5. Description of the project

This chapter describes the key elements of the proposal, including the power generation infrastructure and system, auxiliary infrastructure and systems, and provides background information on both construction and operation to allow potential impacts to be assessed.

5.1 Location

The proposed site for the Tallawarra Stage B power station is located at Yallah Bay Road, Yallah, within Lot 109 DP 1050302, Wollongong City Council, Parish of Calderwood, County of Camden. The site is located on the footslopes of Mount Brown, a prominent hill rising about 130m above the lake to the north-west of the site. Lake Illawarra is located immediately to the east of the site. The location of the project site and immediate surrounds are shown in **Figure 5-1**.

TRUenergy owns all of the land within the Tallawarra Stage B project area and surrounding Tallawarra Lands, a total area of 565 hectares (refer to **Figure 5-1**). The Tallawarra site has been modified significantly as a result of previous land use associated with the operation of the former coal powered power station and its ancillary operations. The former power station had a considerably larger overall footprint than the approved Tallawarra Stage A CCGT power station and the proposed Tallawarra Stage B power station.

As part of the previously approved Tallawarra Stage A CCGT power station project and the proposed project design, TRUenergy has allocated an area of some 50 hectares of the land around and adjacent to the Tallawarra power station site for power station use.

5.2 Elements of the project

The project comprises the following key components, each of which is interlinked to form the project infrastructure. Subject to the findings of TRUenergy's market evaluation of NSW electricity demand projections, the Tallawarra Stage B project will comprise either:

- 2 or 3 open cycle gas turbine generators with a nominal capacity of 300-450MW:
  - evaporative cooling system using potable water
  - natural gas fuel, with diesel fuel as a backup fuel
  - diesel tank and unloading station, or
- 1 combined cycle gas turbine generator with a nominal capacity of 400MW:
  - heat recovery steam generator (HRSG), steam turbine
  - wet mechanical draft cooling tower using lake water
  - natural gas fuel only.

Whichever generator turbine option is selected, the following will be required:

- high voltage switchyard (extension) comprising high voltage transformers and switchgear;
- transmission line connection to the existing 132kV network;
- connecting gas pipelines, gas receiving station and gas conditioning station;
- potable/fire water tank;
- demineralised water tank;
- electrical module; and
- emergency diesel generator.

The gas turbines will be selected following a commercial process that will include the detailed design phase. It is expected that the turbines will be 'off the shelf' units, provided by established manufacturers.

The turbines would be evaluated and selected on the basis of proven performance, efficiency, reliability and demonstrated conformance with the specifications. The specifications provided to prospective equipment suppliers would dictate the technical and environmental performance that the turbines would be required to meet, based on TRUenergy's operational requirements and conditions of approval.

The project will also utilise existing infrastructure associated with the Tallawarra Stage A CCGT power station including (refer to **Figure 5-2**):

- existing gas supply lateral;
- water intake and outlet;
- control room;
- administration building;
- workshop;
- internal roads;
- car parking;
- amenities;
- water treatment plant (with possible augmentation);
- domestic wastewater treatment and disposal system;
- surface water management system;
- security fencing; and
- visual screening.

Legend
- Proposed Tallawara B
- Tallawara A
- Tallawarra Land Border
- Power Station Site Boundary

Source: Aerial supplied by TRUenergy,
Topographic data by Streetworks

0 250 500
Metres

1:18,000 At A4

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Figure 5-1 - Site Layout

EN02239 - Tallawarra Stage B Power Station

Projection: GDA94 MGA Zone 56

February 23, 2009
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Figure 5-2 - Existing Facilities & Approved CCGT Power Station (Stage A)

EN02239 - Tallawarra Stage B Power Station

Source: Aerial supplied by TRUenergy.
Topographic data by Streetworks.
Projection: GDA94 MGA Zone 56

May 4, 2009
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A detailed description of each project element is outlined in the following sections of the chapter.

5.3 Open cycle gas turbine

The OCGT power station would operate as a peaking facility, to supply electricity at short notice during periods of peak demand or system emergency situations. The peaking plant would consist of two or three open cycle turbines with a nominal generating power capacity of 300 to 450MW. Each gas turbine generator unit would consist of three main items being the gas turbine, generator and high voltage transformer.

In each gas turbine generator, air is drawn in through filters to remove particulate matter prior to compression. The compressed air then flows into the combustion chambers where natural gas is injected and burnt, increasing the temperature to approximately 1100°C to 1250°C depending on the particular model. The hot exhaust gases generated by the combustion process are used to drive a turbine which in turn drives an electrical generator to produce electricity. The hot exhaust gases pass through a silencer unit and are discharged through an exhaust stack fitted at the end of each gas turbine unit. The height of the exhaust stacks will be about 40 metres above existing ground level. The height of the OCGT plant will be about 25 metres above the existing ground level, on a base surface of about 3.1m AHD.

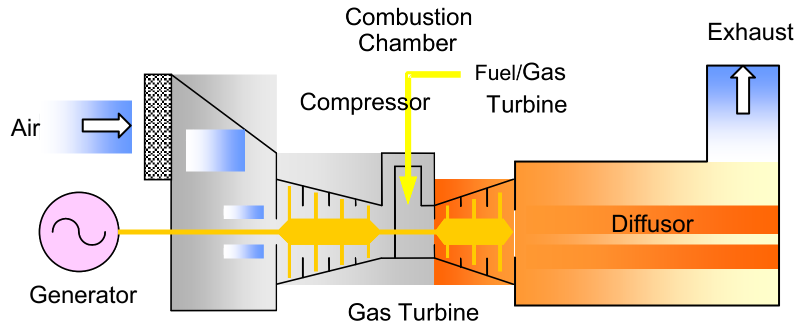
The Tallawarra Stage B OCGT gas turbines will run on natural gas as the primary fuel, with diesel fuel as a backup fuel for use during a major interruption to, or periods of limited, natural gas supply.

The Tallawarra Stage B OCGT plant will generate electricity at a voltage in the range of 11,000-22,000 volts, depending on the power plant selected, with the voltage being increased to 132,000 volts by a transformer prior to being fed via a similar switchyard to the transmission lines crossing the site.

The general layout of the Tallawarra Stage B OCGT plant is shown in **Figure 5-3** and an indicative concept design is provided in **Figure 5-4**.

A process diagram of the OCGT plant is shown below in **Schematic 5-1**.

▪ **Schematic 5-1 Generation process for OCGT plant**



5.3.1 Cooling system

The Tallawarra Stage B OCGT power station would utilise a closed cycle cooling system. This may include an evaporative cooling system using potable water to cool the air stream before it enters the combustion chamber of the gas turbine. This system would ensure maximum efficiency and output of the gas turbines during hot weather conditions.

The gas turbines may incorporate additional spray humidification (which requires demineralised water) to further augment the output on days of high humidity and high temperature.

For each gas turbine, demineralised water is required for washing the blades of the compressor so that efficiency can be maintained.

5.3.2 Fuel

The open cycle gas turbines will be capable of running on both natural gas and diesel. Natural gas will be the primary fuel source, and diesel will only be used as a backup should there be a major disruption or shortage to the natural gas supply.

Figure 5-3 - General Layout - Tallawarra Stage B OCGT

EN02239 - Tallawarra Stage B Power Station

Projection: GDA94 MGA Zone 56

February 24, 2009
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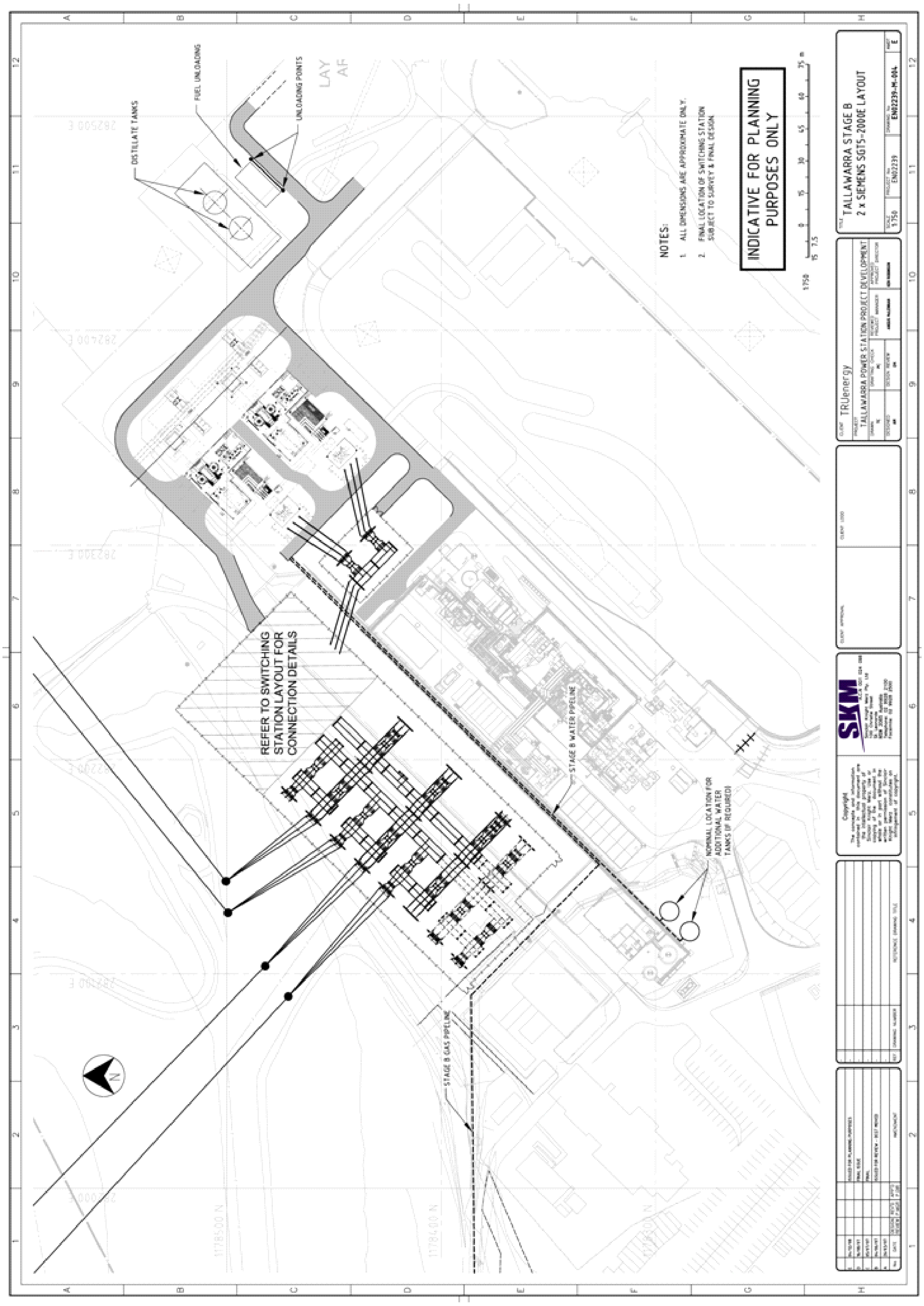
▪ Figure 5-4 Indicative OCGT Concept Design



Natural gas fuel for the turbines will be supplied from a connection to the existing Tallawarra Stage A power station lateral which connects the Tallawarra site with the Eastern Gas Pipeline. A new gas metering and conditioning plant will be constructed adjacent to the existing Tallawarra Stage A gas receiving station (refer to **Figure 5-2**). The metering and conditioning plant will be connected to the Tallawarra B power station via a new gas supply pipeline. The gas supply pipeline will most likely consist of a 273mm X42 grade steel pipe, with a 12.7mm wall thickness and 53bar operating pressure. The pipeline will initially follow the same easement as the Tallawarra A pipeline and then extend beyond the Tallawarra A pipeline connection to the Tallawarra B plant via a “piperack”.

Diesel fuel will be transported to the site by tanker on an “as needed” basis and stored in tank(s) adjacent to the proposed power station (refer to **Figure 5-3**). A maximum of 2,000kL will be stored on-site which will provide for up to 20 hours of full load operation in the event of an interruption to the natural gas supply. The tank(s) and associated pipework will be designed and bunded to comply with requirements of Australian Standard *AS 1940 The storage and handling of flammable and combustible liquids*. The bunded area will include a sump, isolating valve and gravity drain leading to an oily water separator. An isolating valve will be installed to drain any rain water or condensation. The bund capacity will be designed to accommodate a 1 in 100 year rainfall event.

A fuel unloading station will be located adjacent to the fuel storage area. The fuel unloading station will allow for a nominal 2 B-double deliveries per hour of operation at full load.

5.3.3 Emissions control

The gas turbines will be specified with dry, low NOx combustors to produce NOx emissions of 25 parts per million or less at full load when firing on natural gas.

When firing the Tallawarra Stage B OCGT gas turbine facility on distillate fuel, additional demineralised water is injected into the combustion chamber of the gas turbine to lower the peak combustion temperature and limit the generation of NOx emissions to less than 45 parts per million at full load. Therefore, the proposed OCGT plant will comply with the *Protection of the Environment Operations (Clean Air) Regulation 2002* emission limits of 25 parts per million NOx emissions in natural gas firing mode and 45 parts per million NOx emissions in distillate fuel firing mode.

A continuous emission monitoring system will be installed to monitor all stack emissions against Environment Protection Licence limits and other relevant regulations.

5.3.4 Water demand

Tallawarra Stage B will require potable water for drinking, general power station use, evaporative cooling and water injection for NOx control. Water for domestic use and construction supply will be piped directly to usage points. Potable water is also piped to the demineralised water plant for use in the steam cycle. The remaining water, used for evaporative cooling, will be supplied via two existing

1ML storage tanks. A new potable water supply pipe will be installed from the storage tanks to the Stage B site, as shown in **Figure 5-3**.

Water to be used within the gas turbine for NOx control and fogging is required to be of high purity to avoid damage to the plant through corrosion or deposition of salts. The Tallawarra Stage A reverse osmosis water treatment plant will be expanded, with the addition of a further 200kL/day demineralised water train, to accommodate the Stage B water requirements. The treatment plant building has been designed to accommodate the addition of an additional water train and will not require modification for this project. In addition, a 200kL demineralised water tank will be required to provide sufficient storage for Tallawarra Stage B. The tank will be located adjacent the existing Tallawarra Stage A demineralised water tank.

The Tallawarra Stage B OCGT power station will require potable water for evaporative inlet air cooling and demineralised water for fogging/wet compression and compressor washing. Wet compression is a type of "turbine inlet air cooling" method which adds more fog to the turbine inlet air than can be evaporated under the conditions of the ambient air. The turbine inlet air stream carries the excess fog into the compressor section of the combustion turbine where it further evaporates and cools the compressed air, and then creates extra mass for boosting the output.

The annual water demand of the Tallawarra Stage B OCGT plant has been calculated based on the following:

- 30 hot days per year;
- Stage B operates on distillate 40 hours per year;
- Stage B power augmentation is used for operation on gas only; and
- Stage B evaporative cooling is operational for 50% of the overall operating time.

The calculations are considered to be conservative, illustrating potential quantities which are summarised in **Table 5-1** below.

- **Table 5-1 Annual Water Demand for Stage B.**

	E-class			LMS100		
Capacity Factor	2%	5%	10%	2%	5%	10%
Potable [1] **[ML]**	10	20	36	35	87	175
Demineralised [ML]	8	13	23	7	17	34

1. *Includes feed to demin plant.*

5.3.5 Construction program and hours

The construction of the project is anticipated to begin in mid 2010, subject to the determination of the EA and granting of project approval. Based on that start date, construction of the OCGT plant would be expected to last about 24 months and be completed by early to mid 2012. Prior to commencement of works, the power station contractor would prepare a detailed construction program and methods. This would be dependent on the type of turbine selected and detailed design of the project. Construction activities would generally include the following steps:

- Mobilisation of the construction site (~ 2 months);
- Clearing of the site and bulk earthworks (~ 4 months)
- Establishment and preparation of sire foundations (~ 6 months)
- Construction of buildings and plant (~ 12 months)
- Demobilisation of the construction site (~ 2 months)

Construction activities will be undertaken during standard construction hours (7:00am to 6:00pm) Monday to Friday and 7:00am to 1:00pm on Saturdays).

5.3.6 Construction workforce

It is expected that during construction of the Stage B plant, the peak employment level will be in the order of 200-250 personnel for an OCGT. Additional staff may be required from time to time and would be employed on a contract basis.

5.3.7 Operation

Operating hours

Hours of operation during the operational phase of the OCGT plant will be dependent on production needs and usage demand. Operation of the plant is expected to occur mainly during hot summer peak periods and cold winter peak periods. However, the OCGT plant is required to be available for use at any time to respond to periods of peak demand or system emergencies.

Operational workforce

Once operational the Stage B plant will require an increase in the number of existing personnel to manage the day to day routine operations and maintenance. For an OCGT approximately 1-3 additional personnel will be required.

Shut down maintenance activities will be undertaken by a casual workforce of between 80-100 personnel, in the same manner as for the Tallawarra Stage A plant. This will result in a short-term increase in personnel at the site during these events.

5.4 Combined cycle gas turbine

The CCGT power station would operate as an intermediate to base load electricity generation facility. The Tallawarra Stage B CCGT power station will comprise one combined cycle turbine with a nominal capacity of 400MW.

Combined cycle plants utilise a gas turbine and a steam turbine to drive an electrical generator. The hot exhaust gases generated from the gas turbine feed into a heat recovery system which produces steam to power a steam turbine. The steam turbine is coupled to the same shaft as the gas turbine and provides approximately one third of the power output.

The combined cycle process increases the overall efficiency of conversion of fuel to electricity. The Tallawarra Stage B CCGT will exhaust at a low temperature via a stack similar to Tallawarra Stage A, with a nominal height of 60 metres above ground level. The height of the CCGT plant will be about 25 metres above the existing ground level, on a base surface of about 3.1m AHD.

The Tallawarra Stage B CCGT plant will generate electricity at a voltage in the range of 11,000-22,000 volts depending on the power plant selected. The voltage will be increased to 132,000 volts by a transformer prior to being fed via a switchyard to the transmission lines crossing the site.

The general layout of the Tallawarra Stage B CCGT plant is shown in **Figure 5-5** and an indicative concept design is provided in **Figure 5-6**.

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Figure 5-5 - General Layout - Tallawarra Stage B CCGT

EN02239 - Tallawarra Stage B Power Station

Projection: GDA94 MGA Zone 56

May 4, 2009

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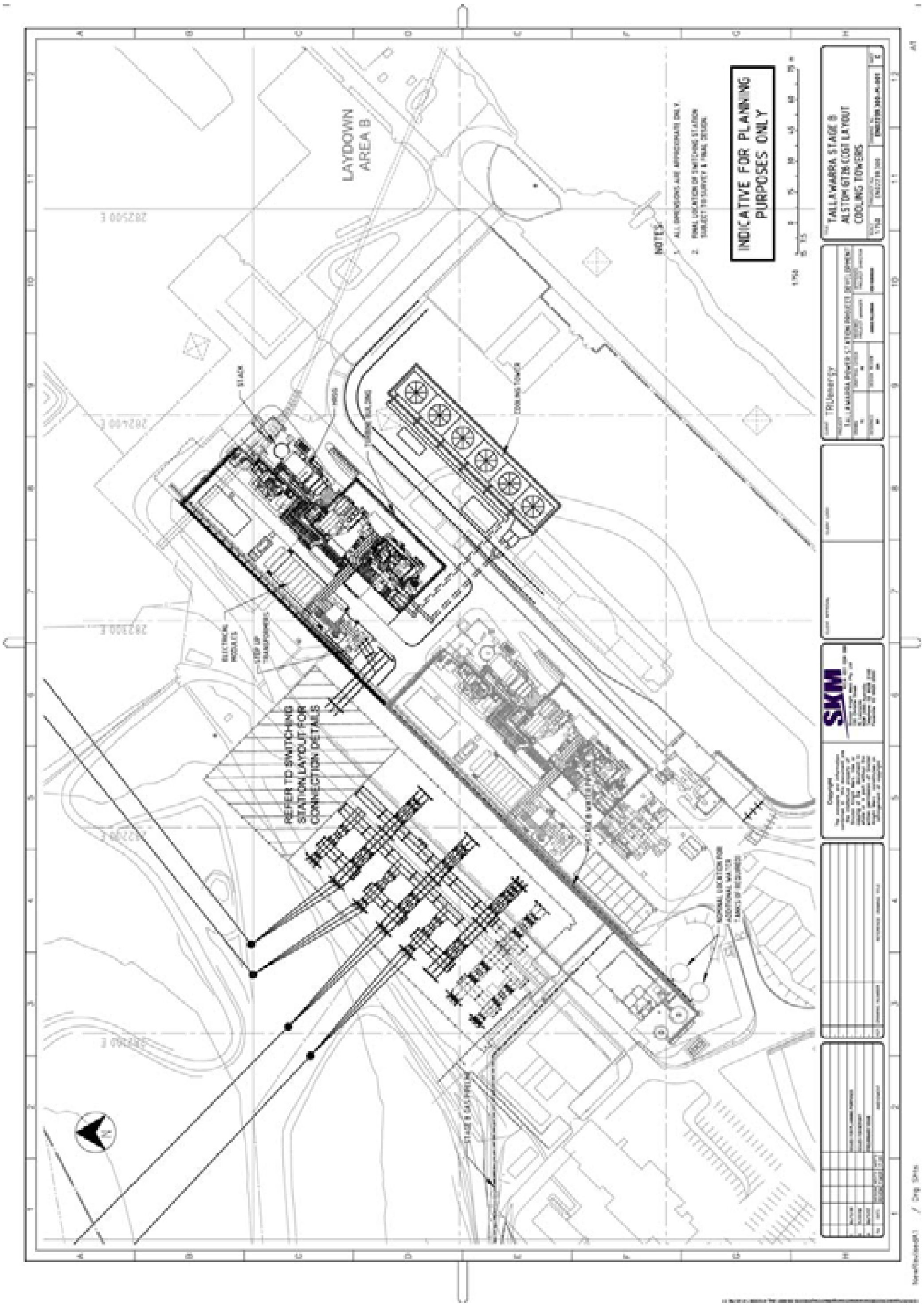
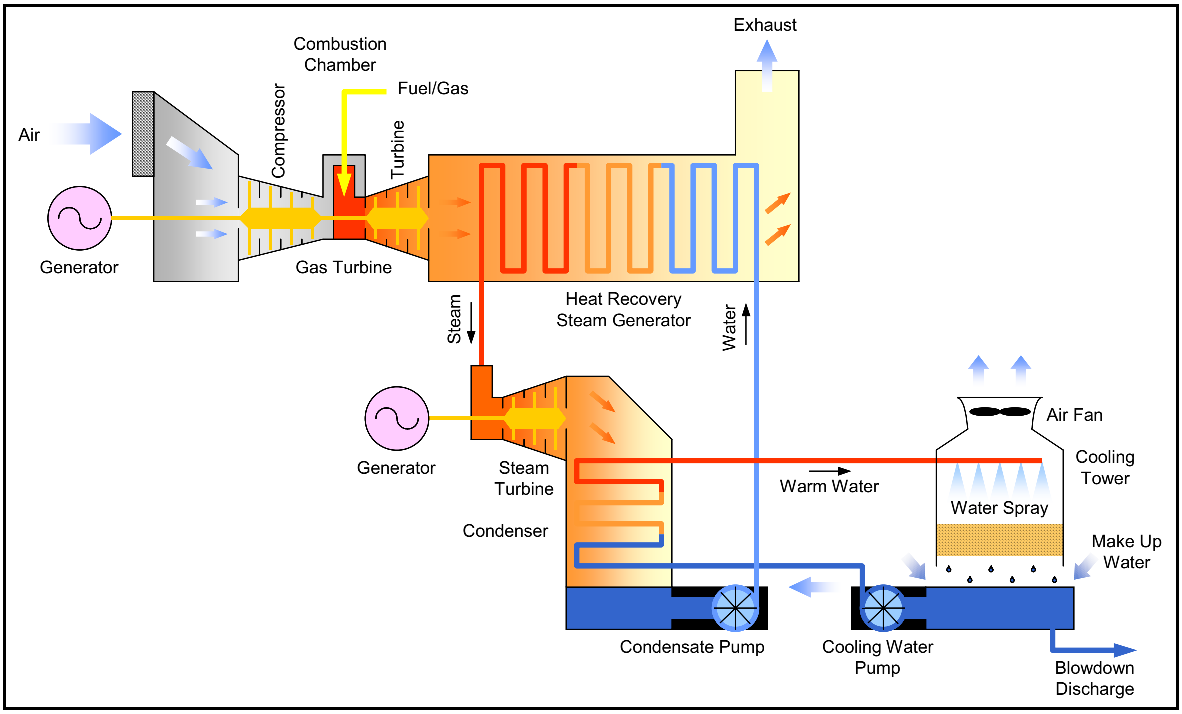
Figure 5-6 Indicative CCGT concept design



A process diagram of the CCGT plant and associated mechanical draft cooling tower is shown below in **Schematic 5-2**.

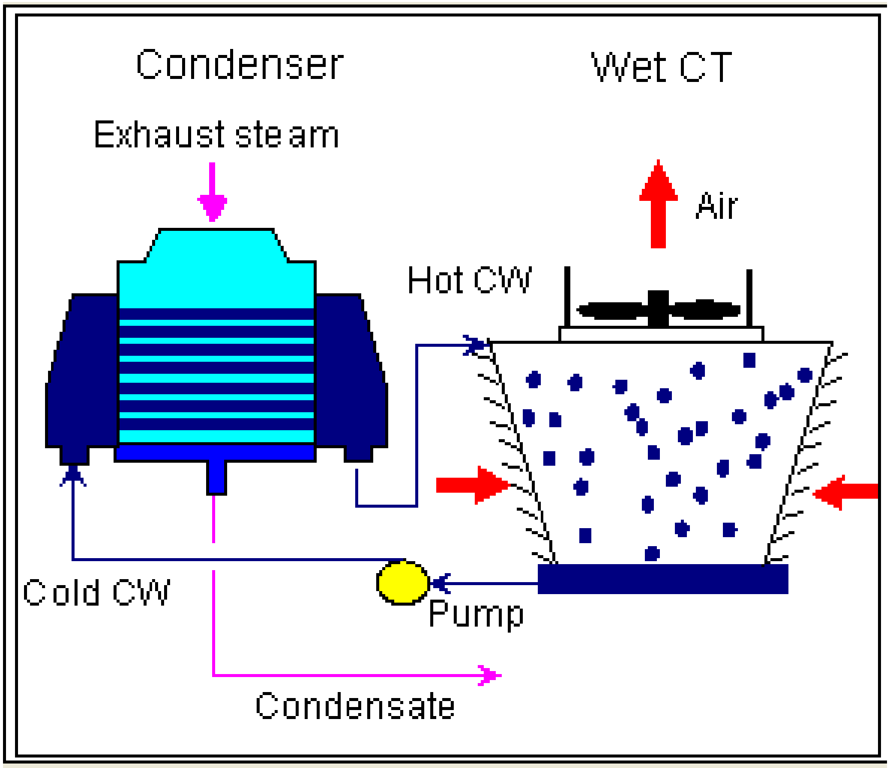
- **Schematic 5-2 Generation process for CCGT plant**



5.4.1 Cooling system

The Tallawarra Stage B CCGT requires additional cooling for the steam cycle. For the Tallawarra Stage B CCGT, a wet mechanical draft cooling tower would be used as the cooling system and involve the use of water from Lake Illawarra. In this system a flow of cooling water is circulated from a storage basin through the condenser where the heat from the condensation process is transferred to it. The warm cooling water is then sent to the wet mechanical draft cooling tower and is cooled by falling through a current of air. The cooling effect is obtained by presenting a large surface area of the water to the atmosphere, allowing heat loss to occur predominantly by evaporation. This process is illustrated in **Schematic 5-3**.

- **Schematic 5-3 Mechanical draft cooling tower schematic**



Source: Thermoflow Inc GT PRO.

The tower comprises a number of "cells" normally arranged in a line or in pairs above a concrete basin (the height of the cells will be about 15m above existing ground level). The large surface area for the water is obtained by the use of "fill", usually consisting of a honeycomb or slats installed in each cell. The water descends from upper trays through the fill and is collected in the concrete basin below. Ventilation through the fill to allow effective evaporation is obtained from a large fan installed at the top of each cell. To minimise escape of water droplets from the fill, drift eliminators are located at the air outlets from the fill. These incorporate changes of direction for the airflow to catch the droplets.

The cooling load in the condenser will be approximately 250 MW. If we assume that the condenser is designed for a 10°C rise, then the circulating water rate will be in the order of 6,200L/s.

Typically 1 to 2% of the circulating cooling water is evaporated, taking its latent heat from the rest of the water and thus cooling it. The evaporated water is carried out to the atmosphere with the humidified current of warm air. For Tallawarra B, the evaporation rate is likely to be in the order of 87L/s. This rate will vary with duty and ambient conditions.

Entrained water droplets that escape from a cooling tower with the exhaust air are known as drift. With the use of drift eliminators, this can normally be controlled to be less than 0.001% of the cooling water system circulation rate.

Because of the losses due to evaporation and drift, there is a build-up of dissolved solids in the remaining cooling water. This build-up must be controlled by draining some of the water to waste, (refer to as "blowdown") and by the addition of make-up water and if required, chemicals. The chemicals are added to control corrosion (if necessary), scaling and fouling which would occur in the cooling tower and circulating water system if the water were left untreated.

The level of blowdown required is a function of the incoming water quality and limits on the quality of water which can be discharged from the site. It is intended that the Stage B cooling towers will draw make-up for water from Lake Illawarra via the existing inlet canal. An analysis of the chemistry of the lake water suggests that the system should be designed for 1.4 cycles of concentration. This would mean that the cooling system will have make-up water requirements as given below in **Table 5-2**.

- **Table 5-2 Water requirements for a lake-water cooling tower**

	Ambient Temperature (°C)	Ambient Relative Humidity (%)	Evaporation (L/s)	Blowdown and drift (L/s)	Total (L/s)
Design	25	70	87	217	304
Cold day	1	70	67	168	235
Hot day	40	20	108	271	379

Note: Assumes 1.4 cycles of concentration

The performance of wet mechanical draft cooling towers depends on the ambient wet-bulb temperature. The cooled water temperature is normally higher than the wet-bulb temperature by between 5 to 15°C, this is called the "approach" temperature. The lower the approach temperature, the lower the steam turbine back-pressure and greater the power cycle output.

Additional smaller self contained systems will also operate throughout the power plant to cool auxiliary equipment. These systems will involve various arrangements using water, air and/or oil as the cooling medium.

The Stage B cooling towers will discharge blowdown water via the Tallawarra Stage A mixing chamber into the existing outlet canal. The existing inlet and outlet canals have sufficient capacity to accommodate both Stage A once-through cooling and Stage B cooling tower water requirements.

5.4.2 Fuel

Natural gas fuel for the turbines will be supplied from a connection to the existing Tallawarra Stage A power station lateral which connects the Tallawarra site with the Eastern Gas Pipeline. A new gas metering and conditioning plant will be constructed adjacent to the existing Tallawarra Stage A plant gas receiving station (refer to **Figure 5-2**). The metering and conditioning plant will be connected to the Tallawarra B power station via a new gas supply pipeline. The gas supply pipeline will consist of a 273mm X42 grade steel pipe, with a 12.7mm wall thickness and 53bar operating pressure. The pipeline will initially follow the same easement as the Tallawarra A pipeline and then extend beyond the Tallawarra A pipeline connection to the Tallawarra B plant, as shown in **Figure 5-5.**

5.4.3 Emissions control

The gas turbines will be specified with dry, low NOx combustors to produce NOx emissions of 25 parts per million or less at full load when firing on natural gas.

A continuous emission monitoring system will be installed to monitor all stack emissions against Environment Protection Licence limits and other relevant regulations.

5.4.4 Water demand

Tallawarra Stage B will require potable water for drinking, general power station use and evaporative cooling. Water for domestic use and construction supply will be piped directly to usage points. Potable water is also piped to the demineralised water plant for use in the steam cycle and fogging. The remaining water, used for evaporative cooling, will be supplied via two existing 1ML storage tanks. A new potable water supply pipe will be installed from the storage tanks to the Stage B site, as shown in **Figure 5-5**.

Water to be used within the steam cycle is required to be of high purity to avoid damage to the plant through corrosion or deposition of salts. The Tallawarra Stage A reverse osmosis water treatment plant will be expanded, with the addition of a further 200kL/day demineralised water train, to accommodate the Stage B water requirements. The treatment plant building has been designed to accommodate the addition of an additional water train and will not require modification for this project. In addition, a 200kL demineralised water tank will be required to provide sufficient storage for Tallawarra Stage B. The tank will be located adjacent the existing Tallawarra Stage A demineralised water tank.

The water demands for the Tallawarra Stage B CCGT plant include cooling towers with lake water makeup for the cooling process, as well as potable water for drinking and general power station use. The water demands of the cooling towers are outlined in **Section 5.4.1**.

The annual potable water demand of the Tallawarra Stage B CCGT plant has been calculated based on the following:

- 30 hot days per year; and
- Stage B fogging is used 150 hours per year.

The calculations are considered to be conservative, illustrating potential quantities which are summarised in **Table 5-3**.

Table 5-3 Annual Potable Water Demand for Tallawarra Stage B CCGT plant

Capacity Factor	Units	95%	65%
Potable [1]	ML	90-100	65-75
Demineralised	ML	40-50	30-35

Note: 1. Includes feed to demineralised water plant.

5.4.5 Construction program and hours

The construction of the project is anticipated to begin in mid 2010, subject to the determination of the EA and granting of project approval. Based on that start date, construction of the OCGT plant would be expected to last about 30 months and be completed by mid to late 2012. Prior to commencement of works, the power station contractor would prepare a detailed construction program and methods. This would be dependent on the type of turbine selected and detailed design of the project. Construction activities would generally include the following steps:

- Mobilisation of the construction site (~ 2 months)
- Clearing of the site and bulk earthworks (~ 4 months)
- Establishment and preparation of site foundations (~ 7 months)
- Construction of buildings and plant (~ 15 months)
- Demobilisation of the construction site (~ 2 months)

Construction activities will be undertaken during standard construction hours (7:00am to 6:00pm) Monday to Friday and 7:00am to 1:00pm on Saturdays).

5.4.6 Construction workforce

It is expected that during construction of the Stage B plant, the peak employment level will be in the order of 600 personnel for a CCGT. Additional staff may be required from time to time and would be employed on a contract basis.

5.4.7 Operation

Operating hours

Hours of operation during the operational phase of the CCGT plant will be dependent on production needs and usage demand. It is anticipated that the plant will operate to meet intermediate to base load demands and may operate 24 hours a day for extended periods.

Operational workforce

Once operational the Stage B plant will require an increase in the number of existing personnel to manage the day to day routine operations and maintenance. For a CCGT approximately 15-20 additional personnel will be required.

Shut down maintenance activities will be undertaken by a casual workforce of between 80-100 personnel, in the same manner as for the Tallawarra Stage A plant. This will result in a short-term increase in personnel at the site during these events.

5.5 Additional infrastructure

In addition to the turbine, cooling and fuel infrastructure requirements outlined above, there is additional infrastructure that is consistent for an OCGT or CCGT plant, irrespective of which plant is constructed.

5.5.1 Transformers and high voltage switchyard

The electricity generated would be fed into the existing 132kV transmission network via an extension of the existing switchyard on the Tallawarra power station site (refer to **Figure 5-7**). The height of the switchyard extension area will be about 15m above the existing ground level, in keeping with the Tallawarra Stage A development. Electric generators coupled to the gas turbines will operate at a voltage of up to approximately 22 kilovolts. This will be stepped up to 132 kilovolts using step-up transformers to evacuate the power from the site. Connection to the high voltage switchyard will be via an above-ground connection from the step-up transformers to a new, dedicated bay adjacent to the existing high voltage switchyard.

The switchyard will be connected to two existing feeder lines (928 and 982Y) to Springhill, located approximately 550 metres north-east of the switchyard via two new 132kv lines. Redundant transmission lines traversing the Tallawarra Lands site will then be removed (refer to **Figure 5-7**).

Legend

Transmission Line Rearrangements

- Proposed Line re-arrangement for Tallawarra Stage A
- Existing Lines
- Lines to be Removed - Tallawarra Stage B
- Proposed Line Works for Tallawarra Stage B

- Proposed Tallawara B
- Tallawara A
- Power Station Site Boundary

Data Sources: Aerial supplied by TRUenergy, Topographic data by Streetworks.

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Metres
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Figure 5-7 - Proposed Transmission Line Re-arrangement

EN02239 - Tallawarra Stage B Power Station

Projection: GDA94 MGA Zone 56

May 4, 2009
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5.5.2 Chemical and oil storage

Due to the nature of the project, chemicals may be stored at the proposed power station site. Some of these chemicals are classified as dangerous goods under the Australian Dangerous Goods Code. A list of the type and quantities of chemicals which may be used and stored at the site is outlined in **Chapter 7** and **Chapter 8**.

Chemicals would be stored on-site in designated chemicals storage facilities that will be constructed in compliance with relevant Australian Standards, including but not limited to:

- Australian Standard AS 1940(2004) *The storage and handling of flammable and combustible liquids*;
- Australian Standard AS 4452(1997) *The storage and handling of toxic substances*;
- Australian Standard AS 3780(1994) *The storage and handling of corrosive substances*;
- Australian Standard AS 4332(2004) *The storage and handling of gases in cylinders*;
- Occupational Health and Safety Act 2000; and
- Occupational Health and Safety Regulation 2001.

In addition to the relevant Australian Standards and legislation outlined above, any chemicals that are classified as dangerous goods will also be stored in accordance with the *Storage and Handling of Dangerous Goods: Code of Practice* (WorkCover NSW, 2005). Storage requirements under the Code of Practice include ventilation, separation and placarding.

Spill controls will be provided around the gas turbine generators and diesel storage areas to contain and separate any leakage. A number of other gas turbine generator controls and alarms will indicate a lubricating oil leak including the low oil pressure alarm, low oil pressure trip and low oil level alarm.

5.5.3 Emergency diesel generators

An emergency diesel generator will be installed adjacent the proposed gas turbine to provide emergency power during a station trip or a complete system shutdown.

5.5.4 Water Management

Clean water management

The clean water management system established for Tallawarra Stage A (refer to **Figure 5-8**) will be extended to incorporate Stage B. Clean rainwater collected from within the power station catchment area will be directed through a large open detention basin to facilitate the removal of suspended material. It is expected that the quantity of clean water captured will increase with the construction of Tallawarra B due to an increase in the impervious area within the catchment area.

Water collected in the retention pond may be returned to the existing 1ML storage tanks, if required, or allowed to run into Lake Illawarra as clean stormwater.

Potentially contaminated water management

The Tallawarra Stage A segregated drainage system (refer to **Figure 5-8**) will be extended to incorporate Tallawarra Stage B. The system will ensure all waste water is captured for reuse or treatment prior to discharge. Segregated drains will direct all waste water through oil and grit traps, designed to remove any oil and minimise suspended solids. Any oil which is collected will be reclaimed while the solids will be disposed of off-site. Excess water will be transferred to an existing constructed wetland system (refer to **Figure 5-2**), including an initial wetland, existing polishing and final holding ponds, prior to discharge to Lake Illawarra. The initial wetland is about $1000m^3$ (with no catchment) and will be used for initial treatment of the flow of process water from the power station. The polishing and final holding ponds are about $66,800m^3$ and have a limited catchment of about 62ha. Inflows to the ponds depend upon rainfall runoff and the outlet from the initial treatment wetland. The wetlands have been assessed as being capable of ensuring a retention time of 20 days. A clay lining in the wetlands will prevent seepage into the local groundwater and prevent contact with old ash deposits.

Use of lake water

Tallawarra B will potentially use lake water for its cooling. Cooling tower makeup water will be sourced from the inlet canal downstream of aquatic screens (potentially Tallawarra A screens) and returned to the outlet canal at or upstream of the Stage A mixing vessel.

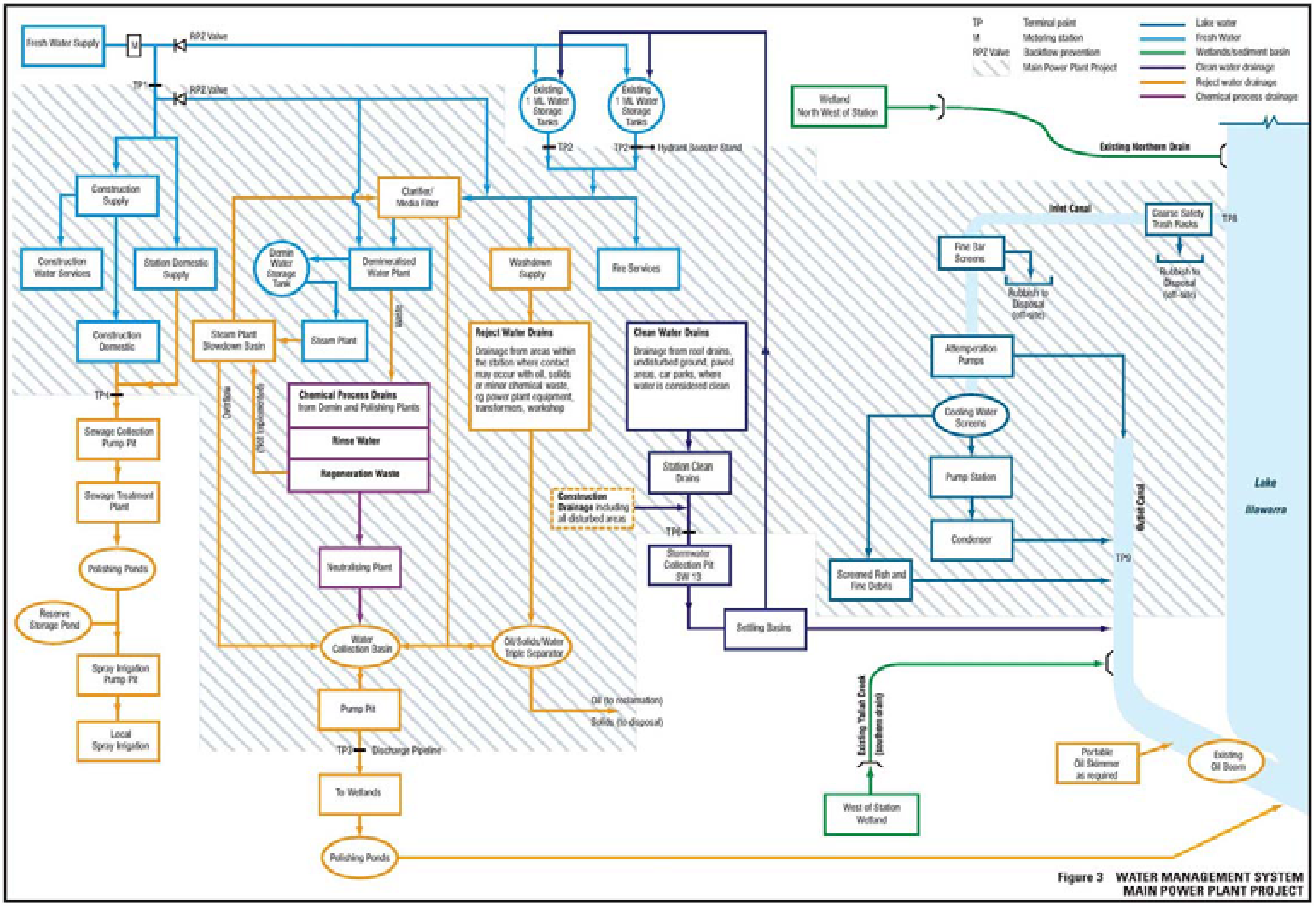

Figure 5-8 – Existing Water Management System

5.5.5 Construction activities and equipment

Key construction activities would include:

- Bulk earthworks and site preparation: During the development phase of Tallawarra A much of the old Tallawarra coal fired power station footings and contamination was removed during site grading. In order to carry out construction of Tallawarra B the balance of this area needs to be prepared and possibly remediated to establish building platforms and access roads;
- Based on Tallawarra A experience this area may well have further asbestos contamination. Additional testing and subsequent removal of potentially contaminated material will be carried out in accordance with the relevant guidelines, as was the case with the remediation of the previous component of the old Tallawarra Power Station site in preparation for the new Tallawarra A Power Station. Any contaminated material removed from this location will be deposited in the on-site asbestos repository. The asbestos repository is covered by the Environmental Protection Licence (EPL) for the Tallawarra Stage A power station;
- Preparing and establishing foundations: Foundations for major plant items and buildings would be established on concrete foundations. The type of foundations would be determined following the detailed design process;
- Construction of facility components: Prefabricated components would be imported and erected on-site;
- Gas feeder pipeline construction: Excavation works would be undertaken to install the gas feeder pipeline. Construction would involve, trenching, stringing and welding the pipe, lowering the pipeline into the trench and backfilling the trench. Once installed the pipeline would be pressure tested for leaks by filling it with clean water; and
- Transmission line installation: Existing redundant lines and poles would be removed. Pre-fabricated concrete poles would be installed along the transmission route in accordance with Integral Energy requirements. The transmission lines would be strung along the poles.

Major construction equipment types and purpose are summarised in **Table 5-3**.

Table 5-3 Likely construction equipment

Equipment type	Purpose
Class 1 Restricted Access Vehicles	Equipment haulage (e.g. the gas turbine, generator and transformers)
Excavators and backhoes	Excavation for drainage, site levelling and pipeline trenching
Front-end loaders	Removal of excavated material
Graders	Site levelling
Semi-tipper trucks	Equipment haulage, materials and equipment delivery
Scrapers	Excavation and site levelling
Bulldozers	Ground preparation
Rollers	Surface compaction

Equipment type	Purpose
Water trucks	Dust suppression
Cranes	Assembly of prefabricated building items and positioning of equipment
Cherry picker	Stringing of transmission lines
Compactors	Site compaction for the base of infrastructure items

5.6 Use of Tallawarra Stage A facilities

One of the aims of the project is to maximise the use of TRUenergy's currently approved Tallawarra Stage A CCGT power station equipment and infrastructure. The Tallawarra Stage B plant will utilise the existing Tallawarra Stage A power station control room, administration building, amenities and workshop building, internal roads and car parking, domestic wastewater treatment and disposal system, security fencing and visual screening.

5.6.1 Administration, control building, amenities and workshop

The Tallawarra Stage A administration, control buildings, amenities and workshop have sufficient capacity to accommodate the Stage B requirements and do not require modification or expansion for this project.

5.6.2 Site security and lighting

As part of the approved Tallawarra Stage A CCGT development, security fencing and lockable gates will be provided around the Tallawarra power station site at all possible site access points, including the main access road, to prevent unauthorised access. The Tallawarra Stage B power station and auxiliary facilities would be located within the broader Tallawarra power station site. No modification to the security of the site is required as part of the Tallawarra Stage B development.

External lighting will be provided in the Tallawarra Stage B plant area. Lighting will be kept to the minimum required for operational needs and safety. Installation would be designed to meet ASNZS 4282 – *Control of Obtrusive Effects of Outdoor Lighting* to ensure the fugitive light emissions are limited.

5.6.3 Sewage treatment

A small amount of wastewater would be generated by staff using the Tallawarra Stage B site. Sewage from amenities provided for staff would be directed, as per current operations, to an existing on-site package sewage treatment plant (as shown in **Figure 5-2**) to ensure that there is no discharge from the site. Treated waste water is utilised for irrigation within the Tallawarra Lands site. The treatment plant, including wet weather storage capacity, has been designed to comply with the relevant Department of Environment and Climate Change (DECC) guidelines and has sufficient capacity to accommodate the additional Tallawarra Stage B workforce. As such, there will be no requirement to augment the sewage treatment or for connection to the Sydney Water sewer, although subject to any further development of Tallawarra Lands and the availability of sewer TRUenergy intends to connect to this system.

5.6.4 Water Intake and Outlet

As outlined in **Section 5.4.1**, it is intended that the Stage B cooling towers will draw make-up for water from Lake Illawarra via the existing inlet canal.

5.6.5 Site access and parking

The existing site access to the Tallawarra power station site, from the Princes Highway via Yallah Bay Road, will be maintained for the Tallawarra Stage B development. The Tallawarra Stage B power station will also utilise the existing site car park facilities.

5.6.6 Emergency systems

The main fire fighting pump for Tallawarra Stage A has been designed to provide for the additional capacity of fire fighting water required for Stage B. The underground fire ring main for Stage A has been equipped with 2 valves at the east side of the plant to allow the connection of an existing ring main for Tallawarra Stage B.

The control room will monitor emergency systems installed around the plant including:

- Comprehensive fire alarm system; and
- Gas leak detection system.

The Stage A Emergency Response Plan will be amended to allow for the construction and operational phases of the proposed Tallawarra Stage B development.

5.6.7 Work compounds

Work site compounds would be located at appropriate locations on the construction site. Typically, the Tallawarra Stage B site compounds would utilise the existing Tallawarra Stage A compounds and would comprise:

- Offices and meeting rooms for construction site personnel;
- Amenity and first aid facilities;
- Storage for light equipment and tools;
- Material storage areas;
- Communication facilities; and
- Parking areas.

Fencing with security points to control access would enclose the site compounds. Electricity, water and other utility services supplied to the compound would be obtained from the existing utilities at the site.