

To all concerned parties

We act for PowerGas Ltd.

NOTES FOR WORKING NEAR POWERGAS GAS TRANSMISSION PIPELINE

1. Introduction

- 1.1 The Gas Transmission Pipeline (GTP) is designed to carry gas at high pressures. It is buried underground with granite dust and earth backfill cover as required under LTA's regulations. Warning markers are planted near the gas pipeline or pasted on nearby lamppost to indicate its existence and warn third parties working in the area.
- 1.2 SPPG patrols the pipeline regularly to monitor works in the vicinity by third parties. Such works if done without knowing the existence and/or exact location of the pipeline can potentially damage the gas pipeline and/or its coating. SPPG pays special attention to drilling, piling, blasting or any high impact works such as, excavation, tunneling works and construction of structures near or over the gas pipeline and gas plant.
- 1.3 Any party who intend to carry out any construction activities in the vicinity of the GTP shall notify and cooperate with SPPG to implement measures to protect the gas pipeline and gas plant from all possible damages.

2. Statutory Requirement

- 2.1 Section 32 Carrying out earthworks within vicinity of gas plant or gas pipe of the Gas Act (Chapter 116A) requires anyone who wants to carry out earthworks in the vicinity of the gas plant or gas pipe to;
 - (a) give the Gas Transporter (PowerGas) not less than 7 days' notice in writing of the date on which it is proposed to commence the earthworks;
 - (b) obtain from the Gas Transporter the necessary information on the location of the gas plant or gas pipe; and
 - (c) consult the Gas Transporter on the steps to be taken to prevent the gas plant or gas pipe from being damaged while the earthworks are being carried out.
- 2.2 Section 32 also requires the person carrying out the earthwork to comply with the requirements of the transporter, ensure precautionary measures are taken to prevent damage to the gas pipe or gas plant and provide access to the transporter for inspection or taking necessary protective measures.
- 2.3 Any person that contravenes this Section 32 is guilty of an offence and shall be liable to a fine not exceeding \$100,000 or to imprisonment for a term not exceeding 5 years or both.

3. Requirements on Third Parties working near the Gas Transmission Pipeline

3.1 Pre-work Consultation with SPPG

- a) The works owner and contractor shall inform SPPG in advance of their intention to work in the vicinity of the GTP and submit NCE accordingly. Such works include excavation, piling, earthwork leveling, bore logging, trial holes, blasting, tunneling or any earth works. The proposed work with construction drawings and method of statements shall be given to SPPG to evaluate the impact of the works on the pipeline. This enables SPPG to advise on appropriate precautionary measures to be taken.
- b) The works owner and contractor shall obtain the as-built drawings of GTP from SPPG. They are required to incorporate the pipeline alignment co-ordinates into their construction drawings. Please note that the information in the as-built drawings should be treated as confidential and should not be shared.
- c) No works in the vicinity of GTP shall be carried out without prior consultation with SPPG. An impact assessment for the works and implementation of precautionary measures to prevent damage to the gas pipe or gas plant shall be submitted to SPPG
- d) SPPG shall be kept informed of any changes to the proposed works.
- e) No permanent structures shall be designed and constructed above the GTP. However, surface road over the pipeline without reducing the pipeline cover may be acceptable, subject to SPPG's concurrence.

3.2 Precautionary Measures during Works

- a) The works owner and contractor shall take all necessary precautions to prevent any damages to the GTP during the construction stage. They shall inform SPPG before carrying out any excavation works near the gas pipeline and **report all damages** to the gas pipeline and its coating to SPPG. Repair shall be done immediately to prevent corrosion aggravation to the gas pipeline at the damage location and thus becoming a potential hazard.
- b) All propose works shall be accompanied with Risk Assessment, Impact Assessment and Safe Works Methodology endorsed by QP.
- c) If any **earthwork is within 5m of the pipeline (or more when required)**, a registered surveyor shall be engaged to peg the pipeline alignment (generally every 2m) and interpret the pipeline depth from the pipeline drawings. Pegging and marking shall be clear and prominent and remain as such for the duration of works. Trial holes to prove the location of the GTP shall be carried out and all trial holes shall only be done in the presence of SPPG officer. A SPPG RES(Registered Earthwork Supervisor) shall supervise the earthwork and monitor the pipeline depth closely based on the surveyor's interpretation.
- d) Only manual excavation is allowed within 1m of the gas pipeline and only hand excavation is allowed within 0.5m of the gas pipeline.
- e) Under no circumstance shall the GTP be exposed without written consent of SPPG. GTP shall only be exposed in the presence of SPPG Officer. If a GTP is exposed, the owner/contractor shall take the necessary measures to protect the pipe from any physical impact that may cause damage to the pipe and/or its coatings to the satisfaction of SPPG.

- f) Do not shift or remove warning markers indicating the existence of the GTP at site without SPPG's approval. The contractor shall protect them from being damaged or tampered. In the event the warning markers are damaged, they shall be reported to SPPG and replaced immediately. Where necessary, additional temporary warning markers shall be installed to warn others of the presence of gas pipeline.
- g) For **blasting works**, piling or any works that cause ground vibration, the peak particle velocity (PPV) of ground shock generated by the blast shall be limited to 15mm/s measured at the pipeline and 5mm/s measured at gas plant. The PPV shall be monitored in real time. SPPG shall be notified once the PPV reaches 10mm/s for the gas pipeline or 3mm/s for the gas plant.
- h) For **tunneling, shaft excavation** and piling works, ground consolidation could occur due to ground water losses resulting in surface settlement. This settlement can potentially induce excessive stress on the pipeline. The contractor shall engage a Qualified Personnel conduct a risk assessment to assess the impact of tunneling on the surrounding area and to the GTP. To monitor the surface settlement, surface monitoring points shall be installed along the pipeline alignment at every 10m intervals for at least 100m pipe length from the tunnel or shaft. The settlement shall be regularly monitored while excavation or tunneling works are being carried out. A differential settlement attained less than 1:1000 will require all parties involved to assess the ground consolidation and evaluate the need to implement measure to arrest the consolidation. Contractors are advised to stop works when the differential settlement attained less than 1:714 and a thorough stress analysis of the pipeline shall be done by competent persons recognised by SPPG. Depending on the findings of the analysis, measures shall be taken to relieve the pipeline from stress induced. Final reinstatement of the differential settlement to relieve the stress on GTP shall be included (i.e. to settlement of 1:1000 or better). Detailed assessments are also required for any pipelines that have gross structural discontinuities (i.e: bends, tees, valves, etc)
- i) For **crossing and parallel laying** of services to GTP, Table 1 shows the required separation distance between the GTP and other services or structures. It should be noted that other authorities may have stricter or additional requirements on minimum separation distance between proposed building / structure and the pipeline than what is stated here. Services crossing the pipeline shall not be at the previous boring pit locations of the pipeline, the locations are to be advised by SPPG. The services crossing over the GTP shall not be an obstruction for SPPG to access the GTP. (Generally, the services should not be wider than 1m and self-suspended without a support).
- j) For movement of heavy haulage over the gas pipeline, the transporter shall submit the proposed route to SPPG. The load per axle shall be limited to 10tonne and sufficient load distribution shall be placed for crossing over the pipeline and if the pipeline is not buried under a proper road.
- k) For any new development surrounding the GTP, the developer shall inform the property owner on the location of the pipeline within their premises and draw up measures to prevent any possible damage to it. Pipeline within a fenced compound shall be accessible to SPPG for patrolling and any maintenance works as and when required.
- l) For laying of new pipeline or construction of new structure with cathodic protection, a proper study and survey needs to be implemented by the contractor to ensure no cathodic protection system are compromise or interfered with.
- m) For major works that span over a long period of time, the owner and contractor shall hold monthly meetings to update SPPG on the progress and any changes to their works.

3.3 Repair of Damage Pipe/Coating

In the event the pipe and/or its coating are damaged by the third party works or found damaged, **immediate report** shall be made to SPPG. SPPG will undertake the necessary repair works. All costs of such repairs shall be borne by the third party responsible for the damage.

3.4 Emergency Works

When emergency works have to be done near the pipeline in the interest of public or private safety, the owner and contractor shall **call SPPG** at the 24-hour hotline at **1800 752 1800 or 69167400**. SPPG officers will respond to site to advise on the approximate location of the gas pipeline. The contractor shall ensure safe works are executed for emergency works near the gas pipeline or gas plant. The Principal shall submit a written notice to ESP within 24 hours after the work has commenced.

4. Enquiries

The above requirements are only stated in general. The concerned party shall consult SPPG on all works near the GTP. SPPG reserves the right to alter any stated requirements or impose additional requirements that are necessary depending on site conditions and type of work. Refer all enquiries and correspondences on works near the GTP to:

Postal address

Transmission Pipelines Operations and Maintenance (TPOM) Section
SP PowerGrid Ltd (Gas Operation)
National Gas Control Centre
24A Senoko Ave
Singapore 758314

Email: gasenquiry@spgroup.com.sg

Telephone numbers

Transmission Pipelines Operations and Maintenance (TPOM) Section :
6916 6136 / 6916 6112

24-hour System Control Centre: **6916 7400**

24-hour Customer Service Centre: **1800 752 1800**

HEAD OF SECTION
TRANSMISSION PIPELINES OPERATIONS AND MAINTENANCE (TPOM)
GAS OPERATIONS
SP POWERGRID LTD
As agent for and on behalf of PowerGas Ltd

(This is a computer-generated document. No signature is required.)

Table 1: Minimum Separation Distance Between GTP And Other Services / Structures

S/N	Service / Structure	Minimum separation distance / Requirements
1.	Bore / sheet piling	5.0m. May require real time monitoring of soil movement and settlement and additional Risk/Impact Assessment.
2.	200x200 Concrete Piles	3.0m
3.	Tunneling	Clearance distance 2.0m or more. Depending on size and depth, it may require real time monitoring of soil movement and settlement and additional Risk/Impact Assessment.
4.	Directional Drilling	2.0m plus radius of final tunnel size
5.	Formed Drain / Earth Drain	1.2m / 1.5m
6.	Minor Drain	0.5m
7.	Water/Sewer Pipe: less than 700mm dia.	1.0m
8.	Water/Sewer Pipe: 700mm dia. or larger	2.5m or more depending on size of pipe and construction method.
9.	Electric Cables: less than 22 KV	0.5m
10.	Electric Cables: 22KV and above	1.2m
11.	Telecom cables	0.5m
12.	Low pressure gas pipe	0.5m
13.	Shrubs	1.2m
14.	Trees	2.0m
15.	Soil Investigation	10.0m (If lesser, with positive identification of GTP)
16.	Posts / foundations for light, signs etc	1.5m
17.	Road Pavement	1.5m
18.	Off-Road Crossing for heavy vehicles	1.5m or more with 25mm steel plating on surface.
19.	Earthing Rods	5.0m