GEOTECHNICS PTY LTD
CONSULTING GEOTECHNICAL ENGINEERS

MONITORING PLAN FOR SYDNEY TRAINS

FOR

HOMES NSW

171 Weston & 2 to 6 Hinemoa Streets, Panania, NSW (BGYAP)

Report No: 24/1694

Project No: 31349/8831D-G

July 2024

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DOCUMENT CONTROL

REPORT TITLE: MONITORING PLAN FOR SYDNEY TRAINS

REPORT NO: 24/1694

Revision	Details	Date	Prepared By
0	Original	June 2024	MT

1. INTRODUCTION

At the request of Homes NSW (The Client), STS Geotechnics Pty Ltd (STS) has a monitoring plan for Sydney Trains for the proposed development at 171 Weston & 2 to 6 Hinemoa Streets, Panania, NSW (the Site) on the existing Sydney Trains railway corridor near the site. The purpose of this report is to provide a methodology for the monitoring of the proposed basement excavation and provide guidelines to manage the potential impacts on the adjacent Sydney Trains assets within the vicinity of the development.

1.1. Background

This report follows on from the previous two reports prepared by STS.

- Geotechnical Investigation (GI) report, Report No 22/156, dated May 2022.
- Impact Assessment Report, Report No 24/1466, dated June 2024.

The following additional documents were used to assist us with the preparation of this report:

- Detail & Level Survey drawings prepared by Norton Survey Partners; Job No: 52042; Dated 07.06.2024.
- Architectural plan by Morson Group Pty Ltd, 'Panania – LAHC 2021/505 171 Weston & 2 to 6 Hinemoa Streets, Panania', dated 13.02.2024.

Based on the provided documents, STS understands that the proposed development involves the construction of a five-storey residential building with one basement level that will require excavating to a depth of 3 m below the existing ground surface. Ground levels varying from RL 18.8 m AHD at the western site corner to RL 21.0 m AHD at the eastern site corner. According to the architectural drawings final level of excavation is about RL 16.8 m AHD.

Based on the information provided, the development is to be constructed within the vicinity of Sydney Trains corridor comprises of two tracks as part of T8 Leppington to City Circle via Airport line. The closest set back to the rail boundary from the site boundary is about 20.1 m. The tracks are running in an east-west direction.

2. MONITORING REQUIREMENTS

2.1. Dilapidation Survey of Sydney Trains Assets

Prior to excavation, during excavation, and following construction, detailed dilapidation surveys must be carried out on the Sydney Trains assets. The initial dilapidation survey will constitute a hold point that construction should not commence until the dilapidation surveys have been completed and submitted to Sydney Trains.

The dilapidation surveys of the Sydney Trains assets will be undertaken at the following times:

- Prior to the commencement of excavation.
- When excavation has reached BEL of basement.
- Once the full load of the building structure has been applied.

2.2. Deformation Monitoring of Sydney Trains Assets

Due to the proposed excavation works being adjacent to Sydney Trains assets, monitoring of movements will be required. This monitoring is necessary to ensure works do not adversely affect the Sydney Trains assets and so that any unexpected deflections can be detected early and rectified accordingly.

The following monitoring points are recommended for monitoring the deflection of Sydney Trains assets.

- **One** survey mark **(S1)** to be taken at the edge of site boundary.
- **One** survey mark **(S2)** to be taken at the edge of the Weston Street.
- **One** survey mark **(S3)** to be taken at the edge of the closets track.

The monitoring locations are shown in the attached **Drawing 1**. Given the predicted impact on Sydney Trains asset and its substantial setback from the proposed shoring system, installation of inclinometers is not warranted.

All instrumentation must be always kept in operational condition and protected from damage caused during excavation and construction through the use of adequate marking, monuments, and barriers. Construction works should be suspended where more than 30% of the devices have malfunctioned and the relevant stakeholders contacted immediately.

All survey data is to be presented to the project geotechnical and structural engineers along with details of the monitoring visit including:

- Date
- Time
- Progress of excavation at time of monitoring
- Weather conditions
- Any further comments relative to the monitoring

2.2.1. Monitoring Frequency

During the excavation phase and the construction of the basement and ground floor slabs, readings should be taken as follows:

- Before commencement of excavation
  - A copy of the baseline measurements and detailed plans of all monitoring devices, comprising at least two independent measurements taken at least three days apart, are to be submitted to Sydney Trains for their records at least one week prior to commencement of any bulk excavation works.
- Readings should be taken weekly during excavation to BEL
- Once a fortnight during construction of the basement until the permanent retaining structure (ground floor slab) is completed
- Following the completion of the permanent basement slabs (and all anchors distressed), measurements will be taken weekly until three consecutive measurements show no further movements.

2.2.2. Supply of Monitoring Results

Results of survey monitoring must be supplied to the geotechnical and structural consultants within two days of the completion of monitoring.

2.2.3. Monitoring of the Magnitude of Induced Movements

Monitoring of the magnitude of the induced movements is required to assess performance versus the predicted movements from the finite element analysis. Our finite element analysis provided in Impact Assessment Report predicted a deflection of less than 1 mm on railway corridor and on site boundary. We recommend the following threshold limits as outlined in Table 1 be adopted for the monitoring of the Sydney Trains Asset.

Table 1: Summary of monitoring criteria

Criteria	Deflection Monitoring
Monitoring Point	S1, S2, S3 (See Note 1)
Maximum Deflection (mm)	5 mm
Green Level (mm)	< 70% of Maximum Deflection (<3.5 mm)
Amber Level (mm)	70-100% Maximum Deflection (3.5 mm to 5 mm)
Red Level (mm)	> 100% of Maximum Deflection (>5.0 mm)

Note 1: Deflection at S1 will be more than that of S2 and S3.

1. **Green Level:** Excavation could be continued. Monitoring should continue to be carried out at the nominated intervals
2. **Amber Level:** The client, geotechnical engineer, structural engineer and Sydney Trains representative should be notified and the monitoring data reviewed while the excavation continues. Ongoing monitoring events to be undertaken at 24 hour intervals until notified otherwise by nominated engineers in consultation with Sydney Trains.

3. **Red Level:** Excavation should cease immediately. Monitoring should be carried out daily until movement is negligible. Work should cease until a risk management/contingency plan is implemented to safeguard existing Sydney Trains assets.

2.2.4. Contingency Plan

Where displacements are greater than acceptable limits nominated, excavation should cease immediately. The geotechnical engineer, structural engineer and client should be notified and work should cease until a risk management/contingency plan is implemented to safeguard Sydney Trains Asset.

2.3. Stakeholder Details

The following stakeholders listed in Table-2 below should be contacted as per the criteria outlined in this report.

Table 2: Stakeholder contact details.

Stakeholder	Stakeholder Contact	Contact Details
Sydney Trains	Sydney Trains Representative	13 15 00
Developer	TBC	TBC
Geotechnical Consultant	STS Geotechnics Mrigesh Tamang	02 9756 2166
Structural Consultant	TBC	TBC

2.4. Completion

On completion of the construction, completion measurement should be taken. Completion measurements along with all previous measurements should be submitted to Sydney Trains for record keeping.

Should you have any queries regarding this report, please do not hesitate to contact STS.

Yours faithfully

Author

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Senior Geotechnical Engineer
STS Geotechnics Pty Limited

3. STATEMENT OF LIMITATIONS

This report has been prepared for the exclusive use of HOMES NSW who is the only intended beneficiary of STS's work. The scope of the investigation carried out for the purpose of this report is limited to those agreed with HOMES NSW.

No other party should rely on the document without the prior written consent of STS, and STS undertakes no duty, or accepts any responsibility or liability, to any third party who purports to rely upon this document without STS's approval.

STS has used a degree of care and skill ordinarily exercised in similar investigations by reputable members of the geotechnical industry in Australia as at the date of this document. No other warranty, expressed or implied, is made or intended. Each section of this report must be read in conjunction with the whole of this report, including its appendices and attachments.

The conclusions presented in this report are based on a limited investigation of conditions, with specific sampling and test locations chosen to be as representative as possible under the given circumstances.

STS's professional opinions are reasonable and based on its professional judgment, experience, training and results from analytical data. STS may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified by STS.

STS's professional opinions contained in this document are subject to modification if additional information is obtained through further investigation, observations, or validation testing and analysis during construction. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

We draw your attention to the document "Important Information", which is included in Appendix D of this report. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be. The document is not intended to reduce the level of responsibility accepted by STS, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

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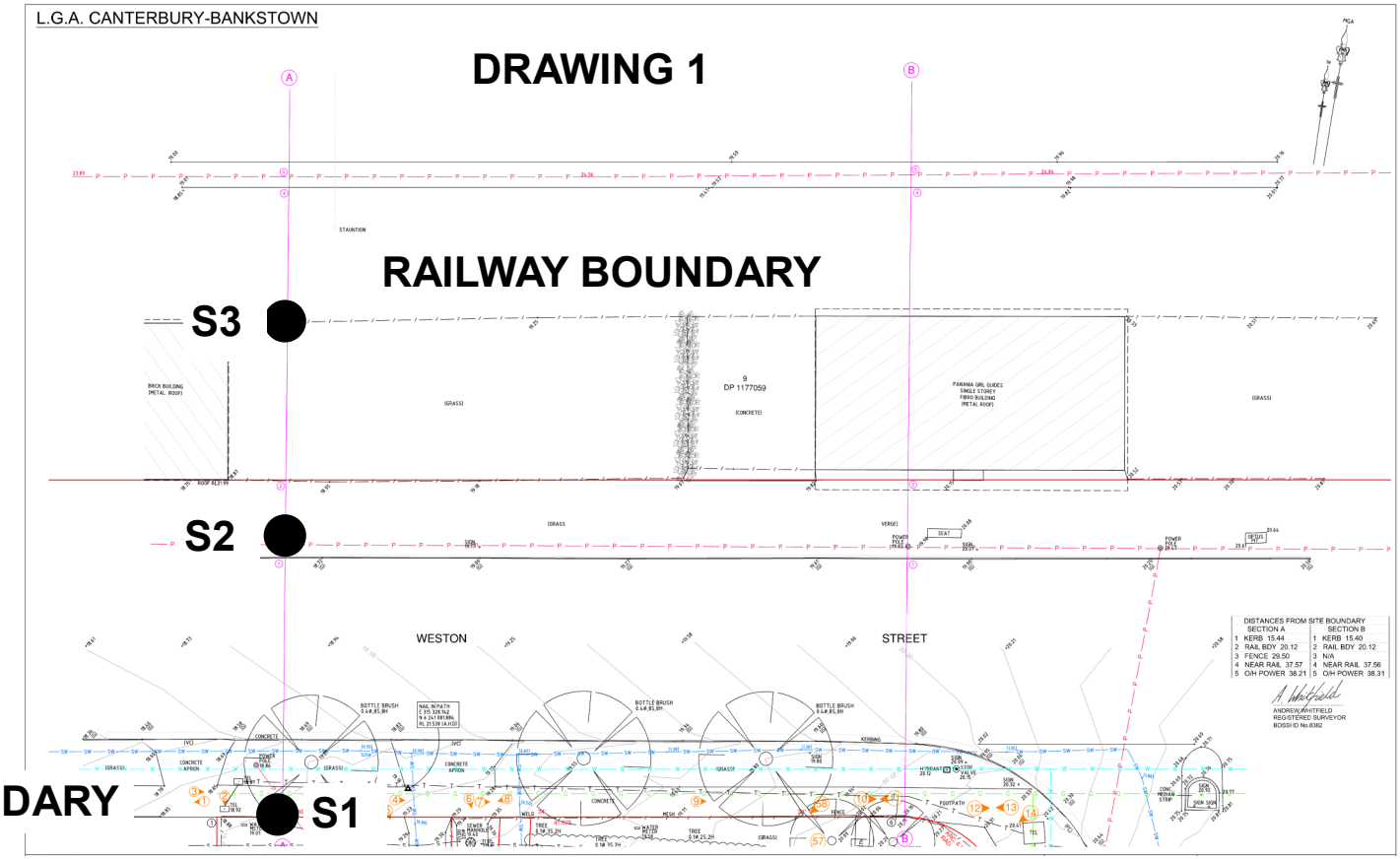
DRAWING 1: Proposed Monitoring Locations



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Proposed Monitoring Locations

Client:	Homes NSW	**Project No.**	31349/8831D-G	**Date:**	June 2024
Site Address:	171 Weston Street and 2-6 Hinemoa Street, Panania	**Drawing No.**	24/1694	**Scale:**	Unknown
Work:	Geotechnical Impact Assessment Report	**Revision No.**	0		

APPENDIX A – Important Information

Important Information

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INTRODUCTION

These notes have been provided to outline the methodology and limitations inherent in geotechnical reporting. The issues discussed are not relevant to all reports and further advice should be sought if there are any queries regarding any advice or report. When copies of reports are made, they should be reproduced in full.

GEOTECHNICAL REPORTS

Geotechnical reports are prepared by qualified personnel on the information supplied or obtained and are based on current engineering standards of interpretation and analysis.

Information may be gained from limited subsurface testing, surface observations, previous work and is supplemented by knowledge of the local geology and experience of the range of properties that may be exhibited by the materials present. For this reason, geotechnical reports should be regarded as interpretative rather than factual documents, limited to some extent by the scope of information on which they rely.

Where the report has been prepared for a specific purpose (eg. design of a three-storey building), the information and interpretation may not be appropriate if the design is changed (eg. a twenty storey building). In such cases, the report and the sufficiency of the existing work should be reviewed by STS Geotechnics Pty Limited in the light of the new proposal.

Every care is taken with the report content, however, it is not always possible to anticipate or assume responsibility for the following conditions:

- Unexpected variations in ground conditions. The potential for this depends on the amount of investigative work undertaken.
- Changes in policy or interpretation by statutory authorities.
- The actions of contractors responding to commercial pressures.

If these occur, STS Geotechnics Pty Limited would be pleased to resolve the matter through further investigation, analysis or advice.

UNFORSEEN CONDITIONS

Should conditions encountered on site differ markedly from those anticipated from the information contained in the report, STS Geotechnics Pty Limited should be notified immediately. Early identification of site anomalies generally results in any problems being more readily resolved and allows re-interpretation and assessment of the implications for future work.

SUBSURFACE CONDITIONS

Logs of a borehole, recovered core, test pit, excavated face or cone penetration test are an engineering and/or geological interpretation of the subsurface conditions. The reliability of the logged information depends on the drilling/testing method, sampling and/or observation spacings and the ground conditions. It is not always possible or economic to obtain continuous high quality data. It should also be recognised that the volume or material observed or tested is only a fraction of the total subsurface profile.

Interpretation of subsurface information and application to design and construction must take into consideration the spacing of the test locations, the frequency of observations and testing, and the possibility that geological boundaries may vary between observation points.

Groundwater observations and measurements outside of specially designed and constructed piezometers should be treated with care for the following reasons:

- In low permeability soils groundwater may not seep into an excavation or bore in the short time it is left open.
- A localised perched water table may not represent the true water table.
- Groundwater levels vary according to rainfall events or season.
- Some drilling and testing procedures mask or prevent groundwater inflow.

The installation of piezometers and long term monitoring of groundwater levels may be required to adequately identify groundwater conditions.

SUPPLY OF GETEOECHNICAL INFORMATION OR TENDERING PURPOSES

It is recommended tenderers are provided with as much geological and geotechnical information that is available and that where there are uncertainties regarding the ground conditions, prospective tenders should be provided with comments discussing the range of likely conditions in addition to the investigation data.