Narrabri Coal Seam Gas Utilisation Project

PEL 238, Gunnedah Basin

New South Wales

Preferred Project Report

August 2008

Narrabri Coal Seam Gas Utilisation Project

PEL 238, Gunnedah Basin
New South Wales

Part 3A Environmental Assessment

(Project Application 07_0023)

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Preamble

This document introduces the Proponent's preferred project and main objectives for the Narrabri Coal Seam Gas Utilisation Project and describes the various Project components and how they will be constructed, installed and used. This document also records the hours of operation and employment during the construction and operational phases. Planned rehabilitation is also described.

The preferred project incorporates a minor adjustment to the location of the Bibblewindi Gas Gathering System and the alteration of the location of the gas compression facilities at Bibblewindi and the location of the southern terminus of the main gas pipeline. The preferred method of crossing Bohena Creek will be horizontal directional drilling. Reference is made in each sub section to whether or not the component of the project has been modified.

The preferred Project is described in sufficient detail to provide the reader with an overall understanding of the nature and extent of activities to be undertaken. Where dimensional information is provided about the various Project components, it needs to be recognised as indicative only.

This document is effectively a modified version of Section 3 of the Environmental Assessment dated May 2008 without reference to the project alternatives incorporated in that document and needs to be reviewed in conjunction with the Final Statement of Commitments for the Project.

This document has been compiled by Mr Tim Donnan, (B.SC, M.Env.Mgmt) Environmental Officer with Eastern Star Gas Limited with the assistance of Mr Rob Corkery (M.Appl.Sc, B.Sc (Hons), Principal of R.W. Corkery & Co Pty Ltd.

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1 INTRODUCTION

A range of short-term strategic, environmental and socio-economic objectives have been integrated into the Project in support of the longer term goal to develop a sustainable and commercially viable gas field and transmission infrastructure in the Narrabri region. The Project objectives include the following.

- The ongoing assessment and development of both conventional petroleum and Coal Seam Gas (CSG) potential of PAL2 and PEL238.
- The conduct of the Project in line with statutory and regulatory requirements.
- The cultivation of best practice cultures both internally and for external contractors and service providers.
- The mitigation of cumulative environmental impacts associated with this activity with a specific focus on biotic and air quality/greenhouse gas impact minimisation.
- The cost effective production and transmission of CSG to the Wilga Park Power Station.
- The provision of socio-economic benefits to the Narrabri region through goods and services supply and direct/indirect employment.

The Narrabri CSG Utilisation Project comprises four main components, the locations of which are illustrated in **Figure 1.1**.

1. A gas gathering system at the Bibblewindi and Bohena CSG Pilots.
2. Gas compression facilities at the Bibblewindi and Bohena CSG Pilots.
3. A 32km long buried gas flow line.
4. The expansion of the Wilga Park Power Station.

2 OVERVIEW AND LOCATION OF THE PROJECT COMPONENTS

The Project will encompass the following components positioned at the locations indicated in the nominated figures. Reference is made to each of the intended minor modifications in the relevant sub-section.

2.1 Gas Gathering Systems

Bibblewindi CSG Pilot

A minor adjustment is intended to the location of the Bibblewindi Gas Gathering System.

An underground, low pressure gas gathering system (GGS) comprising a network of small diameter (maximum 200mm) high density polyethylene flow lines (PE 100) is required to transport gas from the nine individual wells to the inlet hub and gas compression facility located adjacent to the water management facility at Bibblewindi-1, as illustrated in **Figure 2.1(a)**. The GGS will be laid in a trench with a minimum 750mm earth cover.

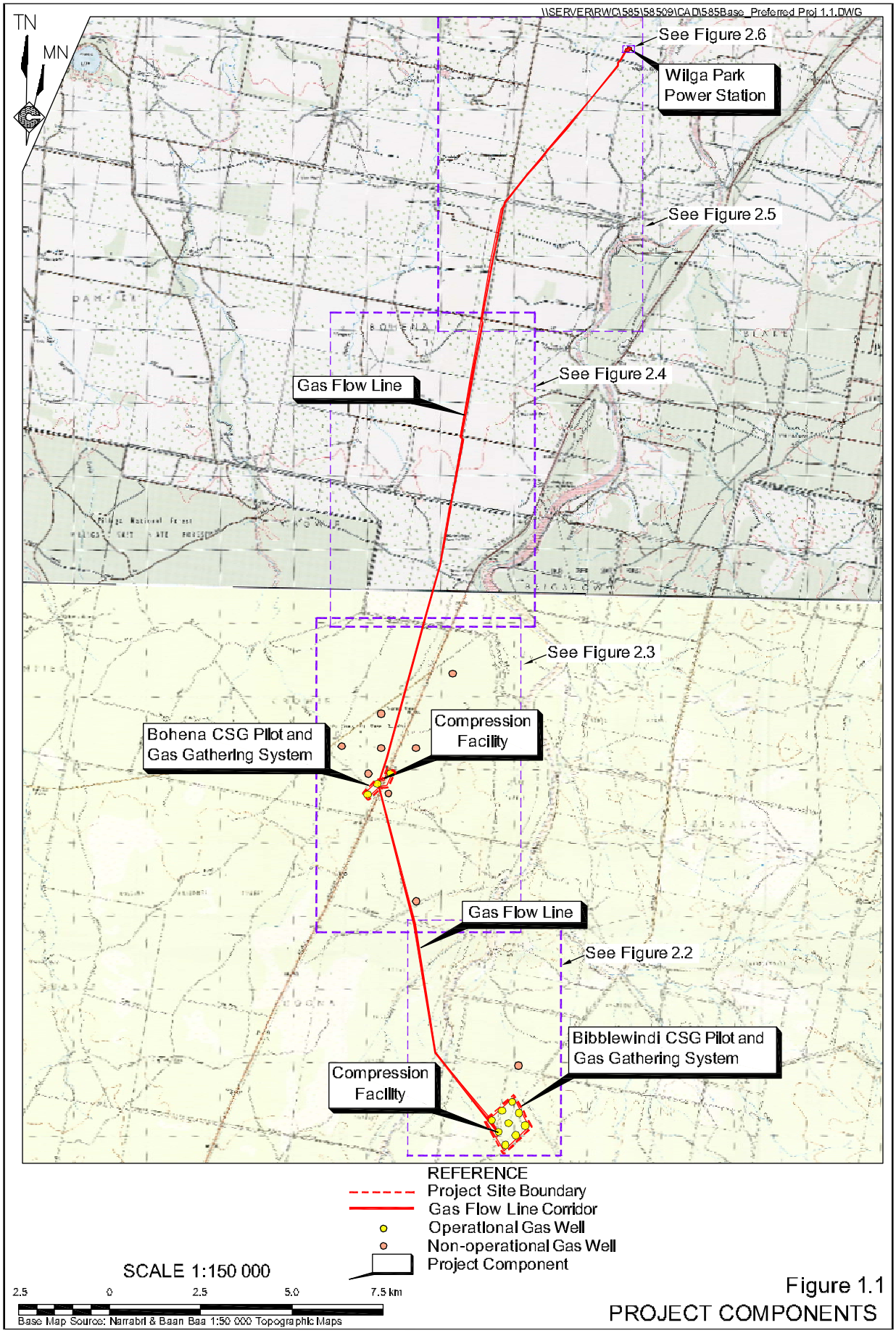

Figure 1.1
PROJECT COMPONENTS

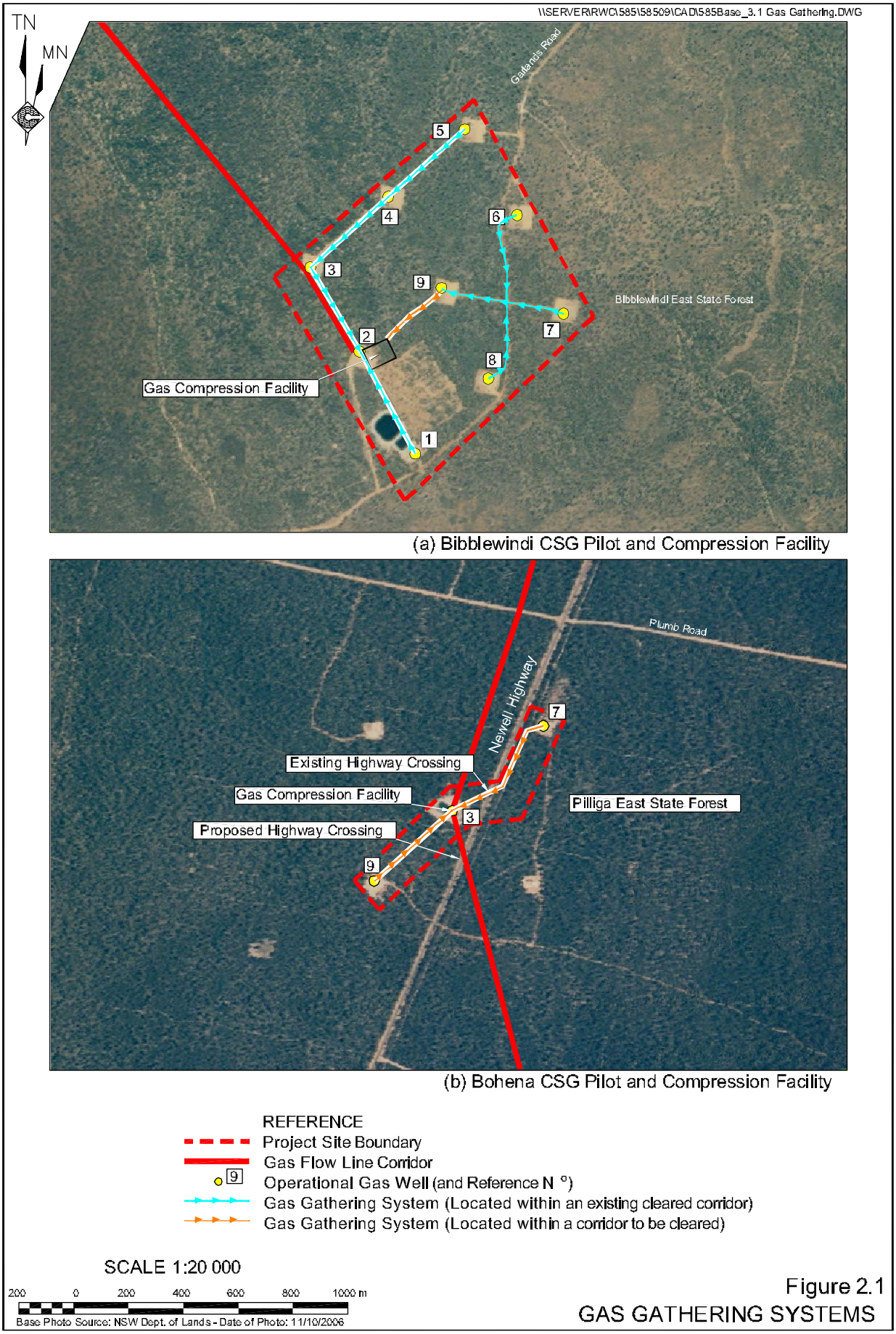

Figure 2.1
GAS GATHERING SYSTEMS

Bohena CSG Pilot

A similar gas gathering system will be installed at the Bohena CSG pilot linking Bohena-7 and Bohena-9 to the inlet manifold and gas compression unit located at Bohena-3 as illustrated in **Figure 1.2(b)**.

2.2 Gas Compression Facilities

The location of the gas compression facility at the Bibblewindi CSG Pilot has been modified from that presented in the May 2008 Environmental Assessment.

The field gas compression facility will be installed at the Bibblewindi CSG Pilot with possible later provision for a small scale booster compressor at the Bohena CSG Pilot. Both locations are shown on **Figure 1.2(a)** and **1.2(b)**.

A review of the intended GGS and the current operation highlighted an opportunity to modify the location of the facility at the Bibblewindi CSG Pilot and consolidate all above ground infrastructure (gas collection and compression) into one location adjacent to the existing operations base at Bibblewindi-1. Incidental reductions in the area of native vegetation impacted by the development would result in addition to providing increased security over the facility and equipment. It is further noted that the relocated gas compression facility would be more distant from the nearest residence ("Burrawarna Park") than the previous location.

The gas compression facility will be a permanent facility required to supply gas to the Wilga Park Power Station during its operational life. As a result, each facility will be designed to ensure ongoing performance reliability and operability. Following compression, the gas will be delivered into a discharge header, through gas metering and then into the GRE (Fibreglass gas flowline) to the Wilga Park Power Station.

Each compressor will increase the gas pressure from approximately 140 kpag to 1100 kpag. The installation of compression is required to transport the gas to the Wilga Park Power Station in sufficient quantities to supply up to 40 MW of generation plant. Initially, there will be one unit installed but provision in the facility design for up to three units will be made.

The skid-mounted design of the gas compression unit will allow easy relocation or re-sizing of the compressors to accommodate changes in gas quantities to be compressed into the gas flow line. The gas compressors will operate continuously, apart from maintenance outages. All equipment required for operation of each compressor (eg. gas filtration and fuel-gas system) will be located within the enclosed unit. The oil-flooded screw compressor will be driven by a gas engine using the in-line gas from the gas wells and develop up to 1 100kW of power – although initial power requirements will typically be only 100kW.

The gas compression facilities incorporate a gravity separation system to separate any water from the gas. Further, the free water (moisture) will be removed at the inlet filter separator and during the heating of the gas product prior to compression and transport.

2.3 Gas Flow Line

2.3.1 Gas Flow Line Corridor

The alignment of the gas flow line corridor was modified to reflect the relocated gas compression facility at the Bibblewindi CSG Pilot.

Approximately 32km of gas flow line will be installed to deliver the compressed gas from the Bibblewindi and Bohena CSG Pilots to the Wilga Park Power Station.

The route as shown on **Figures 2.2** to **2.5** was selected with due consideration of land use, environmental, cultural heritage and available access. The preferred location of the corridor shown in **Figure 2.2** was selected in response to the consolidation of above ground infrastructure (gas compression, water treatment) into one location. Increased security, greater operational efficiencies and a slight reduction in overall pipeline length would be achieved through this modification.

A 20m wide corridor is nominated for the gas flow line although a disturbance corridor typically 10m wide is sufficient to accommodate all construction activities.

The opportunity to make use of existing forestry tracks, fence lines and Shire road clearance envelopes for the gas flow line were investigated and adopted wherever practicable. The route intersects a number of existing cleared corridors through the forested section, however, in most cases there remains little opportunity to exploit existing clearances as they tend to diverge away from the intended route.

Section 1 – 0km to 6.1km *(Minor Modification)*

The gas flow line corridor begins adjacent to the consolidated water management and gas compression facility located between Bibblewindi-1 & Bibblewindi-2 (revised Point A) making use of the existing road access as part of the construction right-of-way and heads west-northwest from Bibblewindi-3 across moderate to heavily vegetated country passing to the south of the intersection of McFarlanes Road and Boundary Road. Heading further west-northwest, the gas flow line passes though approximately 150m of riparian vegetation before crossing Bohena Creek, exiting the western bank riparian zone and intersecting Bohena Creek Road (Point B). The corridor turns more northerly at this point utilising the Worombi and Brandons Road intersection (Point C) as a general target. (**Figure 2.2**).

This section of the pipeline route has been modified to accommodate the change in location of the compression facilities, from Bibblewindi-5 to the revised location as indicated on **Figure 2.1(a)**.

Section 2 – 6.1km to 14.6km *(No Modification)*

From the Worombi Road/Brandons Road intersection (Point C), the corridor heads northwest towards Bohena-3 (Point D). From Bohena-3, the corridor heads north before intersecting Dog Fence Road (Point E) at the edge of the forested zone (**Figure 2.3**).

Section 3 – 14.6km to 23.1km *(No Modification)*

The corridor exits the forested zone (Point E) and heads in a northerly direction across open cleared pasture along existing fence lines. The corridor intersects an east/west trending road corridor (Point F) and on-farm shelter belts until it reaches Glenwood Lane (Point G). Utilising this road crossing, the corridor moves onto the western side of the shelterbelt and crosses Yarrie Lake Road (Point H) (**Figure 3.6**).

Section 4 – 23.1km to 32km *(No Modification)*

From the Yarrie Lake Road crossing (Point H), the corridor follows the eastern edges of three private property boundaries until it reaches the southwest/northeast oriented 66kV Country Energy power transmission lines (Point I). The gas flow line at this point turns to the northeast and runs adjacent to the power line corridor across freehold lands for approximately 5.3km until it reaches the Wilga Park Power Station (Point J) (**Figure 2.5**).

2.3.2 Access to the Gas Flow Line Corridor

No modifications would occur to the access to the gas flow line corridor.

Access to the various sections of the disturbance corridor will be obtained via the extensive network of forestry tracks, internal property access tracks and Shire roads that service the area. Further access to the construction zone within the forested zone will be made possible by the actual corridor itself. A 3m to 4m section of the cleared area within the corridor will be made available for the movement of machinery and transport vehicles. A series of defined turning areas and staging areas will be identified along the gas flow line corridor early during the life of the Project.

2.3.3 Gas Flow Line Design Specifications

No modifications would occur to the gas flow line design specifications.

Table 2.1 lists the proposed specifications for the gas flow line.

Table 2.1
Gas Flow Line Specifications

Gas Flow Line Component	Design Specifications
Length	≈ 32km
Diameter	256mm Outer Diameter
Wall Thickness	4.3 mm
Material	Glass fibre reinforced epoxy (GRE)
Static Pressure Rating	450 psi at 52°C (3150kPa)
Depth Cover	750mm (minimum)
Construction Right Of Way	10m typical maximum
Pressure Testing Parameters	1.5 x standard operating pressure

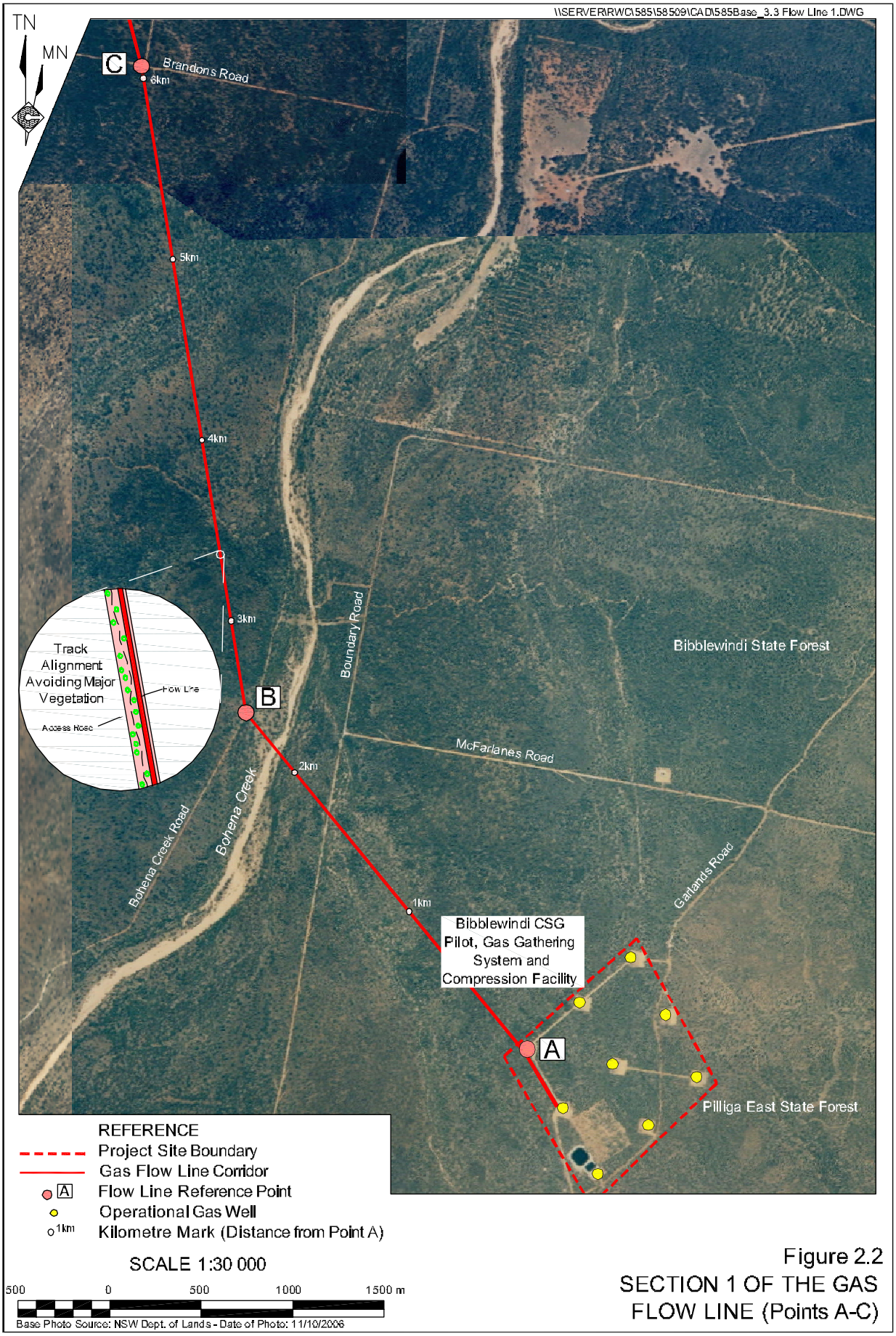

Figure 2.2
SECTION 1 OF THE GAS FLOW LINE (Points A-C)

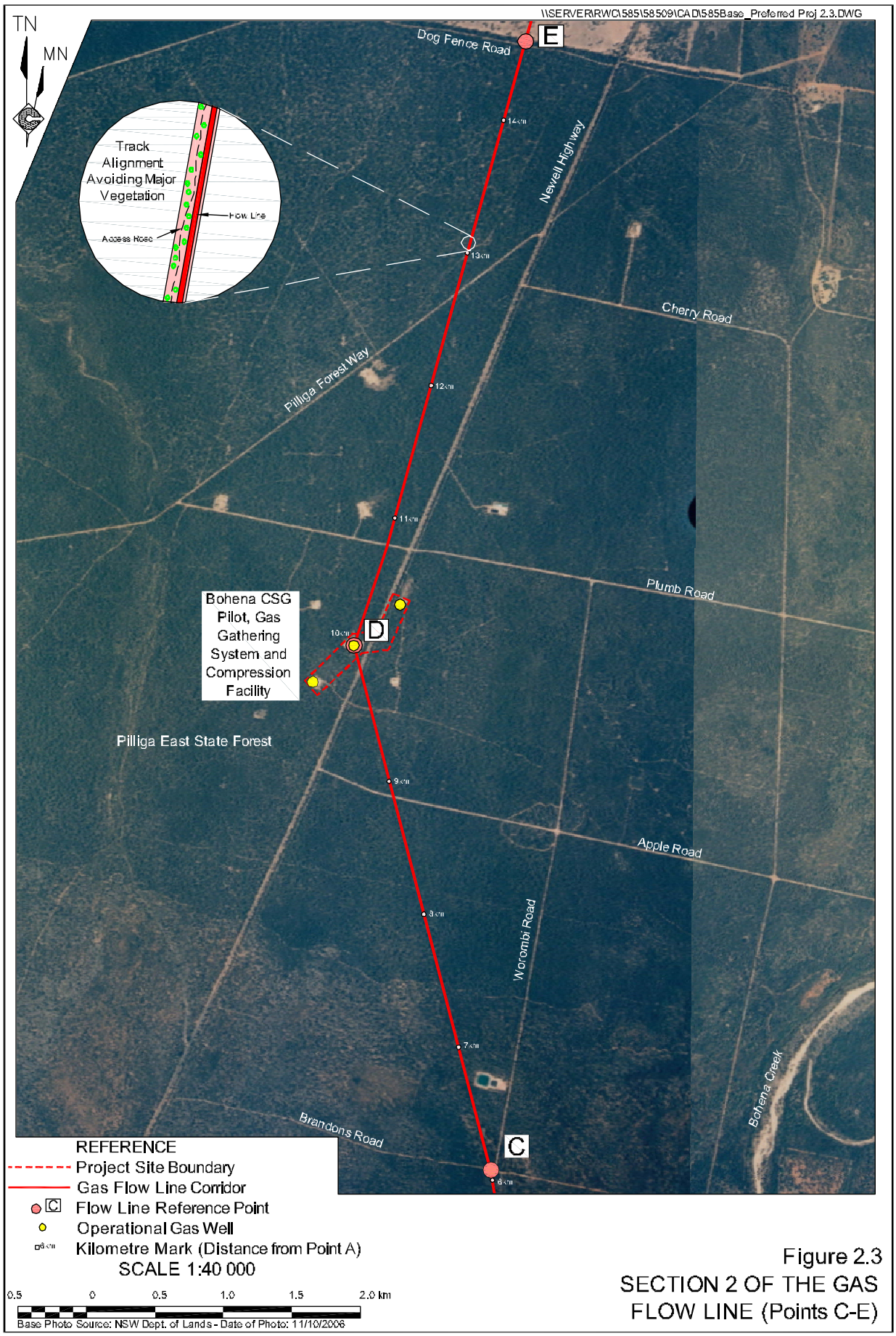

Figure 2.3
SECTION 2 OF THE GAS FLOW LINE (Points C-E)

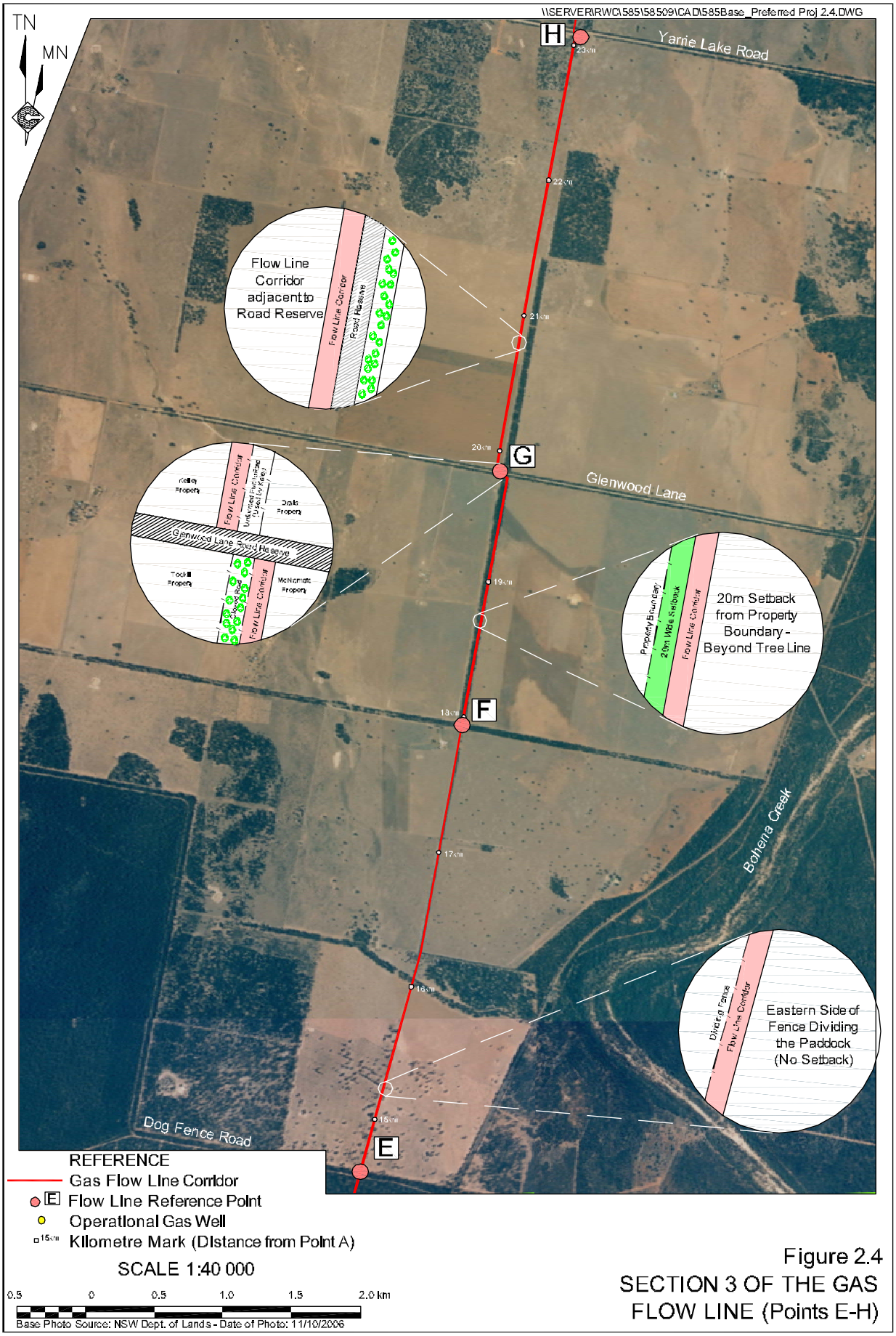

Figure 2.4
SECTION 3 OF THE GAS FLOW LINE (Points E-H)

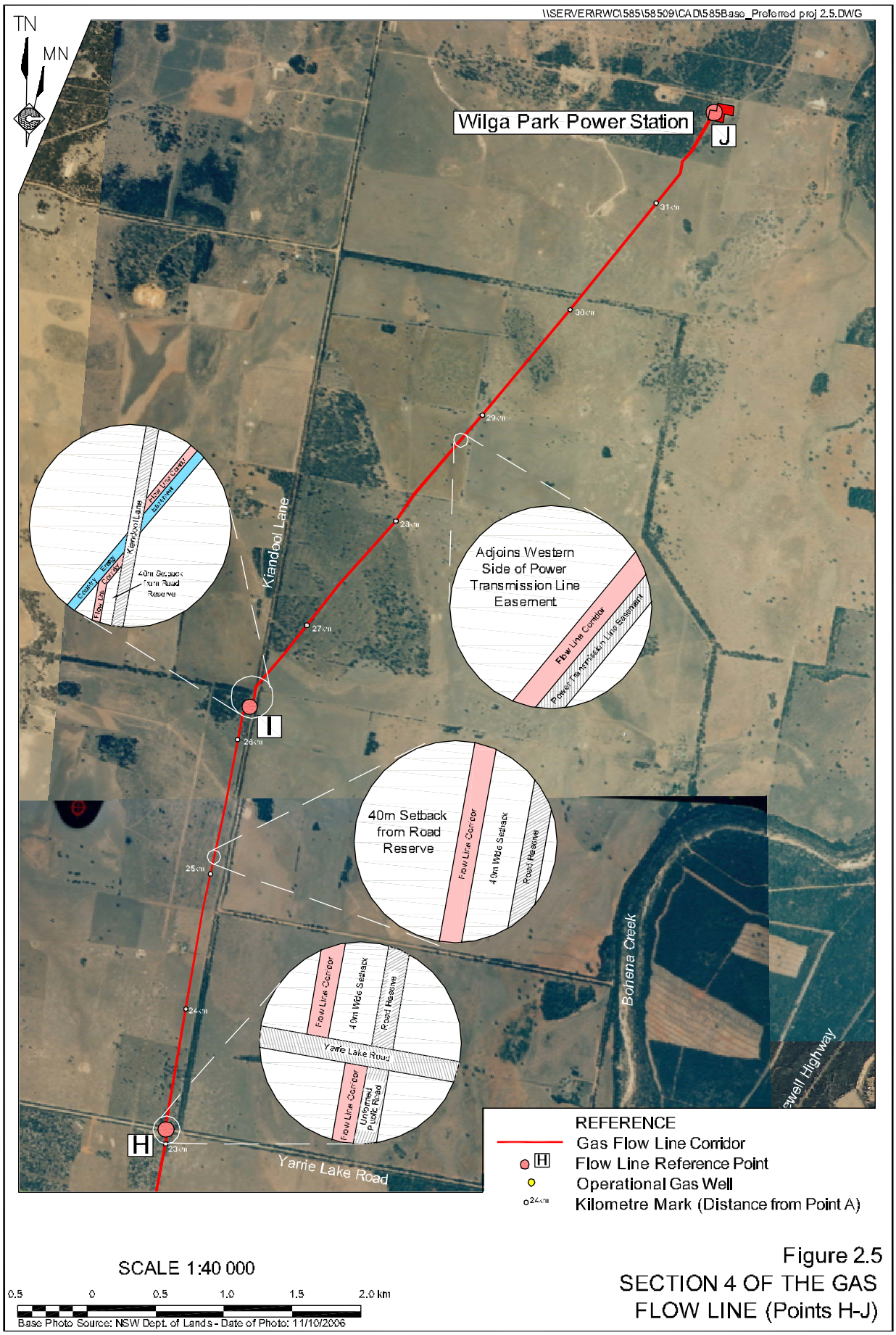

Figure 2.5
SECTION 4 OF THE GAS FLOW LINE (Points H-J)

2.4 Wilga Park Power Station Expansion and Substation Upgrade

No modifications would occur to the Wilga Park Power Station Expansion and Substation Upgrade.

The Wilga Park Power Station will be expanded to a capacity of 40MW by installation of additional reciprocating engine driven generators. The installed cost of generators in the 3MW size range exceeds $1,100 per kW of capacity giving a total cost for the 30MW expansion of approximately $33 million.

Figure 2.6 displays the expanded layout of the Wilga Park Power Station. Essentially, the fenced compound will be increased in area by approximately 0.5ha to provide for the following new buildings and structures.

- 10 x 3MW Generators (15m x 4m x 5m).
- 1 x New Workshop (12m x 9m x 4.5m).
- 1 x New Control Room (18m x 8m x 3.2m).
- 1 x New Amenities (8.4m x 4m x 2.8m).
- 1 x New Gas Slab (15m x 12m).

Plates 2.1 and **2.2** respectively display a single 3MW generator and a bank of 3MW generators, comparable to those to be installed at the Wilga Park Power Station.

A new separate entrance and lockable gate will be provided near the northwestern corner of the new compound area. Two existing pads for generating sets 11 and 12 will be removed. All other features of the existing power station will be retained.

The Wilga Park Power Station supplies electricity into the 66kV network through a substation adjacent to the power station. The substation will be upgraded to accept the increased output from the power station and will involve the installation of a larger transformer and additional circuit breaker equipment.

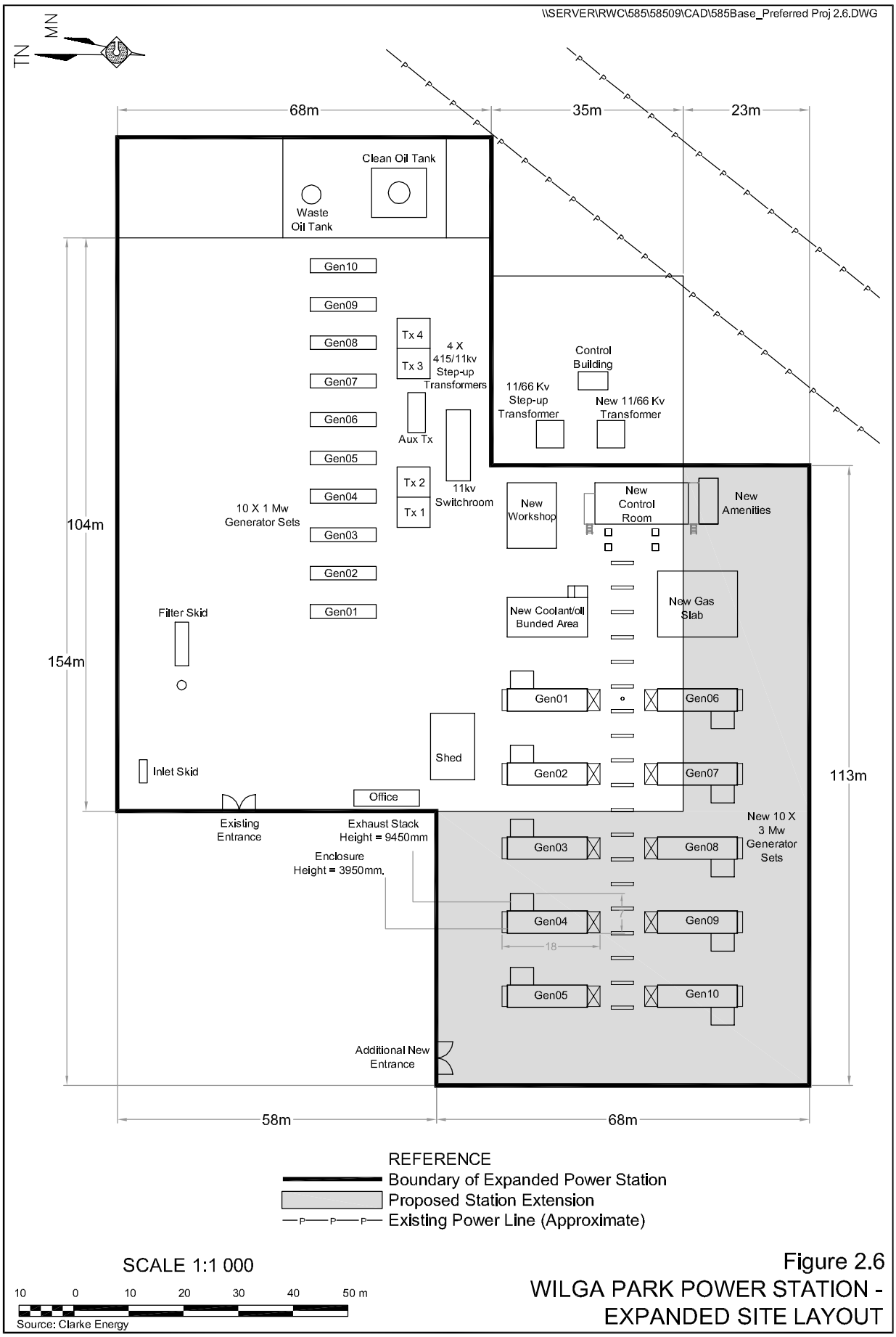

Figure 2.6
WILGA PARK POWER STATION - EXPANDED SITE LAYOUT

Plate 2.1 A 3MW Generator

Plate 2.2 A bank of 3MW Generators

3 APPROVALS REQUIRED

In order for the expansion of the Wilga Park Power Station to proceed, the Proponent will require project approval from the Minister for Planning in accordance with Part 3A of the *Environmental Planning & Assessment Act, 1979*. No further approvals, leases and licences are required to complete this component of the project.

Pursuant to S138 of the *Roads Act 1993*, an application has been made to the Narrabri Shire Council to install the flow line under various Shire roads. These activities would be subject to the conditions and restrictions outlined in Shire's "*Agreement for construction of a pipeline across a Shire road*".

The crossing of Bohena Creek will require the Proponent to obtain a Controlled Activity Approval under the *Water Management Act 2000*.

It is noted that the gas flowline is not a "distribution pipeline" as defined by the *Gas Supply Act 1996*. Rather, the gas flowline is to be constructed for the purposes of recovery of petroleum and therefore does not attract a licensing requirement under the *Pipelines Act 1967*.

4 CONSTRUCTION ACTIVITIES

4.1 Introduction

The Project construction activities will involve the following.

1. Installation of the GGS and gas flow line in both Forestry lands and cleared agricultural lands.
2. Crossing of the Newell Highway and Shire Roads.
3. Crossing beneath Bohena Creek.
4. The expansion of the Wilga Park Power Station

Each of these activities are described in the following subsections.

4.2 Installation of the Gas Gathering System and Gas Flow Line

No modifications would occur to the installation of the gas gathering system and gas flowline.

Figure 4.1 displays the sequence of activities required to install the gas gathering system and gas flow line.

Those component activities involving vegetation clearing and replacement will not be required on open agricultural lands (Steps 1 & 2, **Figure 4.1**).

Surveying the Gas Flow Line Corridor

The gas flow line corridor will be surveyed by a registered surveyor before any preparatory activities take place. Within the forested area, the corridor will be clearly marked to avoid wherever possible any substantial trees, particularly hollow-bearing trees on or near the gas flow line corridor. In the event the alignment of either the trench or adjoining access road cannot avoid a mature tree, it will be clearly marked for later removal and relocation to an adjacent area.

Vegetation Clearance

Within either the Bibblewindi and/or Pilliga East State Forests, all commercial forestry products will be removed and stored in the closest staging area for later collection by Forestry NSW or its contractors. Any hollow-bearing trees felled will be relocated to adjacent bushland. All remaining vegetation will be cleared from the corridor with limited quantities stockpiled at the extreme edge of the corridor and the remainder removed for mulching (see **Figure 4.1**).

Topsoil Stripping and Stockpiling

The topsoil within the corridor will be stripped to a depth of at least 100mm and stockpiled next to the retained vegetation

Trench Surveying

The location of the trench centreline will be marked within the surveyed corridor.

Trenching

The trench will be formed by wheel or chain trencher or excavator (see **Plate 4.1**). Subsoils will be stockpiled in a windrow on the opposite side of the corridor to the topsoils. In the event that any hard rock or hardpan layer is encountered during trenching, a rock saw or other suitable machinery will be employed to achieve and maintain the correct trench depth.

Flow Line Jointing

The individual lengths of gas flow line lying alongside the trench will be picked up by the jointing crew and placed onto the Adtech installation machine.

The jointing crew will prepare the threaded sections of the two lengths of pipe and the installation machine screws them together with a predetermined level of force.

The completed flow line is run off the back of the installation machine and directly into the trench as shown in **Plate 4.3**.

Pipe Hydrotesting

At regular intervals during the gas flow line construction period, sections of the gas flow line will be filled with water and pressurised to 125% of its design pressure for a minimum three hour period. In addition to computerised monitoring of the pressure test, each joint along the testing section will be inspected for visible leaks.

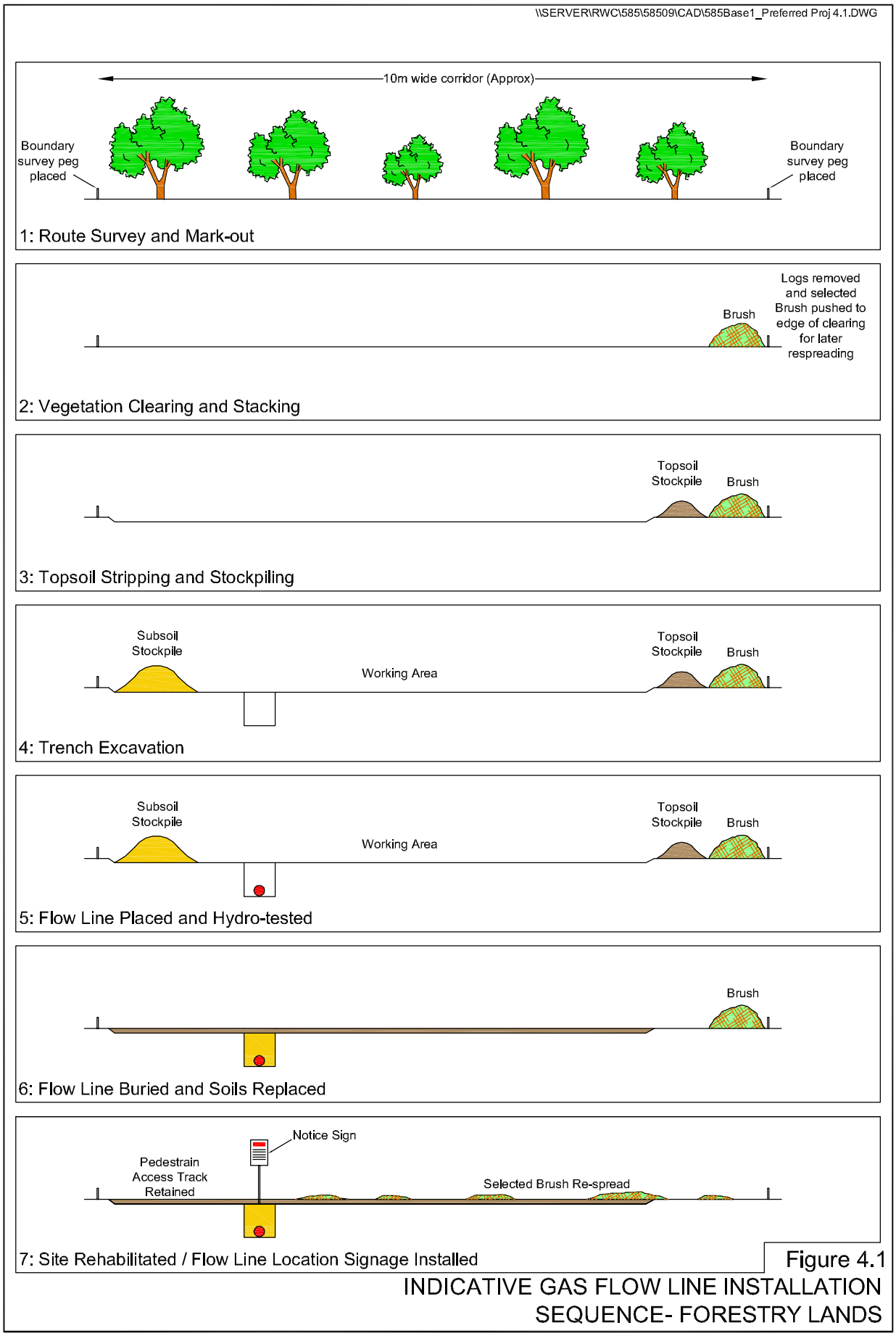

Figure 4.1
INDICATIVE GAS FLOW LINE INSTALLATION SEQUENCE- FORESTRY LANDS

Plate 4.1 Trenching Process

Plate 4.2 Adtech Installation Machine

Plate 4.3 Gas Flow Line Placement

The water utilised for hydrotesting purposes will be sourced from the water treatment plant located at Bibblewindi-1 or from an alternate suitable supply. At the completion of the test, the water can be reused for further sectional Hydrotesting or transported to the nearest on farm dam for stock consumption. The fibreglass pipe does not contain any agents that will contaminate the Hydrotesting water and render it unsuitable for reuse in this manner.

Backfilling and Restoration

The backfilling of the trench will commence at the completion of the Hydrotesting procedures. A magnetic identification/warning tape will be installed approximately 300mm above the gas flow line itself. The compaction of the backfilled subsoil will be closely monitored to minimise the chances of subsequent settling within the trench. Additional fill may be imported from suitable local supplies (subject to landholder approval). The topsoil stockpile will only be accessed once the trench has undergone sufficient backfilling and compaction. The respreading of topsoil will be closely followed by the respreading of retained vegetative material (where available) to assist in soil stabilisation in accordance with agreed forestry protocols for site rehabilitation.

4.3 Newell Highway Crossing

No modifications would occur to the Newell Highway Crossing.

Reliance will be made upon an existing piped crossing beneath the Newell Highway between Bohena-3 and 7 at the Bohena CSG Pilot for the GGS to be installed between these two wells.

The new crossing of the Newell Highway adjacent to the Bohena CSG Pilot for the flow line from the Bibblewindi CSG Pilot will be carried out using a mechanical horizontal boring technique in accordance with RTA requirements. Mechanical boring in this manner is a well recognised low impact construction technique that involves drilling short distances below ground surface to avoid unnecessary impact on traffic flow. The process will involve the following steps.

1. Access pits will be established on both sides of the road reserve. The drilling pits will be approximately 25m x 5m and the receiving pits approximately 5m x 3m. Topsoils and subsoils will be handled in the manner nominated in the soil management plan.
2. A steel sleeve will be placed a minimum 1.2m below the road lowest point in the road reserve.
3. The pipes will be passed through the sleeve and joined to the main gas flow line.
4. The access pits will be backfilled and the surface area re-instated in accordance with the approved rehabilitation plans.

Figure 4.2 displays schematically the configuration of the crossing beneath the Newell Highway.

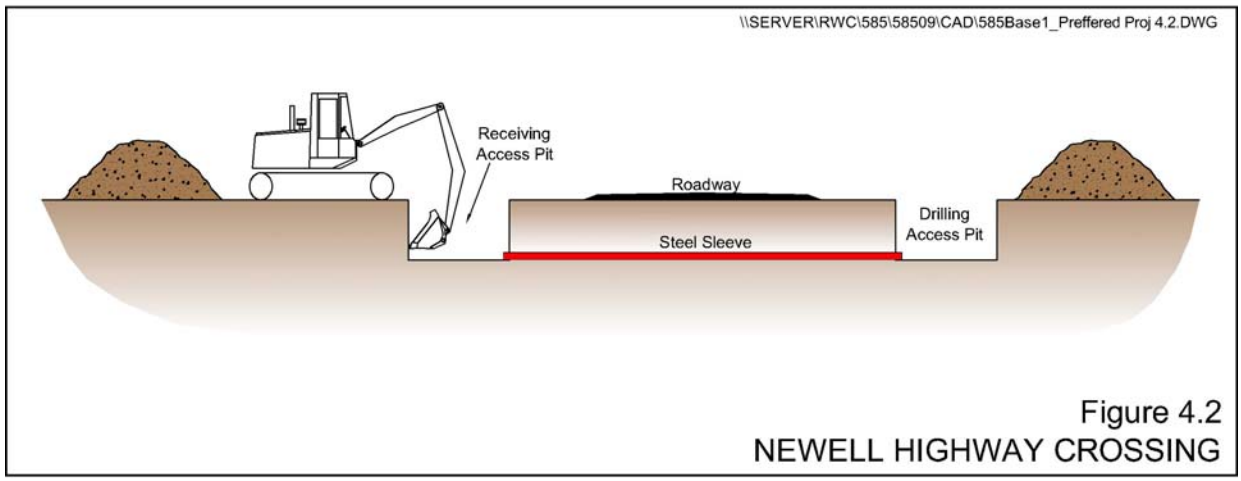

Figure 4.2
NEWELL HIGHWAY CROSSING

4.4 Bohena Creek Crossing

The original preferred option of an open trench installation procedure has been changed to the alternate horizontal directional drilling procedure.

The drilling and receiving access pits will be of similar dimensions to those described in the under boring of the Newell Highway (see Section 4.3) and located in a stable area set back from the creek embankment.

4.5 Shire Road Crossings

No modifications would occur to the Shire road crossings.

The installation of the gas flow line across existing Shire Roads will occur in accordance with Council's requirements provided to the Proponent.

The planned Shire road crossings will be carried out with a minimal disruption to local traffic and nearby residents.

4.6 Wilga Park Power Station Expansion

No modifications would occur to the WPPS expansion.

The expansion of the Wilga Park Power Station will involve the following component activities.

- Importation and compaction of approximately 1500m^3 of suitable base material to create the compound surface within the extended site.
- Excavation, construction / installation of all subsurface pipe work.
- Construction of concrete foundations for all generators and new buildings.
- Construction of all new buildings.
- Placement and connection of all new generators.
- Installation of upgraded transformers and related electrical equipment.
- Erection of a perimeter fence.

4.7 Equipment

No modifications would occur to the equipment used.

Equipment required for the construction / installation of the gas gathering system and gas flow line is outlined in **Table 4.1**.

4.8 Pipe Delivery and Bulk Materials Supply

No modifications would occur to the pipe delivery and bulk materials supply.

The materials required to construction and installation of the gas flow line will include:

- bulk supply of the 250 mm GRE Pipe; and
- materials required for the operation of the Adtech Installer

Table 4.1
Equipment and Machinery List

Use	Machinery / Equipment
Logging/Vegetation Removal	2-5 x Husqvarna 375 or Stihl 044 Chainsaws
	1x Bell 125 Ultra Logger
Corridor Preparation	1 x Caterpillar D6N Bulldozer
	1 x Caterpillar 140G Motor Grader
	1 x Hyundai 210C Excavator
	1 x Bobcat Skid Steer Loader
Pipe / Gas Flow Line Trenching	1 x Trencor 760 HDA Chain Trencher
	1 x Directional Drilling Machine
Gas Flow Line Installation	1 x Adtech Pipeline Installer
Transport/Support	2 x Prime Movers & Low Loaders
	1 x 10 000L Water Cart
	12 x Light 4WD Vehicles (Patrol/LandCruiser or eqiv)
	1 x Off-road forklift/front-end loader
	2 x Truck mounted HiAb flat-bed trucks

The pipe material will begin arriving on site once the gas flow line corridor preparation is nearing completion and be delivered to pre-determined drop-off points or staging areas. Each transport container will carry 500m of pipe. The pipe will be removed from the containers and loaded onto the HiAb by forklift for distribution along the work zone, where required.

4.9 Utilities and Services

No modifications would occur for the utilities and services required for the project.

4.9.1 Water

The suppression of dust along the disturbance corridor will be a key issue to be managed during the construction period. At the completion of the activities required to prepare the gas flow line corridor, the likelihood of fugitive dusts being generated by the movements of vehicles and other construction-based activities within the corridor increases. However, the working of excessively damp or wet soils across all SMU's during this period can present issues to the effective protection of soil structure.

For the duration of the construction period, a water cart will be located near to site to provide adequate dust suppression along access and egress pathways, where required.

Water required for various construction activities and for dust suppression will be sourced from (in order of preference):

- water treatment pilot plant located at Bibblewindi-1;
- licensed (DWE) groundwater bores at Bibblewindi-1 and Bibblewindi-5 well pads;
- Narrabri Shire Council supplies; or
- from a suitable alternative local supply.

The estimated quantities of water required for the duration of the construction period are based upon the deployment of the 10 000 L water carts. Working on access and egress pathways close to the active section, the maximum quantities of water consumed per day is unlikely to exceed 20 000L based upon a twice daily deployment. Based on the estimated 90 day construction period from vegetation clearance to the completion of rehabilitation, at a rate of 20 000L per day the water requirements for the Project's dust suppression program will approximate 1.8 ML.

4.9.2 Power

All power requirements during the construction period will be obtained using small mobile generators and / or mobile earthmoving equipment. Limited mains power will be available for use during the expansion of the Wilga Park Power Station.

4.9.3 Communications

Reliance will be placed upon mobile phone coverage and VHF radio during the construction period.

4.10 Waste Management

No modifications would occur for waste management.

Waste materials generated during the construction period will include:

- construction materials waste such as timber, plastic and small amounts of metals.
- general domestic refuse; and
- wastes such as engine lubricants and coolant fluids.

In accordance with good field practice, work crews will be required to contain waste materials within rubbish cages located at regular points along the active construction zone. Wherever possible, waste materials will be collected for recycling and/or reuse or otherwise be transported for disposal at the Narrabri Waste Depot.

5 PROJECT OPERATIONS

No modifications would occur to project operations.

5.1 Gas Gathering System and Gas Flow Line

5.1.1 Operations

The operation of the GGS and gas flow line does not require any specific operational activities on behalf of the Proponent. Once the GGS connects the CSG wells to the gas flow line inlet and compression unit, operation is automatic. The main operational focus will be monitoring of the CSG wells and the compression units.

5.1.2 Utilities and Services

No specific utilities or services are commonly required to permit the operation of the GGS and gas flow line. The field compression units are powered by the gas within the gas flow line. Periodic maintenance of surface equipment will occur in accordance with manufacturer's recommendations; however, the specific requirements for any such programs will be met by the Proponent's field staff.

5.1.3 Waste Management

No specific waste management plan is required for the operation of the GGS and gas flow line infrastructure.

5.2 Wilga Park Power Station

5.2.1 Operations

The operation of the power station involves predominantly monitoring and planned maintenance activities on the gas driven engines. The Proponent employs two full time power station attendants to complete all activities associated with the operation of the facility.

5.2.2 Utilities and Services

Service requirements for the power station include the delivery of material supplies including engine lubricants and other consumable items provided by specialist vendors.

All other service and supply activities are assumed by employees of the Proponent.

5.2.3 Waste Management

The generation of waste materials during the continued operation of the gas flow line and power station will comprise predominantly of those materials utilised in the operation and maintenance of the gas driven engines.

The disposal of engine lubricants and coolant fluids is currently completed by a licensed service agent. All used lubricants are collected from the dedicated used oil storage tanks and transported off site for recycling.

Other non-recyclable rubbish including putrescible wastes, are stored in appropriate rubbish receptacles on site for later collection by a local rubbish removal contractor.

6 HOURS OF OPERATION AND PROJECT TIMETABLE

No modifications would occur to the hours of operation and project timetable.

6.1 Construction Phase

Hours of operation during the construction period will be between 7am and 6pm, seven days per week.

Table 5.1 lists the indicative timetable for the construction phase.

Table 5.1
Construction Phase Indicative Timetable

Activity	Weeks										
	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
Construction / Installation of the Gas Flow Line.											
Installation and Testing of Gas Gathering System.											
Installation and Commissioning of Field Compression Facilities.											
Wilga Park Power Station Expansion and Substation Upgrade.											

6.2 Operating Phase

The GGS, gas flow line and expanded power station development will be in operation over a 24hr/7 day cycle.

7 EMPLOYMENT

No modifications would occur to the project employment.

7.1 Construction Phase

The construction of the Project will involve up to 30 individuals working in small groups along various sections of the Project Site. Most general contracting (corridor preparation, fencing and rehabilitation) will be sought from local service providers. Specialist services are likely to be sourced from outside the Narrabri region, however, all attempts will be made to maximise the employment of local contractors.

7.2 Operating Phase

As the Project is designed to generally operate automatically, most operational phase employment will concentrate on the maintenance of the two CSG pilots (wells and surface facilities) and various other Project-related infrastructure. A total of 10 personnel are likely to be directly employed to carry out daily operations.

8 REHABILITATION

No modifications would occur to the intended rehabilitation for the Project.

The rehabilitation of the gas flow line corridor will commence as soon as practicable after the construction activities have ceased.

There is no rehabilitation planned for the current or expanded Wilga Park Power Station facility.

8.1 Rehabilitation Objectives

The main objective of the rehabilitation program will be to return the disturbed land back to its previous land use as soon as practicable after the cessation of construction activities. Due to the differences in the land use activities between the State forest and farmland zones, the rehabilitation activities will vary slightly.

8.1.1 Forestry Lands

The rehabilitation program within the Forestry land will focus on the GGS route and gas flow line corridor. The GGS route will, where required, be rehabilitated in full while the gas flow line route will be reduced from the maximum 10m width required for construction to a narrow track suitable for ongoing pedestrian or 4WD access (see **Figure 4.1 step 7**). The retention of this narrow track will permit access for future monitoring and maintenance, if required. The track width through Forestry Lands would be discussed with Forestry NSW, however, it is the Proponent's intention to maximise the length of pedestrian tracks along the GGS route and gas flow line corridor through Forestry Lands.

Along this section of the disturbance corridor, where soils are less fertile and are likely to contain seed stocks of slower growing native species, the primary goal will be the stabilisation of topsoils and therefore the minimisation of incidental erosion by surface flows during and after rainfall and wind. Utilising a method known as 'brushing', a proportion of stems, branches and foliage harvested and stockpile along the edge of the disturbance corridor during clearing will be replaced over the cleared area after the respreading of topsoil stocks. The method is quick, provides a physical barrier to incidental erosion, yet, with limited placement of brush will not introduce unmanageable quantities of combustible material to the forestry lands.

This method will not introduce any new materials that may harbour weeds and diseases and facilitates the germination and establishment seed stored in the retained brush. It will be used together with retention and replacement of topsoil, and will also facilitate germination and establishment of seed from the soil seed bank. No additional oversowing of the disturbance corridor is planned.

No additional tree or shrub planting scheme is planned within the Forestry lands. Previous experience with the introduction of seedlings in a rehabilitation effort at Bohena-2 suggests natural regeneration is more successful as it generally initiated and supported by natural rainfall patterns. The rehabilitation of the Jacks Creek North-1 well site utilised the brushing technique described above. This example provides the basis for the rehabilitation of the disturbance corridor within the East Pilliga and Bibblewindi State Forests.

8.1.2 Farmland

The rehabilitation of open agricultural areas in the freehold farmlands will commence as soon as practicable once the construction activities have been completed.

While the specific terms of the corridor and access agreements with each private landholder will detail the specific rehabilitation strategy more clearly and with regard to summer/winter cropping or planned pasture improvements, the following general actions will be undertaken:

- Topsoils and subsoils will be strictly segregated during the construction process;
- Preparatory activities (ploughing, harrowing, tilling and fertiliser application) will be undertaken along the disturbed zone, where directed;
- Appropriate pasture seed mixtures will be applied where required; and
- The area within the corridor will be returned to the landholder as soon as practicable.

9 MONITORING AND MAINTENANCE

No modification would occur to the intended monitoring and maintenance.

As part of the agreed access agreements with each landowner, there is an ongoing commitment to monitor the disturbed/rehabilitated corridor for the duration of the rehabilitation program. Aspects of the rehabilitation program that will be monitored on a minimum quarterly basis, or as required by the landholder, and will include:

- evidence of slumping within the flow line trench;
- suggestion of excessive erosion or topsoil instability; and
- issues with natural or improved drainage.

Remedial action will be taken where issues such as described or otherwise are evident and in consultation with the landholder. No time limit will be placed upon the monitoring and maintenance program.