North Tuncurry Development Project
Integrated Water Cycle Management Strategy




For: Landcom

April 2019

Project Name:	North Tuncurry Development Project – Integrated Water Cycle Management Strategy
Project Number:	30011196
Report for:	Landcom

PREPARATION, REVIEW AND AUTHORISATION

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5 – For Submission	11/4/2019	Gayani Chandrasena	Marlène van der Sterren	Ian Rowbottom

Note 1: Chris Kuczera prepared this report whilst on secondment from Royal HaskoningDHV

Note 2: Ben Patterson from Royal HaskoningDHV was engaged by SMEC to undertake a peer review of this report

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EXECUTIVE SUMMARY

The North Tuncurry Development Project (NTDP) is a proposed residential development sponsored by Landcom under a Project Delivery Agreement with the Crown Lands Branch of NSW Trade and Investment, who control the land. The NTDP area (project area or the site) comprises 615 ha of land located to the north of the Township of Tuncurry.

Landcom has commissioned a State Significant Precinct Study study for the project that will introduce a new land use framework for the site including land use zones and development controls. SMEC was engaged by Landcom to prepare an Integrated Water Cycle Management Strategy (IWCMS) to form part of the SSS Study and particularly to respond to the SSS Study requirements issued for the project. This report documents the IWCMS and is supported by the following technical reports:

- Groundwater Modelling Technical Report (SMEC, 2014).
- Water Servicing Strategy (SMEC, 2014).
- Wastewater Servicing Strategy (SMEC, 2014).

Various modelling and associated land area calculations have been undertaken for this Integrated Water Cycle Management Strategy. This work was based on a previous (only slightly different) Masterplan layout. The new Masterplan (adopted just prior to the public exhibition period) has however been included in this report. It is not expected that modelling using the new Masterplan would result in any significant changes to the current integrated water cycle strategy. The previous Masterplan, that was used for the modelling and associated land area calculation, is shown at **Appendix E**.

Project Description

The NTDP will be located within a 261.6 ha development area that comprises the following key components:

- Approximately 2,123 residential dwellings.
- 13.2 ha of employment lands
- 9.6 ha of parks and open space.
- A B2 Local Centre.
- Reconfiguration of the existing North Tuncurry Golf Course (total area 59 ha).
- Water management infrastructure, including 18.1 ha of water management basins.

Refer to **Figure 1** for the proposed development layout.

It is expected that the NTDP will be constructed in several stages over a 30-year timeframe. The future form, ownership and management of the water management basins is subject to ongoing investigations by Landcom, and could include, for example, a Community Title arrangement.

Scope of the IWCMS

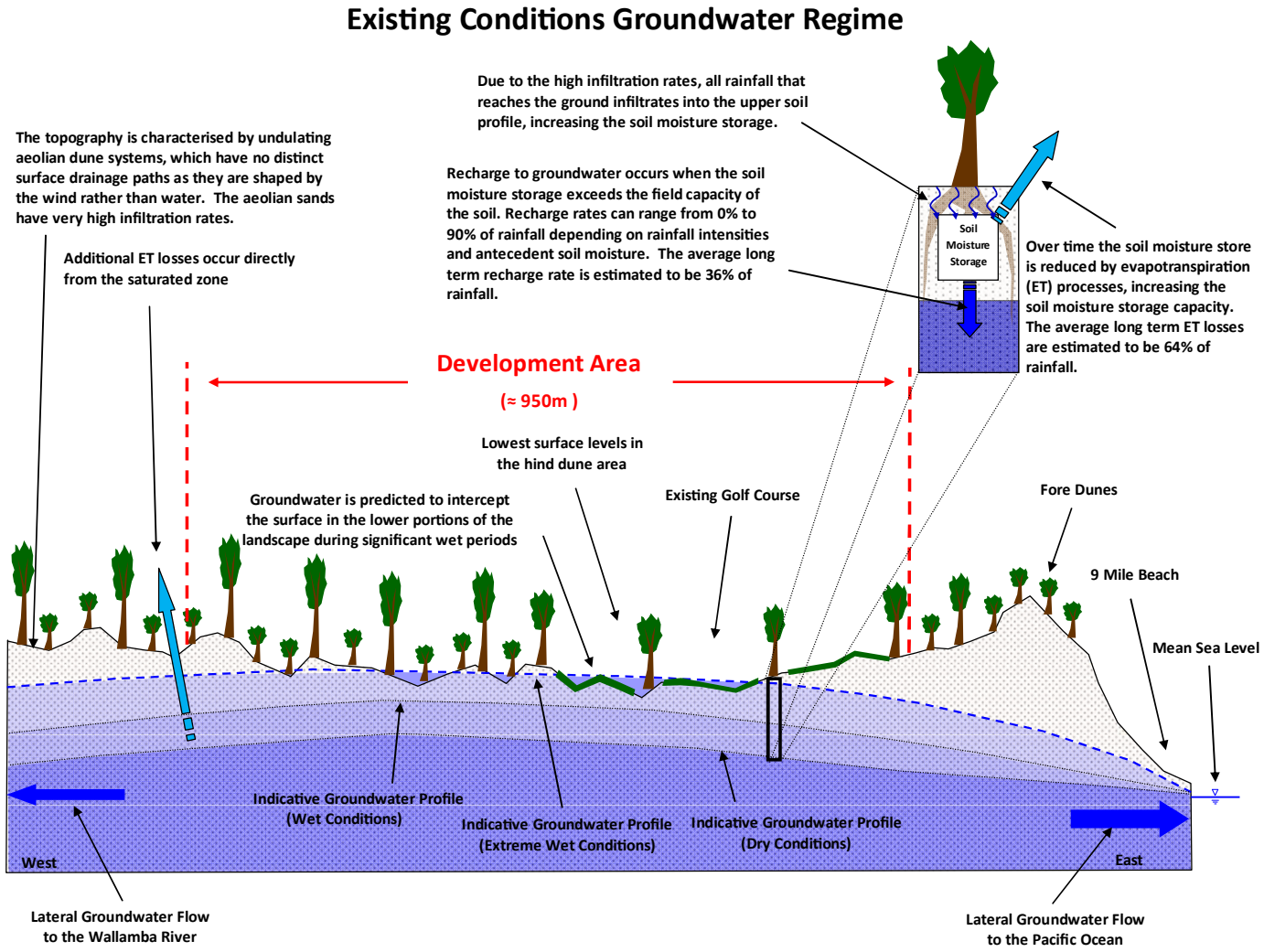
The IWCMS broadly includes the following scope of works:

- A groundwater monitoring program was undertaken to establish baseline groundwater quality and groundwater level information for use in the study.
- Development of groundwater models capable of assessing both the existing and developed conditions groundwater regime for a range of climatic conditions, including extreme flood events and potential sea level rise scenarios.
- Development of an integrated stormwater and groundwater management strategy that responds to the site's opportunities and constraints.
- Development of a conceptual civil design for the project that demonstrates the functionality of the proposed integrated stormwater and groundwater management strategy.
- Development of a potable water demand reduction strategy for the project.
- Development of water and wastewater servicing strategies for the project.

The following sections provide an overview of the existing site conditions, identified water management constraints and the proposed water cycle management strategy.

Existing Site Conditions

The project area is located above an unconfined coastal aquifer. The site topography is characterised by undulating aeolian dune systems, which have no distinct surface drainage paths as they are shaped by the wind rather than water. Accordingly, all rainfall that falls over the project area is either lost to evapotranspiration processes or drains vertically through the upper soil layer into the aquifer through a process referred to as recharge. Water leaves the aquifer through both evapotranspiration (ET) processes and groundwater flow to the east (to the Pacific Ocean) and to the west (to the Wallamba River). The dynamics of these processes vary depending on the groundwater flow characteristics, prevailing rainfall and evapotranspiration rates. The following diagram describes the existing conditions groundwater regime.



The assessment of the existing groundwater characteristics within the project area was informed by a groundwater monitoring program that was undertaken by Landcom. The monitoring program comprised water level measurements and groundwater quality monitoring from up to 16 monitoring bores located within or adjacent to the NTDP project area over a 38-month period (between March 2010 to May 2013). The monitoring period comprised several extended dry and wet periods as well as a 10-year Average Recurrence Interval (ARI) groundwater flood event. This information was used to calibrate and verify numerical models and establish site constraints.

Identified Stormwater and Groundwater Constraints

The existing site topography and groundwater regime significantly constrain the water management options for the project, with the following constraints identified from a review of available data and the existing conditions modelling:

- **Groundwater Flooding**: During a 100-year ARI groundwater flooding event, peak groundwater levels are expected to range from 3.5 to 5.5 m AHD across the development area. During flood conditions, the groundwater table is expected to intercept the surface in the lower portions of the development area, resulting in surface ponding of up to 2 m deep in some locations. Following a significant event, surface ponding and elevated groundwater conditions are expected to slowly recede over several months. Without mitigation measures, the existing groundwater flood constraints would significantly reduce the proportion of the development area that is suitable for urban land use.

- **Existing Topography**: Existing surface levels within the development area typically range from 3 to 8 m AHD and average 5.1 m AHD. When compared to the peak 100-year ARI groundwater flood levels discussed above, it was determined that there is insufficient material within the development area to mitigate groundwater flooding constraints by elevating surface levels, without importing significant volumes of fill material. Accordingly, peak groundwater levels need to be reduced to less than 4 m AHD to enable the proposed development yields to be achieved and flood risks to be adequately managed.

- **Infiltration Rates**: The aeolian dune systems are characterised by clean dune sands that have very high infiltration rates. Accordingly, no surface runoff is expected from pervious surfaces, with most of the rainfall infiltrating into the sandy soils. The very high infiltration rates limit the potential for runoff from pervious areas (and impervious areas that drain to pervious areas) to be collected in a stormwater management system and treated in water quality controls.

Proposed Integrated Stormwater and Groundwater Management Strategy

An integrated stormwater and groundwater management strategy has been developed for the project. The strategy considers:

- The site's opportunities and constraints and established design objectives.

- Relevant Council, MidCoast Water Services (MCWS), NSW Government and industry guidelines.

- Feedback received from stakeholders over the study period.

- The proposed urban design and development yield objectives.

The key elements of the strategy include:

- **Water Management Basins:** 18.1 ha of water management basins (including batters) are proposed for flood mitigation purposes. The basins will provide surface storage that will attenuate the rise of the basin water levels and adjoining groundwater levels and hydraulically connect the water management system throughout the development area, enabling upstream controls such as subsurface drainage to operate effectively.

- **Gravity Drainage:** It is proposed to construct a stormwater pipe system that will drain excess water from the water management basins to the Wallis Lake Entrance Channel. The gravity drainage will only operate during elevated basin levels (due to the pipe inlet being at 3 m AHD) and will provide significant flood mitigation benefits during major flood events, such as the 100-year ARI event.

- **Water Quality Management Controls:** The following water quality controls are proposed:

    - 5 kL rainwater tanks are proposed for each dwelling to capture and use runoff from roof areas. Rainwater tanks (and the use of harvested rainwater) will reduce runoff volumes from the development area as well as reducing potable water usage.

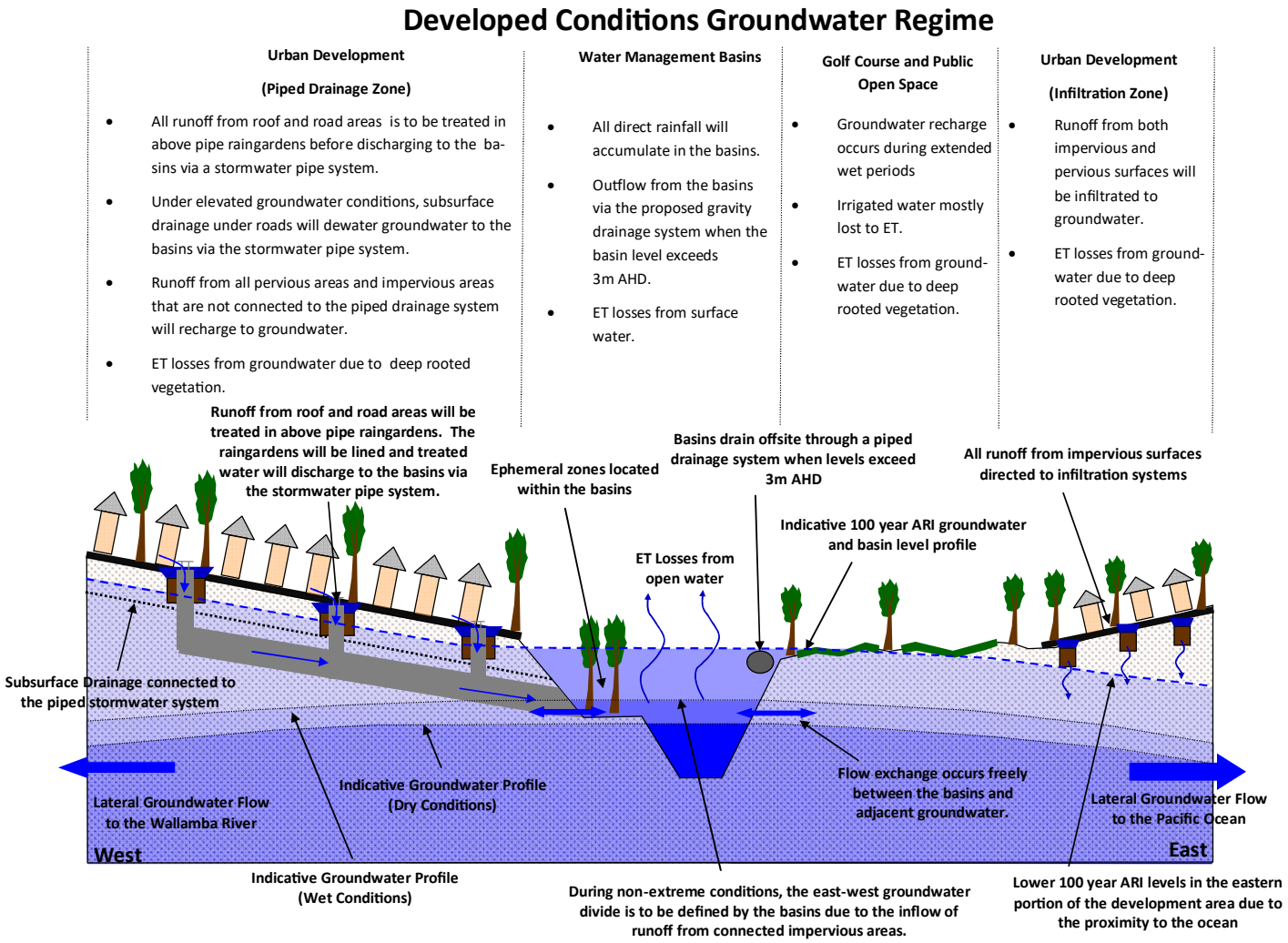
    - Runoff from all road and driveway pavement areas and some overflow from rainwater tanks will be treated in raingardens (or biofiltration basins) that will be constructed within the road reserve.

    - The water management basins will have ephemeral areas equivalent to 48% of the total wet basin area. The ephemeral zones will enhance the ability of the basins to self-regulate water quality.

- The water management basins will receive runoff from some impervious areas which will elevate the basin level above the adjoining groundwater level, reducing the risk of nutrient laden groundwater from the golf course, or groundwater with naturally elevated iron or hydrogen sulphide levels, entering the basins.

The water management basins may be ephemeral or open water and will be dictated by Ownership. Where they are in council ownership, they will be ephemeral.

The proposed water management strategy is conceptually illustrated in the following diagram, which also describes the developed conditions groundwater regime. The location of key water management controls and zones is detailed in the Water Management Plan, which is attached as **Figure 2**.



Numerical modelling was undertaken to assess the effectiveness of the proposed integrated stormwater and groundwater management strategy in managing identified constraints and potential impacts. Modelling results indicate that:

- Under developed conditions, recharge within the development area is expected to increase from 36% of rainfall to 50% of rainfall on an average annual basis. This increase is primarily due to the introduction of impervious surfaces and is expected to result in groundwater levels increasing by 0.3 to 0.4 m under developed conditions except for very wet conditions. The

predicted higher levels are not expected to materially impact any existing properties, infrastructure, the existing golf course or proposed conservation areas that adjoin the development area.

- The combination of the gravity drainage and attenuation provided in the water management basins will be effective in reducing peak basin water levels below 3.9 m AHD. In addition, these controls will enable the basin and adjoining groundwater levels to recede significantly faster than under existing conditions. Accordingly, the proposed controls are expected to be effective in managing groundwater flooding risks within the development area. The controls will also lower local groundwater flood levels, reducing the flood risk to adjoining properties and the Tuncurry Golf Course.

- The proposed stormwater quality controls are expected to exceed relevant pollutant reduction targets when considering runoff from impervious areas only. Relevant targets are not achieved on a whole of development basis due to very high infiltration rates which limit the potential for runoff from pervious areas (and impervious areas that drain to pervious areas) to be collected in a stormwater management system and treated in water quality controls. This limitation is unavoidable.

- It is expected that nutrient loads in recharge to the groundwater aquifer will increase under developed conditions. This is primarily attributed to the predicted increase in recharge volumes. It is expected that any increases in nitrogen and phosphorus loads in groundwater flowing to the west (into the Wallamba River Estuary) will be attenuated to background levels as groundwater recharges into the significant wetland area that exists to the east of the Wallamba River Channel.

- Proposed rainwater tanks and limited groundwater extraction for the irrigation of public open spaces will reduce the project's potential potable water demand by 70% in a 90th Percentile (typical wet) rainfall year, 62% in an average rainfall year and 54% in a 10th Percentile (typical dry) rainfall year. When combined with water restrictions, the proposed measures are expected to achieve similar demand reductions to a recycled water scheme in both typical and extreme dry years.

A conceptual earthworks model was also developed for the project. The earthworks modelling demonstrated that the proposed water management strategy can be implemented without importing fill provided that an efficient civil design (from an earthworks perspective) is applied.

Water and Wastewater Servicing Strategies

The NTDP will be serviced as part of the Manning Water supply system via a 4.5 ML reservoir north of Tuncurry at Rainbow Flat. A DN600 water main located along the Lakes Way has the capacity to supply the NTDP. The NTDP will develop from the south to the north. Therefore, the water connection would be constructed near the southern portion of the development. A second DN450 connection could be constructed to increase the security of supply at a later stage of the development. The preliminary design of the water reticulation system consists of DN100-DN300 mains.

A preliminary capital cost estimate of $5.9M ($2.6K per ET) utilising the Hunter Water Cost Estimating Manual has been developed for the trunk water supply. (It should be noted that the cost estimate was prepared in 2014 based on the previous Master Plan and unit costs current at the time. However, the costing is still considered to be suitable for planning and comparison purposes).

Options for a wastewater reticulation network and for transporting wastewater to MidCoast Water Services' (formerly MidCoast Water) Hallidays Point Wastewater Treatment Plant (WWTP) have been investigated. Options for reticulation to service the NTDP include:

- **Option A** - gravity reticulation sewerage system; and
- **Option B** - vacuum reticulation sewerage system.

The trunk main investigation domain extends from the township of Tuncurry along The Lakes Way and then along the access road to the Hallidays Point WWTP.

Three trunk main options have been considered, being:

- **Option 1** – comprises a new NTDP Central WWPS and 11 km long rising main transporting wastewater into the Hallidays Point WWTP.
- **Option 2** – comprises a new NTDP Central WWPS and a 1.8 km long rising main transporting flow into the Tuncurry No. 23 WWPS. The Tuncurry No. 23 WWPS would transport the existing flow and flow from the NTDP site to the Hallidays Point WWTP.
- **Option 3** – comprises a new NTDP Central WWPS and 0.7km long rising main transporting flow into the Tuncurry No. 23 rising main. As a result, the Tuncurry No. 23 WWPS and the new NTDP Central WWPS would pump into a common rising main.

  Note: For Option 2 with vacuum reticulation, a new NTDP Central WWPS would not be required, as sewage pumps can be established within the Central Vacuum Pumping Station to transport flow to Tuncurry No. 23 WWPS, despite having a vacuum (negative pressure) on the pump inlet this would be manageable given the modest delivery head involved.

Of the servicing options, Option 2B (vacuum sewerage reticulation system with sewage pumps in the Central Vacuum Pumping Station pumping into Tuncurry No. 23 WWPS) has the lowest capital cost.

However, Option 2A (gravity sewerage reticulation system with Central WWPS pumping into Tuncurry No. 23 WWPS) has the lowest operating and maintenance costs and Net Present Value (NPV). A cost comparison is shown below:

- **Option 2A** – Gravity Sewerage Reticulation System, Central WWPS pumping into Tuncurry No. 23 WWPS

- Capital Cost - $17.9M
- NPV at 7% over 30 years - $12.0M

- **Option 2B**- Vacuum Sewerage Reticulation System, pumps established within the Central Vacuum Pumping Station pumping into Tuncurry No. 23 WWPS
  - Capital Cost - $16.2M
  - NPV at 7% over 30 years - $15.5M

It should be noted that the above cost estimates were prepared in 2014 based on the previous Master Plan and unit costs current at the time. However, the costs are still considered to be suitable for planning and comparison purposes.

Option B (vacuum reticulation system) has a lower potential environmental impact than Option A (gravity reticulation system) due to lower risk of exfiltration, odour emission and no emergency overflows.

However, it is considered that the potential environmental impacts of the gravity reticulation system could be minimised during the design and construction (e.g. allowing for a larger WWPS emergency storage, targeting high quality construction, providing sufficient cover to the reticulation pipes to minimise movement and cracking, etc.)

As a result, it is considered that a gravity sewerage system is preferable for the North Tuncurry site.

Potable Water Demand Reduction Strategy

The following potable demand reduction measures have been considered in this study:

- **Water efficiency measures** - such as efficient appliances and fittings as well as native landscaping that can significantly reduce the project's potable water demand.
- **Alternative non-potable water supply options** – the following options have been considered in this study:
  - Rainwater harvesting (using rainwater tanks).
  - Recycled water use.
  - Groundwater harvesting and use.

The centralised groundwater extraction option provides the highest potential average annual demand reduction out of all options (79%). However, adopting this strategy would require a high upfront capital cost and high operating costs with a high ongoing water supply cost. The centralised groundwater extraction option is not favoured due to the high upfront costs and high ongoing water supply costs.

The decentralised groundwater extraction option is the least effective strategy (potential average annual demand reduction would be only 31%). Adopting this strategy involves no upfront capital cost and low capital costs for future spear points as individual properties are developed. It also involves low operating costs with a low ongoing water supply cost. The de-centralised groundwater extraction option is however not favoured because:

- The low 31% proportion of total NTDP water demand that can be offset, a figure that would reduce further in drier years.

- Groundwater is likely to have elevated iron and hydrogen sulphide levels (in some areas) and without treatment extracted groundwater is likely to be only suitable for outdoor use.

- A decentralised scheme would be difficult to effectively regulate, and potential impacts of unregulated groundwater extraction would need to be considered.

There is some merit in the recycled water option, and it would have both a moderate upfront capital cost and moderate ongoing water supply costs. It provides the third highest potential average annual demand reduction out of all options (58%). By comparison, the rainwater harvesting option provides the second highest potential average annual demand reduction out of all options (65%), and it involves no upfront capital cost and low capital costs for future rainwater tanks and plumbing as individual properties are developed. It also has no ongoing water supply costs, except that in very dry periods tanks would need to be topped up with mains water when empty.

The rainwater harvesting option was found overall to be the most beneficial strategy to reduce potable water demand for the NTDP, and it has the following benefits:

- Low upfront capital costs and ongoing water supply costs. The NPV of total infrastructure costs is $9.9M, compared with $10.8M for a recycled water system and $10.3M for a lower cost recycled water system. (Note, the recycled water system includes new trunk main supplying recycled water from the Recycled Water Plant. The capital costs of any plant upgrades and upstream works are not known and have not been included in the cost estimates. This could understate the actual cost of this option. Under the lower cost recycled water option the recycled water that is currently supplied to the golf course would be diverted to the NTDP. The golf course would source irrigation from groundwater, as they did prior to the recycled water scheme being implemented. It should be noted that the use of recycled water is perceived to have had a beneficial effect on the golf course and diversion of this water source may incur a community benefit cost.

- The NPV of capital and operating costs per household is $4,700, compared with $5,100 for a recycled water system. The cost for all water consumed per household is $0.69 per kL, compared with $2.36 per kL for a recycled water system.

- Rainwater harvesting (including decentralised groundwater extraction for irrigation of public open space) is a decentralised scheme that does not require any upfront capital expenditure (except for rainwater tanks purchased by individual owners), and does not constrain the staging of the project, which will be constructed over a 30-year timeframe. This contributes to lower life cycle costs compared with recycled water or centralised groundwater harvesting.

- Rainwater tanks provide substantial stormwater and groundwater management benefits by partially mitigating the increase in runoff / recharge that will occur as a result of the development.

- The proposed strategy does not constrain the potential for groundwater to be extracted by MCWS for regional water use.

- When compared to the recycled water option, rainwater harvesting with 5KL tanks would offset more demand during wet and average rainfall years, but would be moderately less effective during drier rainfall years. Using 5KL tanks, rainwater harvesting would offset more demand than the recycled water option in 63% of years (rises to 93% of years with 10KL tanks).

The proposed strategy incorporates the following measures:

- The water efficiency measures described in **Section 9** which include efficient appliances and native landscaping.
- Minimum 5 kL rainwater tanks for each dwelling. The rainwater tanks would be plumbed to supply water for toilet flushing, laundry, hot water and all outdoor tap fittings.
- Rainwater tanks for larger commercial buildings that are appropriately sized to achieve the water use profiles that are similar to a 5 kL rainwater tank for a residential dwelling.
- Decentralised groundwater extraction to provide water for the irrigation of public open spaces. It is expected that irrigation of public open spaces would be managed by Council.
- All new homes will have optional sustainability packages that will enable the homeowner to voluntarily have water efficiency measures installed that exceed minimum BASIX requirements. Options for larger rainwater tanks will also be provided.

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FIGURES

APPENDICES

ABBREVIATIONS

AHD	Australian Height Datum
AIP	Aquifer Interference Policy
ARI	Average Recurrence Interval
ARQ	Australian Runoff Quality (2005)
AR&R	Australian Rainfall and Runoff (1987)
ASS	Acid Sulphate Soils
BASIX	Building Sustainability Index
BoM	Bureau of Meteorology
CMP	Coastal Management Program
CZMP	Coastal Zone Management Plan
DCP	Development Control Plan
DOI	Department of Industry
EP&A Act 1979	Environmental Planning & Assessment Act 1979
IWCMS	Integrated Water Cycle Management Strategy
LGA	Local Government Area
MCWS	MidCoast Water Services
ML	Megalitre
NPV	Net Present Value
NTDP	North Tuncurry Development Project
PET	Potential Evapotranspiration
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
WAL	Water Access Licence
WWPS	Wastewater Pumping Station
WWTP	Wastewater Treatment Plant

1 INTRODUCTION

The North Tuncurry Development Project (NTDP) is a proposed residential development sponsored by Landcom under a Project Delivery Agreement with the Crown Lands Branch of NSW Trade and Investment, who control the land. The NTDP area (project area or the site) comprises 615 ha of land located to the north of the Township of Tuncurry. The proposed development area comprises 261.6 ha of land that is in the southern portion of the project area. **Plate 1-1** shows the project area and development area.

Plate 1-1 *– Project and development area*

Landcom has commissioned a State Significant Precinct Study for the project that will introduce a new land use framework for the site including land use zones and development controls. SMEC was engaged by Landcom to prepare an Integrated Water Cycle Management Strategy (IWCMS) to form part of the SSS Study and particularly to respond to the SSS Study requirements issued for the project.

Various modelling and associated land area calculations have been undertaken for this IWCMS. This work was based on a previous (only slightly different) Masterplan layout. The new Masterplan was adopted in 2015 following discussions with the Office of Environment and Heritage. It is not expected that modelling using the new Masterplan would result in any significant changes to the current integrated water cycle strategy. The previous Masterplan that was used for the modelling and associated land area calculations, is shown at **Appendix E**.

1.1 Project Description

Landcom are proposing to deliver a mixed-use development on the site that meets the State Government's objectives to increase housing supply, provide community benefits and create jobs. The development will be located within the 261.6ha development area indicated in **Plate 1-1** and will comprise the following development precincts:

- The main development precinct will have an area of 255ha and will broadly comprise the following components:
    - Approximately 2,123 residential dwellings.
    - 6.6ha of employment lands
    - 9.6ha of parks and open space.
    - A B2 Local Centre.
    - of the existing North Tuncurry Golf Course (total area 59ha).
    - Water management infrastructure, including 18.1ha of water management basins.
    - Utilities including power, telecommunications, gas, potable water and wastewater infrastructure.
    - Roads and bike paths.
    - Bushfire Asset Protection Zones.
    - Refer to **Figure 1** for the proposed layout of the 255 ha development area.
- A smaller 6.6ha development precinct is proposed in the north-western portion of the project area (as indicated in **Plate 1-1**), adjacent to the Lakes Way. It is proposed to establish employment lands in this precinct.

It is expected that the NTDP will be constructed in several stages over a 30-year timeframe.

1.2 Report Structure

This report documents the IWCMS and is structured as follows:

- **Section 2** – details the **Assessment Framework** for the IWCMS and includes details on the study requirements, stakeholder consultation, relevant guidelines and previous investigations.
- **Section 3** – describes the **Existing Environment** and data used for this assessment.
- **Section 4** – establishes **Water Cycle Management Strategy Objectives** for the project.
- **Section 5** – establishes the **Integrated Stormwater and Groundwater Management Strategy** for the Project.
- **Section 6** – provides further details on the proposed **Stormwater Quality Management Strategy** for the project.
- **Section 7** – describes a **Conceptual Civil Design** for the project.
- **Section 8** – provides an overview of the **Water and Wastewater Servicing Strategies** prepared for the project.
- **Section 9** – establishes a **Potable Water Demand Reduction Strategy** for the project.
- **Section 10** – provides a **Summary** of proposed **Management Measures** and **Predicted Impacts**.

This report documents the IWCMS and is supported by the following technical reports:

- Groundwater Modelling Technical Report (SMEC, 2014).
- Water Servicing Strategy (SMEC, 2014).
- Wastewater Servicing Strategy (SMEC, 2014).

The IWCMS has been prepared based on the Project Masterplan to establish an appropriate water cycle management strategy and assess potential impacts. The Project Masterplan represents a single development concept that may be revised in future. Accordingly, the IWCMS may be required to be progressively updated to reflect changes to the development concept.

2 ASSESSMENT FRAMEWORK

2.1 Statutory Requirements

The NSW Department of Planning and Environment provided State Significant Precinct Study requirements for the NTDP in a letter dated 8 December 2011. **Table 2-1** lists the study requirements that are applicable to this document and provides a reference to the relevant section of this report that addresses each study requirement.

***Table 2-1** – SSS study requirements.*

SSS Study Requirement	Applicable Section
Assessment of Flood Impacts	
Undertake a flood / sea level rise risk assessment for the site. This assessment should be conducted in accordance with relevant NSW government guidelines.	• **Groundwater Flooding** is addressed in the Groundwater Modelling Technical Report (SMEC, 2014) and summarised in Section 5. • **Fluvial Flooding** is addressed in the Lower Wallamba River Study (WMA Water, 2014)
Identify and map the extent and depth of a suitable range of flood events on and adjoining site including but not limited to the 1% AEP and PMF events.	
Review and assess any changes to flood behaviour and characteristics, based on the potential urban development of the site.	
Water Quality Impacts	
Prepare a conceptual stormwater management plan that outlines the general measures for stormwater and effluent management in relation to climate, topography, soil types and local geology and identify potential risk issues.	Refer to **Sections 5** and **6**
Provide details of how the proposed stormwater management system will meet the requirements of the Great Lakes Water Quality Improvement Plan (2009).	Refer to **Section 6**
Provide details, and an assessment of, impacts of the proposal on any watercourses, wetlands, coastal and riparian land located on or adjacent to the site.	Refer to **Section 6**
Identify riparian corridors and associated buffers in accordance with relevant NSW government guidelines.	Not applicable as no riparian corridors exist onsite.
Assess impacts of the proposal on groundwater. Identify any potential degradation to the groundwater resource and any impact on groundwater dependant ecosystems.	Refer to **Sections 5 and 6** in the Groundwater Modelling Technical Report (SMEC, 2014).
Utilities and Infrastructure	
Prepare a preliminary utility and infrastructure servicing report and plan for the site that assesses the capacity of existing utility and infrastructure servicing the site and identifies all necessary augmentation works to service the site.	Refer to the Water Servicing Strategy (SMEC, 2014) and Wastewater Servicing Strategy (SMEC, 2014).
Address water sustainability and efficiency principles including opportunities for waste water re-use within the development.	Refer to **Section 9**
Stakeholder Consultation	
An appropriate and justifiable level of consultation with Council, other relevant State and Federal government agencies and community stakeholders should be undertaken during the preparation of the environmental assessment, having regard to any previous consultation.	Refer to **Section 2.2**

2.2 Stakeholder Consultation

Over the duration of the project, Landcom and SMEC have facilitated consultation with the key stakeholders associated with the water management aspects of the project. The key objective of the consultation was to seek input into the water management strategies and design concepts that were being progressively developed. A summary of stakeholder consultation is provided as follows:

- **MidCoast Council (formerly Great Lakes Council) (Council)**: SMEC and Landcom attended several meetings with Council staff. At most meetings a presentation was made that provided:
    - An update on the study progress.
    - Information on key development constraints and opportunities.
    - Information regarding potential water management concepts and the project's potential water quality and flood impacts.

  Landcom also funded an external peer review of preliminary information that was provided to Council in a PowerPoint presentation format. The peer review was undertaken by BMT WBM.

- **MidCoast Water Services (MCWS)**: SMEC and Landcom attended several meetings with MCWS Staff to discuss the servicing aspects of the project. MCWS provided information for use in the studies. Draft reports detailing the proposed water and wastewater servicing strategies were submitted to MCWS for comment in late 2012. MCWS provided high level comments on the draft servicing strategies in 2013.

- **Department of Industry (DoI) – Land and Water**: DoI attended initial project meetings. DoI provided some guidance on their key expectations for the study in 2013.

Additional stakeholder consultation was undertaken by Landcom and others as part of the SSS Study. When developing the IWCMS, strong consideration has been given to all feedback received from stakeholders.

2.3 Relevant Polices, Plans and Guidelines

The following policies, plans, and guidelines have been considered in this assessment.

MidCoast Council Policy and Guidelines

Great Lakes Water Quality Improvement Plan

The Great Lakes Water Quality Improvement Plan was adopted by Council in 2009. The plan includes a comprehensive assessment of the existing environment of the Wallis, Smith and Myall Lake systems and develops a suite of water quality improvement initiatives. Of relevance to the NTDP is the recommendation that greenfield developments within the Wallis Lake Catchment Area be required to demonstrate that the development will not result in an increase in pollutant loads (principally nutrients and suspended sediments) relative to existing conditions. This recommendation was subsequently adopted in the Great Lakes Development Control Plan (2014), which is discussed further below.

Great Lakes Development Control Plan 2014

The Great Lakes Development Control Plan (DCP) was adopted by MidCoast Council in April 2014 and applies to all land within the MidCoast Council LGA. Chapter 11 of the DCP provides stormwater management control targets for a range of development categories based on scale, development type (i.e. redevelopment or greenfield development) and location. Under the DCP definitions, the NTDP is a large-scale greenfield development located within a "Coastal Drainage" catchment area (as defined in the catchment maps provided in Appendix 1 of the DCP).

The DCP recommends the following stormwater management objectives for large scale greenfield developments in "Coastal Drainage" catchments:

- **Water Quality Control**: The DCP recommends that stormwater controls achieve the following pollutant load reductions from unmitigated developed conditions:
    - Total Suspended Solids (TSS) – 80% Reduction
    - Total Phosphorous (TP) – 60% Reduction
    - Total Nitrogen (TN) – 45% Reduction
- **Stormwater Flow Management**: The DCP recommends that reasonable management actions are taken to:
    - reduce the impervious areas that are directly connected to the stormwater system; and to
    - reduce the potential for erosion within downstream areas of natural bushland.

The stormwater management plan presented in subsequent sections of this report addresses the above DCP requirements.

It is noted that the DCP applies more stringent water quality control targets for catchment areas that drain to the Wallis Lake and Port Stephens Estuaries. These catchment areas are defined as either "Water Quality Improvement" or "Sensitive Catchment" areas in the catchment maps provided in Appendix 1 of the DCP. In these catchment areas, a no net increase target for TSS, TP and TN is established in the DCP. Groundwater modelling results presented in **Section 5** of this report establish that groundwater from the western portion of the development area will flow to the west into the Wallamba River, which forms part of the Wallis Lake Estuary. Accordingly, the no net increase target is also considered in subsequent sections of this report.

NSW Government Policy and Guidelines

BASIX

In 2004, the NSW Government introduced the Building Sustainability Index (BASIX) to deliver equitable water and greenhouse gas reductions across the state. BASIX applies to all residential dwelling types and is part of the development application process in NSW. Of relevance to this assessment, BASIX requires a 40% reduction in mains supplied potable water consumption, compared to the average 'pre-BASIX' home benchmark. This objective can be achieved through a range of measures including rainwater harvesting, grey water reuse, recycled effluent reuse, water efficiency measures and water efficient landscaping. For the NTDP, BASIX certificates for individual dwellings will be prepared at the Development Application Stage.

Aquifer Interference Policy

The NSW Aquifer Interference Policy (AIP) was initially published in September 2012 and defines the regime for protecting and managing the impacts of aquifer interference activities on NSW's water resources and strikes a balance between the water needs of towns, farmers, industry and the environment.

The Policy:

- applies across the state, clarifying water license and impact assessment requirements for aquifer interference activities;
- ensures equitable water sharing among different types of water users;
- ensures that water taken by aquifer interference activities is properly licensed and accounted for in the water budget and water sharing arrangements; and
- enhances existing regulation, resulting in a comprehensive framework to protect the rights of all water users and the environment.

There are three key parts to the Policy:

- All water taken must be properly accounted for.
- The activity must address minimal impact considerations for impacts on water table, water pressure and water quality.
- Planning for measures in the event that the actual impacts are greater than predicted, including making sure that there is sufficient monitoring in place.

The AIP is administered by the Department of Industry – Land and Water. DoI provide an assessment framework that can be submitted with any EIS document to simplify the review process. **Appendix A** contains the assessment framework document which includes relevant information from this study and provides an assessment of the NTDP against the AIP.

Flood Risk Management Guide: Incorporating Sea Level Rise Benchmarks in Flood Risk Assessments

The guideline titled *Flood Risk Management Guide: Incorporating sea level rise benchmarks in flood risk assessments* (DECCW, 2010) provides guidance on incorporating sea level rise benchmarks in flood risk management planning and flood risk assessments for new developments. This guideline applies to areas where the sea level rise planning benchmarks are likely to have an impact on predicted flood levels. The guideline recommends sea level rise bench marks, relative to the 1990 mean sea level, of 0.4 metres by 2050 and 0.9 metres by 2100. The 2100 sea level rise predictions have been applied to the groundwater flood assessment that undertaken as part of the study.

This guideline was adopted as policy by MidCoast Council in June 2011.

Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources (2009)

Water Access Licenses (WALs) in the Wallamba River Catchment are administered by the *Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009*. The Water Sharing Plan is administered based on catchment scale Water Sources. The NTDP is located within the Tidal Management Zone of the Wallamba River Water Source. There are currently no water sharing rules that apply to the coastal sands aquifer category that exists within the NTDP area.

At this stage in the project, it is anticipated that limited amounts of groundwater (estimated to be up to 67 ML/year) will be extracted to irrigate proposed public open space areas. It is envisaged that the extraction will occur through several decentralised spear point bores. Once the extent and nature of the irrigation works is confirmed an assessment will be made to establish if any WALs are required for the proposed extraction. This assessment will be undertaken at a latter approval stage.

Additional groundwater extraction will occur when excess water in the proposed water management basins drains through a gravity drainage system. This extraction will be for flood mitigation purposes. Accordingly, the proposed water management basins and gravity drainage system are excluded works under Water Management (General) Regulation 2011, Schedule 1, Item 2 (dams solely for flood mitigation and detention) and no water licensing is required.

New legislation that may impact the proposed development has been gazetted following the issue of Revision 3 of the IWCMS report. The new legislation, and its potential impact on the proposed development, has been reviewed and documented below.

Coastal Management Act 2016

The Coastal Management Act 2016 makes provision for the ecologically sustainable management, use and occupation of the New South Wales coast, and for related purposes. **Table 2-2** lists the requirements of 'Part 2: coastal zone and management objectives for coastal management areas' of the act that are applicable to the proposed development.

***Table 2-2** –Management objectives for coastal management areas.*

Applicable requirements	Water cycle management actions
8 - Coastal environment area	
(2) The management objectives for the coastal environment area are as follows: (a) to protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes and coastal lagoons, and enhance natural character, scenic value, biological diversity and ecosystem integrity, (b) to reduce threats to and improve the resilience of coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change, (c) to maintain and improve water quality and estuary health, (d) to support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons, (e) to maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system operating at the relevant place, (f) to maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms.,	The land adjacent to the eastern boundary of the development area and the eastern edge of the project area is within the zone classified as "Coastal environment area". This also shows that Wallamba River and Wallis Lake Estuary are classified as "Coastal environment area". Development is not proposed to occur within these areas. However, the infiltrated stormwater will transfer as groundwater to Wallamba river and a stormwater pipe will drain into Wallis Lake Estuary. The treatment of these discharges occurs within the catchment to ensure the management objectives are met. In particular, stormwater runoff from the western portion for the development is being treated via streetscape raingardens and an ephemeral zone of basins. No additional treatment is needed for stormwater discharges into the

	estuary. Furthermore, additional treatment is likely through significant nutrient attenuation as groundwater recharges within the wetland area to the east of the Wallamba River Channel.
9 - Coastal use area	
(2) The management objectives for the coastal use area are as follows: (a) to protect and enhance the scenic, social and cultural values of the coast by ensuring that: (i) the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast, and (ii) adverse impacts of development on cultural and built environment heritage are avoided or mitigated, and (iii) urban design, including water sensitive urban design, is supported and incorporated into development activities, and (iv) adequate public open space is provided, including for recreational activities and associated infrastructure, and (v) the use of the surf zone is considered, (b) to accommodate both urbanised and natural stretches of coastline.	The eastern end of the development area is within the zone classified as “Coastal use area”. Water sensitive urban design has been incorporated in the IWCMS using rainwater tanks, raingardens, and infiltration systems.

Additionally, as per the Coastal Management Act, the Great Lakes Coastal Zone Management Plan (CZMP) applies to the development. The current CZMP is based on the Coastal Protection Act 1979. A full revision of the current CZMP is planned by 2021 to be integrated into the Coastal Management Program (CMP) format specified in the current Coastal Management Act. This CZMP has been considered in the development of this IWCMS.

State Environmental Planning Policy (Coastal Management) 2018

The aim of this Policy is to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the Coastal Management Act 2016, including the management objectives for each coastal management area. **Table 2-3** lists the requirements of ‘Part 2 Development controls for coastal management areas’ of the policy that are applicable to the development.

***Table 2-3** –Requirements for development on land within coastal environment and coastal use areas applicable to NTDP.*

Applicable Requirements	Water cycle management actions
Division 3 Coastal environment area	
13 Development on land within the coastal environment area (1) Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following: (c) the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,	There is no development proposed within the area classified as “Coastal Environmental Area”, as mentioned in **Table 2-2**. However, some portion of the surface runoff and groundwater are discharged into the waterbodies that are classified as “Coastal Environmental Area”. The IWCMS provides means for treating both surface runoff and groundwater before discharge into the coastal environment area, meeting the management objectives and water

	quality requirements.
Division 4 Coastal use area	
14 Development on land within the coastal use area	There is no development proposed within the coastal use area.

Additionally, 'Schedule 1 Coastal Lakes' provides a list of sensitive Coastal Lakes and Other Coastal Lakes. Wallis Lake is listed as "Other Coastal Lake". The IWCMS has taken this into consideration and therefore WSUD is included throughout the development and groundwater recharges are the primary discharge methods. This will enable the groundwater level to remain at similar levels utilising stormwater infiltration via the proposed raingardens.

Marine Estate Management Act 2014

There are no marine parks or aquatic reserves adjacent to the development area and therefore this Act does not apply to the development.

Environmental Planning and Assessment Amendment Act 2017

The amendments to the EP&A Act have been considered and the IWCMS is consistent with this legislation and requirements.

Industry Guidelines

The following industry best practice guidelines have been considered when developing the IWCMS. It is noted that these guidelines provide general information and, in some cases, have specific relevance to the NTDP.

Australian Guidelines for Water Quality Monitoring and Reporting – ANZECC, 2000

These guidelines are the benchmark documents of the National Water Quality Management Strategy which are used for comparison of water quality monitoring data throughout Australia.

Australian Runoff Quality

Australian Runoff Quality (ARQ) is an industry guideline document published in 2005 by the *Institution of Engineers Australia* (IEAust). The document provides guidance on all aspects of water sensitive urban design, including preventative measures, source controls, conveyance controls and end of pipe controls.

Australian Rainfall and Runoff

Australian Rainfall and Runoff (IEAust, 1987) is a document published by the Institution of Engineers, Australia. This document has been prepared to provide designers with the best available information on design flood estimation and is widely accepted as a design guideline for all flood and stormwater related investigation and design in Australia.

A revised version of AR&R1987 was released in 2016. The revised document (AR&R2106) was not available when the initial IWCMS was developed. However, draft chapters (where available) were considered during development of the strategy. Although the latest version of AR&R2016 was not used in development of this IWCMS, it is deemed that the changes in AR&R2016 have limited impacts on the IWCMS. However, it is recommended that the detailed design of the drainage systems is conducted against the latest release of industry standard documentation.

NSW Floodplain Development Manual

The NSW Floodplain Development Manual is a document published in 2005 by the NSW State Government. The document details Flood Prone Land Policy which has the primary objective of reducing the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods. At the same time, the policy recognises the benefits from occupation and development of flood prone land.

Stormwater Biofiltration Systems – Adoption Guidelines

The *Adoption Guidelines for Stormwater Biofiltration Systems* were developed by the Facility for Advancing Water Biofiltration in 2009. This guideline contains design recommendations for biofiltration systems.

Australian Groundwater Modelling Guideline

The *Australian Groundwater Modelling Guideline (Barnett et al, 2012)* was developed by the National Centre for Groundwater Research and Training. The guideline provides details on the best practice methods for the development, calibration and application of groundwater models.

2.4 Previous Studies

The project area has been the subject of several stormwater management, hydrogeology and geotechnical studies that have been undertaken over the last 15 years. The scope of works and key outcomes of these studies are summarised below.

North Tuncurry Planning Study Drainage and Soils Investigation (Sinclair Knight Merz, 1988)

This study was commissioned by the MidCoast Council and Department of Lands in 1988 to assess drainage issues and constraints to assist in master planning of the project area. The study identified six drainage options, which included the provision of surface drainage to the Wallamba River, surface drainage to the ocean, on-site infiltration and several hybrid options.

Geotechnical Investigation North Tuncurry Planning Study – Southern Precinct (Douglas and Partners, 1988)

This study was also commissioned by MidCoast Council and the Department of Conservation and Land Management (DCLM) in 1988 as part of the master planning process. The scope of the investigation included interpretation of available data, the excavation of ten test pits, static cone penetrometer testing at two locations and the measurement of infiltration rates using a double ring infiltrometer at several locations. The report provides a general definition of the subsoil profile and groundwater conditions as well as providing recommendations for foundation and pavement subgrade design.

The study concluded that from a geotechnical perspective, the site is suitable for urban development with sand being the foundation stratum and requiring compaction prior to footing construction. The study recommended that further definition of the groundwater regime would be required to evaluate stormwater disposal options for the site.

North Tuncurry Residential Land Development – Evaluation of Trunk Drainage Strategies (GHD, 1995)

An additional study was commissioned by the Department of Lands in 1995 to further investigate drainage options for the project area. The study evaluated six stormwater / groundwater management options to identify groundwater constraints, site grading levels, potential developable area and development costs.

The study included the development of a numerical groundwater model to evaluate the performance of the various options. The model was calibrated with groundwater level data recorded at monthly intervals from twenty-one groundwater monitoring bores that were installed across the site.

The preferred option comprised on-lot infiltration systems overflowing to street drainage that would be connected to a lake system. Under this option, GHD concluded that groundwater flooding would occur on streets and low areas of open space following a major rainfall event.

North Tuncurry Development Project – Coastal Hazard and Flood Study (WorleyParsons and WMA Water 2010)

In 2009, Landcom commissioned the following studies to assess the coastal, flooding and groundwater processes within the project area and to identify associated development constraints:

- **North Tuncurry: Coastal Hazards and Planning Study (WorleyParsons, 2010):** This study recommended coastal hazard zones based on the assessment of a range of coastal hazards. This study forms the basis of the coastal hazards assessment that has been prepared for the SSS Study of the NTDP.

- **North Tuncurry: Hydrogeology Constraints (WorleyParsons, 2010):** This study included targeted field investigations and the commencement of a groundwater level and quality monitoring program which is ongoing. A numerical groundwater model was developed to assess the extent and nature of groundwater flooding at the site and to identify associated development constraints.

- **North Tuncurry: Stormwater Constraints and Opportunities Assessment (WorleyParsons, 2010):** This study reviewed the site characteristics and identified several possible stormwater management solutions.

- **North Tuncurry: Lower Wallamba River Flood Study (WMA Water, 2010):** This study included the development of hydrologic and hydraulic models to assess the extent and nature of Wallamba River flooding in the lower reaches of the Wallamba River. The study concluded that the NTDP is not constrained by Wallamba River flooding.

Relevant information from the abovementioned studies has been used in this assessment. It is noted that whilst all previous studies have been used to inform the IWCMS, the IWCMS supersedes all previous studies in the event of an inconsistency.

3 EXISTING ENVIRONMENT

This section presents and discusses data that relates to the existing environment of the project area.

3.1 Climatic Data

This section reviews available climatic information and establishes representative climatic data for use in this assessment.

3.1.1 Rainfall Records

There are three regional Bureau of Meteorology (*BoM*) operated rain gauges that are located within 1km of the coast and have long term rainfall records. **Table 3-1** presents key information and statistical data from these rain gauges.

Table 3-1 *– Local Rainfall Records*[1]

Statistics	Forster – Tuncurry Marine Rescue[2] (60013)	Harrington - Oxley Anchorage Caravan Park (60023)	Seal Rocks Camping Reserve (60028)
Rainfall Record	1896 to Present	1887 to Present	1897 to 2012
Distance from site	2km to south-east	34km to the north-east	30km to the south
Location	Within 1km of the coast	Within 1km of the coast	Within 1km of the coast
Elevation (m AHD)	4	6	4
Lowest Annual Rainfall (mm/year)	653	737	605
5th Percentile Rainfall (mm/year)	731	839	779
10th Percentile Rainfall (mm/year)	806	906	924
Average Rainfall (mm/year)	1217	1344	1323
90th Percentile Rainfall (mm/year)	1595	1797	1830
95th Percentile Rainfall (mm/year)	1706	2131	1931
Highest Annual Rainfall (mm/year)	2395	2548	2232

Note 1: Data Source: Bureau of Meteorology
Note 2: Also referred to as the Forster or South Forster Gauge

With reference to **Table 3-1**, comparison of the rainfall records from the three regional gauges indicate that the rainfall in dry, average and wet years is marginally lower at Forster than at Seal Rocks (30km to the south) and Harrington (34km to the north–east). The Forster rainfall record is the most representative data set for use in this study due to the proximity of the rain gauge to the project area (2km to the south–east). It is noted that rainfall data from other local non-BoM operated gauges has also been used in this study for model calibration purposes.

Plate 3-1 plots the annual rainfall depths recorded at Forster between 1900 and 2013. A 7-year moving average is also provided to demonstrate medium term trends over the 114-year period. The annual rainfall data demonstrates that the majority of the higher annual rainfall totals occurred in the 1920s, 1950s and 1960s and that no significant (greater than 90th Percentile) annual rainfall totals have been recorded since 1985, except for 2013 which was the third highest annual rainfall total on record.

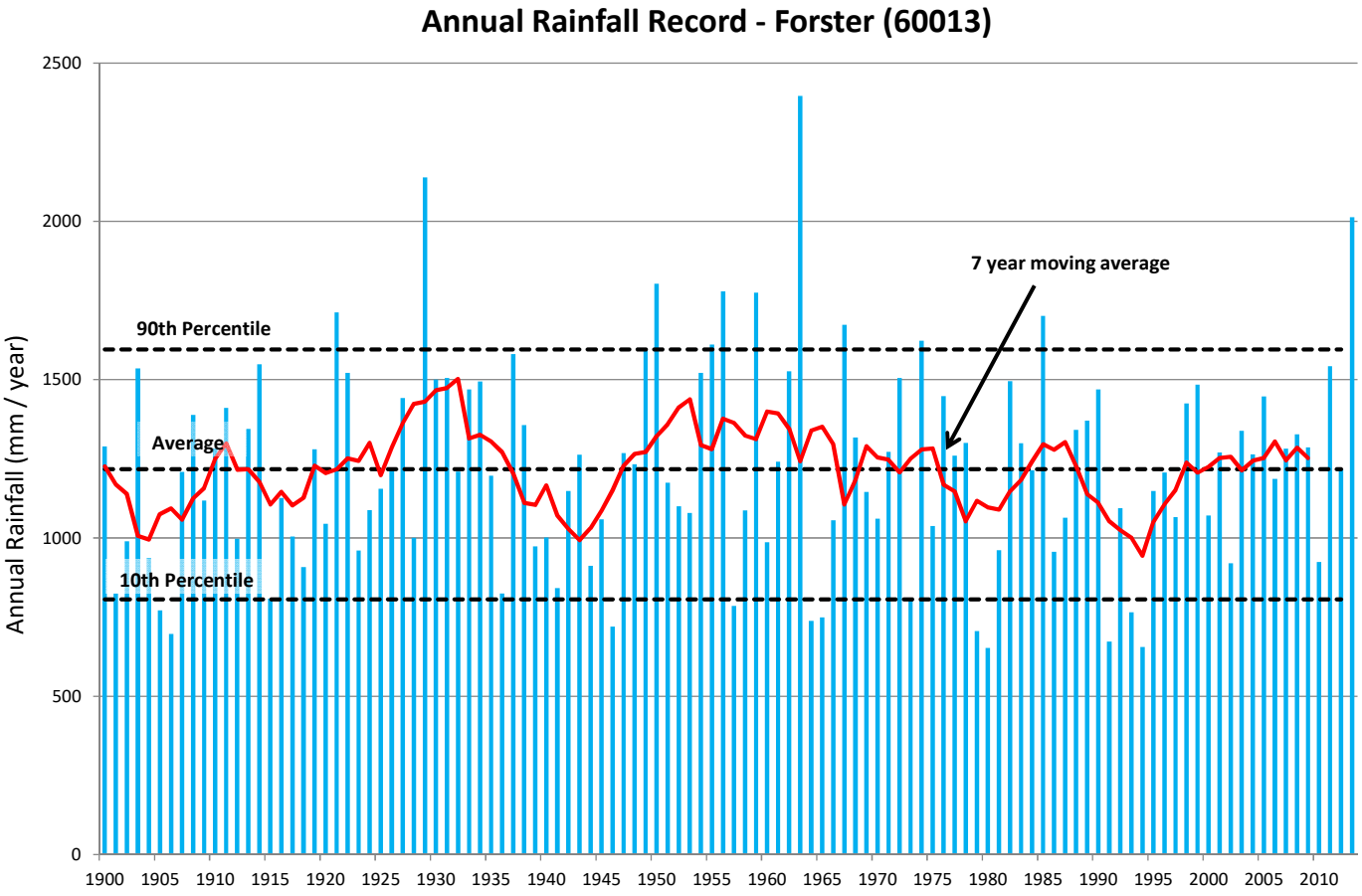

Plate 3-1 – *Annual rainfall at Forster – 60013 (Source: BoM)*

Plate 3-2 plots the average, 10th and 90th Percentile monthly rainfall totals recorded at Forster. The monthly data demonstrates that summer and autumn months are the wettest and the spring and winter months are generally drier.

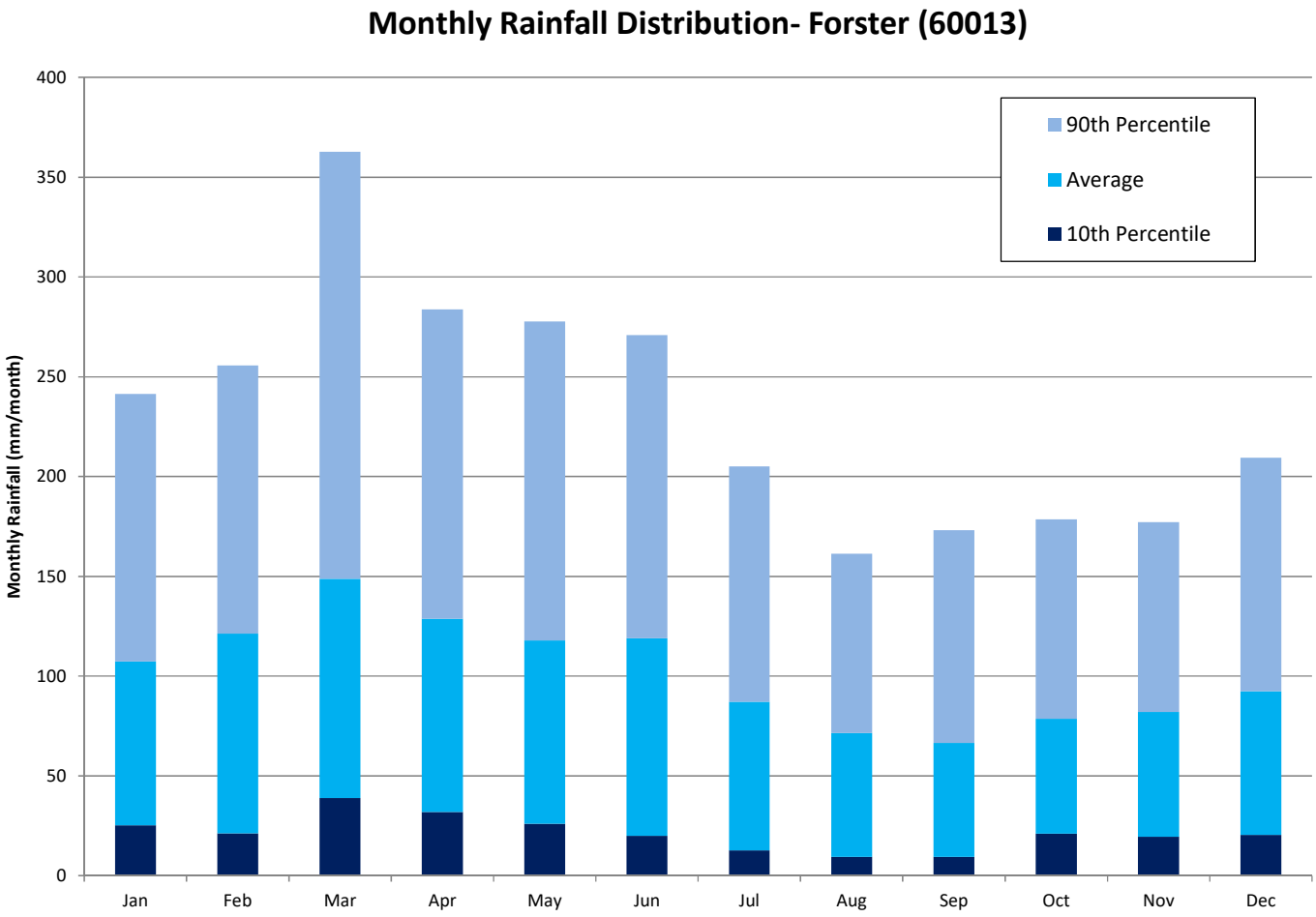

***Plate 3-2** – Monthly rainfall statistics at Forster – 60013 (Source: BoM)*

3.1.2 Evaporation Data

Estimates of regional evaporation and evapotranspiration rates are available from the following sources:

- **Regional Data** - Daily pan evaporation rates have been recorded at the BoM operated weather station at Taree Airport (60141) from 1999 to present.
- **Climate Maps** – Regional estimates of monthly evaporation and potential evapotranspiration are available from climate maps that were downloaded from the BoM website.

Table 3-2 compares average monthly rates from the above data sources.

Table 3-2 - *Average monthly evaporation and potential evapotranspiration data.*

Month	Average Monthly Pan Evaporation (mm / month)		Average Areal Potential Evapotranspiration (mm / month)
	Taree (60141)	Climate Maps (BoM)	
January	202	175	180
February	154	150	150
March	149	125	150
April	105	100	105
May	84	80	75
June	66	60	60
July	71	80	60
August	99	100	75
September	143	125	105
October	158	150	150
November	162	175	165
December	198	200	180
Annual	**1,591**	**1,520**	**1,455**

Source: Bureau of Meteorology

3.1.3 Potential Impact of Climate Change on Climatic Trends

The most recent and comprehensive estimate of projected climate change impacts in the MidCoast Council LGA is documented in a report titled "*NSW Climate Impact Profile: The Impacts of Climate Change on the Biophysical Environment of New South Wales*" (DECCW, 2010). The report predicts that:

- Maximum and minimum temperatures will increase in all seasons.
- Rainfall will increase in spring, summer and autumn but decrease in winter.
- Evaporation will increase in all seasons.

Table 3-3 presents the reported projected climate change impacts by 2050 in the MidCoast Council LGA.

***Table 3-3** – Projected climatic changes in the MidCoast Council LGA by 2050 (DECCW, 2010)*

Season	Minimum Temperature	Maximum Temperature	Rainfall	Evaporation
Spring	2 to 3°C warmer	2 to 3°C warmer	5 to 20% increase	20 to 50% increase
Summer	2 to 3°C warmer	1 to 1.5°C warmer	10 to 50% increase	10 to 20% increase
Autumn	2 to 3°C warmer	1.5 to 2°C warmer	5 to 10% increase	5 to 20% increase
Winter	2 to 3°C warmer	2 to 3°C warmer	5 to 20% decrease	10 to 20% increase

3.2 Topographic Characteristics

The topography within the project area is characterised by undulating aeolian dune systems, which have no distinct surface drainage paths as they are shaped by the wind rather than water. The dunes are stabilised by vegetation and are typically orientated along a north-south alignment, parallel to the coast. Spacing between dune crests ranges between 20 and 100 m, while the variation in height between a peak and a corresponding trough typically ranges between 0.5 to 2.5 m.

Analysis of LiDAR data indicates that surface levels within the project area range between 2 to 10 m AHD. With reference to **Plate 3-3**, which thematically shows the surface levels within the project area, the highest levels (8 to 10 m AHD) are associated with the fore dune system which is offset from the beach by approximately 100 to 150 m. The hind dune area (located to the west of the fore dune system), is characterised by lower topography, with levels typically ranging between 3 to 7 m AHD. The topography is generally higher in the western portion of the hind dune area than the eastern portion. The proposed 255 ha development area is in the hind dune area. The average surface level within the 255 ha development area is estimated (from the LiDAR) to be 5.1 m AHD.

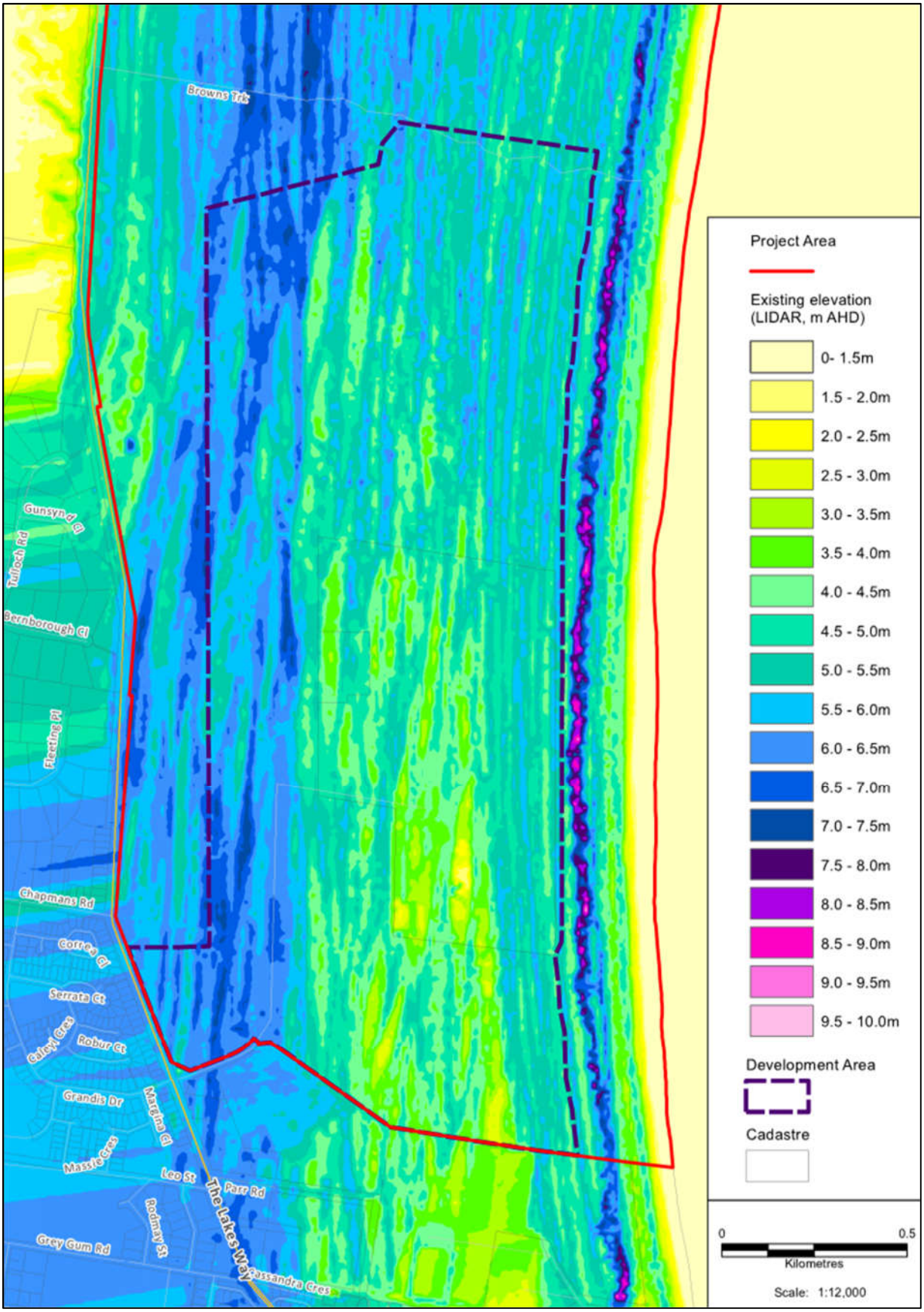

Plate 3-3 *– Existing Surface Levels within the Project Area.*

3.3 Existing Groundwater Conditions

As described above, the project area is located above an unconfined coastal aquifer. The site topography is characterised by undulating aeolian dune systems, which have no distinct surface drainage paths as they are shaped by the wind rather than water. Accordingly, all rainfall that falls over the project area is either lost to evapotranspiration processes or drains vertically through the upper soil layer into the aquifer through a process referred to as recharge. Water leaves the aquifer through both evapotranspiration processes and lateral groundwater flow to the east (to the Pacific Ocean) and to the west (the Wallamba River). The dynamics of these processes vary depending on the groundwater flow characteristics, prevailing rainfall and evapotranspiration rates.

Plate 3-4 diagrammatically describes the existing conditions groundwater regime. The various aspects of the regime are discussed in detail in subsequent sections of this report.

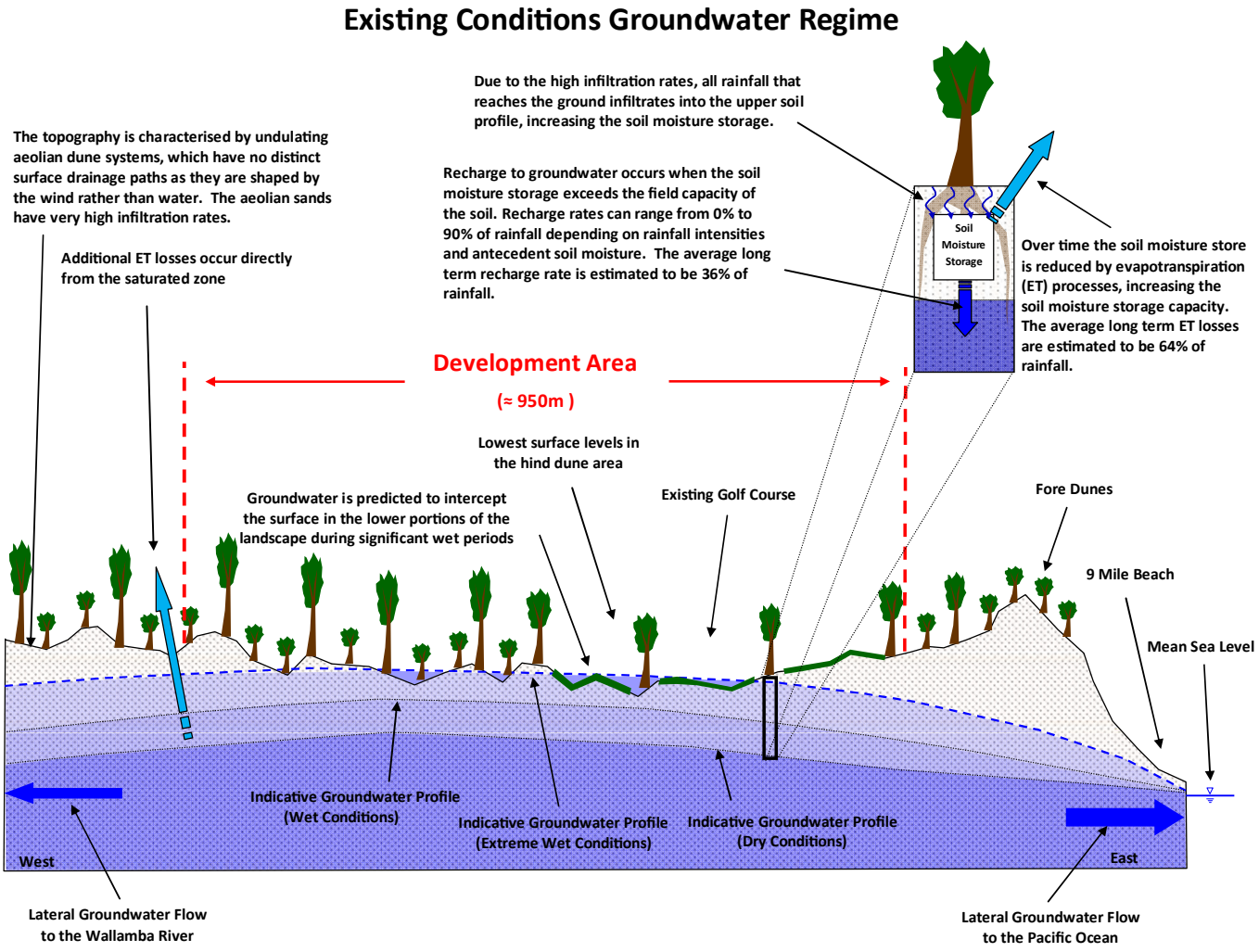

Plate 3-4 – *A diagram describing the existing conditions groundwater regime.*

A comprehensive groundwater monitoring program has been undertaken by various consultants on behalf of Landcom. The objective of the program was to establish baseline groundwater level and quality data for use in this study. This section describes the monitoring program and presents and analyses the monitoring results to established baseline groundwater conditions. The information presented in this section is also frequently referred to in subsequent sections of this report.

Description of Monitoring Program

The groundwater monitoring program commenced in March 2010 and is ongoing. Monitoring results between March 2010 and May 2013 (a 38-month period) have been used for this assessment. This period comprised a good diversity of climatic conditions including:

- A period of below average rainfall that occurred between March 2010 and June 2011.
- A period of above average rainfall that occurred between June 2011 and June 2012.
- A significant recharge event occurred between January 2013 and March 2013. Analysis presented in the Groundwater Modelling Technical Report (SMEC, 2014) established that this event was approximately a 10-year Average Recurrence Interval (ARI) event.

Monitoring included the measurement of groundwater levels and the extraction of groundwater samples for both in-situ and laboratory testing of a range of water quality analytes. Additional groundwater quality data was provided by MidCoast Water Services from several bores located within the golf course and to the south of the development area. **Plate 3-5** shows the location of monitoring bores. The following sections provide further information on the groundwater level and water quality data collected.

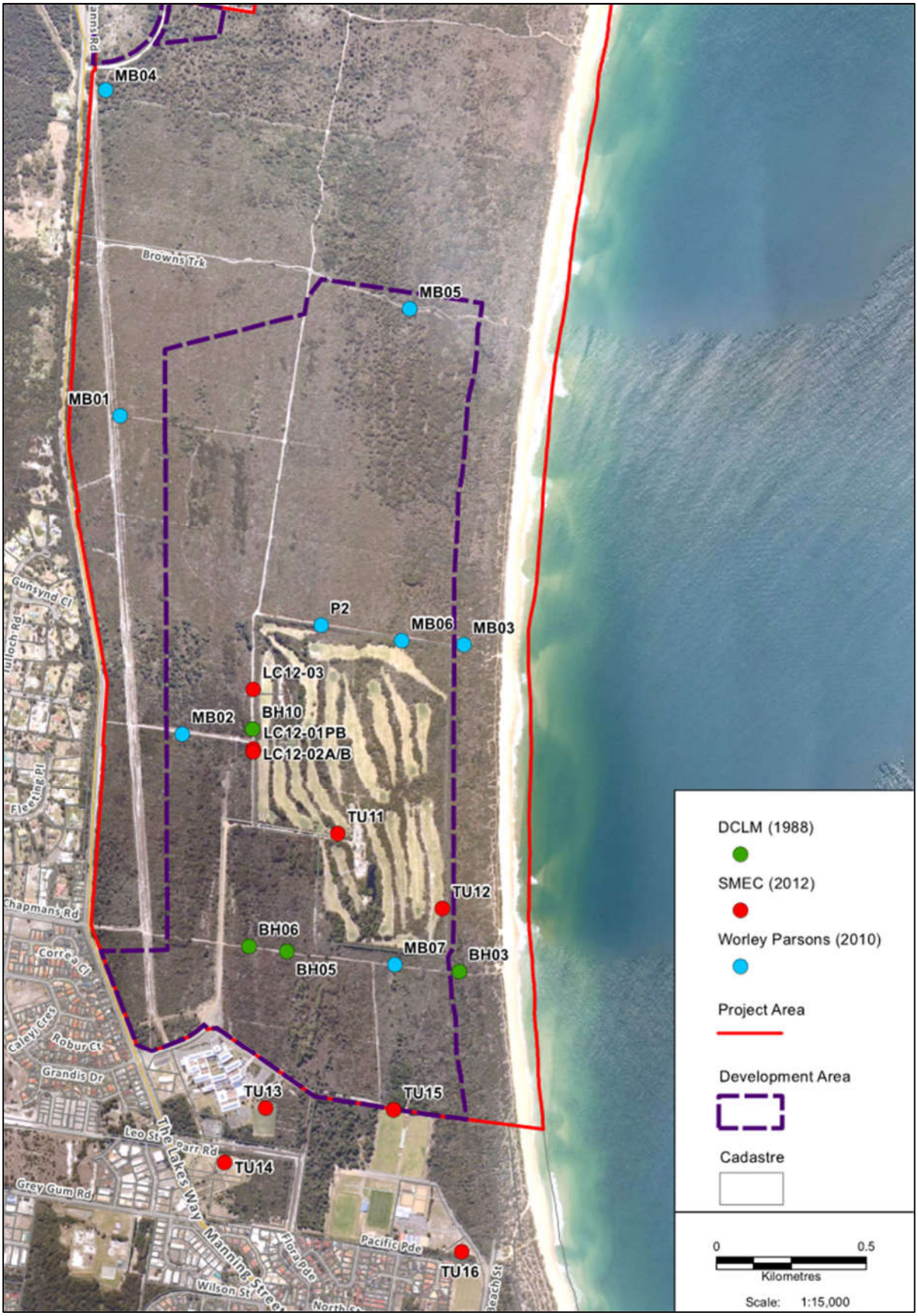

Plate 3-5 *- Location of monitoring bores.*

3.3.1 Groundwater Level Monitoring Data

The groundwater monitoring program included the following measurements of groundwater levels within the project area over the monitoring period:

- Pressure sensors were installed at MB01, MB02 (installed in March 2013) and MB05. The pressure sensors recorded the groundwater pressure at 30-minute increments over the period. The groundwater level was calculated from the pressure records following correction for atmospheric pressure.

- Spot groundwater levels were taken at most monitoring bore locations on 14 occasions over the monitoring period.

Plate 3-6 provides a summary of groundwater level data recorded over the monitoring period. Observed daily rainfall (from the South Forster BoM gauge) over the period is also provided on the secondary axis for context.

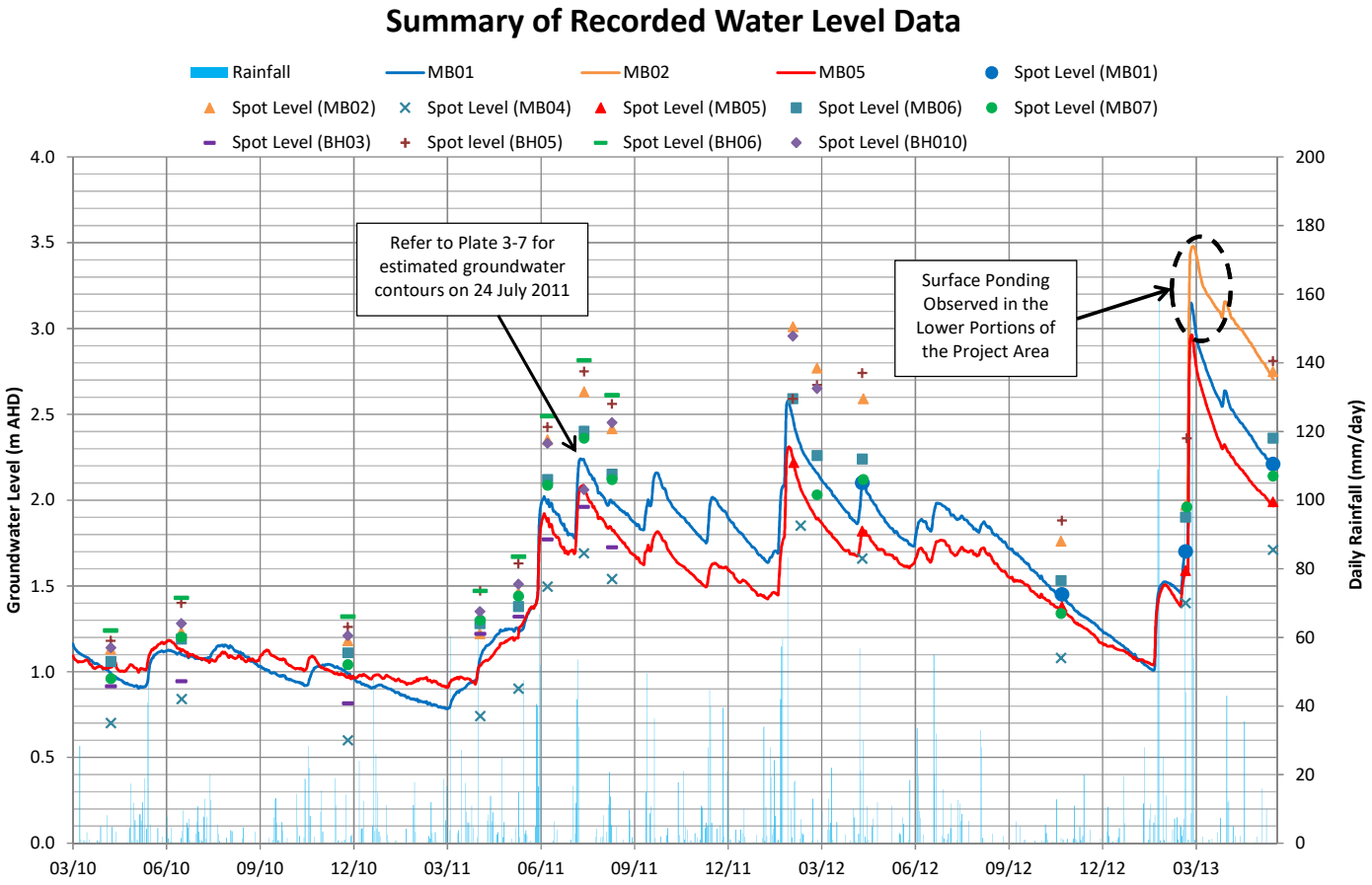

***Plate 3-6** – Observed groundwater level data*

Numerical models were established to estimate recharge and groundwater regimes within the project area. The models were developed and calibrated using available rainfall and groundwater data and other geological information. To provide context to the discussion in this section, groundwater contours on 24 July 2011 estimated using the numerical model are provided in **Plate 3-7**. As noted in **Plate 3-6**, a moderate recharge event occurred prior to 24 July 2011. Hence the groundwater contours in **Plate 3-7** are indicative of wet weather conditions. Refer to the Groundwater Modelling Technical Report (SMEC, 2014) for further information on the numerical models.

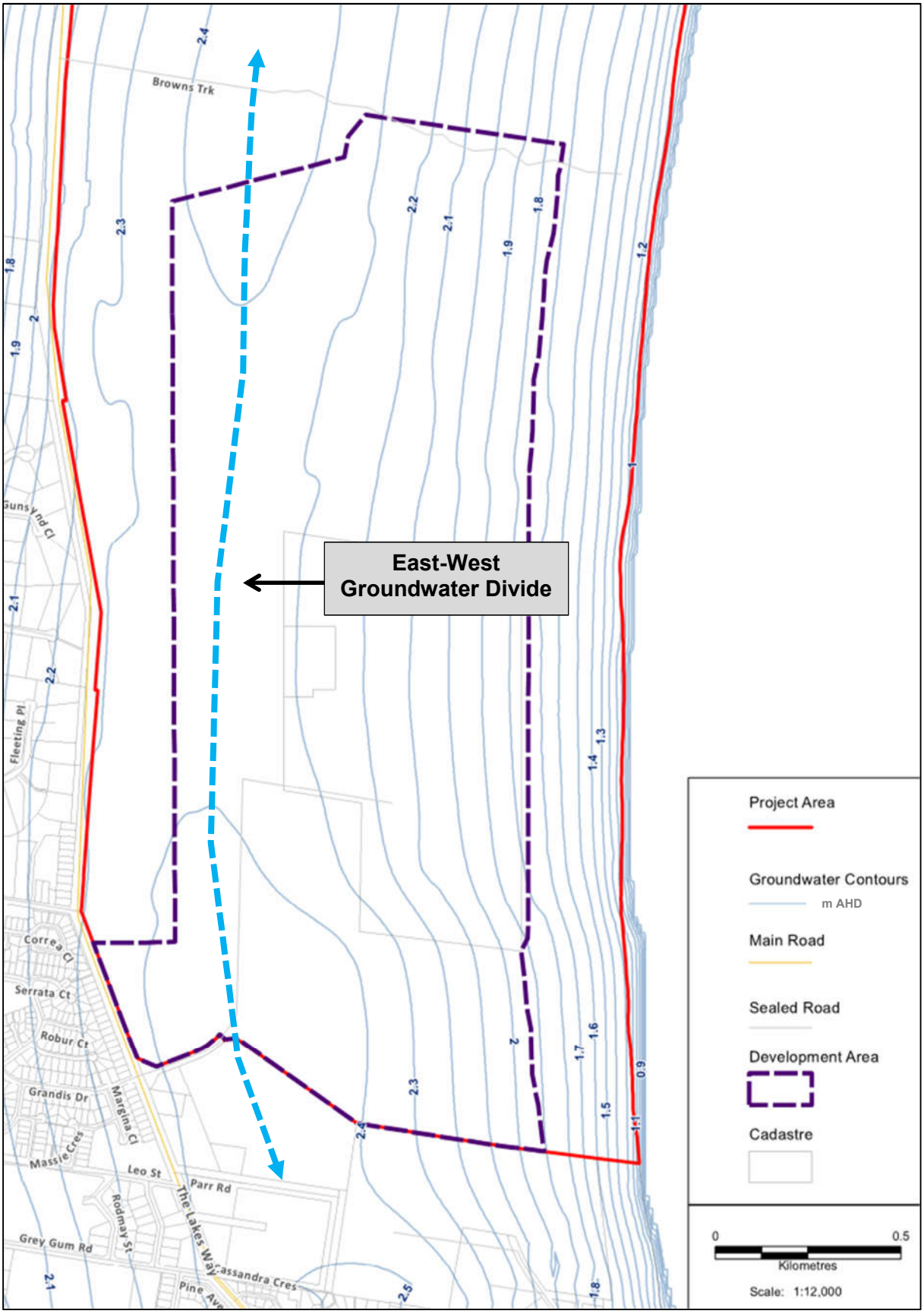

Plate 3-7 *– Indicative groundwater profile on 24 July 2011 following a recharge event*

The following observations can be made from the groundwater level data presented in **Plate 3-6** and the numerical model results presented in **Plate 3-7**:

- Recorded groundwater levels ranged from 0.6 to 3.5 m AHD over the period. The lowest groundwater levels occurred in March 2010, following an extended period of below average rainfall over the summer months. The highest levels were recorded in March 2013 following a significant (10-year ARI) recharge event. Surface ponding was observed in the lower portions of the site following this event.

- With reference to **Plate 3-7**, the east-west groundwater divide is in the western portion of the project area. Groundwater to the east of the divide flows into the Pacific Ocean to the east and groundwater to the west of the divide flows into the Wallamba River Estuary to the west. It is noted that the alignment of the groundwater divide is likely to be somewhat dynamic with model results indicating it moves further to the west under higher groundwater conditions.

- Typical variations in groundwater levels across the project area at a point in time ranged from 0.6 m during dry periods to 1.2 m during wet periods. Groundwater levels were consistently higher in the western portion of the project area than the eastern portion. This is due to the location of the groundwater divide.

- The continuously recorded groundwater level profiles at MB01, MB02 and MB05 provide a comprehensive database of the groundwater's response to rainfall over the period. The observations indicate that following a dry period, a moderate amount (100 to 150mm) of rainfall is required to initiate a recharge event. Once a recharge event is initiated, any additional rainfall is likely to result in further recharge. The recharge characteristics of the site are discussed in detail in the Groundwater Modelling Technical Report (SMEC, 2014).

Further information on the groundwater regime under existing and developed conditions is provided in the Groundwater Modelling Technical Report (SMEC, 2014).

3.3.2 Groundwater Quality Monitoring Data

A comprehensive groundwater quality monitoring program has been undertaken by SMEC on behalf of Urban Growth NSW. The program included 7 sampling rounds over the 38-month period (March 2010 to May 2013). Some additional data was provided by MidCoast Water Services from a monitoring program that they are undertaking to assess the water quality impacts associated with the irrigation of treated effluent on the golf course and existing playing fields that are located to the south of the development area.

The groundwater quality monitoring program included sampling and analysis of a full suite of water quality analyses.

Table 3-4 provides a summary of analytes tested. It is noted that the monitoring program was progressively revised to manage costs and to ensure adequate data was collected. This has resulted in some variation in the monitoring program between sampling rounds.

***Table 3-4** – Water Quality Sampling Program*

Category	Analytes Tested
In-situ Measurements	pH, Electrical Conductivity (EC) and Dissolved Oxygen (DO) were taken shortly after samples were bailed from the monitoring bores
Nutrients	• **Nitrogen** – Total Nitrogen (TN), Oxidised Nitrogen (NO_x), Ammonia, Ammonium, Nitrate, Nitrite and Total Kjeldahl Nitrogen (TKN) • **Phosphorous** – Total Phosphorus (TP) and Reactive Phosphorus
Metals	• **Dissolved Metals** – Manganese (Mn) and Iron (Fe) • **Total Metals** – Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Nickel (Ni), Lead (Pb), Zinc (Zn), Molybdenum (Mo), Selenium (Se), Silver (Ag), Tin (Sn), Iron (Fe) and Mercury (Hg)
Anions and Cations	• **Dissolved Major Cations** – Calcium (Ca), Magnesium (Mg), Sodium (Na) and Potassium (K) • **Dissolved Major Anions -** Fluoride (Fl) and Silicon (Si) • **Dissolved Ions** – Chloride (Cl) and Sulphate (SO_4)
Oxygen Demand Potential	Biological and Chemical Oxygen Demand
Olfactory Compounds	Un-ionised Hydrogen Sulphide
Biological	Faecal Coliforms (FC) and Escherichia Coli (E. Coli)
Herbicides and Pesticides	A full suite of herbicides and pesticides
Hydrocarbons	Oil and Grease and Total Petroleum Hydrocarbons (TPHs)

The following sections provide a summary of the water quality results. A full set of all results are provided in **Appendix C** of the Groundwater Modelling Technical Report (SMEC, 2014).

Nitrogen and Phosphorous Results

Groundwater quality results for nitrogen and phosphorous have been broadly arranged into the following categories:

- **Non Golf Course Bores**: are defined as bores that are located within the project area but outside of the golf course. Groundwater at these bores is expected to have originated from undisturbed bushland located within the project area.
- **Golf Course Bores**: are defined as bores that are located within the project area and are located either within the golf course or at a location where groundwater quality may be affected by the golf course. Groundwater at these bores is potentially degraded by golf course management practices such as the application of fertiliser to the golf greens and fairways.
- **MCWS Bores**: are located on existing playing fields located to the south of the development area.

Table 3-5 provides a summary of results for Organic Nitrogen (as TKN), Oxidised Nitrogen (as NOx) and Total Nitrogen (TN) and **Table 3-6** provides a summary of results for Reactive Phosphorous and Total Phosphorous (TP). A full set of all results are attached as Appendix C of the Groundwater Modelling Technical Report (SMEC, 2014).

It is noted that irrigation of treated effluent commenced at the golf course and existing playing fields that are located to the south of the development area in early 2013. The results in Appendix C of the Groundwater Modelling Technical Report (SMEC, 2014) depict the samples that were collected before and after the commencement of treated effluent irrigation.

The following key conclusions can be made from the nitrogen and phosphorus monitoring results:

- A total of 86 nitrogen and phosphorus samples have been collected over a 38-month monitoring period from 16 monitoring locations. Accordingly, the available data is considered sufficient to enable the temporal and spatial variation in nitrogen and phosphorous concentrations to be captured and key statistics such as average, 10th and 90th Percentile values to be reliably estimated.

- **Summary of Nitrogen Results**: For non-golf course bores, TN concentrations typically ranged between 0.4 (P10) to 2.1 (P90) mg/l with an average value of 1.1 mg/l. On average, TN comprised 80% organic nitrogen and 20% oxidised nitrogen. These results are considered typical for undisturbed groundwater systems. Conversely, for golf course bores, TN concentrations were significantly higher, with results typically ranging between 0.7 (P10) to 11.2 (P90) mg/l with an average value of 4.9 mg/l. On average, TN in golf course bores comprised 30% organic nitrogen and 70% oxidised nitrogen, indicating that the elevated nitrogen concentrations are associated with anthropogenic influences such as fertiliser application. Elevated TN with similar speciation characteristics was also observed at the MCWS bores. This analysis indicates that the application of fertilisers to the golf course and playing fields has resulted in elevated nitrogen concentrations in the underlying groundwater.

- **Summary of Phosphorous Results**: Phosphorous concentrations ranged considerably in both a temporal and spatial context over the period. The highest average concentrations occurred from the non-golf course bores. As phosphorous in groundwater can be readily fixed by iron, aluminium, manganese and calcium (as a function of the pH), the phosphorous data is likely to reflect geochemical conditions rather than potential anthropogenic influences.

- As mentioned previously, irrigation of recycled effluent to the golf course and the playing fields located to the south of the development area commenced in early 2013. Three sampling rounds were undertaken following the commencement of this program (Refer to **Appendix C** of the Groundwater Modelling Technical Report (SMEC, 2014) for detailed results). Nitrogen and phosphorous results from these sampling rounds were within a similar range to the pre-irrigation results, indicating that the application of recycled effluent has not resulted in increased nutrient concentrations in the groundwater. However, as data from only three sampling rounds was available further data and evaluation would be required to confirm this.

***Table 3-5** – Summary of Nitrogen Results*

	Organic Nitrogen (as TKN)			Oxidised Nitrogen (as NO_x)			Total Nitrogen (TN)		
	Min / P10[1]	Avg	Max / P90[1]	Min / P10[1]	Avg	Max / P90[1]	Min / P10[1]	Avg	Max / P90[1]
	Units for all results are **mg/l.** Results have been rounded to 1 decimal place								
Non Golf Course Bores									
MB01	0.1	0.4	0.6	0.0	0.1	0.1	0.1	0.4	0.8
MB02	0.4	0.6	0.8	0.0	0.1	0.1	0.4	0.7	0.8
MB04	0.9	2.2	3.3	0.0	0.3	1.3	0.9	2.7	4.6
MB05	0.4	0.9	1.4	0.0	0.0	0.1	0.4	0.9	1.4
BH05	0.2	0.4	0.6	0.2	0.5	0.6	0.5	0.8	1.2
LC12-03	0.2	0.5	1.1	0.3	0.5	0.5	0.5	0.9	1.6
All Bores	**0.2**	**0.8**	**2.1**	**0.0**	**0.2**	**0.6**	**0.4**	**1.1**	**2.1**
Golf Course Bores									
MB06	1.2	1.6	2.1	0.8	2.0	3.3	2.2	3.6	4.9
MB07	0.4	0.8	1.1	0.0	0.1	0.1	0.5	0.8	1.1
P2	1.2	1.4	1.6	0.0	0.0	0.0	1.2	1.4	1.6
TU11[2]	0.4	1.7	2.9	1.6	5.8	15.6	3.1	7.3	17.2
TU12[2]	0.7	1.4	2.9	0.9	8.9	17.2	2.2	10.2	20.0
Golf Course Pond[3]	0.4	0.6	0.8	0.0	0.1	0.1	0.5	0.7	0.9
All Bores	**0.5**	**1.3**	**2.1**	**0.0**	**3.6**	**9.9**	**0.7**	**4.9**	**11.2**
MCWS Bores (located on existing playing fields to the south of the development area)									
TU13[2]	0.1	0.8	1.9	0.6	4.4	8.0	1.2	5.2	9.4
TU14[2]	0.2	0.3	0.5	0.0	0.6	2.5	0.3	0.9	2.9
TU15[2]	0.9	1.0	1.0	0.1	0.4	0.9	1.1	1.3	1.7
TU16[2]	0.0	0.5	0.7	0.7	1.5	2.5	1.3	2.0	3.2
All Bores	**0.2**	**0.6**	**1.0**	**0.1**	**1.7**	**5.0**	**0.5**	**2.4**	**6.0**
Summary of All Results									
All Results	**0.3**	**1.0**	**1.9**	**0.0**	**1.9**	**6.1**	**0.5**	**2.9**	**7.5**

Note 1 – Minimum and maximum values have been reported for each monitoring location. 10th and 90th Percentile values are reported for totals (in bold).

Note 2 – Some data was provided by MidCoast Water Services.

Note 3 – Golf Course Pond is a surface water sample.

***Table 3-6** – Summary of Phosphorous Results*

	Reactive Phosphorous			Total Phosphorous (TP)		
	Min / P10[1]	Avg	Max / P90[1]	Min / P10[1]	Avg	Max / P90[1]
	Units for all results are **mg/l.** Results have been rounded to 2 decimal places.					
Non Golf Course Bores						
MB01	0.01	0.01	0.01	0.05	0.12	0.18
MB02	0.01	0.01	0.01	0.11	0.21	0.27
MB04	0.05	0.21	0.32	0.32	0.41	0.48
MB05	0.01	0.02	0.03	0.02	0.14	0.33
BH05	0.01	0.01	0.01	0.01	0.13	0.39
LC12-03	0.02	0.09	0.23	0.02	0.09	0.23
All Bores	**0.01**	**0.06**	**0.22**	**0.02**	**0.18**	**0.42**
Golf Course Bores						
MB06	0.01	0.02	0.06	0.02	0.08	0.11
MB07	0.01	0.02	0.03	0.16	0.62	1.02
P2	0.01	0.01	0.01	0.05	0.10	0.17
TU11[2]	0.01	0.02	0.04	0.02	0.04	0.07
TU12[2]	0.00	0.01	0.01	0.02	0.04	0.07
Golf Course Pond[3]	0.06	0.08	0.09	0.04	0.10	0.13
All Bores	**0.01**	**0.02**	**0.06**	**0.02**	**0.15**	**0.44**
MCWS Bores (located on existing playing fields to the south of the development area)						
TU13[2]	0.02	0.02	0.02	0.03	0.03	0.03
TU14[2]	0.01	0.02	0.02	0.03	0.04	0.04
TU15[2]	0.02	0.03	0.03	0.04	0.05	0.05
TU16[2]	0.02	0.02	0.02	0.02	0.03	0.03
All Bores	**0.02**	**0.02**	**0.03**	**0.03**	**0.03**	**0.05**
Summary of All Results						
All Results	**0.01**	**0.03**	**0.06**	**0.02**	**0.13**	**0.33**

Note 1 – Minimum and maximum values have been reported for each monitoring location. 10th and 90th Percentile values are reported for totals (in bold).

Note 2 – Some data was provided by MidCoast Water Services.

Note 3 – Golf Course Pond is a surface water sample.

Other Water Quality Results

Water quality results for the following analytes are summarised in **Table 3-7**:

- In-situ measurements (pH, DO and EC);
- All metals, anions and cations sampled (as listed in **Table 3-4**);
- Biological Oxygen Demand and Chemical Oxygen Demand;
- Olfactory compounds (i.e. hydrogen sulphide); and
- Biological Compounds (i.e. Faecal Coliforms and E-Coli).

All results are compared to relevant trigger values where available. Values exceeding the relevant trigger values (or range) are shaded in the table. A full set of all results are attached as **Appendix C** of the Groundwater Modelling Technical Report (SMEC, 2014).

The following key conclusions can be made from the water quality results presented in **Table 3-7**:

- In-situ pH measurements were typically between 5 and 7 indicating the groundwater is mildly acidic.
- EC and TDS results confirmed that the groundwater is fresh water, with no evidence of salt water intrusion at any bore hole.
- Elevated iron concentrations were detected at most monitoring locations. Elevated iron is common in groundwater systems that are characterised by marine geology and mildly acidic groundwater. When exposed to oxygen, iron in the groundwater is likely to oxidise, forming an orange / brown coloured precipitate. This is likely to occur in areas where groundwater seeps into a surface water body or if untreated groundwater is used within dwellings as an alternative non-potable water supply. Elevated iron can also be an indicator of acid sulphate soils.
- Elevated hydrogen sulphide (rotten egg gas) was detected at MB01, MB02, MB04 and MB05. The highest results were at MB04 (which is outside of the development area) where odours were clearly noticeable during sampling. These results indicate that there is potential for elevated hydrogen sulphide levels to exist in groundwater within the northern and western portions of the development area. This may create odour issues in areas where groundwater is exposed to the surface (i.e. where groundwater seeps into an open basin) or if untreated groundwater is used within dwellings as an alternative non-potable water supply. Hydrogen sulphide can also be an indicator of acid sulphate soils.
- Some results for Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Selenium and Zinc were above ANZECC trigger values for slightly to moderately disturbed ecosystems. It is expected that these results are associated with the natural geochemical characteristic of the aquifer and the mildly acidic groundwater.

***Table 3-7** – Summary of other water quality results*

Analyte & Units	Relevant Trigger Value	LOR[4]		Non Golf Course Bores						Golf Course Bores				
				MB01	MB02	MB04	MB05	BH05	LC12-03	MB06	MB07	P2	TU11	GC Pond
pH (field)	6.5 – 8[1]	0.1	Samples	5	5	5	5	3	4	5	5	3	4	4
			Min	4.5	5.0	4.5	5.3	5.5	5.5	5.1	5.8	4.2	6.4	6.5
			Avg	5.1	5.7	5.2	5.8	5.7	6.5	5.8	6.3	4.9	6.6	7.0
			Max	5.6	7.1	6.0	7.1	5.9	7.6	7.5	7.0	5.6	6.8	7.5
pH (Lab)	6.5 – 8[1]	5	Samples	6	6	5	7	7	3	7	5	0	0	0
			Min	5.6	5.8	5.4	5.7	6.7	7.1	5.9	6.5	-	-	-
			Avg	6.1	6.5	5.7	6.6	6.8	7.3	6.5	6.9	-	-	-
			Max	8.0	8.1	6.1	7.9	6.8	7.5	7.9	7.4	-	-	-
Electrical Conductivity (µS/cm)	-	1	Samples	6	6	6	7	3	3	7	6	3	4	4
			Min	102	158	122	126	138	247	114	142	300	328	383
			Avg	116	285	293	354	152	261	405	201	517	386	407
			Max	144	366	384	487	165	274	652	230	733	480	425
Total Dissolved Solids (mg/l)	-	5	Samples	5	5	5	6	3	3	6	5	2	2	2
			Min	65	136	186	227	93	110	238	110	194	213	257
			Avg	71	186	217	275	99	164	292	186	335	222	267
			Max	84	232	292	318	111	205	382	300	476	231	276
Dissolved Oxygen (mg/l)	-	0.1	Samples	4	3	5	4	3	2	4	4	2	3	3
			Min	6.0	4.2	4.9	4.5	5.0	6.5	4.1	3.8	6.9	1.2	5.1
			Avg	6.6	4.7	6.0	5.9	6.9	6.6	6.0	6.2	8.6	6.1	9.1
			Max	7.4	5.7	8.1	7.9	9.0	6.7	8.1	9.0	10.2	9.4	14.7
Faecal Coliforms (CFU/100ml)	-	2	Samples	4	4	5	5	3	2	5	3	-	4	-
			Min	2	2	2	2	2	2	2	2	-	2	-
			Avg	4	4	5	4	2	2	2	32	-	2	-
			Max	10	10	10	10	2	2	2	62	-	2	-
Escherichia coli (CFU/100ml)	-	2	Samples	5	5	5	6	3	2	6	4	-	-	-
			Min	2	2	2	2	2	2	2	2	-	-	-
			Avg	5	5	5	5	2	2	3	27	-	-	-
			Max	10	10	10	10	2	2	10	62	-	-	-
Biological Oxygen Demand (mg/l)	-	2	Samples	4	4	5	5	3	2	5	3	-	4	-
			Min	2	2	2	2	2	2	2	2	-	2	-
			Avg	2	2	23	2	2	2	2	2	-	2	-
			Max	2	2	31	2	2	2	2	2	-	2	-
Chemical Oxygen Demand (mg/l)	-	2	Samples	4	4	5	5	3	2	5	3	-	-	-
			Min	16	18	97	45	9	5	32	67	-	-	-
			Avg	22	32	117	78	12	12	63	73	-	-	-
			Max	34	54	145	111	18	18	88	81	-	-	-
Un-ionised Hydrogen Sulfide (mg/l)	0.05[3]	0.01	Samples	4	4	5	5	3	3	5	4	-	-	-
			Min	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-
			Avg	0.02	0.02	0.08	0.03	0.01	0.02	0.03	0.01	-	-	-
			Max	0.05	0.06	0.17	0.10	0.02	0.04	0.10	0.01	-	-	-
Total Hardness as $CaCO_3$ (mg/l)	-	1	Samples	4	4	5	5	3	3	5	4	-	-	-
			Min	8	17	17	26	43	61	33	53	-	-	-
			Avg	8	24	24	45	45	72	55	59	-	-	-
			Max	8	33	35	60	48	83	78	78	-	-	-
Total Alkalinity as $CaCO_3$ (mg/l)	-	1	Samples	5	5	5	6	3	3	6	5	-	-	-
			Min	1	13	8	1	32	57	11	53	-	-	-
			Avg	3	27	11	19	35	63	30	60	-	-	-
			Max	4	44	15	32	37	74	100	68	-	-	-
Sulfate as SO_4 (mg/l)	-	1	Samples	5	5	5	6	3	3	6	5	-	-	-
			Min	3	2	5	5	2	4	6	1	-	-	-
			Avg	4	11	8	8	3	5	22	6	-	-	-
			Max	5	17	13	18	4	6	34	13	-	-	-

Analyte & Units	Relevant Trigger Value	LOR[4]		Non Golf Course Bores						Golf Course Bores				
				MB01	MB02	MB04	MB05	BH05	LC12-03	MB06	MB07	P2	TU11	GC Pond
Chloride (mg/l)	-	1	Samples	5	5	6	6	3	3	6	6	-	-	-
			Min	4	25	67	42	15	29	66	21	-	-	-
			Avg	23	65	80	91	19	32	100	35	-	-	-
			Max	42	80	106	122	24	37	180	85	-	-	-
Arsenic (mg/l)	0.001[2]	0.001	Samples	6	6	6	7	3	3	7	6	2	3	3
			Min	0.001	0.001	0.001	0.007	0.001	0.001	0.001	0.010	0.006	0.004	0.007
			Avg	0.003	0.007	0.009	0.010	0.001	0.001	0.003	0.014	0.015	0.005	0.011
			Max	0.009	0.024	0.035	0.016	0.001	0.001	0.008	0.022	0.024	0.006	0.014
Cadmium (mg/l)	0.0002[2]	0.0001	Samples	6	6	6	7	3	3	7	6	2	3	3
			Min	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
			Avg	0.0002	0.0002	0.0001	0.0026	0.0001	0.0001	0.0002	0.0003	0.0001	0.0001	0.0001
			Max	0.0005	0.0005	0.0002	0.0174	0.0001	0.0001	0.0005	0.0005	0.0001	0.0001	0.0001
Chromium (mg/l)	0.001[2]	0.001	Samples	6	5	6	7	3	3	7	6	2	3	3
			Min	0.001	0.004	0.002	0.002	0.001	0.001	0.003	0.004	0.006	0.002	0.001
			Avg	0.006	0.019	0.003	0.008	0.001	0.001	0.005	0.008	0.007	0.003	0.001
			Max	0.021	0.069	0.004	0.020	0.001	0.001	0.010	0.016	0.007	0.004	0.001
Copper (mg/l)	0.001[2]	0.001	Samples	6	6	6	7	3	3	7	6	2	3	3
			Min	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001	0.001
			Avg	0.003	0.006	0.003	0.003	0.001	0.001	0.002	0.011	0.002	0.001	0.001
			Max	0.006	0.023	0.005	0.008	0.001	0.001	0.005	0.016	0.002	0.001	0.001
Iron (Dissolved) (mg/l)	0.3[3]	0.05	Samples	4	4	5	5	3	3	5	4	2	3	3
			Min	0.05	0.68	1.72	2.12	0.05	0.05	0.09	0.20	6.42	0.18	0.12
			Avg	0.08	1.35	2.31	3.35	0.05	0.05	0.30	0.29	6.45	0.28	0.17
			Max	0.10	1.64	3.54	4.50	0.05	0.05	0.81	0.44	6.47	0.38	0.26
Iron (Total) (mg/l)	0.3[3]	0.05	Samples	4	4	5	5	3	3	5	4	2	3	3
			Min	0.33	5.01	2.34	3.09	0.06	0.13	0.43	13.80	7.68	0.55	0.32
			Avg	0.98	5.86	4.13	4.82	0.22	0.25	0.67	16.90	8.34	0.78	0.55
			Max	2.03	7.48	7.23	5.60	0.32	0.38	1.13	23.30	8.99	0.92	0.88
Lead (mg/l)	0.003[2]	0.001	Samples	6	6	6	7	3	3	7	6	2	3	3
			Min	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.039	0.020	0.001	0.001
			Avg	0.007	0.016	0.008	0.006	0.003	0.001	0.005	0.057	0.023	0.001	0.001
			Max	0.028	0.062	0.016	0.022	0.006	0.001	0.010	0.087	0.025	0.001	0.001
Manganese (mg/l)	1.9[2]	0.001	Samples	4	4	5	5	3	3	5	4	2	3	3
			Min	0.005	0.101	0.013	0.009	0.001	0.001	0.019	0.065	0.024	0.002	0.003
			Avg	0.010	0.135	0.027	0.024	0.002	0.001	0.021	0.089	0.046	0.004	0.007
			Max	0.016	0.161	0.058	0.033	0.003	0.001	0.024	0.104	0.068	0.006	0.010
Mercury (mg/l)	0.00006[2]	0.0001	Samples	6	6	6	7	3	3	7	6	2	3	3
			Min	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
			Avg	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001
			Max	0.0002	0.0003	0.0001	0.0001	0.0001	0.0001	0.0010	0.0003	0.0001	0.0001	0.0001
Molybdenum (mg/l)	-	0.001	Samples	6	6	6	7	3	3	7	6	2	3	3
			Min	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
			Avg	0.002	0.002	0.005	0.002	0.001	0.001	0.002	0.002	0.001	0.001	0.001
			Max	0.005	0.005	0.022	0.005	0.001	0.001	0.005	0.005	0.001	0.001	0.001
Nickel (mg/l)	0.011[2]	0.001	Samples	6	6	6	7	3	3	7	6	2	3	3
			Min	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.007	0.001	0.001	0.001
			Avg	0.002	0.010	0.002	0.003	0.001	0.001	0.002	0.008	0.004	0.001	0.001
			Max	0.006	0.028	0.004	0.005	0.001	0.001	0.005	0.011	0.006	0.001	0.001
Selenium (mg/l)	0.005	0.01	Samples	6	6	6	7	3	3	7	6	2	3	3
			Min	0.005	0.005	0.005	0.005	0.010	0.010	0.005	0.005	0.010	0.010	0.010
			Avg	0.009	0.008	0.009	0.009	0.010	0.010	0.009	0.016	0.010	0.010	0.010
			Max	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.038	0.010	0.010	0.010

Analyte & Units	Relevant Trigger Value	LOR[4]		Non Golf Course Bores						Golf Course Bores				
				MB01	MB02	MB04	MB05	BH05	LC12-03	MB06	MB07	P2	TU11	GC Pond
Silver (mg/l)	0.00005[2]	0.001	Samples	6	6	6	7	3	3	7	6	2	3	3
			Min	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
			Avg	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
			Max	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Tin (mg/l)	-	0.001	Samples	6	6	6	7	3	3	7	6	2	3	3
			Min	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
			Avg	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.002	0.001	0.001	0.001
			Max	0.005	0.005	0.005	0.005	0.001	0.001	0.005	0.005	0.001	0.001	0.001
Zinc (mg/l)	0.008[2]	0.005	Samples	6	6	6	7	3	3	7	6	2	3	3
			Min	0.001	0.001	0.001	0.007	0.005	0.005	0.005	0.028	0.011	0.005	0.005
			Avg	0.012	0.030	0.016	0.026	0.007	0.005	0.012	0.647	0.014	0.005	0.005
			Max	0.043	0.110	0.040	0.064	0.012	0.006	0.018	2.110	0.016	0.005	0.005

Note 1: Default trigger value for physical and chemical stressors for south-east Australia for slightly disturbed ecosystems as defined in Table 3.3.2 of the ANZECC 2000 guidelines have been applied as the relevant trigger value.

Note 2: Trigger values for slightly-moderately disturbed systems as defined in Table 3.4.1 of the ANZECC 2000 guidelines have been applied as the relevant trigger value.

Note 3: Aesthetic guideline values from Table 10.5 from the Australian Drinking Water Guidelines (Australian Government, 2011) have been applied as the relevant trigger value.

Note 4: Results that were reported below the Limit of Reporting (LOR) have been set at the LOR level for the purposes of statistical calculations. This may inflate some average and minimum values.

Herbicide and Pesticides Results

Limited testing of a full suite of herbicide and pesticides was undertaken. All results were below detection limits indicating that there is no significant herbicide and pesticide contamination within the groundwater at the monitoring locations. Refer to **Appendix C** of the Groundwater Modelling Technical Report (SMEC, 2014) for all results.

Hydrocarbon Results

Limited testing for oil and grease and TPHs was undertaken. The majority of results were below detection limits indicating that there is no significant hydrocarbon contamination within the groundwater at the monitoring locations. Refer to **Appendix C** of the Groundwater Modelling Technical Report (SMEC, 2014) for all results.

3.4 Geological Conditions

This section discusses the geological characteristics that are relevant to this assessment.

Summary of Field Investigations and Data Collection

As discussed in **Section 2**, geotechnical investigations have been previously undertaken by Douglas Partners in 1988, WorleyParsons in 2010 and by SMEC in 2012. The following field investigations were undertaken as part of these studies:

- 10 test pits were excavated to approximately 2.5 m depth as part of the 1988 Douglas Partners study.

- It is understood that twenty-one boreholes (BH01 to BH021) were installed within the project area by the Department of Conservation and Land Management in 1988. Of the twenty-one existing boreholes, only 4 boreholes (BH03, BH05, BH06 and BH010) were located by WorleyParsons as part of the 2010 study.

- An additional seven monitoring bores were established by WorleyParsons in 2010. These bores were established to a depth of approximately 6m and are referred to as MB01, MB02, MB03, MB04, MB05, MB06 and MB07.

- Four additional boreholes were established by SMEC in 2012 as part of the pump test that was undertaken. These boreholes were established to the base of the sand deposits (depths of 25 to 30 m) and are referred to as LC12-01 PB, LC12-02 MB A, LC 12-02 MB B and LC12-03.

Refer to the Groundwater Modelling Technical Report (SMEC, 2014) for further information on these bores.

Interpreted Geological Profiles

The data collected from the geological investigations described above indicate that the development area comprises relatively homogeneous geological characteristics, with fine to medium aeolian sands encountered in all test pits and boreholes. The deeper boreholes drilled by SMEC in 2012 encountered fine to medium marine sands at 12 m below ground level (mbgl) and marine clays from 24 mbgl. Importantly, no low permeability material such as clay or indurated sands has been encountered in any borehole or test pit to date. This indicates that no significant geological barriers to groundwater flow exist within the development area.

Photos 1 and **2** show examples of the sandy soils that exist throughout the development area. **Table 3-8** presents a geological profile that has been interpreted from available data. The local and regional geology is discussed further in the Groundwater Modelling Technical Report (SMEC, 2014).

Photo 1 *on the left shows the sandy soils that are encountered throughout the development area.* ***Photo 2*** *on the right shows sand extracted during the development of production borehole LC 12-01 PB.*

***Table 3-8** – Interpreted Geological Profiles*

Geological Layer	Depth	Description
Holocene Aeolian Sands (Top Soil)	0 to 0.5 mbgl	**Sand:** Fine to medium with organic matter and roots.
Holocene Aeolian Sands (below 0.5 metres)	From 0.5 to 12 mbgl	**Sand**: Fine to medium, moderately sorted with shells. Some roots encountered.
Holocene Marine Sands	From 12 to 24 mbgl	**Sand**: Fine to medium, moderately sorted with shells and some occasional clay bands.
Marine Clay	From 24 mbgl	**Sandy Clay**: Dark grey, high plasticity with fine to medium sand

Note: No geotechnical data is available for the northern employment lands that are detached from the primary development area.

Surface Infiltration Testing

Infiltration rates vary in response to soil water content and the hydraulic properties of the soil. During rainfall events, the initial infiltration rates tend to be rapid if the soils are dry. As rainfall continues and the soil water content increases towards saturation, the infiltration rates decrease towards the saturated hydraulic conductivity. Rainfall rates which exceed infiltration rates give rise to surface runoff. Understanding this relationship is important to investigations of stormwater as well as the processes affecting soil water flux and the rainfall recharge to groundwater.

Surface infiltration testing using a Double Ring Infiltrometer was undertaken by SMEC in 2012 (4 test locations) and Douglas Partners in 1988 (2 test locations). Test locations are indicated in **Plate 3-8**.

Plate 3-8 *– Surface Infiltration Test Locations*

Table 3-9 provides a summary of the saturated hydraulic conductivity derived from the Double Ring Infiltrometer tests. With reference to **Plate 3-8**, surface infiltration tests at IT 1 to IT 5 were undertaken on undisturbed soil. The estimated saturated conductivity from these tests ranged from 432 mm/hr to 1,700 mm/hr, with an average rate of 954 mm/hr. A significantly lower rate was reported at IT 6, which was located on a golf fairway. This lower rate is most likely due to a thin layer of topsoil that would have been imported to establish the golf fairway. The IT 6 result (70 mm/hr) is indicative of surface infiltration rates of any lawn areas that are established within the NTDP. Given that the average rainfall intensity for a one-hour duration 100-year Average Recurrence Interval (ARI) event is approximately 80 mm/hr, surface runoff is generally not expected to occur from pervious areas within the development area.

Table 3-9 *– Saturated Hydraulic Conductivity Results*

Infiltration Test Site	Saturated hydraulic conductivity at soil surface (mm/h)	Test location
IT1 (SMEC)	960	Undisturbed soil
IT2 (SMEC)	432	Undisturbed soil
IT3 (SMEC)	1140	Undisturbed soil
IT4 (SMEC)	540	Undisturbed soil
IT5 (DP)[1]	1700	Undisturbed soil
IT6 (DP)[1]	70	Golf fairway

Note 1: Data sourced from Douglas Partners (1988)

4 WATER CYCLE MANAGEMENT STRATEGY OBJECTIVES

Table 4-1 outlines and rationalises the key objectives that have been applied to the development of the IWCMS. Detailed information on the various components of the IWCMS are provided in the following sections:

- **Section 5** details the integrated stormwater and groundwater management strategy for the project. **Section 5** is supported by groundwater modelling which is documented separately in the Groundwater Modelling Technical Report (SMEC, 2014) and the water quality modelling that is documented in **Section 6**.
- **Section 7** describes the conceptual civil design that has been prepared for the project.
- **Section 8** provides an overview of the proposed water and wastewater servicing strategies, which are documented in the following technical reports:
    - Water Servicing Strategy (SMEC, 2014); and
    - Wastewater Servicing strategy (SMEC, 2014)
- **Section 9** details the proposed potable water demand reduction strategy that includes an assessment of water efficiency measures and alternative non-potable water supply options.
- **Section 10** summarises the management measures applied to achieve the IWCMS objectives presented in **Table 4-1.**

***Table 4-1** – Water management objectives and rationale.*

Water Management and Design Objective	Rationale
Groundwater and Surface Water Flood Management Objectives	
Manage nuisance flooding within the development area.	If unmitigated, groundwater flooding is expected in the lower portions of the development area for extended (1 to 2 month) periods following a major groundwater flooding event. In SMEC's view, this would be considered unacceptable by the future community.
Construct all habitable floor levels at least 500 mm above the predicted 100-year ARI groundwater or surface water flood levels.	This is a standard flood risk management measure applied in NSW.
Prevent groundwater from saturating road bases for extended periods of time.	Road pavements are likely to be damaged or fail if the road base is saturated for an extended period as a result of groundwater inundation.
Maintain or reduce the existing level of flood risk to the golf course greens and fairways.	Under existing conditions, groundwater flooding would occur in the lower portions of the development area for extended (1 to 2 month) periods following a major groundwater flooding event. This is likely to result in grass kill in the lower portions of the golf course. As greens and fairways can take over 1 year to fully recover, a significant grass kill event could have major ramifications for the golf club.
Maintain or reduce the existing level of flood risk to local properties and infrastructure that are near the development area.	This is a standard flood risk management measure applied in NSW.
Establish a groundwater and surface water management system that is simple to operate and easy to maintain.	To maximise the system's long-term effectiveness and minimise the long-term maintenance costs.
Groundwater Management Objectives	
Establish groundwater management measures to ensure that any groundwater extraction within the development area can be appropriately managed and regulated.	Uncontrolled groundwater extraction has the potential to significantly lower groundwater levels during dry and average conditions. The uncontrolled lowering of groundwater levels may lead to salt water intrusion into the aquifer and other significant impacts such as a reduction in pH and the liberalisation of metals in groundwater.
Establish stormwater and groundwater management controls that mitigate potential water quantity impacts associated with the development.	The introduction of an urban landscape to the development area will result in some unavoidable impacts to the local groundwater regime due to the expected increase in runoff volumes. Stormwater and groundwater management controls can be implemented to mitigate water quality and hydrologic impacts.

Water Management and Design Objective	Rationale
Water Quality Management Objectives	
Establish preventative measures to minimise the generation of water quality pollutants.	The proposed water quality management measures will: • Reduce the project's potential to degrade the quality of groundwater within the development area and in areas where groundwater from the development area flows. • Manage the water quality in the water management basins to reduce the long-term maintenance costs and maintain the aesthetic qualities of the open water that are envisaged in the urban design.
Establish water quality controls that can operate under elevated groundwater conditions and achieve the proposed pollutant reduction targets, which are discussed separately in **Section 6**.	
Establish ephemeral zones in the water management basins to improve the basin's ability to self-regulate water quality.	
Establish measures to discourage groundwater originating from the golf course (which was established in **Section 3** has elevated nitrogen levels) entering the water management basins.	
Civil Design Objectives	
Establish a civil design that responds to the site's constraints, can accommodate the groundwater and stormwater management controls and does not require the importation of fill.	An efficient civil design that can accommodate the proposed water management controls and achieves a cut to fill balance is required for the project to be viable.
Water and Wastewater Management Objectives	
Establish water and wastewater servicing strategies that respond to the site's opportunities and constraints and achieve MCWS performance objectives.	This is a standard requirement for any major greenfield urban development project.
Sustainability Objectives	
Establish measures to reduce the project's potable water demand.	The NTDP is a major urban growth project in the MidCoast LGA. Measures to reduce the project's potable water demand will reduce the magnitude of additional demand on the centralised potable water supply system that is operated by MidCoast Water Services.
Establish alternative non-potable water sources for both residential allotments and for the irrigation of public open space.	

5 STORMWATER AND GROUNDWATER MANAGEMENT STRATEGY

An integrated stormwater and groundwater management strategy has been developed for the project. The strategy considers:

- The design objectives described in **Table 4-1**.
- The site's opportunities and constraints.
- Relevant Council, MCWS, NSW Government and industry guidelines.
- Feedback received from stakeholders over the study period.
- The proposed urban design and development yield objectives.

The strategy is described herein and is supported by the following sources:

- **Section 6** provides additional information on the proposed stormwater management strategy, including details of water quality modelling that has been undertaken.
- **Section 7** discusses a conceptual civil design for the project that has been prepared to demonstrate "proof of concept".
- **Section 8** – provides information on the water and wastewater servicing strategies prepared for the project.
- **Section 9** – considers alternative options (rainwater harvesting, recycled water, groundwater harvesting) for a potable water demand reduction strategy for the project and determines that the preferred strategy is rainwater harvesting.
- Groundwater modelling that is documented in the Groundwater Modelling Technical Report (SMEC, 2014).

The following sections provide a review of identified constraints and detail the integrated stormwater and groundwater management strategy proposed for the project.

5.1 Review of Constraints

The existing site topography and groundwater regime significantly constrain the water management options for the project, with the following constraints identified from a review of available data and the existing conditions modelling that is documented in the Groundwater Modelling Technical Report (SMEC, 2014):

- **Groundwater Flooding**: During a 100-year Average Recurrence Interval (ARI) groundwater flooding event, peak groundwater levels are expected to range from 3.5 m AHD to 5.5 m AHD across the development area. During flood conditions, the groundwater table is expected to intercept the surface in the lower portions of the development area, resulting in surface ponding of up to 2 m deep in some locations. Following a significant event, surface ponding and elevated groundwater conditions are expected to slowly recede over several months. Without mitigation measures, the existing groundwater flood constraints would significantly reduce the portion of the development area that is suitable for urban land use. **Plate 5-1** shows the estimated 100-year ARI groundwater levels and surface ponding extents for existing conditions.

- **Existing Topography**: Existing surface levels within the development area typically range from 3 to 8 m AHD and average 5.1 m AHD. When compared to the peak 100-year ARI groundwater flood levels discussed above, it was determined that there is insufficient material within the development area to mitigate groundwater flooding constraints by elevating surface levels, without importing significant volumes of fill material. Accordingly, peak groundwater levels need to be reduced to less than 4 m AHD to enable the proposed development yields to be achieved and flood risks to be adequately managed.

- **Infiltration Rates**: As described in **Section 3**, the aeolian dune systems are characterised by clean dune sands that have very high infiltration rates. Accordingly, no surface runoff is expected from pervious surfaces, with most of the rainfall infiltrating into the sandy soils. Similarly, runoff from impervious surfaces that drain to a pervious area or a designated infiltration system are also expected to infiltrate readily into the sandy soils. During periods of wet weather when the sandy soils become saturated, it is expected that most of the rainfall will recharge to the groundwater table, resulting in a rise in the groundwater level. As the groundwater level rise is due to recharge, during flooding conditions, peak groundwater levels can only be reduced by either:

    - Reducing infiltration rates by constructing stormwater drainage to manage runoff from impervious areas; and / or

    - Providing subsurface drainage that enables groundwater to drain from a given area at significantly higher rates than currently occurs under existing conditions.

In addition to the flood related constraints discussed above, the following water quality management constraints were identified from the water quality monitoring results presented in **Section 3**:

- Groundwater that originates from the golf course is likely to have elevated nitrogen levels.

- Elevated iron concentrations were detected at most monitoring locations. When exposed to oxygen, dissolved iron in the groundwater is likely to oxidise, forming a non-toxic but unsightly, orange coloured precipitate. This is likely to occur in areas where groundwater seeps into a surface water body.

- Elevated hydrogen sulphide (rotten egg gas) was detected at some monitoring locations, with results indicating that there is potential for elevated levels to exist in groundwater within the northern and western portions of the development area. Elevated hydrogen sulphide may create odour issues in areas where groundwater is exposed to the surface (i.e. where groundwater seeps into an open basin).

The following sections describe the integrated stormwater and groundwater management strategy that has been developed for the project. The strategy responds to the abovementioned constraints and the design objectives established in **Table 4-1**.

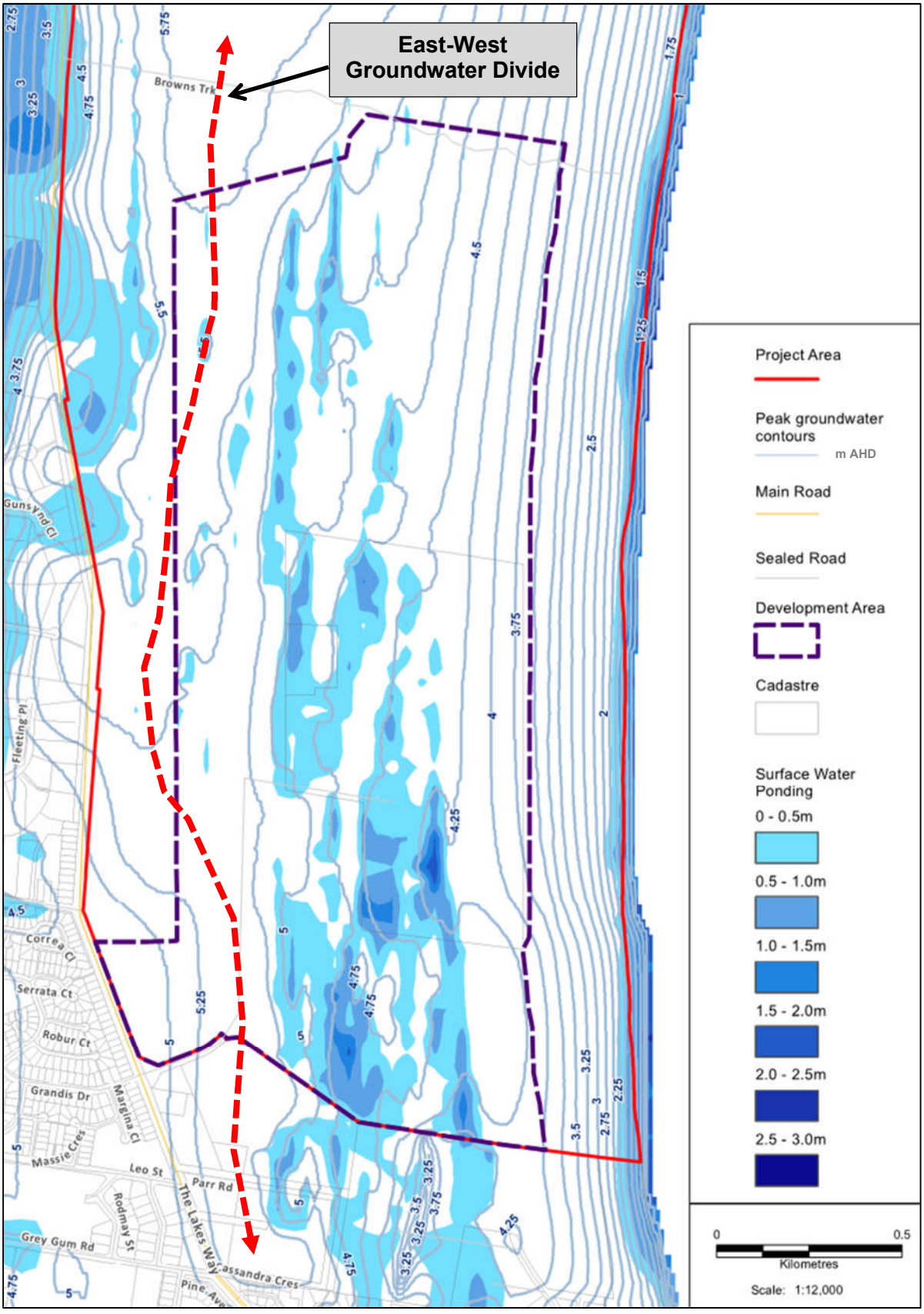

Plate 5-1 - *Detailed Groundwater Model Results: 100-year ARI levels for Existing Conditions (Note: these results are referred to as EC 1 in the Groundwater Modelling Technical Report SMEC, 2014)*

5.2 Strategy Overview

The key elements of the water management strategy include:

- **Water Management Basins:** 18.1 ha of water management basins (including batters) are proposed for flood mitigation purposes. The basins will provide surface storage that will attenuate the rise of the basin and adjoining groundwater levels and hydraulically connect the water management system throughout the development area, enabling upstream controls such as subsurface drainage to operate effectively.

- **Gravity Drainage:** It is proposed to construct a stormwater pipe system that will drain excess water from the water management basins to the Wallis Lake Entrance Channel. The gravity drainage will only operate during elevated basin levels (due to the pipe inlet being at 3 m AHD) and will provide significant flood mitigation benefits during major flood events, such as the 100-year ARI event.

- **Water Quality Management Controls:** The following water quality controls are proposed:

    - 5 kL rainwater tanks are proposed for each dwelling to capture and use runoff from roof areas. Rainwater tanks (and the use of harvested rainwater) will reduce runoff volumes from the development area as well as reducing potable water usage.

    - Runoff from all road pavement areas will be treated in raingardens (or biofiltration basins) that will be constructed within the road reserve.

    - The water management basins will have ephemeral areas equivalent to 48% of the total wet basin area. The ephemeral zones will enhance the ability of the basins to self-regulate water quality.

    - The water management basins will receive runoff from some impervious areas which will elevate the basin level above the adjoining groundwater level, reducing the risk of nutrient laden groundwater from the golf course, or groundwater with elevated iron or hydrogen sulphide levels, entering the basins.

The water management basins may be ephemeral or open water and will be dictated by Ownership. Where they are in council ownership, they will be ephemeral. The future form, ownership and management of the water management basins is subject to ongoing investigations by Landcom, and could include, for example, a Community Title arrangement.

The development area has been divided into the following water management zones that were established based on the proposed land use and stormwater management approach:

- **Zone D1 - Golf Course and Open Space - 68.6 ha**: comprises the golf course and public open space areas.

- **Zone D2 - Water Management Area - 18.1 ha:** comprises the water management basins and associated batters.

- **Zone D3 - Development Area (Infiltration Zone) – 62.5 ha:** Infiltration based stormwater systems are proposed in development areas that are not expected to have significant groundwater flooding constraints under developed conditions. These areas include the eastern portion of the development area (where peak groundwater flooding levels are lower due to the proximity to the ocean) and the eco village, which is proposed on higher ground in the north-western portion of the development area.

- **Zone D4 - Development Area (Piped Drainage Zone) – 112.3 ha:** Piped stormwater drainage is proposed in the central and western portions of the development area where groundwater flooding controls are required to manage peak groundwater levels.

Further information on the expected land uses in each zone is provided in **Section 6**.

The distribution of the abovementioned zones is depicted in **Plate 5-2**. It is noted that the proposed 6.6ha employment lands located off the Lakes Way are not shown in **Plate 5-2** but are expected to have infiltration-based stormwater controls (i.e. a Zone D3 approach).

The proposed water management strategy for each of the abovementioned zones is conceptually illustrated in **Plate 5-3**, which also describes the developed conditions groundwater regime. The location of key water management controls and zones is detailed in the Water Management Plan, which is attached as **Figure 2**. More detailed information on all elements of the water management strategy are provided in the following sections.

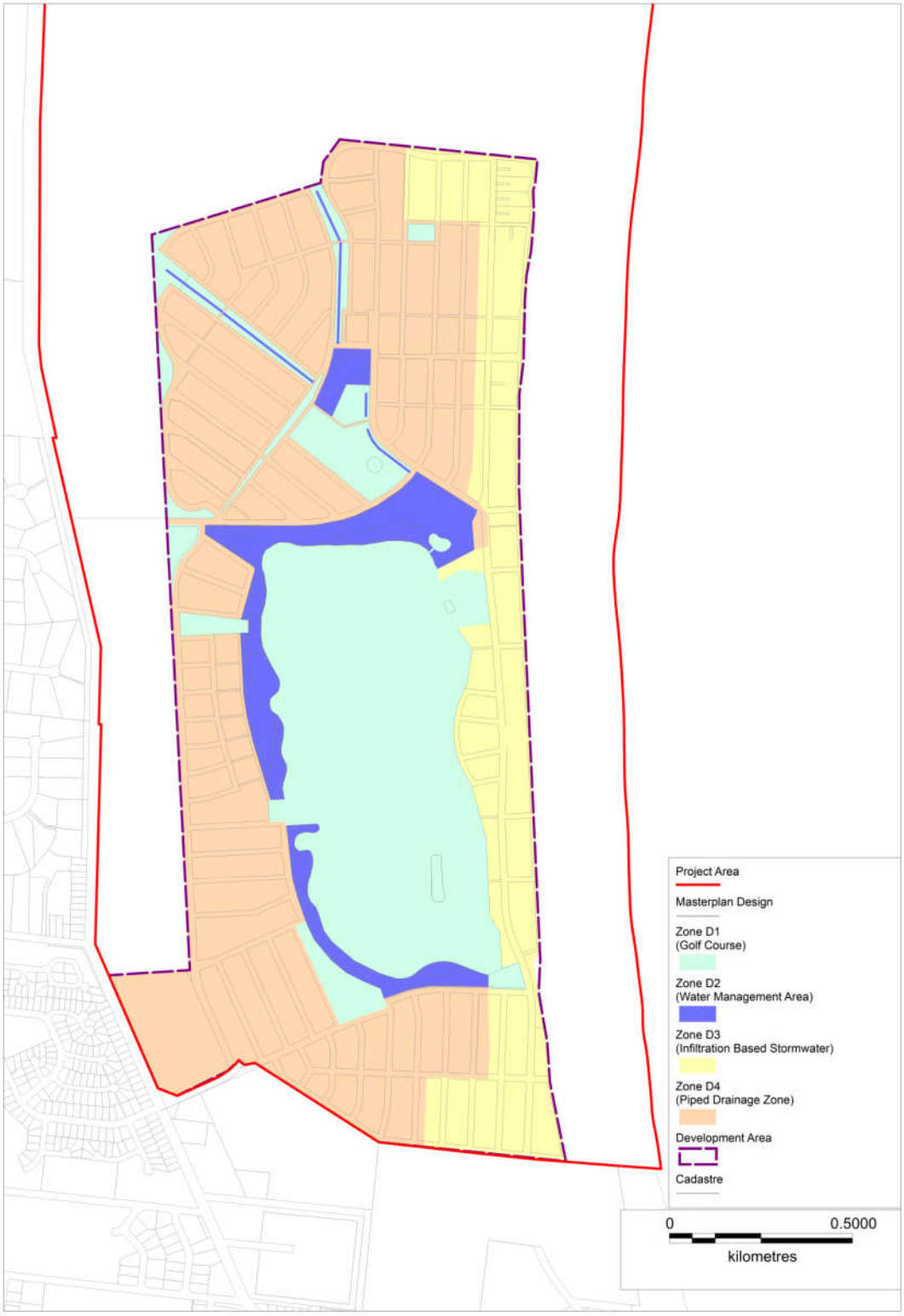

***Plate 5-2**– Distribution of water management zones within development area*

Developed Conditions Groundwater Regime

Zone D4: Urban Development

(Piped Drainage Zone)

- All runoff from roof and road areas is to be treated in above pipe rain gardens before discharging to the basins via a stormwater pipe system.
- Under elevated groundwater conditions, subsurface drainage under roads will dewater groundwater to the basins via the stormwater pipe system.
- Runoff from all pervious areas and impervious areas that are not connected to the piped drainage system will recharge to groundwater.
- ET losses from groundwater due to deep rooted vegetation.

Zone D2: Water Management Area

- All direct rainfall will accumulate in the basins.
- Outflow from the basins via the proposed gravity drainage system when the basin level exceeds 3m AHD.
- ET losses from surface water.

Zone D1: Golf Course and Public Open Space

- Groundwater recharge occurs during extended wet periods
- Irrigated water mostly lost to ET.
- ET losses from ground-water due to deep rooted vegetation.

Zone D3: Urban Development

(Infiltration Zone)

- Runoff from both impervious and pervious surfaces will be infiltrated to groundwater.
- ET losses from ground-water due to deep rooted vegetation.

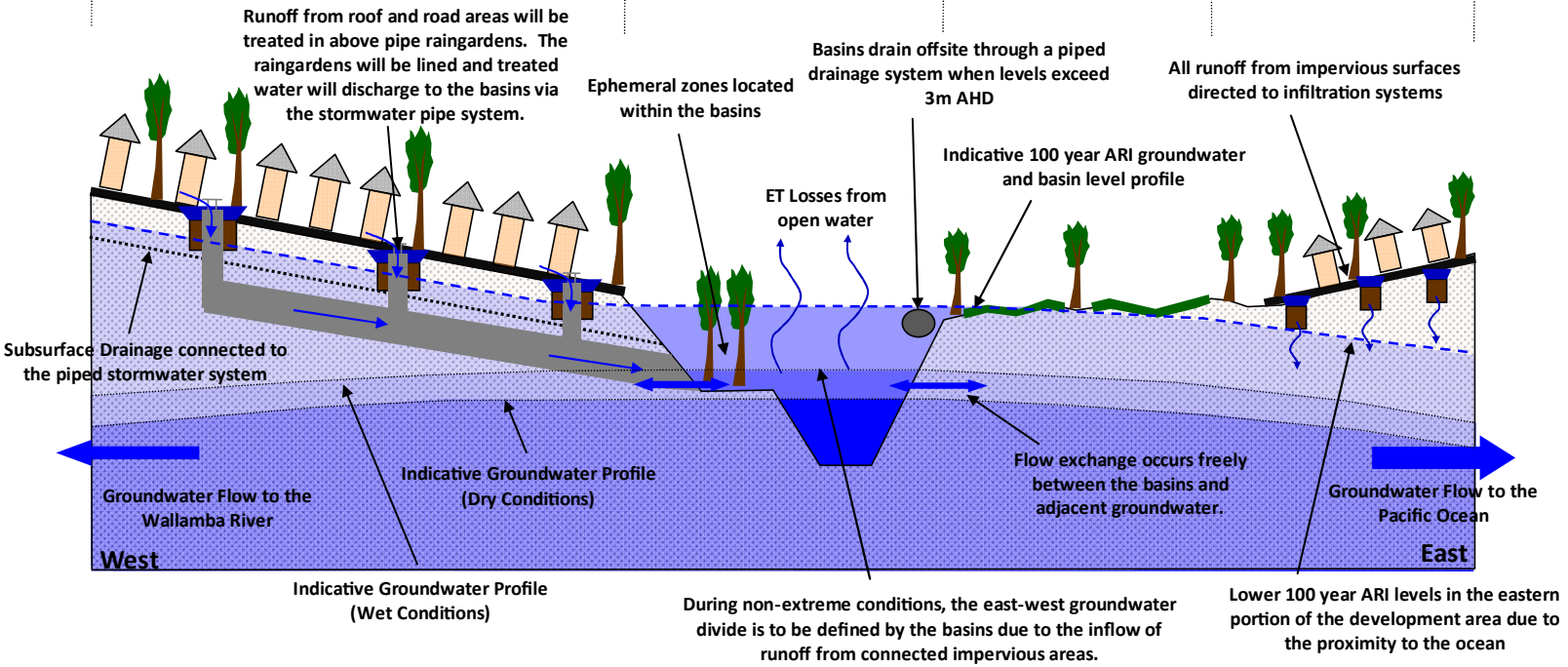

Plate 5-3 *– A conceptual diagram that describes the functionality of the proposed integrated stormwater and groundwater strategy.*

5.3 Water Management Basins

As shown in **Figure 2**, a series of interconnected water management basins are proposed. The basins will be excavated in the sandy soils and will therefore be highly permeable. Accordingly, flow exchange is expected between the water ponded in the basins and the adjoining groundwater. As described in **Plate 5-3,** the water management basins will receive runoff (following treatment) from approximately 62ha of impervious areas proposed in the piped drainage zone (Zone D4) as well as direct rainfall over the basins (refer to **Table 6-1** and supporting text for further information on the contributing catchment area to the basins). Outflows from the basins will occur through evapotranspiration processes, gravity drainage to the Wallis Lake Entrance Channel (only when the basin level exceeds 3 m AHD) and through groundwater flow into the adjoining aquifers, when the basin level is higher than the adjoining groundwater level.

From a water management perspective, the key functions of the basins are to:

- Provide surface storage to attenuate the rise of surface and groundwater levels during major flooding events, such as the 100-year ARI event.
- Hydraulically connect the water management system throughout the development area, enabling the gravity drainage system to effectively regulate peak basin and groundwater levels throughout the entire development area.
- Provide low points to which pipe drainage systems can outlet.
- Provide low points to which overland flow paths can discharge.

The surface area and volumetric requirements of the basins were established using the groundwater models that are described in the Groundwater Modelling Technical Report (SMEC, 2014). The combined effect of the surface storage volume of the basins and the capacity of the gravity drainage system were balanced to achieve a 100-year ARI peak basin level below the target level of 4 m AHD, which was established in **Section 5.1**.

The location, shape and alignment of the basins were established to optimise a range of civil and urban design outcomes, including:

- Distributing the basins throughout the development areas where piped drainage is proposed (Zone D4). This generally avoids excessively long pipe and overland flow path lengths and enables an efficient earthworks design to be established.
- Minimising the basin batter footprints by minimising narrow sections of basin.
- Separating the development area from the golf course.

5.3.1 Description of Water Management Basins

As shown in **Figure 2**, the following interconnected water management basins are proposed.

- **Golf Course Basins:** will be located around the southern, western and northern perimeters of the reconfigured golf course. The basins will comprise a series of interconnected deep water and ephemeral zones and will have a collective area of approximately 14.6 ha (including batters). Accordingly, the golf course basins will provide most of the surface storage volume.

- **Northern Basin:** will be located centrally in the northern portion of the development area. The northern basin will comprise a deep-water zone with smaller ephemeral zones around the basin edges. The northern basin will have a total footprint of 1.6 ha and will be hydraulically connected to the Golf Course Basins through an 8 m wide open drain that is indicated in **Figure 2**.

- **Northern Finger Drains:** are proposed in the northern portion of the development area. The finger drains are aligned to maximise connectivity with the adjoining groundwater and to provide low points for stormwater pipe outlets in the northern portion of the development area. The finger drains will be ephemeral with drain inverts limited to 2.5 m AHD to minimise batter extents.

As depicted in **Figure 2**, the water management basins will comprise the following zones:

- **Deep Water Zones:** will be excavated to an invert level of approximately 0 m AHD and are intended to have permanent water. Permanent water is expected to inhibit the growth of macrophytes, resulting in sections of open water within the basins. Ephemeral macrophyte benches ranging from 5 to 10 m wide will be established around the fringes of the deep-water zones. It is expected that approximately 20% of the deep-water zone area will comprise macrophyte benches, with the remaining 80% being open water.

- **Ephemeral Zones:** ephemeral zones will be integrated either between or on the periphery of the deep-water zones. Ephemeral zones will be established at levels ranging between 2 to 2.5 m AHD and will only be inundated during wet conditions when basin levels are elevated. It is proposed to establish Mahogany Swamp Forests or similar vegetation types within the ephemeral zones. The primary function of the ephemeral zones will be to enhance the ability of the basins to self-regulate water quality.

- **Basin Batters:** are required to interface between deep water or ephemeral zones and either development or golf course areas. At this stage of the design process, minimum batter slopes of 1(Vertical) to 4(Horizontal) were adopted based on preliminary geotechnical advice. There is potential to steepen batters in select areas through either further geotechnical investigations or the use of retaining walls. In some locations, softer (flatter) batters may be implemented for urban design or landscaping reasons.

Figure 2 depicts the extent of the deep water and ephemeral zones described above. Typical section drawings depicting the above-mentioned features are also provided in **Figure 4**.

Refer to the Landscape Masterplan (Contex, 2014) for a description of the proposed landscaping concept for the deep water and ephemeral zones as well as the basin batters and adjoining land.

5.3.2 Storage and Area Characteristics of the Water Management Basins

Earthworks modelling was undertaken to establish indicative design levels and storage profiles for the water management basins by applying the conceptual civil design information described above. The earthworks model is described further in **Section 7**. Key storage and area characteristics of the water management basins are presented as follows:

- **Table 5-1** details estimated areas of the deep water and ephemeral zones and batter footprints for the Golf Course and Northern Basins and the Northern Finger Drains. Refer to the table notes for assumptions applied to calculating the reported areas.

- **Plate 5-4** details the storage profile for the basins that was calculated using the earthworks model. This calculated storage profile was applied to groundwater modelling. However, the storage volume for basin areas below 3.5 m AHD was reduced by 20%. This affords for some design flexibility / contingency in the conceptual design of the water management basins that is presented in this report. Refer to the Groundwater Modelling Technical Report (SMEC, 2014) for further details on the modelling of the water management basins.

***Table 5-1** – Estimated areas of the proposed water management basins*

	Deep Water Zone[1]			Ephemeral Zone[1]	Batters[2]	Total	Ephemeral Ratio[3]
	Open Water	*Macrophyte Bench*	*Total*				
	(ha)	*(ha)*	*(ha)*	*(ha)*	*(ha)*	*(ha)*	*(%)*
Golf Course Basins	6.1	1.5	7.6	3.3	3.7	14.6	44%
Northern Basin	0.6	0.2	0.8	0.4	0.4	1.6	50%
Northern Finger Drains[4]	nil	nil	nil	0.9	1.0	1.9	100%
All Basins	6.7	1.7	8.4	4.6	5.1	18.1	48%

Note 1: Deep water and ephemeral zone areas were calculated from the design contours, with all basin area below 2.5m AHD (≈90th Percentile basin water level) counted.

Note 2: Basin batters were assumed to be all basin area above 2.5m AHD.

Note 3: The ephemeral ratio was calculated as (Macrophyte Bench Area + Ephemeral Zone Area) / (Total Deep-Water Zone Area + Ephemeral Zone Area).

Note 4: The areas reported for the northern finger drains include the surface drain that connects the Northern Basin to the Golf Course Basin.

The information presented in **Table 5-1** indicates that the water management basin area below the 90th Percentile water level (2.5 m AHD) will collectively comprise 52% open water area and 48% ephemeral area.

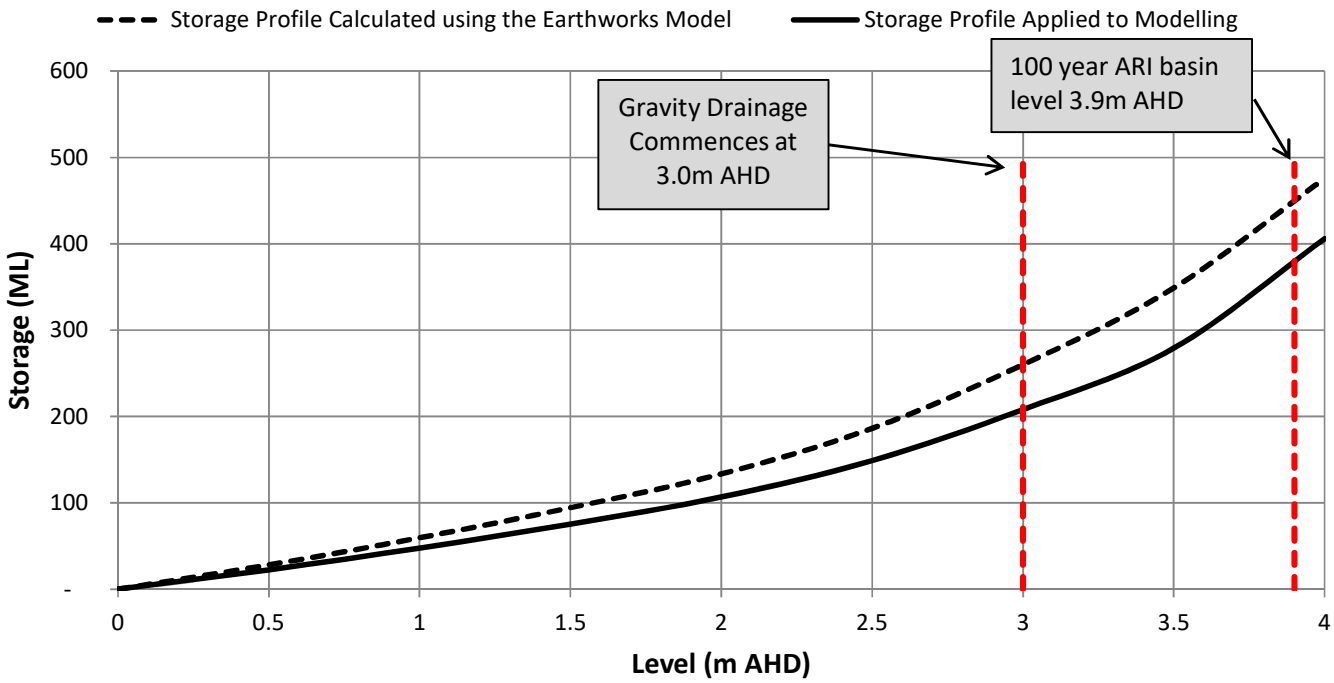

Plate 5-4 *– Storage properties of the Water Management Basins*

5.3.3 Water Quality Considerations

Water quality management in the basins was a key concern raised by Council during stakeholder consultations. The following measures are proposed to manage water quality in the basins to maintain the long-term aesthetic benefit of the open water areas and minimise long term maintenance costs:

- **Stormwater Management**: As described in **Plate 5-3,** the water management basins will receive runoff (following treatment) from impervious areas within the piped drainage zone (Zone D4) as well as direct rainfall over the basin footprint. Runoff from the impervious areas will be treated in rainwater tanks and streetscape raingardens prior to entering the piped stormwater system that will drain to the water management basins. Collectively, these controls are expected to remove 60% of nutrients (Total Phosphorus and Total Nitrogen) and over 85% of Total Suspended Solids on an average annual basis. This level of treatment exceeds the pollutant removal targets recommended in the Council and industry guidelines that are discussed in **Section 2**. Hence, treated stormwater runoff entering the basins is expected to have suitable water quality to prevent excessive algal growth in the basins. The stormwater management strategy is discussed further in **Section 6**.

- **Sediment Forebays:** Sediment forebays will be established around the outlets of major pipe inlet systems. Sediment forebays will trap medium to coarse sediments in a consolidated area, facilitating the low-cost removal of trapped sediment. The extent and nature of sediment forebays will be established at the detailed design stage.

- **Groundwater Quality Management Measures**: As established in **Section 5.1** the following groundwater quality constraints were identified from the groundwater monitoring results:

    - Groundwater within the golf course is likely to have elevated nitrogen concentrations. Hence, any groundwater flowing into the basins from the golf course is likely to increase the nitrogen loads entering the basins.

- Groundwater in some portions of the development area is expected to have elevated iron and hydrogen sulphide concentrations. Dissolved iron, when oxidised forms an unsightly (but non-toxic) orange coloured precipitant and hydrogen sulphide is an unpleasant odour.

- The above groundwater quality constraints will be managed by directing runoff from impervious areas into the water management basins so that the basin level is generally higher than the adjoining groundwater level. As a result, water will generally flow from the basins into the adjoining groundwater, mitigating the abovementioned potential water quality issues.

- **Ephemeral Zones**: As described in **Table 5-1** it is estimated that 48% of the Water Management Basin area will be ephemeral. Ephemeral areas will be vegetated with either macrophytes (in the smaller ephemeral sections) or Swamp Mahogany Forests (in the larger sections). The wetting and drying cycle of the ephemeral zones combined with the established vegetation will facilitate the removal of nitrogen (through denitrification processes) and other pollutants from the water column.

- **Mixing of the Water Column**: During average to dry climatic conditions, when poor water quality conditions are most likely to occur, the depth of water in the deep-water zones is expected to be less than 2 m. Hence, stratification of the water column and the associated formation of anaerobic zones are unlikely to occur. Furthermore, due to the coastal location of the project it is expected that the frequent coastal breezes will provide adequate mixing of the water column.

If over time the water quality in the water management basins is worse than expected, the following additional measures could be considered to provide additional water quality management:

- Floating reed beds to remove nutrients.

- Pumping to improve circulation between deep water and ephemeral zones.

- Mechanical aerators to improve mixing and dissolved oxygen levels.

5.3.4 Gravity Drainage

At an early stage in the study the benefits of a system that can remove meaningful volumes of water from the water management basins during flooding conditions was identified. Without such a system, it is expected that the water management basins would require areas two to three times larger than those proposed.

A dewatering system is constrained by the existing topography and the distance to a suitable receiving water (being the ocean, Wallamba River Estuary or the Wallis Lake Entrance Channel) as well as various environmental and infrastructure constraints. Several dewatering options were considered including:

- Pump extraction from the open basins.

- Gravity drainage to the south through the existing township of Tuncurry. Options considered included augmenting the existing stormwater infrastructure and building a standalone drainage system.

- Gravity drainage to the west through the existing wetland area.

The preferred option is to construct a standalone stormwater pipe system that will drain excess water from the water management basins. The inlet for this gravity drainage system will be in the southern portion of the open basins and will convey excess water to the Wallis Lake Entrance Channel. Conceptually, the pipe will be aligned along the Beach Street Road Reserve (or adjacent crown land) and will have a length of approximately 1,950 m and a grade of between 0.2 and 0.3%. The conceptual alignment is indicated in **Plate 5-5**. Further investigations considering constraints associated with existing infrastructure, possible Acid Sulphate Soils and constructions costs are required to confirm the alignment.

Due to the limited available grade, the inlet of the pipe is expected to have an invert of 3 m AHD. Hence, gravity drainage will only commence when the basin level exceeds 3 m AHD. A range of pipe sizes were assessed using the Empirical Groundwater Model. Put simply, a smaller pipe, with lower capacity will result in a higher peak basin water level or require larger storages to provide more attenuation than a system with a larger pipe with higher capacity. However, the benefits of a larger pipe need to be considered against the higher associated construction costs.

Conceptually, a 1050 mm diameter stormwater pipe was considered to provide an appropriate balance between discharge capacity and implementation cost and was adopted for the developed conditions modelling. Such a system is expected to have a capacity of approximately 1 m^3/s or 86 ML/day when the basin level is at the 100-year ARI level of 3.9 m AHD. Hydraulic modelling indicates that potential sea level rise of 0.91 m will not significantly constrain the capacity of the gravity drainage system.

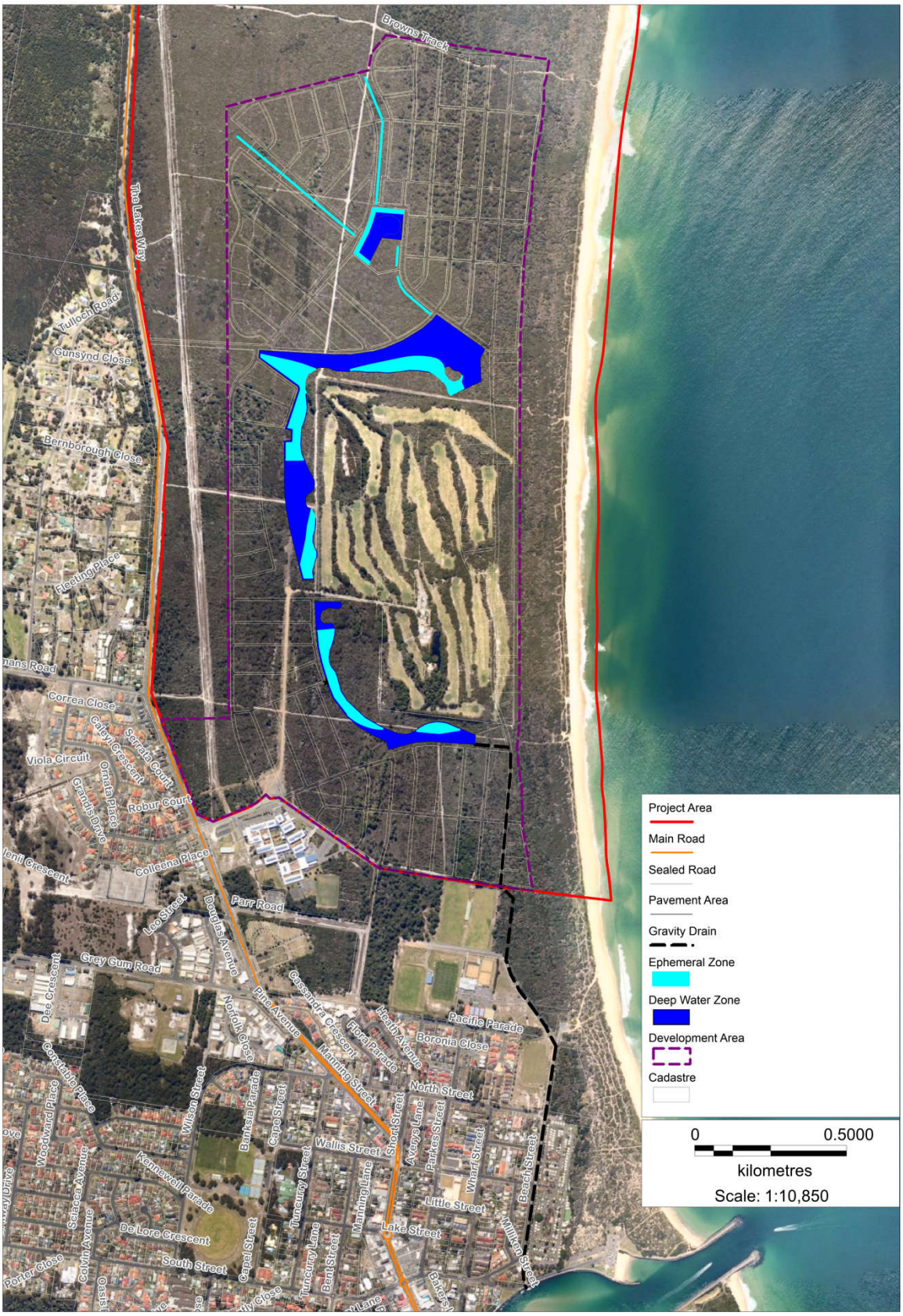

Plate 5-5 *– Conceptual alignment of gravity drain*

5.4 Expected Water Level Regime and Flood Mitigation Functionality

As described earlier in this section, the water management basins will receive runoff (following treatment) from approximately 62 ha of impervious areas proposed in the piped drainage zone (Zone D4) as well as direct rainfall over the basins. Outflows from the basins will occur from evapotranspiration processes, through flows into the gravity drainage system (only when the basin level exceeds 3 m AHD) and through groundwater flow into the adjoining aquifers. As the basins will receive direct runoff from impervious areas, it is expected that the basin level will generally be marginally higher than the adjoining groundwater levels when the basin levels are below the inlet to the gravity drainage system (which is assumed to be 3 m AHD). This means that under non-flood conditions, water will generally flow from the basins into the adjoining groundwater aquifers. For this reason, the basins are expected to define the east-west groundwater divide under developed conditions.

During flood conditions, water will drain from the basins through the gravity drainage system. This will result in the basin level being generally lower than the adjoining groundwater, and groundwater is expected to generally drain into the basins, resulting in lower groundwater levels. The rate of drainage will be accelerated by the proposed subsurface drainage that will be constructed adjacent to road bases within the piped drainage zone (Zone D4).

Groundwater modelling was undertaken for the project to assess the developed conditions groundwater regimes for both typical (i.e. non-flooding) and flooding conditions. Select model results are presented in the following sections. Refer to the Groundwater Modelling Technical Report (SMEC, 2014) for detailed information on the modelling methods and results.

5.4.1 Summary of Model Results for Non-Flooding Conditions

The groundwater models developed for the project were applied to assess the existing and developed conditions groundwater regime within the development area for a full range of climatic conditions. The models were specifically used to:

- Estimate groundwater recharge characteristics and groundwater level regimes within the development area.
- Estimate groundwater levels within and adjacent to the development area during a typical wet weather event.
- Estimate water fluxes (or flow rates) into and out of the groundwater system within the development area.
- Assess the project's impact on the local and regional groundwater regime.

Select model results are presented as follows:

- **Plate 5-6** shows a percentile chart that plots typical groundwater and basin water levels for a range of climatic conditions. Typical existing conditions groundwater levels are shown for context. The percentile values were calculated from the daily results over the114 year simulation period (1900 to May 2013) that was applied to the Empirical Groundwater Model. Refer to the Groundwater Modelling Technical Report (SMEC, 2014) for detailed information on the modelling methods.

- **Plate 5-7** is a daily exceedance chart that compares groundwater and basin water levels. The charted values were calculated from the daily results over the abovementioned Empirical Groundwater Model simulation period. Note that a logarithmic scale has been applied to the horizontal axis.

- **Plate 5-8** shows a percentage chart of annual gravity drainage volumes through the gravity drainage system.

- **Plate 5-9** shows results from the three-dimensional groundwater model of the estimated developed conditions groundwater contours during typical 90th Percentile wet weather conditions.

Model results are discussed briefly following the charts.

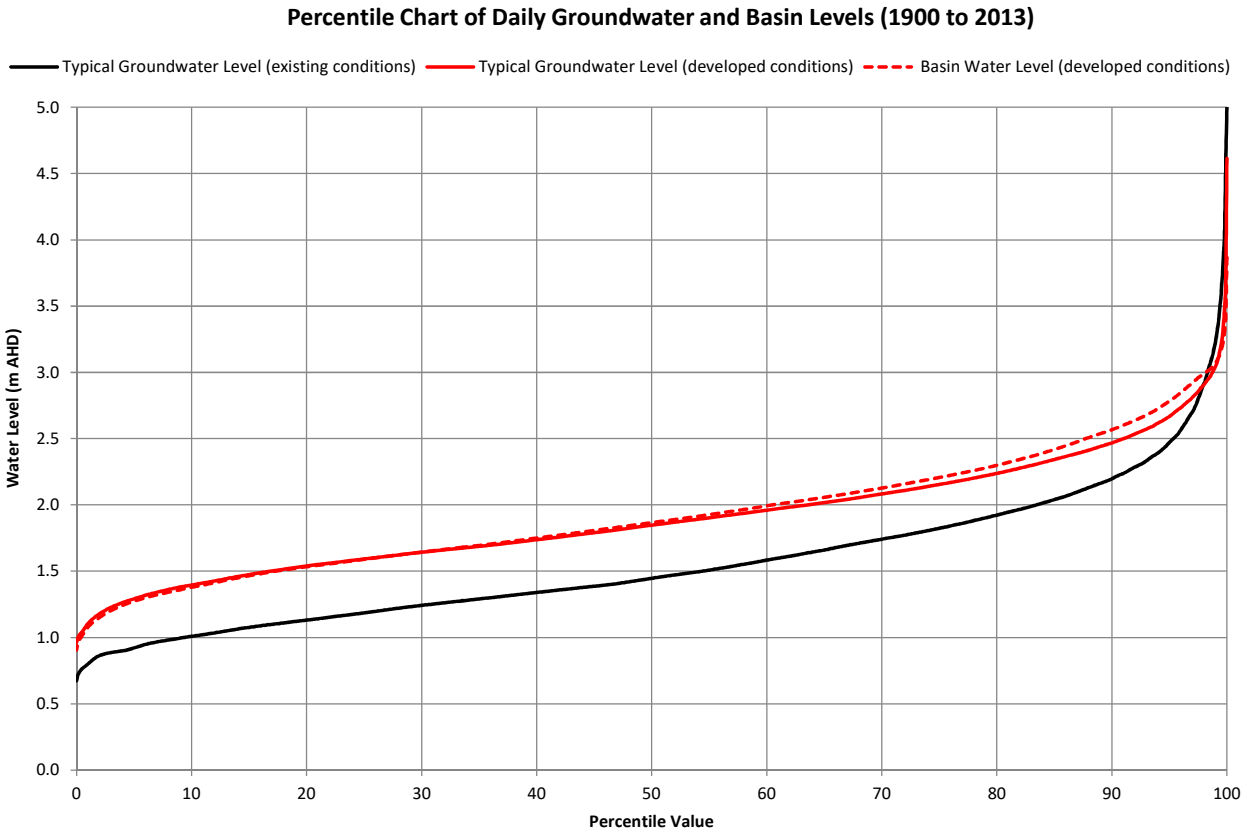

Plate 5-6 - *Empirical Groundwater Model Results: Daily Percentile Chart: Groundwater and Basin Water Levels*

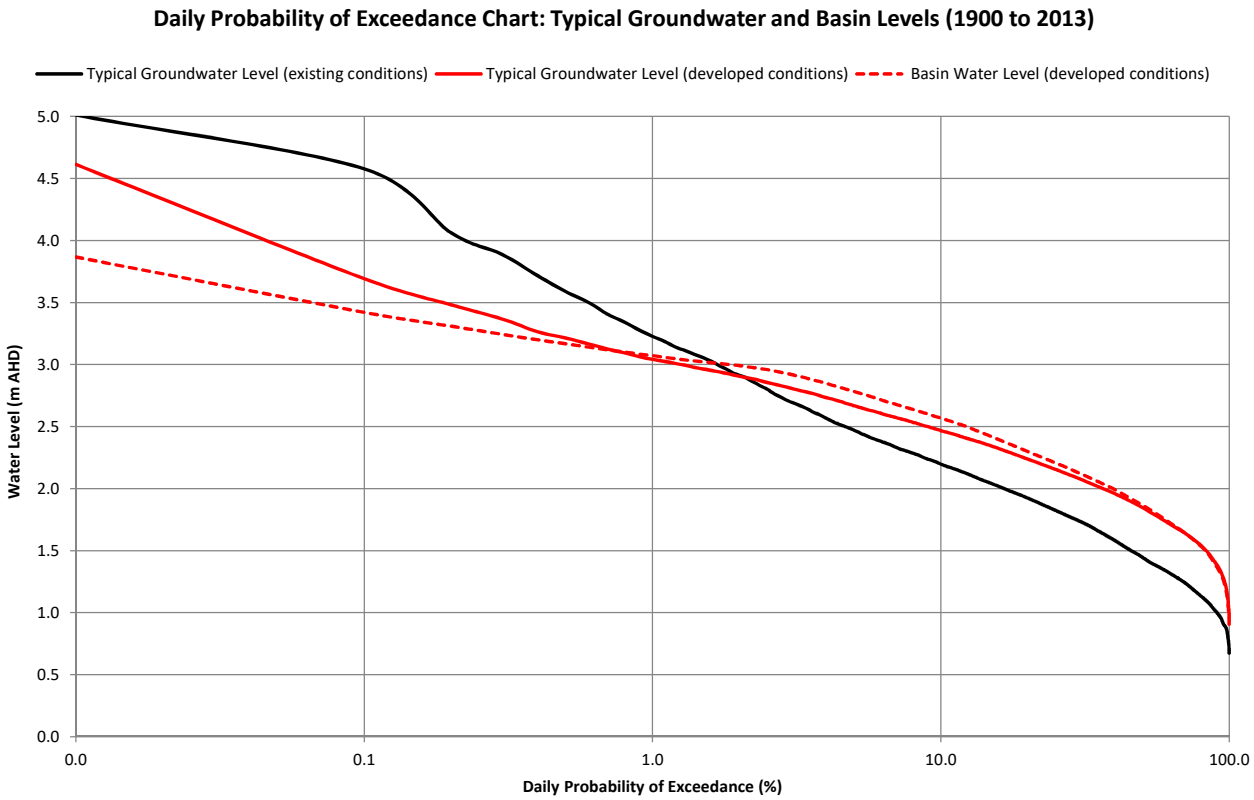

Plate 5-7 - *Empirical Groundwater Model Results: Daily Probability of Exceedance Chart: Groundwater and Basin Water Levels*

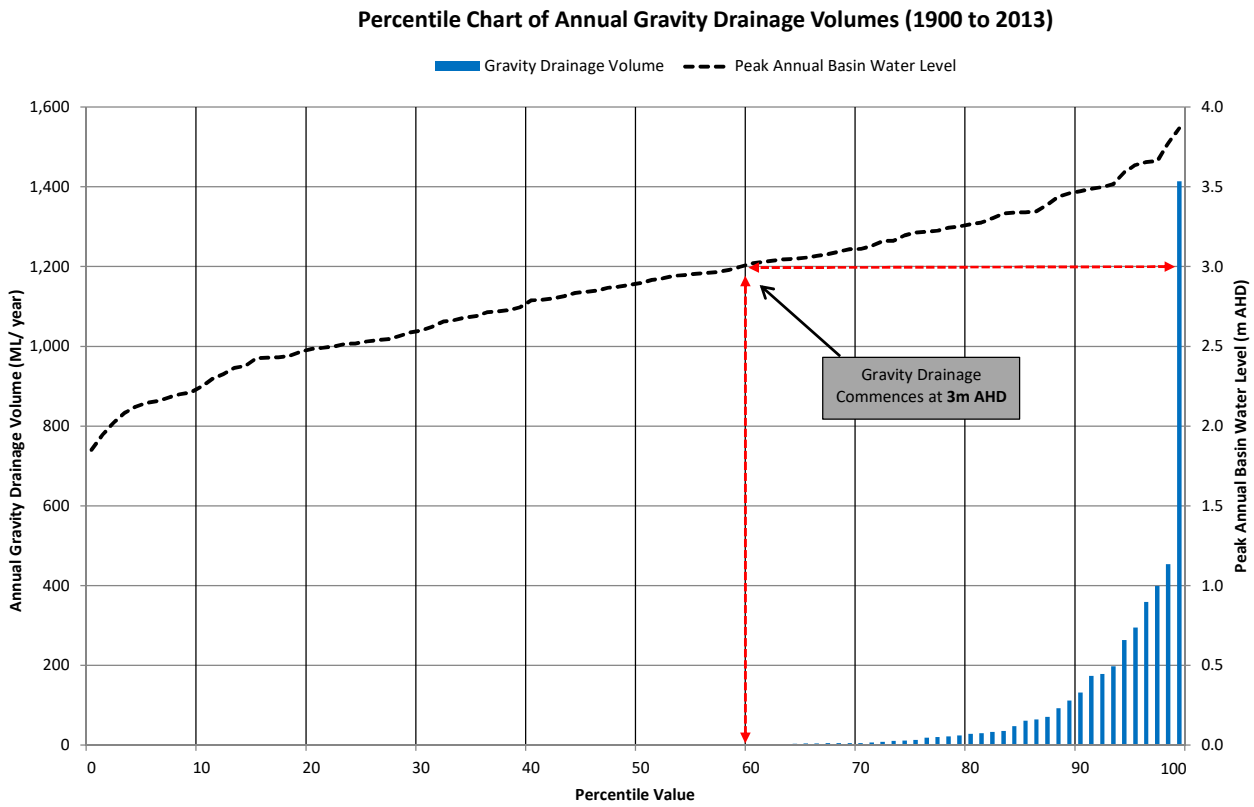

Plate 5-8 - *Empirical Groundwater Model Results: Annual Percentile Chart: Annual Gravity Drainage Volumes*

The model results presented in the above plates indicate that:

- Typical developed conditions groundwater levels will likely be approximately 0.3 to 0.4 m higher than existing conditions levels except for very wet conditions. The higher levels are primarily due to the expected increase in recharge volumes, which are predicted to increase from 36% to 50% of rainfall on an annual average basis as a result of the development. The Groundwater Modelling Technical Report (SMEC, 2014) provides detailed information on the expected changes to recharge characteristics due to the development and discusses the implications of higher groundwater levels.

- With reference to **Plate 5-6**, the ephemeral zones within the water management basins that will be established between 2 to 2.5 m AHD, will be inundated between 40 to 10% of the time, depending on the establishment level.

- During very wet conditions, developed conditions groundwater levels will be lower than existing conditions levels due to the proposed groundwater management controls (water management basins and gravity drainage), but higher than the water level in the water management basins. As a result of the higher levels, groundwater will flow into the basins. These conditions are estimated to occur 2% of the time. Groundwater characteristics during flooding conditions are discussed further in **Section 5.4.2** .

- Under developed conditions, basin water levels will generally be higher than the adjoining groundwater. This is due to the basins receiving treated runoff from impervious areas within the pipe drainage zone. The Detailed Groundwater Model results presented in **Plate 5-9** show indicative groundwater contours during typical wet weather conditions.

- Gravity drainage discharge will be initiated when the basin level exceeds 3m AHD. With reference to **Plate 5-8**, this is expected to occur in some capacity in 40% of years. However, significant flow volumes are only expected following major rainfall events such as the 1963 event.

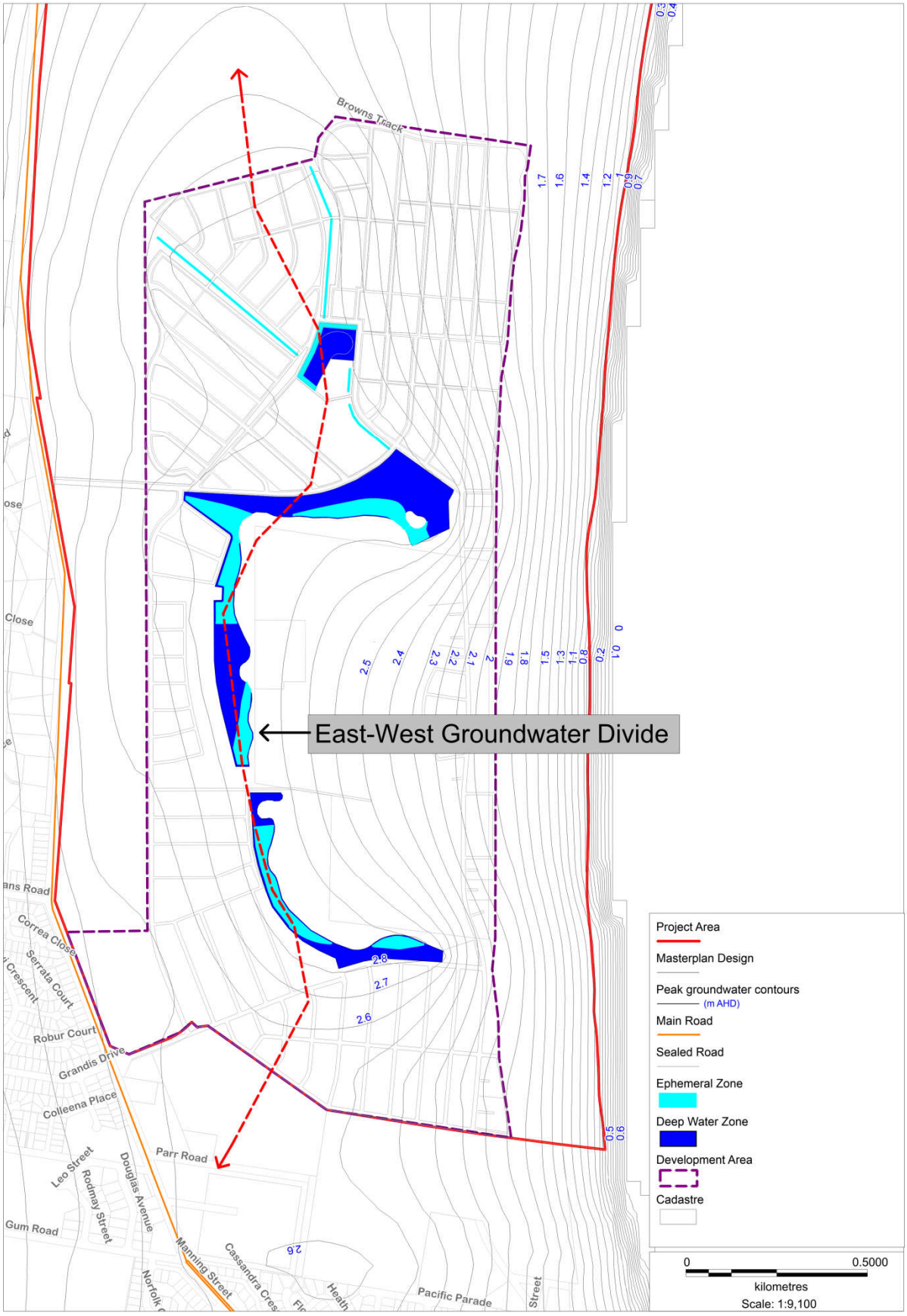

Plate 5-9 - *Developed Conditions Detailed Groundwater Model Results: Typical 90th Percentile (wet weather) groundwater conditions.*

The model results presented in **Plate 5-9** indicate that the east-west groundwater divide will be defined by the water management basins. This is expected as the basins receive runoff from connected impervious areas in Zone D4. The model results confirm that:

- Water will generally flow from the basins into the adjoining groundwater. This is due to the basin level being higher than the adjoining groundwater.
- Groundwater originating from the golf course, which as established in **Section 3** has elevated nitrogen levels, will flow to the east into the ocean. No groundwater from the golf course is predicted to flow into the basins when the basin level is below the gravity drainage inlet level (i.e. below 3 m AHD).

5.4.2 Summary of Model Results for Flooding Conditions

The groundwater models developed for the project were applied to assess groundwater flooding characteristics within the development area for existing and developed conditions. The models were used to:

- Identify existing groundwater flood constraints.
- Develop and assess a range of groundwater management solutions.
- Assess groundwater and surface water flooding characteristics for developed conditions.

The groundwater modelling that is described in the Groundwater Modelling Technical Report (SMEC, 2014) identified a significant sequence of rainfall events that occurred over a 3-month period in 1963 as being representative of a 100-year ARI event. This event was adopted as the flood planning event for the project. Select model results from this event are presented as follows:

- **Plate 5-10** shows Empirical Groundwater Model results for the 1963 event. The plate plots the typical groundwater levels (for both developed and existing conditions), the basin surface water level, rainfall depth and the volume of water predicted to drain through the proposed gravity drainage system.
- **Plate 5-11** shows the peak groundwater levels predicted from three-dimensional groundwater modelling (referred to as the Detailed Groundwater Model) of the 1963 event. The model results are for a 2100 climate scenario which accounts for 0.91 m of sea level rise at the model boundaries. This scenario is referred to as DC 2 in the Groundwater Modelling Technical Report (SMEC, 2014). Peak groundwater and basin levels from this scenario have been adopted as the flood planning levels for the project.

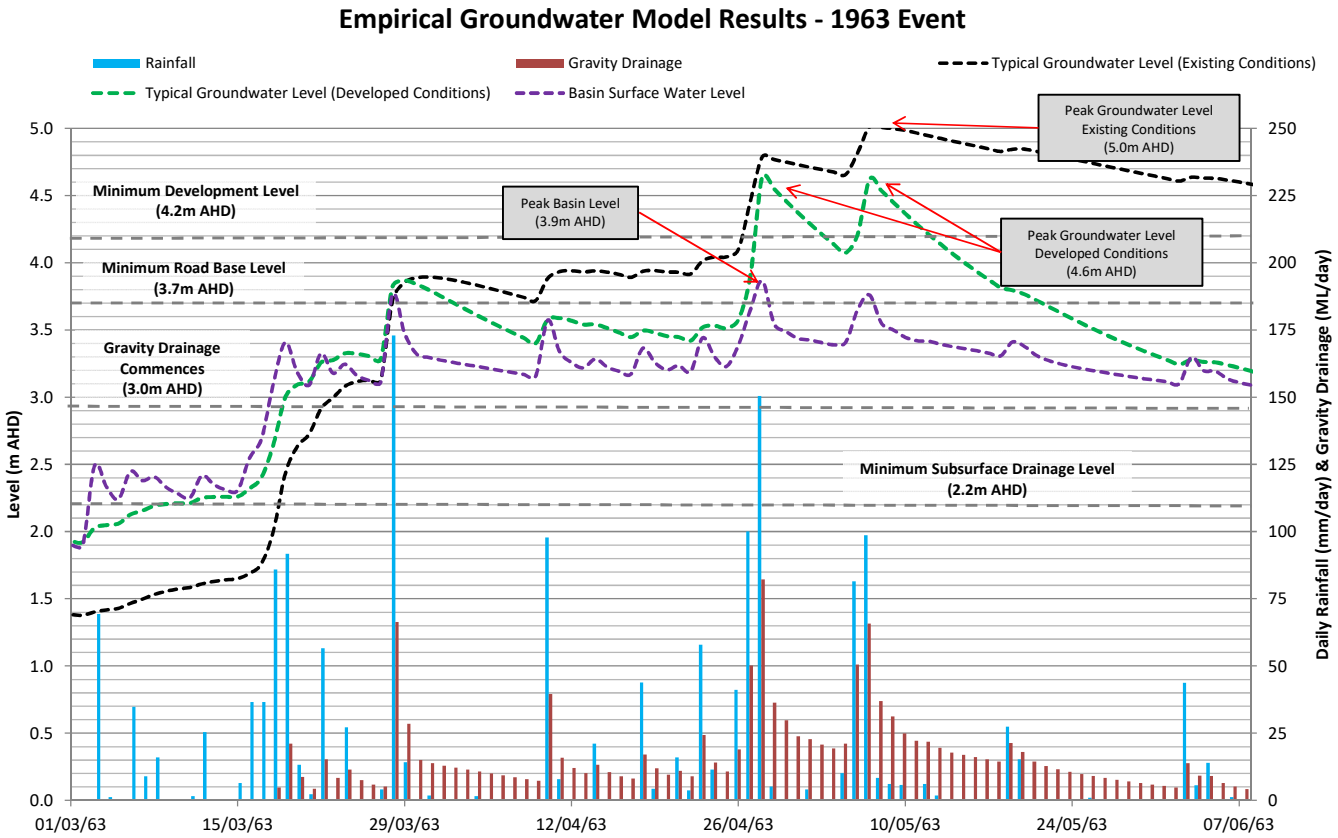

Plate 5-10 - *Empirical Groundwater Model Results: 1963 Event*

The model results presented in **Plate 5-10** indicate that the combination of the gravity drainage and attenuation provided in the water management basins is effective at maintaining peak basin water levels below 3.9 m AHD. That is below the 4 m AHD target established earlier in this section. In addition, following periods of significant rainfall, the open basins and gravity drainage will enable basin and adjoining groundwater levels to recede significantly faster than under existing conditions. This significantly reduces the risk of damage to road bases (or subgrades) due to water logging.

The Empirical Groundwater Model calculates typical groundwater levels within the development area. As groundwater levels vary spatially across the development area, the typical groundwater levels should only be considered in context with the other results, such as basin water levels and gravity drainage volumes. The Detailed Groundwater Model results presented in **Plate 5-11** depict peak developed conditions groundwater levels for the 1963 event.

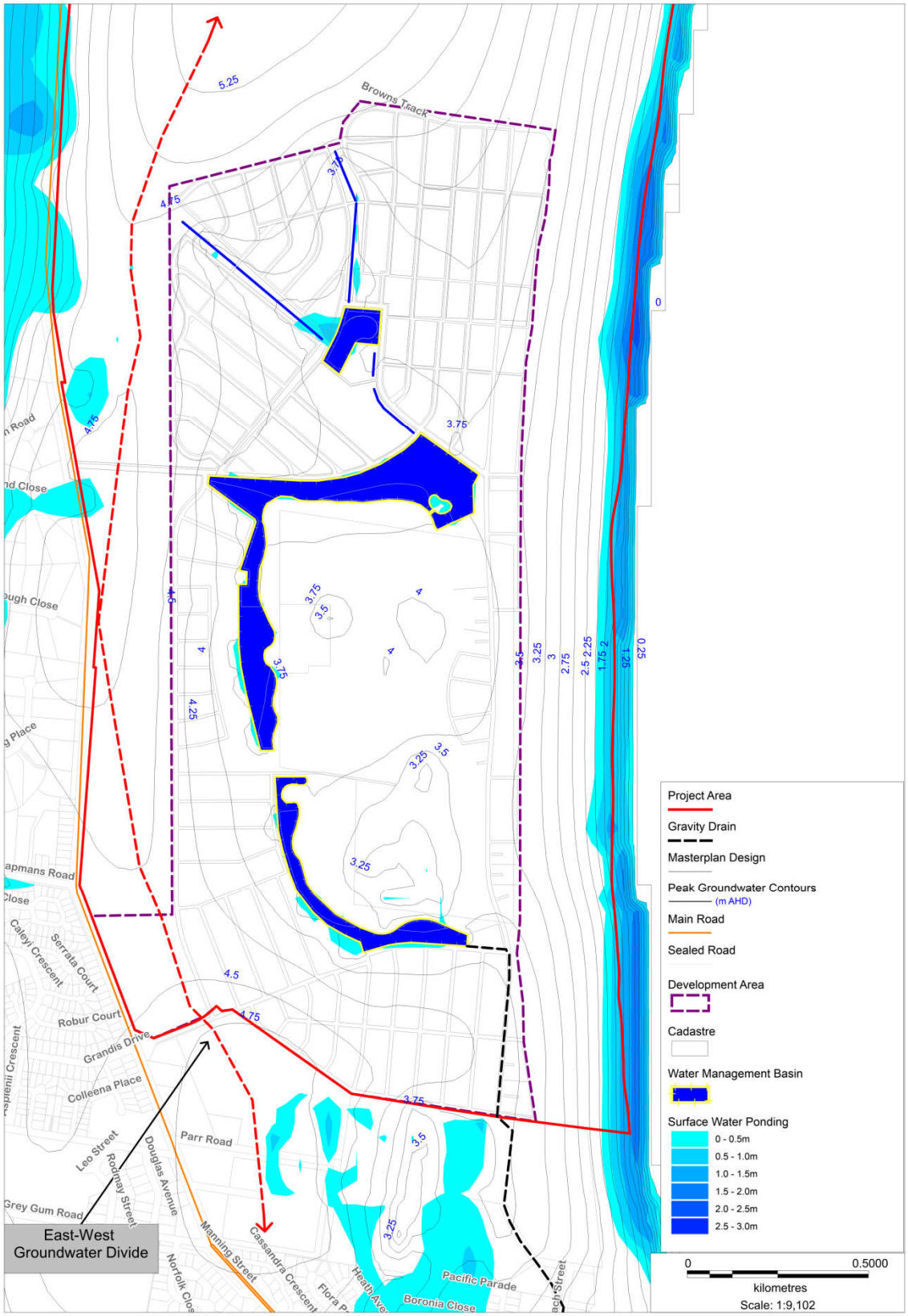

Plate 5-11 – *Detailed Groundwater Model Results: 1963 event (assuming 0.91m sea level rise).*

The following key conclusions can be made from the developed conditions results presented in **Plate 5-11**:

- **Peak Groundwater Levels** - Peak groundwater levels are predicted to range between 3.75 m AHD to 4.75 m AHD within the development area. Model results indicate that during flood conditions, groundwater flow within the development area will be generally towards the water management basins, which will be dewatered by the gravity drainage system.

- **Surface water ponding** – Due to the lower peak groundwater levels and modified design surface levels, peak groundwater levels are not predicted to intercept the surface within the proposed development areas. Hence, no surface ponding (from groundwater flooding) beyond the water management basins is expected.

In summary, the developed conditions model results have demonstrated that the proposed flood mitigation controls will be effective in reducing peak flood levels for both current and 2100 sea level rise scenarios. Flood planning levels and risk management measures are discussed in the following sections. Refer to **Section 7** of the Groundwater Modelling Technical Report (SMEC, 2014) for further information on the developed conditions flood modelling and predicted flood impacts.

5.5 Adopted Flood Planning Levels

As discussed in **Section 5.4**, the 1963 event is representative of a 100-year ARI event and has been adopted as the flood planning event for the project. Model results from this event were used to establish the following 100-year ARI levels for the project:

- **3.9 m AHD** has been adopted as the 100-year ARI surface water level in the Golf Course Basins, based on the Empirical Groundwater Model Results.

- **4.1 m AHD** has been adopted as the 100-year ARI surface water level in the Northern Basin and Northern Finger Drains, based on the Empirical Groundwater Model Results plus a 0.2m contingency to allow for some head loss between the northern water management basins and the inlet to the gravity drain. The 0.2 m contingency is expected to be conservative as only minor head losses are expected due to the low flow rates (less than 1 m^3/s) and significant flow conveyance areas in the basins and connecting surface drains (Note: all culverts that connect basin areas under roads will be adequately sized to have negligible head loss for design flows).

- The groundwater levels (assuming 0.91 m of sea level rise) that are presented in **Plate 5-11** have been adopted as the design 100-year ARI groundwater levels for developed conditions.

5.6 Flood Risk Management Measures

The following flood risk management measures are proposed:

- The **water management basins** and **gravity drainage system** will be designed to collectively limit the 100-year ARI Golf Course Basin level to 3.9 m AHD.

- **Subsurface drainage** will be provided under road bases in the piped drainage zone (Zone D4). The subsurface drainage will de-water the local groundwater into the stormwater pipes that will drain to the water management basins. When basin water levels are elevated, it is expected that the subsurface drainage systems will be temporarily constrained by basin tail water effects. **Figure 3** shows a typical section of a road reserve in the piped drainage zone (Zone D4), illustrating the functionality of the proposed subsurface drainage systems. It is noted that the effect of the subsurface drainage was not considered in the groundwater modelling as the subsurface drainage is a contingent control that will be effective in managing elevated groundwater levels in localised areas.

- **Minimum road surface levels** will be 4.2 m AHD in areas adjacent to the Golf Course Basins and 4.4 m AHD in development areas adjacent to the Northern Basin and Finger Drains, providing approximately 0.3 m freeboard to the predicted peak basin levels.

- **Minimum habitable floor levels** will be 4.7 m AHD in areas adjacent to the Golf Course Basins and 4.9 m AHD in development areas adjacent to the Northern Basin and Finger Drains. These levels will provide 0.8 m freeboard to the predicted 100-year ARI peak basin levels. This freeboard is 0.3 m higher than typical freeboards applied in NSW which adds additional contingency to the flood risk management measures. This is considered appropriate given the uncertainties in estimating recharge and groundwater flow characteristics within the development area.

6 STORMWATER QUALITY MANAGEMENT STRATEGY

Section 5 outlined the proposed stormwater management strategy in the broader context of the integrated stormwater and groundwater management strategy for the project. This present section provides further details on the stormwater management strategy, including water quality, and includes the following information:

- A description of identified stormwater management constraints.
- A description of the adopted stormwater management objectives.
- A description of the stormwater management strategies proposed for the four water management zones established in **Section 5**.
- A description of the water quality modelling that was undertaken to demonstrate the effectiveness of the proposed stormwater controls and assess the water quality impacts of the project.

6.1 Definitions

The integrated stormwater and groundwater management strategy that is described in **Section 5** includes a series of water management basins that are required for flood mitigation purposes. The basins will be excavated in the site's sandy soils and will therefore be highly permeable, with flow exchange expected between water ponded in the basins and the adjoining groundwater. Accordingly, for the purposes of this assessment, the water management basins are part of the groundwater aquifer.

Specific definitions used in the section include:

- **Stormwater** refers to:
    - Runoff from impervious surfaces that drain into the water management basins.
    - Direct rainfall over the water management basins.
    - Recharge originating from runoff from impervious surfaces.
    - Recharge from pervious surfaces.
- **Receiving waters** refers to:
    - Groundwater within the development area
    - Surface water within the water management basins.

6.2 Stormwater Management Strategy

This section establishes a stormwater strategy for the four water management zones described in **Section 5.**

6.2.1 Identified Constraints

The proposed stormwater strategy was formulated considering the following site constraints:

- **High Infiltration Rates**: As described in **Section 3**, the aeolian dune systems are characterised by clean dune sands that have very high infiltration rates. Accordingly, no surface runoff is expected from pervious surfaces, with most of the rainfall infiltrating into the sandy soils. Similarly, runoff from impervious surfaces that either drain to a pervious area or a designated infiltration area is also expected to infiltrate readily into the sandy soils. Accordingly, water quality treatment of runoff / recharge from pervious areas is not considered possible due to the high infiltration rates. Similar constraints are also applicable to impervious areas that drain to pervious areas.

- **Limited Vertical Fall**: Due to the relatively low design levels and identified groundwater constraints, there is limited vertical fall available for any stormwater controls. Hence, any stormwater solution needs to efficiently utilise the available vertical fall to maximise its treatment functionality and minimise its impost on the civil design aspects of the project.

6.2.2 Stormwater Management Objectives

The following stormwater management objectives have been adopted:

- **Stormwater Conveyance Objectives**: Establish the framework for a stormwater management system that can (at a later design stage) be designed to safely manage stormwater runoff during minor (10-year ARI) and major (100-year ARI) storm events in accordance with standard stormwater management design guidelines.

- **Water Quality Treatment Objectives**: Water quality controls are proposed to reduce pollutant loads in all runoff from impervious areas that can be directed to streetscape water quality controls. Proposed controls will be designed and constructed to achieve the following minimum pollutant load reduction targets (compared to developed conditions with no controls):

    - 85% removal of Total Suspended Solids (TSS)

    - 60% removal of Total Phosphorous (TP)

    - 60% removal of Total Nitrogen (TN)

The proposed pollutant load reduction targets were originally adopted to reflect Landcom's sustainability objectives that were in place when work on the IWCMS commenced in 2012. These objectives were subsequently removed from Landcom's sustainability policy. Notwithstanding, the pollutant load reduction targets are considered appropriate for the site and have therefore been maintained. The proposed pollutant load reduction targets meet or exceed the applicable targets recommended in Council's DCP 2014 that are discussed in **Section 2**.

6.2.3 Stormwater Management Approach

The following stormwater management approach was formulated responding to the abovementioned objectives and constraints:

- Stormwater treatment controls are only proposed to treat runoff from impervious surfaces as it is not considered possible to collect and treat runoff / recharge from pervious surfaces, given the very high infiltration rates. This limits the potential for pollutant load reductions (through water quality treatment) as reductions are not possible for runoff / recharge from the estimated 151.1 ha of pervious surfaces that will exist within the 261.5 ha development area.

- The following water quality controls are proposed to treat runoff from impervious surfaces (including roof areas and road pavements):

    - **Rainwater Tanks** - Runoff from roof areas will be collected in rainwater tanks. In infiltration areas (Zone D3) rainwater tanks will overflow into on-lot gravel filled infiltration pits, or similar infiltration devices. In the piped drainage zone (Zone D4), rainwater tanks will overflow to the kerb for further treatment in the proposed raingardens.

    - **Raingardens** – Runoff from road pavements and overflow from rainwater tanks (in Zone D4 only) will be collected in kerb and guttering and will be directed to streetscape raingardens (or biofiltration basins) for treatment. The conceptual design of the raingardens is discussed further below.

- **Stormwater Conveyance:** The following stormwater conveyance measures are proposed:

    - In **Zone D3**, the overflow from rainwater tanks will be directed to an on-lot infiltration system (gravel filled pit or similar) that, due to the very high infiltration rates, will be designed to have the capacity to infiltrate the overflow from the rainwater tank during a 100-year ARI event (major event). As a contingency, the infiltration systems are to be designed so that they overflow to a pervious area. Runoff from road pavements and driveways will be collected in roadside biofiltration swales that will facilitate infiltration of the majority of runoff. The swales will be graded to either the water management basins or one of the designated overland flow outlet locations indicated in **Figure 2** to safely convey any runoff that may occur during a 100-year ARI event (major event).

    - In **Zone D4**, the piped drainage system will be designed to convey the 10-year ARI event (minor event). Inlet pits will be located within each raingarden (as indicated in **Plate 6-1** below) to divert excess runoff into the piped drainage system. Surface drainage (primarily along roads) will be designed to safely convey runoff during a 100-year ARI event (major event) to either the water management basins or one of the designated overland flow outlet locations indicated in **Figure 2**.

Raingarden Design Concept

Streetscape raingardens are proposed as the primary water quality control. The raingardens will receive runoff from road pavements, driveways and overflow from rainwater tanks (in Zone D4 only) that will be collected in a standard kerb and gutter configuration. Runoff from the kerb and gutter will flow into an inlet area before entering an aboveground extended detention storage area from which ponded water will infiltrate through the underlying filter media. The filter media will comprise of at least 0.6 m sandy loam material that meets standard design specifications for biofiltration systems. The filter media will be lined as follows:

- In **Zone D3** the base of the filter media will be unlined and treated water will infiltrate freely into the underlying groundwater. The walls of the filter media will be lined to prevent water infiltrating out of the sides of the media.
- In **Zone D4**, it is proposed to line both the walls and the base of the filter media. A subsurface drain will be provided under the base of the filter media to capture treated stormwater and divert it into the piped stormwater system that will drain to the water management basins. The reasons for this configuration are explain in **Section 5**.

Plate 6-1 provides a typical section that details the design concept for the proposed raingardens.

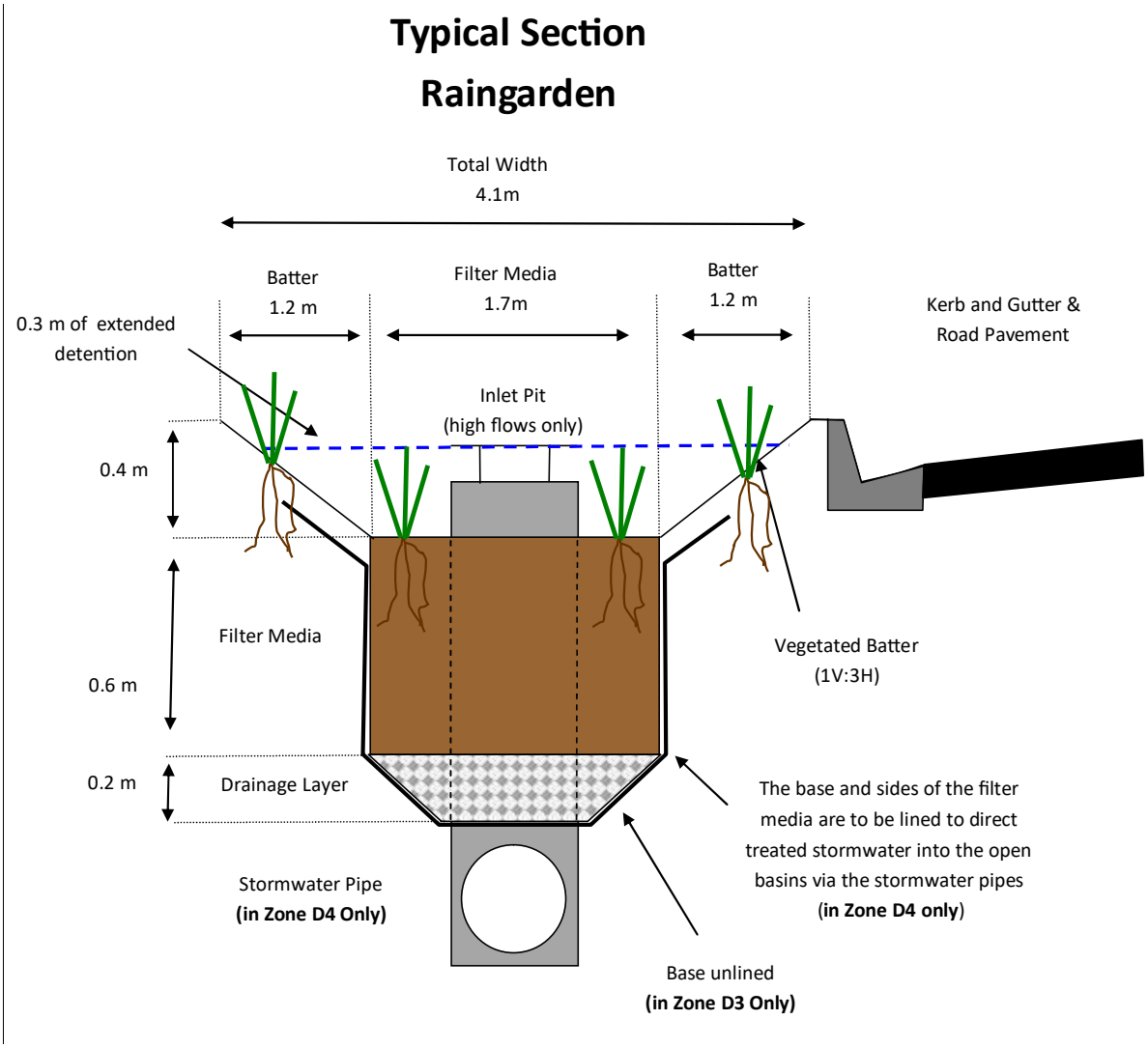

***Plate 6-1** – Typical section of a streetscape raingarden*

As indicated in **Plate 6-1**, the base of the filter media will be located within 1 m of the surface and above the stormwater pipe. This will enable the raingardens to hydraulically function under elevated groundwater conditions.

The most suitable location, size and shape of each raingarden will be established at the detailed design stage. However, as the raingardens will receive surface runoff they will need to be distributed throughout the development landscape to collect and treat the majority of runoff from impervious surfaces. Broadly it is expected that in:

- **Zone D3** raingardens will be constructed in swales formed to maximise the infiltration area. The swales will also convey any excess flow to the designated overland flow locations indicated in **Figure 2**.

- **Zone D4** raingardens will be constructed within the road reserve at approximately 60m centres. It is expected that a typical contributing catchment area will comprise three lots and adjoining road reserve area, with contributing impervious areas ranging from 500 to 1,000 m^2. **Plate 6-2** shows a plan view concept of a typical streetscape raingarden that has been sized to meet the water quality objectives established earlier in this section for runoff from the typical catchment described above. The indicated dimensions are also consistent with the road sections established for the Project Masterplan (Roberts Day, 2014).

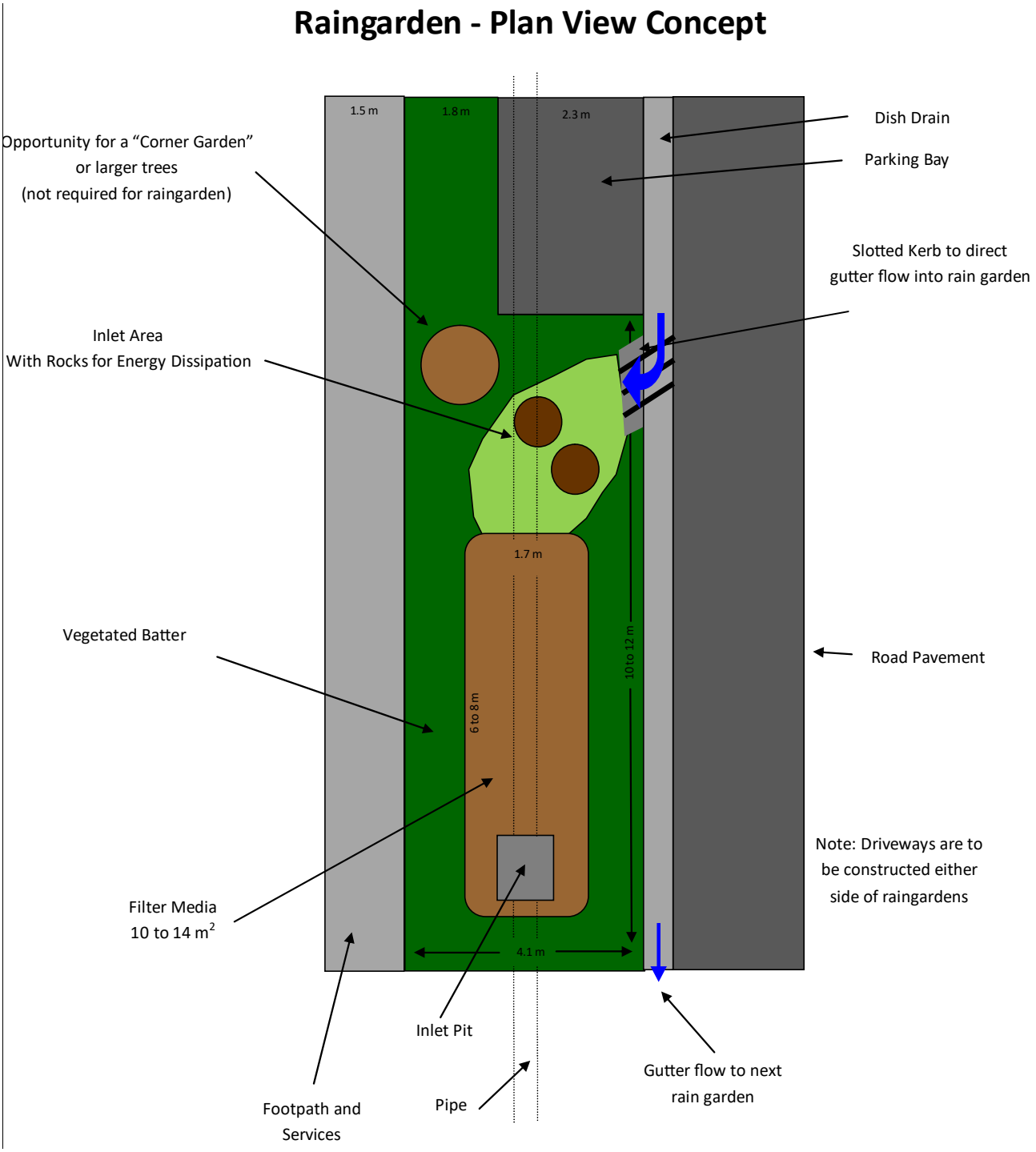

***Plate 6-2** – Typical plan view concept of a street scape raingarden in Zone D4*

6.2.4 Stormwater Management Strategy

The proposed stormwater management strategy is described diagrammatically in **Plate 6-3** for the infiltration zone (Zone D3) and **Plate 6-4** for the piped drainage zone (Zone D4). It is proposed to implement infiltration-based controls for any impervious areas located within the golf course and open space (Zone D1).

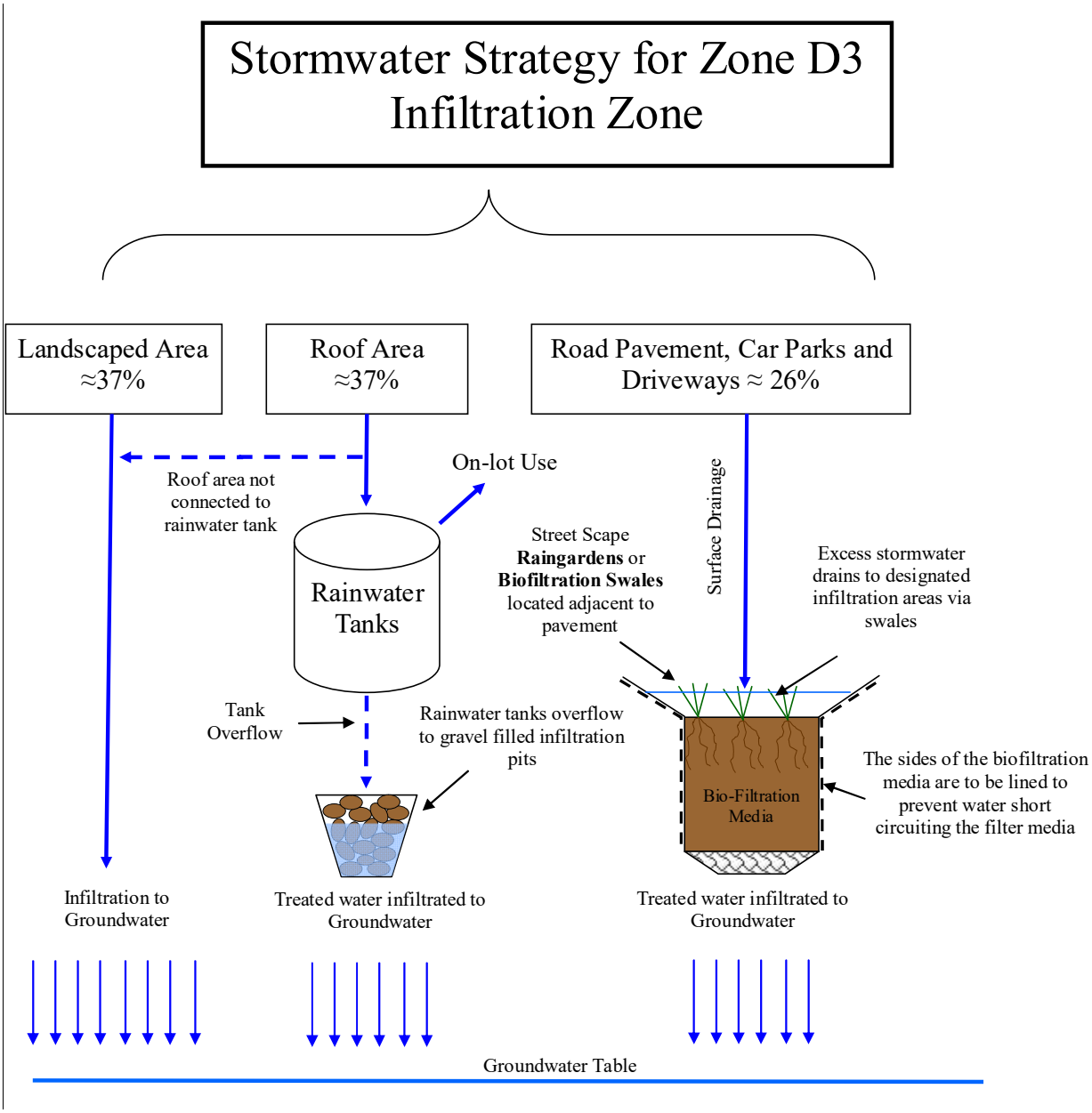

***Plate 6-3** - Stormwater Management Approach in Zone D3: Infiltration Zone*

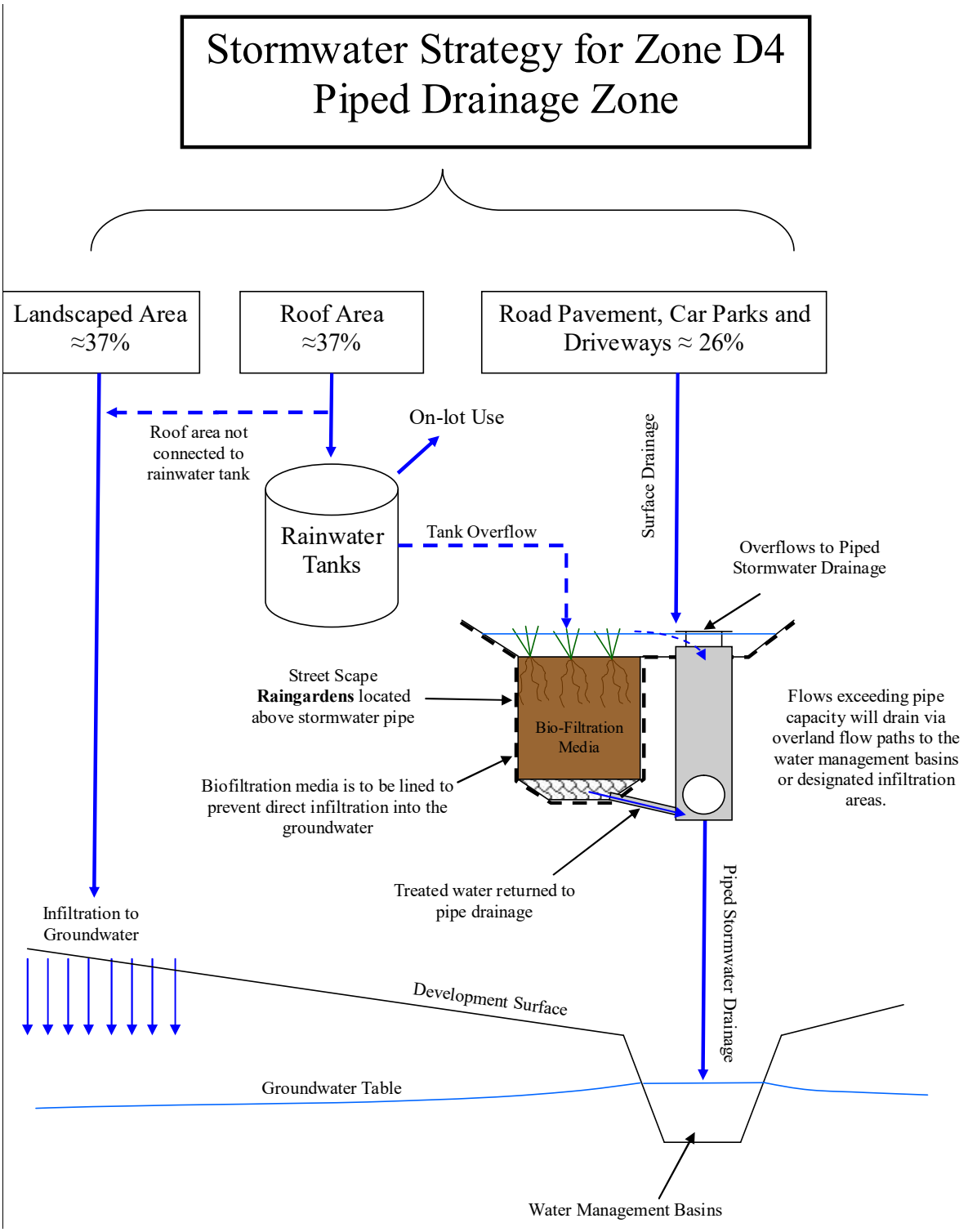

***Plate 6-4** - Stormwater Management Approach in Zone D4: Piped Drainage Zone*

6.3 Water Quality Modelling

Water quality modelling was undertaken to demonstrate the effectiveness of the stormwater strategy and to determine the key design parameters for the proposed water quality controls. The following sections outline the modelling approach, key assumptions and model results.

6.3.1 Modelling Approach

The performance of the proposed stormwater management controls was assessed using the *Model for Urban Stormwater Improvement Conceptualisation* (MUSIC) software (Version 6.1) developed by eWater. MUSIC has been specifically designed to model the effectiveness of stormwater management systems in achieving pollutant reduction targets and mitigating hydrologic impacts, such as increases in runoff volume.

Where possible, model parameters were established based on data that was collected for use in this study or the results from the groundwater modelling that is described in the Groundwater Modelling Technical Report (SMEC, 2014). Typical values were applied when no data or insufficient data was available to inform a given model assumption.

Modelling Objectives

The objectives of the modelling exercise were to:

- Identify the extent and nature of water quality controls required to achieve the water quality management objectives presented in **Table 4-1** and discussed in more detail in **Section 6.2**.
- Establish the likely changes to key pollutant loads and concentrations in the local groundwater system. As described in **Section 6.1** for the purposes of water quality modelling the water management basins are also considered to be part of the receiving waters.

Meteorological Template

The MUSIC meteorological template includes rainfall and areal potential evapotranspiration data. The template forms the basis for hydrologic calculations.

MUSIC modelling Guidelines (WBM, 2010) recommend that MUSIC simulations are undertaken at a 6-minute time step. The nearest regional rain gauge that has 6-minute pluviograph data is located at the Taree Gauge (BoM 60141). The five-year record between 1970 and 1974 from the Taree gauge was considered the most appropriate for use in the MUSIC modelling as it contains a continuous record of typical rainfall conditions for the Forster / Tuncurry area. The average rainfall recorded over the 5-year period was 1,149 mm/year, which similar to the average rainfall reported in **Table 3-1** of 1,217 mm/year for the South Forster Gauge (BoM 60013). The average monthly areal potential evapotranspiration rates reported in **Table 3-2** were applied to the MUSIC model.

6.3.2 Catchment Parameters

The catchment nodes in MUSIC simulate the runoff quantity and quality from a given catchment. This section describes the modelling approach and associated assumptions.

Water Management Zones

As described in **Section 5**, the development area was divided into the following water management zones based on the land use and the applied water management strategy:

- **Zone D1 - Golf Course and Open Space:** comprising the golf course and open space areas.
- **Zone D2 - Water Management Area**: comprises the open water zones, ephemeral zones, ephemeral finger drains and basin batters.
- **Zone D3 - Development Area (Infiltration Zone):** Comprises all development within the infiltration zone.
- **Zone D4 - Development Area (Piped Drainage Zone):** Comprises all development within the piped drainage zone.

The distribution of the abovementioned zones is depicted in **Plate 6-5** (Note: these are the same zones that are shown in **Plate 5-2**). It is noted that the proposed employment lands located off the Lakes Way are not shown in **Plate 6-5** , but are expected to have infiltration-based stormwater controls (i.e. Zone D3).

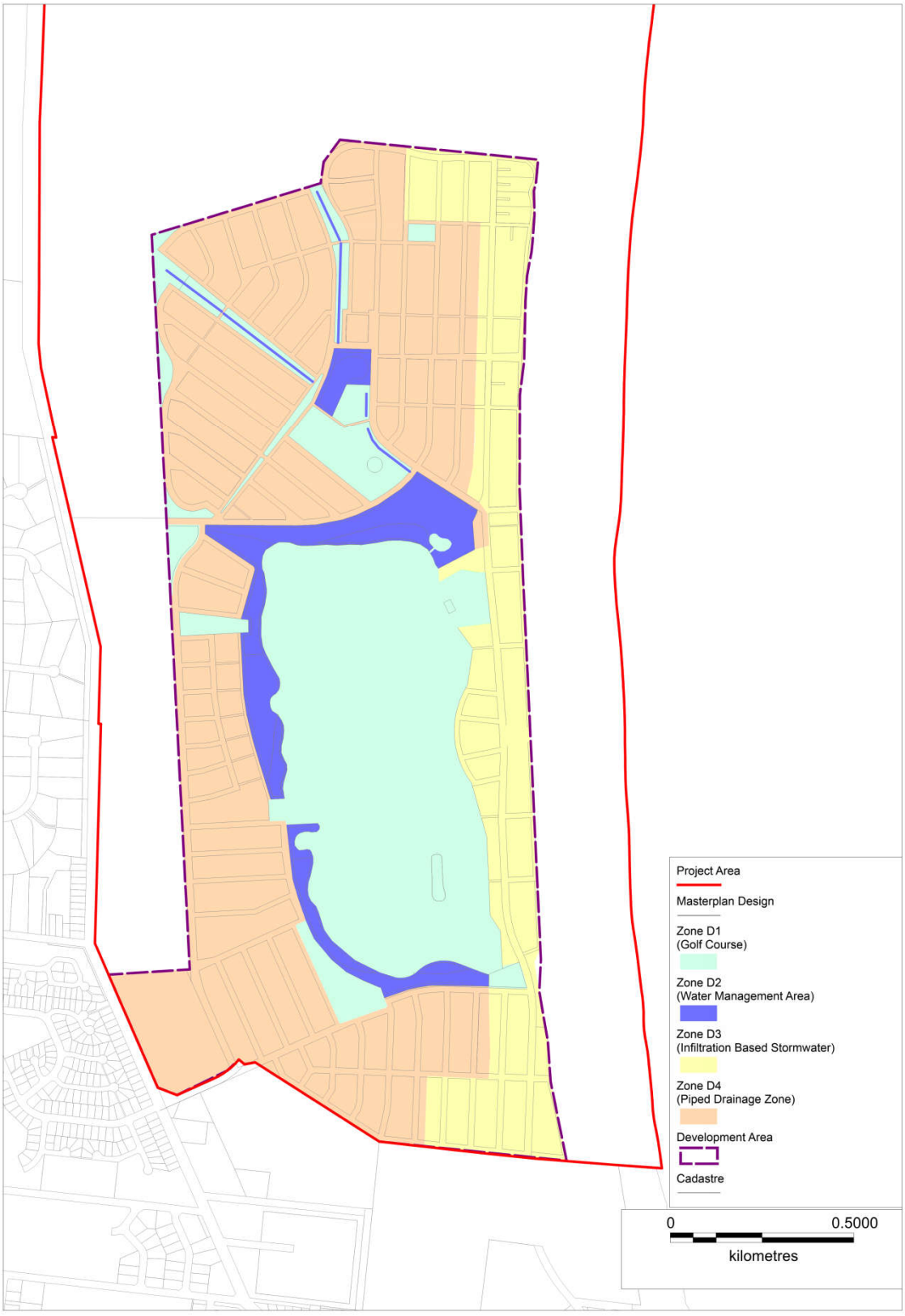

***Plate 6-5** – Distribution of water management zones within the development area*

For the purposes of MUSIC modelling, the development area within each of the above zones was divided into the following land use categories based on the expected recharge characteristics and runoff quality:

- Golf course (includes both the greens, fairways and native vegetation within the golf course);
- Existing Bushland;
- Roof Area;
- Road and Driveway Areas;
- Native Landscaping; and
- Non-native landscaping.

Table 6-1 provides a breakdown of the abovementioned land uses in each water management zone. **Appendix B** provides a detailed breakdown of the land use calculations used to inform this table.

***Table 6-1** – Estimated land uses within water management zones (unit areas are in ha)*[1]

Land Use Category[2]	Zone D1 Golf Course and Open Space	Zone D2 Water Management Area	Zone D3 Development Area (infiltration zone)	Zone D4 Development Area (Piped Drainage Zone)	Totals for Development Area
Development Area (existing conditions)					
- Existing Bushland	Note: the development area was not divided into water management zones for existing conditions modelling.				**201.5**
- Golf Course					**60**
Total (existing conditions)					**261.5**
Development Area (developed conditions)					
- Golf Course	57.5	-	-	-	**57.5**
- Roof Area	0.2	-	22.1	40.9	**63.2**
- Road and Driveway Area	2.2	-	15.7	29.2	**47.1**
- Native Landscaping Areas	2.9	15.5	13.8	17.9	**51.2**
- Non-Native Landscaping Areas	5.8	2.6	10.9	24.3	**42.4**
Total (developed conditions)	**68.6**	**18.1**	**62.5**	**112.3**	**261.5**

Note 1: All areas have been rounded to one decimal place.

Note 2: Refer to **Appendix B** for a detailed breakdown of land use calculations used to inform this table.

It is noted that for the purposes of water quality modelling, it was assumed that the collective impervious area directly connected to the water management basins is 62 ha. This area was calculated based on 100% of the road and driveway area in Zone D4 (29.2ha) plus 80% of the roof area in Zone D4 (0.8 x 40.9 ha = 32.8 ha). The remaining 20% of roof area in Zone D4 is assumed to drain to a pervious area and infiltrate into the groundwater system.

Rainfall Runoff Parameters

MUSIC applies a rainfall runoff model to estimate surface runoff and base flow from both pervious and impervious surfaces. As described in **Section 3**, the development area is characterised by an undulating aeolian dune system, which comprises clean dune sands that have very high infiltration rates. Accordingly, no surface runoff from pervious surfaces is expected for either existing or developed conditions. Existing site recharge characteristics were assessed in detail as part of the groundwater modelling that is described in the Groundwater Modelling Technical Report (SMEC, 2014. his modelling exercise estimated that for the existing site conditions, on an average annual basis, 36% of rainfall is converted to recharge.

For the purposes of water quality modelling, the rainfall runoff model for pervious areas was parameterised to achieve an average annual base flow of 36% of rainfall over the modelling period. As discussed in **Section 6.1**, base flow is treated as groundwater recharge. **Table 5-2** presents the adopted rainfall runoff parameters for pervious and impervious surfaces.

***Table 6-2** – Adopted MUSIC rainfall runoff model parameters*

Parameter	Adopted Value
Impervious Area Parameters	
- *Rainfall Threshold*	1.5
Pervious Area Parameters	
- *Soil Storage Capacity (mm)*	300
- *Initial Storage (% of Capacity)*	30
- *Field Capacity*	100
- *Infiltration Capacity Coefficient – a*	600
- *Infiltration Capacity Coefficient – b*	3.5
Groundwater Parameters	
- *Initial depth (mm)*	10
- *Daily Recharge Rate (%)*	100
- *Daily Baseflow Rate (%)*	10
- *Daily Deep Seepage Rate (%)*	0

Runoff Quality Parameters

MUSIC applies Event Mean Concentration (EMC) values for TSS, TP and TN to simulated runoff quality from a given catchment area. EMC values are typically assigned for both surface runoff and baseflow. EMC values for each of the land uses established above were selected based on the following rationale:

- **Golf Course** - EMCs for TN and TP were selected based on the average concentration calculated from 33 groundwater samples collected from monitoring locations within the existing golf course over the 38-month water quality monitoring period (March 2010 to May 2013). Refer to **Section 3** for water quality monitoring results.
- **Existing Bushland** - EMCs for TN and TP were selected based on the average concentration calculated from 29 groundwater samples collected from non-golf course monitoring locations over the 38-month monitoring period (March 2010 to May 2013). Refer to **Section 3** for water quality monitoring results.
- **Native Landscaping** (developed conditions) – The EMCs adopted for the existing bushland land use category were applied to areas of the development where native vegetation will either be retained or established.
- **Other Land Use Categories** - EMCs for roof area, road and pavement areas and non-native landscaping were established based on recommended values in Fletcher et all. (2004) and Australian Runoff Quality (IEAust, 2005).

Adopted EMC values are presented in **Table 6-3.**

***Table 6-3** – Adopted Event Mean Concentrations*

Land Use Category	TSS (mg/l)		TN (mg/l)		TP (mg/l)	
	Base Flow	*Surface Flows*	*Base Flow*	*Surface Flows*	*Base Flow*	*Surface Flows*
Golf Course	N/A[1]	N/A[3]	4.9	N/A[3]	0.15	N/A[3]
Existing Bushland	N/A[1]	N/A[3]	1.1	N/A[3]	0.18	N/A[3]
Roof Area	N/A[2]	36	N/A[2]	2.0	N/A[2]	0.13
Road and Driveways	N/A[2]	270	N/A[2]	2.2	N/A[2]	0.50
Native Landscaping	N/A[1]	N/A[3]	1.1	N/A[3]	0.18	N/A[3]
Non-native Landscaping	N/A[1]	N/A[3]	2.0	N/A[3]	0.25	N/A[3]

Note 1: TSS was not modelled for pervious areas as all baseflow is assumed to recharge to the groundwater and it is expected that suspended sediment will not be conveyed through the aquifer.

Note 2: No base flow will occur from impervious surfaces such as roofs or roads.

Note 3: Surface flows were not modelled for pervious areas as they are unlikely to occur due to the very high infiltration rates that exist onsite.

6.3.3 Treatment Node Parameters

One of the key objectives of MUSIC modelling is to determine the appropriate design criteria of water quality controls required to meet the stormwater management objectives. MUSIC facilitates assessment of a range of controls and contains generic algorithms that estimate the pollutant removal efficiencies and runoff load reductions for each control. MUSIC enables controls to be modelled in series, allowing for the collective effect of all controls to be estimated. The following sections describe the key assumptions applied to the MUSIC modelling of the proposed stormwater controls.

Rainwater Tanks

The Potable Water Demand Reduction Strategy that is presented in **Section 9** proposes that all dwellings will be fitted with a 5 kL (or larger) rainwater tank that will be plumbed to supply water for toilet flushing, laundry, hot water and all outdoor tap fittings. Water balance modelling was undertaken to estimate the effectiveness of rainwater tanks in reducing potable water demand for a range of climatic conditions. The assumptions applied to the **Section 9** modelling were also applied in full to model the stormwater management benefits of rainwater tanks in the MUSIC model. Refer to **Section 9.4** for details on the modelling assumptions.

It is noted that 80% of the net roof area is assumed to drain to rainwater tanks, with the remaining 20% of roof area assumed to drain onto pervious areas adjacent to the building and infiltrate to the groundwater.

Raingardens

As established in **Section 6.2**, streetscape raingardens are proposed as the primary water quality control. Raingardens were modelled using the “biofiltration” node in MUSIC with the following key assumptions applied:

- The raingardens will have a 0.3 m extended detention depth, with the extended detention area assumed to be 1.3 x the filter area. This is considered conservative for streetscape raingardens.
- The raingardens will be by-passed when the extended detention depth is exceeded.
- The filter media will be 0.6 m deep and will comprise a sandy loam soil. It is expected that the long-term hydraulic conductivity will be 100 mm/hr. The filter media will have a TN content no greater than 800 mg/kg and an orthophosphate content no greater than 50 mg/kg.
- It was assumed that all raingardens were lined to enable the MUSIC model results to be easily calculated and processed. As both the groundwater and surface water in the basins is considered to be receiving waters, this assumption has no bearing on the model results.

Indicative design specifications for raingardens within each water management zone are provided in **Table 6-6**.

6.3.4 Model Framework

A MUSIC model was established to reflect the expected functionality of the proposed stormwater management strategy as described in **Section 6.2** and the modelling assumptions discussed in this section. **Plate 6-6** shows a schematic of the MUSIC model framework.

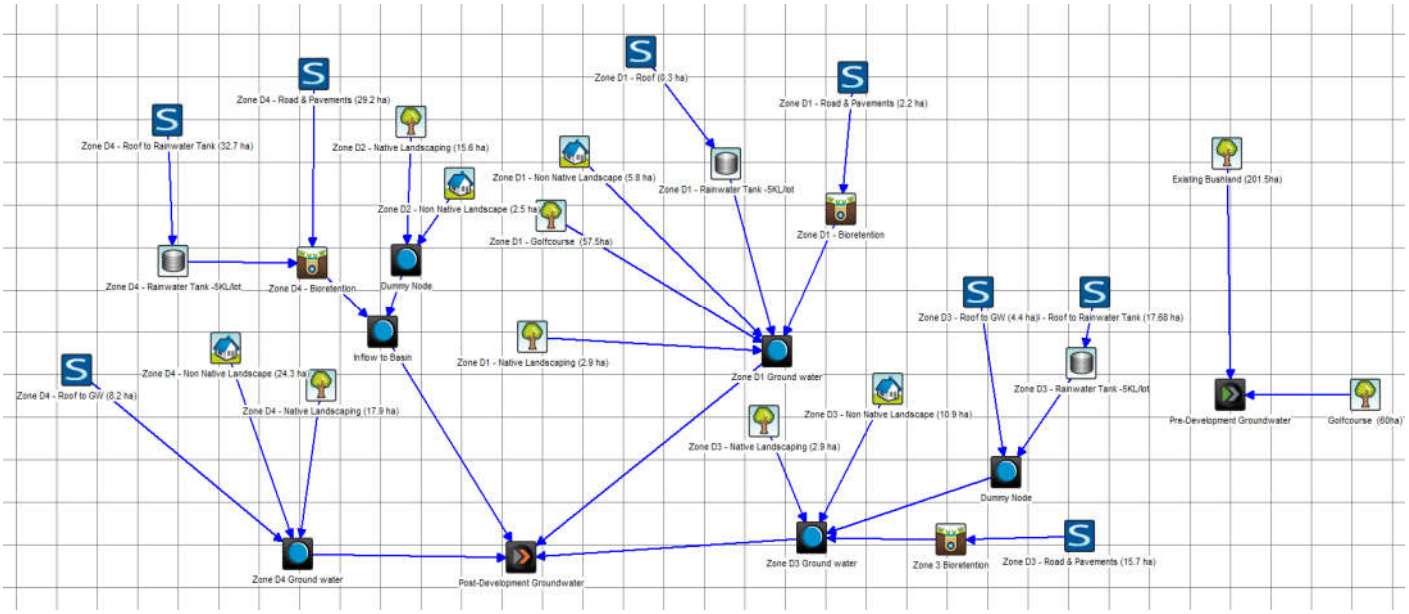

***Plate 6-6** – Model Framework*

6.3.5 Modelling Results

MUSIC model results for both existing and developed conditions are presented as follows:

- **Table 6-5** reports results for each water management zone for existing conditions, developed unmitigated and developed mitigated conditions. The estimated pollutant load reductions achieved by the proposed controls are also reported as a percentage.
- **Error! Reference source not found.** reports the predicted changes to average annual pollutant loads and concentrations due to the development. As recharge from the golf course is a significant contributor to annual nitrogen loads to the receiving groundwater (for both existing and proposed conditions), changes to annual loads and concentrations are reported including and excluding loads from the golf course.
- **Table 6-6** provides details on the minimum biofiltration requirements for each water management zone. The areas are compared to the total area and contributing impervious area in each zone for context.

For all results it is noted that:

- As discussed in **Section 6.1**, both the surface water in the water management basins and the groundwater within the development area are the receiving waters. Hence, no pollutant removal has been modelled in the water management basins.
- Runoff / recharge from pervious areas cannot be collected and treated in water quality controls. Hence, no pollutant reductions from pervious areas are assumed in the model.

- Results for TSS have only been reported for surface runoff to the water management basins. Results for TSS have not been reported where the groundwater is the receiving waters as TSS are not expected to be transmitted through the aquifer.

Table 6-4 – *MUSIC modelling results summary*

	Units	Existing Conditions	Developed Conditions			Change in Annual Load or Concentration (after mitigations)	
			Unmitigated	*Mitigated*	*Percentage Reduction*	*Load or Concentration Change*	*Percentage Change*
Results including recharge from the golf course							
Runoff Volume[2]	(ML/yr)	1,090	1,849	1,606	13%	+516	+47%
TP (load)	(kg/yr)	190	458	256	44%	+66	+35%
TP (concentration)	(mg/l)	0.17	0.25	0.16	30%	-0.01	+9%
TN (load)	(kg/yr)	2,140	4,182	3,013	28%	+873	+41%
TN (concentration)	(mg/l)	2.0	2.3	1.9	13%	-0.1	-4%
Results excluding recharge from the golf course							
Runoff Volume	(ML/yr)	839	1,610	1,367	15%	+528	+63%
TP (load)	(kg/yr)	153	422	220	48%	+67	+44%
TP (concentration)	(mg/l)	0.18	0.26	0.16	39%	-0.02	-12%
TN (load)	(kg/yr)	920	3,012	1,843	39%	+923	+100%
TN (concentration)	(mg/l)	1.1	1.9	1.3	28%	+0.3	+23%

Note 1: all results are mean annual loads
Note 2: the reported runoff volumes are moderately different to the mass balance results presented in Table 8-2 of the Groundwater Modelling Technical Report (SMEC, 2014). This is due to mass balance results being calculated from a typical average year that was derived from a 114-year simulation period, while the MUSIC results have been calculated as the mean annual loads from a 5-year simulation period.

Table 6-5 – *MUSIC modelling results (for existing and developed conditions)*

	Runoff Volume			TSS			TP			TN		
	Source	Post Treatment	Reduction	Source	Post Treatment	Reduction	Source	Post Treatment	Reduction	Source	Post Treatment	Reduction
	(ML/year)	(ML/year)	(%)	(kg/year)	(kg/year)	(%)	(kg/year)	(kg/year)	(%)	(kg/year)	(kg/year)	(%)
Existing Conditions												
- Existing Bushland (recharge to Groundwater)	839						153			920		
- Golf Course (recharge to Groundwater)	250						38			1,220		
Total (existing conditions)	**1,090**						**190**			**2,140**		
Developed Conditions												
- Surface Runoff to Basins (from Zone D4)	616	459	25%	89,800	10,400	88%	188	63	67%	1,290	515	60%
- Direct Rainfall to Basins (from Zone D2)	197	197	0%	16,000	16,000	0%	36	36	0%	222	222	0%
Total Inflow to Basins	**813**	**656**	**19%**	**105,800**	**26,400**	**75%**	**224**	**99**	**56%**	**1,512**	**737**	**51%**
- Zone D1 (recharge to groundwater)												
a. Golf Course	239	239	0%				36.2	36.2	0%	1,170	1,170	0%
b. Open Space	61	59	3%				19.8	11.8	40%	120	90	25%
- Zone D1 Total	300	298	1%				56	48	15%	1,290	1,260	2%
- Zone D3 (recharge to groundwater)												
a. Road Areas	156	149	4%				78	19	75%	342	137	60%
b. Other Areas	323	246	24%				50	40	19%	592	433	27%
- Zone D3 Total	479	395	18%				128	59	54%	934	570	39%
- Zone D4 (recharge to groundwater)	257	257	0%				50	50	0%	446	446	0%
Total Recharge to Groundwater	**1,036**	**950**	**8%**				**233**	**156**	**33%**	**2,670**	**2,276**	**15%**
Total (developed conditions)	**1,849**	**1,606**	**13%**				**458**	**256**	**44%**	**4,182**	**3,013**	**28%**

Note 1: all results are mean annual loads
Note 2: Light blue shading indicates results for the given column are not applicable.

***Table 6-6** – Minimum biofiltration area requirements*

Zone	Catchment Characteristics			Minimum Biofiltration Areas		
	Total Area (ha)	*Contributing Impervious Area (ha)*	*% of Total Catchment Area*	*Filter Area (m^2)*	*Extended Detention Area (m^2)*	*Filter Area to Contributing Impervious Area Ratio (%)*
Zone D1	68.6	2.4	3%	400	520	1.7%
Zone D3	62.5	15.7	25%	2,700	3,510	1.7%
Zone D4	112.3	62	55%	5,200	6,760	0.8%
Total	243.4	80.1	33%	8,300	10,790	1.0%

Results Discussion

The following conclusions can be made from the water quality modelling results:

- With reference to **Table 6-5**, the water quality controls proposed to treat runoff from roof areas (in Zone D4 only) and road pavements and driveways in all zones, will be effective in achieving the pollutant load reduction targets established in **Section 6.2**. A summary of minimum biofiltration area requirements for each zone is provided in **Table 6-6**. For Zones D1 and D3, where raingardens will treat runoff from road pavements and driveways only, a filter area equivalent to 1.7% of the contributing impervious area will be required to achieve the target reductions. For Zone D4, where rainwater tanks will provide significant stormwater management benefits, a filter area equivalent to 0.8% of the contributing impervious area (which includes roof, road and driveways) will be required to achieve the target reductions. Collectively, the total filter area for all zones is estimated to be 8,300 m^2. Making allowance for inlet areas and raingarden batters, the total raingarden footprint is expected to be approximately 2 to 2.5 times the filter area (i.e. 16,600 to 20,750 m^2 across all zones). This is equivalent to 0.9 to 1.1% of the development area (excluding Zone D2 and the golf course).

- With reference to **Table 6-5**, the proposed stormwater management controls will significantly reduce pollutant loads entering the water management basins. It is expected that further pollutant load reductions will occur in the water management basins, which will comprise 48% ephemeral areas. However, these reductions have not been considered in the water quality modelling as the basins are receiving waters. Refer to **Section 5.3.3** for further information on the water quality management measures for the water management basins.

- The summary results provided in **Error! Reference source not found.** provide estimates of changes to groundwater quality expected under developed conditions. As the golf course is a significant contributor of Total Nitrogen loads to the groundwater for both existing and developed conditions, model results excluding the golf course are the most representative of the development's potential to change groundwater quality. Accordingly, model results on this basis indicate that the following changes to groundwater quality within the development area are predicted:

    - Mean annual Total Nitrogen concentrations from the development area are expected to increase by 23%, from 1.1 mg/l to 1.3mg/l. Minor reductions (12%) in mean annual Total Phosphorous concentrations are predicted.

- Mean annual runoff / recharge volumes are predicted to increase by 63% based on the 5-year simulation applied to the MUSIC model.

- Total Nitrogen loads to the receiving groundwater are expected to increase by 100% as a result of the higher mean annual concentration and increase in recharge volumes to the groundwater. This magnitude of increase is typical for a greenfield urban development project that adopts best practise water quality controls. As indicated in **Error! Reference source not found.**, the relative change in Total Nitrogen loads reduces significantly (to 41%) if the golf course is included in the pollutant load calculations.

- Total Phosphorus loads to the receiving groundwater are expected to increase by 44% as a result of the increase in recharge volumes to the groundwater. This magnitude of increase is typical for a greenfield urban development project that adopts best practice water quality controls. As indicated in **Error! Reference source not found.**, the relative change in Total Phosphorus loads reduces to 35% if the golf course is included in the pollutant load calculations.

Further reductions in Total Nitrogen and Phosphorus loads are not considered practically achievable as:

- Water quality controls are proposed to remove 60% of mean annual Total Nitrogen and Phosphorus loads in runoff from impervious surfaces. Only modest improvements to the target removal rate could be achieved if significantly larger raingardens were implemented. Larger raingardens would create urban design issues due to the raingardens being integrated into the streetscape and increase the long-term maintenance cost.

- As established in **Section 6.2**, runoff /recharge from pervious areas and impervious areas that drain to pervious areas, cannot be collected and treated. Collectively, these areas are estimated to comprise 163.9ha or 63% of the 261.5ha development area. Hence, the potential to further increase pollutant load reductions is significantly constrained by the high infiltration rates.

- Most of the pollutant load increases are due to the predicted increase in runoff / recharge volume from the development area. Rainwater tanks are predicted to partially mitigate the volumetric increase. Further reductions are not considered possible without implementing a pumping system to remove groundwater from the development area. Such a system would have significant ongoing costs and is unlikely to result in any beneficial environmental outcomes.

Given the above constraints, Council's DCP targets (that are discussed in **Section 2**) are considered to not be a representative benchmark for assessing the performance of the proposed stormwater management strategy on a whole of development basis. The project's potential to impact water quality in the Wallamba River and the Wallis Lake is discussed in the following section.

6.4 Predicted Water Quality Impacts

Groundwater modelling results presented in **Section 8** of the Groundwater Modelling Technical Report (SMEC, 2014) established that for both existing and developed conditions, groundwater flows from the development area would be distributed as follows:

- 50% of total groundwater flow will be to the east, into the Pacific Ocean.
- 33% of total groundwater flow will be to the west, towards the Wallamba River Estuary
- 8% of total groundwater flow will be to the north, into the adjoining unconfined aquifer.
- 9% of total groundwater flow will be to the south, into the adjoining unconfined aquifer within the Tuncurry area.

During stakeholder consultation, Council raised concern that increased pollutant loads in groundwater flowing to the west could potentially result in an increase in pollutant loads entering the Wallamba River Estuary and the Wallis Lake system. Based on the above analysis, it is expected that approximately 33% of the pollutant load increase reported in **Error! Reference source not found.** would be exported to the west in groundwater flow. The “excluding golf course” results are most representative as the golf course is located to the east of the basins and all groundwater originating from the golf course is expected to flow to the east, into the Pacific Ocean.

Applying a 33% proportion of the predicted pollutant load increases reported in **Error! Reference source not found.**, the following changes to pollutant loads in groundwater flowing from the development area to the west were established:

- The Total Nitrogen load expected to increase by 305 kg/year (calculated as 33% of 923kg/year increase reported in **Error! Reference source not found.**).
- The Total Phosphorous load is expected to increase by 22k g/year (calculated as 33% of 67kg/year increase reported in **Error! Reference source not found.**).

It is expected that the above increased loads will be attenuated to background levels due to the following biochemical processes:

- As discussed in **Section 2**, phosphorous in groundwater can be readily fixed by iron, aluminium, manganese and calcium (as a function of the pH). Hence, increased phosphorus loads in groundwater are likely to be absorbed by the aquifer stratum.
- Groundwater flowing from the development area to the Wallamba River Estuary is expected to recharge within the significant wetland area that exists to the east of the Wallamba River Channel. There is potential for significant nutrient attenuation to occur as groundwater recharges within the wetland area as the shallow slow-moving groundwater will flow through a swampy environment where sufficient soil carbon is available and anaerobic conditions are likely to exist. These processes were applied in the Chapmans Road Stormwater Management Strategy (BMT WBM, 2010) to establish compliance with the ‘no net increase’ provisions in Council’s DCP 2014. It is understood that BMT WBM strategy was adopted by Council in 2010.

In summary, for the purposes of assessing potential water quality impacts to the Wallamba River Estuary, it is expected that any increases in nitrogen and phosphorus loads in groundwater flowing to the west are likely to be attenuated to background levels by the abovementioned processes.

7 CONCEPTUAL CIVIL DESIGN

A conceptual civil design was prepared for the project. The key objectives of the civil design were to:

- Demonstrate that the proposed water management strategy can be implemented without importing fill.
- Estimate the footprint and storage profiles for the proposed water management basins (as described in **Section 5**).
- Provide conceptual design information for the proposed stormwater management infrastructure to demonstrate how the infrastructure will be integrated into the urban landscape (as proposed in the development layout).

Key elements of the conceptual civil design are documented in the following figures:

- **Figure 2** shows the proposed design surface levels, the extent of the water management basins and associated batters and indicative alignments for the piped drainage system.
- **Figure 3** shows a typical section of a road reserve in the piped drainage zone (Zone D4), illustrating the functionality of the proposed raingardens and subsurface drainage.
- **Figure 4** shows a series of longitudinal sections that describe the design concept applied to the water management basins.

7.1 Earthworks Modelling

An earthworks model for the project was developed using 12D civil design software. The model applied the following assumptions to establish design levels for the development area.

- The development area was graded to achieve indicative road grades of at least 0.5% towards either the water management basins or the designated overland flow outlets that are indicted in **Figure 2**.
- The following minimum development levels were adopted based on the Flood Risk Management Measures that are described in **Section 5.6** :
    - 4.2 m AHD for development areas adjoining the Golf Course Basins.
    - 4.4 m AHD for development areas adjoining the Northern Basins or the Northern Finger Drains.

    In addition, 5.0 m AHD was adopted as a minimum level for all development areas that are adjacent to the development boundary.
- The public open space areas that were included in the model were assumed to be at 4 m AHD.

- The following assumptions were applied to establishing design levels for the water management basins:
    - 1 in 4 batters were applied to all basins.
    - An invert level of 0 m AHD was applied to the deep-water zones.
    - Ephemeral zones were set at 2.5 m AHD.
- The model did not include the following areas where the existing topography will be maintained:
    - The reconfigured golf course.
    - The eco village in the north-west of the development area.
    - Open space areas located in the western portion of the development area.

The estimated design levels are depicted in **Figure 2**. At the development boundary locations, design levels are typically within ±1 m of the existing levels of land adjoining the development area.

The earthworks model was applied to estimate cut and fill volumes for the project by comparing the design levels to the existing site levels within the 187 ha earthworks model domain. The LiDAR levels were lowered by 200 mm based on a comparison to detailed survey levels in open areas. These reduced levels were applied to all volumetric calculations.

The earthworks modelling results indicate that the design surface levels would achieve a **surplus** of **324,000 m^3** of material, which is equivalent to **0.17 m** of additional material over the 187 ha earthworks model domain. These model results demonstrate that:

- The proposed water management strategy can be implemented provided that an efficient civil design (from an earthworks perspective) is applied.
- The proposed flood mitigation controls are justified as there would be insufficient material available to raise development levels (at the proposed development yields) in response to higher flood planning levels.

7.2 Design Contingency and Flexibility

It is expected that the conceptual design of the water management basins and development areas will evolve as the project progresses through more detailed design phases. The water management strategy and associated civil design has been established to maximise design contingency and flexibility. Accordingly, the following adjustments could be made at future design stages without impacting the broad outcomes of the proposed strategy:

- The functionality of the flood mitigation controls (namely the water management basins and the gravity drainage) can be maintained under a range of configurations. Hence, if deemed necessary the shape and storage profile of individual basins can be adjusted, provided the cumulative volume and general site coverage is maintained.

- As discussed, in **Section 5.3.2** , the storage profile of the water management basins was calculated in the earthworks model. The storage profile applied to groundwater modelling was reduced by 20% to allow for some design flexibility / contingency. This contingent volume is equivalent to approximately 2ha of the net basin area and subject to the outcomes of detailed survey and design, there is potential to use this contingency to embellish the landscaping options around the water management basins.

- The assumptions applied to the earthworks model were generally conservative. Hence, a more efficient design is expected to be achievable if there is less material than expected due to the LiDAR survey overestimating existing site levels, beyond the 200mm adjustment factor that has already been applied.

8 WATER AND WASTEWATER SERVICING STRATEGIES

An overview of servicing strategies for potable water and wastewater are presented in this section. The complete strategies are available separately. The strategies have been prepared based on demonstrating servicing viability consistent with a proposal for re-zoning. It is noted that these strategies were developed based on an earlier version of the masterplan. While these strategies will need to be updated as the development design is progressed, there are no updates that will affect the serviceability of the development. This is outlined under a separate cover.

Additionally, a 'Potable Water Demand Reduction Strategy' is presented in **Section 9**.

The site is proposed to be developed in stages over a period of about 30 years, subject to the progressive delivery of necessary infrastructure, services and facilities and market demand. The stages of the development will proceed from the south to the north-west, then to the north and to the south-east.

8.1 Overview of Potable Water Servicing Strategy

The NTDP will be serviced as part of the Manning Water supply system via a 4.5ML reservoir north of Tuncurry at Rainbow Flat.

8.1.1 Existing MidCoast Water Services Trunk Main

MidCoast Water Services (MCWS) has indicated that the existing DN600 water main located along the Lakes Way has a capacity to supply the NTDP.

The NTDP will proceed from the south to the north. Therefore, the water connection would be constructed near the southern portion of the development. The new water main would connect to the existing DN600 water main located on the western side of The Lakes Way. The new main would cross The Lakes Way and then run along the Northern Parkway to the site. Preliminary sizing indicates a DN450 main would be required.

A second DN450 connection could be constructed to increase the security of supply at a later stage of the development. This main would connect the northern portion of the development site to the existing DN600 water main running along the Lakes Way.

8.1.2 Reticulation

For the purpose of this study a preliminary sizing of internal water mains has been undertaken. The preliminary design of the water reticulation system consists of DN100-DN300 mains.

Water mains would be sized more accurately during the concept design stage.

8.1.3 Preliminary Cost Estimate

The preliminary capital cost of the potable water system is $5.9 M for an estimated 2,303 ET, giving a cost per ET of $2,600. It should be noted that the above cost estimates were prepared in 2014 based on the previous Master Plan and unit costs current at the time. However, the costs are still considered to be suitable for planning and comparison purposes.

8.2 Overview of Wastewater Servicing Strategy

Options for servicing the NTDP site via a wastewater reticulation network and options for transporting wastewater from the site into MCWS' existing wastewater system have been investigated.

Options for servicing the development site include:

- **Option A** - gravity reticulation sewerage system; and
- **Option B** - vacuum reticulation sewerage system.

There are other technology options to provide wastewater service to the site, including onsite treatment and pressure sewers. Preliminary negotiations with MCWS have indicated that these are not favoured for the NDTP due to a variety of technical, environmental, legislative and cost factors.

8.2.1 Servicing Option A - Gravity Sewerage System

A gravity sewerage system is expected to comprise six catchment areas. The gravity sewerage system in each catchment area would drain into an internal Wastewater Pumping Station (WWPS). Ultimately, there would be a system of six internal WWPSs transporting flow via rising mains and gravity mains to a Central WWPS. The Central WWPS would be constructed during Stage A in the southern portion of the development site. The Central WWPS would transport wastewater from the development site into MCWS' existing wastewater system.

In the early stages of the development, the detention time of the pumped system would be longer than 4 hours. As a result, odour control would be required.

8.2.2 Servicing Option B - Vacuum Sewerage System

Wastewater from each property would gravitate to a collection chamber. When the collection chamber sump fills to a pre-determined level, an automatic pneumatically operated vacuum interface valve would open. Pneumatic pressure would force the wastewater from the collection chamber into the collection lines.

For the NTDP vacuum mains would deliver sewage and air from the collection chambers to the Central Vacuum Pumping Station. Pumps in the Vacuum Station would transfer the sewage from the collection tank through a rising main to a Central WWPS. The Central WWPS would transport wastewater from the development site into MCWS' existing wastewater system.

The initial stages of the development would be serviced by a temporary skid mounted vacuum pumping station. The vacuum pumping station and Central WWPS would be constructed during Stage A in the southern portion of the development site. As the development proceeds, the temporary vacuum pumping station would be replaced by a permanent station.

In the early stages of the development, the detention time in the Central WWPS and rising main would be longer than 4 hours. As a result, odour control would be required.

8.2.3 Trunk Main Options

The trunk main investigation domain extends from the township of Tuncurry along The Lakes Way and then along the access road to the Hallidays Point WWTP.

Three trunk main options have been considered, being:

- **Option 1** – comprises a new NTDP Central WWPS and 11km long rising main transporting wastewater into the Hallidays Point WWTP.
- **Option 2** – comprises a new NTDP Central WWPS and a 1.8km long rising main transporting flow into the Tuncurry No. 23 WWPS. The Tuncurry No. 23 WWPS would transport the existing flow and flow from the NTDP site to the Hallidays Point WWTP.
- **Option 3** – comprises a new NTDP Central WWPS and 0.7km long rising main transporting flow into the Tuncurry No. 23 rising main. As a result, the Tuncurry No. 23 WWPS and the new NTDP central WWPS would pump into a common rising main.

  Note: For Option 2 with vacuum reticulation, a new NTDP Central WWPS would not be required, as sewage pumps can be established within the Central Vacuum Pumping Station to transport flow to Tuncurry No. 23 WWPS. Despite having a vacuum (negative pressure) on the pump inlet this would be manageable given the modest delivery head involved.

8.2.4 Preliminary Cost Estimates

The cost estimates were prepared in 2014 based on the previous Master Plan and unit costs current at the time. However, the costs are still considered to be suitable for planning and comparison purposes.

Of the servicing options, Option 2B (vacuum sewerage reticulation system with sewage pumps in the Central Vacuum Pumping Station pumping into Tuncurry No. 23 WWPS) has the lowest capital cost.

However, Option 2A (gravity sewerage reticulation system with Central WWPS pumping into Tuncurry No. 23 WWPS) has the lowest operating and maintenance costs and Net Present Value (NPV). A cost comparison is shown below:

- **Option 2A** – Gravity Sewerage Reticulation System, Central WWPS pumping into Tuncurry No. 23 WWPS
  - Capital Cost - $17.9M
  - NPV at 7% over 30 years - $12.0M
- **Option 2B**- Vacuum Sewerage Reticulation System, pumps established within the Central Vacuum Pumping Station pumping into Tuncurry No. 23 WWPS
  - Capital Cost - $16.2M
  - NPV at 7% over 30 years - $15.5M

Option B (vacuum reticulation system) has a lower potential environmental impact than Option A (gravity reticulation system) due to lower risk of exfiltration, odour emission and no emergency overflows.

However, it is considered that the potential environmental impacts of the gravity reticulation system could be minimised during the design and construction (e.g. allowing for a larger WWPS emergency storage, targeting high quality construction, providing sufficient cover to the reticulation pipes to minimise movement and cracking, etc.)

As a result, it is considered that a gravity sewerage system is preferable for the North Tuncurry site.

The NTDP site is expected to be developed over thirty years with in excess of 25 development stages currently envisaged. The ultimate NTDP wastewater infrastructure will therefore involve considerable capital cost as well as ongoing operation and maintenance costs. Accordingly, the Wastewater Servicing Strategy (SMEC, 2014) also addresses a more modest and cost-effective means of servicing the development in the early years, when the number of developed lots is relatively low.

9 POTABLE WATER DEMAND REDUCTION STRATEGY

The NTDP is one of the major urban growth projects in the MidCoast Council LGA. Accordingly, the project is expected to contribute additional demand on the potable water supply system that is operated by MCWS. Measures to reduce the potable water demand from the NTDP will assist MCWS in achieving its mandate to provide a sustainable potable water supply to its customers.

The following potable demand reduction measures have been considered in this study:

- **Water efficiency measures** - such as efficient appliances and fittings as well as native landscaping can significantly reduce the project's potable water demand.
- **Alternative non-potable water supply options** – the following options have been considered in this study:
    - Rainwater harvesting (using rainwater tanks).
    - Recycled water use.
    - Groundwater harvesting and use.

The following sections provide details on the project's expected potable water demands and discuss opportunities to reduce the potable water demand. The effectiveness of each of the abovementioned options is discussed in the context of:

- Its effectiveness to reduce potable water demand under a full range of climatic conditions.
- Other tangible benefits or impacts such as stormwater management benefits or water quality impacts.
- Operational, maintenance and regulatory issues.

Following analysis of all options, a potable water demand reduction strategy has been established for the project.

9.1 Overview of Potable Water Supply Scheme

Potable water to the NTDP will be supplied from MCWS' Manning Water Supply Scheme (the Manning Scheme). The Manning Scheme supplies water to 90% of MCWS' customers in areas such as Taree, Wingham, Forster, Tuncurry, Pacific Palms, Nabiac, Dyers Crossing, Harrington, Coopernook, Hallidays Point and Lansdowne. The scheme is solely supplied by water sourced from the Manning River, from which water is pumped to Bootawa Dam daily when river water quality is acceptable. Bootawa Dam has a storage volume of 2,200 ML and supplies water to the entire Manning Scheme. Future upgrades to the scheme may include increasing the capacity of Bootawa Dam and water extraction from the Nabiac Bore Field (*MCWS Website*).

MCWS has advised that in 2011, the Manning Scheme provided 6,633 ML of potable water to over 27,000 residential dwellings, over 1,500 commercial premises, over 180 industrial premises and over 470 private and public institutions. Approximately 68% of the scheme's water was supplied to residential dwellings.

Data provided by MCWS indicates that water use in the Manning Scheme has reduced significantly over the 2000 to 2011 period as a result of demand management initiatives. The data indicates that:

- Total water supply has declined from 9,529 ML/yr in 2000 to 6,633 ML/yr in 2011. This is despite the number of MCWS customers increasing by around 20% over the 12-year period.
- Average household water use has declined 50% over the 12-year period from 329 kL/year in 2000 to 165 kL/yr in 2011.

Plate 9-1 plots the annual residential and total scheme water use as well as the average household water use over the 2000 to 2011 period.

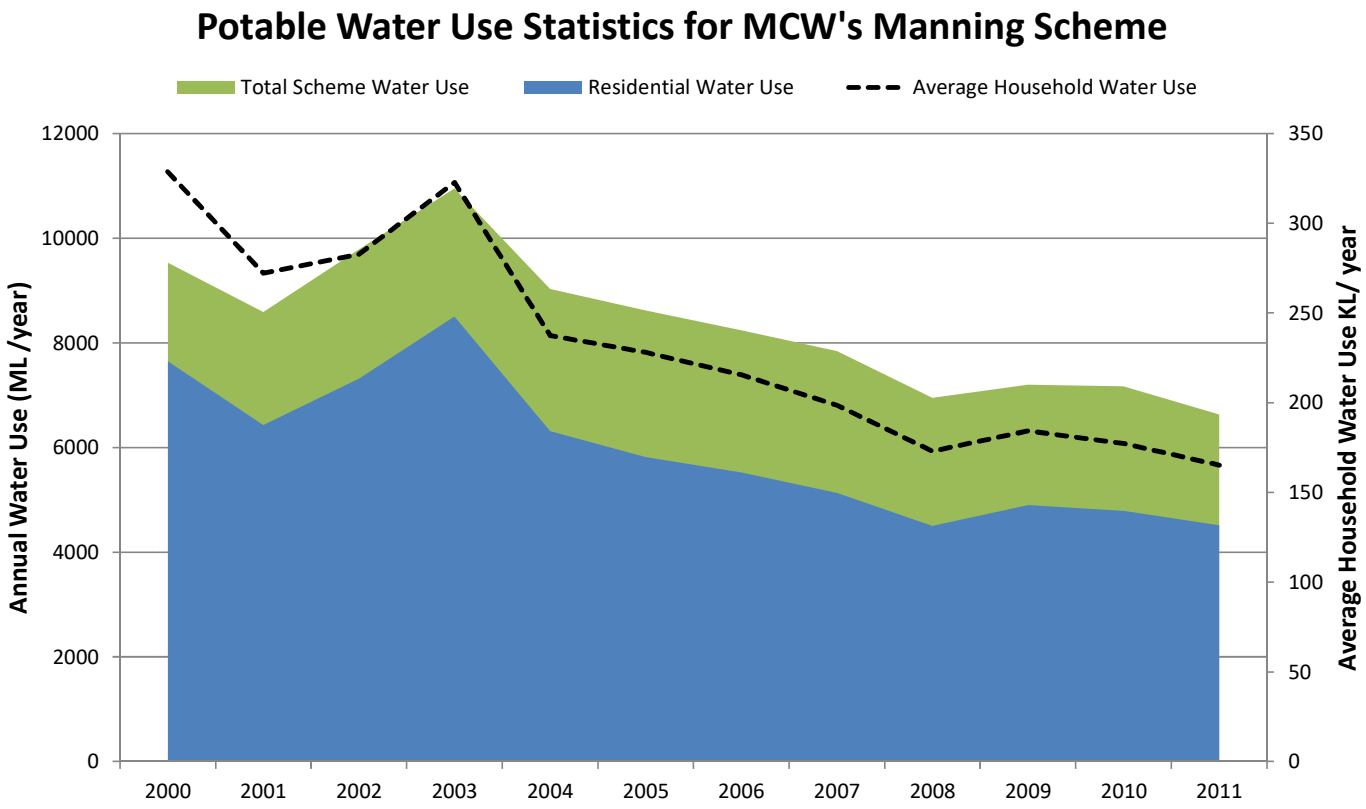

Plate 9-1 *– Potable Water Use Statistics between 2000 and 2011 (Data provided by MCWS).*

9.2 Assessment of the Project's Water Demand

The NTDP's potable water demand can be calculated as a function of the number of proposed residential dwellings and other water using premises and typical water use rates. For the purpose of assessing the effectiveness of potable water demand reduction measures, all analysis has been undertaken using average annual water use rates. The Water Servicing Strategy (SMEC, 2014) considers both peak and average potable water use rates.

MCWS have provided potable water demand profiles for a typical multi bedroom free standing house on a block greater than 450 m^2 in the Forster Tuncurry Area. This demand profile is referred to as an Equivalent Tenement (ET). **Table 9-1** provides a breakdown of the on-lot water use for an ET based on:

- A traditional pre-BASIX demand profile; and
- A post-BASIX demand profile that incorporates demand reductions associated with the water efficiency measures that are featured in modern homes.

Table 9-1 also provides a breakdown of hot water usage in the typical home.

The post-BASIX demand profiles have been adopted for all potable water demand calculations undertaken to assess the effectiveness of potable water demand reduction measures. The adopted total annual demand for an ET of 174 kL/year is marginally higher than the average household water use rate recorded in 2011 of 165 kL/year that was discussed in **Section 9.1** .

Table 9-1 – *Water Demand Profile for an Equivalent Tenement (ET)*[1]

	Traditional Demand		with BASIX				
	Annual Demand (KL/ year)	% of Total Demand	Demand Reduction (%)	Annual Demand (KL/ year)	% of Total Demand	% Sourced from Hot Water	Annual Hot Water Demand (KL/ year)
Garden	41	20%	20%	33	19%	0%	0
Toilet	31	15%	20%	25	14%	0%	0
Laundry	51	25%	15%	43	25%	30%	13
Bathroom	62	30%	15%	53	30%	50%	27
Kitchen	10	5%	0%	10	6%	50%	5
Other	10	5%	0%	10	6%	0%	0
Total	**205**	**100%**	**15%**	**174**	**100%**	**26%**	**44**[2]

Note 1: All data was provided by MCWS.

Note 2: Hot water usage is included in the total annual demand.

The Water Servicing Strategy (SMEC, 2014) establishes that the ultimate project potable water demand can be calculated based on 2,303 ET, which comprises:

- 2,123 ET for the proposed 2,123 residential dwellings; and
- 180 ET for the 15.6 ha of mixed-use employment lands.

In addition, annual irrigation water demands for the 9.7ha of proposed open space are estimated to be 67 ML/year based on 60% of the open space area requiring irrigation and an application rate of 1.15 m/year (equivalent to 80% of the average annual Potential Evapotranspiration depth). Water demands for the golf course have not been considered in this study as they are already connected to the North Tuncurry Recycled Water Scheme which provides water for irrigating the golf course greens and fairways.

The net potable water demand profile for the NTDP was calculated based on the demand profile for an equivalent ET as presented in **Table 9-1** and the abovementioned estimated number of ETs and irrigation demands. **Table 9-2** summarises the estimated potable water demand profile for the NTDP.

Table 9-2 – *Estimated Potable Water Demands for the NTDP*

	Traditional Demand		with BASIX				
	Annual Demand (ML/ year)	% of Total Demand	Demand Reduction (%)	Annual Demand (ML/ year)	% of Total Demand	% Sourced from Hot Water	Annual Hot Water Demand (ML/ year)
Total Demands for Residential and Employment Lands (2,303 ET)							
Garden	94	20%	20%	76	19%	0%	0
Toilet	71	15%	20%	57	14%	0%	0
Laundry	117	25%	15%	100	25%	30%	29
Bathroom	143	30%	15%	121	30%	50%	58
Kitchen	23	5%	0%	23	6%	50%	11
Other	23	5%	0%	23	6%	0%	0
Total	**472**	**100%**	**15%**	**400**	**100%**	**25%**	**98**[1]
Irrigation of Public Open Space							
Irrigation	67	N/A	0%	**67**	N/A	0%	**0**
Total	**539**	**100%**	**13%**	**467**	**100%**	**21%**	**98**[1]

Note 1: Hot water usage is included in the total annual demand.

The potable water demand calculations presented in **Table 9-2** estimate the ultimate potable water demand (with BASIX efficiency measures) for the NTDP to be 467 ML/year. This is equivalent to approximately 7% of the total water supplied from MCWS' Manning Scheme in 2011. The following sections discuss efficiency measures and alternative non-potable supply options that could be implemented to reduce the project's potable water demand.

9.3 Proposed Water Efficiency Measures

The following water efficiency measures are proposed:

- All homes will require BASIX certification as part of the construction certificate. The BASIX water target requires up to a 40% reduction in mains supplied potable water consumption, compared to the average 'pre-BASIX' home benchmark. The BASIX water target is generally achieved through a combination of water efficiency measures, such as more efficient appliances and tap fittings and demand reductions from alternative non-potable water sources such as rainwater tanks. The potable water demand calculations presented in **Section 9.2** applied a 15% demand reduction factor (based on advice from MCWS) to account for water efficiency measures. Demand reductions from alternative non-potable water sources are discussed separately in **Section 9.4** .

- All new homes will have optional sustainability packages that will enable the homeowner to voluntarily have water efficiency measures installed that exceed minimum BASIX requirements. As the popularity of sustainability packages is unknown, no allowance was made for the potential additional demand reductions from sustainability packages.

- Native landscaping will be encouraged in both on lot and public open spaces. Native landscaping generally does not require excessive irrigation and is therefore an effective water efficiency measure.

9.4 Assessment of Alternative Non-Potable Water Supply Options

The following alternative non-potable water supply options have been considered in this study:

- **Rainwater Harvesting:** Rainwater harvesting can be achieved at the lot scale through the implementation of rainwater tanks. Rainwater tanks would receive and store runoff from roof areas for subsequent use. The tanks would be plumbed to the toilet, laundry, hot water system and all outdoor tap fittings. When water is available, it is expected that over 75% of potable water for a typical residential dwelling would be supplied from the rainwater tank. Rainwater tanks would be topped up by mains water when empty. Rainwater tanks also provide stormwater management benefits due to the reduction in runoff volume from each allotment.

- **Recycled Water:** MCWS currently operate several recycled water schemes that treat effluent to a quality that is suitable for irrigation of public open spaces such as golf courses and sporting fields. The Tuncurry Recycled Water Scheme currently provides water for irrigation of the Tuncurry Golf Course and nearby sporting fields. MCWS has advised that the Tuncurry Recycled Water Scheme could potentially be expanded to provide recycled water that is suitable for use in the toilet, laundry and on-lot outdoor water use and could therefore meet approximately 50% of the potable water demand for a typical residential dwelling. Recycled water could be supplied from the new Tuncurry Recycled Water Treatment Plant (RTP) in Grey Gum Road 1.2 km from the project site. This RTP was commissioned in 2013 and has capacity to supply presently 3.5 ML/day upgradable to at least 7 ML/day in the future. This option would require construction of a standalone “third pipe” reticulation network that would supply recycled water to each dwelling.

- **Groundwater Use:** Given that the NTDP is located above an unconfined coastal aquifer, there is potential to extract groundwater for use within the development area. Both decentralised, centralised and regional schemes are considered in this study and are outlined below:

- **Decentralised Scheme** – would comprise spear point wells on individual allotments. As the groundwater is likely to have elevated iron and hydrogen sulphide levels (in some areas), extracted groundwater is likely to be only suitable for outdoor use without treatment. Localised groundwater bores could be potentially used to irrigate public open spaces. As a decentralised scheme would be difficult to effectively regulate, potential impacts of unregulated groundwater extraction would need to be considered.

- **Centralised Scheme** – could potentially extract water from either several extraction bores or the open basins (which are integrated with the groundwater aquifer). A water treatment plant would be required to achieve water quality that is suitable for non-drinking water uses, such as toilet flushing, laundry, hot water and outdoor use. The construction of a standalone "third pipe" reticulation network that would supply treated groundwater to each dwelling would also be required.

- **Extraction for Regional Water Use** – groundwater within the project area could be sustainably extracted to supplement supply to MCWS' Manning Scheme. Such an arrangement could supplement water sourced by MCWS from the Nabiac Bore Field.

Any groundwater extraction scheme would require ongoing monitoring and regulation to ensure that groundwater is sustainably extracted. This may limit the effectiveness of a groundwater use scheme during dry conditions.

The following section discusses the potential potable water reductions that can be achieved from the abovementioned alternative non-potable water supply schemes.

Assessment of Demand Reduction Potential

An assessment of the demand reduction potential of the abovementioned alternative non-potable water supply schemes was undertaken. The demand reduction potential of each scheme was calculated as a function of the suitable water uses for each scheme (as described above) and the potential total demand available for each water use that is detailed in **Table 9-2**.

Table 9-3 details the potential demand reductions for each alternative non-potable water supply scheme on an Equivalent Tenement basis.

Table 9-4 provides similar information for an entire development basis.

It is noted that potential demand reductions refer to the reduction that could be achieved if water is always available. For rainfall dependant schemes, such as rainwater harvesting and groundwater extraction, water shortages will limit the actual demand reduction. The actual demand reduction for each scheme is assessed in the next section. The potential for a regional groundwater use scheme is also assessed separately.

***Table 9-3** – Potential demand reductions from non-potable water supply schemes: Per ET Basis*[1]

	Adopted Demand Profile for an Equivalent Tenement[1]				Potential Demand Reductions from Alternative Non-Potable Water Supply Scheme[3]			
	Annual Demand (KL/year)	% of Total Demand	% Sourced from Hot Water	Annual Hot Water Demand (KL/year)	Rainwater Harvesting (KL/year)	Recycled Water (KL/year)	Decentralised Groundwater Extraction Scheme (KL/year)	Centralised Groundwater Extraction Scheme (KL/year)
Based on a single Equivalent Tenement (all units are KL/year)								
Garden[4]	33	19%	0%	0	33	33	33	33
Toilet	25	14%	0%	0	25	25	0	25
Laundry	43	25%	30%	13	43	30	0	43
Bathroom	53	30%	50%	27	27	0	0	27
Kitchen	10	6%	50%	5	5	0	0	5
Other	10	6%	0%	0	0	0	0	0
Total	**174**	**100%**	**26%**	**44**[2]	**137**	**86**	**33**	**137**
% of Total Demand[3]					**79%**	**49%**	**19%**	**79%**

Note 1: All data was provided by MCWS.

Note 2: Hot water usage is included in the total annual demand.

Note 3: Potential demand reductions refer to the demand reduction that could be achieved if water is always available. For rainfall dependant schemes, such as rainwater harvesting and groundwater extraction, water shortages will limit the actual demand.

Note 4: Garden water use will vary seasonally, with most of the annual water use occurring over the summer months.

Table 9-4 – *Potential demand reductions from non-potable water supply schemes: Project Basis*[1]

	Adopted Demand Profile for an Equivalent Tenement[1]				Potential Demand Reductions from Alternative Non-Potable Water Supply Scheme[3]			
	Annual Demand (ML/year)	% of Total Demand	% Sourced from Hot Water	Annual Hot Water Demand (ML/year)	Rainwater Harvesting (ML/year)	Recycled Water (ML/year)	Decentralised Groundwater Extraction Scheme (ML/year)	Centralised Groundwater Extraction Scheme (ML/year)
Total Demands for Residential and Employment Lands (2,303 ET)								
Garden[4]	76	16%	0%	0	76	76	76	76
Toilet	57	12%	0%	0	57	57	0	57
Laundry	100	21%	30%	29	100	71	0	100
Bathroom	121	26%	50%	58	58	0	0	58
Kitchen	23	5%	50%	11	11	0	0	11
Other	23	5%	0%	0	0	0	0	0
Irrigation of Public Open Space								
Irrigation[4]	67	14%	0%	**0**	0	67	67	67
Total	**467**	100%	**21%**	**98**[2]	**301**	**270**	**143**	**368**
% of Total Demand[3]					**65%**	**58%**	**31%**	**79%**

Note 1: All data was provided by MCWS.

Note 2: Hot water usage is included in the total annual demand.

Note 3: Potential demand reductions refer to the demand reduction that could be achieved if water is always available. For rainfall dependant schemes, such as rainwater harvesting and groundwater extraction, water shortages will limit the actual demand.

Note 4: Garden and irrigation water use will vary seasonally, with most of the annual water use occurring over the summer months.

Assessment of Actual Demand Reduction

For rainfall dependant water sources, such as rainwater tanks and groundwater extraction, water balance modelling is required to estimate the continuity of supply under a full range of climatic conditions. Model results can be used to establish the effectiveness of various configurations for each scheme and assist in identifying the most suitable strategy for the NTDP.

Water balance modelling methodologies and results are presented below for both rainwater tanks and groundwater extraction schemes.

Water Balance Modelling - Harvesting from Rainwater Tanks

Water balance modelling was undertaken to estimate the effectiveness of rainwater tanks in reducing potable water demand. The following methodologies and assumptions were applied to the model formulation:

- **Modelling Approach:** A water balance model was formulated to estimate water inflows, use and overflows from a rainwater tank on a daily time step. A 114-year simulation period (1900 to May 2013) was applied to the model. This is the same simulation period as the Empirical Groundwater Model that is described in detail in the Groundwater Modelling Technical Report (SMEC, 2014).

- **Catchment Area**: It was assumed that on average, each dwelling would have 220 m^2 of roof area contributing runoff to a rainwater tank, which equates to 50.5 ha of contributing roof area over the total development area. This is equivalent to 80% to the total roof area (estimated to be 63.2 ha). A daily initial loss of 1.5 mm/day was applied to estimate the runoff volume.

- **Tank Size**: Modelling was undertaken for 2.5 kL, 5 kL, 7.5 kL and 10 kL tank sizes.

- **Demand Profiles**: The potential demand profile presented in ***Table 9-4*** was applied to the water balance model. All indoor water uses were applied at constant rates, while outdoor use rates were varied seasonally to reflect higher water usage rates during the warmer months.

- Model results are presented in **Plate 9-2**, which shows a percentile plot of the estimated actual demand reduction achieved for each tank size for a full range of climatic conditions. The results are compared to the total project water demand and the potential recycled water demand for context. For clarity, all demands presented exclude the irrigation demand estimated for public open spaces as rainwater tanks will not be capable of providing water to meet this demand.

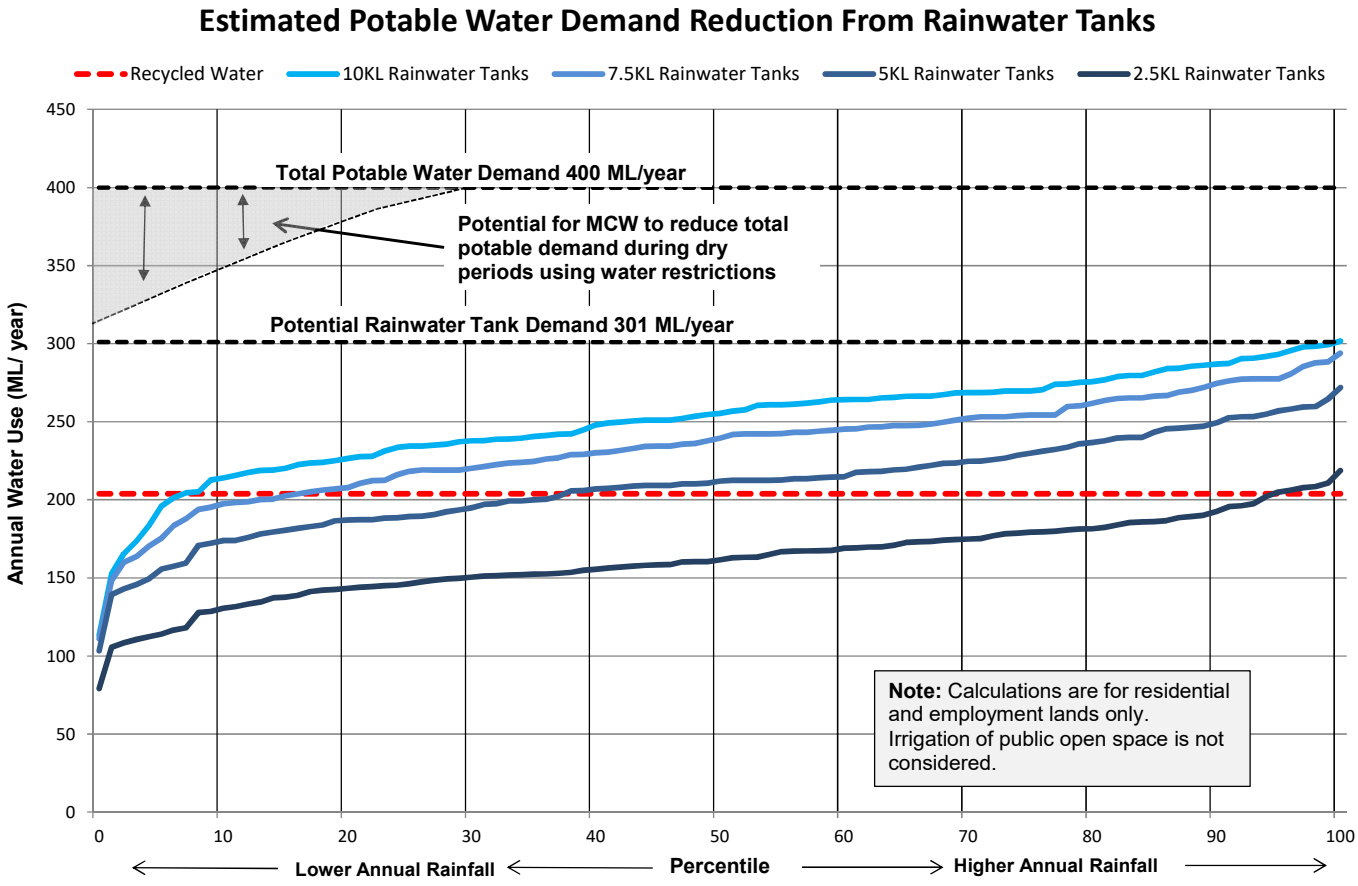

***Plate 9-2** – Effectiveness of rainwater tanks in reducing potable water demand.*

The model results presented in **Plate 9-2** indicate that rainwater tanks would be an effective means of reducing potable water demand. If standard 5 kL tanks were adopted throughout the NTDP, rainwater harvesting would offset more than 50% of the total potable water demand in 65% of years. Larger 10 kL tanks would achieve this reduction in 94% of years. When compared to the recycled water demand profile, rainwater tanks would offset more demand during wet and average rainfall years, but would be moderately less effective during drier rainfall years. However, when combined with water restrictions, rainwater tanks could achieve similar demand reductions to a recycled water scheme during both typical and extreme dry conditions. (Note: Recycled water provides a complete potable water demand substitution. Hence, recycled water use will not be affected by water restrictions. Rainwater tanks will only partially offset the burden of water restrictions as they are likely to be frequently empty during drought conditions.).

Water Balance Modelling – Sustainable Groundwater Extraction Profiles

The Empirical Groundwater Model that is described in detail in the Groundwater Modelling Technical Report (SMEC, 2014) was applied to estimate sustainable groundwater extraction profiles from the 255ha development area. The following methodologies and assumptions were applied to the model formulation:

- Extraction was assumed to occur at a constant rate from the proposed open basins. Six extraction profiles ranging from 100 to 500 ML/year were assessed.
- A sustainable extraction threshold was applied by ceasing extraction when the basin level reaches 1 m AHD. This level was selected as it is a typical groundwater level within the development area observed during dry conditions (refer to **Plate 3-6**) and there would also be negligible risk of salt water intrusion into the aquifer at this level.
- Modelling was undertaken with and without 5 kL rainwater tanks.

It is noted that under developed conditions, recharge from within the development area is expected to increase due the introduction of impervious areas. This increase would be partially mitigated if rainwater tanks are incorporated into the water management strategy. Hence, groundwater extraction could be a means of offsetting the expected volumetric increase. Refer to the Groundwater Modelling Technical Report (SMEC, 2014) for further information on changes to the recharge characteristics and water balance volumes.

Model results are presented in **Plate 9-3**, which shows a percentile plot of the estimated sustainable extraction profiles for extraction rates ranging from 100 to 500 ML/year for the no rainwater tanks scenario. Similar results are provided in **Plate 9-4** for a 5 kL rainwater tank scenario. The results are compared to the total project water demand, the potential recycled water use profile and the estimated water use profile with 5 kL rainwater tanks for context.

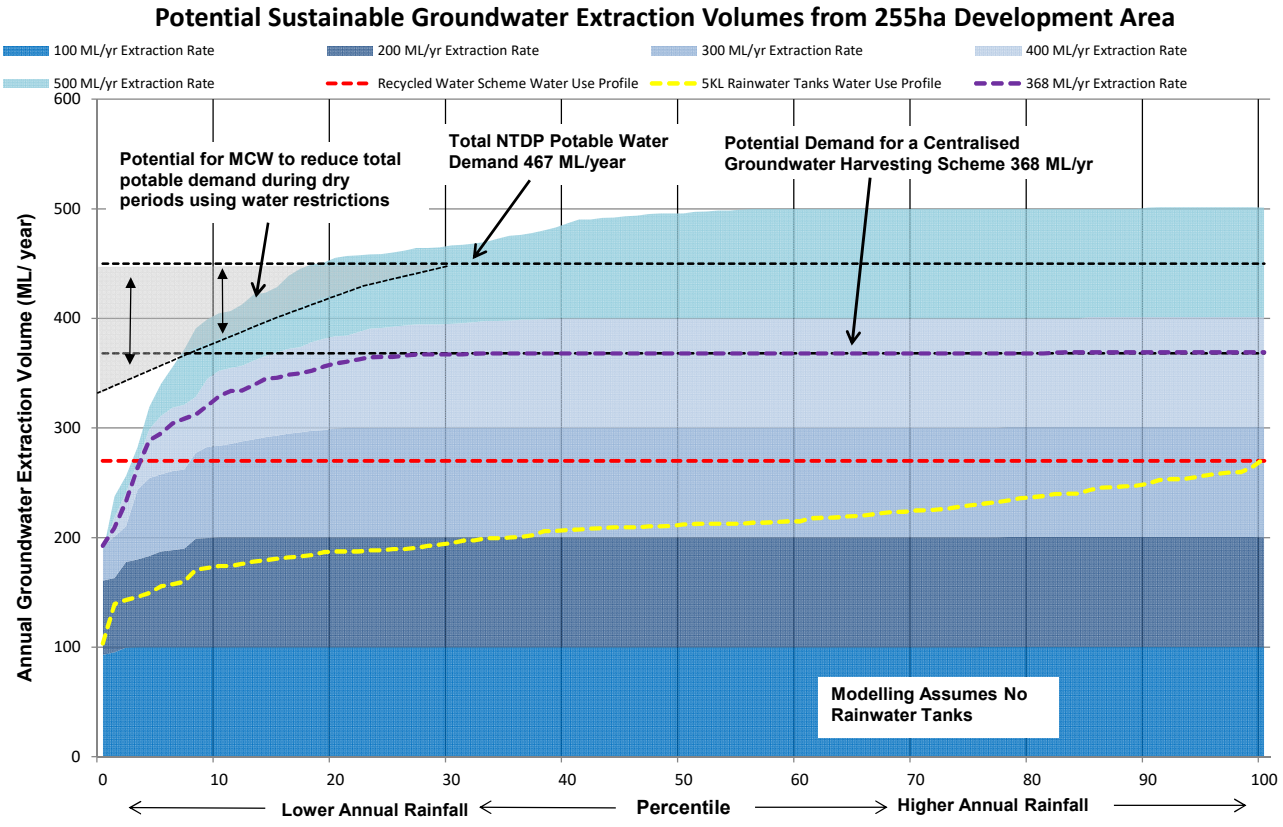

Plate 9-3 – *Potential sustainable groundwater extraction profiles (with no rainwater tanks).*

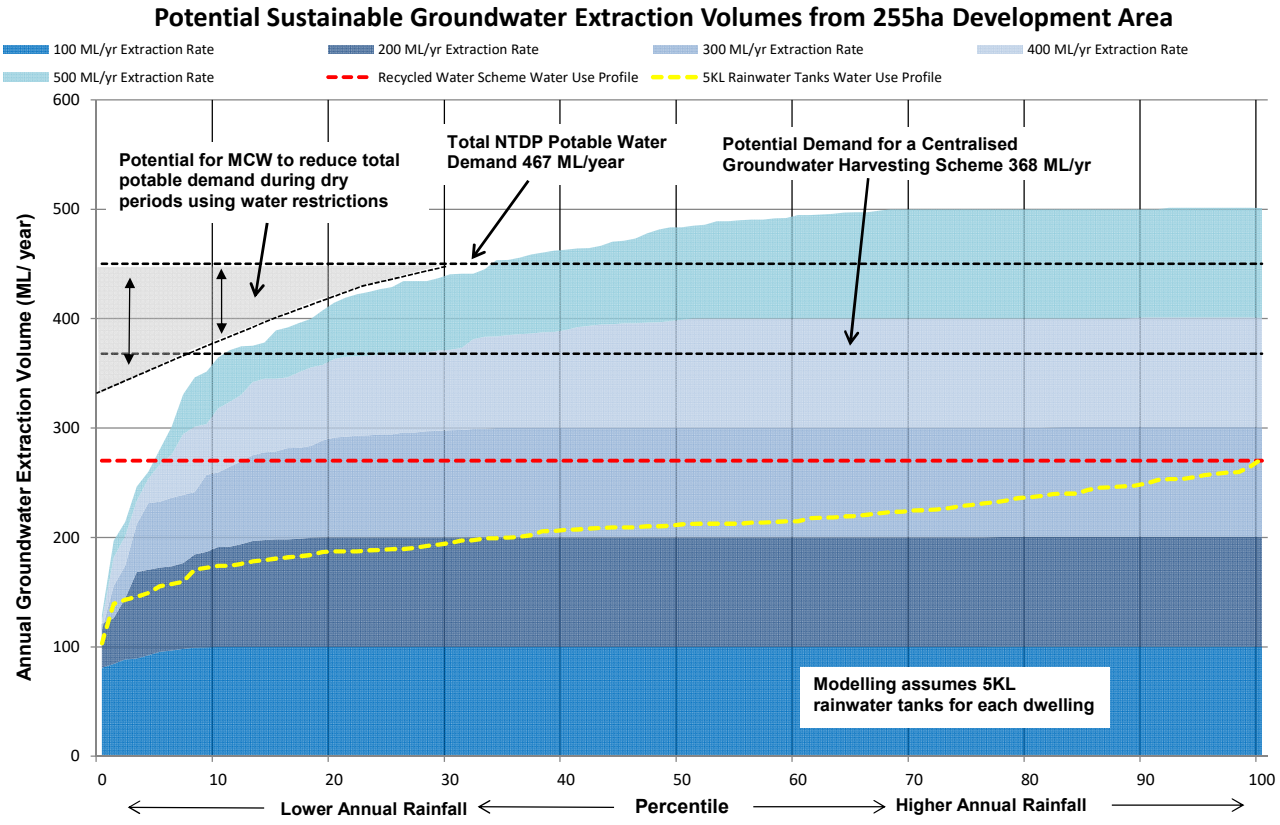

Plate 9-4 *– Potential sustainable groundwater extraction profiles (with 5KL rainwater tanks).*

The model results presented above indicate that there is potential to sustainably extract meaningful volumes of groundwater from within the project area. Possible extraction scenarios include:

- A decentralised groundwater extraction scheme could meet its potential annual demand of 143 ML/year in more than 90% of years both with and without rainwater tanks.
- A centralised groundwater extraction scheme (which would not coexist with rainwater tanks) could fully meet its potential annual demand of 368 ML/year in 75% of years. The demand could be partially met in lower rainfall years. When compared to the recycled water demand profile, a centralised groundwater extraction scheme would offset more potable water demand in 96% of years.
- The groundwater resource within the NTDP development area could be sustainably harvested by MCWS to supplement water supply to the Manning Scheme. As it is likely that such a scheme would coexist with rainwater tanks, the model results in **Plate 9-4** (with rainwater tanks scenario) are representative of the possible sustainable harvesting profiles. The most appropriate configuration for such a scheme would depend on the infrastructure and associated life cycle costs as well as the storage and supply characteristics of MCWS' Manning Scheme. Assessment of this information is beyond the scope of this study and would require further investigation.

9.5 Assessment of the Potable Water Demand Reduction Strategies

A range of potable water demand reduction strategies are compared in **Section 9.5.1** and further detail on the preferred strategy is given in **Section 9.5.2**.

9.5.1 Comparison of Possible Strategies

Preparation of a detailed life cycle cost analysis for each possible strategy is beyond the scope of this study. Notwithstanding, likely life cycle costs have been addressed and compared. This comparison has been informed by the demand and water balance analysis presented earlier in this section as well as the non-tangible benefits and impacts of the various options assessed.

An assessment and comparison of the potable water demand reduction strategies is provided in **Table 9-5** and the discussion that follows the table.

Table 9-5 – *Assessment of the Potable Water Demand Reduction Strategies*

Option	Effectiveness	Capital Cost	Ongoing Water Supply Cost
Rainwater Harvesting	When water is available, it is expected that over 75% of potable water demand for a typical residential dwelling would be supplied from rainwater tanks. When compared to the recycled water demand profile, 5kL rainwater tanks would offset more demand during wet and average rainfall years, but would be moderately less effective during drier rainfall years. However, when combined with water restrictions, rainwater tanks could achieve similar demand reductions to a recycled water scheme during both typical and extreme dry conditions. (Note: Recycled water provides a complete potable water demand substitution. Hence, recycled water use will not be affected by water restrictions. Rainwater tanks will only partially offset the burden of water restrictions as they are likely to be frequently empty during drought conditions.). **Potential[1] NTDP average annual demand reduction from rainwater tank supply would be 65%.**	**Very Low** (Nil upfront capital cost and low cost for rainwater tanks and associated plumbing in the future as individual properties are developed.)	**Very Low** (Typically the supply cost of water is nil, however in drier years rainwater tanks would be topped up by mains water when empty.)

Option	Effectiveness	Capital Cost	Ongoing Water Supply Cost
Recycled Water	It is expected that approximately 50% of the potable water demand for a typical residential dwelling would be supplied from the recycled water scheme. The scheme could also provide water for irrigation of public spaces. **Potential[1] NTDP average annual demand reduction from recycled water supply would be 58%.**	**Medium** (Upfront cost of the construction of a 1.2km trunk main and a standalone "third pipe" reticulation network that would supply recycled water to each dwelling.)	**Medium** (Operating costs are expected to be medium due to the medium energy costs to supply and treat recycled water to the site from the existing RTP and other maintenance and regulatory requirements. It is expected this would result in a medium ongoing water supply cost of approximately $2.00/kL being 75% of the drinking water supply price[2].)
Decentralised Groundwater Extraction Scheme	Extracted groundwater is likely to be only suitable for outdoor use without treatment. Localised groundwater bores could be potentially used to irrigate public open spaces. **Potential[1] NTDP average annual demand reduction from decentralised groundwater supply would be 31%.**	**Low** (Nil upfront capital cost and low cost for the construction of spear points and the mains that would supply groundwater for irrigation within the site.)	**Low** (Operating costs are expected to be low due to the low energy costs to supply groundwater within the site. It is expected that the low operating cost would result in a low ongoing water supply cost.)
Centralised Groundwater Extraction Scheme	A water treatment plant would be required to achieve water quality that is suitable for non-drinking water uses, such as toilet flushing, laundry, hot water and outdoor use. **Potential[1] NTDP average annual demand reductions from centralised groundwater supply would be 79%.**	**High** (Upfront cost for the construction of the groundwater treatment plant, trunk main and standalone "third pipe" reticulation network that would supply treated groundwater to each dwelling.)	**High** (Operating costs are expected to be high due to the higher energy costs and other maintenance and regulatory requirements. It is expected that the high operating cost would result in a high ongoing water supply cost.)

Note 1: Potential demand reductions refer to the demand reduction that could be achieved if water is always available. For rainfall dependant schemes, such as rainwater harvesting and groundwater extraction, water shortages will limit the actual demand.

Note 2: Data provided by MCWS.

The centralised groundwater extraction option provides the highest potential total demand reduction out of all options (79%). However, adopting this strategy would require a high upfront capital cost and high operating costs with a high ongoing water supply cost. The centralised groundwater extraction option is not favoured due to the high upfront costs and high ongoing water supply costs.

The decentralised groundwater extraction option is the least effective strategy (potential total demand reduction would be only 31%). Adopting this strategy involves no upfront capital cost and low capital costs for future spear points as individual properties are developed. It also involves low operating costs with a low ongoing water supply cost. The de-centralised groundwater extraction option is however not favoured because:

- The low 31% proportion of total NTDP water demand that can be offset, a figure that would reduce further in drier years.
- Groundwater is likely to have elevated iron and hydrogen sulphide levels (in some areas) and without treatment extracted groundwater is likely to be only suitable for outdoor use.
- A decentralised scheme would be difficult to effectively regulate, and potential impacts of unregulated groundwater extraction would need to be considered.

There is some merit in the recycled water option, and it would have both a moderate upfront capital cost and moderate ongoing water supply costs. It provides the third highest potential total demand reduction out of all options (58%). By comparison, the rainwater harvesting option provides the second highest potential total demand reduction out of all options (65%), and it involves no upfront capital cost and low capital costs for future rainwater tanks and plumbing as individual properties are developed. It also has no ongoing water supply costs, except that in very dry periods tanks would need to be topped up with mains water when empty. Therefore, capital cost and NPV analysis of the recycled water and rainwater harvesting options have been further investigated.

Additionally, a lower cost recycled water solution has been added into the comparison. The recycled water option detailed in the above sections includes trunk main supplying recycled water from the Recycled Water Plant to the project site. Under the lower cost recycled water option the recycled water that is currently supplied to the golf course would be diverted to the NTDP. This strategy would substantially reduce CAPEX as it would make use of the current infrastructure. The golf course would source irrigation from groundwater, as they did prior to the recycled water scheme being implemented. This groundwater use would partially offset the predicted increase in ground water levels due to increases in recharge.

Preliminary cost estimates and a net present value (NPV) analysis have been prepared for the recycled water option and rainwater harvesting option and are included in **Appendix C** and summarised in **Table 9-6**.

As detailed in Section 9, the adopted total annual demand for an ET of 174 kL/year. The potential demand reduction for an ET when adopting the rainwater harvesting option is 137 kL/year and for the recycled water option 86 kL/year (for details refer Table 9-3).

***Table 9-6** – Capital Costs and NPV Analysis for Recycled Water Option and Rainwater Harvesting Option*[a]

Item	Rainwater Harvesting Option		Recycled Water Option		Lower Cost Recycled Water Option
	Value	Explanatory Notes	Value	Explanatory Notes	Value
Capital Cost of reticulation infrastructure and trunk mains	$9.4 M	Includes cost of the potable water reticulation infrastructure and trunk main connection applied in sequence with the development plan.	$11.3 M	Includes cost of the potable water and recycled water reticulation infrastructure and trunk main connections applied in sequence with the development plan. The capital costs of any recycled water plant upgrades and upstream works are not known and have not been included.	$10.7 M
Capital Cost of Rainwater Tanks and Pumps	$6.8 M	Includes cost of rainwater tanks and pumps applied in sequence with the development plan.	$0		$0
NPV at 7% over 30 years of total costs	$9.9 M	The total costs include the following: - capital cost of the reticulation potable water network, water connections, rainwater tanks and pumps; - operating and maintenance cost of the reticulation potable water network and connections and the rainwater tanks and pumps; - potable water supply cost.	$10.8 M	Total costs include the following: - capital cost of the reticulation potable water and recycled water network, potable water and recycled water connections; - operating and maintenance cost of the reticulation potable water and recycled water network and connections; - potable water and recycled water supply costs.	$10.3 M

Item	Rainwater Harvesting Option		Recycled Water Option		Lower Cost Recycled Water Option
	Value	Explanatory Notes	Value	Explanatory Notes	Value
NPV at 7% over 30 years of reticulation infrastructure and connections	$5.3 M	This cost includes the following: - capital cost of the reticulation potable water network and water connections; and - operating and maintenance cost of the reticulation potable water network and connections.	$6.3 M	This cost includes the following: - capital cost of the reticulation potable water and recycled water network and connections; and - operating and maintenance cost of the potable water and recycled water reticulation network and connections.	$5.8 M
Water Supply Cost Per Household **NPV at 7% over 30 years**	$4.7 K	5 kL Rainwater Tank and Pumps including plumbing and installation - $3,200. Rainwater Tank and Pumps Operating and Maintenance Cost - $20/year. Potable Water Supply Cost ($2.7/kL, 37kL/year) - $100/year. Total annual water supply cost - $120/year ($0.69 per kL).	$5.1 K	- Recycled Water Supply Cost ($2.0/kL, 86kL/year) - $172/year. - Potable Water Supply Cost ($2.7/kL, 88kL/year) - $238/year. - Total annual water supply cost - $410/year ($2.36 per kL).	$5.1 K

[a]The cost estimates in this table were prepared in 2014 based on the previous Master Plan and unit costs current at the time. However, the costs are still considered suitable for planning and comparison purposes.

The rainwater harvesting option was found overall to be the most beneficial strategy to reduce potable water demand for the NTDP, and it has the following benefits:

- Low upfront capital costs and ongoing water supply costs. The NPV of total infrastructure costs is $9.9M, compared with $10.8M for a recycled water system and $10.3M for a lower cost recycled water system. It is noted that under the recycled water option an upgrade of the Recycled Water Plant may be required. The capital costs of any plant upgrades and upstream works are not known and have not been included in the cost estimates. This could understate the actual cost of this option. Under the lower cost recycled water option the recycled water that is currently supplied to the golf course would be diverted to the NTDP. It should be noted that the use of recycled water is perceived to have had a beneficial effect on the golf course and diversion of this water source may incur a community benefit cost.

- For the rainwater harvesting option the NPV of capital and operating costs per household is $4,700, compared with $5,100 for a recycled water system. The cost for all water consumed per household is $0.69 per kL, compared with $2.36 per kL for a recycled water system.

- Rainwater harvesting (including decentralised groundwater extraction for irrigation of public open space) is a decentralised scheme that does not require any upfront capital expenditure (except for rainwater tanks purchased by individual owners), and does not constrain the staging of the project, which will be constructed over a 30-year timeframe. This contributes to lower life cycle costs compared with recycled water or centralised groundwater harvesting.

- Rainwater tanks provide substantial stormwater and groundwater management benefits by partially mitigating the increase in runoff / recharge that will occur as a result of the development.

- The proposed strategy does not constrain the potential for groundwater to be extracted by MCWS for regional water use.

- When compared to the recycled water option, rainwater harvesting with 5KL tanks would offset more demand during wet and average rainfall years, but would be moderately less effective during drier rainfall years. Using 5KL tanks, rainwater harvesting would offset more demand than the recycled water option in 63% of years (rises to 93% of years with 10KL tanks).

9.5.2 Proposed Potable Water Demand Reduction Strategy

The proposed strategy incorporates the following measures:

- The water efficiency measures described in Section 9.3 which include efficient appliances and native landscaping.

- Minimum 5 kL rainwater tanks for each dwelling. The rainwater tanks would be plumbed to supply water for toilet flushing, laundry, hot water and all outdoor tap fittings.

- Rainwater tanks for larger commercial buildings that are appropriately sized to achieve the water use profiles that are similar to a 5 kL rainwater tank for a residential dwelling.

- Decentralised groundwater extraction to provide water for the irrigation of public open spaces. It is expected that irrigation of public open spaces would be managed by Council.

- All new homes will have optional sustainability packages that will enable the homeowner to voluntarily have water efficiency measures installed that exceed minimum BASIX requirements. Options for larger rainwater tanks will also be provided.

The effectiveness of the proposed strategy is presented in **Plate 9-5**, which shows a percentile plot of the estimated demand reduction achieved by the abovementioned strategy elements for a full range of climatic conditions. The total potable NTDP water demand and water use profiles for a recycled water scheme are shown for reference.

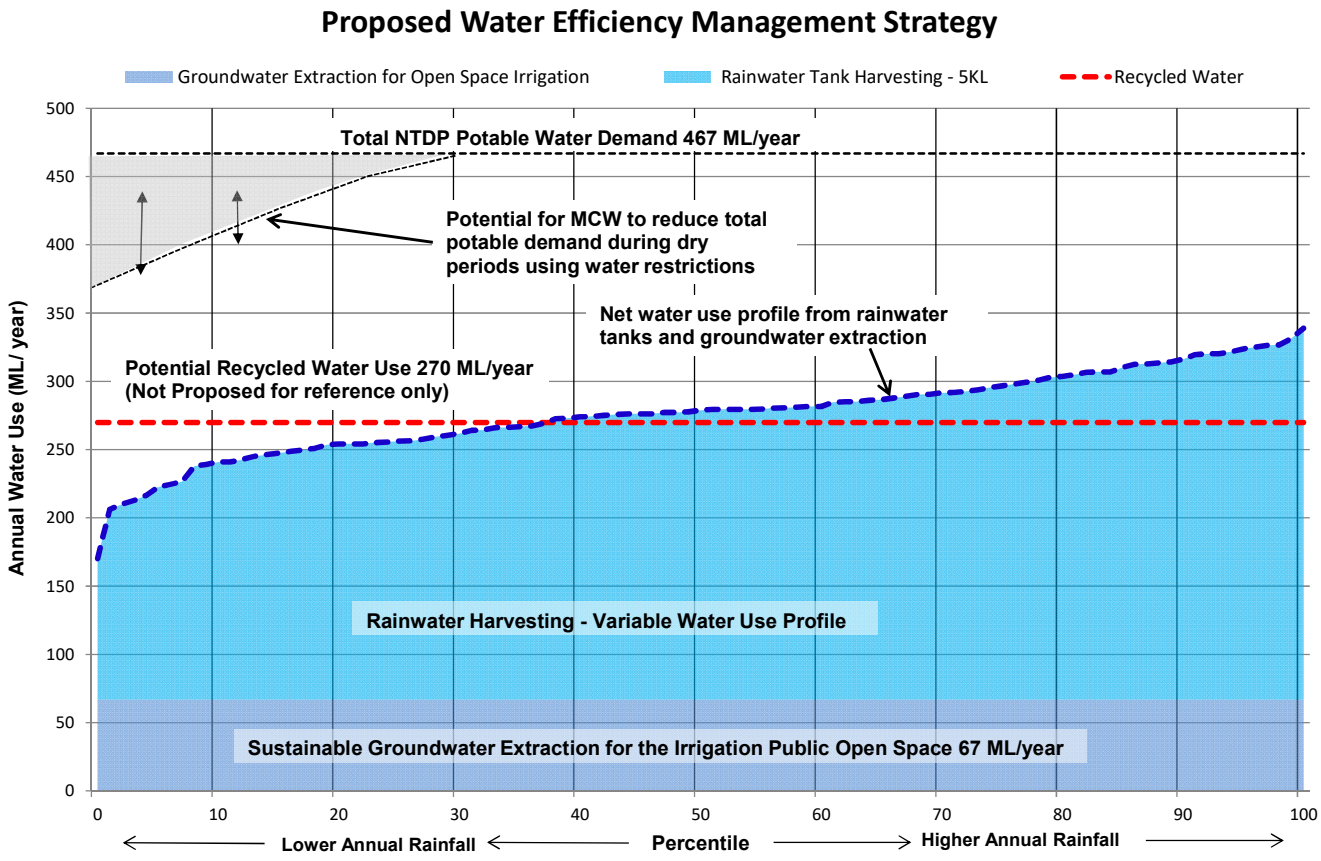

Plate 9-5 *– Proposed Water Efficiency Management Strategy*

The information presented in **Plate 9-5** indicates that the proposed potable water reduction strategy would be an effective means of reducing potable water demand with the following reductions expected:

- For high (90th Percentile) rainfall years, net potable water demand is expected to be reduced by 316 ML/year, which is equivalent to 70% of the total demand.
- For median (50th Percentile) rainfall years, net potable water demand is expected to be reduced by 279 ML/year, which is equivalent to 62% of the total demand.
- For low (10th Percentile) rainfall years, net potable water demand is expected to be reduced by 241 ML/year, which is equivalent to 54% of the total demand.

9.5.3 Comment on Other Potable Water Demand Reduction Strategies

As outlined in **Section 9.5.1**, rainwater harvesting was assessed as being the most beneficial strategy to reduce potable water demand for the NTDP following consideration of life cycle costs and other criteria. It is worth however providing further comment on the alternatives considered.

Comments on a Recycled Water Scheme

A recycled water scheme is not preferred for the following reasons:

- The scheme's life cycle costs are expected to be higher than the proposed strategy elements due to:
    - The need to construct separate reticulation to supply recycled water to all dwellings.
    - Operating costs are expected to be higher due to the higher energy costs and other maintenance and regulatory requirements.
- A recycled water scheme would negate the need for rainwater tanks. As rainwater tanks provide a stormwater management benefit (primarily through reducing runoff volumes), the absence of rainwater tanks would result in:
    - Increased size and maintenance costs of the proposed streetscape raingardens in Zone D4.
    - Higher recharge volumes and associated pollutant loads entering the groundwater system.
- A recycled water scheme would provide water for outdoor uses including garden and lawn irrigation, car washing and general outdoor use. Some outdoor water use is expected to either enter the stormwater system (i.e. if a car is washed on a driveway) or recharge to the groundwater if water used for the irrigation of lawns or gardens is over applied or applied during periods of wet weather. Given that recycled water is expected to have higher nutrient concentrations than water sourced from rainwater tanks, the outdoor use of recycle water is expected to increase the risk of nutrient laden water entering the local groundwater aquifer.
- As well as the expected higher life cycle costs, a recycled water scheme is not expected to achieve significant reductions to potable water demand beyond the reductions expected by the proposed strategy.

It is noted that the NTDP is expected to be constructed over a 30-year timeframe. There may be potential to opportunistically implement recycled water use in some portions of the development area if suitable land uses arise. Examples could include a school, nursing home or an industrial land use that requires significant volumes of non-potable water.

Comments on a Centralised Groundwater Extraction Scheme

A centralised groundwater extraction scheme is not preferred for the following reasons:

- The scheme's life cycle costs are expected to be higher than the proposed strategy due to:
    - The need to construct a groundwater treatment plant and trunk mains at an early stage in the project.
    - The need to construct separate reticulation to supply treated groundwater to all dwellings.
    - Operating costs are expected to be higher due to the higher energy costs and other maintenance and regulatory requirements.

- A centralised groundwater extraction scheme would negate the need for rainwater tanks, which would increase the size and maintenance costs of downstream stormwater controls.

- A centralised groundwater extraction scheme would constrain the potential for groundwater to be extracted by MCWS for regional water use.

Comments on a Regional Groundwater Extraction Scheme

Water balance model results presented in **Section 9.4** indicate that the groundwater resource within the NTDP development area could be sustainably harvested by MCWS to supplement water supply to the Manning Scheme, with sustainable extraction volumes of up to 500ML/year possible during higher rainfall years. A potential scheme could also be expanded to access groundwater resources located to the north of the development area. The most appropriate configuration for such a scheme would depend on the infrastructure and associated life cycle costs of the scheme as well as the storage and supply characteristics of MCWS' Manning Scheme. This information has not been established as part of this study and would require further investigation by MCWS if they wish to pursue this concept.

It is noted that a regional groundwater extraction scheme would result in generally lower water levels in the water management basins and the adjoining groundwater. As the water management basins will provide an aesthetic benefit to the future community, the aesthetic impact of any regional groundwater extraction scheme would need to be considered if the concept is pursued further.

The future form, ownership and management of the water management basins is subject to ongoing investigations by Landcom, and could include, for example, a Community Title arrangement.

10 SUMMARY OF MANAGEMENT MEASURES AND PREDICTED IMPACTS

Section 4 outlines and rationalises key objectives that were applied to the development of the IWCMS. Detailed information on the various components of the IWCMS were provided in the following sections:

- **Section 5** details the integrated stormwater and groundwater management strategy for the project. **Section 5** is supported by groundwater modelling which is documented separately in the Groundwater Modelling Technical Report (SMEC, 2014) and the water quality modelling that is documented in **Section 6**.
- **Section 7** also describes the conceptual civil design that has been prepared for the project.
- **Section 8** provides an overview of the proposed water and wastewater servicing strategies, which are documented in the following technical reports:
    - Water Servicing Strategy (SMEC, 2014); and
    - Wastewater Servicing strategy (SMEC, 2014)
- **Section 9** details the proposed potable water demand reduction strategy that includes an assessment of water efficiency measures and alternative non-potable water supply options.

Table 10-1 provides a summary of the management measures and predicted impacts that were established in the abovementioned sections. The rationalisation for each objective is also provided for context.

***Table 10-1** – Summary of management measures*

Water Management and Design Objective	Rationale for Objective and Summary of Relevant Management Measure
Groundwater and Surface Water Flood Management Objectives	
Manage nuisance flooding within the development area.	**Rationale**: If unmitigated, groundwater flooding is expected in the lower portions of the development area for extended (1 to 2 month) periods following a major groundwater flooding event. In SMEC's view, this would be considered unacceptable by the future community. **Management Measure**: The integrated stormwater and groundwater management strategy is designed to reduce peak groundwater flood levels within the development area and increase the rate of groundwater recession following an event. As a result of these measures, no nuisance groundwater flooding is expected.
Construct all habitable floor levels at least 500mm above the predicted 100-year ARI groundwater or surface water flood levels.	**Rationale**: This is a standard flood risk management measure in NSW. **Management Measure**: Flood planning levels have been established for the project. Refer to **Section 5** for details.
Prevent groundwater from saturating road bases for extended periods of time.	**Rationale**: Road pavements are likely to be damaged or fail if the road base is saturated for an extended period as a result of groundwater inundation. **Management Measure**: Minimum road surface levels are expected to be 300mm above the100 year ARI levels. Due to the proposed groundwater controls, groundwater and basin levels are expected to recede from peak levels relatively quickly. Hence, the proposed flood mitigation controls are expected to significantly mitigate the risk of pavement failure due to extended periods of groundwater inundation.
Maintain or reduce the existing level of flood risk to the golf course greens and fairways.	**Rationale**: Under existing conditions, groundwater flooding would occur in the lower portions of the development area for extended (1 to 2 month) periods following a major groundwater flooding event. This is likely to result in grass kill in the lower portions of the golf course. As greens and fairways can take over 1 year to fully recover, a significant grass kill event could have major ramifications for the golf club. **Management Measure**: The proposed groundwater controls are expected to reduce the 100-year ARI groundwater levels within the golf course by more than 1m. Hence, the project is expected to significantly reduce the existing level of groundwater flood risk to the golf course. Refer to **Section 7** of the Groundwater Modelling Technical Report (SMEC, 2014) for further details.

Water Management and Design Objective	Rationale for Objective and Summary of Relevant Management Measure
Groundwater and Surface Water Flood Management Objectives (continued)	
Maintain or reduce the existing level of flood risk to local properties and infrastructure that are near the development area.	**Rationale:** This is a standard flood risk management measure in NSW. **Management Measure**: The proposed groundwater controls are expected to reduce the 100-year ARI groundwater levels within the developed area and adjoining land. Hence, the project is expected to reduce the existing groundwater flood risk in adjacent properties. Refer to **Section 7** of the Groundwater Modelling Technical Report (SMEC, 2014) for further details
Establish a groundwater and surface water management system that is simple to operate and easy to maintain.	**Rational:** To maximise the system's long-term effectiveness and minimise the long-term maintenance costs. **Management Measure:** The proposed stormwater and groundwater management strategy has been established to respond to the project's unique constraints. The proposed stormwater and groundwater controls have been formulated to hydraulically function under gravity, during elevated groundwater conditions. Hence, no active management is required. Refer to **Sections 5** and **6** for further details on the proposed stormwater and groundwater controls.
Groundwater Management Objectives	
Establish groundwater management measures to ensure that any groundwater extraction within the development area can be appropriately managed and regulated.	**Rationale:** Uncontrolled groundwater extraction has the potential to significantly lower groundwater levels during dry and average conditions. The uncontrolled lowering of groundwater levels may lead to salt water intrusion into the aquifer and other significant impacts. **Management Measure:** It is expected that groundwater extraction will only be used to source water for the irrigation of public open spaces within the development area. Any extraction will be managed by Council and due to the relatively minor volumes, no potential impacts are expected. Refer to **Section 9** for further information on groundwater extraction.
Establish stormwater and groundwater management controls that mitigate potential water quantity impacts associated with the development.	**Rationale:** The introduction of an urban landscape to the development area will result in some unavoidable impacts to the local groundwater regime due to the expected increase in runoff volumes. Stormwater and groundwater management controls can be implemented to mitigate water quality and volumetric impacts. **Management Measure:** See response to Water Quality Management Objectives

Water Management and Design Objective	Rationale for Objective and Summary of Relevant Management Measure
Water Quality Management Objectives	
Establish preventative measures to minimise the generation of water quality pollutants. Establish water quality controls that can operate under elevated groundwater conditions and achieve the proposed pollutant reduction targets, which are discussed separately in **Section 6**. Establish ephemeral zones in the water management basins to improve the basin's ability to self-regulate water quality. Establish measures to discourage groundwater from the golf course (which as established in **Section 3** has elevated nitrogen levels) entering the water management basins.	**Rationale**: The proposed water quality management measures will: • Reduce the project's potential to degrade the quality of groundwater within the development area and in areas where groundwater from the development area flows. • Manage the water quality in the water management basins to reduce the long-term maintenance costs and maintain the aesthetic qualities of the open water that are envisaged in the urban design. **Management Measures:** The following water quality management measures are proposed: • 5KL rainwater tanks are proposed for each dwelling to capture and use runoff from roof areas. Rainwater tanks (and the use of harvested rainwater) will reduce recharge volumes from the development area as well as reduce potable water usage. • Runoff from all road pavement and driveway areas and most roof areas will be treated in raingardens that will be constructed within the road reserve. The raingardens will be sized to achieve pollutant reduction targets that exceed the targets recommended in best practice industry guidelines. • The water management basins will have ephemeral areas equivalent to 48% of the total wet basin area. The ephemeral zones will enhance the ability of the basins to self-regulate water quality. • The water management basins will receive runoff from some impervious areas which will elevate the basin level above the adjoining groundwater level, reducing the risk of nutrient laden groundwater from the golf course, or groundwater with elevated iron or hydrogen sulphide levels, entering the basins. It should be noted that the water management basins may be ephemeral or open water and this will be dictated by ownership. The future form, ownership and management of the water management basins is subject to ongoing investigations by Landcom, and could include, for example, a Community Title arrangement. Refer to **Sections 5** and **6** for further information on the proposed water quality controls.
Civil Design Objectives	
Establish a civil design that responds to the site's constraints, can accommodate the groundwater and stormwater management controls and does not require the importation of	**Rationale**: An efficient civil design that can accommodate the proposed water management controls and achieves a cut to fill balance is required for the project to be viable. **Management Measure:** A conceptual civil design was prepared for the project. The design demonstrated that the proposed

Water Management and Design Objective	Rationale for Objective and Summary of Relevant Management Measure
fill.	water management strategy can be implemented without importing fill. Refer to **Section 7** for further information on the proposed conceptual civil design prepared for the project.
Water and Wastewater Management Objectives	
Establish water and wastewater servicing strategies that respond to the site's opportunities and constraints and achieve MCWS' performance objectives.	**Rationale**: This is a standard requirement for any major greenfield urban development project. **Management Measure:** Water and Wastewater Servicing Strategies have been prepared for the project.
Sustainability Objectives	
Establish measures to reduce the project's potable water demand. Establish alternative non-potable water sources for both residential allotments and for the irrigation of public open space.	**Rationale**: The NTDP is a major urban growth project in the MidCoast LGA. Measures to reduce the project's potable water demand will reduce the magnitude of additional demand on the centralised potable water supply system that is operated by MidCoast Water Services. **Management Measure: Section 9** establishes a potable water demand reduction strategy for the project. Key elements of the strategy include: • Water efficiency measures including water efficient appliances and native landscaping will be implemented in all dwellings. • Minimum 5 kL rainwater tanks will be installed at each dwelling. The rainwater tanks would be plumbed to supply water for toilet flushing, laundry, hot water and all outdoor tap fittings. • Decentralised groundwater extraction to provide water for the irrigation of public open spaces. It is expected that irrigation of public open spaces would be managed by Council. The proposed strategy is expected to reduce the project's annual potable water demand by 70% in a 90th Percentile (typical wet) rainfall year, 62% in a median rainfall year and 54% in a 10th Percentile (typical dry) rainfall year. When combined with water restrictions, the proposed strategy is expected to achieve similar demand reductions to a recycled water scheme during both typical and extreme dry conditions. (Note: Recycled water provides a complete potable water demand substitution. Hence, recycled water use will not be affected by water restrictions. Rainwater tanks will only partially offset the burden of water restrictions as they are likely to be frequently empty during drought conditions.).

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22) *SMEC (2014), 'North Tuncurry Development Project – Water Servicing Strategy'*

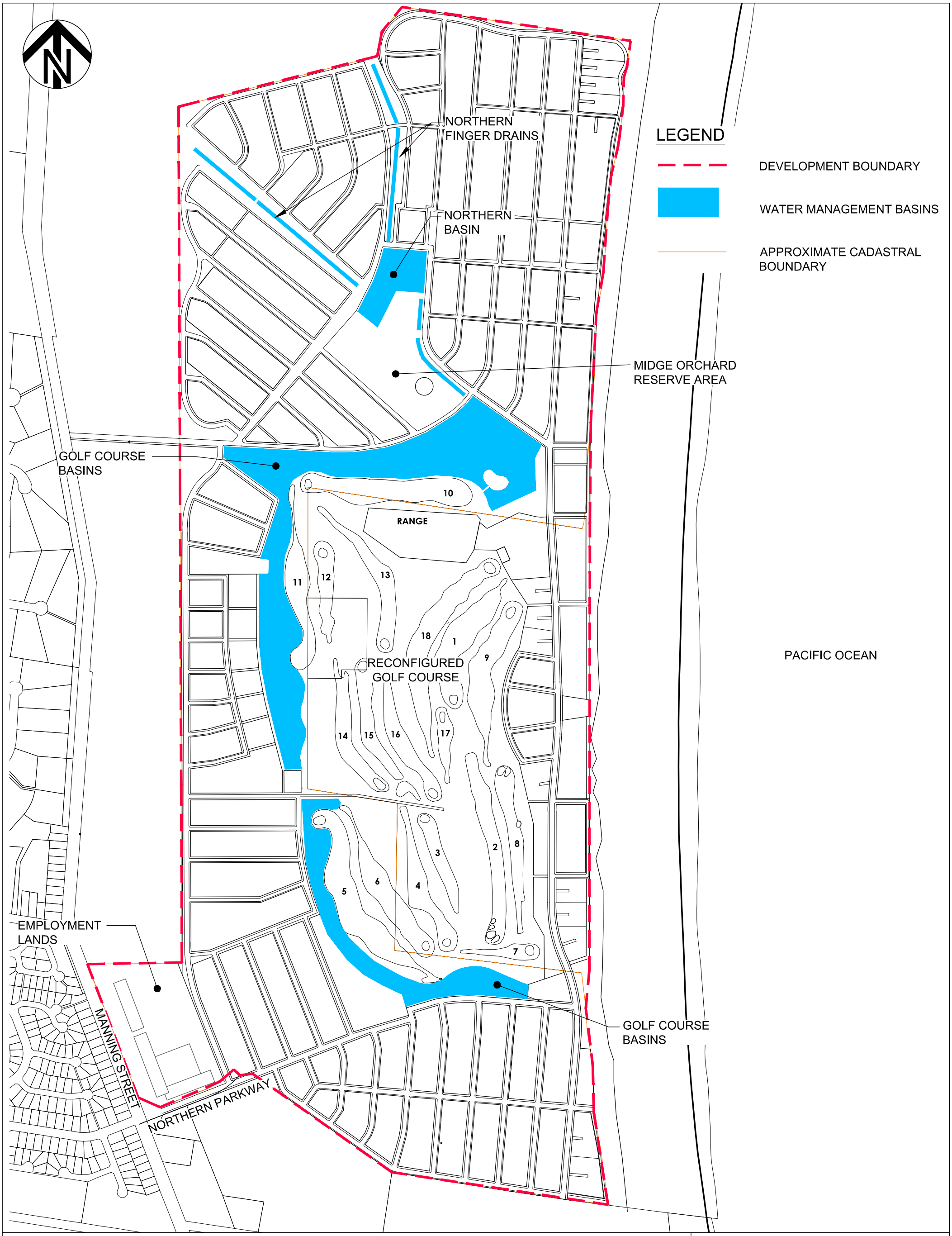
23) *SMEC (2014), 'North Tuncurry Development Project – Wastewater Servicing Strategy'*

24) WorleyParsons *(2010), 'North Tuncurry - Stormwater Opportunity and Constraints Assessment'*

25) WorleyParsons *(2010), 'North Tuncurry Coastal Hazard and Flood Study – Hydrogeology'*

26) WMA Water *(2014), 'Lower Wallamba River Flood Study'*

APPENDIX A – AQUIFER INTERFERENCE ASSESSMENT FRAMEWORK



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DATE 26/05/15		PAGE SIZE A3	COORDINATE SYSTEM MGA
PROJECT NO. 30011196	PROJECT TITLE	NORTH TUNCURRY DEVELOPMENT PROJECT	
FIG NO. 1	FIGURE TITLE	DEVELOPMENT LAYOUT	
CREATED BY S.DRUERY	SOURCES	DEVELOPMENT LAYOUT PROVIDED BY ROBERTS DAY	

SMEC AUSTRALIA PTY LTD

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LEGEND

- DEVELOPMENT BOUNDARY
- ZONE D1 GOLF COURSE & OPEN SPACE
- ZONE D3 INFILTRATION ZONE
- ZONE D4 PIPED DRAINAGE ZONE
- ZONE D2 WATER MANAGEMENT BASINS DEEP WATER ZONE
- ZONE D2 WATER MANAGEMENT BASINS EPHEMERAL ZONE
- CONCEPTUAL LAYOUT OF PIPED STORMWATER SYSTEM
- PIPED GRAVITY DRAINAGE TO WALLIS LAKE ENTRANCE CHANNEL
- 4.8 MINOR DESIGN CONTOUR (0.2m)
- 6.0 MAJOR DESIGN CONTOUR (1m)
- OVERLAND FLOW DISCHARGE
- CULVERT CONNECTING BASINS
- APROXIMATE CADASTRAL BOUNDARY

PROPOSED WATER QUALITY CONTROLS NOTES (ZONE D3)

- 5KL RAINWATER TANKS ON EACH DWELLING.
- RAINWATER TANKS OVERFLOW TO ON LOT INFILTRATION PITS.
- RUNOFF FROM ROAD PAVEMENT AREA WILL BE TREATED IN STREET SCAPE BIOFILTRATION SWALES, WITH TREATED RUNOFF INFILTRATING TO THE GROUNDWATER.

PROPOSED WATER QUALITY CONTROLS NOTES (ZONE D4)

- 5KL RAINWATER TANKS ON EACH DWELLING.
- RAINWATER TANKS OVERFLOW TO KERB AND GUTTERING.
- RUNOFF FROM ROAD PAVEMENT AND OVERFLOW FROM RAINWATER TANKS WILL BE TREATED IN STREET SCAPE RAINGARDENS THAT WILL BE LINED TO PREVENT INFILTRATION. TREATED RUNOFF WILL BE COLLECTED IN A PIPED DRAINAGE SYSTEM THAT WILL DRAIN TO THE WATER MANAGEMENT BASINS.

PROPOSED WATER MANAGEMENT BASINS NOTES (ZONE D2)

- PROVIDE SURFACE STORAGE TO ATTENUATE THE RISE OF SURFACE AND GROUNDWATER LEVELS DURING MAJOR FLOODING EVENTS, SUCH AS THE 100 YEAR ARI EVENT.
- HYDRAULICALLY CONNECT THE WATER MANAGEMENT SYSTEM THROUGHOUT THE DEVELOPMENT AREA, ENABLING THE GRAVITY DRAINAGE SYSTEM TO EFFECTIVELY REGULATE PEAK LEVELS THROUGHOUT THE ENTIRE DEVELOPMENT AREA.
- PROVIDE LOW POINTS FOR PIPE DRAINAGE SYSTEM OUTLETS.
- PROVIDE LOW POINTS FOR OVERLAND FLOW PATH OUTLETS.

80 0 80 160 240m
SCALE 1:8000

DATE 26/05/15		PAGE SIZE A3	COORDINATE SYSTEM MGA
PROJECT NO. 30011196	PROJECT TITLE	NORTH TUNCURRY DEVELOPMENT PROJECT	
FIG NO. 2	FIGURE TITLE	WATER MANAGEMENT PLAN	
CREATED BY S.DRUERY	SOURCES	DEVELOPMENT LAYOUT PROVIDED BY ROBERTS DAY	

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ABN 47 065 475 149

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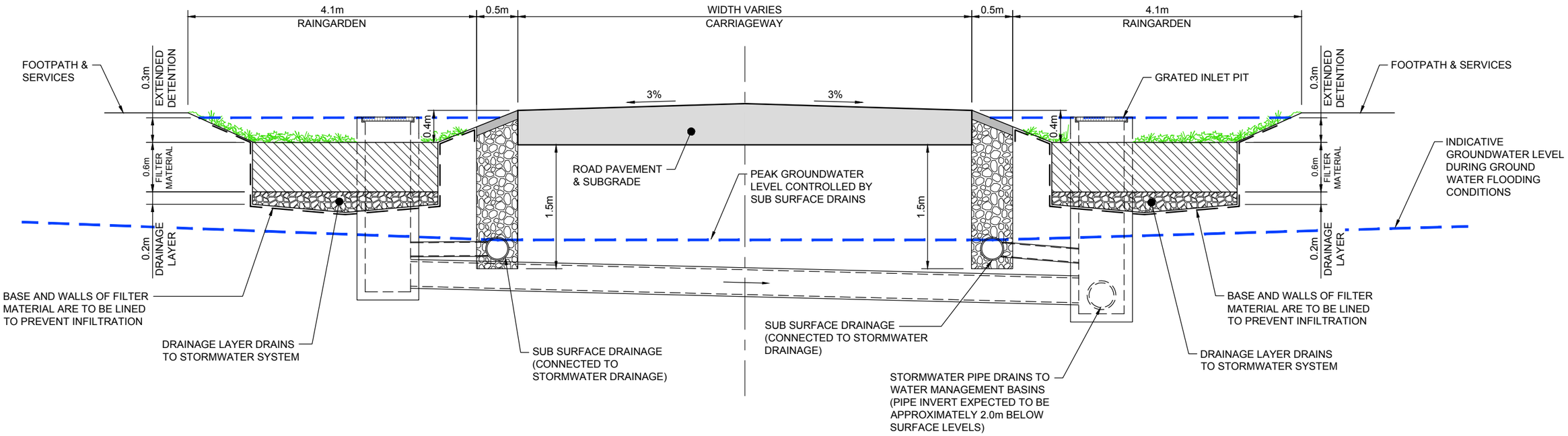

TYPICAL SECTION

SCALE 1:50

SOURCES: .

THIS FIGURE SHOWS CONCEPTUAL INFORMATION ONLY

0.5 0 0.5 1 1.5m

SCALE 1:50

NORTH TUNCURRY DEVELOPMENT PROJECT
TYPICAL SECTION ROAD WITH RAINGARDEN
ZONE D4 - PIPED DRAINAGE ZONE

FIGURE No. 3

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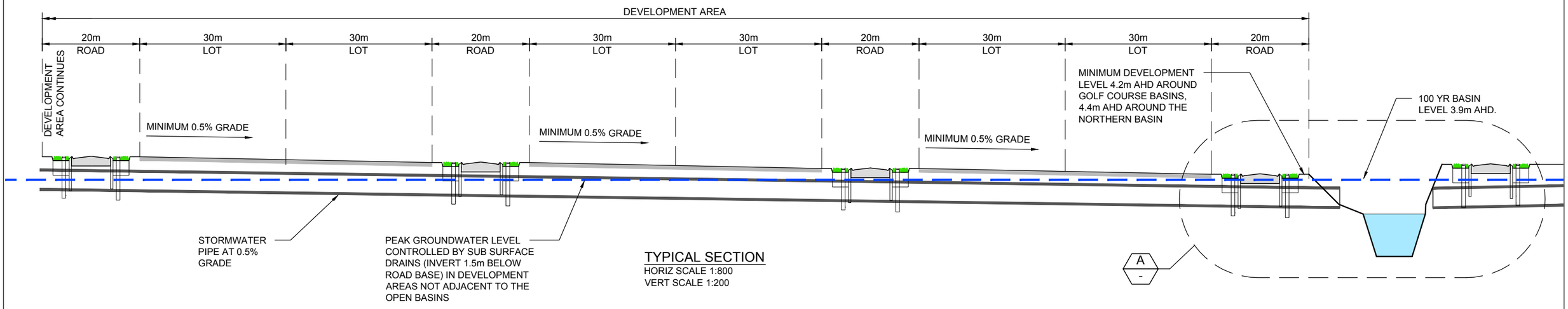
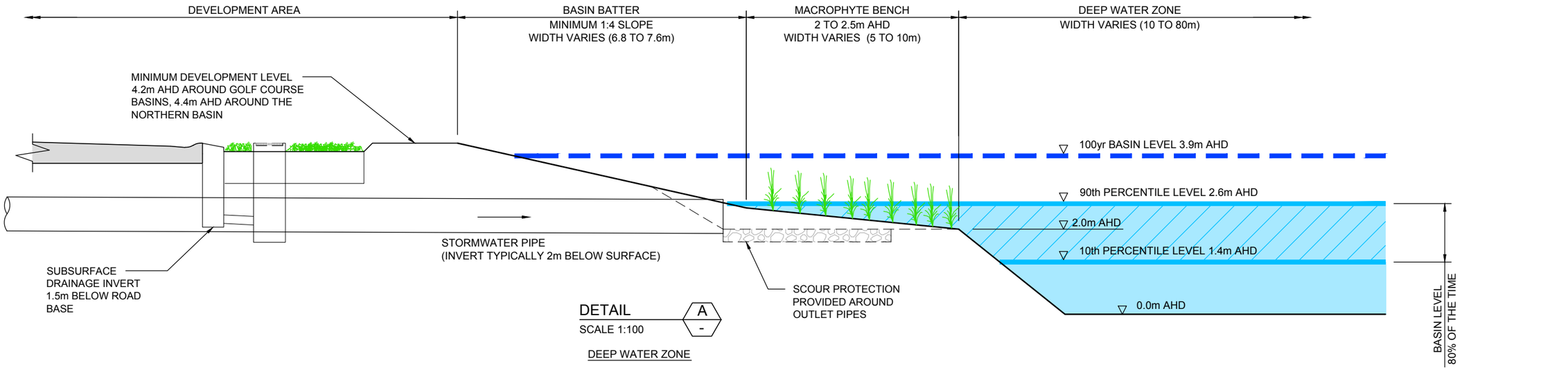


TYPICAL SECTION

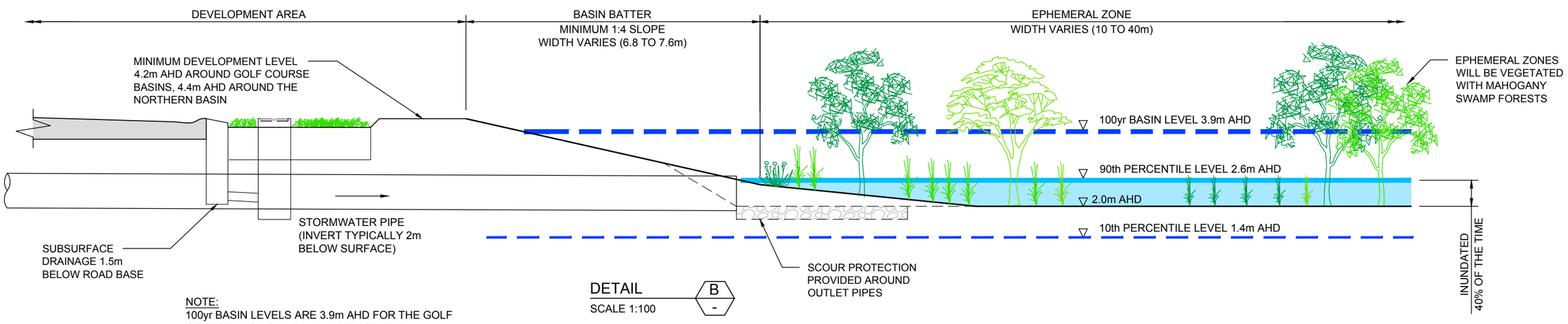
HORIZ SCALE 1:800
VERT SCALE 1:200



DETAIL A

SCALE 1:100

DEEP WATER ZONE



DETAIL B

SCALE 1:100

EPHEMERAL ZONE

NOTE:
100yr BASIN LEVELS ARE 3.9m AHD FOR THE GOLF COURSE BASINS AND 4.1m AHD FOR THE NORTHERN BASIN & NORTHERN FINGER DRAINS

SOURCES: .

THIS FIGURE SHOWS CONCEPTUAL INFORMATION ONLY

8 0 8 16 24m
SCALE 1:800

2.0 0 2.0 4.0 6.0m
SCALE 1:200

1 0 1 2 3m
SCALE 1:100

NORTH TUNCURRY DEVELOPMENT PROJECT
WATER MANAGEMENT BASIN TYPICAL SECTION

FIGURE No. 4

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APPENDIX A – AQUIFER INTERFERENCE ASSESSMENT FRAMEWORK

Department of Primary Industries
Office of Water

AQUIFER INTERFERENCE ASSESSMENT FRAMEWORK

Assessing a proposal against the NSW Aquifer Interference Policy – step by step guide

Note for proponents

This is the basic framework which the NSW Office of Water uses to assess project proposals against the **NSW Aquifer Interference Policy (AIP).**

The NSW Aquifer Interference Policy can be downloaded from the NSW Office of Water website (www.water.nsw.gov.au under Water management > Law and policy > Key policies > Aquifer interference).

While you are not required to use this framework, you may find it a useful tool to aid the development of a proposal or an **Environmental Impact Statement (EIS).**

We suggest that you summarise your response to each AIP requirement in the tables following and provide a reference to the section of your EIS that addresses that particular requirement. Using this tool can help to ensure that all necessary factors are considered, and will help you understand the requirements of the AIP.

Table 1. Does the activity require detailed assessment under the AIP?

	Consideration	Response
1	Is the activity defined as an aquifer interference activity?	If **NO,** then no assessment is required under the AIP. If **YES,** continue to Question 2.
2	Is the activity a defined minimal impact aquifer interference activity according to section 3.3 of the AIP?	If **YES**, then no further assessment against this policy is required. Volumetric licensing still required for any water taken, unless exempt. If **NO**, then continue on for a full assessment of the activity.

Note for proponents

Section 3.2 of the AIP defines the framework for assessing impacts. These are addressed here under the following headings:

1. Accounting for or preventing the take of water
2. Addressing the minimal impact considerations
3. Proposed remedial actions where impacts are greater than predicted.

1. Accounting for, or preventing the take of water

Where a proposed activity will take water, adequate arrangements must be in place to account for this water. It is the proponent's responsibility to ensure that the necessary licences are held. These requirements are detailed in Section 2 of the AIP, with the specific considerations in Section 2.1 addressed systematically below.

Where a proponent is unable to demonstrate that they will be able to meet the requirements for the licensing of the take of water, consideration should be given to modification of the proposal to prevent the take of water.

Table 2. Has the proponent:

	AIP requirement	Proponent response	NSW Office of Water comment
1	Described the water source(s) the activity will take water from?	Yes refer to Section 3.	
2	Predicted the total amount of water that will be taken from each connected groundwater or surface water source on an annual basis as a result of the activity?	At this stage in the project, it is anticipated that limited amounts of groundwater (estimated to be up to 67ML/year) will be extracted to irrigate public open space areas proposed in the project masterplan. It is envisaged that the extraction will occur through a number of decentralised spear point bores. Once the extent and nature of the irrigation works is confirmed (at a later design stage) an assessment will be made to establish if any WALs are required for the proposed extraction.	
3	Predicted the total amount of water that will be taken from each connected groundwater or surface water source after the closure of the activity?	Not Applicable	
4	Made these predictions in accordance with Section 3.2.3 of the AIP? (refer to Table 3, below)	Yes	
5	Described how and in what proportions this take will be assigned to the affected aquifers and connected surface water sources?	See response to Item 2	
6	Described how any licence exemptions might apply?	Water licensing requirements will be considered at a latter design stage once the water management strategy is settled and the extent and nature of the extraction works are known.	
7	Described the characteristics of the water requirements?	Section 9 provides detailed information on the potential water extraction requirements .	

	AIP requirement	Proponent response	NSW Office of Water comment
8	Determined if there are sufficient water entitlements and water allocations that are able to be obtained for the activity?	Water Access Licenses (WALs) in the Wallamba River Catchment are administered by the Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009. The Water Sharing Plan is administered on the basis of catchment scale Water Sources. The NTDP is located within the Tidal Management Zone of the Wallamba River Water Source. There are currently no water sharing rules that apply to the coastal sands aquifer category that exists within the NTDP area.	
9	Considered the rules of the relevant water sharing plan and if it can meet these rules?	see above	
10	Determined how it will obtain the required water?	Any groundwater extraction will be for the irrigation of public open space. It is envisaged that extraction would be through small spear point groundwater extraction bores	
11	Considered the effect that activation of existing entitlement may have on future available water determinations?	The project is expected to increase the volume of recharge into the aquifer due the predicted higher recharge rates from impervious surfaces. Hence, the project is expected to positively impact future opportunities for groundwater extraction.	
12	Considered actions required both during and post-closure to minimize the risk of inflows to a mine void as a result of flooding?	Not Applicable	
13	Developed a strategy to account for any water taken beyond the life of the operation of the project?	Not Applicable	
Will uncertainty in the predicted inflows have a significant impact on the environment or other authorised water users? If **YES,** items 14-16 must be addressed.			
14	Considered any potential for causing or enhancing hydraulic connections, and quantified the risk?	Not Applicable	

	AIP requirement	Proponent response	NSW Office of Water comment
15	Quantified any other uncertainties in the groundwater or surface water impact modelling conducted for the activity?	Not Applicable	
16	Considered strategies for monitoring actual and reassessing any predicted take of water throughout the life of the project, and how these requirements will be accounted for?	Not Applicable	

Table 3. Determining water predictions in accordance with Section 3.2.3
(complete one row only – consider both during and following completion of activity)

	AIP requirement	Proponent response	NSW Office of Water comment
1	**For the Gateway process**, is the estimate based on a simple modelling platform, using suitable baseline data, that is, fit-for-purpose?		
2	**For State Significant Development or mining or coal seam gas production**, is the estimate based on a complex modelling platform that is: • Calibrated against suitable baseline data, and in the case of a **reliable water source,** over at least two years? • Consistent with the Australian Modelling Guidelines? • Independently reviewed, robust and reliable, and deemed fit-for-purpose?	Groundwater models have been developed for the project. The models have been constructed, calibrated and verified using available data. Refer to Sections 2 to 5 of the Groundwater Modelling Technical Report (SMEC, 2014) for a description of model development and calibration. Section 6 of the same report discusses model confidence in context to the Australian Groundwater Modelling Guideline.	
3	In all other processes, estimate based on a desk-top analysis that is: • Developed using the available baseline data that has been collected at an appropriate frequency and scale; and • Fit-for-purpose?		

Other requirements to be reported on under Section 3.2.3

Table 4. Has the proponent provided details on:

	AIP requirement	Proponent response	NSW Office of Water comment
1	Establishment of baseline groundwater conditions?	Refer to Section 2 for a description of baseline data	
2	A strategy for complying with any water access rules?	Not Applicable - no water access rules established	
3	Potential water level, quality or pressure drawdown impacts on nearby basic landholder rights water users?	Not Applicable - no draw down impacts or signficant water quality impacts are expected	
4	Potential water level, quality or pressure drawdown impacts on nearby licensed water users in connected groundwater and surface water sources?	Not Applicable - no draw down impacts or signficant water quality impacts are expected	
5	Potential water level, quality or pressure drawdown impacts on groundwater dependent ecosystems?	Not Applicable - no draw down impacts or signficant water quality impacts are expected	
6	Potential for increased saline or contaminated water inflows to aquifers and highly connected river systems?	Not Applicable - no draw down impacts or signficant water quality impacts are expected	
7	Potential to cause or enhance hydraulic connection between aquifers?	Not Applicable	
8	Potential for river bank instability, or high wall instability or failure to occur?	Not Applicable	
9	Details of the method for disposing of extracted activities (for coal seam gas activities)?	Not Applicable	

2. Addressing the minimal impact considerations

Note for proponents

Section 3.2.1 of the AIP describes how aquifer impact assessment should be undertaken.

1. Identify all water sources that will be impacted, referring to the water sources defined in the relevant water sharing plan(s). Assessment against the minimal impact considerations of the AIP should be undertaken for each ground water source.
2. Determine if each water source is defined as 'highly productive' or 'less productive'. If the water source is named in then it is defined as highly productive, all other water sources are defined as less productive.
3. With reference to pages 13-14 of the Aquifer Interference Policy, determine the sub-grouping of each water source (eg alluvial, porous rock, fractured rock, coastal sands).
4. Determine whether the predicted impacts fall within Level 1 or Level 2 of the minimal impact considerations defined in Table 1 of the AIP, for each water source, for each of water table, water pressure, and water quality attributes. The tables below may assist with the assessment. There is a separate table for each sub-grouping of water source – only use the tables that apply to the water source(s) you are assessing, and delete the others.
5. If unable to determine any of these impacts, identify what further information will be required to make this assessment.
6. Where the assessment determines that the impacts fall within the Level 1 impacts, the assessment should be 'Level 1 – Acceptable'
7. Where the assessment falls outside the Level 1 impacts, the assessment should be 'Level 2'. The assessment should further note the reasons the assessment is Level 2, and any additional requirements that are triggered by falling into Level 2.
8. If water table or water pressure assessment is not applicable due to the nature of the water source, the assessment should be recorded as 'N/A – reason for N/A'.

Table 5. Minimal impact considerations – *example tables*

Aquifer	**Alluvial aquifer**
Category	**Highly Productive**

Level 1 Minimal Impact Consideration	**Assessment**
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic post-water sharing plan variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. **OR** A maximum of a 2 metre water table decline cumulatively at any water supply work.	Not Applicable
Water pressure A cumulative pressure head decline of not more than 40% of the post-water sharing plan pressure head above the base of the water source to a maximum of a 2 metre decline, at any water supply work. **OR**, for the Lower Murrumbidgee Deep Groundwater Source: A cumulative pressure head decline of not more than 40% of the post-water sharing plan pressure head above the top of the relevant aquifer to a maximum of a 3 metre decline, at any water supply work.	Not Applicable
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity. No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity. No mining activity to be below the natural ground surface within 200 metres laterally from the top of high bank or 100 metres vertically beneath (or the three dimensional extent of the alluvial water source - whichever is the lesser distance) of a highly connected surface water source that is defined as a reliable water supply. Not more than 10% cumulatively of the three dimensional extent of the alluvial material in this water source to be excavated by mining activities beyond 200 metres laterally from the top of high bank and 100 metres vertically beneath a highly connected surface water source that is defined as a reliable water supply.	Not Applicable.

Aquifer	Coastal sands
Category	Highly Productive

Level 1 Minimal Impact Consideration	Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. **OR** A maximum of a 2 metre water table decline cumulatively at any water supply work.	The project is expected to generally increase groundwater levels in areas adjacent to the development area. Refer the Groundwater Modelling Technical Report (SMEC, 2014) for a description of the project's expected impacts on the local and regional groundwater regime
Water pressure A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.	The project is expected to generally increase groundwater levels in areas adjacent to the development area. Refer the Groundwater Modelling Technical Report (SMEC, 2014) for a description of the project's expected impacts on the local and regional groundwater regime
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.	No significant groundwater quality impacts are expected. Refer to Sections 5 and 6 for further details on water quality management

Aquifer	Porous Rock – except Great Artesian Basin
Category	Highly Productive

Level 1 Minimal Impact Consideration	Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. **OR** A maximum of a 2 metre water table decline cumulatively at any water supply work.	Not Applicable
Water pressure A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.	Not Applicable
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.	Not Applicable

Aquifer	Porous Rock – Great Artesian Basin – Eastern Recharge and Southern Recharge
Category	Highly Productive

Level 1 Minimal Impact Consideration	Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. **OR** A maximum of a 2 metre water table decline cumulatively at any water supply work.	Not Applicable
Water pressure Less than 0.2 metre cumulative variation in the groundwater pressure, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. A cumulative pressure level decline of not more than 15 metres, allowing for typical climatic 'post-water sharing plan' variations. The cumulative pressure level decline of no more than 10% of the 2008 pressure level above ground surface at the NSW State border, as agreed between NSW and Queensland.	Not Applicable
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.	Not Applicable

Aquifer	Porous Rock – Great Artesian Basin – Surat, Warrego and Central
Category	Highly Productive

Level 1 Minimal Impact Consideration	Assessment
Water table NOT APPLICABLE	
Water pressure Less than 0.2 metre cumulative variation in the groundwater pressure, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. A cumulative pressure level decline of not more than 30 metres, allowing for typical climatic 'post-water sharing plan' variations. The cumulative pressure level decline of no more than 10% of the 2008 pressure level above ground surface at the NSW State border, as agreed between NSW and Queensland.	Not Applicable
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.	Not Applicable

Aquifer	Fractured Rock
Category	Highly Productive

Level 1 Minimal Impact Consideration	Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem; or • high priority culturally significant site; listed in the schedule of the relevant water sharing plan. **OR** A maximum of a 2 metre water table decline cumulatively at any water supply work.	Not Applicable
Water pressure A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.	Not Applicable
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.	Not Applicable

Aquifer	**Alluvial**
Category	**Less productive**

Level 1 Minimal Impact Consideration	Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. **OR** A maximum of a 2 metre water table decline cumulatively at any water supply work unless make good provisions apply	Not Applicable
Water pressure A cumulative pressure head decline of not more than 40% of the 'post-water sharing plan' pressure head above the base of the water source to a maximum of a 2 metre decline, at any water supply work.	Not Applicable
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity. No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity. No mining activity to be below the natural ground surface within 200 metres laterally from the top of high bank or 100 metres vertically beneath (or the three dimensional extent of the alluvial water source - whichever is the lesser distance) of a highly connected surface water source that is defined as a 'reliable water supply'.	Not Applicable

Aquifer	Porous rock or fractured rock
Category	Less productive

Level 1 Minimal Impact Consideration	Assessment
Water table Less than or equal to a 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any: • high priority groundwater dependent ecosystem or • high priority culturally significant site listed in the schedule of the relevant water sharing plan. **OR** A maximum of a 2 metre water table decline cumulatively at any water supply work.	Not Applicable
Water pressure A cumulative pressure head decline of not more than a 2 metre decline, at any water supply work.	Not Applicable
Water quality Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 metres from the activity.	Not Applicable

3. Proposed remedial actions where impacts are greater than predicted.

Note for proponents

Point 3 of section 3.2 of the AIP provides a basic framework for considerations to consider when assessing a proponent's proposed remedial actions.

Table 6. Has the proponent:

	AIP requirement	Proponent response	NSW Office of Water comment
1	Considered types, scale, and likelihood of unforeseen impacts *during operation*?	A comprehensive assessment of the water management constraints and opportunities was undertaken based on available data. The proposed surface and groundwater management strategy was formulated to respond to identified constraints and risks.	
2	Considered types, scale, and likelihood of unforeseen impacts *post closure*?	Not Applicable	
3	Proposed mitigation, prevention or avoidance strategies for each of these potential impacts?	A comprehensive assessment of the water management constraints and opportunities was undertaken based on available data. The proposed surface and groundwater management strategy was formulated to respond to identified constraints and risks	
4	Proposed remedial actions should the risk minimization strategies fail?	If water quality in the water management basins is worse than expected, a number of contingency measures to improve water quality are discussed in Section 5.	
5	Considered what further mitigation, prevention, avoidance or remedial actions might be required?	Not Applicable for urban development projects	
6	Considered what conditions might be appropriate?	Not Applicable	

4. Other considerations

Note for proponents

These considerations are not included in the assessment framework outlined within the AIP, however are discussed elsewhere in the document and are useful considerations when assessing a proposal.

Table 7: Has the proponent:

	AIP requirement	Proponent response	NSW Office of Water comment
1	Addressed how it will measure and monitor volumetric take? (page 4 of the AIP)	At this stage in the project, it is anticipated that limited amounts of groundwater (estimated to be up to 67ML/year) will be extracted to irrigate public open space areas proposed in the project masterplan. It is envisaged that the extraction will occur through a number of decentralised spear point bores. Once the extent and nature of the irrigation works is confirmed (at a later design stage) an assessment will be made to establish if any WALs are required for the proposed extraction. This will inlcude monitoring and reporting procedures	
2	Outlined a reporting framework for volumetric take? (page 4 of the AIP)	see above	

More information

www.water.nsw.gov.au

Published by the NSW Department of Primary Industries.

Reference 12279

APPENDIX B – LAND USE ASSUMPTIONS

APPENDIX B – LAND USE ASSUMPTIONS

	Area	Number of Lots	Roof Area	Roof Area		Road & Pavement		Landscaped (native)		Landscaped (non-native)		Impervious Area		Pervious Area		Piped Drainage		Infiltration Only	
Land Use	*(ha)*		*(m2/lot)*	*(%)*	*(ha)*	*(%)*	*(ha)*	*(%)*	*(ha)*	*(%)*	*(ha)*	*(%)*	*(ha)*	*(%)*	*(ha)*	(%)	(ha)	(%)	(ha)
Reconfigured Golf Course	**59.0**			0%	0.3	2%	1.2	48%	28.0	50%	29.5	2%	1.5	98%	57.5	N/A	N/A	N/A	N/A
Water Management Area																			
Open Water Zone 8.4				0%	0.0	0%	0.0	100%	8.4	0%	0.0	0%	0.0	100%	8.4	N/A	N/A	N/A	N/A
Basin Batters 5.1				0%	0.0	0%	0.0	50%	2.6	50%	2.6	0%	0.0	100%	5.1	N/A	N/A	N/A	N/A
Ephemeral Zone 3.7				0%	0.0	0%	0.0	100%	3.7	0%	0.0	0%	0.0	100%	3.7	N/A	N/A	N/A	N/A
Ephemeral Finger Drain 0.9				0%	0.0	0%	0.0	100%	0.9	0%	0.0	0%	0.0	100%	0.9	N/A	N/A	N/A	N/A
Water Management Area Total	**18.1**			0%	0.0	0%	0.0	86%	15.6	14%	2.6	0%	0.0	100%	18.1	N/A	N/A	N/A	N/A
Parks and Open Space	**9.7**			0%	0.0	10%	1.0	30%	2.9	60%	5.8	10%	1.0	90%	8.7	N/A	N/A	N/A	N/A
Road Reserve	**47.4**			0%	0.0	70%	33.2	15%	7.1	15%	7.1	70%	33.2	30%	14.2	66%	31.4	34%	16.0
Employment	**6.6**			60%	4.0	25%	1.7	15%	1.0	0%	0.0	85%	5.6	15%	1.0	100%	6.6	0%	0.0
Village Centre	**0.7**			70%	0.5	30%	0.2	0%	0.0	0%	0.0	100%	0.7	0%	0.0	100%	0.7	0%	0.0
Eco Village	**15.6**	190	300	36%	5.7	7%	1.0	47%	7.3	10%	1.6	43%	6.7	57%	8.9	15%	3.1	85%	12.6
Development Area																			
1000 m2 Lots 5.2		52	380	38%	2.0	5%	0.3	29%	1.5	29%	1.5	43%	2.2	57%	3.0	N/A	N/A	N/A	N/A
950 m2 Lots 5.6		59	380	40%	2.2	5%	0.3	27%	1.5	27%	1.5	45%	2.5	55%	3.1	N/A	N/A	N/A	N/A
850 m2 Lots 6.0		70	350	41%	2.5	6%	0.4	21%	1.3	32%	1.9	47%	2.8	53%	3.2	N/A	N/A	N/A	N/A
750 m2 Lots 22.1		294	350	47%	10.3	7%	1.5	19%	4.1	28%	6.2	53%	11.8	47%	10.3	N/A	N/A	N/A	N/A
650 m2 Lots 17.8		274	330	51%	9.0	8%	1.4	14%	2.5	28%	4.9	58%	10.4	42%	7.4	N/A	N/A	N/A	N/A
550 m2 Lots 10.8		196	310	56%	6.1	7%	0.8	12%	1.3	24%	2.6	64%	6.9	36%	3.9	N/A	N/A	N/A	N/A
450 m2 Lots 13.2		294	250	56%	7.4	9%	1.2	10%	1.3	25%	3.4	65%	8.5	35%	4.7	N/A	N/A	N/A	N/A
350m2 Lots 10.2		292	170	49%	5.0	9%	0.9	12%	1.3	31%	3.1	57%	5.8	43%	4.4	N/A	N/A	N/A	N/A
300 m2 Lots 4.0		132	170	57%	2.2	8%	0.3	9%	0.3	26%	1.0	65%	2.6	35%	1.4	N/A	N/A	N/A	N/A
210 m2 Terrace 1.5		70	120	57%	0.8	20%	0.3	6%	0.1	17%	0.3	77%	1.1	23%	0.3	N/A	N/A	N/A	N/A
80 m2 Apartments 1.6		200	70	88%	1.4	0%	0.0	3%	0.1	9%	0.2	88%	1.4	13%	0.2	N/A	N/A	N/A	N/A
Total - Development Area	**97.9**	**1933**		**50%**	**49**	**7%**	**7**	**16%**	**15**	**27%**	**27**	**57%**	**56**	**43%**	**42**	73%	71.2	27%	26.6
Totals	**254.9**	**2123**		**23%**	**59.3**	**18%**	**45.5**	**30%**	**77.1**	**29%**	**73.0**	**41%**	**104.7**	**59%**	**150.2**	67%	**113.0**	33%	**55.2**
Lakes Way Employment Lands	**6.6**			60%	4.0	25%	1.7	15%	1.0	0%	0.0	85%	5.6	15%	1.0	0%	0.0	100%	6.6

APPENDIX C – COST ESTIMATES AND NPV ANALYSIS

APPENDIX C – COST ESTIMATES AND NPV ANALYSIS

Options Cost Estimates and NPV Analysis Summary

- **Rainwater Harvesting Option**
    - Capital Cost of Potable Water Reticulation Infrastructure Network and Connections - $9.4M
    - Capital Cost of Rainwater Tanks and Pumps (for 2,123 residential dwellings) - $6.8M
    - NPV at 7% over 30 years of total costs - $9.9M. The total costs include the following costs applied in sequence with development:
        - capital cost of the reticulation potable water network, water trunk mains and connections, rainwater tanks and pumps;
        - operating and maintenance cost of the reticulation potable water network, trunk main connections and the rainwater tanks and pumps;
        - potable water supply cost.
    - NPV at 7% over 30 years of reticulation infrastructure and connections (rainwater tanks and pumps not included) - $5.3M. This NPV includes the following costs applied in sequence with development:
        - capital cost of the reticulation potable water network and water connections; and
        - operating and maintenance cost of the reticulation potable water network and connections.
    - Water Supply Cost per Household:
        - 5 kL Rainwater Tank and Pumps including plumbing and installation - $3,200.
        - Rainwater Tank and Pumps Operating and Maintenance Cost - $20/year.
        - Potable Water Supply Cost ($2.7/kL, 37kL/year) - $100/year.
        - Total annual water supply cost - $120/year ($0.69 per kL).
        - NPV at 7% over 30 years - $4.7K.
- **Recycled Water Option**
    - Capital Cost Potable Water and Recycled Water Reticulation Infrastructure Network, Potable Water Trunk Mains, Recycled Water Trunk Main and Connections - $11.3M
    - The capital costs of any plant upgrades and upstream works are not known and have not been included in the cost estimates. This could understate the actual cost of this option.
    - NPV at 7% over 30 years of total costs - $10.8M. This total costs include the following costs applied in sequence with development:
        - capital cost of the reticulation potable water and recycled water network, potable water and recycled water trunk mains and connections;

- operating and maintenance cost of the reticulation potable water and recycled water network and trunk main connections;
- potable water and recycled water supply costs.

- NPV at 7% over 30 years of reticulation infrastructure and connections - $6.3M. This NPV includes the following costs applied in sequence with development:
  - capital cost of the reticulation potable water and recycled water network, potable water trunk main and connections; and
  - operating and maintenance cost of the potable water and recycled water reticulation network and connections.
- Water Supply Cost per Household:
  - Recycled Water Supply Cost ($2.0/kL, 86kL/year) - $172/year.
  - Potable Water Supply Cost ($2.7/kL, 88kL/year) - $238/year.
  - Total annual water supply cost - $410/year ($2.36 per kL).
  - NPV at 7% over 30 years - $5.1K.

- **Lower Cost Recycled Water Option**
  - Capital Cost Potable Water and Recycled Water Reticulation Infrastructure Network, Potable Water Trunk Mains, Potable Water and Recycled Water Connections - $10.7M
  - The capital costs of any recycled water plant upgrades and upstream works are not known and have not been included.
  - NPV at 7% over 30 years of total costs - $10.3M. This total costs include the following costs applied in sequence with development:
    - capital cost of the reticulation potable water and recycled water network, potable water trunk mains, potable water and recycled water connections;
    - operating and maintenance cost of the reticulation potable water and recycled water network and trunk main connections;
    - potable water and recycled water supply costs.
  - NPV at 7% over 30 years of reticulation infrastructure and connections - $5.8 M. This NPV includes the following costs applied in sequence with development:
    - capital cost of the reticulation potable water and recycled water network, potable water trunk main and connections; and
    - operating and maintenance cost of the potable water and recycled water reticulation network and connections.

- Water Supply Cost per Household:
    - Recycled Water Supply Cost ($2.0/kL, 86kL/year) - $172/year.
    - Potable Water Supply Cost ($2.7/kL, 88kL/year) - $238/year.
    - Total annual water supply cost - $410/year ($2.36 per kL).
    - NPV at 7% over 30 years - $5.1K.

NORTH TUNCURRY DEVELOPMENT PROJECT - ALTERNATIVE WATER SUPPLY OPTIONS COMPARISON

NPV of the Total Capital Costs, Operating and Maintenance Costs and Water Supply Costs (includes cost of the reticulation network, water connections and rainwater tanks and pumps)

Option A **Rainwater Harvesting Option**

The below table details NPV of the following: capital cost of the reticulation potable water network, water trunk mains and connections, rainwater tanks and pumps (applied in sequence with the development plan);
operating and maintenance cost of the reticulation potable water network and trunk main connections and the rainwater tanks and pumps;
potable water supply cost.

NPV	4%	NPV 7%	10%	Year 0 2015	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025	11 2026	12 2027	13 2028	14 2029	15 2030	16 2031	17 2032	18 2033	19 2034	20 2035	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041	27 2042	28 2043	29 2044	30 2045	TOTAL
Number of dwellings				85	76	82	125	76	91	75	74	74	75	64	76	153	73	82	63	69	42	70	76	80	75	72	78	109	66	42				
Accumulated number of dwellings				85	161	243	368	444	535	610	684	758	833	897	973	1,126	1,199	1,281	1,344	1,413	1,455	1,525	1,601	1,681	1,756	1,828	1,906	2,015	2,081	2,123	2,123	2,123	2,123	2,123	
RETICULATION POTABLE WATER SUPPLY																																		
Capital Cost																																		
Reticulation Potable Water Network and Potable Water Connections	$ 6,392,399	$ 5,111,063	$ 4,262,442	1,102,402	241,045	468,636	311,435	226,486	410,438	420,089	486,538	463,171	568,390	329,110	313,753	292,792	311,611	262,512	303,474	261,842	261,781	325,084	321,044	85,403	358,792	85,403	299,782	308,384	251,328	292,856	0	0	0	0	**9,363,581**
Operating and Maintenance Cost																																		
Reticulation Potable Water Network and Connection (0.25% of capital cost per annum)	$ 219,090	$ 138,607	$ 93,146		2,756	3,359	4,530	5,309	5,875	6,901	7,951	9,168	10,326	11,747	12,569	13,354	14,086	14,865	15,521	16,280	16,934	17,589	18,401	19,204	19,418	20,315	20,528	21,278	22,048	22,677	23,409	23,409	23,409	23,409	**446,623**
SUB-TOTAL POTABLE WATER SUPPLY	**$ 6,611,488**	**$ 5,249,670**	**$ 4,355,588**	1,102,402	243,801	471,995	315,965	231,795	416,313	426,990	494,489	472,339	578,715	340,857	326,323	306,146	325,696	277,377	318,995	278,122	278,716	342,673	339,445	104,607	378,210	105,718	320,310	329,661	273,376	315,533	23,409	23,409	23,409	23,409	**9,810,204**
RAINWATER TANKS & PUMPS (Rainwater Supply)																																		
Capital Cost																																		
Rainwater Tank and Pump Installation	$ 4,365,764	$ 3,343,176	$ 2,679,407	272,000	243,200	262,400	400,000	243,200	291,200	240,000	236,800	236,800	240,000	204,800	243,200	489,600	233,600	262,400	201,600	220,800	134,400	224,000	243,200	256,000	240,000	230,400	249,600	348,800	211,200	134,400	0				**6,793,600**
Operating and Maintenance Cost																																		
Rainwater Tank and Pump ($20/unit/annum)	$ 354,870	$ 218,814	$ 143,130		1,700	3,220	4,860	7,360	8,880	10,700	12,200	13,680	15,160	16,660	17,940	19,460	22,520	23,980	25,620	26,880	28,260	29,100	30,500	32,020	33,620	35,120	36,560	38,120	40,300	41,620	42,460	42,460	42,460	42,460	**745,880**
Potable Water Supply Cost																																		
$2.7 per kL, 37 kL/ET/year	$ 1,772,577	$ 1,092,977	$ 714,933		8,492	16,084	24,276	36,763	44,356	53,447	60,939	68,332	75,724	83,217	89,610	97,203	112,487	119,780	127,972	134,266	141,159	145,355	152,348	159,940	167,932	175,424	182,617	190,409	201,299	207,892	212,088	212,088	212,088	212,088	**3,725,671**
SUB-TOTAL RAINWATER SUPPLY	**$ 6,493,212**	**$ 4,654,967**	**$ 3,537,469**	272,000	253,392	281,704	429,136	287,323	344,436	304,147	309,939	318,812	330,884	304,677	350,750	606,263	368,607	406,160	355,192	381,946	303,819	398,455	426,048	447,960	441,552	440,944	468,777	577,329	452,799	383,912	254,548	254,548	254,548	254,548	**11,265,151**
TOTAL RAINWATER AND POTABLE WATER SUPPLY	**$ 13,104,700**	**$ 9,904,638**	**$ 7,893,057**	1,374,402	497,192	753,699	745,101	519,118	760,749	731,137	804,428	791,151	909,600	645,534	677,073	912,409	694,304	683,537	674,187	660,068	582,534	741,127	765,493	552,567	819,762	546,662	789,088	906,991	726,175	699,444	277,957	277,957	277,957	277,957	**21,075,354**

Option B1 **Recycled Water Option** **(includes new trunk main supplying recycled water from the Recycled Water Plant)**

The below table details NPV of the following: capital cost of the reticulation potable water and recycled water network, potable water and recycled water trunk mains and connections (applied in sequence with the development plan);
operating and maintenance cost of the reticulation potable water and recycled water network and trunk main connections;
potable water and recycled water supply costs.

The capital costs of any recycled water plant upgrades and upstream works are not known and have not been included in this analysis.

NPV	4%	NPV 7%	10%	Year 0 2015	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025	11 2026	12 2027	13 2028	14 2029	15 2030	16 2031	17 2032	18 2033	19 2034	20 2035	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041	27 2042	28 2043	29 2044	30 2045	TOTAL
Number of dwellings				85	76	82	125	76	91	75	74	74	75	64	76	153	73	82	63	69	42	70	76	80	75	72	78	109	66	42				
Accumulated number of dwellings				85	161	243	368	444	535	610	684	758	833	897	973	1,126	1,199	1,281	1,344	1,413	1,455	1,525	1,601	1,681	1,756	1,828	1,906	2,015	2,081	2,123	2,123	2,123	2,123	2,123	
POTABLE AND RECYCLED WATER INFRASTRUCTURE																																		
Capital Cost	**$ 7,701,615**	**$ 6,180,476**	**$ 5,178,885**	**1,399,890**	**326,959**	**642,664**	**346,810**	**297,231**	**464,732**	**473,596**	**546,304**	**500,119**	**646,675**	**453,491**	**288,711**	**333,534**	**345,196**	**284,910**	**351,173**	**373,169**	**275,943**	**401,486**	**373,214**	**86,509**	**479,920**	**86,509**	**346,032**	**448,688**	**319,433**	**367,191**	**0**	**0**	**0**	**0**	**11,260,087**
Reticulation Potable & Recycled Water Network including Potable Water Connections	$ 7,168,678	$ 5,647,540	$ 4,645,949	866,954	326,959	642,664	346,810	297,231	464,732	473,596	546,304	500,119	646,675	453,491	288,711	333,534	345,196	284,910	351,173	373,169	275,943	401,486	373,214	86,509	479,920	86,509	346,032	448,688	319,433	367,191					10,727,150
Trunk Main from RWTP to site	$ 532,936	$ 532,936	$ 532,936	532,936																															532,936
Operating and Maintenance Cost	**$ 264,370**	**$ 167,903**	**$ 113,340**	**0**	**3,500**	**4,317**	**5,924**	**6,791**	**7,534**	**8,696**	**9,880**	**11,245**	**12,496**	**14,112**	**15,246**	**15,968**	**16,802**	**17,665**	**18,377**	**19,255**	**20,188**	**20,878**	**21,881**	**22,815**	**23,031**	**24,231**	**24,447**	**25,312**	**26,434**	**27,232**	**28,150**	**28,150**	**28,150**	**28,150**	**536,856**
Reticulation Network & Connections (0.25% of capital cot per annum)	$ 241,331	$ 151,369	$ 100,780		2,167	2,985	4,591	5,458	6,202	7,363	8,547	9,913	11,163	12,780	13,914	14,636	15,469	16,332	17,045	17,923	18,856	19,545	20,549	21,482	21,698	22,898	23,115	23,980	25,101	25,900	26,818	26,818	26,818	26,818	496,886
Trunk Main from RWTP to site (0.25% of capital cost per annum)	$ 23,039	$ 16,533	$ 12,560		1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	39,970
TOTAL POTABLE & RECYCLED WATER INFRASTRUCTURE	**$ 7,965,985**	**$ 6,348,379**	**$ 5,292,225**	1,399,890	330,459	646,981	352,734	304,022	472,265	482,292	556,184	511,364	659,171	467,603	303,957	349,502	361,998	302,575	369,550	392,424	296,131	422,363	395,095	109,323	502,951	110,739	370,479	474,000	345,866	394,423	28,150	28,150	28,150	28,150	**11,796,942**
POTABLE AND RECYCLED WATER SUPPLY																																		
Potable Water Supply Cost																																		
$2.7 per kL, 88 kL/ET/year	$ 4,215,860	$ 2,599,514	$ 1,700,381		20,196	38,254	57,737	87,437	105,494	127,116	144,936	162,518	180,101	197,921	213,127	231,185	267,538	284,882	304,366	319,334	335,729	345,708	362,340	380,398	399,406	417,226	434,333	452,866	478,764	494,446	504,425	504,425	504,425	504,425	**8,861,054**
Recycled Water Supply Cost																																		
$2.0 per kL, 86 kL/ET/year	$ 3,051,885	$ 1,881,803	$ 1,230,915		14,620	27,692	41,796	63,296	76,368	92,020	104,920	117,648	130,376	143,276	154,284	167,356	193,672	206,228	220,332	231,168	243,036	250,260	262,300	275,372	289,132	302,032	314,416	327,832	346,580	357,932	365,156	365,156	365,156	365,156	**6,414,568**
TOTAL POTABLE AND RECYCLED WATER SUPPLY	**$ 7,267,745**	**$ 4,481,317**	**$ 2,931,296**	0	34,816	65,946	99,533	150,733	181,862	219,136	249,856	280,166	310,477	341,197	367,411	398,541	461,210	491,110	524,698	550,502	578,765	595,968	624,640	655,770	688,538	719,258	748,749	780,698	825,344	852,378	869,581	869,581	869,581	869,581	**15,275,622**
TOTAL RAINWATER AND POTABLE WATER SUPPLY	**$ 15,233,730**	**$ 10,829,695**	**$ 8,223,521**	1,399,890	365,275	712,927	452,267	454,755	654,128	701,428	806,040	791,530	969,648	808,800	671,368	748,043	823,207	793,685	894,247	942,927	874,895	1,018,331	1,019,735	765,093	1,191,488	829,997	1,119,228	1,254,697	1,171,210	1,246,801	897,731	897,731	897,731	897,731	**27,072,565**

Total	Annual water Demand	174	kL/ET/year		
Option A	Rainwater	137	kL/ET/year	Potable Water	37 kL/ET/year
Option B	Recycled Water	86	kL/ET/year	Potable Water	88 kL/ET/year

NORTH TUNCURRY DEVELOPMENT PROJECT - ALTERNATIVE WATER SUPPLY OPTIONS COMPARISON

NPV of the Total Capital Costs, Operating and Maintenance Costs and Water Supply Costs (includes cost of the reticulation network, water connections and rainwater tanks and pumps)

Option B2 Lower Cost Recycled Water Option **(recycled water currently supplied to golf course diverted to supply NTDP project)**

The below table details NPV of the following:
- capital cost of the reticulation potable water and recycled water network, potable water trunk mains and connections (applied in sequence with the development plan);
- operating and maintenance cost of the reticulation potable water and recycled water network and connections;
- potable water and recycled water supply costs.

NPV	NPV 4%	NPV 7%	NPV 10%
Number of dwellings			
Accumulated number of dwellings			
POTABLE AND RECYCLED WATER INFRASTRUCTURE			
Capital Cost	**$ 7,168,678**	**$ 5,647,540**	**$ 4,645,949**
Reticulation Potable & Recycled Water Network including Potable Water Connections	$ 7,168,678	$ 5,647,540	$ 4,645,949
Trunk Main from RWTP to site	$ -	$ -	$ -
Operating and Maintenance Cost	**$ 241,331**	**$ 151,369**	**$ 100,780**
Reticulation Network & Connections (0.25% of capital cot per annum)	$ 241,331	$ 151,369	$ 100,780
Trunk Main from RWTP to site (0.25% of capital cost per annum)	$ -	$ -	$ -
TOTAL POTABLE & RECYCLED WATER INFRASTRUCTURE	**$ 7,410,009**	**$ 5,798,909**	**$ 4,746,729**
POTABLE AND RECYCLED WATER SUPPLY			
Potable Water Supply Cost $2.7 per kL, 88 kL/ET/year	$ 4,215,860	$ 2,599,514	$ 1,700,381
Recycled Water Supply Cost $2.0 per kL, 86 kL/ET/year	$ 3,051,885	$ 1,881,803	$ 1,230,915
TOTAL POTABLE AND RECYCLED WATER SUPPLY	**$ 7,267,745**	**$ 4,481,317**	**$ 2,931,296**
TOTAL RAINWATER AND POTABLE WATER SUPPLY	**$ 14,677,754**	**$ 10,280,226**	**$ 7,678,025**

Year	0 2015	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025
Number of dwellings	85	76	82	125	76	91	75	74	74	75	64
Accumulated number of dwellings	85	161	243	368	444	535	610	684	758	833	897
POTABLE AND RECYCLED WATER INFRASTRUCTURE											
Capital Cost	**866,954**	**326,959**	**642,664**	**346,810**	**297,231**	**464,732**	**473,596**	**546,304**	**500,119**	**646,675**	**453,491**
Reticulation Potable & Recycled Water Network including Potable Water Connections	866,954	326,959	642,664	346,810	297,231	464,732	473,596	546,304	500,119	646,675	453,491
Trunk Main from RWTP to site											
Operating and Maintenance Cost	**0**	**2,167**	**2,985**	**4,591**	**5,458**	**6,202**	**7,363**	**8,547**	**9,913**	**11,163**	**12,780**
Reticulation Network & Connections (0.25% of capital cot per annum)		2,167	2,985	4,591	5,458	6,202	7,363	8,547	9,913	11,163	12,780
Trunk Main from RWTP to site (0.25% of capital cost per annum)		0	0	0	0	0	0	0	0	0	0
TOTAL POTABLE & RECYCLED WATER INFRASTRUCTURE	866,954	329,126	645,649	351,402	302,690	470,933	480,960	554,852	510,032	657,839	466,271
POTABLE AND RECYCLED WATER SUPPLY											
Potable Water Supply Cost $2.7 per kL, 88 kL/ET/year		20,196	38,254	57,737	87,437	105,494	127,116	144,936	162,518	180,101	197,921
Recycled Water Supply Cost $2.0 per kL, 86 kL/ET/year		14,620	27,692	41,796	63,296	76,368	92,020	104,920	117,648	130,376	143,276
TOTAL POTABLE AND RECYCLED WATER SUPPLY	0	34,816	65,946	99,533	150,733	181,862	219,136	249,856	280,166	310,477	341,197
TOTAL RAINWATER AND POTABLE WATER SUPPLY	866,954	363,942	711,594	450,934	453,422	652,795	700,096	804,708	790,198	968,315	807,468

Year	11 2026	12 2027	13 2028	14 2029	15 2030	16 2031	17 2032	18 2033	19 2034	20 2035
Number of dwellings	76	153	73	82	63	69	42	70	76	80
Accumulated number of dwellings	973	1,126	1,199	1,281	1,344	1,413	1,455	1,525	1,601	1,681
POTABLE AND RECYCLED WATER INFRASTRUCTURE										
Capital Cost	**288,711**	**333,534**	**345,196**	**284,910**	**351,173**	**373,169**	**275,943**	**401,486**	**373,214**	**86,509**
Reticulation Potable & Recycled Water Network including Potable Water Connections	288,711	333,534	345,196	284,910	351,173	373,169	275,943	401,486	373,214	86,509
Trunk Main from RWTP to site										
Operating and Maintenance Cost	**13,914**	**14,636**	**15,469**	**16,332**	**17,045**	**17,923**	**18,856**	**19,545**	**20,549**	**21,482**
Reticulation Network & Connections (0.25% of capital cot per annum)	13,914	14,636	15,469	16,332	17,045	17,923	18,856	19,545	20,549	21,482
Trunk Main from RWTP to site (0.25% of capital cost per annum)	0	0	0	0	0	0	0	0	0	0
TOTAL POTABLE & RECYCLED WATER INFRASTRUCTURE	302,624	348,170	360,665	301,242	368,217	391,092	294,798	421,031	393,763	107,991
POTABLE AND RECYCLED WATER SUPPLY										
Potable Water Supply Cost $2.7 per kL, 88 kL/ET/year	213,127	231,185	267,538	284,882	304,366	319,334	335,729	345,708	362,340	380,398
Recycled Water Supply Cost $2.0 per kL, 86 kL/ET/year	154,284	167,356	193,672	206,228	220,332	231,168	243,036	250,260	262,300	275,372
TOTAL POTABLE AND RECYCLED WATER SUPPLY	367,411	398,541	461,210	491,110	524,698	550,502	578,765	595,968	624,640	655,770
TOTAL RAINWATER AND POTABLE WATER SUPPLY	670,036	746,710	821,875	792,353	892,915	941,595	873,563	1,016,999	1,018,403	763,760

Year	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041	27 2042	28 2043	29 2044	30 2045	TOTAL
Number of dwellings	75	72	78	109	66	42					
Accumulated number of dwellings	1,756	1,828	1,906	2,015	2,081	2,123	2,123	2,123	2,123	2,123	
POTABLE AND RECYCLED WATER INFRASTRUCTURE											
Capital Cost	**479,920**	**86,509**	**346,032**	**448,688**	**319,433**	**367,191**	**0**	**0**	**0**	**0**	**10,727,150**
Reticulation Potable & Recycled Water Network including Potable Water Connections	479,920	86,509	346,032	448,688	319,433	367,191					10,727,150
Trunk Main from RWTP to site											0
Operating and Maintenance Cost	**21,698**	**22,898**	**23,115**	**23,980**	**25,101**	**25,900**	**26,818**	**26,818**	**26,818**	**26,818**	**496,886**
Reticulation Network & Connections (0.25% of capital cot per annum)	21,698	22,898	23,115	23,980	25,101	25,900	26,818	26,818	26,818	26,818	496,886
Trunk Main from RWTP to site (0.25% of capital cost per annum)	0	0	0	0	0	0	0	0	0	0	0
TOTAL POTABLE & RECYCLED WATER INFRASTRUCTURE	501,618	109,407	369,147	472,667	344,534	393,091	26,818	26,818	26,818	26,818	**11,224,036**
POTABLE AND RECYCLED WATER SUPPLY											
Potable Water Supply Cost $2.7 per kL, 88 kL/ET/year	399,406	417,226	434,333	452,866	478,764	494,446	504,425	504,425	504,425	504,425	**8,861,054**
Recycled Water Supply Cost $2.0 per kL, 86 kL/ET/year	289,132	302,032	314,416	327,832	346,580	357,932	365,156	365,156	365,156	365,156	**6,414,568**
TOTAL POTABLE AND RECYCLED WATER SUPPLY	688,538	719,258	748,749	780,698	825,344	852,378	869,581	869,581	869,581	869,581	**15,275,622**
TOTAL RAINWATER AND POTABLE WATER SUPPLY	1,190,156	828,664	1,117,895	1,253,365	1,169,878	1,245,469	896,399	896,399	896,399	896,399	**26,499,658**

Total	Annual water Demand	174 kL/ET/year		
Option A	Rainwater	137 kL/ET/year	Potable Water	37 kL/ET/year
Option B	Recycled Water	86 kL/ET/year	Potable Water	88 kL/ET/year

NORTH TUNCURRY DEVELOPMENT PROJECT - ALTERNATIVE WATER SUPPLY OPTIONS COMPARISON

NPV of the External Infrastructure Capital Costs and Operating and Maintenance Costs (includes cost of the reticulation network and water connections, does not include cost of the rainwater tanks and pumps)

Option A **Rainwater Harvesting Option**

The below table details NPV of the following: capital cost of the reticulation potable water network and water trunk main connections (applied in sequence with the development plan); and
operating and maintenance cost of the reticulation potable water network and trunk main connections.

NPV		NPV																	Year																TOTAL
	4%	7%	10%	0 2015	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025	11 2026	12 2027	13 2028	14 2029	15 2030	16 2031	17 2032	18 2033	19 2034	20 2035	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041	27 2042	28 2043	29 2044	30 2045	
Number of dwellings				85	76	82	125	76	91	75	74	74	75	64	76	153	73	82	63	69	42	70	76	80	75	72	78	109	66	42					
Accumulated number of dwellings				85	161	243	368	444	535	610	684	758	833	897	973	1,126	1,199	1,281	1,344	1,413	1,455	1,525	1,601	1,681	1,756	1,828	1,906	2,015	2,081	2,123	2,123	2,123	2,123	2,123	
EXTERNAL INFRASTRUCTURE (Potable Water Supply)																																			
Capital Cost																																			
Reticulation Potable Water Network and Potable Water Connections	$ 6,392,399	$ 5,111,063	$ 4,262,442	1,102,402	241,045	468,636	311,435	226,486	410,438	420,089	486,538	463,171	568,390	329,110	313,753	292,792	311,611	262,512	303,474	261,842	261,781	325,084	321,044	85,403	358,792	85,403	299,782	308,384	251,328	292,856	0	0	0	0	**9,363,581**
Operating and Maintenance Cost																																			
Reticulation Potable Water Network (0.25% of capital cot per annum)	$ 219,090	$ 138,607	$ 93,146		2,756	3,359	4,530	5,309	5,875	6,901	7,951	9,168	10,326	11,747	12,569	13,354	14,086	14,865	15,521	16,280	16,934	17,589	18,401	19,204	19,418	20,315	20,528	21,278	22,048	22,677	23,409	23,409	23,409	23,409	**446,623**
TOTAL POTABLE WATER SUPPLY	**$ 6,611,488**	**$ 5,249,670**	**$ 4,355,588**																																**9,810,204**

Option B1 **Recycled Water Option (includes new trunk main supplying recycled water from the Recycled Water Plant)**

The below table details NPV of the following: capital cost of the potable water and recycled water reticulation network, trunk mains and connections (applied in sequence with the development plan); and
operating and maintenance cost of the potable water and recycled water reticulation network and trunk main connections.
The capital costs of any recycled water plant upgrades and upstream works are not known and have not been included in this analysis.

NPV		NPV																	Year																TOTAL
	4%	7%	10%	0 2015	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025	11 2026	12 2027	13 2028	14 2029	15 2030	16 2031	17 2032	18 2033	19 2034	20 2035	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041	27 2042	28 2043	29 2044	30 2045	
Number of dwellings				85	76	82	125	76	91	75	74	74	75	64	76	153	73	82	63	69	42	70	76	80	75	72	78	109	66	42					
Accumulated number of dwellings				85	161	243	368	444	535	610	684	758	833	897	973	1,126	1,199	1,281	1,344	1,413	1,455	1,525	1,601	1,681	1,756	1,828	1,906	2,015	2,081	2,123	2,123	2,123	2,123	2,123	
EXTERNAL INFRASTRUCTURE (Potable Water & Recycled Water Supply)																																			
Capital Cost	**$ 7,701,615**	**$ 6,180,476**	**$ 5,178,885**	**1,399,890**	**326,959**	**642,664**	**346,810**	**297,231**	**464,732**	**473,596**	**546,304**	**500,119**	**646,675**	**453,491**	**288,711**	**333,534**	**345,196**	**284,910**	**351,173**	**373,169**	**275,943**	**401,486**	**373,214**	**86,509**	**479,920**	**86,509**	**346,032**	**448,688**	**319,433**	**367,191**	**0**	**0**	**0**	**0**	**11,260,087**
Reticulation Potable & Recycled Water Network including Potable Water Connections	$ 7,168,678	$ 5,647,540	$ 4,645,949	866,954	326,959	642,664	346,810	297,231	464,732	473,596	546,304	500,119	646,675	453,491	288,711	333,534	345,196	284,910	351,173	373,169	275,943	401,486	373,214	86,509	479,920	86,509	346,032	448,688	319,433	367,191					10,727,150
Trunk Main from RWTP to site	$ 532,936	$ 532,936	$ 532,936	532,936																															532,936
Operating and Maintenance Cost	**$ 264,370**	**$ 167,903**	**$ 113,340**	**0**	**3,500**	**4,317**	**5,924**	**6,791**	**7,534**	**8,696**	**9,880**	**11,245**	**12,496**	**14,112**	**15,246**	**15,968**	**16,802**	**17,665**	**18,377**	**19,255**	**20,188**	**20,878**	**21,881**	**22,815**	**23,031**	**24,231**	**24,447**	**25,312**	**26,434**	**27,232**	**28,150**	**28,150**	**28,150**	**28,150**	**536,856**
Reticulation Network (0.25% of capital cot per annum)	$ 241,331	$ 151,369	$ 100,780		2,167	2,985	4,591	5,458	6,202	7,363	8,547	9,913	11,163	12,780	13,914	14,636	15,469	16,332	17,045	17,923	18,856	19,545	20,549	21,482	21,698	22,898	23,115	23,980	25,101	25,900	26,818	26,818	26,818	26,818	496,886
Trunk Main from RWTP to site (0.25% of capital cost per annum)	$ 23,039	$ 16,533	$ 12,560		1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	39,970
TOTAL POTABLE & RECYCLED WATER SUPPLY	**$ 7,965,985**	**$ 6,348,379**	**$ 5,292,225**																																**11,796,942**

Option B2 **Lower Cost Recycled Water Option (recycled water currently supplied to golf course diverted to supply NTDP project)**

The below table details NPV of the following: capital cost of the potable water and recycled water reticulation network and potable water trunk main connections (applied in sequence with the development plan); and
operating and maintenance cost of the potable water and recycled water reticulation network and connections.
The capital costs of any recycled water plant upgrades and upstream works are not known and have not been included in this analysis.

NPV		NPV																	Year																TOTAL
	4%	7%	10%	0 2015	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025	11 2026	12 2027	13 2028	14 2029	15 2030	16 2031	17 2032	18 2033	19 2034	20 2035	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041	27 2042	28 2043	29 2044	30 2045	
Number of dwellings				85	76	82	125	76	91	75	74	74	75	64	76	153	73	82	63	69	42	70	76	80	75	72	78	109	66	42					
Accumulated number of dwellings				85	161	243	368	444	535	610	684	758	833	897	973	1,126	1,199	1,281	1,344	1,413	1,455	1,525	1,601	1,681	1,756	1,828	1,906	2,015	2,081	2,123	2,123	2,123	2,123	2,123	
EXTERNAL INFRASTRUCTURE (Potable Water & Recycled Water Supply)																																			
Capital Cost	**#REF!**	**#REF!**	**#REF!**	**866,954**	**326,959**	**642,664**	**346,810**	**297,231**	**464,732**	**473,596**	**546,304**	**500,119**	**646,675**	**453,491**	**288,711**	**333,534**	**345,196**	**284,910**	**351,173**	**373,169**	**275,943**	**401,486**	**373,214**	**86,509**	**479,920**	**86,509**	**346,032**	**448,688**	**319,433**	**367,191**	**0**	**0**	**0**	**0**	**10,727,150**
Reticulation Potable & Recycled Water Network including Potable Water Connections	#REF!	#REF!	#REF!	866,954	326,959	642,664	346,810	297,231	464,732	473,596	546,304	500,119	646,675	453,491	288,711	333,534	345,196	284,910	351,173	373,169	275,943	401,486	373,214	86,509	479,920	86,509	346,032	448,688	319,433	367,191					10,727,150
Trunk Main from RWTP to site	#REF!	#REF!	#REF!																																0
Operating and Maintenance Cost	**#REF!**	**#REF!**	**#REF!**	**0**	**2,167**	**2,985**	**4,591**	**5,458**	**6,202**	**7,363**	**8,547**	**9,913**	**11,163**	**12,780**	**13,914**	**14,636**	**15,469**	**16,332**	**17,045**	**17,923**	**18,856**	**19,545**	**20,549**	**21,482**	**21,698**	**22,898**	**23,115**	**23,980**	**25,101**	**25,900**	**26,818**	**26,818**	**26,818**	**26,818**	**496,886**
Reticulation Network (0.25% of capital cot per annum)	#REF!	#REF!	#REF!		2,167	2,985	4,591	5,458	6,202	7,363	8,547	9,913	11,163	12,780	13,914	14,636	15,469	16,332	17,045	17,923	18,856	19,545	20,549	21,482	21,698	22,898	23,115	23,980	25,101	25,900	26,818	26,818	26,818	26,818	496,886
Trunk Main from RWTP to site (0.25% of capital cost per annum)	#REF!	#REF!	#REF!		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL POTABLE & RECYCLED WATER SUPPLY	**#REF!**	**#REF!**	**#REF!**																																**11,224,036**

Total	Annual water Demand	174 kL/ET/year		
Option A	Rainwater	137 kL/ET/year	Potable Water	37 kL/ET/year
Option B	Recycled Water	86 kL/ET/year	Potable Water	88 kL/ET/year

NORTH TUNCURRY DEVELOPMENT PROJECT - ALTERNATIVE WATER SUPPLY OPTIONS COMPARISON

Water Supply Cost per Household (1 ET) - includes capital cost and operating and maintenance cost of the rainwater tanks and pumps, potable water and recycled water supply costs

Option A **Rainwater Harvesting Option**

NPV	4%	NPV 7%	10%	Year 0 2015	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025	11 2026	12 2027	13 2028	14 2029	15 2030	16 2031	17 2032	18 2033	19 2034	20 2035	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041	27 2042	28 2043	29 2044	30 2045	TOTAL
RAINWATER TANKS & PUMPS (Rainwater Supply)																																			
Capital Cost																																			
Rainwater Tank and Pump Installation	$ 3,200	$ 3,200	$ 3,200	3,200																															**3,200**
Operating and Maintenance Cost																																			
Rainwater Tank and Pump ($20/unit/annum)	$ 346	$ 248	$ 189		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	**600**
Potable Water Supply Cost																																			
$2.7 per kL, 37 kL/ET/year	$ 1,727	$ 1,240	$ 942		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	**2,997**
TOTAL RAINWATER AND POTABLE WATER SUPPLY	**$ 5,273**	**$ 4,688**	**$ 4,330**	3,200	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	**6,797**

Option B1 **Recycled Water Option**

NPV	4%	NPV 7%	10%	Year 0 2015	1 2016	2 2017	3 2018	4 2019	5 2020	6 2021	7 2022	8 2023	9 2024	10 2025	11 2026	12 2027	13 2028	14 2029	15 2030	16 2031	17 2032	18 2033	19 2034	20 2035	21 2036	22 2037	23 2038	24 2039	25 2040	26 2041	27 2042	28 2043	29 2044	30 2045	TOTAL
Potable Water Supply Cost																																			
$2.7 per kL, 88 kL/ET/year	$ 4,109	$ 2,948	$ 2,240		238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	**7,128**
Recycled Water Supply Cost																																			
$2.0 per kL, 86 kL/ET/year	$ 2,974	$ 2,134	$ 1,621		172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172	**5,160**
TOTAL POTABLE AND RECYCLED WATER SUPPLY	**$ 7,083**	**$ 5,083**	**$ 3,861**	0	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	410	**12,288**

Total	Annual water Demand	174 kL/ET/year		
Option A	Rainwater	137 kL/ET/year	Potable Water	37 kL/ET/year
Option B	Recycled Water	86 kL/ET/year	Potable Water	88 kL/ET/year

NORTH TUNCURRY DEVELOPMENT PROJECT - ALTERNATIVE WATER SUPPLY OPTIONS COMPARISON

Capital cost of the Potable Water Reticulation Network and Water Connections

(Option A)

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage A

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 12,114.00	$ 12,114.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 15,000.00	$ 15,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 15,000.00	$ 15,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 16,000.00	$ 16,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 36,000.00	$ 36,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 6,857.17	$ 6,857.17
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 845.82	$ 845.82
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	812	m	$ 14.00	$ 11,368.00
20FVSS	Nominal DN150 PVC pipe	597	m	$ 28.00	$ 16,716.00
21EVSS	Nominal DN300 PVC pipe	540	m	$ 90.00	$ 48,600.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	812	m	$ 48.40	$ 39,300.80
20FVSS	Nominal DN150 PVC (Trench type B)	597	m	$ 56.40	$ 33,670.80
21EVSS	Nominal DN300 PVC (Trench type B)	540	m	$ 81.25	$ 43,875.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	

HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1949	m	$ 1.00	$ 1,949.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$196,325

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 $
HWT001	Service Location	Item	Lump Sum	$ 800.00	$ 800.00
HWT002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWT003	Supply all fittings	Item	Lump Sum		$ -
HWT004	Supply all pipes materials, including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
32DDSS	Nominal DN450 DICL pipe	800	m	$ 300.00	$ 240,000.00

HWT005	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Up to 1.5 m depth to invert in OTR.				
32DDSS	Nominal DN450 DICL (Trench type B)	800	m	$ 107.25	$ 85,800.00
HWT006	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >1.5m to 3.0m depth to invert in OTR.				
HWT007	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWT008	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWT009	EMPTY				
HWT010	Extra over rate for installation for Additional compaction.		m3	$ 25.50	
HWT011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 105.00	
HWT012	Extra over rate for installation for supply & place compact non cohesive material		m3		
HWT013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 450.00	
HWT014	Extra over rate for installation for Supply, place and compact aggregate		m3		
HWT015	Supply & place ballast		tonnes	$ 90.00	
HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWT017	Supply and place treated timber piling for pipe support		m		
HWT018	Road / creek crossings				
HWT019	Extra over rate for installation of trenchless technique under existing rail line		m		
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:				
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:				
HWT022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWT023	Supply and Install valve pits excluding cost of valves and fittings	0	Each	$ -	$ -
HWT024	Flow Relief Structures		Each		
HWT025	EMPTY				
HWT026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	Item	Lump Sum		$ -
HWT027	Preparation of line sheets	800	m	$ 1.00	$ 800.00
HWT028	Acceptance testing - trunk main		m		

HWT029	**Miscellaneous**				
HWT000	***Sub Total***				$327,400

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage B

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 2,304.00	$ 2,304.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 1,951.79	$ 1,951.79
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 370.37	$ 370.37
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	641	m	$ 14.00	$ 8,974.00
20FVSS	Nominal DN150 PVC pipe	418	m	$ 28.00	$ 11,704.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	641	m	$ 48.40	$ 31,024.40
20FVSS	Nominal DN150 PVC (Trench type B)	418	m	$ 56.40	$ 23,575.20
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1059	m	$ 1.00	$ 1,059.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$76,707

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 8,472.00	$ 8,472.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 137,434.76

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 27,486.95
HW0017	Project Management of Design	$ 15,497.39
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 42,984.34
	Pre construction contingency (30% of B1)	$ 12,895.30
	TOTAL PRE-CONSTRUCTION COST (B)	$ 55,879.65

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 137,434.76
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)		$ 5,000.00
	Sub Total (C1)		$ 142,434.76
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 42,730.43
	TOTAL CONSTRUCTION COST (C)		$ 185,165.19

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 241,044.83

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage C

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 4,597.00	$ 4,597.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 27,000.00	$ 27,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 6,000.00	$ 6,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,098.64	$ 3,098.64
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 764.96	$ 764.96
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1043	m	$ 14.00	$ 14,602.00
20FVSS	Nominal DN150 PVC pipe	589	m	$ 28.00	$ 16,492.00
21EVSS	Nominal DN300 PVC pipe	303	m	$ 90.00	$ 27,270.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1043	m	$ 48.40	$ 50,481.20
20FVSS	Nominal DN150 PVC (Trench type B)	589	m	$ 56.40	$ 33,219.60
21EVSS	Nominal DN300 PVC (Trench type B)	303	m	$ 81.25	$ 24,618.75
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	

HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1935	m	$ 1.00	$ 1,935.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$169,384

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		

HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 15,480.00	$ 15,480.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 261,559.15

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 52,311.83
HW0017	Project Management of Design	$ 20,462.37
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 72,774.20
	Pre construction contingency (30% of B1)	$ 21,832.26
	TOTAL PRE-CONSTRUCTION COST (B)	$ 94,606.45

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 261,559.15
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)	$ 26,155.92
	Sub Total (C1)	$ 287,715.07
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 86,314.52
	TOTAL CONSTRUCTION COST (C)	$ 374,029.58

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 468,636.04

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage D

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,151.00	$ 3,151.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 16,000.00	$ 16,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 36,000.00	$ 36,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,375.74	$ 2,375.74
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 412.10	$ 412.10
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	276	m	$ 14.00	$ 3,864.00
20FVSS	Nominal DN150 PVC pipe	473	m	$ 28.00	$ 13,244.00
214VSS	Nominal DN200 PVC pipe	143	m	$ 49.00	$ 7,007.00
219VSS	Nominal DN250 PVC pipe	111	m	$ 63.00	$ 6,993.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	276	m	$ 48.40	$ 13,358.40
20FVSS	Nominal DN150 PVC (Trench type B)	473	m	$ 56.40	$ 26,677.20
214VSS	Nominal DN200 PVC (Trench type B)	143	m	$ 63.40	$ 9,066.20
219VSS	Nominal DN250 PVC (Trench type B)	111	m	$ 71.40	$ 7,925.40
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 15.05	

HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 61.95	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 265.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1003	m	$ 1.00	$ 1,003.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$89,550

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -

HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 8,024.00	$ 8,024.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 181,101.04

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 36,220.21
HW0017	Project Management of Design	$ 17,244.04
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 53,464.25
	Pre construction contingency (30% of B1)	$ 16,039.27
	TOTAL PRE-CONSTRUCTION COST (B)	$ 69,503.52

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 181,101.04
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)	$ 5,000.00
	Sub Total (C1)	$ 186,101.04
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 55,830.31
	TOTAL CONSTRUCTION COST (C)	$ 241,931.35

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 311,434.88

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage E

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 2,128.00	$ 2,128.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 1,864.11	$ 1,864.11
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 316.18	$ 316.18
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	576	m	$ 14.00	$ 8,064.00
21EVSS	Nominal DN300 PVC pipe	194	m	$ 90.00	$ 17,460.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	576	m	$ 48.40	$ 27,878.40
21EVSS	Nominal DN300 PVC (Trench type B)	194	m	$ 81.25	$ 15,762.50
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	770	m	$ 1.00	$ 770.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$70,251

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 6,160.00	$ 6,160.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 128,403.19

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 25,680.64
HW0017	Project Management of Design	$ 15,136.13
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 40,816.77
	Pre construction contingency (30% of B1)	$ 12,245.03
	TOTAL PRE-CONSTRUCTION COST (B)	$ 53,061.80

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 128,403.19
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)	$ 5,000.00
	Sub Total (C1)	$ 133,403.19
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 40,020.96
	TOTAL CONSTRUCTION COST (C)	$ 173,424.15

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 226,485.94

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage F

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 4,228.00	$ 4,228.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 20,000.00	$ 20,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 45,000.00	$ 45,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 10,000.00	$ 10,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,913.76	$ 2,913.76
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 563.60	$ 563.60
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	443	m	$ 14.00	$ 6,202.00
20FVSS	Nominal DN150 PVC pipe	390	m	$ 28.00	$ 10,920.00
214VSS	Nominal DN200 PVC pipe	167	m	$ 49.00	$ 8,183.00
219VSS	Nominal DN250 PVC pipe	130	m	$ 63.00	$ 8,190.00
21EVSS	Nominal DN300 PVC pipe	160	m	$ 90.00	$ 14,400.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	443	m	$ 48.40	$ 21,441.20
20FVSS	Nominal DN150 PVC (Trench type B)	390	m	$ 56.40	$ 21,996.00
214VSS	Nominal DN200 PVC (Trench type B)	167	m	$ 63.40	$ 10,587.80
219VSS	Nominal DN250 PVC (Trench type B)	130	m	$ 71.40	$ 9,282.00
21EVSS	Nominal DN300 PVC (Trench type B)	160	m	$ 81.25	$ 13,000.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -

HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1290	m	$ 1.00	$ 1,290.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$126,056

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -

HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 10,320.00	$ 10,320.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 242,517.36

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 48,503.47
HW0017	Project Management of Design	$ 19,700.69
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 68,204.17
	Pre construction contingency (30% of B1)	$ 20,461.25
	TOTAL PRE-CONSTRUCTION COST (B)	$ 88,665.42

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 242,517.36
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)	$ 5,000.00
	Sub Total (C1)	$ 247,517.36
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 74,255.21
	TOTAL CONSTRUCTION COST (C)	$ 321,772.57

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 410,437.98

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage G

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 4,344.00	$ 4,344.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 20,000.00	$ 20,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 45,000.00	$ 45,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 10,000.00	$ 10,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,971.89	$ 2,971.89
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 576.37	$ 576.37
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	532	m	$ 14.00	$ 7,448.00
20FVSS	Nominal DN150 PVC pipe	304	m	$ 28.00	$ 8,512.00
214VSS	Nominal DN200 PVC pipe	94	m	$ 49.00	$ 4,606.00
219VSS	Nominal DN250 PVC pipe	73	m	$ 63.00	$ 4,599.00
21EVSS	Nominal DN300 PVC pipe	296	m	$ 90.00	$ 26,640.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	532	m	$ 48.40	$ 25,748.80
20FVSS	Nominal DN150 PVC (Trench type B)	304	m	$ 56.40	$ 17,145.60
214VSS	Nominal DN200 PVC (Trench type B)	94	m	$ 63.40	$ 5,959.60
219VSS	Nominal DN250 PVC (Trench type B)	73	m	$ 71.40	$ 5,212.20
21EVSS	Nominal DN300 PVC (Trench type B)	296	m	$ 81.25	$ 24,050.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -

HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1299	m	$ 1.00	$ 1,299.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$131,797

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -

HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 10,392.00	$ 10,392.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 248,504.46

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 49,700.89
HW0017	Project Management of Design	$ 19,940.18
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 69,641.07
	Pre construction contingency (30% of B1)	$ 20,892.32
	TOTAL PRE-CONSTRUCTION COST (B)	$ 90,533.39

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 248,504.46
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)	$ 5,000.00
	Sub Total (C1)	$ 253,504.46
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 76,051.34
	TOTAL CONSTRUCTION COST (C)	$ 329,555.80

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 420,089.19

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage H

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 4,797.00	$ 4,797.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 20,000.00	$ 20,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 45,000.00	$ 45,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 10,000.00	$ 10,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,198.40	$ 3,198.40
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 674.44	$ 674.44
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	642	m	$ 14.00	$ 8,988.00
20FVSS	Nominal DN150 PVC pipe	509	m	$ 28.00	$ 14,252.00
214VSS	Nominal DN200 PVC pipe	93	m	$ 49.00	$ 4,557.00
219VSS	Nominal DN250 PVC pipe	73	m	$ 63.00	$ 4,599.00
21EVSS	Nominal DN300 PVC pipe	272	m	$ 90.00	$ 24,480.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	642	m	$ 48.40	$ 31,072.80
20FVSS	Nominal DN150 PVC (Trench type B)	509	m	$ 56.40	$ 28,707.60
214VSS	Nominal DN200 PVC (Trench type B)	93	m	$ 63.40	$ 5,896.20
219VSS	Nominal DN250 PVC (Trench type B)	73	m	$ 71.40	$ 5,212.20
21EVSS	Nominal DN300 PVC (Trench type B)	272	m	$ 81.25	$ 22,100.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -

HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1589	m	$ 1.00	$ 1,589.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$152,128

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -

HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 12,712.00	$ 12,712.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 271,835.64

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 54,367.13
HW0017	Project Management of Design	$ 20,873.43
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 75,240.55
	Pre construction contingency (30% of B1)	$ 22,572.17
	TOTAL PRE-CONSTRUCTION COST (B)	$ 97,812.72

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 271,835.64
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)	$ 27,183.56
	Sub Total (C1)	$ 299,019.20
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 89,705.76
	TOTAL CONSTRUCTION COST (C)	$ 388,724.97

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 486,537.68

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage I

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 4,536.00	$ 4,536.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 20,000.00	$ 20,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 45,000.00	$ 45,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 10,000.00	$ 10,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,068.18	$ 3,068.18
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 622.37	$ 622.37
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	513	m	$ 14.00	$ 7,182.00
20FVSS	Nominal DN150 PVC pipe	370	m	$ 28.00	$ 10,360.00
214VSS	Nominal DN200 PVC pipe	161	m	$ 49.00	$ 7,889.00
219VSS	Nominal DN250 PVC pipe	125	m	$ 63.00	$ 7,875.00
21EVSS	Nominal DN300 PVC pipe	236	m	$ 90.00	$ 21,240.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	513	m	$ 48.40	$ 24,829.20
20FVSS	Nominal DN150 PVC (Trench type B)	370	m	$ 56.40	$ 20,868.00
214VSS	Nominal DN200 PVC (Trench type B)	161	m	$ 63.40	$ 10,207.40
219VSS	Nominal DN250 PVC (Trench type B)	125	m	$ 71.40	$ 8,925.00
21EVSS	Nominal DN300 PVC (Trench type B)	236	m	$ 81.25	$ 19,175.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -

HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1405	m	$ 1.00	$ 1,405.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$140,578

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -

HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 11,240.00	$ 11,240.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 258,422.15

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 51,684.43
HW0017	Project Management of Design	$ 20,336.89
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 72,021.32
	Pre construction contingency (30% of B1)	$ 21,606.39
	TOTAL PRE-CONSTRUCTION COST (B)	$ 93,627.71

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 258,422.15
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)	$ 25,842.22
	Sub Total (C1)	$ 284,264.37
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 85,279.31
	TOTAL CONSTRUCTION COST (C)	$ 369,543.67

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 463,171.39

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage J

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 5,709.00	$ 5,709.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 20,000.00	$ 20,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 45,000.00	$ 45,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 10,000.00	$ 10,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,654.59	$ 3,654.59
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 846.18	$ 846.18
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	549	m	$ 14.00	$ 7,686.00
20FVSS	Nominal DN150 PVC pipe	651	m	$ 28.00	$ 18,228.00
214VSS	Nominal DN200 PVC pipe	150	m	$ 49.00	$ 7,350.00
219VSS	Nominal DN250 PVC pipe	117	m	$ 63.00	$ 7,371.00
21EVSS	Nominal DN300 PVC pipe	414	m	$ 90.00	$ 37,260.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	549	m	$ 48.40	$ 26,571.60
20FVSS	Nominal DN150 PVC (Trench type B)	651	m	$ 56.40	$ 36,716.40
214VSS	Nominal DN200 PVC (Trench type B)	150	m	$ 63.40	$ 9,510.00
219VSS	Nominal DN250 PVC (Trench type B)	117	m	$ 71.40	$ 8,353.80
21EVSS	Nominal DN300 PVC (Trench type B)	414	m	$ 81.25	$ 33,637.50
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -

HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1881	m	$ 1.00	$ 1,881.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$195,411

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -

HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 15,048.00	$ 15,048.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 318,823.07

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 63,764.61
HW0017	Project Management of Design	$ 22,752.92
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 86,517.54
	Pre construction contingency (30% of B1)	$ 25,955.26
	TOTAL PRE-CONSTRUCTION COST (B)	$ 112,472.80

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 318,823.07
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)	$ 31,882.31
	Sub Total (C1)	$ 350,705.38
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 105,211.61
	TOTAL CONSTRUCTION COST (C)	$ 455,916.99

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 568,389.79

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage K

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,364.00	$ 3,364.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 27,000.00	$ 27,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 6,000.00	$ 6,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,482.20	$ 2,482.20
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 506.76	$ 506.76
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	597	m	$ 14.00	$ 8,358.00
20FVSS	Nominal DN150 PVC pipe	485	m	$ 28.00	$ 13,580.00
21EVSS	Nominal DN300 PVC pipe	193	m	$ 90.00	$ 17,370.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	597	m	$ 48.40	$ 28,894.80
20FVSS	Nominal DN150 PVC (Trench type B)	485	m	$ 56.40	$ 27,354.00
21EVSS	Nominal DN300 PVC (Trench type B)	193	m	$ 81.25	$ 15,681.25
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	

HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1275	m	$ 1.00	$ 1,275.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$113,020

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		

HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 10,200.00	$ 10,200.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 192,066.01

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 38,413.20
HW0017	Project Management of Design	$ 17,682.64
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 56,095.84
	Pre construction contingency (30% of B1)	$ 16,828.75
	TOTAL PRE-CONSTRUCTION COST (B)	$ 72,924.60

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 192,066.01
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)	$ 5,000.00
	Sub Total (C1)	$ 197,066.01
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 59,119.80
	TOTAL CONSTRUCTION COST (C)	$ 256,185.81

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 329,110.41

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage L

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,179.00	$ 3,179.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 20,000.00	$ 20,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 45,000.00	$ 45,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 10,000.00	$ 10,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,389.70	$ 2,389.70
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 333.68	$ 333.68
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	148	m	$ 14.00	$ 2,072.00
20FVSS	Nominal DN150 PVC pipe	308	m	$ 28.00	$ 8,624.00
214VSS	Nominal DN200 PVC pipe	54	m	$ 49.00	$ 2,646.00
219VSS	Nominal DN250 PVC pipe	42	m	$ 63.00	$ 2,646.00
21EVSS	Nominal DN300 PVC pipe	176	m	$ 90.00	$ 15,840.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	148	m	$ 48.40	$ 7,163.20
20FVSS	Nominal DN150 PVC (Trench type B)	308	m	$ 56.40	$ 17,371.20
214VSS	Nominal DN200 PVC (Trench type B)	54	m	$ 63.40	$ 3,423.60
219VSS	Nominal DN250 PVC (Trench type B)	42	m	$ 71.40	$ 2,998.80
21EVSS	Nominal DN300 PVC (Trench type B)	176	m	$ 81.25	$ 14,300.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -

HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	728	m	$ 1.00	$ 728.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$78,146

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -

HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 5,824.00	$ 5,824.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 182,539.18

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 36,507.84
HW0017	Project Management of Design	$ 17,301.57
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 53,809.40
	Pre construction contingency (30% of B1)	$ 16,142.82
	TOTAL PRE-CONSTRUCTION COST (B)	$ 69,952.22

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 182,539.18
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)	$ 5,000.00
	Sub Total (C1)	$ 187,539.18
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 56,261.75
	TOTAL CONSTRUCTION COST (C)	$ 243,800.93

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 313,753.16

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage VC

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 2,927.00	$ 2,927.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 27,000.00	$ 27,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 6,000.00	$ 6,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,263.46	$ 2,263.46
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 399.57	$ 399.57
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	271	m	$ 14.00	$ 3,794.00
20FVSS	Nominal DN150 PVC pipe	368	m	$ 28.00	$ 10,304.00
21EVSS	Nominal DN300 PVC pipe	262	m	$ 90.00	$ 23,580.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	271	m	$ 48.40	$ 13,116.40
20FVSS	Nominal DN150 PVC (Trench type B)	368	m	$ 56.40	$ 20,755.20
21EVSS	Nominal DN300 PVC (Trench type B)	262	m	$ 81.25	$ 21,287.50
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	

HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	901	m	$ 1.00	$ 901.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$94,138

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		

HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 7,208.00	$ 7,208.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 169,536.13

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 33,907.23
HW0017	Project Management of Design	$ 16,781.45
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 50,688.67
	Pre construction contingency (30% of B1)	$ 15,206.60
	TOTAL PRE-CONSTRUCTION COST (B)	$ 65,895.27

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 169,536.13
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)	$ 5,000.00
	Sub Total (C1)	$ 174,536.13
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 52,360.84
	TOTAL CONSTRUCTION COST (C)	$ 226,896.97

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 292,792.24

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage M

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,154.00	$ 3,154.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 16,000.00	$ 16,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 36,000.00	$ 36,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,376.79	$ 2,376.79
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 413.86	$ 413.86
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	287	m	$ 14.00	$ 4,018.00
20FVSS	Nominal DN150 PVC pipe	411	m	$ 28.00	$ 11,508.00
214VSS	Nominal DN200 PVC pipe	165	m	$ 49.00	$ 8,085.00
219VSS	Nominal DN250 PVC pipe	128	m	$ 63.00	$ 8,064.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	287	m	$ 48.40	$ 13,890.80
20FVSS	Nominal DN150 PVC (Trench type B)	411	m	$ 56.40	$ 23,180.40
214VSS	Nominal DN200 PVC (Trench type B)	165	m	$ 63.40	$ 10,461.00
219VSS	Nominal DN250 PVC (Trench type B)	128	m	$ 71.40	$ 9,139.20
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 15.05	

HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 61.95	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 265.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	991	m	$ 1.00	$ 991.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$89,751

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -

HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 7,928.00	$ 7,928.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 181,210.05

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 36,242.01
HW0017	Project Management of Design	$ 17,248.40
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 53,490.41
	Pre construction contingency (30% of B1)	$ 16,047.12
	TOTAL PRE-CONSTRUCTION COST (B)	$ 69,537.54

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 181,210.05
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)	$ 5,000.00
	Sub Total (C1)	$ 186,210.05
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 55,863.02
	TOTAL CONSTRUCTION COST (C)	$ 242,073.07

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 311,610.60

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage N

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 2,562.00	$ 2,562.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 16,000.00	$ 16,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 36,000.00	$ 36,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,081.09	$ 2,081.09
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 294.13	$ 294.13
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	379	m	$ 14.00	$ 5,306.00
20FVSS	Nominal DN150 PVC pipe	240	m	$ 28.00	$ 6,720.00
214VSS	Nominal DN200 PVC pipe	79	m	$ 49.00	$ 3,871.00
219VSS	Nominal DN250 PVC pipe	61	m	$ 63.00	$ 3,843.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	379	m	$ 48.40	$ 18,343.60
20FVSS	Nominal DN150 PVC (Trench type B)	240	m	$ 56.40	$ 13,536.00
214VSS	Nominal DN200 PVC (Trench type B)	79	m	$ 63.40	$ 5,008.60
219VSS	Nominal DN250 PVC (Trench type B)	61	m	$ 71.40	$ 4,355.40
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 15.05	

HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 61.95	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 265.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	759	m	$ 1.00	$ 759.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$62,037

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -

HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 6,072.00	$ 6,072.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 150,751.82

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 30,150.36
HW0017	Project Management of Design	$ 16,030.07
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 46,180.44
	Pre construction contingency (30% of B1)	$ 13,854.13
	TOTAL PRE-CONSTRUCTION COST (B)	$ 60,034.57

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 150,751.82
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)	$ 5,000.00
	Sub Total (C1)	$ 155,751.82
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 46,725.55
	TOTAL CONSTRUCTION COST (C)	$ 202,477.37

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 262,511.93

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage O

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,056.00	$ 3,056.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 16,000.00	$ 16,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 36,000.00	$ 36,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,327.79	$ 2,327.79
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 398.37	$ 398.37
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	472	m	$ 14.00	$ 6,608.00
20FVSS	Nominal DN150 PVC pipe	394	m	$ 28.00	$ 11,032.00
214VSS	Nominal DN200 PVC pipe	94	m	$ 49.00	$ 4,606.00
219VSS	Nominal DN250 PVC pipe	73	m	$ 63.00	$ 4,599.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	472	m	$ 48.40	$ 22,844.80
20FVSS	Nominal DN150 PVC (Trench type B)	394	m	$ 56.40	$ 22,221.60
214VSS	Nominal DN200 PVC (Trench type B)	94	m	$ 63.40	$ 5,959.60
219VSS	Nominal DN250 PVC (Trench type B)	73	m	$ 71.40	$ 5,212.20
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 15.05	

HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 61.95	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 265.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1033	m	$ 1.00	$ 1,033.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$84,515

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -

HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 8,264.00	$ 8,264.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 176,162.36

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 35,232.47
HW0017	Project Management of Design	$ 17,046.49
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 52,278.97
	Pre construction contingency (30% of B1)	$ 15,683.69
	TOTAL PRE-CONSTRUCTION COST (B)	$ 67,962.66

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 176,162.36
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)	$ 5,000.00
	Sub Total (C1)	$ 181,162.36
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 54,348.71
	TOTAL CONSTRUCTION COST (C)	$ 235,511.07

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 303,473.72

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage P

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 2,554.00	$ 2,554.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,077.05	$ 2,077.05
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 431.24	$ 431.24
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	898	m	$ 14.00	$ 12,572.00
20FVSS	Nominal DN150 PVC pipe	355	m	$ 28.00	$ 9,940.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	898	m	$ 48.40	$ 43,463.20
20FVSS	Nominal DN150 PVC (Trench type B)	355	m	$ 56.40	$ 20,022.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1253	m	$ 1.00	$ 1,253.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$87,681

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 10,024.00	$ 10,024.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 150,336.49

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 30,067.30
HW0017	Project Management of Design	$ 16,013.46
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 46,080.76
	Pre construction contingency (30% of B1)	$ 13,824.23
	TOTAL PRE-CONSTRUCTION COST (B)	$ 59,904.98

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 150,336.49
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)	$ 5,000.00
	Sub Total (C1)	$ 155,336.49
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 46,600.95
	TOTAL CONSTRUCTION COST (C)	$ 201,937.44

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 261,842.42

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage Q

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 2,553.00	$ 2,553.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 16,000.00	$ 16,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 36,000.00	$ 36,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,076.69	$ 2,076.69
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 282.85	$ 282.85
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	173	m	$ 14.00	$ 2,422.00
20FVSS	Nominal DN150 PVC pipe	477	m	$ 28.00	$ 13,356.00
214VSS	Nominal DN200 PVC pipe	45	m	$ 49.00	$ 2,205.00
219VSS	Nominal DN250 PVC pipe	35	m	$ 63.00	$ 2,205.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	173	m	$ 48.40	$ 8,373.20
20FVSS	Nominal DN150 PVC (Trench type B)	477	m	$ 56.40	$ 26,902.80
214VSS	Nominal DN200 PVC (Trench type B)	45	m	$ 63.40	$ 2,853.00
219VSS	Nominal DN250 PVC (Trench type B)	35	m	$ 71.40	$ 2,499.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 15.05	

HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 61.95	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 265.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	730	m	$ 1.00	$ 730.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$61,829

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -

HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 5,840.00	$ 5,840.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 150,298.54

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 30,059.71
HW0017	Project Management of Design	$ 16,011.94
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 46,071.65
	Pre construction contingency (30% of B1)	$ 13,821.49
	TOTAL PRE-CONSTRUCTION COST (B)	$ 59,893.14

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 150,298.54
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)	$ 5,000.00
	Sub Total (C1)	$ 155,298.54
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 46,589.56
	TOTAL CONSTRUCTION COST (C)	$ 201,888.10

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 261,781.25

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage R

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,316.00	$ 3,316.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 16,000.00	$ 16,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 36,000.00	$ 36,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,457.94	$ 2,457.94
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 456.02	$ 456.02
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	602	m	$ 14.00	$ 8,428.00
20FVSS	Nominal DN150 PVC pipe	446	m	$ 28.00	$ 12,488.00
214VSS	Nominal DN200 PVC pipe	89	m	$ 49.00	$ 4,361.00
219VSS	Nominal DN250 PVC pipe	69	m	$ 63.00	$ 4,347.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	602	m	$ 48.40	$ 29,136.80
20FVSS	Nominal DN150 PVC (Trench type B)	446	m	$ 56.40	$ 25,154.40
214VSS	Nominal DN200 PVC (Trench type B)	89	m	$ 63.40	$ 5,642.60
219VSS	Nominal DN250 PVC (Trench type B)	69	m	$ 71.40	$ 4,926.60
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 15.05	

HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 61.95	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 265.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1206	m	$ 1.00	$ 1,206.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$96,146

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -

HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 9,648.00	$ 9,648.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 189,568.36

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 37,913.67
HW0017	Project Management of Design	$ 17,582.73
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 55,496.41
	Pre construction contingency (30% of B1)	$ 16,648.92
	TOTAL PRE-CONSTRUCTION COST (B)	$ 72,145.33

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 189,568.36
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)	$ 5,000.00
	Sub Total (C1)	$ 194,568.36
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 58,370.51
	TOTAL CONSTRUCTION COST (C)	$ 252,938.87

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 325,084.20

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage S

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,267.00	$ 3,267.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 16,000.00	$ 16,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 36,000.00	$ 36,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,433.61	$ 2,433.61
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 442.78	$ 442.78
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	469	m	$ 14.00	$ 6,566.00
20FVSS	Nominal DN150 PVC pipe	408	m	$ 28.00	$ 11,424.00
214VSS	Nominal DN200 PVC pipe	134	m	$ 49.00	$ 6,566.00
219VSS	Nominal DN250 PVC pipe	105	m	$ 63.00	$ 6,615.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	469	m	$ 48.40	$ 22,699.60
20FVSS	Nominal DN150 PVC (Trench type B)	408	m	$ 56.40	$ 23,011.20
214VSS	Nominal DN200 PVC (Trench type B)	134	m	$ 63.40	$ 8,495.60
219VSS	Nominal DN250 PVC (Trench type B)	105	m	$ 71.40	$ 7,497.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 15.05	

HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 61.95	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 265.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1116	m	$ 1.00	$ 1,116.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$94,433

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -

HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 8,928.00	$ 8,928.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 187,061.79

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 37,412.36
HW0017	Project Management of Design	$ 17,482.47
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 54,894.83
	Pre construction contingency (30% of B1)	$ 16,468.45
	TOTAL PRE-CONSTRUCTION COST (B)	$ 71,363.28

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 187,061.79
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)	$ 5,000.00
	Sub Total (C1)	$ 192,061.79
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 57,618.54
	TOTAL CONSTRUCTION COST (C)	$ 249,680.33

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 321,043.61

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage T

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 662.00	$ 662.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 3,000.00	$ 3,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 3,000.00	$ 3,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 2,000.00	$ 2,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 1,130.90	$ 1,130.90
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 65.00	$ 65.00
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
21EVSS	Nominal DN300 PVC pipe	100	m	$ 90.00	$ 9,000.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
21EVSS	Nominal DN300 PVC (Trench type B)	100	m	$ 81.25	$ 8,125.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	

HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	100	m	$ 1.00	$ 100.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$17,290

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		

HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 800.00	$ 800.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 40,882.90

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 8,176.58
HW0017	Project Management of Design	$ 11,635.32
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 19,811.90
	Pre construction contingency (30% of B1)	$ 5,943.57
	TOTAL PRE-CONSTRUCTION COST (B)	$ 25,755.46

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 40,882.90
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)	$ 5,000.00
	Sub Total (C1)	$ 45,882.90
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 13,764.87
	TOTAL CONSTRUCTION COST (C)	$ 59,647.77

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 85,403.23

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage U

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,722.00	$ 3,722.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 16,000.00	$ 16,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 36,000.00	$ 36,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,660.96	$ 2,660.96
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 546.24	$ 546.24
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	725	m	$ 14.00	$ 10,150.00
20FVSS	Nominal DN150 PVC pipe	379	m	$ 28.00	$ 10,612.00
214VSS	Nominal DN200 PVC pipe	165	m	$ 49.00	$ 8,085.00
219VSS	Nominal DN250 PVC pipe	128	m	$ 63.00	$ 8,064.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	725	m	$ 48.40	$ 35,090.00
20FVSS	Nominal DN150 PVC (Trench type B)	379	m	$ 56.40	$ 21,375.60
214VSS	Nominal DN200 PVC (Trench type B)	165	m	$ 63.40	$ 10,461.00
219VSS	Nominal DN250 PVC (Trench type B)	128	m	$ 71.40	$ 9,139.20
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 15.05	

HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 61.95	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 265.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1397	m	$ 1.00	$ 1,397.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$114,920

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -

HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 11,176.00	$ 11,176.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 210,479.00

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 42,095.80
HW0017	Project Management of Design	$ 18,419.16
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 60,514.96
	Pre construction contingency (30% of B1)	$ 18,154.49
	TOTAL PRE-CONSTRUCTION COST (B)	$ 78,669.45

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 210,479.00
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)	$ 5,000.00
	Sub Total (C1)	$ 215,479.00
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 64,643.70
	TOTAL CONSTRUCTION COST (C)	$ 280,122.70

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 358,792.15

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage V

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 662.00	$ 662.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 3,000.00	$ 3,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 3,000.00	$ 3,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 2,000.00	$ 2,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 1,130.90	$ 1,130.90
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 65.00	$ 65.00
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
21EVSS	Nominal DN300 PVC pipe	100	m	$ 90.00	$ 9,000.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
21EVSS	Nominal DN300 PVC (Trench type B)	100	m	$ 81.25	$ 8,125.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	

HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	100	m	$ 1.00	$ 100.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$17,290

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		

HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 800.00	$ 800.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 40,882.90

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 8,176.58
HW0017	Project Management of Design	$ 11,635.32
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 19,811.90
	Pre construction contingency (30% of B1)	$ 5,943.57
	TOTAL PRE-CONSTRUCTION COST (B)	$ 25,755.46

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 40,882.90
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)	$ 5,000.00
	Sub Total (C1)	$ 45,882.90
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 13,764.87
	TOTAL CONSTRUCTION COST (C)	$ 59,647.77

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 85,403.23

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage W

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,011.00	$ 3,011.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 16,000.00	$ 16,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 36,000.00	$ 36,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,305.56	$ 2,305.56
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 392.59	$ 392.59
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	532	m	$ 14.00	$ 7,448.00
20FVSS	Nominal DN150 PVC pipe	271	m	$ 28.00	$ 7,588.00
214VSS	Nominal DN200 PVC pipe	115	m	$ 49.00	$ 5,635.00
219VSS	Nominal DN250 PVC pipe	90	m	$ 63.00	$ 5,670.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	532	m	$ 48.40	$ 25,748.80
20FVSS	Nominal DN150 PVC (Trench type B)	271	m	$ 56.40	$ 15,284.40
214VSS	Nominal DN200 PVC (Trench type B)	115	m	$ 63.40	$ 7,291.00
219VSS	Nominal DN250 PVC (Trench type B)	90	m	$ 71.40	$ 6,426.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 15.05	

HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 61.95	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 265.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1008	m	$ 1.00	$ 1,008.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$82,492

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -

HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 8,064.00	$ 8,064.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 173,872.35

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 34,774.47
HW0017	Project Management of Design	$ 16,954.89
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 51,729.36
	Pre construction contingency (30% of B1)	$ 15,518.81
	TOTAL PRE-CONSTRUCTION COST (B)	$ 67,248.17

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 173,872.35
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)	$ 5,000.00
	Sub Total (C1)	$ 178,872.35
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 53,661.71
	TOTAL CONSTRUCTION COST (C)	$ 232,534.06

	TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 299,782.23

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage X

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,115.00	$ 3,115.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,357.36	$ 2,357.36
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 512.85	$ 512.85
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	845	m	$ 14.00	$ 11,830.00
21EVSS	Nominal DN300 PVC pipe	360	m	$ 90.00	$ 32,400.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	845	m	$ 48.40	$ 40,898.00
21EVSS	Nominal DN300 PVC (Trench type B)	360	m	$ 81.25	$ 29,250.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1205	m	$ 1.00	$ 1,205.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$116,096

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 9,640.00	$ 9,640.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 179,208.21

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 35,841.64
HW0017	Project Management of Design	$ 17,168.33
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 53,009.97
	Pre construction contingency (30% of B1)	$ 15,902.99
	TOTAL PRE-CONSTRUCTION COST (B)	$ 68,912.96

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 179,208.21
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)	$ 5,000.00
	Sub Total (C1)	$ 184,208.21
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 55,262.46
	TOTAL CONSTRUCTION COST (C)	$ 239,470.67

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 308,383.63

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage Y

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 2,427.00	$ 2,427.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,013.73	$ 2,013.73
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 367.70	$ 367.70
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	545	m	$ 14.00	$ 7,630.00
21EVSS	Nominal DN300 PVC pipe	289	m	$ 90.00	$ 26,010.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	545	m	$ 48.40	$ 26,378.00
21EVSS	Nominal DN300 PVC (Trench type B)	289	m	$ 81.25	$ 23,481.25
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	834	m	$ 1.00	$ 834.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$84,701

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 6,672.00	$ 6,672.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 143,813.68

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 28,762.74
HW0017	Project Management of Design	$ 15,752.55
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 44,515.28
	Pre construction contingency (30% of B1)	$ 13,354.58
	TOTAL PRE-CONSTRUCTION COST (B)	$ 57,869.87

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 143,813.68
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)	$ 5,000.00
	Sub Total (C1)	$ 148,813.68
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 44,644.10
	TOTAL CONSTRUCTION COST (C)	$ 193,457.78

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 251,327.65

PROJECT DESCRIPTION: North Tuncurry Development Project - Potable Water - Stage Z

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 2,928.00	$ 2,928.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,263.84	$ 2,263.84
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 460.53	$ 460.53
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	586	m	$ 14.00	$ 8,204.00
21EVSS	Nominal DN300 PVC pipe	411	m	$ 90.00	$ 36,990.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	586	m	$ 48.40	$ 28,362.40
21EVSS	Nominal DN300 PVC (Trench type B)	411	m	$ 81.25	$ 33,393.75
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	997	m	$ 1.00	$ 997.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$108,408

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 7,976.00	$ 7,976.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 169,575.52

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 33,915.10
HW0017	Project Management of Design	$ 16,783.02
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 50,698.12
	Pre construction contingency (30% of B1)	$ 15,209.44
	TOTAL PRE-CONSTRUCTION COST (B)	$ 65,907.56

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 169,575.52
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)	$ 5,000.00
	Sub Total (C1)	$ 174,575.52
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 52,372.66
	TOTAL CONSTRUCTION COST (C)	$ 226,948.18

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 292,855.74

NORTH TUNCURRY DEVELOPMENT PROJECT - ALTERNATIVE WATER SUPPLY OPTIONS COMPARISON

Capital cost of the Potable Water and Recycled Water Reticulation Network and Connections

(Option B)

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage A

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 8,921.00	$ 8,921.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 15,000.00	$ 15,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 15,000.00	$ 15,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 27,000.00	$ 27,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 6,000.00	$ 6,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 5,260.33	$ 5,260.33
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 1,764.67	$ 1,764.67
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	2819	m	$ 14.00	$ 39,466.00
20FVSS	Nominal DN150 PVC pipe	1080	m	$ 28.00	$ 30,240.00
214VSS	Nominal DN200 PVC pipe	800	m	$ 49.00	$ 39,200.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	2819	m	$ 48.40	$ 136,439.60
20FVSS	Nominal DN150 PVC (Trench type B)	1080	m	$ 56.40	$ 60,912.00
214VSS	Nominal DN200 PVC (Trench type B)	800	m	$ 63.40	$ 50,720.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 13.52	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 55.65	

HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 238.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	4699	m	$ 1.00	$ 4,699.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$363,441

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		

HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 37,592.00	$ 37,592.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 490,214.60

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 98,042.92
HW0017	Project Management of Design	$ 29,608.58
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 127,651.50
	Pre construction contingency (30% of B1)	$ 38,295.45
	TOTAL PRE-CONSTRUCTION COST (B)	$ 165,946.96

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 490,214.60
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)	$ 49,021.46
	Sub Total (C1)	$ 539,236.06
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 161,770.82
	TOTAL CONSTRUCTION COST (C)	$ 701,006.88

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 866,953.83

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage B

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,338.00	$ 3,338.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 2,000.00	$ 2,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,469.24	$ 2,469.24
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 698.94	$ 698.94
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	2118	m	$ 14.00	$ 29,652.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	2118	m	$ 48.40	$ 102,511.20
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 8.42	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 34.65	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 148.50	

HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2118	m	$ 1.00	$ 2,118.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$134,980

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		

HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 16,944.00	$ 16,944.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 190,731.38

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 38,146.28
HW0017	Project Management of Design	$ 17,629.26
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 55,775.53
	Pre construction contingency (30% of B1)	$ 16,732.66
	TOTAL PRE-CONSTRUCTION COST (B)	$ 72,508.19

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 190,731.38
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)	$ 5,000.00
	Sub Total (C1)	$ 195,731.38
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 58,719.41
	TOTAL CONSTRUCTION COST (C)	$ 254,450.79

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 326,958.98

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage C

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 6,421.00	$ 6,421.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 15,000.00	$ 15,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 15,000.00	$ 15,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 4,010.29	$ 4,010.29
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 1,307.73	$ 1,307.73
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	3265	m	$ 14.00	$ 45,710.00
20FVSS	Nominal DN150 PVC pipe	606	m	$ 28.00	$ 16,968.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	3265	m	$ 48.40	$ 158,026.00
20FVSS	Nominal DN150 PVC (Trench type B)	606	m	$ 56.40	$ 34,178.40
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	3871	m	$ 1.00	$ 3,871.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$260,061

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 30,968.00	$ 30,968.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 361,460.42

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 72,292.08
HW0017	Project Management of Design	$ 24,458.42
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 96,750.50
	Pre construction contingency (30% of B1)	$ 29,025.15
	TOTAL PRE-CONSTRUCTION COST (B)	$ 125,775.65

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 361,460.42
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)	$ 36,146.04
	Sub Total (C1)	$ 397,606.46
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 119,281.94
	TOTAL CONSTRUCTION COST (C)	$ 516,888.40

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 642,664.05

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage D

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,578.00	$ 3,578.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,588.79	$ 2,588.79
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 673.46	$ 673.46
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1784	m	$ 14.00	$ 24,976.00
20FVSS	Nominal DN150 PVC pipe	223	m	$ 28.00	$ 6,244.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1784	m	$ 48.40	$ 86,345.60
20FVSS	Nominal DN150 PVC (Trench type B)	223	m	$ 56.40	$ 12,577.20
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2007	m	$ 1.00	$ 2,007.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$132,823

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 16,056.00	$ 16,056.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 203,046.05

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 40,609.21
HW0017	Project Management of Design	$ 18,121.84
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 58,731.05
	Pre construction contingency (30% of B1)	$ 17,619.32
	TOTAL PRE-CONSTRUCTION COST (B)	$ 76,350.37

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 203,046.05
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)	$ 5,000.00
	Sub Total (C1)	$ 208,046.05
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 62,413.82
	TOTAL CONSTRUCTION COST (C)	$ 270,459.87

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 346,810.23

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage E

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 2,980.00	$ 2,980.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,290.20	$ 2,290.20
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 527.60	$ 527.60
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1152	m	$ 14.00	$ 16,128.00
20FVSS	Nominal DN150 PVC pipe	388	m	$ 28.00	$ 10,864.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1152	m	$ 48.40	$ 55,756.80
20FVSS	Nominal DN150 PVC (Trench type B)	388	m	$ 56.40	$ 21,883.20
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1540	m	$ 1.00	$ 1,540.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$106,700

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 12,320.00	$ 12,320.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 172,289.80

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 34,457.96
HW0017	Project Management of Design	$ 16,891.59
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 51,349.55
	Pre construction contingency (30% of B1)	$ 15,404.87
	TOTAL PRE-CONSTRUCTION COST (B)	$ 66,754.42

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 172,289.80
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)	$ 5,000.00
	Sub Total (C1)	$ 177,289.80
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 53,186.94
	TOTAL CONSTRUCTION COST (C)	$ 230,476.74

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 297,231.16

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage F

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 4,554.00	$ 4,554.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,076.87	$ 3,076.87
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 879.69	$ 879.69
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1999	m	$ 14.00	$ 27,986.00
20FVSS	Nominal DN150 PVC pipe	579	m	$ 28.00	$ 16,212.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1999	m	$ 48.40	$ 96,751.60
20FVSS	Nominal DN150 PVC (Trench type B)	579	m	$ 56.40	$ 32,655.60
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2578	m	$ 1.00	$ 2,578.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$177,063

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 20,624.00	$ 20,624.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 259,317.76

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 51,863.55
HW0017	Project Management of Design	$ 20,372.71
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 72,236.26
	Pre construction contingency (30% of B1)	$ 21,670.88
	TOTAL PRE-CONSTRUCTION COST (B)	$ 93,907.14

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 259,317.76
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)	$ 25,931.78
	Sub Total (C1)	$ 285,249.54
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 85,574.86
	TOTAL CONSTRUCTION COST (C)	$ 370,824.40

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 464,731.54

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage G

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 4,653.00	$ 4,653.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,126.27	$ 3,126.27
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 894.24	$ 894.24
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1860	m	$ 14.00	$ 26,040.00
20FVSS	Nominal DN150 PVC pipe	738	m	$ 28.00	$ 20,664.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1860	m	$ 48.40	$ 90,024.00
20FVSS	Nominal DN150 PVC (Trench type B)	738	m	$ 56.40	$ 41,623.20
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2598	m	$ 1.00	$ 2,598.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$181,843

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 20,784.00	$ 20,784.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 264,406.71

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 52,881.34
HW0017	Project Management of Design	$ 20,576.27
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 73,457.61
	Pre construction contingency (30% of B1)	$ 22,037.28
	TOTAL PRE-CONSTRUCTION COST (B)	$ 95,494.89

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 264,406.71
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)	$ 26,440.67
	Sub Total (C1)	$ 290,847.38
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 87,254.21
	TOTAL CONSTRUCTION COST (C)	$ 378,101.60

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 473,596.49

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage H

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 5,463.00	$ 5,463.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,531.50	$ 3,531.50
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 1,083.19	$ 1,083.19
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	2489	m	$ 14.00	$ 34,846.00
20FVSS	Nominal DN150 PVC pipe	689	m	$ 28.00	$ 19,292.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	2489	m	$ 48.40	$ 120,467.60
20FVSS	Nominal DN150 PVC (Trench type B)	689	m	$ 56.40	$ 38,859.60
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	3178	m	$ 1.00	$ 3,178.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$217,726

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 25,424.00	$ 25,424.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 306,144.89

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 61,228.98
HW0017	Project Management of Design	$ 22,245.80
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 83,474.77
	Pre construction contingency (30% of B1)	$ 25,042.43
	TOTAL PRE-CONSTRUCTION COST (B)	$ 108,517.21

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 306,144.89
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)	$ 30,614.49
	Sub Total (C1)	$ 336,759.38
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 101,027.81
	TOTAL CONSTRUCTION COST (C)	$ 437,787.19

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 546,304.40

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage I

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 4,948.00	$ 4,948.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,274.10	$ 3,274.10
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 963.07	$ 963.07
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	2087	m	$ 14.00	$ 29,218.00
20FVSS	Nominal DN150 PVC pipe	722	m	$ 28.00	$ 20,216.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	2087	m	$ 48.40	$ 101,010.80
20FVSS	Nominal DN150 PVC (Trench type B)	722	m	$ 56.40	$ 40,720.80
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2809	m	$ 1.00	$ 2,809.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$194,938

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 22,472.00	$ 22,472.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 279,631.77

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 55,926.35
HW0017	Project Management of Design	$ 21,185.27
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 77,111.62
	Pre construction contingency (30% of B1)	$ 23,133.49
	TOTAL PRE-CONSTRUCTION COST (B)	$ 100,245.11

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 279,631.77
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)	$ 27,963.18
	Sub Total (C1)	$ 307,594.95
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 92,278.48
	TOTAL CONSTRUCTION COST (C)	$ 399,873.43

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 500,118.54

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage J

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 6,465.00	$ 6,465.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 15,000.00	$ 15,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 15,000.00	$ 15,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 4,032.65	$ 4,032.65
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 1,294.56	$ 1,294.56
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	2700	m	$ 14.00	$ 37,800.00
20FVSS	Nominal DN150 PVC pipe	1062	m	$ 28.00	$ 29,736.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	2700	m	$ 48.40	$ 130,680.00
20FVSS	Nominal DN150 PVC (Trench type B)	1062	m	$ 56.40	$ 59,896.80
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	3762	m	$ 1.00	$ 3,762.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$263,169

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 30,096.00	$ 30,096.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 363,763.01

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 72,752.60
HW0017	Project Management of Design	$ 24,550.52
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 97,303.12
	Pre construction contingency (30% of B1)	$ 29,190.94
	TOTAL PRE-CONSTRUCTION COST (B)	$ 126,494.06

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 363,763.01
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)	$ 36,376.30
	Sub Total (C1)	$ 400,139.31
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 120,041.79
	TOTAL CONSTRUCTION COST (C)	$ 520,181.10

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 646,675.16

PROJECT DESCRIPTION: North Tuncurry Development - Potable Water & Recycled - Stage K

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 4,428.00	$ 4,428.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,014.23	$ 3,014.23
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 860.80	$ 860.80
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	2164	m	$ 14.00	$ 30,296.00
20FVSS	Nominal DN150 PVC pipe	386	m	$ 28.00	$ 10,808.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	2164	m	$ 48.40	$ 104,737.60
20FVSS	Nominal DN150 PVC (Trench type B)	386	m	$ 56.40	$ 21,770.40
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2550	m	$ 1.00	$ 2,550.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$171,023

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 20,400.00	$ 20,400.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 252,865.03

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 50,573.01
HW0017	Project Management of Design	$ 20,114.60
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 70,687.61
	Pre construction contingency (30% of B1)	$ 21,206.28
	TOTAL PRE-CONSTRUCTION COST (B)	$ 91,893.89

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 252,865.03
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)		$ 25,286.50
	Sub Total (C1)		$ 278,151.53
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 83,445.46
	TOTAL CONSTRUCTION COST (C)		$ 361,596.99

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 453,490.88

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage L

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 2,878.00	$ 2,878.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,238.87	$ 2,238.87
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 501.57	$ 501.57
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1019	m	$ 14.00	$ 14,266.00
20FVSS	Nominal DN150 PVC pipe	435	m	$ 28.00	$ 12,180.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1019	m	$ 48.40	$ 49,319.60
20FVSS	Nominal DN150 PVC (Trench type B)	435	m	$ 56.40	$ 24,534.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1454	m	$ 1.00	$ 1,454.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$102,255

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 11,632.00	$ 11,632.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 167,004.04

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 33,400.81
HW0017	Project Management of Design	$ 16,680.16
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 50,080.97
	Pre construction contingency (30% of B1)	$ 15,024.29
	TOTAL PRE-CONSTRUCTION COST (B)	$ 65,105.26

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 167,004.04
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)	$ 5,000.00
	Sub Total (C1)	$ 172,004.04
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 51,601.21
	TOTAL CONSTRUCTION COST (C)	$ 223,605.25

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 288,710.51

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage VC

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,418.00	$ 3,418.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,508.83	$ 2,508.83
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 621.19	$ 621.19
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1279	m	$ 14.00	$ 17,906.00
20FVSS	Nominal DN150 PVC pipe	524	m	$ 28.00	$ 14,672.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1279	m	$ 48.40	$ 61,903.60
20FVSS	Nominal DN150 PVC (Trench type B)	524	m	$ 56.40	$ 29,553.60
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1803	m	$ 1.00	$ 1,803.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$126,459

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 14,424.00	$ 14,424.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 194,810.22

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 38,962.04
HW0017	Project Management of Design	$ 17,792.41
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 56,754.45
	Pre construction contingency (30% of B1)	$ 17,026.34
	TOTAL PRE-CONSTRUCTION COST (B)	$ 73,780.79

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 194,810.22
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)	$ 5,000.00
	Sub Total (C1)	$ 199,810.22
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 59,943.07
	TOTAL CONSTRUCTION COST (C)	$ 259,753.29

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 333,534.07

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage M

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,558.00	$ 3,558.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,579.07	$ 2,579.07
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 667.24	$ 667.24
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1726	m	$ 14.00	$ 24,164.00
20FVSS	Nominal DN150 PVC pipe	257	m	$ 28.00	$ 7,196.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1726	m	$ 48.40	$ 83,538.40
20FVSS	Nominal DN150 PVC (Trench type B)	257	m	$ 56.40	$ 14,494.80
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1983	m	$ 1.00	$ 1,983.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$132,043

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 15,864.00	$ 15,864.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 202,044.51

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 40,408.90
HW0017	Project Management of Design	$ 18,081.78
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 58,490.68
	Pre construction contingency (30% of B1)	$ 17,547.20
	TOTAL PRE-CONSTRUCTION COST (B)	$ 76,037.89

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 202,044.51
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)	$ 5,000.00
	Sub Total (C1)	$ 207,044.51
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 62,113.35
	TOTAL CONSTRUCTION COST (C)	$ 269,157.86

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 345,195.75

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage N

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 2,832.00	$ 2,832.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,215.98	$ 2,215.98
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 507.09	$ 507.09
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1395	m	$ 14.00	$ 19,530.00
20FVSS	Nominal DN150 PVC pipe	123	m	$ 28.00	$ 3,444.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1395	m	$ 48.40	$ 67,518.00
20FVSS	Nominal DN150 PVC (Trench type B)	123	m	$ 56.40	$ 6,937.20
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1518	m	$ 1.00	$ 1,518.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$99,454

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 12,144.00	$ 12,144.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 164,646.27

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 32,929.25
HW0017	Project Management of Design	$ 16,585.85
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 49,515.10
	Pre construction contingency (30% of B1)	$ 14,854.53
	TOTAL PRE-CONSTRUCTION COST (B)	$ 64,369.64

C.	**CONSTRUCTION COST**		
	Total Estimated Contract Award Sum (A)		$ 164,646.27
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)		$ 5,000.00
	Sub Total (C1)		$ 169,646.27
	Construction contingency (Table 12) (30% of C1)	Preliminary Estimate	$ 50,893.88
	TOTAL CONSTRUCTION COST (C)		$ 220,540.15

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 284,909.79

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage O

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,630.00	$ 3,630.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,615.07	$ 2,615.07
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 689.46	$ 689.46
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1920	m	$ 14.00	$ 26,880.00
20FVSS	Nominal DN150 PVC pipe	147	m	$ 28.00	$ 4,116.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1920	m	$ 48.40	$ 92,928.00
20FVSS	Nominal DN150 PVC (Trench type B)	147	m	$ 56.40	$ 8,290.80
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2067	m	$ 1.00	$ 2,067.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$134,971

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 16,536.00	$ 16,536.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 205,752.33

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 41,150.47
HW0017	Project Management of Design	$ 18,230.09
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 59,380.56
	Pre construction contingency (30% of B1)	$ 17,814.17
	TOTAL PRE-CONSTRUCTION COST (B)	$ 77,194.73

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 205,752.33
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)	$ 5,000.00
	Sub Total (C1)	$ 210,752.33
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 63,225.70
	TOTAL CONSTRUCTION COST (C)	$ 273,978.03

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 351,172.76

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage P

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,895.00	$ 3,895.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 2,000.00	$ 2,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,747.55	$ 2,747.55
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 826.98	$ 826.98
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	2506	m	$ 14.00	$ 35,084.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	2506	m	$ 48.40	$ 121,290.40
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 8.42	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 34.65	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 148.50	

HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2506	m	$ 1.00	$ 2,506.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$159,707

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		

HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 20,048.00	$ 20,048.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 219,397.93

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 43,879.59
HW0017	Project Management of Design	$ 18,775.92
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 62,655.50
	Pre construction contingency (30% of B1)	$ 18,796.65
	TOTAL PRE-CONSTRUCTION COST (B)	$ 81,452.15

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 219,397.93
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)	$ 5,000.00
	Sub Total (C1)	$ 224,397.93
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 67,319.38
	TOTAL CONSTRUCTION COST (C)	$ 291,717.31

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 373,169.46

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage Q

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 2,724.00	$ 2,724.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,161.98	$ 2,161.98
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 484.97	$ 484.97
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1389	m	$ 14.00	$ 19,446.00
20FVSS	Nominal DN150 PVC pipe	70	m	$ 28.00	$ 1,960.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1389	m	$ 48.40	$ 67,227.60
20FVSS	Nominal DN150 PVC (Trench type B)	70	m	$ 56.40	$ 3,948.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1459	m	$ 1.00	$ 1,459.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$94,526

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 11,672.00	$ 11,672.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 159,083.55

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 31,816.71
HW0017	Project Management of Design	$ 16,363.34
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 48,180.05
	Pre construction contingency (30% of B1)	$ 14,454.02
	TOTAL PRE-CONSTRUCTION COST (B)	$ 62,634.07

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 159,083.55
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)	$ 5,000.00
	Sub Total (C1)	$ 164,083.55
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 49,225.07
	TOTAL CONSTRUCTION COST (C)	$ 213,308.62

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 275,942.68

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage R

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 4,120.00	$ 4,120.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,859.84	$ 2,859.84
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 802.53	$ 802.53
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	2273	m	$ 14.00	$ 31,822.00
20FVSS	Nominal DN150 PVC pipe	138	m	$ 28.00	$ 3,864.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	2273	m	$ 48.40	$ 110,013.20
20FVSS	Nominal DN150 PVC (Trench type B)	138	m	$ 56.40	$ 7,783.20
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2411	m	$ 1.00	$ 2,411.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$156,696

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 19,288.00	$ 19,288.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 236,963.77

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 47,392.75
HW0017	Project Management of Design	$ 19,478.55
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 66,871.30
	Pre construction contingency (30% of B1)	$ 20,061.39
	TOTAL PRE-CONSTRUCTION COST (B)	$ 86,932.70

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 236,963.77
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)	$ 5,000.00
	Sub Total (C1)	$ 241,963.77
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 72,589.13
	TOTAL CONSTRUCTION COST (C)	$ 314,552.90

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 401,485.60

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage S

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,896.00	$ 3,896.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,747.82	$ 2,747.82
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 747.34	$ 747.34
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	2024	m	$ 14.00	$ 28,336.00
20FVSS	Nominal DN150 PVC pipe	209	m	$ 28.00	$ 5,852.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	2024	m	$ 48.40	$ 97,961.60
20FVSS	Nominal DN150 PVC (Trench type B)	209	m	$ 56.40	$ 11,787.60
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2233	m	$ 1.00	$ 2,233.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$146,918

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 17,864.00	$ 17,864.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 219,425.36

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 43,885.07
HW0017	Project Management of Design	$ 18,777.01
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 62,662.09
	Pre construction contingency (30% of B1)	$ 18,798.63
	TOTAL PRE-CONSTRUCTION COST (B)	$ 81,460.71

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 219,425.36
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)	$ 5,000.00
	Sub Total (C1)	$ 224,425.36
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 67,327.61
	TOTAL CONSTRUCTION COST (C)	$ 291,752.97

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 373,213.68

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage T

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 675.00	$ 675.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 3,000.00	$ 3,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 3,000.00	$ 3,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 2,000.00	$ 2,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 1,137.56	$ 1,137.56
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 76.00	$ 76.00
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20FVSS	Nominal DN150 PVC pipe	200	m	$ 28.00	$ 5,600.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20FVSS	Nominal DN150 PVC (Trench type B)	200	m	$ 56.40	$ 11,280.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	

HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	200	m	$ 1.00	$ 200.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$17,156

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		

HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 1,600.00	$ 1,600.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 41,568.56

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 8,313.71
HW0017	Project Management of Design	$ 11,662.74
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 19,976.45
	Pre construction contingency (30% of B1)	$ 5,992.94
	TOTAL PRE-CONSTRUCTION COST (B)	$ 25,969.39

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 41,568.56
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)	$ 5,000.00
	Sub Total (C1)	$ 46,568.56
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 13,970.57
	TOTAL CONSTRUCTION COST (C)	$ 60,539.13

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 86,508.52

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage U

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 4,723.00	$ 4,723.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,161.52	$ 3,161.52
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 935.20	$ 935.20
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	2538	m	$ 14.00	$ 35,532.00
20FVSS	Nominal DN150 PVC pipe	257	m	$ 28.00	$ 7,196.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	2538	m	$ 48.40	$ 122,839.20
20FVSS	Nominal DN150 PVC (Trench type B)	257	m	$ 56.40	$ 14,494.80
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2795	m	$ 1.00	$ 2,795.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$183,792

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 22,360.00	$ 22,360.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 268,036.72

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 53,607.34
HW0017	Project Management of Design	$ 20,721.47
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 74,328.81
	Pre construction contingency (30% of B1)	$ 22,298.64
	TOTAL PRE-CONSTRUCTION COST (B)	$ 96,627.46

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 268,036.72
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)	$ 26,803.67
	Sub Total (C1)	$ 294,840.39
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 88,452.12
	TOTAL CONSTRUCTION COST (C)	$ 383,292.51

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 479,919.97

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage V

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 675.00	$ 675.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 3,000.00	$ 3,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 3,000.00	$ 3,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 2,000.00	$ 2,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 1,137.56	$ 1,137.56
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 76.00	$ 76.00
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20FVSS	Nominal DN150 PVC pipe	200	m	$ 28.00	$ 5,600.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20FVSS	Nominal DN150 PVC (Trench type B)	200	m	$ 56.40	$ 11,280.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		
HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	

HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	200	m	$ 1.00	$ 200.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$17,156

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		

HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 1,600.00	$ 1,600.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 41,568.56

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 8,313.71
HW0017	Project Management of Design	$ 11,662.74
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 19,976.45
	Pre construction contingency (30% of B1)	$ 5,992.94
	TOTAL PRE-CONSTRUCTION COST (B)	$ 25,969.39

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 41,568.56
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)	$ 5,000.00
	Sub Total (C1)	$ 46,568.56
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 13,970.57
	TOTAL CONSTRUCTION COST (C)	$ 60,539.13

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 86,508.52

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage W

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 3,568.00	$ 3,568.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,584.11	$ 2,584.11
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 673.57	$ 673.57
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1835	m	$ 14.00	$ 25,690.00
20FVSS	Nominal DN150 PVC pipe	179	m	$ 28.00	$ 5,012.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1835	m	$ 48.40	$ 88,814.00
20FVSS	Nominal DN150 PVC (Trench type B)	179	m	$ 56.40	$ 10,095.60
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 9.69	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 39.90	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 171.00	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2014	m	$ 1.00	$ 2,014.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$132,299

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 16,112.00	$ 16,112.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 202,563.28

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 40,512.66
HW0017	Project Management of Design	$ 18,102.53
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 58,615.19
	Pre construction contingency (30% of B1)	$ 17,584.56
	TOTAL PRE-CONSTRUCTION COST (B)	$ 76,199.74

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 202,563.28
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)	$ 5,000.00
	Sub Total (C1)	$ 207,563.28
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 62,268.98
	TOTAL CONSTRUCTION COST (C)	$ 269,832.26

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 346,032.01

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage X

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 5,629.00	$ 5,629.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,614.72	$ 3,614.72
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 1,025.70	$ 1,025.70
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1690	m	$ 14.00	$ 23,660.00
21EVSS	Nominal DN300 PVC pipe	720	m	$ 90.00	$ 64,800.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1690	m	$ 48.40	$ 81,796.00
21EVSS	Nominal DN300 PVC (Trench type B)	720	m	$ 81.25	$ 58,500.00
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	2410	m	$ 1.00	$ 2,410.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$232,192

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 19,280.00	$ 19,280.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 314,715.42

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 62,943.08
HW0017	Project Management of Design	$ 22,588.62
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 85,531.70
	Pre construction contingency (30% of B1)	$ 25,659.51
	TOTAL PRE-CONSTRUCTION COST (B)	$ 111,191.21

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 314,715.42
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)	$ 31,471.54
	Sub Total (C1)	$ 346,186.96
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 103,856.09
	TOTAL CONSTRUCTION COST (C)	$ 450,043.05

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 561,234.26

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage Y

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 4,255.00	$ 4,255.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 2,927.46	$ 2,927.46
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 735.40	$ 735.40
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1090	m	$ 14.00	$ 15,260.00
21EVSS	Nominal DN300 PVC pipe	578	m	$ 90.00	$ 52,020.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1090	m	$ 48.40	$ 52,756.00
21EVSS	Nominal DN300 PVC (Trench type B)	578	m	$ 81.25	$ 46,962.50
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1668	m	$ 1.00	$ 1,668.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$169,402

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 13,344.00	$ 13,344.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 243,928.36

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 48,785.67
HW0017	Project Management of Design	$ 19,757.13
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 68,542.81
	Pre construction contingency (30% of B1)	$ 20,562.84
	TOTAL PRE-CONSTRUCTION COST (B)	$ 89,105.65

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 243,928.36
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)	$ 5,000.00
	Sub Total (C1)	$ 248,928.36
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 74,678.51
	TOTAL CONSTRUCTION COST (C)	$ 323,606.87

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 412,712.52

PROJECT DESCRIPTION: North Tuncurry Development - Potable & Recycled Water - Stage Z

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 5,255.00	$ 5,255.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 8,000.00	$ 8,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 18,000.00	$ 18,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,427.67	$ 3,427.67
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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

Item	Construction of Reticulation Watermains	Qty	Unit	Rate $/Unit	Amount $
HWW001	Service Location	Item	Lump Sum	$ 921.06	$ 921.06
HWW002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWW003	Supply all fittings	Item	Lump Sum		$ -
HWW004	Supply all pipes materials including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
20AVSS	Nominal DN100 PVC pipe	1172	m	$ 14.00	$ 16,408.00
21EVSS	Nominal DN300 PVC pipe	822	m	$ 90.00	$ 73,980.00
HWW005	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Up to 1.5 m depth to invert in OTR.				
20AVSS	Nominal DN100 PVC (Trench type B)	1172	m	$ 48.40	$ 56,724.80
21EVSS	Nominal DN300 PVC (Trench type B)	822	m	$ 81.25	$ 66,787.50
HWW006	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >1.5m to 3.0m to invert in OTR.				
HWW007	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWW008	Clear, excavate, lay, join, bed, backfill & test pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWW009	Supply additional service connection pipe and fittings and install	Item	Lump Sum		$ -
HWW010	Extra over rate for installation for Additional compaction		m3	$ 16.58	
HWW011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 68.25	
HWW012	Extra over rate for installation to Supply & place & compact non cohesive material		m3		

HWW013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 292.50	
HWW014	Extra over rate for installation for supply, place and compact aggregate		m3		
HWW015	Supply & place ballast			$ 90.00	
HWW016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWW017	Supply and place treated timber piling for pipe support		m		
HWW018	Road / creek crossings				
HWW019	Extra over rate for installation of trenchless technique under existing rail line		m		
HWW020	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:				
HWW021	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:				
HWW022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWW023	Supply and Install valve pits (excluding valves and fittings)	0	Each	$ -	$ -
HWW024	Flow Relief Structures		Each		
HWW025	EMPTY				
HWW026	Supply and install structure to house flowmeter (excluding cost of flowmeter).		Each		
HWW027	Preparation of line sheets	1994	m	$ 1.00	$ 1,994.00
HWW028	Acceptance testing - reticulation main		m		
HWW029	**Miscellaneous**				
HWW000	***Sub Total***				$216,815

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		

HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		
HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 15,952.00	$ 15,952.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 295,450.03

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 59,090.01
HW0017	Project Management of Design	$ 21,818.00
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 80,908.01
	Pre construction contingency (30% of B1)	$ 24,272.40
	TOTAL PRE-CONSTRUCTION COST (B)	$ 105,180.41

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 295,450.03
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)	$ 29,545.00
	Sub Total (C1)	$ 324,995.03
	Construction contingency (Table 12) (30% of C1) — Preliminary Estimate	$ 97,498.51
	TOTAL CONSTRUCTION COST (C)	$ 422,493.54

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 527,673.95

NORTH TUNCURRY DEVELOPMENT PROJECT - ALTERNATIVE WATER SUPPLY OPTIONS COMPARISON

Capital cost of the Recycled Water Trunk Main

(Option B)

PROJECT DESCRIPTION: North Tuncurry Development - Trunk Recycled Water Main

Item No.	Item Description	Qty	Unit	Rate $/Unit	Amount $
HW0001	All work not included elsewhere in this schedule	Item	Lump Sum	$ 5,314.00	$ 5,314.00
HW0002	Site Establishment <Insert Max $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0003	Site Disestablishment <Insert Min $>	Item	Lump Sum	$ 12,000.00	$ 12,000.00
HW0004	Preparation and implementation of the Construction EMP	Item	Lump Sum	$ 4,000.00	$ 4,000.00
HW0005	Preparation and implementation of the Safety Management Plan.	Item	Lump Sum	$ 9,000.00	$ 9,000.00
HW0006	Preparation and implementation of the Traffic Control Plan.	Item	Lump Sum	$ 12,800.00	$ 12,800.00
HW0007	Preparation and Implementation of Quality Management Plan	Item	Lump Sum	$ 3,457.00	$ 3,457.00
HW0008	Community Consultation	Item	Lump Sum	$ -	$ -

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 $
HWT001	Service Location	Item	Lump Sum	$ 1,440.00	$ 1,440.00
HWT002	Supply all valves and flowmeters	Item	Lump Sum		$ -
HWT003	Supply all fittings	Item	Lump Sum		$ -
HWT004	Supply all pipes materials, including detector tape, pipe protection wrapping, rubber rings and lubricant for following pipe sizes:				
314VSS	Nominal DN200 PVC pipe	1200	m	$ 49.00	$ 58,800.00
HWT005	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Up to 1.5 m depth to invert in OTR.				
314VSS	Nominal DN200 PVC (Trench type B)	1200	m	$ 126.80	$ 152,160.00
HWT006	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >1.5m to 3.0m depth to invert in OTR.				
HWT007	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth >3.0m to 4.5m to invert in OTR.				
HWT008	Clear, excavate, lay, join, bed, backfill & test reticulation pipelines (installation). Nominal depth > 4.5m to invert in OTR.				
HWT009	EMPTY				
HWT010	Extra over rate for installation for Additional compaction.		m3	$ 15.30	
HWT011	Excavate below specified design depth where directed including disposal of excess excavated material		m3	$ 63.00	
HWT012	Extra over rate for installation for supply & place compact non cohesive material		m3		
HWT013	Extra over rate for installation for supply, place and compact stabilised sand cement (14:1) backfill		m3	$ 270.00	
HWT014	Extra over rate for installation for Supply, place and compact aggregate		m3		

HWT015	Supply & place ballast		tonnes	$ 90.00	
HWT016	External Dewatering of trench including establishment and disestablishment (Contingent Item)		m		
HWT017	Supply and place treated timber piling for pipe support		m		
HWT018	Road / creek crossings				
HWT018.01	DN200 Thrustbore Soil	20	m	$ 835.00	$ 16,700.00
HWT019	Extra over rate for installation of trenchless technique under existing rail line		m		
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:				
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:				
HWT022	Bulkheads and Trenchstops in accordance with WSAA drawing WAT-1209		Each		
HWT023	Supply and Install valve pits excluding cost of valves and fittings	0	Each	$ -	$ -
HWT024	Flow Relief Structures		Each		
HWT025	EMPTY				
HWT026	Supply and install structure to house flowmeter (excluding cost of flowmeter).	Item	Lump Sum		$ -
HWT027	Preparation of line sheets	1200	m	$ 1.00	$ 1,200.00
HWT028	Acceptance testing - trunk main		m		
HWT029	**Miscellaneous**				
HWT000	***Sub Total***				$230,300

Item No.	Item Description	Qty	Unit		Amount $
HW0009	Restoration - Pipelines:				
HW0009.01	Concrete kerb & gutter	0	m	$ 110.00	$ -
HW0009.02	Concrete driveway	0	m2	$ 178.00	$ -
HW0009.03	Exposed aggregate & stamped driveway	0	m2	$ 220.00	$ -
HW0009.04	Concrete footpath	0	m2	$ 155.00	$ -
HW0009.05	Bitumen footpath	0	m2	$ 117.00	$ -
HW0009.06	Gravel pavement	0	m2	$ 69.00	$ -
HW0009.07	Bitumen pavement		m2		
HW0009.08	AC pavement		m2		
HW0009.09	Pavers		m2		
HW0009.10	Turf		m2		
HW0009.11	Grass seeding		m2		
HW0009.12	Hydromulch		m2		
HW0010	Extra over item for Excavation in rock and disposal of excess excavated material		m3		

HW0011	Acid sulphate soil				
HW0011.01	Initial testing for acid sulphate soils and prepare and submit report		per test		
HW0011.02	Establish treatment facility		Item		
HW0011.03	Handling, treatment and testing of acid sulphate soils		m3		
HW0011.04	Disposal off site of acid sulphate soil		tonne		
HW0012	Preconstruction record				
HW0012.01	Photographic	Item	Lump Sum		$ -
HW0012.02	Video	Item	Lump Sum		$ -
HW0012.03	CCTV	Item	Lump Sum		$ -
HW0013	Work as Constructed Information <Insert Min $>	Item	Lump Sum	$ 9,600.00	$ 9,600.00

A.	**TOTAL ESTIMATED CONTRACT AWARD SUM**	$ 298,471.00

B.	**PRE-CONSTRUCTION COST (Table 10)**	
HW0016	Design	$ 59,694.20
HW0017	Project Management of Design	$ 21,938.84
HW0018	Land Matters	$ -
HW0024	Community Consultation	
	Sub Total(B1)	$ 81,633.04
	Pre construction contingency (30% of B1)	$ 24,489.91
	TOTAL PRE-CONSTRUCTION COST (B)	$ 106,122.95

C.	**CONSTRUCTION COST**	
	Total Estimated Contract Award Sum (A)	$ 298,471.00
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)	$ 29,847.10
	Sub Total (C1)	$ 328,318.10
	Construction contingency (Table 12) (30% of C1) Preliminary Estimate	$ 98,495.43
	TOTAL CONSTRUCTION COST (C)	$ 426,813.53

TOTAL PRELIMINARY PROJECT ESTIMATE (B+C) (Preliminary Estimate)	$ 532,936.48

Options Cost Estimates and NPV Analysis Summary

It should be noted that the cost estimate was prepared in 2014 based on the previous Master Plan and unit costs current at the time, however is still considered to be suitable for planning and comparison purposes.

- **Rainwater Harvesting Option**

  - Capital Cost of Potable Water Reticulation Infrastructure Network and Connections - $9.4M

  - Capital Cost of Rainwater Tanks and Pumps (for 2,123 residential dwellings) - $6.8M

  - NPV at 7% over 30 years of total costs - $9.9M. The total costs include the following costs applied in sequence with development:

    - capital cost of the reticulation potable water network, water trunk mains and connections, rainwater tanks and pumps;

    - operating and maintenance cost of the reticulation potable water network, trunk main connections and the rainwater tanks and pumps;

    - potable water supply cost.

  - NPV at 7% over 30 years of reticulation infrastructure and connections (rainwater tanks and pumps not included) - $5.3M. This NPV includes the following costs applied in sequence with development:

    - capital cost of the reticulation potable water network and water connections; and

    - operating and maintenance cost of the reticulation potable water network and connections.

  - Water Supply Cost per Household:

    - 5 kL Rainwater Tank and Pumps including plumbing and installation - $3,200.

    - Rainwater Tank and Pumps Operating and Maintenance Cost - $20/year.

    - Potable Water Supply Cost ($2.7/kL, 37kL/year) - $100/year.

    - Total annual water supply cost - $120/year ($0.69 per kL).

    - NPV at 7% over 30 years - $4.7K.

- **Recycled Water Option**

  - Capital Cost Potable Water and Recycled Water Reticulation Infrastructure Network, Potable Water Trunk Mains, Recycled Water Trunk Main and Connections - $11.3M

  - The capital costs of any plant upgrades and upstream works are not known and have not been included in the cost estimates. This could understate the actual cost of this option.

  - NPV at 7% over 30 years of total costs - $10.8M. This total cost include the following costs applied in sequence with development:

    - capital cost of the reticulation potable water and recycled water network, potable water and recycled water trunk mains and connections;

    - operating and maintenance cost of the reticulation potable water and recycled water network and trunk main connections;

    - potable water and recycled water supply costs.

  - NPV at 7% over 30 years of reticulation infrastructure and connections - $6.3M. This NPV includes the following costs applied in sequence with development:

    - capital cost of the reticulation potable water and recycled water network, potable water trunk main and connections; and

    - operating and maintenance cost of the potable water and recycled water reticulation network and connections.

  - Water Supply Cost per Household:

    - Recycled Water Supply Cost ($2.0/kL, 86kL/year) - $172/year.

    - Potable Water Supply Cost ($2.7/kL, 88kL/year) - $238/year.

    - Total annual water supply cost - $410/year ($2.36 per kL).

    - NPV at 7% over 30 years - $5.1K.

- **Lower Cost Recycled Water Option**

  - Capital Cost Potable Water and Recycled Water Reticulation Infrastructure Network, Potable Water Trunk Mains, Potable Water and Recycled Water Connections - $10.7M

  - The capital costs of any recycled water plant upgrades and upstream works are not known and have not been included.

  - NPV at 7% over 30 years of total costs - $10.3M. Total costs include the following costs applied in sequence with development:

    - capital cost of the reticulation potable water and recycled water network, potable water trunk mains, potable water and recycled water connections;

  - operating and maintenance cost of the reticulation potable water and recycled water network and trunk main connections;

  - potable water and recycled water supply costs.

- NPV at 7% over 30 years of reticulation infrastructure and connections - $5.8 M. This NPV includes the following costs applied in sequence with development:

  - capital cost of the reticulation potable water and recycled water network, potable water trunk main and connections; and

  - operating and maintenance cost of the potable water and recycled water reticulation network and connections.

- Water Supply Cost per Household:

  - Recycled Water Supply Cost ($2.0/kL, 86kL/year) - $172/year.

  - Potable Water Supply Cost ($2.7/kL, 88kL/year) - $238/year.

  - Total annual water supply cost - $410/year ($2.36 per kL).

  - NPV at 7% over 30 years - $5.1K.

APPENDIX D – CORRESPONDENCE

APPENDIX D – CORRESPONDECE

McCarthy, Marketa

From: Mounser, Glenn
Sent: Friday, 13 February 2015 3:44 PM
To: Michael Pring
Cc: Sutcliffe, Daniel; McCarthy, Marketa
Subject: North Tuncurry Development Project - Response to NSW Office of Water comments

Hello Michael,

Please find below SMEC's response to the 3 items raised by NSW Office of Water in their comments dated 12/11/14 (NOW - Wayne Jones). The 3 items are:

1. Aquifer Interference Policy
2. Incidental take of groundwater by basins
3. Water licensing

The NOW comments relate to the following key study requirement in the State Significant Study Requirements (under the heading *'8. Water Quality'*):

> *"Assess impacts of the proposal on ground water. Identify any potential degradation to the groundwater resource and any impacts on ground water ecosystems."*

The response to these 3 items is given below and is based on information in the Integrated Water Cycle Management Strategy (IWCMS).

ITEM 1. AQUIFER INTERFERENCE POLICY

NOW's comments recommend that the Planning report be amended to address the requirements of the Aquifer Interference Policy (AIP). Further comment by NOW is that:

> *"In its current form the Planning Report and IWCMS do not address the requirements of the Aquifer Interference Policy."*

SMEC Response

The IWCMS does in fact address the requirements of the AIP. The reader is referred to Appendix A of the IWCMS, which addresses the AIP using the formal framework provided by NOW. Where relevant, Appendix A references applicable sections of the IWCMS that address particular items listed in the framework. Also, it is confirmed that all sections in the AIP assessment framework have been addressed , specifically the sections headed:

1. Accounting for, or preventing the take of water
2. Addressing the minimal impact considerations
3. Proposed remedial actions where impacts are greater than predicted
4. Other considerations

ITEMS 2 AND 3. INCIDENTIAL TAKE OF GROUNDWATER BY BASINS and WATER LICENSING

NOW's comments recommend that the Planning report be amended to clearly identify the impacts of the proposal on groundwater, including prediction of incidental take of water as a result of the proposed water management basins intercepting groundwater. NOW's comments also recommend that the Planning report be amended to include assessment of any water licensing requirements (including those for ongoing water take following completion of the project).

We have considered the NOW comments and our response is divided into two key areas, as follows:

- The impacts of the proposal on groundwater; and
- Prediction of incidental take of water as a result of the proposed water management basins intercepting groundwater, and assessment of any water licensing requirements.

The response to the two key areas is outlined below at Sections A and B.

SMEC Response

A. Impacts of the Proposal on Groundwater

Relevant aspects of the proposed development in relation to groundwater impacts are:

1. Flow exchange will occur freely between the basins and adjacent groundwater.
2. Under developed conditions, recharge within the development area is expected to increase from 36% of rainfall to 50% of rainfall on an average annual basis. This increase is primarily due to the introduction of impervious surfaces and is expected to result in groundwater levels increasing by 0.3 to 0.4m under developed conditions at all times except for very wet conditions. The predicted higher levels are not expected to materially impact any existing properties and infrastructure, or the existing golf course and proposed conservation areas that adjoin the development area.
3. As the project is expected to generally increase groundwater levels both within the development site and in areas adjacent to the development site, no draw down impacts or significant water quality impacts are expected. Likewise there is not expected to be any adverse impacts with respect to:
    - Landholder basic water use rights
    - Nearby licensed water users in connected groundwater or surface water sources
    - Groundwater dependent ecosystems
    - Potential increase in saline or contaminated water inflows to aquifers or any connected river systems
4. In major flood events, the basins will drain offsite through a gravity piped drainage system when levels exceed 3m AHD. This will provide significant flood mitigation benefits during major flood events, such as the 100 year ARI event. Flood events of this magnitude are very rare and the volume of water discharged offsite is very small compared with the average annual increase in groundwater recharge associated with the proposed development.
5. The combination of the gravity drainage and attenuation provided in the water management basins will be effective in reducing peak basin water levels below 3.9m AHD (in the 100yr ARI event). In addition, these controls will enable the basin and adjoining groundwater levels to recede significantly faster than under existing conditions. The proposed controls are expected to be effective in managing groundwater flooding risks within the development area, and to also lower local groundwater flood levels during major flooding thereby reducing the flood risk to adjoining properties and the Tuncurry Golf Course.

B. Prediction of Incidental Take of Water Due to Basins Intercepting Groundwater AND Water Licensing Requirements

The proposed development will actually increase groundwater volumes in the longer term, although there is the potential for groundwater extraction to irrigate public open space as part of a rainwater harvesting scheme that is targeted at the reduction of potable water use. Hence, the following points address the impact of the proposed development on available groundwater volumes, and the potential for groundwater extraction to irrigate public open space:

1. It is important to note that under developed conditions available groundwater will actually increase substantially. This is because the project is expected to increase the volume of recharge into the aquifer due the predicted higher recharge rates from impervious surfaces.
2. Section 9 of the IWCMS provides details on the project's expected potable water demands and discusses opportunities to reduce the potable water demand. Alternative options considered are rainwater harvesting, recycled water and groundwater harvesting. Based on the information available the IWCMS has determined that the preferred strategy is rainwater harvesting (using rainwater tanks).
3. Rainwater harvesting may include limited groundwater extraction for the irrigation of public open spaces (estimated currently at 67 ML/year). This would likely be a decentralised arrangement with spear point wells located on individual open space areas.
4. Rainwater harvesting (as well as any component for groundwater extraction for public open space irrigation) is a decentralised scheme that does not require any upfront capital expenditure and does not constrain the staging of the project, which will be constructed over a 30 year timeframe. Hence, with a rainwater harvesting scheme the component for groundwater irrigation of public open space would occur gradually over a 30 year time frame.
5. Only after a more detailed design will it be possible to confirm the reduction of potable water demand for a rainwater harvesting scheme, and to then determine a reliable extraction rate for the irrigation of public open space. Notwithstanding, the ultimate extraction rate would be very small compared with the average annual increase in groundwater recharge associated with the proposed development.
6. Once the extent and nature of any future open space irrigation works are confirmed (at a later design stage), an assessment can then be made as to the quantum of any groundwater extraction and the associated licensing requirement. Hence, at the present time there is no licensing requirement for groundwater extraction.

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CONCLUDING REMARKS

Please contact me at any time is you would like to discuss this matter further.

Regards,

Glenn
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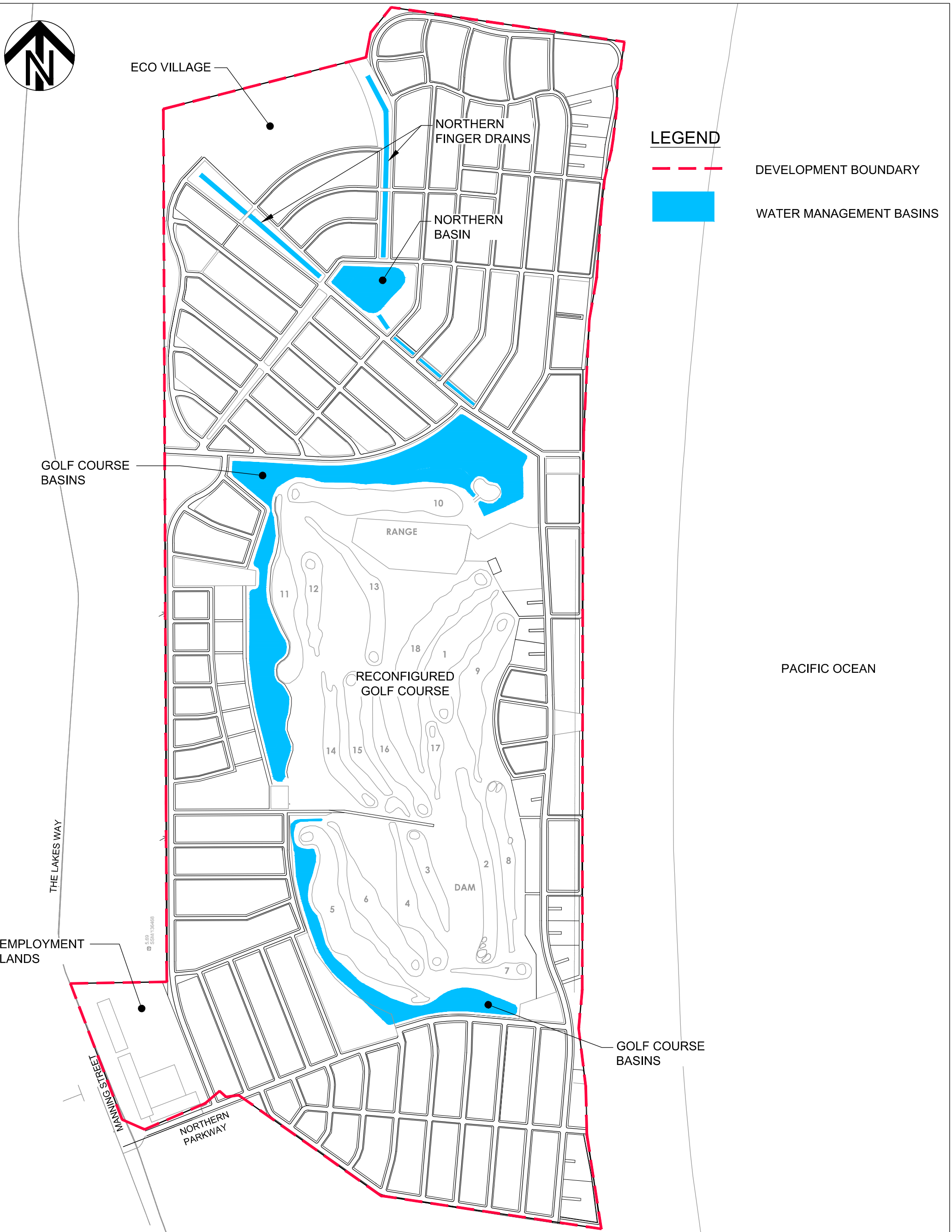
APPENDIX E – PREVIOUS MASTERPLAN (AS USED FOR MODELLING)



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PROJECT NO. 30011196	PROJECT TITLE	NORTH TUNCURRY DEVELOPMENT PROJECT	
FIG NO. E1	FIGURE TITLE	PREVIOUS MASTERPLAN LAYOUT (AS USED FOR MODELLING)	
CREATED BY S.DRUERY	SOURCES	DEVELOPMENT LAYOUT PROVIDED BY ROBERTS DAY	

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