HILL URBAN RELEASE AREA WATER SEVICING STRATEGY

DRAWING TITLE: CONCEPT PLAN WATER ALIGNMENT WESTERN OPTION SHEET 3

JOB NUMBER: NL120526

DRAWING NUMBER: C202

REVISION: 1

DRAWING SHEET SIZE = A1

VERIFIER B.CLARK
JOB MANAGER B.CLARK
DESIGNED S.SPURR
DRAWN S.SPURR

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CLIENT
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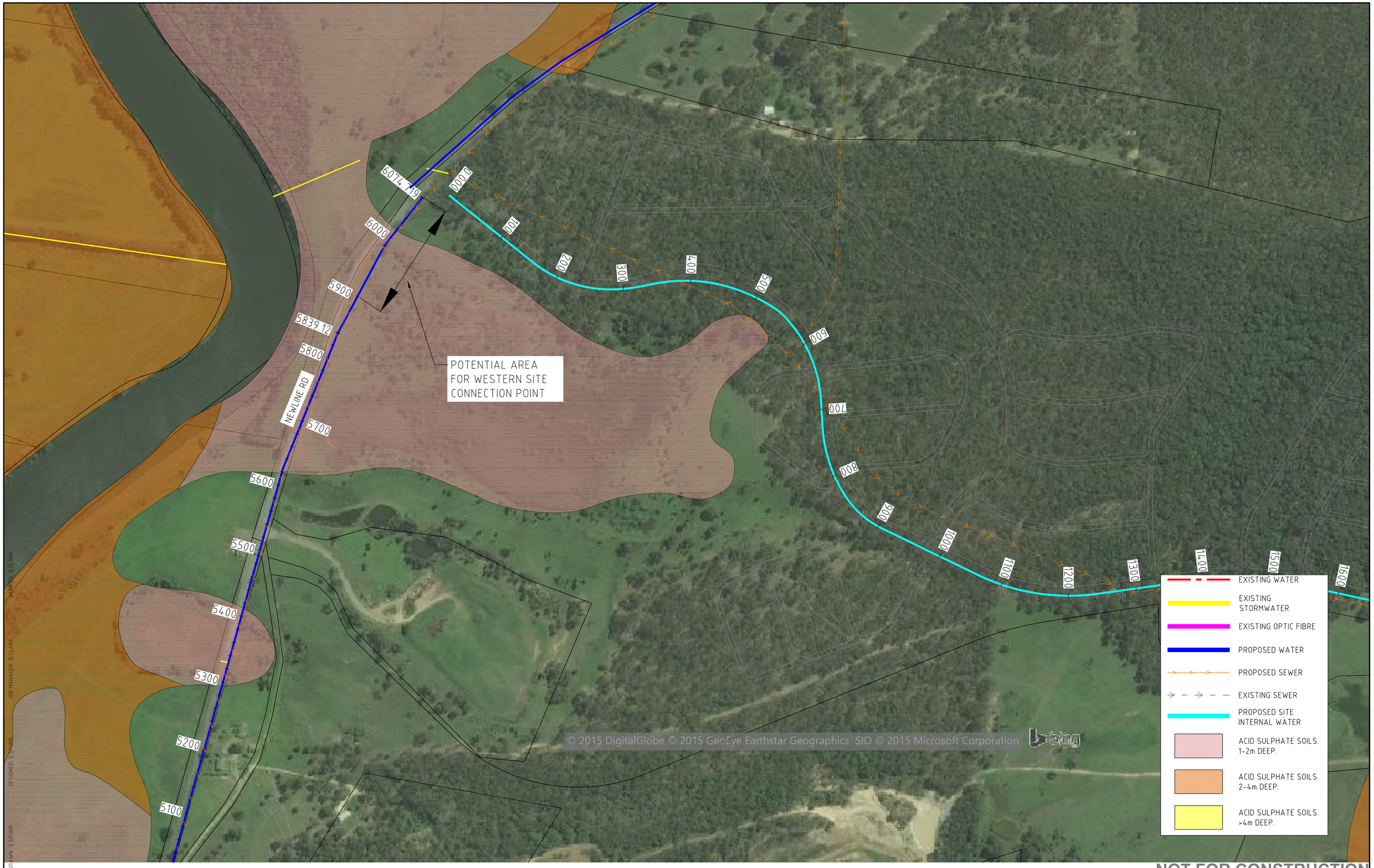
PROJECT
KINGS HILL
URBAN RELEASE AREA
WATER SEVICING STRATEGY

DRAWING TITLE
CONCEPT PLAN
WATER ALIGNMENT
WESTERN OPTION SHEET 4

JOB NUMBER **NL120526**
DRAWING NUMBER **C203**
REVISION **1**
DRAWING SHEET SIZE = A1



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SCALE 1:2500 AT ORIGINAL SIZE

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PROJECT: **KINGS HILL URBAN RELEASE AREA WATER SEVICING STRATEGY**

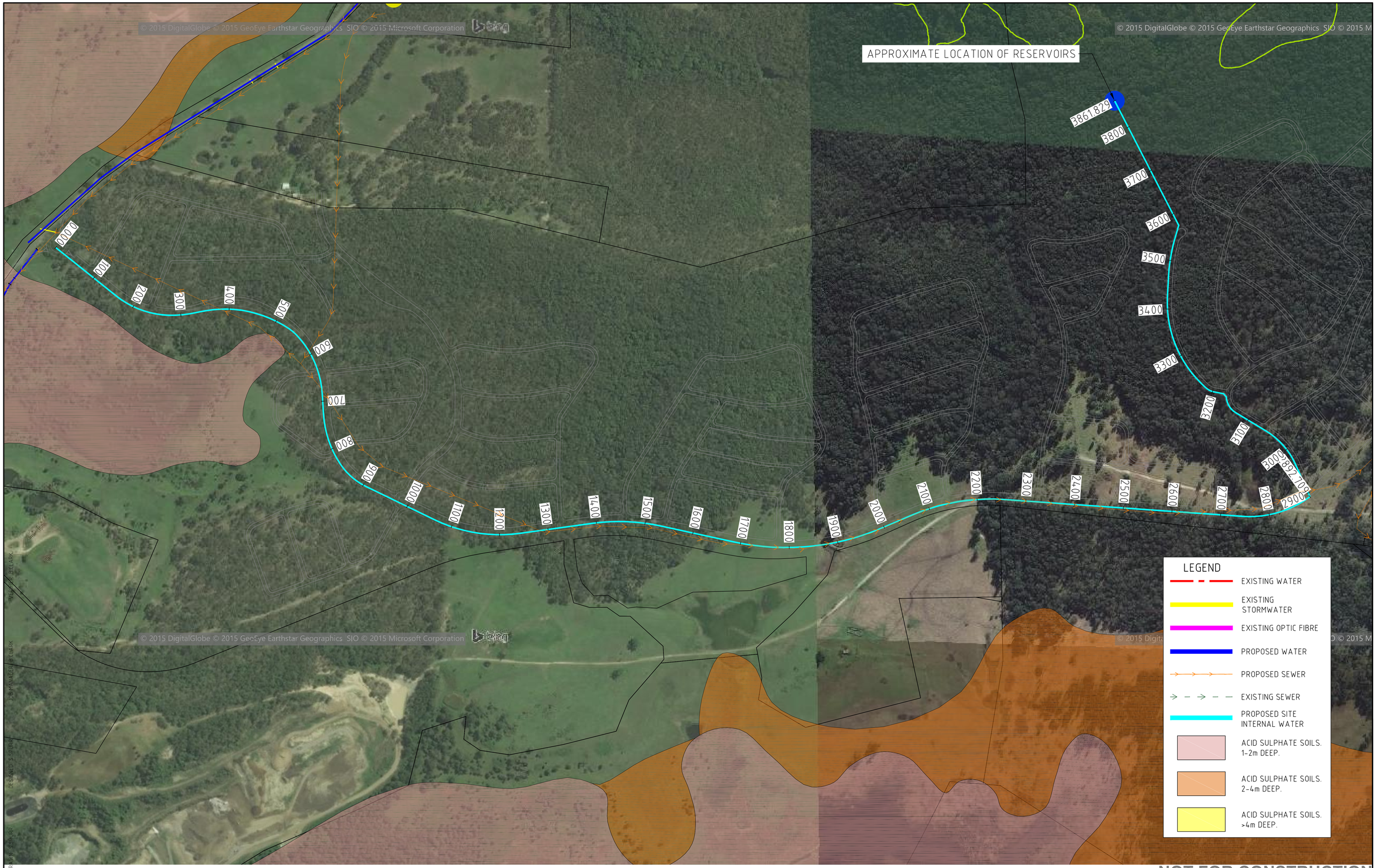
DRAWING TITLE: **CONCEPT PLAN WATER ALIGNMENT WESTERN OPTION SHEET 5**

JOB NUMBER: **NL120526**

DRAWING NUMBER: **C204**

REVISION: **1**

DRAWING SHEET SIZE = A1



DRAWN: S.SPURR DESIGNED: S.SPURR JOB MANAGER: B.CLARK VERIFIER: B.CLARK

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REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
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SCALE 1:3500 AT ORIGINAL SIZE

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PROJECT: KINGS HILL URBAN RELEASE AREA WATER SEVICING STRATEGY

DRAWING TITLE: CONCEPT PLAN INTERNAL SITE WATER ALIGNMENT WESTERN OPTION

JOB NUMBER: NL120526

DRAWING NUMBER: C205

REVISION: 1

DRAWING SHEET SIZE = A1

VERIFIED: B CLARK
JOB MANAGER: B CLARK
DESIGNED: S SPURR
DRAWN: S SPURR

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
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PLANNER
JW PLANNING

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0 25 50 75 100 125m
SCALE 1:2500 AT ORIGINAL SIZE

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PROJECT
KINGS HILL
URBAN RELEASE AREA
WATER SEVICING STRATEGY

DRAWING TITLE
CONCEPT PLAN
WATER ALIGNMENT
EASTERN OPTION SHEET 1

JOB NUMBER
NL120526

DRAWING NUMBER	REVISION
C300	**1**

DRAWING SHEET SIZE = A1

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CLIENT: **KINGS HILL DEVELOPMENTS**

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PLANNER: **JW PLANNING**

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0 25 50 75 100 125m
SCALE 1:2500 AT ORIGINAL SIZE

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PROJECT: **KINGS HILL URBAN RELEASE AREA WATER SEVICING STRATEGY**

DRAWING TITLE: **CONCEPT PLAN WATER ALIGNMENT EASTERN OPTION SHEET 2**

JOB NUMBER: **NL120526**

DRAWING NUMBER: **C301** REVISION: **1**

DRAWING SHEET SIZE = A1

RAYMOND TERRACE 9 WWPS

RAYMOND TERRACE 8 WWPS

REES JAMES RD

PACIFIC HIGHWAY

ADELAIDE ST

ALTON RD

2300
2400
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500
3600
3700
3800
3900
4000
4100
4200

VERIFIER: B CLARK
JOB MANAGER: B CLARK
DESIGNED: S SPURR
DRAWN: S SPURR

LEGEND

- EXISTING WATER
- EXISTING STORMWATER
- EXISTING OPTIC FIBRE
- PROPOSED WATER
- PROPOSED SEWER
- EXISTING SEWER
- PROPOSED SITE INTERNAL WATER
- ACID SULPHATE SOILS. 1-2m DEEP.
- ACID SULPHATE SOILS. 2-4m DEEP.
- ACID SULPHATE SOILS. >4m DEEP.

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0 25 50 75 100 125m

SCALE 1:2500 AT ORIGINAL SIZE

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PROJECT: KINGS HILL URBAN RELEASE AREA WATER SEVICING STRATEGY

DRAWING TITLE: CONCEPT PLAN WATER ALIGNMENT EASTERN OPTION SHEET 3

JOB NUMBER: NL120526

DRAWING NUMBER: C302

REVISION: 1

DRAWING SHEET SIZE = A1

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
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KINGS HILL DEVELOPMENTS

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PROJECT
KINGS HILL
URBAN RELEASE AREA
WATER SEVICING STRATEGY

DRAWING TITLE
CONCEPT PLAN
WATER ALIGNMENT
EASTERN OPTION SHEET 4

JOB NUMBER **NL120526**
DRAWING NUMBER **C303**
REVISION **1**
DRAWING SHEET SIZE = A1

DRAWN: S.SPURR
DESIGNED: S.SPURR
JOB MANAGER: B.CLARK
VERIFIER: B.CLARK

NOT FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR INFORMATION	WC	BC	PB	31.03.17

CLIENT: **KINGS HILL DEVELOPMENTS**

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PLANNER: **JW PLANNING**

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0 25 50 75 100 125m

SCALE 1:2500 AT ORIGINAL SIZE

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PROJECT: **KINGS HILL URBAN RELEASE AREA WATER SEVICING STRATEGY**

DRAWING TITLE: **CONCEPT PLAN WATER ALIGNMENT EASTERN OPTION SHEET 5**

JOB NUMBER: **NL120526**

DRAWING NUMBER: **C304**

REVISION: **1**

DRAWING SHEET SIZE = A1

APPROXIMATE LOCATION OF RESERVOIRS

1098745
1000
900
800
700
600
500
400
300
200
100
0 000
6351 23
6300
6200
6100

SOUTH EASTERN WWPS

LEGEND

- EXISTING WATER
- EXISTING STORMWATER
- EXISTING OPTIC FIBRE
- PROPOSED WATER
- PROPOSED SEWER
- EXISTING SEWER
- PROPOSED SITE INTERNAL WATER
- ACID SULPHATE SOILS. 1-2m DEEP.
- ACID SULPHATE SOILS. 2-4m DEEP.
- ACID SULPHATE SOILS. >4m DEEP.

DESIGNED S.SPURR JOB MANAGER B.CLARK VERIFIER B.CLARK

DRAWN S.SPURR

NOT FOR CONSTRUCTION

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CLIENT
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PROJECT
KINGS HILL
URBAN RELEASE AREA
WATER SEVICING STRATEGY

DRAWING TITLE
CONCEPT PLAN
INTERNAL SITE WATER ALIGNMENT
EASTERN OPTION

JOB NUMBER **NL120526**

DRAWING NUMBER	REVISION
C305	1

DRAWING SHEET SIZE = A1

Attachment 2 – Route Photos

Photo 1: Corner Kangaroo Street and Irrawang Street (Approx. Chainage 550)

Photo 2: Mount Hall Road (Approx. Chainage 800 looking North)

Photo 3: Looking from Mount Hall Road to Adelaide Street (Approx. Chainage 850 looking North)

Photo 4: Looking from Adelaide Street to Mount Hall Road (Approx. Chainage 1100 looking North)

Photo 5: Adelaide Street and Tregenna Street Intersection (Approx. Chainage 1650 looking North – Eastern Route)

Photo 6: Rees James Road (Approx. Chainage 2200 looking North – Eastern Route)

Photo 7: Intersection of Rees James Road and Bellvue Street (Approx. Chainage 3050 – Eastern Route)

Photo 8: HWC Spillway looking West (Approx. Chainage 5400 – Eastern Route)

Photo 9: Newline Road Wetland looking North (Approx. Chainage 2200 – Western alignment)

Photo 10: Cnr of Newline Road and Beaton Avenue (Approx. Chainage 2400 – Western alignment)

Photo 11: SEPP14 wetland along Newline Road looking north (Approx. Chainage 5600 – Western alignment)

Attachment 3 – Detailed Costing

ESTIMATING SHEET

PROJECT DESCRIPTION: Adelaide St to Site Boundary - East Route

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	$ 45,668.00	$ 45,668.00	**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	$ 30,000.00	$ 30,000.00	**Payment**: 100% after completion.
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 30,000.00	$ 30,000.00	**Payment**: 100% after completion.
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 4,000.00	$ 4,000.00	**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	$ 9,000.00	$ 9,000.00	**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	$ 56,704.00	$ 56,704.00	**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	$ 23,984.09	$ 23,984.09	**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 - Trunk - section will be present if one or more trunk watermains are specified

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 8,379.00	$ 8,379.00	**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.*
31EDSS	Nominal DN300 DICL pipe	5320	m	$ 178.00	$ 946,960.00	
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>.
31EDSS	Nominal DN300 DICL (Trench type B)	5320	m	$ 123.07	$ 654,752.25	Pipeline 1 - area allowance, 2695m under powerlines, 480m near services,
HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)	700	m	$ 92.04	$ 64,430.00	**Measurement**: **Measurement**: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point. **Submit:** Relevant Quality Records. **Limits of Accuracy:** <To be inserted>.
HWT018	Road / creek crossings					**Measurement:** Length in metres of casing installed. **Submit:** Relevant Quality Records. **Limits of Accuracy:** <To be inserted>.
HWT018.01	Tregenna St	40	m	$ 1,054.80	$ 42,192.00	
HWT018.02	Alton St	20	m	$ 1,139.60	$ 22,792.00	
HWT018.03	Bellevue St	20	m	$ 1,139.60	$ 22,792.00	
HWT018.04	Kuranga St	20	m	$ 1,139.60	$ 22,792.00	
HWT018.05	Spillway	80	m	$ 1,312.40	$ 104,992.00	
HWT018.06	Old Spillway	20	m	$ 1,439.60	$ 28,792.00	
HWT027	Preparation of line sheets	5320	m	$ 1.16	$ 6,171.20	**Measurement**: Length of pipelines constructed as per design. **Limits of Accuracy:** <To be inserted>.
HWT029	**Miscellaneous**					
HWT000	***Sub Total***				$1,925,044	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0009	Restoration - Pipelines:					**Payment**: 100% after completion.
HW0009.02	Concrete driveway	100	m2	$ 185.00	$ 18,500.00	**Measurement**: Square metres restored based on actual length by Minimum Trench Width. **Limits of Accuracy:** <To be inserted>
HW0009.04	Concrete footpath	1240	m2	$ 165.00	$ 204,600.00	**Measurement**: Square metres restored based on actual length by Minimum Trench Width. **Limits of Accuracy:** <To be inserted>
HW0009.07	Bitumen pavement	100	m2	$ 230.00	$ 23,000.00	**Measurement**: Square metres restored based on actual length by Minimum Trench Width. **Limits of Accuracy:** <To be inserted>
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 42,560.00	$ 42,560.00	**Payment**: 100% at Practical Completion.

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 2,413,060.54

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 289,567.26
HW0017	Project Management of Design	$ 67,913.45
HW0024	Community Consultation	
	Sub Total(B1)	$ 357,480.72
	Pre construction contingency (30% of B1)	$ 107,244.22
	TOTAL PRE-CONSTRUCTION COST (B)	$ 464,724.93

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 2,413,060.54
HW0023	Construction Management (Table 11)		$ 313,697.87
	Sub Total (C1)		$ 2,726,758.40
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 818,027.52
	TOTAL CONSTRUCTION COST (C)		$ 3,544,785.93

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 4,009,510.86

ESTIMATING SHEET

PROJECT DESCRIPTION: Site Boundary to reservoir - East Route

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	$ 13,754.00	$ 13,754.00	**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	$ 11,547.50	$ 11,547.50	**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	$ 8,027.14	$ 8,027.14	**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 - Trunk - section will be present if one or more trunk watermains are specified

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 1,320.00	$ 1,320.00	**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.*
31EDSS	Nominal DN300 DICL pipe	1100	m	$ 178.00	$ 195,800.00	
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>.
31EDSS	Nominal DN300 DICL (Trench type B)	1100	m	$ 231.33	$ 254,465.00	Pipeline 1 - terrain allowance, Pipeline 2 - terrain allowance,
HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)	100	m	$ 14.30	$ 1,430.00	**Measurement**: **Measurement**: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point. **Submit:** Relevant Quality Records. **Limits of Accuracy:** <To be inserted>.
HWT027	Preparation of line sheets	1100	m	$ 1.16	$ 1,276.00	**Measurement**: Length of pipelines constructed as per design. **Limits of Accuracy:** <To be inserted>.
HWT029	**Miscellaneous**					
HWT029.01	Tree Clearing 4m wide x 950m	3800	Each	$ 32.00	$ 121,600.00	
HWT000	***Sub Total***				$575,891	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material	545.625	m3	$ 120.00	$ 65,475.00	**Measurement**: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. **Limits of Accuracy:** <To be inserted>.
HW0013	Work as Constructed Information<Insert Min $>	Item	Lump Sum	$ 8,800.00	$ 8,800.00	**Payment**: 100% at Practical Completion.

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 739,494.64

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 110,924.20
HW0017	Project Management of Design	$ 32,184.84
HW0024	Community Consultation	
	Sub Total(B1)	$ 143,109.04
	Pre construction contingency (30% of B1)	$ 42,932.71
	TOTAL PRE-CONSTRUCTION COST (B)	$ 186,041.75

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 739,494.64
HW0023	Construction Management (Table 11)		$ 162,688.82
	Sub Total (C1)		$ 902,183.46
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 270,655.04
	TOTAL CONSTRUCTION COST (C)		$ 1,172,838.50

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 1,358,880.24

ESTIMATING SHEET

PROJECT DESCRIPTION: from new lead in to Hunter land - East Route

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	$ 29,082.00	$ 29,082.00	**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	$ 30,000.00	$ 30,000.00	**Payment**: 100% after completion.
HW0003	Site Disestablishment<Insert Min $>	Item	Lump Sum	$ 30,000.00	$ 30,000.00	**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	$ 22,766.00	$ 22,766.00	**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	$ 15,690.78	$ 15,690.78	**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 - Trunk - section will be present if one or more trunk watermains are specified

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 3,158.40	$ 3,158.40	**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.*
319DSS	Nominal DN250 DICL pipe	3290	m	$ 118.00	$ 388,220.00	
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>.
319DSS	Nominal DN250 DICL (Trench type B)	3290	m	$ 144.13	$ 474,196.00	Pipeline 2 - terrain allowance,
HWT006	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth**>1.5m to 3.0m** depth to invert in OTR.					**Measurement:** Actual metres of pipe installed to design depth of excavation > 1.5m to and including 3.0m. **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>.
HWT007	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth**>3.0m to 4.5m** to invert in OTR.					**Measurement:** Actual metres of pipe installed to design depth of excavation > 3.0m to and including 4.5m. **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>.
HWT008	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth**> 4.5m** to invert in OTR.					**Measurement:** Actual metres of pipe installed to design depth of excavation > 4.5m. **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>.
HWT009	EMPTY					
HWT018.01	DN250 Thrustbore Rock	20	m	$ 1,337.60	$ 26,752.00	
HWT018.02	DN250 Thrustbore Rock	20	m	$ 1,337.60	$ 26,752.00	
HWT018.03	DN250 Thrustbore Rock	20	m	$ 1,337.60	$ 26,752.00	
HWT018.04	DN250 Thrustbore Rock	50	m	$ 1,235.84	$ 61,792.00	
HWT020	Supply & installation of river crossing includes supply of MSCL pipe, welding, weld testing, 150mm concrete encasement, mobilisation & demobilisation of dredge, excavation, disposal of excavated material, backfilling, lay, bed & test:					**Measurement:** Length in metres of casing installed. **Retention:** 10% <or other appropriate percentage> until satisfactory testing. *Note: Consider other milestone retentions.* **Submit:** Relevant Quality Records. **Limits of Accuracy:** <To be inserted>.
HWT021	Supply and installation of pipe aerial creek crossing including supply of MSCL pipe with protection coating, internal and external welding, testing of welds. For the following MSCL pipe sizes:					**Measurement:** Length in metres of crossing installed in accordance with design. **Retention:** 10% <or other appropriate percentage> until satisfactory testing. *Note: Consider other milestone retentions.* **Submit:** Relevant Quality Records. **Limits of Accuracy:** <To be inserted>.
HWT025	EMPTY					
HWT027	Preparation of line sheets	3290	m	$ 1.16	$ 3,816.40	**Measurement**: Length of pipelines constructed as per design. **Limits of Accuracy:** <To be inserted>.
HWT028	Acceptance testing - trunk main	2890	m	$ 3.70	$ 10,693.00	**Measurement:** Length of pipelines constructed as per design. **Submit:** Staisfactory test records **Limits of Accuracy:** <To be inserted>.
HWT029.01	Tree clearing 4m wide x 1400m	5600	Each	$ 32.00	$ 179,200.00	
HWT000	***Sub Total***				$1,201,332	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material	1480.5	m3	$ 120.00	$ 177,660.00	**Measurement**: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. **Limits of Accuracy:** <To be inserted>.
HW0013	Work as Constructed Information<Insert Min $>	Item	Lump Sum	$ 26,320.00	$ 26,320.00	**Payment**: 100% at Practical Completion.

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 1,558,850.58

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 187,062.07
HW0017	Project Management of Design	$ 47,412.41
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 234,474.48
	Pre construction contingency (30% of B1)	$ 70,342.35
	TOTAL PRE-CONSTRUCTION COST (B)	$ 304,816.83

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 1,558,850.58
HW0023	Construction Management (Table 11)		$ 202,650.58
	Sub Total (C1)		$ 1,761,501.16
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 528,450.35
	TOTAL CONSTRUCTION COST (C)		$ 2,289,951.50

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 2,594,768.33

ESTIMATING SHEET

PROJECT DESCRIPTION: Adelaide St to Site Boundary - West Route

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	$ 38,494.00	$ 38,494.00	**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	$ 30,000.00	$ 30,000.00	**Payment**: 100% after completion.
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 30,000.00	$ 30,000.00	**Payment**: 100% after completion.
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 4,000.00	$ 4,000.00	**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	$ 9,000.00	$ 9,000.00	**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	$ 56,704.00	$ 56,704.00	**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	$ 20,397.00	$ 20,397.00	**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 - Trunk - section will be present if one or more trunk watermains are specified

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 7,764.75	$ 7,764.75	**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.*
31EDSS	Nominal DN300 DICL pipe	4930	m	$ 178.00	$ 877,540.00	
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>.
31EDSS	Nominal DN300 DICL (Trench type B)	4930	m	$ 115.88	$ 571,300.20	Pipeline 1 - area allowance, 1330m under powe
HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)	971	m	$ 181.47	$ 176,210.00	**Measurement**: **Measurement**: Length of pipeline for which external dewatering is agreed with the Superintendent and provided, measured along the axis of the pipeline between the first and last spear point. **Submit:** Relevant Quality Records. **Limits of Accuracy:** <To be inserted>.
HWT018	Road / creek crossings					**Measurement:** Length in metres of casing installed. **Submit:** Relevant Quality Records. **Limits of Accuracy:** <To be inserted>.
HWT018.01	Beaton Ave	50	m	$ 1,037.84	$ 51,892.00	
HWT018.02	Culvert/Flood Gates	30	m	$ 1,083.07	$ 32,492.00	
HWT018.03	Culvert	20	m	$ 1,139.60	$ 22,792.00	
HWT027	Preparation of line sheets	4930	m	$ 1.16	$ 5,718.80	**Measurement**: Length of pipelines constructed as per design. **Limits of Accuracy:** <To be inserted>.
HWT029	**Miscellaneous**					
HWT000	***Sub Total***				$1,745,710	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0011	Acid sulphate soil					
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report	13	per test	$ 121.00	$ 1,573.00	**Submit**: Result for each test. **Limits of Accuracy:** <To be inserted>.
HW0011.03	Handling, treatment and testing of acid sulphate soils	1092.375	m3	$ 62.50	$ 68,273.44	**Measurement**: Cubic metres excavated based on thickness of ASS by actual length by Minimum Trench Width. **Submit:** Test results confirming satisfactory treatment. **Limits of Accuracy:** <To be inserted>
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 39,440.00	$ 39,440.00	**Payment**: 100% at Practical Completion.

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 2,043,591.19

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 245,230.94
HW0017	Project Management of Design	$ 59,046.19
HW0024	Community Consultation	
	Sub Total(B1)	$ 304,277.13
	Pre construction contingency (30% of B1)	$ 91,283.14
	TOTAL PRE-CONSTRUCTION COST (B)	$ 395,560.27

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 2,043,591.19
HW0023	Construction Management (Table 11)		$ 265,666.85
	Sub Total (C1)		$ 2,309,258.04
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 692,777.41
	TOTAL CONSTRUCTION COST (C)		$ 3,002,035.46

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 3,397,595.73

ESTIMATING SHEET

PROJECT DESCRIPTION: Site Boundary to Reservoir - West Route

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	$ 44,572.00	$ 44,572.00	**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	$ 30,000.00	$ 30,000.00	**Payment**: 100% after completion.
HW0003	Site Disestablishment<Insert Min $>	Item	Lump Sum	$ 30,000.00	$ 30,000.00	**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	$ 31,055.00	$ 31,055.00	**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	$ 23,436.18	$ 23,436.18	**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 - Trunk - section will be present if one or more trunk watermains are specified

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates	
HWT001	Service Location	Item	Lump Sum	$ 4,632.00	$ 4,632.00	**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.*	
31EDSS	Nominal DN300 DICL pipe	3860	m	$ 178.00	$ 687,080.00		
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>.	
31EDSS	Nominal DN300 DICL (Trench type B)	3860	m	$ 189.09	$ 729,875.00		Pipeline 1 - terrain allowance, Pipeline 2 - terrain allowance,
HWT018	Road / creek crossings					**Measurement:** Length in metres of casing installed. **Submit:** Relevant Quality Records. **Limits of Accuracy:** <To be inserted>.	
HWT018.04	DN300 Thrustbore Rock	20	m	$ 1,439.60	$ 28,792.00		
HWT018.05	DN300 Thrustbore Rock	20	m	$ 1,439.60	$ 28,792.00		
HWT018.06	DN300 Thrustbore Rock	20	m	$ 1,439.60	$ 28,792.00		
HWT018.07	DN300 Thrustbore Rock	50	m	$ 1,337.84	$ 66,892.00		
HWT027	Preparation of line sheets	3860	m	$ 1.16	$ 4,477.60	**Measurement**: Length of pipelines constructed as per design. **Limits of Accuracy:** <To be inserted>.	
HWT029	**Miscellaneous**						
HWT029.01	Tree clearing 4m wide x 950m	3800	Each	$ 32.00	$ 121,600.00		
HWT029.02	Tree clearing 4m wide x 1400m	5600	Each	$ 32.00	$ 179,200.00		
HWT000	***Sub Total***				$1,880,133		

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material	2171.25	m3	$ 120.00	$ 260,550.00	**Measurement**: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. **Limits of Accuracy:** <To be inserted>.
HW0013	Work as Constructed Information<Insert Min $>	Item	Lump Sum	$ 30,880.00	$ 30,880.00	**Payment**: 100% at Practical Completion.

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 2,356,625.78

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 282,795.09
HW0017	Project Management of Design	$ 66,559.02
HW0024	Community Consultation	
	Sub Total(B1)	$ 349,354.11
	Pre construction contingency (30% of B1)	$ 104,806.23
	TOTAL PRE-CONSTRUCTION COST (B)	$ 454,160.35

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 2,356,625.78
HW0023	Construction Management (Table 11)		$ 306,361.35
	Sub Total (C1)		$ 2,662,987.13
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 798,896.14
	TOTAL CONSTRUCTION COST (C)		$ 3,461,883.27

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 3,916,043.62

ESTIMATING SHEET

PROJECT DESCRIPTION: from new lead in to Hunter Land site - West Route

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	$ 2,485.00	$ 2,485.00	**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	$ 9,000.00	$ 9,000.00	**Payment**: 100% after completion.
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00	**Payment**: 100% after completion.
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 4,000.00	$ 4,000.00	**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	$ 9,000.00	$ 9,000.00	**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	$ 4,660.00	$ 4,660.00	**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	$ 2,392.68	$ 2,392.68	**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 - Trunk - section will be present if one or more trunk watermains are specified

Item	Construction of Trunk Mains	Qty	Unit	Rate $/Unit	Amount $	Application of Schedule of Rates
HWT001	Service Location	Item	Lump Sum	$ 384.00	$ 384.00	**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.*
319DSS	Nominal DN250 DICL pipe	400	m	$ 118.00	$ 47,200.00	
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>.
319DSS	Nominal DN250 DICL (Trench type B)	400	m	$ 84.40	$ 33,760.00	
HWT027	Preparation of line sheets	400	m	$ 1.16	$ 464.00	**Measurement**: Length of pipelines constructed as per design. **Limits of Accuracy:** <To be inserted>.
HWT029	**Miscellaneous**					
HWT000	***Sub Total***				$81,808	

Item No.	Item Description	Qty	Unit		Amount $	Application of Schedule of Rates
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material	180	m3	$ 120.00	$ 21,600.00	**Measurement**: Cubic metres excavated based on thickness of rock by actual length by Minimum Trench Width. **Limits of Accuracy:** <To be inserted>.
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 3,200.00	$ 3,200.00	**Payment**: 100% at Practical Completion.

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 147,145.68

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 29,429.14
HW0017	Project Management of Design	$ 15,885.83
HW0024	Community Consultation	
	Sub Total(B1)	$ 45,314.96
	Pre construction contingency (30% of B1)	$ 13,594.49
	TOTAL PRE-CONSTRUCTION COST (B)	$ 58,909.45

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 147,145.68
HW0023	Construction Management (Table 11)		$ 5,000.00
	Sub Total (C1)		$ 152,145.68
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 45,643.70
	TOTAL CONSTRUCTION COST (C)		$ 197,789.38

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 256,698.84