Project Description – Summary of Key Outcomes

AGL proposes to construct and operate a gas turbine power station with a nominal generating capacity of up to 1500 MW. Each gas turbine unit includes the gas turbine itself, a generator and a high voltage transformer with air coolers and filters on the inlet. A gas receiving and conditioning station would be required to ensure flow and pressure control, isolation and filtration.

The Facility may be operated remotely with staff working during day shifts and on call at other times. During operation, between five and ten staff would be employed. Construction for each stage would occur over an approximate 24 month period. The successful contractor would prepare detailed construction programs and plans.

The Dalton Power Project would be constructed in two stages. The total Project would involve the installation of up to six gas turbines with a nominal generating capacity of up to 1500 MW. AGL is seeking approval for both stages of the Project as part of this current application.

The constituent elements of the Dalton Power Project would include the proposed power station; an approximately 3 km lateral gas pipeline connection from the power station to an existing natural gas supply pipeline located to the south of the Site; access road to the Site, a communications tower connected to the Facility via underground services and an access track and a connection between the power station and the existing high voltage transmission system on Site requiring one or two transmission towers within the existing 330 kV transmission line easement.

The Project would involve the construction and operation of the following infrastructure:

Gas Pipeline (northern portion) and Access Road

The Facility would be fuelled by natural gas from a lateral gas pipeline connection to the Moomba to Sydney Gas Pipeline to the south of the Site. The northern portion of this pipeline into the Facility would be developed within a shared easement with a new road to be constructed from the intersection of Walshs Road where the road makes a right angle turn west. The length of the gas pipeline (northern portion) and access road would be 1.9 km (to the edge of the Facility footprint) and the maximum area of the easement footprint would be approximately 4.2 ha. The width of this shared easement and ranges between 10 and 45 m in width, and would require the permanent removal of some vegetation.

Gas Pipeline (southern portion) and Valve Station

The southern portion of the gas pipeline would be constructed within the western easement of the existing Walshs Road reserve. The southern portion of the gas pipeline would extend from a proposed valve station adjacent to the Walshs Road easement to the Moomba to Sydney Gas Pipeline, and would connect with the northern portion of the gas pipeline into the Facility where the proposed new road meets Walshs Road. The length of the gas pipeline (southern portion) would be 1.1 km and the maximum area of the easement footprint would be 0.6 ha (or 0.8 ha including the valve station).

The gas pipeline (northern and southern portions) would be an underground line (except at entry and exit points) and would be located within an easement of approximately 5 m.

AGL proposes the construction of a valve station as the connection point from the Moomba to Sydney Gas Pipeline. The valve station would be set back 25 m from Walshs Road and would occupy and area of approximately 0.22 ha. The area would be fenced off from public access.

Communications Tower Infrastructure

A communications tower would require construction and establishment beyond the Facility footprint. The tower would be approximately 60 m in height, and would be located on an elevated area approximately 1.5 km to the east of the Facility. The tower would be connected to the Facility via underground services and a new access track.

Electrical Infrastructure

The electricity generated by the Facility would be fed into the high voltage transmission network located within the Site via a new connection facility built in stages. To facilitate this connection, one or two additional transmission towers would require construction within the existing 330 kV transmission line easement. The positioning of the tower(s) would be determined during the detailed design stage. The structure(s) would be in the height range of 30 – 40 m and would be located within the existing transmission line easement which forms part of the southern boundary of the Development Footprint.

Other Project Components

Some small amounts of chemicals and oil would be required on-site for use in the Dalton Power Project. Chemical storage would comply with statutory requirements. Water would be stored on-site in tanks for process, domestic and fire fighting uses.

Water and Wastewater Management

A number of feasible options exist, and are being considered, for the water source and treatment for the Facility.

Site water could be sourced from a range of sources including: tankering (by road) water to the Site; groundwater extraction; and via the augmentation of the Dalton or Gunning supply and/or from the Gunning Sewerage Treatment Plant if the water quality is suitable and sufficient water quantities are available.

It is currently proposed that the site water supply may be offsite tankering to meet the essential base domestic and utility water demands, and some or all of the process water demands (depending upon the development option adopted). During further design and development of the power station, further investigations will be conducted on the additional water supply options, with on-site groundwater extraction and/or Upper Lachlan Shire Council water supplies the current preferred options, to meet the full nominated site water supply requirements. The final arrangements would be subject to further feasibility assessment.

Process wastewater would be generated at the Facility by the process of blow down from evaporative air inlet coolers which cool the gas turbine air intake. Blow down water would be collected in evaporation ponds lined with a synthetic liner (such as high density polyethylene) to minimise the risk of the saline blow down water escaping into the natural groundwater system.

Clean rainwater collected from the power plant catchment area would be directed to a sedimentation pond and associated earth bund and diversion drain. The outlet of the stormwater system would be designed to maximize the dispersion of these high flows and thereby minimise their potential to cause soil erosion downstream.

Surface water from the plant footprint such as wash water from turbine washing and cleaning of other components, rainfall runoff from bunded plant areas of the plant footprint, and accumulated water within bunds would be directed through oil and grit traps designed to remove any oil and minimise suspended solids to an acceptable level prior to discharge to the sedimentation pond. This system would also be fitted with a gross pollutant trap to collect any large material mobilised by stormwater.

4.1 Overview

4.1.1 General

AGL proposes to build a gas-fired power plant (known as the Dalton Power Project) at a site north of Dalton, NSW. The Dalton Power Project would be constructed over two stages, resulting in a maximum installation of six turbines with a nominal generating capacity of 1500 MW at the completion of both stages.

AGL is seeking approval for both stages of the Project as part of this current application.

Stage 1 would initially result in the construction of a gas turbine power station with a nominal generation capacity of between 250 and 780 MW. The first stage would consist of the installation of two to four “E” class turbines, or two to three “F” class units. Each “E” class turbine would have a capacity of between 125 and 200 MW each run in open cycle mode, and each “F” class turbine would have a nominal generation capacity range between 200 and 320 MW.

Stage 2 of the Project would involve the incorporation of additional open cycle gas turbine units into the power station to bring the maximum number of turbines to six, and the total maximum generating capacity to 1500 MW. Proceeding with Stage 2 would be likely to be contingent upon the proposed upgrade by TransGrid of the 330 kV transmission line from the Bannaby substation to Yass.

It is envisaged that the Facility would operate in open cycle mode during times of peak electricity demand, typically for less than 15 % of the year (refer also to **Section 2.5**).

Natural gas would be supplied to the Facility via the construction of a gas pipeline extension from the Facility to the existing Moomba to Sydney Gas Pipeline which is located approximately 4 km to the south of the Site.

The proposed gas pipeline connection would be located underground and would be approximately 3 km in length from the proposed valve station to the Facility (calculated to the edge of the Facility footprint). The valve station would occupy an area of approximately 0.22 ha and would connect the Moomba to Sydney Gas Pipeline to the proposed gas pipeline (southern portion) at a location 25 m to the west of Walshs Road.

4.2 Development Area

The Site is located approximately 4 km north of Dalton, and approximately 12 km north west of Gunning in south western NSW (refer to **Figure 4-1**). The Development Area comprises rural land holdings and includes the titles listed in **Table 4-1**.

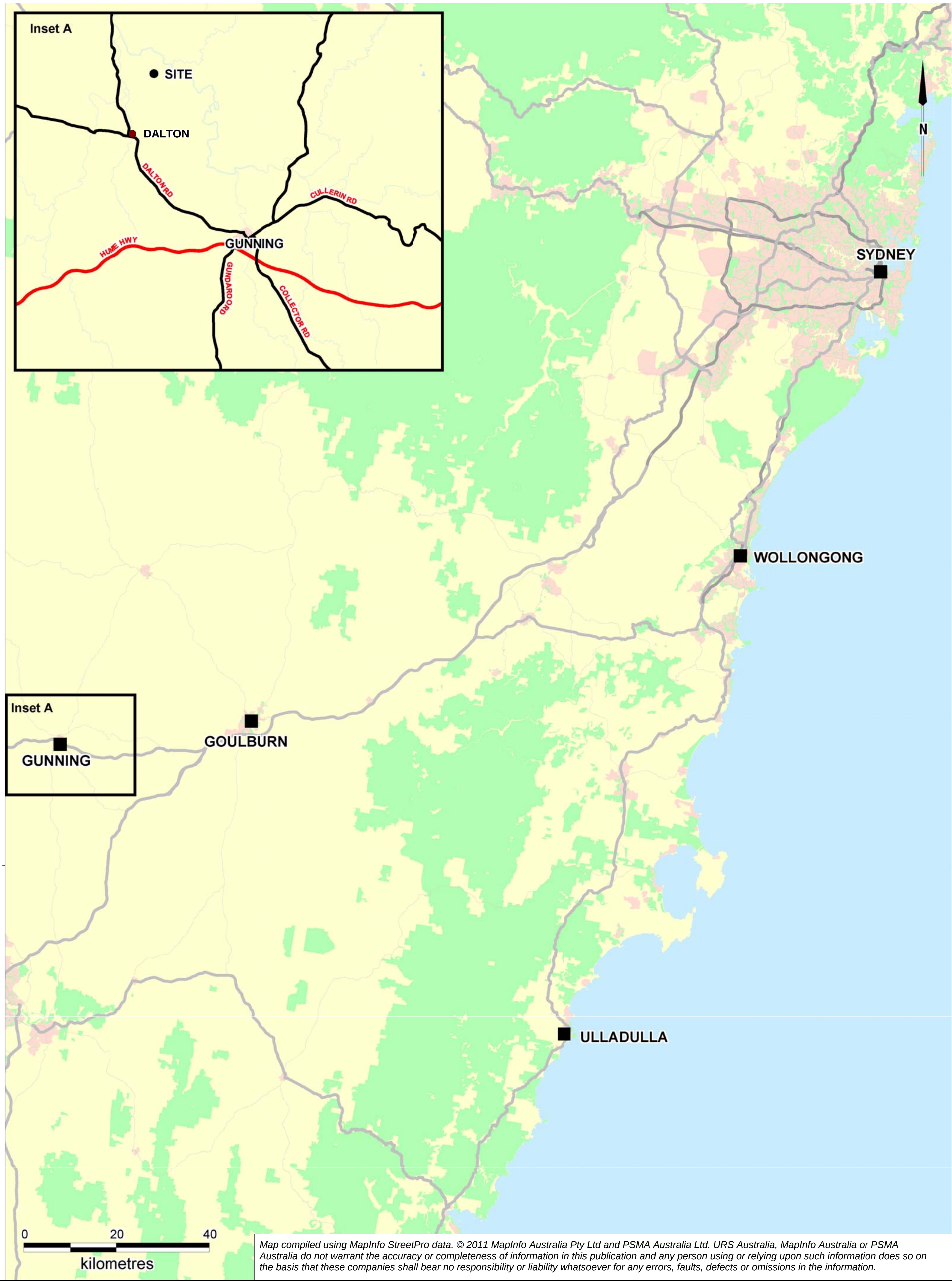
Table 4-1 Titles for Development Area

Lot identifier	Owner	Comment	Proposed Use
Lot 115,249,252,253,305,307 in DP754111	AGL	Formerly "The Elms"	Part infrastructure - gas pipeline (northern section) and access road; transmission connection Part Facility footprint Part access track and underground services to communications tower
Lot 14, 183,184,187,200,283,306 in DP 754111; and Lots 1 & 2, DP 126122	AGL	Formerly The "Holmes"	Part infrastructure - gas pipeline (northern section) and access road; transmission connection Part Facility footprint
Lot 116, 321, 322, 162, 317, 318 in DP754111	AGL	Formerly "Riverview"	Traversed by transmission line Communications tower and part access track and underground services.
Lots 21,186 and 251 in DP754111; Lot 1 DP 126119	AGL		Part infrastructure - gas pipeline (northern section) and access road
Walshs Road easement and parts of Lots 30 and 31 in DP754111	AGL; the Crown; Baines and Baines		Part infrastructure -gas pipeline (southern portion)
Lot 30 in DP754111	AGL		Valve station

The Dalton Power Project would be constructed and operated within an approximately 26 ha footprint within a 508 ha site area. AGL has purchased 573 ha of land in total (shown in **Figure 1-2**, **Chapter 1**). However for the purposes of the Environmental Assessment, the 508 ha boundary encompassing the estates formerly known as "Riverview", "Holmes" and "The Elms" is considered as the Site. The remaining area owned by AGL is land in proximity to and through which ancillary infrastructure would traverse.

The Site currently operates as a rural landholding with sheep and cattle grazing. The majority of the Site is cleared with some areas of woodland in the centre of the Site. Main improvements include existing buildings, dams and sheds.

Developments immediately surrounding the Site are predominantly rural enterprises. The Lachlan River forms the northern boundary of the Site.



Map compiled using MapInfo StreetPro data. © 2011 MapInfo Australia Pty Ltd and PSMA Australia Ltd. URS Australia, MapInfo Australia or PSMA Australia do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that these companies shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

Client	Project	Title
AGL POWER GENERATION (NSW)	AGL DALTON POWER PROJECT	**PROPOSED SITE**
URS	Drawn: SB/AY · Approved: KT · Date: 22/02/2011	Figure: **4-1** · Rev: A
	Job No: **43177661** · File No: 43177661.048.wor	**A4**

4.3 Facility

4.3.1 Proposed layout and key components

Approximately 26 ha of the 508 ha of the Site is required for the Dalton Power Project. The Dalton Power Project comprises the following key components:

- Facility:
  - power plant comprising up to six gas turbines, generators and ancillary plant;
  - high voltage switchyard comprising high voltage transformers and switchgear;
  - transmission line connection to the 330 kV network;
  - control room, administration, amenities, car parking and workshop facility;
  - connecting gas pipelines, gas receiving station and gas conditioning station;
  - fire protection tank(s);
  - process water tank(s);
  - domestic/rainwater tank(s);
  - domestic wastewater treatment and disposal system;
  - sedimentation pond and associated earth bund and diversion drain;
  - evaporation pond;
  - air compressor plant;
  - switchroom;
  - buildings;
  - emergency generator and transformers; and
  - landscaping.
- Infrastructure within Site:
  - a gas pipeline and access road easement connecting the Site to Walshs Road;
  - transmission connection to existing transmission lines within the Site (requiring the construction of one or two new steel lattice transmission towers);
  - communications tower connected to the Facility via underground services and an access track;
  - communications hut (3m x 3m) adjacent to the communications tower; and
  - security and general fencing and gatehouse.
- Infrastructure beyond the Site:
  - portion of the gas pipeline (northern section) and access road to connect to the gas pipeline (southern section);

- gas pipeline (southern section) to be incorporated into the western side of the existing road reserve along Walshs Road; and
- new valve station at the connection point of the proposed pipeline infrastructure with the Moomba to Sydney Gas Pipeline.

The proposed Site layout of the Dalton Power Project is presented in **Figure 4-2**. An indicative arrangement of key components within the Facility footprint is presented in the Indicative Site Concept Plan, **Figure 4-3.**

4.3.2 Staging and Process Description

The Dalton Power Project would be constructed in two stages, and would involve the installation of up to six gas turbine units, and would have a total nominal generating capacity of up to 1500 MW. AGL is seeking approval for both stages of the Project as part of this current application.

The vendors for the gas turbine units would be determined through a tendering process. The potential units would be assessed on the basis of proven levels of efficiency, reliability and operability. It is envisaged that the gas turbines would be proprietary units, provided by manufacturers. Precise outputs would only be known once the tendering process is completed. A nominal output of 1500 MW has been provided for the purposes of this Environmental Assessment. **Figure 4-4** illustrates the general process flow description for a functioning gas fired power station.

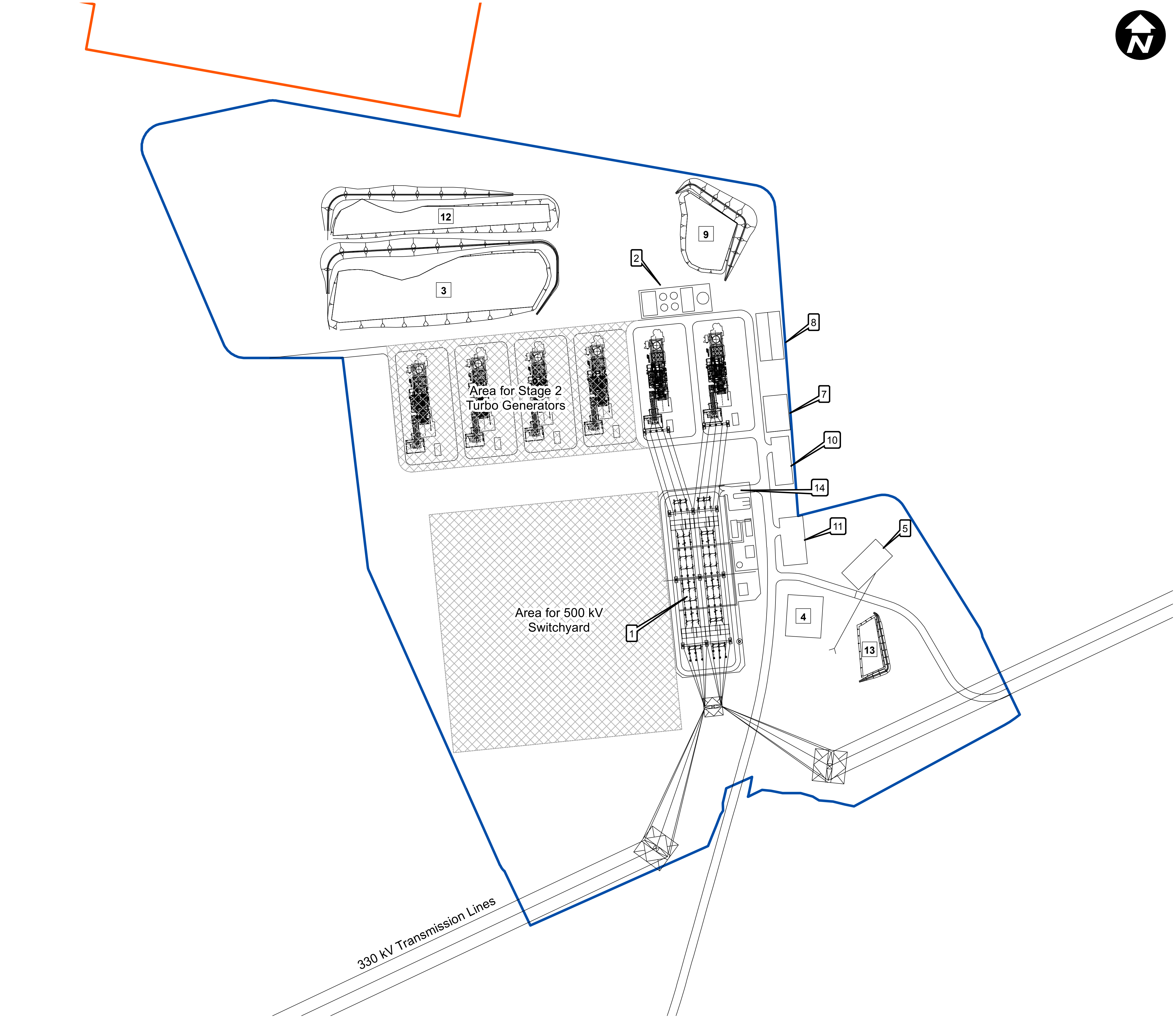
4.3.3 Gas Turbines

The Facility would be constructed over two stages:

- The first stage would initially consist of:
  - between two and four “E” class turbines, with capacity between 125 MW and 200 MW, each run in open cycle mode, **or**
  - two to three “F” class machines with a generation capacity of between 200 MW and 320 MW each, up to a maximum of 780 MW.
- The second stage would result in the residual generating capacity being completed, with a maximum of six turbines on site generating up to nominally 1500 MW.

Each gas turbine generator unit consists of three main items being the gas turbine, generator and high voltage transformer. In each gas turbine, air is drawn in through filters to remove particulate matter and is compressed. The compressed air flows into the combustion chambers where natural gas is injected and burnt, increasing the temperature to approximately 1100 – 1200 ^{o}C.

The combustion products from the combustion chambers enter the turbine area and expand to atmospheric pressure, reducing in temperature to around 550 ^{o}C. As the gas expands, it drives each turbine, which in turn drives the compressor and an electrical generator. From the turbine, the heated exhaust gases pass through a silencer unit and are discharged through a stack. The combustors feature Dry Low NO_x technology to produce very low NO_x emissions.



Legend

Site Boundary

Plant Footprint

1 Switchyard
2 Water Treatment Plant
3 Evaporation Pond (Stage 1)
4 Storm Water Pond
5 Gas Receiving Facility
6 Workshop / Store
7 Control Building
8 Administration Building
9 Sedimentation Pond
10 Staff and Visitor Carpark
11 Contractor Carkpark
12 Evaporation Pond (Stage 2)
13 Sedimentation Pond
14 Switchyard Access Road

0 100
Metres

Source: Translated from ENV002.dwg (Aurecon)

Drawn: SB	Approved: KT	Date: 12/07/2011
Job No.: 43177661	File No.:43177661.047-2.mxd	

Client

AGL POWER
GENERATION (NSW)

Project

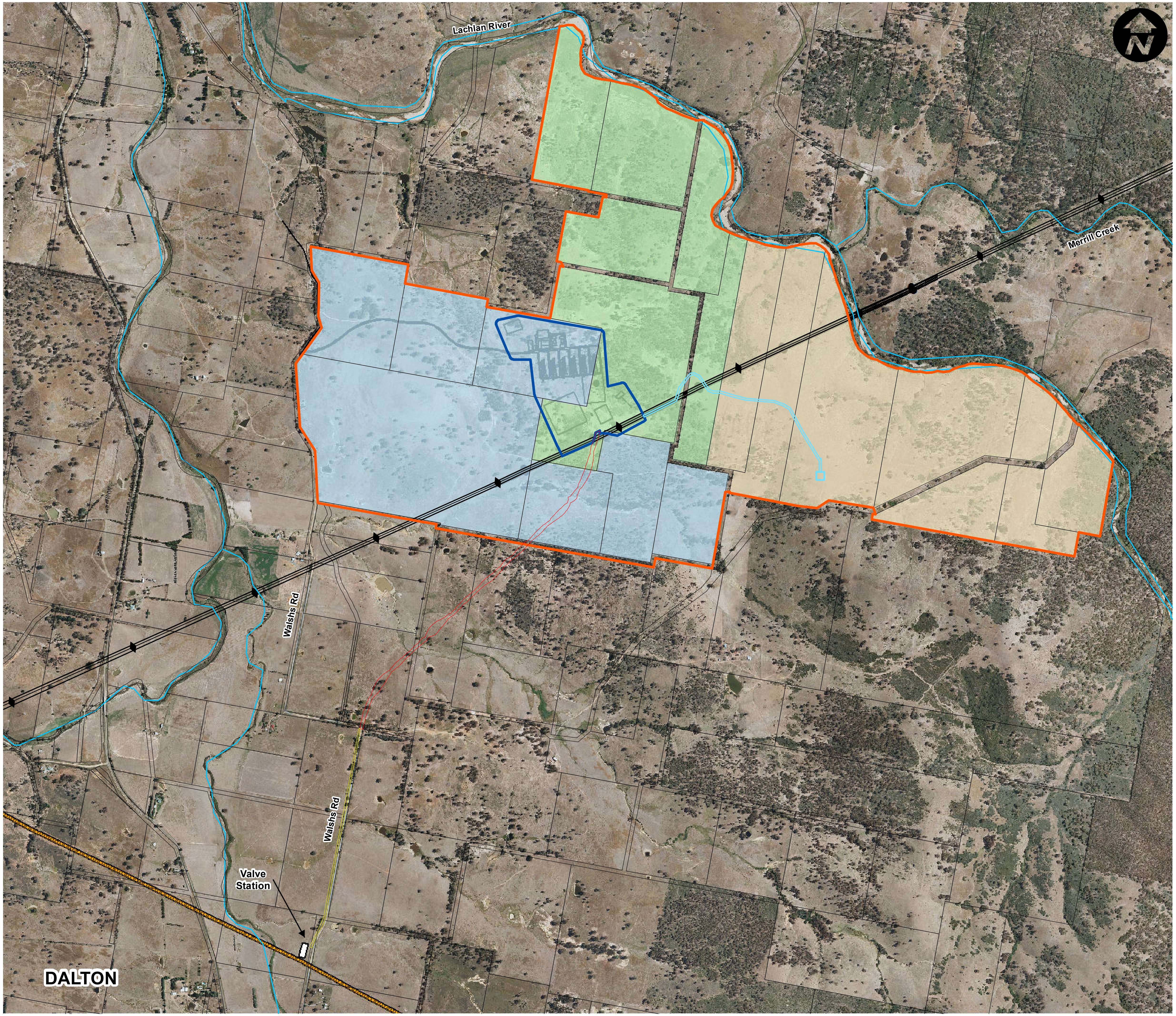
AGL DALTON
POWER PROJECT

Title

INDICATIVE SITE CONCEPT PLAN

Figure: 4-3

URS



Source: Aerial Image from AGL

Drawn: SB	Approved: JM	Date: 24/06/2011
Job No.: 43177661	File No.: 43177661.036.mxd	

Client

AGL

Project

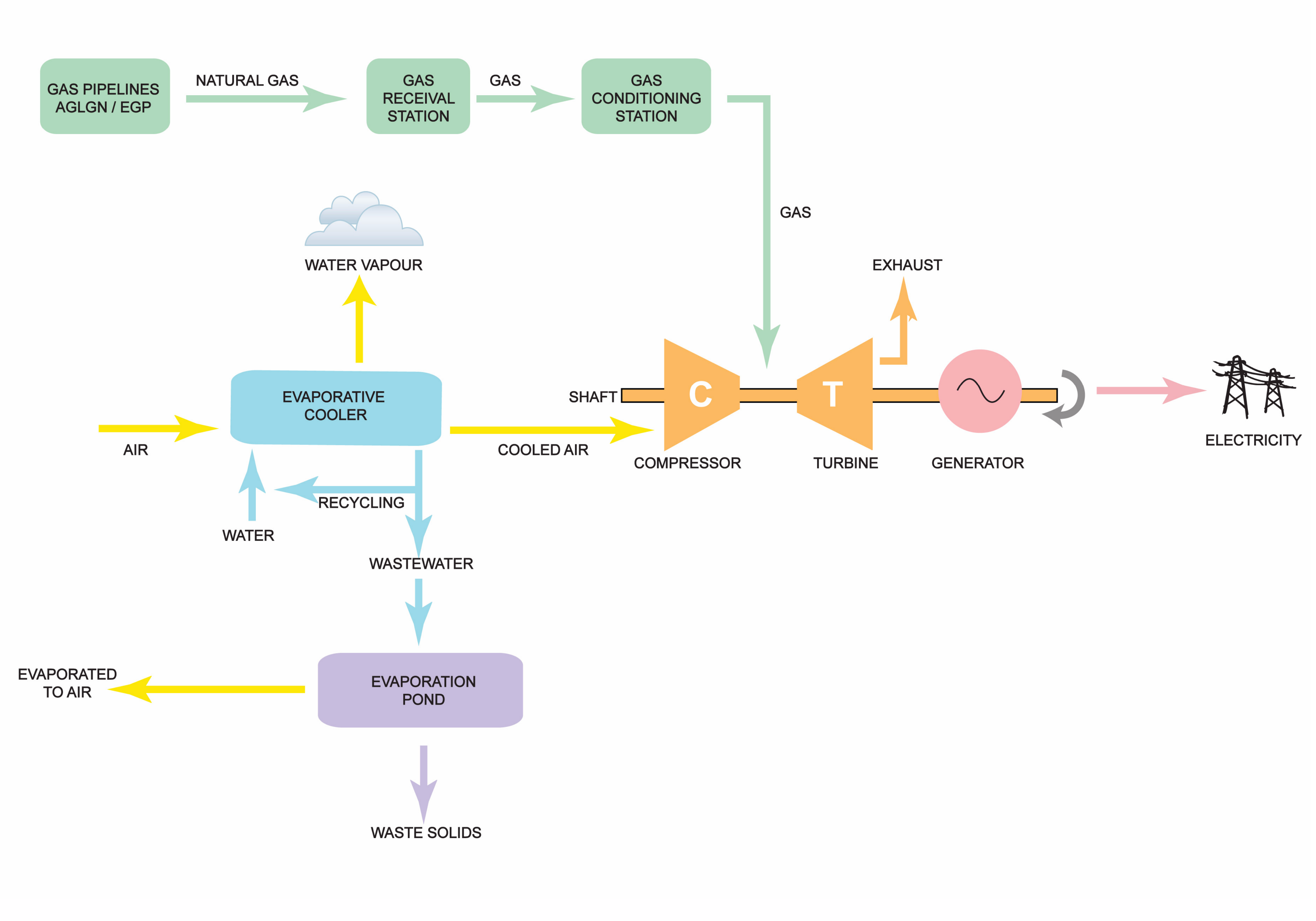
DALTON POWER PROJECT

Title

PROPOSED SITE LAYOUT

Figure: 4-2

URS



Drawn: AJW/SB	Approved: KT	Date: 10/02/2011
Job No: **43177661**	File: 43177661.046.wor	

Client

AGL POWER GENERATION (NSW)

Project

AGL DALTON POWER PROJECT

Title

PROCESS FLOW DIAGRAM

Figure: **4-4**

URS

The height of the exhaust stacks could be up to 46m but likely in the order of 28 to 30 m. The height of the stack is primarily determined by the silencer design. Ancillary plant and buildings would be up to 20 m in height. **Figure 4-3** provides the indicative site concept plan. The outcome of the tendering process would determine the preferred manufacturer and layout.

4.3.4 Inlet Air Cooling and Densification

The following options are being considered:

- high fogging, for densification of gas turbine inlet air;
- evaporative cooling of the gas turbine inlet air cooling.

However, the lack of availability to supply process water beyond the nominated demand (or even any) would not affect the ability of the plant to operate and supply power, merely the efficiency of that generation.

The ambient conditions under which a gas turbine operates have a noticeable effect on the power output. At elevated inlet air temperatures, the power output decreases. The power output decreases due to the decreased air flow mass rate or density (the density of air declines as temperature increases). Conversely, the power output increases when the inlet air temperature is reduced. At inlet air temperatures of near 38°C, power output can drop to as low as 90 % of ISO-rated power for typical gas turbines.

At cooler temperatures of about 4 to 10°C, power can increase to as high as 105 % of ISO-rated power. ISO-rated power refers to the power rating of the turbine at an ambient temperature of 15 °C, relative humidity of 60 % and ambient pressure at sea level.

The density of air also decreases at altitudes above sea level. Consequently, power output decreases with an increase in altitude.

The operation of inlet air coolers is generally only required in warmer weather, typically in summer and to a lesser extent in spring and autumn. The decreased power output of gas turbines at high ambient temperatures means that gas turbine performance is at its lowest at the times power is often in greatest demand and most valued (in the local context). Cooling the air entering the turbine by 4 to 10°C on a hot day, thus increasing the air density, can increase power output by approximately 1 to 3%. The decreased power resulting from high ambient air temperatures can be mitigated by inlet-air cooling, including evaporative cooling.

The density of the inlet air can also be increased by directly spraying very finely dispersed water (‘fog’) into the inlet air stream. This is referred to as ‘high fogging’. Ion-exchange (I-X) or electro-deionisation (EDI) would be required as one of the pretreatment processes (regardless of the supply source) if high fogging is applied.

In the water supply and demand scenario for a high fogging option, the potential wastewater volume would be such that evaporation ponds alone as the primary wastewater concentration method becomes less attractive. In this context, based on preliminary assumptions of treatment technologies and wastewater volumes, a brine concentrator may be required to concentrate the wastewater and recover water for recycle. The concentrated brine would either be directly tankered offsite or discharged to an evaporation pond.

4.3.5 Fuel

The fuel for the turbines would be natural gas supplied by a lateral gas pipeline to the existing Moomba to Sydney Gas Pipeline. The new lateral gas pipeline would be located underground, extending from the proposed valve station adjacent to the Moomba to Sydney Gas pipeline, along the western side of the Walshs Road easement, and extending north east within the proposed gas pipeline (northern portion) and access road easement to be developed to the Facility.

The Moomba to Sydney Gas Pipeline would deliver gas at a maximum pressure of 6 MPa to the gas receiving station where it would be reduced to 3.5 MPa or lower prior to injection into the gas turbine.

Safety features at the gas receiving station include automatic shutdown due to low pressure. There would also be manual shut down (i.e. isolating manually) at the pipeline off take. Methods to prevent pipeline leaks would include:

- coating on external surfaces;
- regular patrolling of pipeline; and
- cathodic protection for external corrosion.

These methods would be detailed in a plan for pipeline protection.

4.3.6 Gas Conditioning Station

The gas conditioning station is the connection of the supply of gas into the power station. The final location would be determined during detailed design.

The following equipment would be located in the pipeline delivery facility:

- header pipeline connecting the conditioning station to each of the gas turbines;
- actuated isolation valve installed at the inlet facility;
- gas filtration, heating and pressure regulation equipment;
- over pressure protection and pressure relief systems; and
- process control and communications equipment.

The header pipeline connects the pressure regulation station to the inlet gas manifold at the gas turbines. The length and diameter of the header pipe would be determined in the detailed design phase and would be designed to comply with the requirements of Australian Standard *AS4041 Pressure Piping*.

Safety features would be installed to provide overpressure protection. The delivery facility would incorporate equipment to vent gas from the connecting pipeline if required for maintenance or in an emergency situation. In the event of a plant trip signal and the sudden reduction in gas demand, pressure protection mechanisms would need to be in place to protect pipe work from overpressure between the pressure regulation and station and the gas turbine facility. These mechanisms would be determined in the detailed design phase but would include a pressure relief valve and / or control valves and slam-shut valves.

4.3.7 Gas Receiving Station

The receiving station regulates the gas entering the power station. The inlet facility would contain the following equipment:

- gas filtration, custody transfer, flow control and metering;
- process control and communications equipment; and
- pipeline connection to the gas conditioning station.

This station would be fenced.

4.3.8 Electrical Generators

Attached to each gas turbine is an electrical generator that generates electricity when rotated by the turbine. The generators are large items of plant, assembled off-site and delivered in one piece.

4.3.9 Emergency Generator

An emergency generator would be available as back up to ensure an uninterrupted power supply for plant start up. This emergency generator would use diesel. A diesel tank of up to 10,000 L would supply this generator. The diesel tank would be managed in accordance with the requirements of the *Occupational Health and Safety Act 2000* and the *Occupational Health and Safety Regulation 2001*. Diesel is a class C1 combustible liquid and not listed in the Australian Dangerous Goods Code. The diesel tank would be installed in accordance with relevant WorkCover requirements and Australian Standard *AS1940:2004 Storage and Handling of Flammable and Combustible Liquids*.

Although diesel is not classified as a hazardous material; it is combustible. The diesel tank, associated pipelines and fittings would be constructed in accordance with relevant Australian Standards and regular inspection and/or testing shall be conducted by a licensed contractor.

Diesel would not be used as a fuel for the turbines.

4.3.10 Transformers and High Voltage Switchyard

The electrical transformers step the voltage from the generator at around 16 kV to 330 kV. Each gas turbine generator set would be connected to a switchyard operating at 330 kV. The transformers would have appropriate switchgear to ensure safe and reliable connection to the electricity network.

The switchyard is proposed to be located adjacent to the power plant and transmission line traversing the Development Site. During the Connection Application process and ongoing consultation with TransGrid, the switchyard design will be further refined to address network issues.

4.3.11 Transmission Tower(s)

The electricity generated by the Facility would be fed into the high voltage transmission network located within the Site via a new connection facility that is proposed to be built in stages. To facilitate this connection, one or two additional transmission towers would require construction within the existing TransGrid 330 kV transmission line easement. The positioning of the tower(s) would be determined during the detailed design stage. The structure(s) would be in the height range of 30 – 40 m and would be located within the existing transmission line easement which forms part of the southern boundary of the Development Footprint.

Indicative dimensions of transmission line structures (suitable for a 330kV transmission line) are outlined below.

Table 4-2 Indicative Tower Configuration

	Steel Lattice Tower
Average Height Range	30 – 40 m
Dimensions of base	9.5 m x 4.75 m to 12.3 m x 12.3 m depending on design configuration
Max Height to cross-arm	31 m
Cross-arm width	22 m – 30 m
Foundation Type	Typically bored footing or mass concrete footing
Typical foundation depth	2 - 2.5 m
Typical average span across level ground	200 – 400 m

4.3.12 Communications Tower

A communications tower would be located beyond the Facility footprint. The tower would be approximately 60 m in height, and would be located on an elevated area approximately 1.5 km to the east of the Facility.

Infrastructure for the communications tower includes:

- underground services - electricity and communications;
- access track to the tower from the Facility; and
- communications hut (dimensions 3m x 3m).

The underground services would be collocated in the same alignment as the access track. The footprint of this access track is 10 m wide allowing for construction activities including trenching for the services and grading the access track (refer to **Figure 4-2**).

The tower would be approximately 60m in height, and would be a steel lattice structure with a base of approximately 10 m by 10 m. The communications hut would be located adjacent to the tower and would be an approximately 3 m by 3 m structure. A footprint of 40 m by 40 m has been allowed for the location and construction of the tower and hut (refer to **Figure 4-2**).

Ground disturbing activities associated with this infrastructure would be limited to the excavation of a narrow trench, and grading of surface material to form a suitable access track to the communications tower location. The ground disturbing works anticipated for the tower assembly would be to establish footings for the structure and the communications hut. This infrastructure has been sited to avoid the need for any vegetation clearing beyond exotic pasture communities.

4.3.13 Buildings, Amenities and Security

A number of buildings would be constructed within the plant footprint. Buildings would include buildings for administration, amenities, control room facilities, security gatehouse, workshops, and storage facilities (refer to **Figure 4-3.** This represents a preliminary, and indicative, site layout arrangement that will be finalised post approval). The plant footprint would be surrounded by a fence. Lighting would be installed for safe working and security purposes and would be designed such that light is contained within the Site.

4.4 Water and Wastewater

4.4.1 Water Demand

Table 4-3 outlines the breakdown of indicative water requirements for specific uses within the Facility, outlining indicative water requirements for nominal 750 MW (Stage 1) and 1500 MW (Stage 2) plant options on the basis of supply of the process water demands for 438 hours (5 % of the year).

It is important to note that the lack of availability to supply process water beyond the nominated demand (or even any) would not affect the ability of the plant to operate and supply power, merely the efficiency of that generation. The only water that is essential to facilitate operation is fire water (to fill the tanks), some utility water and a domestic water supply i.e. less than 3 ML/a.

The demands nominated in **Table 4-3** are indicative only and would be refined in later stages of facility design. AGL has considered a range of options for generator cooling water. Further refinement of these options by AGL has narrowed the options to:

- E Class turbines (up to 4 per stage of development) that operate with high fogging all of the time (if water is available), and evaporative cooling in hot weather, and
- F Class turbines (up to 3 per stage of development) that use evaporative cooling only in hot weather.

If high fogging is not included, the overall water demand, as can be seen in **Table 4-3** would be substantially reduced (by about 78 %, noting also that there is one less turbine in the F-Class case).

Also, if high fogging is not included, then it is possible to supply high quality (low total dissolved solids) potable water as make-up to the inlet air evaporative coolers rather than the nominated deionised water.

Table 4-3 Indicative water demand requirements

Water Demands	Total Amount (ML/year)						Water Quality Requirement
	E Class Turbines with evaporative cooling and high fogging		F Class Turbines with evaporative cooling only		Minimum Demand (no evaporative cooling or high fogging demand		
	Nominal 750MW Installed Capacity (Stage 1)	Nominal 1500MW Installed Capacity (Stage 2)	Nominal 750MW Installed Capacity (Stage 1)	Nominal 1500MW Installed Capacity (Stage 2)	Nominal 750MW Installed Capacity (Stage 1)	Nominal 1500MW Installed Capacity (Stage 2)	
High fogging water (for turbine inlet air densification)	39.1	78.2	-	-	-	-	Deionised water
Evaporative cooler water (for turbine inlet air cooling)[&]	12.0	24.0	10.0	20.0	-	-	Deionised water or high quality (low TDS) potable water*
Potable water	0.2	0.3	0.2	0.3	0.2	0.3	Potable water
Gas turbine compressor wash	0.4	0.8	0.4	0.8	0.4	0.8	Potable water
Other utility water	1.0	1.5	1.0	1.5	1.0	1.5	Filtered raw water or potable water
Fire fighting system[#]	0.0	0.0	0.0	0.0	0.0	0.0	Filtered raw water or potable water

Water Demands	Total Amount (ML/year)						Water Quality Requirement
	E Class Turbines with evaporative cooling and high fogging		F Class Turbines with evaporative cooling only		Minimum Demand (no evaporative cooling or high fogging demand		
	Nominal 750MW Installed Capacity (Stage 1)	Nominal 1500MW Installed Capacity (Stage 2)	Nominal 750MW Installed Capacity (Stage 1)	Nominal 1500MW Installed Capacity (Stage 2)	Nominal 750MW Installed Capacity (Stage 1)	Nominal 1500MW Installed Capacity (Stage 2)	
Landscaping#	0.0	0.0	0.0	0.0	0.0	0.0	Raw or potable water (depending upon dissolved solids of raw water)
Annual Water Demand	**52.7**	**104.7**	**11.6**	**22.6**	**1.6**	**2.6**	

Notes: * High quality (low total dissolved solids) potable water can be used for this demand, but if deionised water is required for high fogging and a deionised water supply would therefore be produced, it is preferable to also supply this water quality for this demand.

There is a 3 ML firewater demand to initially fill up the fire water tanks that would need to met over and above the annual demand. Topping up these tanks associate with minor firewater use eg equipment testing, is assumed to be met from the utility water demand. Similarly, a small amount of landscaping water might be required during establishment, but would not be an ongoing demand.

& For the high fogging case, (ie E Class generators) this assumes that the make-up will be deionised water, and for the F-Class case, that the make-up will be high quality potable water, which has an associated higher blowdown rate due to the higher make-up water TDS.

The water requirement nominated in **Table 4-3** is the demand only and the water supply requirement for the Facility would be higher and dependent upon the water supply source and the extent of wastewater treatment and recycling incorporated into the design. Different water sources would have different qualities and therefore different pre-treatment requirements. There are water losses (as wastewater streams) associated with the potential pre-treatment processes. Potential wastewater treatment options, such a brine concentration, have been considered, which would produce high quality recycle water stream. Further discussion on water demand is presented in **Chapter 14**.

4.4.2 Water Supply

Sources

A number of potential water sources for the Dalton Power Project have been considered. The possible options may include one or a combination of:

- Utilising existing Upper Lachlan Council water supply;
- Lachlan River off take via the existing Upper Lachlan Council entitlement;
- Lachlan River off take via a new off-take;
- Local groundwater (via extraction bores);

- Delivering of water to site by truck;
- Rainwater harvesting (rooves and surface runoff); and
- Treated wastewater (including blowdown water and water from other on-site storages).

The overall water supply requirement to meet the water demands is a function of the pre-treatment requirements of the water supply. Different water sources would have different qualities and therefore different pre-treatment requirements. There are water losses (as wastewater streams) associated with the potential pre-treatment processes. The final water supply arrangement for the site may be a hybrid of different sources.

A summary of the water supply options is presented in **Table 4-4**. More detailed discussion of each option is provided in **Chapter 14.**

Table 4-4 Summary of Water Supply Options

Water Supply Options	Advantages	Disadvantages	Conclusion
Dalton potable water supply (groundwater)	Existing water supply in reasonable proximity to site. Water supply system is proposed to be upgraded.	Likely to be insufficient excess capacity to be the main water supply for the site, although this may change with proposed ULSC upgrades. Marginal water quality as a potable water supply without further treatment (though fine for further treatment to process water)	May be an option as a supplementary supply but unlikely to be sufficiently available excess capacity to be the main supply, although this may change with proposed ULSC upgrades.
Gunning potable water supply (Lachlan River offtake)	Council extraction entitlement held, which is well in excess of site needs. Water supply system is proposed to be upgraded.	Source is 15 km from the site (if piping). There is a suggestion that there is potential water supply constraints associated with the available water from the river.	Potential option as a primary water supply source but further investigation is required to determine feasibility, and to assess the implications of the proposed system upgrades.
Gunning treated sewage effluent (recycle water)	Initial indications are that there may of the order of 40ML of excess effluent, which is sufficient for all of or a reasonable proportion of site needs.	Source is 15 km from the site (if piping). Recycled water quality is not yet clear, but there is likely to be a higher pretreatment requirement. Microbiological quality risks would need to be managed.	Potential option as a supplementary water supply source but further investigation is required to determine feasibility.

Water Supply Options	Advantages	Disadvantages	Conclusion
Direct Lachlan River offtake	River in reasonable proximity to the site.	Suggestions that the supply may be seasonally constrained. Entitlement would need to be acquired. Diversion infrastructure required. Marginal water quality as a potable water supply without further treatment (though fine for further treatment to process water)	Not initially attractive relative to other options and would only be considered further if primary options prove unviable.
Groundwater extraction	Groundwater is available in the area. Although, relatively, local aquifers are not high yielding it is reasonably possible that the sufficient groundwater supply could be acquired from a number of bores on or nearby the site.	Entitlement would need to be acquired within the existing cap. Further investigations, including drilling, would be required to locate extraction bores, with no guarantee of success. Groundwater TDS may be higher than other potential supplies.	Potential option as a primary water supply source but further investigation is required to determine feasibility.
Tankered water (from sources identified above or another source beyond the immediate region)	Water can be sourced and is a guaranteed supply	Base domestic and utility water demands readily met by tankering. Relatively large overall water demand, including process water, to supply by tankering . Therefore large number of trips per year and potentially relatively expensive.	This is currently the only guaranteed water supply, and although other options would be considered and may be implemented, provision would be made for receiving tankered water.
Roof runoff harvesting	Reasonably good quality water.	Yield small relative to over water demand	This would be implemented as part of the design to provide supplementary water.
Stormwater runoff harvesting	Available onsite.	Could impact on downstream waterways, which has not been assessed. Objective to retain post development hydrology as close as possible to pre-development.	Not currently proposed.

For the purposes of this Environmental Assessment, it is currently proposed that the site water supply be through offsite tankering to meet the essential base domestic and utility water demands, and some or all of the process water demands (depending upon the development option adopted).

During the further design and development of the power station, further investigations will be conducted on the aforementioned supplementary water supplies, with on-site groundwater extraction and/or Upper Lachlan Shire Council water supplies the current preferred options, to meet the full nominated site water supply requirements. The final arrangements would be subject to further feasibility assessment. Further consideration, if necessary, may be given in the detailed design stage regarding piping from these sources, however, this Environmental Assessment does not address the broader environmental impacts associated with construction and operation of a water supply pipeline from these sources.

Demand

Assuming assume no significant implementation of the potential minimisation and recycling measures other than the recycling of brine concentrator distillate in the high fogging options, the overall water supply requirement then, depending upon the water source or combination of sources may be of the order of up to:

- **2 to 3 ML / annum** minimum water demand
- **10 to 20 ML / annum** overall for Stage 1 and **20 to 40 ML / annum** overall for Stage 2 for the F-Class case (evap cooling only)
- **50 to 70 ML / annum** overall for Stage 1 and **100 to 140 ML / annum** overall for Stage 2 for the E-Class case (evap cooling and high fogging).

Further discussion on water demand is presented in **Chapter 14**.

4.4.3 Wastewater Management

Wastewater from the Facility would be generated by the following operations:

- wastewater from evaporative cooler operation (referred to as blow down water);
- wastewater from water pre-treatment operation including:
  - pre-filtration backwash wastewater;
  - desalination system concentrate (high TDS reject steam); and
  - ion-exchange plant regeneration wastewater (and activated carbon pre-filter backwash, or EDI concentrate.
- wastewater from maintenance activities;
- domestic wastewater;
- spills; and
- stormwater collected in bunded areas.

Brine Concentrator

In the water supply and demand scenario for a high fogging option, the potential wastewater volume would be such that evaporation ponds alone as the primary wastewater concentration method would become less attractive. In this context, based on preliminary assumptions of treatment technologies and wastewater volumes, a brine concentrator may be required to concentrate the wastewater and recover water for recycle. The concentrated brine would either be directly tankered offsite or discharged to an evaporation pond.

Process Wastewaters

The estimated wastewater generation quantities are:

- Stage 1: ranging from approximately **0.2 ML/annum** for a potable water supply case with a brine concentrator (fogging) compared to **5.4 ML/ annum** for a high TDS groundwater supply case for evaporative cooling; and
- Stage 2: ranging from approximately **0.4 ML/ annum** to **10.7 ML/ annum** respectively.

Process wastewaters, which are characterised by high TDS would be discharged directly to an evaporation pond for volume reduction and periodic offsite tanker disposal, or via a brine concentrator. In the case of the brine concentrator, the estimate volume is relatively small (~770 kL/a) and may be directly tankered off site for disposal at an appropriately licensed facility. Nevertheless, it has been assumed that it will be discharged to an evaporation pond for planning purposes.

Indicative sizing of the evaporation ponds for Stage 1 and Stage 2 is presented in **Table 4-5**.

Table 4-5 Evaporation Pond Indicative Sizing

Evaporation Pond	Evaporative surface area (m^2) (approx.)	Depth (m) (approx.) (excluding freeboard capacity)	Capacity (ML) (excluding freeboard capacity)
Stage 1	36,000	1.00	36
Stage 2	36,000	1.00	36

The pond sizing is very indicative and would be finalised when Project design is verified. The evaporation ponds are able to be accommodated within the Project footprint as shown in **Figure 14-3**.

A pond liner would be required to avoid contamination of surface water, soil and groundwater. A composite pond liner is proposed. The liner may consist of a High Density Polyethylene (HDPE) geomembrane placed over 1 m of compacted clay, to achieve a minimum combined permeability of $1x10^{-9}$. This is a preferred choice over a solitary clay liner, to minimise the potential for cracking of the clay liner and to define the boundary between sediment and liner, thus assisting cleaning of sediments. The final liner design would be considered in further design stages, understanding however that it would meet the regulatory permeability requirements.

Domestic Wastewater

A small amount of domestic wastewater would be generated by staff using the site. This is estimated to be less than 200 kL/annum. Wastewater generated may contain pathogens, oils and greases and small amounts of other chemicals such as detergents and soaps. Wastewater would be treated on-site to meet on-site disposal standards. The on-site disposal would utilise proprietary treatment system (examples of such systems include Advanced Wastewater Treatment System (AWTS) or Ecomax system) to ensure that there is zero discharge from the site. Appropriate investigations, if required, would be undertaken on the selection of the system to ensure that the manufacturer's installation requirements are met and that there is no discharge to the environment.

Alternatively a storage and pump system could be used to dispose of wastewater off-site at an appropriately licensed facility, or wastewater would be stored in a sewer tank and pumped out periodically.

Wastewater from Maintenance

It is expected that 1 to 2 ML/annum of wastewater could be generated from cleaning and maintenance at the plant. Liquid wastes generated through the washdown of the turbine blades is expected to contain only contaminates from the inlet air and the cleaning agents used. This waste water would be collected in washing bays in a bunded area and then disposed of off-site by a licensed contractor. Such a system would be used during construction works.

Fire Water

In the event of a fire, wastewater from fire fighting would be collected in the bunded facility area. The water may be of poor quality and would be assessed after any event and disposed of off site at licensed facilities if necessary. The facility bund would be sized in accordance with relevant guidelines.

Spills

It is possible that accidental spills would produce liquid wastes. This is most likely to occur in the bunded areas and the compound area. A spill management plan would be developed and implemented to minimise the likelihood of spills occurring and to minimise their impact. Spills within bunded areas would be contained within the bunds. Spills within the compound area would be contained within the compound area. Bunds would prevent potentially contaminated water from entering the stormwater system. Impacted bund water would be collected by an eductor truck for offsite disposal to an appropriately licensed facility.

Bund Water

Areas where there is a higher likelihood of spills or leaks occurring would be bunded. These areas include unroofed areas of plant.

As far as possible, rainwater would be prevented from collecting in bunds by ensuring that bunds are no larger than they need to be and by roofing bunded areas where practicable. It is, however, still possible that storm water would fall into bunds and become contaminated. Bunds would be sized to contain not only potential spills but also the maximum of potential firewater and/or rainfall (as per relevant government guidelines). Bunds would be designed so that they do not automatically empty into the compound's stormwater system. Any water contained within the bund would be assessed to determine if it was suitable for discharge into the stormwater system or requires off-site disposal.

Roofed areas of plant and the workshop would also be bunded to ensure that any spills or fire water would not escape into the compound area. Stormwater should not enter these areas. Any liquid contained in these bunds is likely to be contaminated and would be disposed of off-site.

4.4.4 Stormwater Management

The following stormwater management measures are proposed for the Project:

- Swale/Table drains:
  - Divert catchment runoff around the site areas and into the sediment pond.
  - Divert and treat runoff from the power station hardstands into the sediment pond.
  - Treat runoff from the access road via swales.
- Sedimentation Pond:
  - Treat runoff from the disturbed site areas.

Sedimentation Pond

Sediment basins are used to retain coarse sediments from runoff and are important for protecting downstream elements from becoming overloaded or smothered with sediments. They operate by reducing flow velocities and encouraging sediments to settle out of the incoming water stormwater.

Initial assessment estimates the sediment pond volume as 800 kL, 20 m long x 20 m wide x 2 m deep. The permanent pool volume in the sediment pond is 200 kL, which would capture and store settled-out sediments. These sediments would be periodically removed during pond maintenance (normally once per 10 years). The average detention time for the pond would be 48 hours to achieve 85 % removal of suspended solids, some nutrients and metals. The proposed location of the pond is shown in **Figure 14-3**. This pond would discharge to the creek located to the south of the Site.

Bunded Transmission Pad

To contain any potential leaks or spillages the bunded area is proposed in accordance with *AS 1940-2004 The storage and handling of flammable and combustible liquids*. The transmission pad would retain 100 % of the oil volume on site, in the incident of a spill, and to have additional capacity to contain incident rainfall for a 100 year ARI event. Bund drainage (manual) would be confirmed clean and pass through an oil/sediment trap prior to discharge to the stormwater system.

Swales Drains

Vegetated swales are also proposed to convey stormwater in lieu of pipes and provide a desirable buffer between receiving waters (e.g. creek or wetland) and impervious areas of a catchment. They use overland flows and mild slopes to slowly convey water downstream. The interaction with vegetation promotes an even distribution and slowing of flows thus encouraging coarse sediments to be retained.

4.5 Facility Management

4.5.1 Chemicals and Oil Management

Only minor quantities of chemicals and / or dangerous goods would be stored at the Facility. A representative list of the type and quantities of chemicals to be used and stored at the proposed power plant is presented in **Table 4-6**.

Table 4-6 Chemical List

Product Name	Use	Quantity and Area Storage Location	Area of Facility where used
Diesel	Backup generator	Up to 10,000 L in fixed tank	Backup generator
Turbine Oils	Lubrication of turbines and pumps	1,000 L– bulk oil storage	Turbine building
Acetone	Cleaning Solvent	100 L– workshop, storage	Throughout the facility
Insulating Oil	Transformers	1,000 L	Bulk Oil Storage
Miscellaneous oils and lubricants	Lubrication of caustic and acid pumps, fire water pumps, transformer pumps	1,000 L – bulk oil storage	Fire water pump station and switchyard
Wash Water Liquid	Gas wash water additive	1,000 L– bulk chemical storage	Workshop / stores
Carbon dioxide and/or other proprietary fire protection gases such as Inergen and/or FM200	Fire protection and fuel line purging	As required	Throughout the facility
Scale inhibitor	Closed loop cooling system	100 L	Closed loop cooling system
Nitrogen	Gas line purging, in cylinders	As required, in cylinders	Chemicals for maintenance / repair work and clean-up

Note: Brand names are for example only

Chemicals would be stored on-site in designated chemicals storage facilities that would 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 (2008) The Storage and Handling of Corrosive Substances;*
- Australian Standard AS 4332 (2004) The Storage and Handling of Gases in Cylinders; and
- *Occupational Health and Safety Act 2000* and *Occupational Health and Safety Regulation 2001*.

Appropriate spill control would be provided around the gas turbine generators. Appropriate controls and alarms would indicate a lubricating oil leak including the low oil pressure alarm, low oil pressure trip and low oil level alarm.

Packaged chemicals would be stored within the storage room in the main on-site control building or workshop. Separate spillage control would be provided for each of these products, for example by the use of pallet bunds.

4.5.2 Waste Management

Solid Waste

The normal operation of the Facility would not be expected to generate significant quantities of solid waste. Most solid waste would be classified as “inert waste” and would be generated from spent filters – air, fuel and oil filters as well as:

- scrap metal – from packaging waste and plastic cabling;
- general maintenance – e.g. wood and cloth, office waste and chemical containers; and
- salts formed as a result of the evaporation process.

Solid waste would be segregated where possible into recyclable and non-recyclable waste products and disposed of appropriately by licensed contractors.

Liquid Waste

Liquid waste generated at the plant would include:

- potentially direct disposal of brine depending on design of Facility;
- waste oil; and
- used cleaning solvents.

All liquid wastes would be contained on-site and where possible separated into recyclable and non-recyclable materials. All waste would be classified and disposed of by a licensed contractor in accordance with the *EPA's Environmental Guidelines: Assessment, Classification & Management of Liquid and Non-Liquid Wastes* (1999).

4.5.3 Power

During construction and site preparation phases it would be necessary to have power to the Development Site. Power would be supplied from the existing distribution system by connecting to the existing 330 kV transmission line, other distribution supply or by use of temporary generators.

Ongoing local power supply is provided by the substation and local distribution connection.

4.5.4 Emergency Systems

A comprehensive fire alarm system would be installed throughout the plant and monitored from the control room. A gas leak detection system would be installed and monitored at the facility control room. A water tank for fire protection would be installed on-site.

Maintenance checks and training would be conducted to ensure operational preparedness of fire fighting equipment and the staff.

An Emergency Response Plan would be prepared for the Facility for the construction and operational phases of the proposed development.

4.6 Infrastructure

The proposed gas pipeline and access road has been split into two clear sections for the purposes of this assessment (**Figure 4-2**):

- Gas Pipeline (northern portion) and access road incorporates the gas pipeline route as well as a new road to allow access from the Facility to Walshs Road.
- Gas Pipeline (southern portion) would utilise Walshs Road and the gas pipeline would be located in the western side of the existing road easement until the connection point to the Moomba to Sydney Gas Pipeline. AGL proposes the construction of a valve station as the connection point from the Moomba to Sydney Gas Pipeline.

4.6.1 Gas Pipeline (northern portion) and access road

An access road would provide access to the Facility from the south from Walshs Road at the point where Walshs Road makes a 90 degree turn west. The northern portion of the gas pipeline would be collocated within this same easement. This infrastructure easement is approximately 1.9 km. The gas pipeline (northern portion) and access road easement presented in **Figure 4-2** is wider than the total area required, however is provided to encompass the worse case potential impact during construction.

The area of impact for the access road would be driven by the cut and fill areas required which would likely range from 10 to 45 m in width for the access road. Vegetation would need to be cleared to construct the access road, and the road easement would remain permanently cleared. The gas pipeline would be located within this footprint. Some vegetation around the gas pipeline may be allowed to regenerate following completion of construction. However, all vegetation clearing figures given in this report that relate to the Gas Pipeline (northern portion) and access road are maximum amounts of clearing required.

The gas pipeline and access road would also need to traverse up to four unnamed waterways or drainage lines with intermittent flow, or that flow only following rain events. To avoid adverse impacts on drainage catchments, local cross drain culverts would be provided at local gullies, depressions and other features. Water crossings would be designed in accordance with Department of Water and Energy's *Guidelines for controlled activities - Watercourse crossings* (February 2008).

The gas pipeline would be an underground line, except at the entry points to the Facility.

The road would be a sealed carriageway 6 m in width, with 1 m shoulder either side, total 8 m in width.

4.6.2 Gas Pipeline (southern portion) and valve station

The southern portion of the gas pipeline extends from the junction of Walshs Road to the Moomba – Sydney pipeline. In this portion the gas pipeline would be located in the western side of the existing road easement of Walshs Road until the connection point is reached at the new valve station. The width of the easement and construction areas would be between 5m and 6 m.

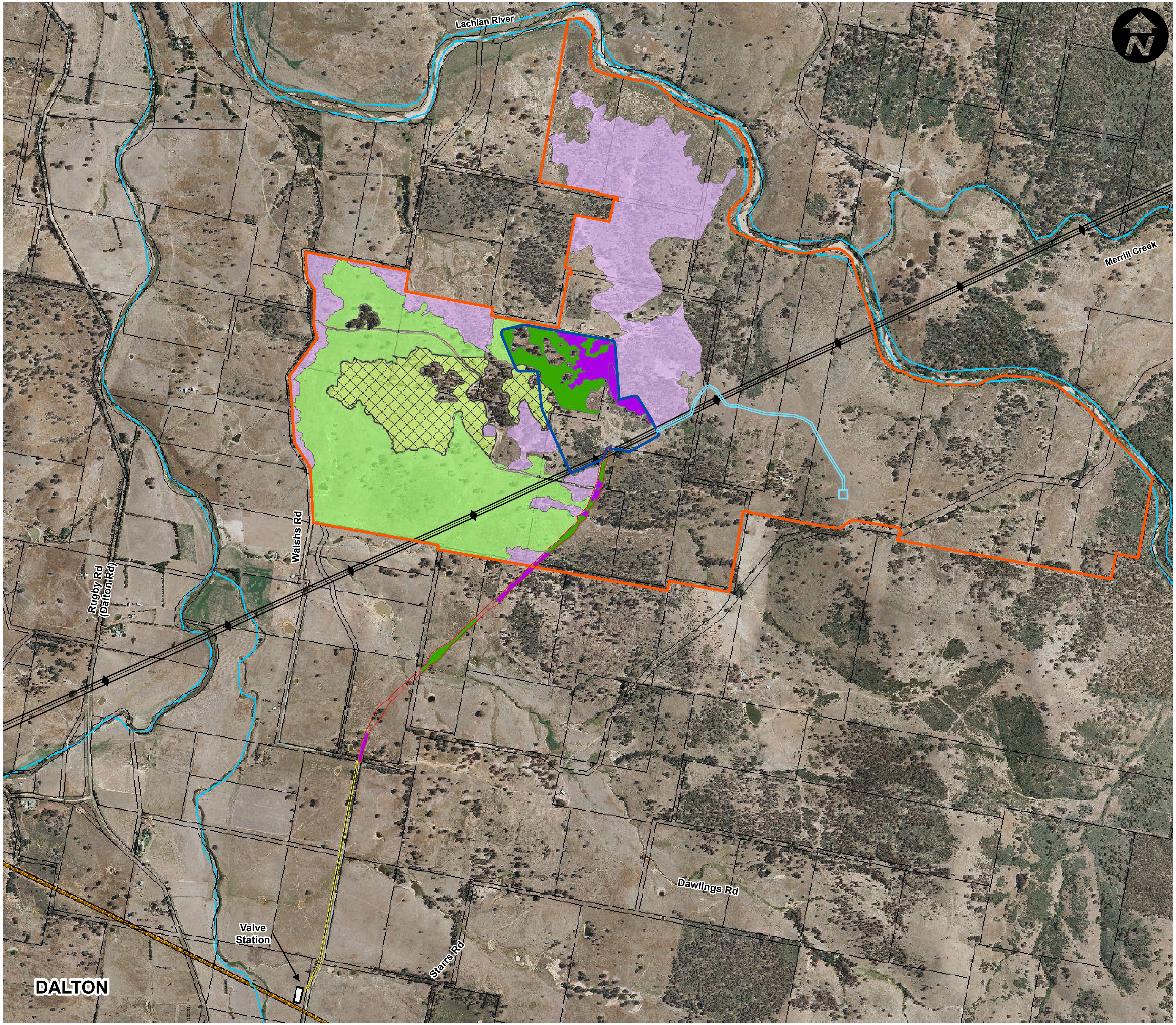
The gas pipeline would be an underground line (except at entry and exit points) extending from the end of the gas pipeline (northern section) and access road to the existing Moomba to Sydney Gas Pipeline at a valve station adjoining the road reserve directly adjacent to Walshs Road.

A new valve station would be constructed as the connection point from the Moomba to Sydney Gas Pipeline. The valve station would be set back 25 m from Walshs Road and would occupy an area of approximately 0.22 ha. The area would be fenced off from public access.

4.6.3 Offset Area

As a key component of the Dalton Power Project is of the proposal for a biodiversity offset area. The proposed offset area for the Dalton Power Project totals 183.26 ha and is sited adjoining the development area, shown in **Figure 4-5**. A decision on the conservation mechanism to be adopted to secure the site in perpetuity would be made in discussion with the OEH and following the determination of the Project.

The proposed offset area recognises the importance of the native biodiversity of the development footprint and encompasses some of the areas of highest relative biodiversity value within the Site. The offset area also includes areas that would otherwise not be conserved either naturally or through existing land management practices.



Legend

- AGL Site Boundary
- Plant Footprint
- Gas Pipeline (northern) and Access Road
- Gas Pipeline (southern)
- Communications Tower and Hut Footprint
- Communications Tower Services and Access Track
- Moomba-Sydney Pipeline
- Transmission Line

EEC's impacted by construction (URS):

- Natural Temperate Grassland^
- Box Gum Woodland*

EEC's for Offset (URS):

- Natural Temperate Grassland^
- Box Gum Woodland*
- Potential Natural Temperate Grassland

* TSC Listed Community
^ EBPC Listed Community

Note: Areas in hectares

0 1
Kilometres

Source: Aerial Image from AGL

Drawn: SB/AC	Approved: JW	Date: 04/03/2011
Job No.: 43177661	File No.: 43177661.068.mxd	

Client

AGL

Project

DALTON POWER PROJECT

Title

PROPOSED OFFSET AREA

Figure:4-5

URS

The key features of the offset area include:

- 158.29 ha of native vegetation which comprises vegetation of high conservation significance, namely, endangered ecological communities:
  - Natural Temperate Grassland (80.71 ha); and
  - Box Gum Woodland (77.58 ha).
- 24.97 ha of Exotic Pasture that with appropriate management has the potential to become Natural Temperate Grassland.
- Protection of areas of native vegetation that have the potential to support a range of threatened fauna.
- Protection of habitat features such as hollow bearing trees, rocky outcrops and fallen timber that may be used by a range of threatened fauna species.

Table 4-7 summarises the offset area.

Table 4-7 Proposed Offset Area

Vegetation Community	EPBC Act Status	TSC Act Status	Total Area in Proposed Offset
Exotic Pasture (Potential Natural Temperate Grassland)	N/A	N/A	**24.97**
Box Gum Woodland	N/A*	Endangered Ecological Community	**77.58**
Natural Temperate Grassland	Endangered Ecological Community	N/A	**80.71**
Total			**183.26**

*Community condition does not meet the condition required to be classified as Box Gum Woodland, under EPBC Act.

Full details of the proposed management regime for the offset area would be included in a management plan that would be prepared in consultation with OEH and SEWPAC.

4.7 Other site areas within the AGL property

The area of the AGL property not covered by the development footprint and offset area (i.e. the eastern portion of the AGL property beyond the communications tower footprint) is not proposed for any further future development by AGL.

This area would be managed in accordance with the management plans identified in **Chapter 13**.

4.8 Operating Hours and Staffing

The Dalton Power Project would be available to operate 24 hours a day, 7 days a week and could be operated remotely by AGL staff with contractors used for maintenance. In practice the Facility would only run during periods of high electrical demand. AGL's experience with its peaking power stations in Victoria and South Australia suggests that the Dalton Power Project is likely to operate between 2 to 15 % of the year.

The actual operating times of the power would be largely dependent on supply and demand conditions in the electricity market. Operation of the Facility is expected to occur mainly during morning and afternoon peak periods in summer and winter when demand rises due to weather conditions. However the Facility is required to be available to operate at any time should it be required to respond to high spot prices in the NEM, system emergency or security situations.

During the operational phase staff levels are expected to average around five personnel and generate around four to five vehicle movements in the peak.

Post construction maintenance of major items would occur once every three years at the most and require up to 100 personnel for a four to eight week period. This activity is likely to generate some cars, trucks and cranes during a weekday.

4.9 Project Construction

The construction and operational timetable for Dalton Power Project would be dependent on growth in electricity demand and economic factors. The Project would be constructed in time to meet projected demand, subject to economic factors such as the price of fuel, equipment, labour costs and the exchange rate. The estimated duration of construction would be around 24 months.

It is anticipated that construction would most likely take place on weekdays from 7.00 am to 6.00 pm during weekdays and 8.00 am to 1.00 pm on Saturdays or in accordance with any Environment Protection Licence conditions. Construction activities would not normally be undertaken on Sundays or public holidays unless inaudible at residential receivers. Where the Project requires construction work outside these hours, the regulatory authorities and affected stakeholders would be consulted and advised accordingly and approval sought where appropriate.

4.9.1 Facility Construction

The following summarises the construction program for the first stage:

- around 24 month duration per stage;
- typical workforce 50 persons;
- peak workforce 250 persons (duration up to two months);

- around 4,600 truck deliveries of construction equipment and materials (e.g. backhoes, cranes, materials, etc). Construction equipment would be sourced locally (where available) and once delivered, would stay on-site for the duration of construction;
- up to four (first stage) over-dimensional and / or over-mass escorted heavy transport convoys of pre-assembled gas turbine, generator and transformer units;
- between 2 and 20 truck deliveries per day of construction materials;
- the majority of the workforce is expected to be sourced from the local region where possible;
- typical peak hourly construction workforce traffic generation of 70 vehicle trips/hour; and
- peak workforce hourly construction workforce traffic generation of 140 vehicle trips/hour.

The construction program for the second stage would comprise Facility construction to achieve the residual generating capacity (an additional two to four turbines) for a completed maximum of six turbines on site. Although it is assumed that construction activities in stage 2 would be generally similar to the first stage, the intensity is likely to be lower as the majority of site preparation works and infrastructure would be established in the first stage.

The Facility construction contractor, prior to commencement on the Development Site, would prepare detailed construction programs and methods. These would be dependent on the detailed design and would need to demonstrate compliance with conditions of consent issued for the Dalton Power Project and other statutory requirements.

Construction activities would include the following:

- site establishment
  - mobilisation - establishing the site with equipment and facilities necessary to execute the construction phase;
  - clearing – managed in accordance with the mitigation measures identified in **Chapter 13**;
  - bulk earthworks – dust suppression and water containment would be employed during the bulk earthworks program to ensure that the effects on surrounding properties are minimised. Where excavation work extends into bedrock, suitable material would be reused as engineering fill on-site. During civil works to prepare the site, safeguards would be developed to protect the Lachlan River.
  - establishing and preparing foundations - foundations for major plant items and buildings would be established. The detailed design and construction of the foundations would take into account potential for geological activity;
- construction of buildings and plant – where possible, to minimise the construction time, prefabricated components would be imported to the site and erected during construction. Mobile cranes would be used to erect and complete the construction of heavy plant items; and
- demobilisation – removing all construction equipment and facilities and rehabilitating the development Footprint where impacted by construction activities.

The site establishment phase would have the following indicative timing post determination:

Month 1

- no physical works to be undertaken on site

Months 2 and 3

- GPS setting out of the Facility footprint- and heritage constraint mapping and staked out
- mobilisation - establishing the site with equipment and facilities necessary to execute the beginning stages of the construction work (huts and mess facilities)
- geotech investigations of plant footprint and road (boreholes)
- formation of laydown areas/ parking areas
- construction of the access road to the facility (4-8 weeks)
- grading works and formation of access track
- truck deliveries of construction equipment and materials (e.g. backhoes, cranes, materials, etc).
- stockpiling of materials

Month 4

- bulk earthworks (benching, cut and fill) (4 weeks)
- on site access road formed

Months 5 – 7

- Bored Piling
- Laying concrete slabs (establishing and preparing foundations)

All plant, equipment, buildings and services would be supplied, erected, operated and maintained in accordance with the relevant Australian Standards and the Building Code of Australia. Where an appropriate Australian Standard may not exist, the most suitable international standard would be used.

Construction Equipment

It is expected that construction would require heavy loads of plant and equipment to be delivered to the Development Footprint. The main components, being the gas turbine, generator and transformers, would be assembled overseas and delivered using special haulage vehicles known as Class 1 Restricted Access Vehicles. These vehicles require special permits and escorts, temporarily disrupting normal traffic flows at defined times approved by relevant authorities. The major plant components requiring special haulage conditions are listed in **Table 4-7**.

Table 4-7 Indicative Gas Turbine equipment transport for Stage 1 and Stage 2

Plant item	Number of items	Approximate weight (tonnes)	Maximum width (metres)	Maximum length (metres)	Maximum height (metres)
Turbine	6	343	5.4	11.2	5.2
Generator	6	230	3.8	10.7	4.2
Transformer	6	127	3.4	7.7	4.2

The remaining plant and equipment would be erected on the Site. The Facility Footprint is sufficiently large to permit laydown areas and parking within the Site.

Major construction equipment types, estimated numbers and purpose are summarised in **Table 4-8.**

Table 4-8 Indicative Construction Equipment and Purpose

Equipment Type	Activity	Estimated Number
Bulldozers	Clearing of vegetation, removal of topsoil, development of internal roads and drainage swales	1
Scrapers	Removal of topsoil, development of internal roads and drainage swales and basins	2
Graders	Site levelling	2
Excavators	Excavation of soil, grading and levelling the site	5
Hydraulic Hammer	Rock excavation	2
Backhoe, Excavators	Trenching	3
Compactor, Rollers	Earth, road base, foundation and pad compaction	5
Cranes	Assembling fabricated building items and positioning plant equipment	2 (25 tonne) 1 (150 tonne) 1 (40 tonne) 5 (20 tonne)
Water Trucks	Moisture and dust control	2
Trucks	Haulage of excavated material, gravel, steel, and reinforcement, etc	5
Concrete Trucks	Delivery and pouring of concrete	8
Fuel and maintenance		2
Over dimensional vehicle	Transformer, gas turbine & generators (possible convoy of one multi-wheel transport unit with up to 3 tow vehicles & under private escort and police control)	6 convoys

4.9.2 Gas Pipeline Construction

The gas pipeline would be an underground line (except at entry and exit points) extending from the existing supply line. The majority of the gas pipeline route would be located beneath existing agricultural land or road reserves.

The pipeline would be approximately 3 km in length (northern and southern portions collectively). The estimated nominal pipeline size is 200 - 400 mm. The pipeline would be made of plastic coated steel.

The gas pipeline (northern portion) and access road would be approximately 1.9 km in length to the point where it enters the Facility footprint. The length of the gas pipeline (southern portion) would be approximately 1.1 km.

The gas pipeline would be constructed in accordance with the requirements of AS 2885 *Pipelines – Gas and Liquid Petroleum* and the APIA *Code of Environmental Practice*.

Construction activities would involve the following key steps:

- clearing of vegetation to prepare a safe construction area and to protect and preserve top soil;
- creating a trench in which to lay the pipeline undertaken by a trenching machine or excavator;
- installing cathodic protection systems;
- installing communications and control systems;
- rehabilitating all disturbed work areas maintaining cleared area;
- testing; and
- installing appropriate signage.

4.9.3 Gas Pipeline Operation

The pipeline and ancillaries operation, monitoring and control would be automated and/or performed remotely. The pipeline would require periodic inspection, maintenance and patrol activities by the pipeline operator. Occasional venting of limited gas volumes would be necessary for maintenance activities.