

A Detailed Project Description

This appendix summarises the Modification 3 changes to the existing Killingworth to Kooragang Island Gas Pipeline (as modified by Modifications 1 and 2).

This updated project description should be read in conjunction with the:

- *Environmental Impact Statement for the Natural Gas Pipeline Killingworth to Kooragang Island* (James B. Croft and Associates 1980) (1980 EIS)
- *Lenaghan Lateral Pipeline Modification 1 – Modification Report* (Umwelt 2023) (Modification 1 Report)
- *Modification Report – Modification 3: Killingworth to Kooragang Island Pipeline* (MVC 2025) (Modification 3 Report).

Project overview

The project involves the construction and operation of a pipeline to convey natural gas between Killingworth and Kooragang Island along the route shown in Figure A.1. Modification 3 will not change the purpose of the existing gas pipeline. Modification 3 extends the existing pipeline to allow natural gas from Narrabri and the Hunter Gas Pipeline to be supplied to the domestic gas market.

Specifically, Modification 3 seeks to construct, maintain and operate:

- a 5.3 km-long high-pressure gas pipeline between Kilometre Point (KP) 161.7 of the Killingworth to Hexham section of the Killingworth to Kooragang Island pipeline, to Santos' proposed Hunter Gas Pipeline.
- the Jemena Hunter Lateral Facility (HLF) at Millers Forest - a 94 m by 84 m fenced hardstand area that will connect the proposed Hunter Gas Pipeline to the modification
- the Jemena Tie-In Facility at Pipeline Road, Hexham - a 34.5 m by 15.2 m fenced hardstand area that will connect the modification to the Killingworth to Kooragang Island pipeline.

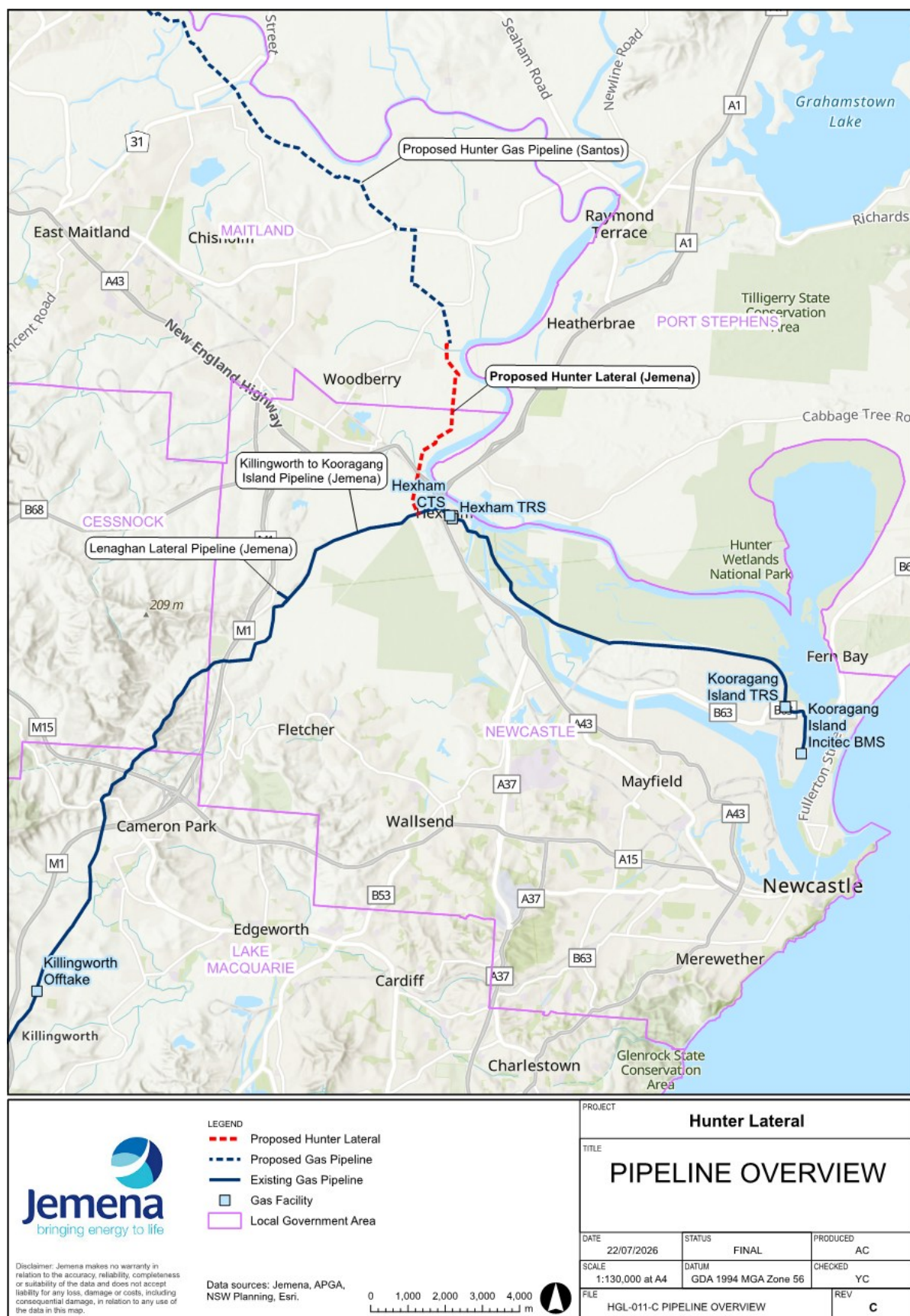


Figure A.1 Project route

A summary of changes to the existing Killingworth to Kooragang Island Pipeline introduced by Modification 3 is provided in Table A.1. Changes to the existing pipeline are indicated in **bold**.

Table A.1 Summary of proposed Modification 3

Project element	Summary of approved Modifications 1 and 2 (Umwelt 2023; Jemena 2024)	Modification 3 (in bold)	Reference in Modification 3 Report
Total pipeline length	The length of the pipeline from Killingworth to Kooragang Island and associated laterals is 33.3 km.	The length of the pipeline from Killingworth to Kooragang Island is 38.6 km . A new 5.3 km section is proposed from KP 161.7 of the Killingworth to Hexham section of the Killingworth to Kooragang Island pipeline, connecting to the proposed Hunter Gas Pipeline.	Section 3.1.1
Pipe segment lengths	12 m or 18 m.	No change.	Table 3.1
Average outside diameter	The pipeline includes the following sections and the pipe outside diameter for these sections: - Killingworth to Hexham: 508 mm. - Hexham to Walsh Point: 356 mm. - Lenaghan Lateral Pipeline: 355.6 mm. Therefore, the average outside diameter of the pipeline is 406.5 mm.	The pipeline includes the following sections and the pipe outside diameter for these sections: - Killingworth to Hexham: 508 mm. - Hexham to Walsh Point: 356 mm. - Lenaghan Lateral Pipeline: 355.6 mm. Hunter Lateral Pipeline: 508 mm. Therefore, the average outside diameter of the pipeline is 432.1 mm .	Table 3.1
Wall thickness	The wall thickness of the: - Killingworth to Kooragang Pipeline is (on average) 6.585 mm. - Lenaghan Lateral Pipeline is 12.7 mm.	The wall thickness of the: - Killingworth to Kooragang Pipeline is (on average) 6.585 mm. - Lenaghan Lateral Pipeline is 12.7 mm. Hunter Lateral Pipeline is 8.48 mm.	Table 3.1
Material	The pipeline includes the following sections (the pipe steel used for these sections are also included): - Killingworth to Hexham: Steel Specification API-5LX-X60. - Hexham to Walsh Point: Steel Specification API-5LX-X42 and API-5LX-X46. - Lenaghan Lateral Pipeline: Steel Specification API 5L	The pipeline includes the following sections (the pipe steel used for these sections are also included): - Killingworth to Hexham: Steel Specification API-5LX-X60. - Hexham to Walsh Point: Steel Specification API-5LX-X42 and API-5LX-X46. - Lenaghan Lateral Pipeline: Steel Specification API-5L-PSL2-X52 (being high strength steel, electric resistance welded).	Table 3.1

Project element	Summary of approved Modifications 1 and 2 (Umwelt 2023; Jemena 2024)	Modification 3 (in bold)	Reference in Modification 3 Report
	PSL2 X52 (being high strength steel, electric resistance welded).	Hunter Lateral Pipeline: Steel Specification API-5L-PSL2-X60.	
External coating	The external coating used for the: - Killingworth to Kooragang Pipeline is an extruded polyethylene coating. - Lenaghan Lateral Pipeline is a fusion-bonded epoxy coating.	The external coating used for the: - Killingworth to Kooragang Pipeline is an extruded polyethylene coating. - Lenaghan Lateral Pipeline and Hunter Lateral Pipeline is a fusion-bonded epoxy coating.	Table 3.1
Maximum allowable operating pressure	The design pressure for the: - Killingworth to Kooragang Island Pipeline is 6.895 megapascals (MPa) - Lenaghan Lateral Pipeline is 6.9 MPa.	The design pressure for the: - Killingworth to Kooragang Island Pipeline is 6.895 MPa. - Lenaghan Lateral Pipeline is 6.9 MPa. Hunter Lateral Pipeline is 6.895 MPa.	Table 3.1
Operational capacity	The operational capacity for the Killingworth to Kooragang Pipeline is 6.895 MPa.	The operational capacity for the Killingworth to Kooragang Pipeline is 6.895 MPa. The Hunter Lateral Pipeline will have an operational capacity of 5 MPa.	Table 3.1
Typical construction footprint width	Nominally 25 m.	30 m (15 m if environmental, heritage or utility infrastructure constraints are present).	Figure 3.4; Figure 3.5
Typical easement width	Nominally 25 m.	No change.	Section 3.4
Trunk Receiving and Meter Stations	There are four major take-off points for the supply of gas to Newcastle at: - Hexham Trunk Receiving Station - Lenaghan Meter Station, connecting to the Kurri Kurri Lateral pipeline - Kooragang Island Trunk Receiving Station - Eastern Nitrogen Meter Station at Walsh Point, Kooragang Island.	There are five major take-off points for the supply of gas to Newcastle at: - Hexham Trunk Receiving Station - Lenaghan Meter Station, connecting to the Kurri Kurri Lateral pipeline Hexham, connecting to the Hunter Gas Pipeline via a new metering station at Millers Forest (the Hunter Lateral Facility) - Kooragang Island Trunk Receiving Station - Eastern Nitrogen Meter Station at Walsh Point, Kooragang Island.	Section 3.1.2

Project element	Summary of approved Modifications 1 and 2 (Umwelt 2023; Jemena 2024)	Modification 3 (in bold)	Reference in Modification 3 Report
Minimum depths of cover	- Killingworth to Kooragang Island Pipeline - Minimum cover of 750 mm in soil and 450 mm in consolidated rock. - Lenaghan Lateral Pipeline - Typical (per AS 2885) – 900 mm - Road crossing – 1,200 mm - Watercourse crossing – 1,500 mm	- Killingworth to Kooragang Island Pipeline - Minimum cover of 750 mm in soil and 450 mm in consolidated rock. - Lenaghan Lateral Pipeline - Typical (per AS2885) – 900 mm - Road crossing – 1,200 mm - Watercourse crossing – 1,500 mm Hunter Lateral Pipeline Typical (per AS 2885) – 750 mm HDD watercourse crossings – approximately 10 m to 15 m HDD transport infrastructure crossing – approximately 15 m to 20 m	Section 3.1.1

Construction works

Methodology

Early works

Once the modification is approved, the site will be prepared to accommodate the main construction activities. Early works will include the following activities:

- Service proving throughout the modification area.
- Geotechnical surveys.
- Weed and pest surveys.
- Surveys of built and natural features within the modification area.
- Installation of temporary fencing and gates along the construction ROW.
- Establishing the temporary construction facilities and access, as outlined in Section 3.2.3 of the Modification 3 Report.

Vegetation clearing and site grading

Vegetation and topsoil within the construction ROW will be progressively cleared in preparation to install the pipeline strings. Exposed soil within the construction ROW will also be graded to level the site, ensuring proper drainage prior to trenching or HDD work. Topsoil will be windrowed and stored within the construction ROW; the topsoil will be stockpiled separately and used for site rehabilitation activities.

Pipe stringing and welding

The pipeline segments are delivered to the construction ROW and strung out, with the segments placed end to end. A welding crew will then progressively work along the pipeline segments, welding them together to make one contiguous pipeline. Each of the welded joints are coated or wrapped for corrosion protection.

Open-cut trenching

Open-cut trenching will be the primary installation method for the pipeline. To achieve the minimum depth of cover outlined in Section 3.1.1 of the Modification 3 Report, a trench of 800 mm width will be excavated. Excavated spoil will be stored along the construction ROW (separated from the topsoil), to be backfilled into trenches once installation works are complete.

To support the pipeline, bedding material will be placed at the bottom of the trench. The welded pipeline is then lowered into the trench using a side boom crane. The trench is then backfilled using the excavated spoil. This backfilled trench is then compacted to minimise the risk of soil movements damaging the installed pipeline.

Where ground water is encountered or if there is a risk of exposing acid sulfate soils, a wet-trench installation method using concrete weight coated pipe segments will be used. This installation method avoids the need to dewater trenches in these areas.

Backfilled trenches will then be progressively reinstated by returning the topsoil back across the Construction ROW, enabling grass to re-establish.

Horizontal direct drilling

HDD will be used to install pipe segments across watercourses and major transport infrastructure. The HDD installation method will be used at these locations (with approximate distances):

- Francis Greenways Creek (KP 0.2 to KP 0.25 – 50 m)
- unnamed channel (KP 1.95 to KP 2.0 – 50 m)
- unnamed channel, Purgatory Creek, New England Highway, Main North Railway Line, Woodlands Close, Railway siding, Aurizon Access Road (KP 3.65 to KP 4.35 – 700 m).

An entry and exit pad will be constructed at both ends of each HDD extent. At the entry pad, the HDD drill creates an underground borehole that is the same diameter as the pipe segments. Pre-welded pipeline segments are then pulled through the bore, completing the installation of the pipe segments.

Construction of the Jemena Tie-In Facility and HLF

The construction of both facilities will entail the construction/installation of:

- Concrete hardstand areas, steel mounting structures and permanent stormwater drainage
- Permanent fencing, gates and lighting
- Piping skids and interface piping
- Pig launching and receiving facilities
- Underground cabling between the metering skids and the control and amenities hut
- Solar photovoltaic and battery system
- Monitoring equipment.

Commissioning

Commissioning activities for the pipeline include:

- **Hydrostatic testing** to identify leaks within the pipeline. The hydrostatic testing will use water stored in a hydrostatic testing dam located at the southern portion of the project site. This water will be trucked in from an off-site location.
- **Calibration and testing activities** at the Jemena tie-in facility and HLF.
- **Inspections** of the pipeline and its associated infrastructure to establish a referential 'baseline condition' for subsequent operational inspections.
- **Clean up, reinstatement and rehabilitation** of the construction ROW and extra workspaces.

Access and construction laydown

To facilitate the construction of the Hunter Lateral Pipeline, temporary construction facilities will be required:

- **Construction laydown and pipe stockpiling area** – a construction laydown and pipe stockpiling area will be set up on 10/-/DP1150648. The construction laydown area will contain site offices, equipment, storage consumables storage, as well as spaces for light/heavy vehicle parking and plant staging.
- **Workspace areas** – extra workspaces will be created to accommodate a hydrostatic testing dam, pipe stringing area, acid sulphate soil handling area, truck turnarounds, as well as HDD entry and exit pads.
- **Construction Right-of-Way (ROW)** – a 30 m-wide construction ROW will be established where the pipeline will be installed using the open-cut trench method (see Figure 3.4 of the Modification 3 Report). The width of the construction ROW will be reduced to 15 m in areas where there are environmental or heritage values located within the modification area (see Figure 3.5 of the Modification 3 Report). The construction ROW will include space for topsoil and trench spoil stockpiling, and spaces for construction plant and vehicles.

Five construction access points are proposed for the Hunter Lateral Pipeline:

- **Existing site access off the New England Highway** – provides access to the construction laydown area and KP 2.0 to KP 4.0 of the construction ROW.
- **Landowner's track off Woodberry Road to construction laydown area** – provides access to the HLF construction site and KP 0 to KP 0.2 of the construction ROW.
- **Landowner's track off Oakfield Road** – provides access to KP 0.25 to KP 1.95 of the construction ROW. Additional workspace will be required to accommodate a truck turning point.
- **Aurizon Access Road** – provides access to the Jemena tie-in facility construction site and KP 4.4 to KP 5.3 of the construction ROW.
- **New England Highway/Purgatory Creek** – provides an alternative access to the HDD entry pad at Purgatory Creek and KP 2.0 to KP 4.0 of the construction ROW.

A construction laydown area (consisting of site offices, plant staging, equipment, consumables storage) and pipe stockpiling area will be located on Transport for NSW land currently used for the M1 Pacific Motorway Extension Project (10/-/DP1150648).

Operational activities

The modification is designed to have an operational life of 50 years; the Hunter Lateral Pipeline will be operational 24 hours a day, seven days a week.

Under normal conditions, the Hunter Lateral Pipeline (including the Hunter Lateral Facility) will be operated remotely. Routine inspections of the Hunter Lateral Pipeline, its associated easements and supporting infrastructure will be required to ensure its integrity. This includes:

- Weekly inspections and maintenance of the Hunter Lateral Facility by two Jemena personnel.
- Vehicle (weekly) and aerial patrols (fortnightly) of easements for weeds, erosion and subsidence, as well as unauthorised third-party activities.
- Maintenance surveys, such as odorant surveys (1–5 yearly), leakage surveys (1–5 yearly), cathodic protection surveys (every 4–6 months), direct current voltage gradient surveys and internal pipeline inspections (every 5–10 years).

The Hunter Lateral Facility would be designed to be operated automatically under normal operating conditions. An additional one or two field operators would typically be required to conduct operational activities as required.

Operational access points to the Hunter Lateral Pipeline will be through the same access points used for construction.

The entire Hunter Lateral Pipeline will be protected by easements benefitting Jemena. These easements will typically be 25 m wide. The easements will protect the pipeline from unauthorised encroachment and provide Jemena the right to access and maintain the pipeline. The easements will protect the pipeline from unauthorised encroachment and provide Jemena the right to access and undertake activities to operate and maintain the pipeline. In accordance with the requirements of PL8, AS 2885 and the *Pipelines Regulation 2023* (NSW), marker posts and signage will be placed at regular intervals along the pipeline easement.