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Our Ref: PSM2124-009L
Date: 1 November 2013

South Village Pty Ltd
c/o Ionic Management Pty Ltd
Shop 1, 22 Gadigal Avenue
ZETLAND NSW 2017

ATTENTION: CHRIS RYAN
By email: cryan@imanage.net.au

Dear Chris,

RE: KIRRAWEE BRICK PIT
GEOTECHNICAL MONITORING PLAN DURING DEWATERING

1. INTRODUCTION

This letter provides PSM's proposed geotechnical monitoring plan for Kirrawee Brick Pit for the proposed dewatering. The monitoring plan was prepared in accordance with the recommendation in our geotechnical and groundwater assessment letter dated 31 October 2013 (Ref. PSM2124-008L).

2. GEOTECHNICAL INSPECTIONS

A walkover inspection by a geotechnical engineer shall be undertaken along the crest of the batter. The inspection shall be undertaken at the following times:

- Prior to dewatering.
- Every fortnight during dewatering.
- Every month for the following six months after completion of dewatering.

3. MONITORING INSTRUMENTS

The monitoring described in the following sections shall be undertaken for the southern batter. Figure 1 and Figure 2 show indicative monitoring point locations.

3.1. Survey Monitoring Points

The following survey points shall be installed:

- Monitoring points at the crest of the southern batter at 10 m centres, with a minimum of twenty (20) points. These monitoring points shall comprise reflectors on star pickets driven firmly into the ground (or other approved alternative).
- Monitoring points along the carpark kerb on Flora Street with a minimum of fifteen (15) points. These monitoring points shall comprise reflectors on the kerb or other approved alternative.
- At least three (3) control points to allow movement at the crest and the kerb be assessed within the level of monitoring accuracy described below.

The monitoring points are required to be measured to ± 1 mm accuracy and results should be provided in terms of Easting, Northing and RL. We expect this accuracy can be achieved eg with survey prisms and / or metallic reflectors.

3.2. Monitoring of water level within the brickpit

The water level (RL) in the brick pit shall be measured at the following frequencies:

- Immediately prior to commencement of dewatering.
- Every 2 days during dewatering.

3.3. Vibrating Wire Piezometers (VWP)

Vibrating wire piezometers shall be installed at 50 m centres along the southern batter to monitor changes in pore water pressures within the batter. A minimum of four (4) VWPs will be required. The installation will involve drilling of boreholes and grouting in the VWPs. The VWPs will be installed to a maximum depth of 20 m. Single channel data loggers will be established at the surface within a lockable standpipe to record the pressure at 1 hour intervals.

4. BASELINE AND MONITORING FREQUENCY

A minimum of two (2) baseline readings of all survey monitoring points are to be completed prior to commencement of dewatering of the brick pit.

Following baseline readings being undertaken, PSM will confirm that the baseline documentation, as-installed locations and instrument accuracy meets the requirements of this plan.

Table 1 provides the frequency of monitoring.

TABLE 1
PROPOSED MONITORING FREQUENCY

MONITORING		PROPOSED MONITORING FREQUENCY
Survey monitoring points	At the crest of the southern batter	• Upon completion of the instrument installation. • Prior to the start of dewatering (together with the previous readings this will form the baseline readings). • During dewatering – daily. • Upon completion of dewatering – weekly for the following 1 month (and as directed by PSM, ie after rain event etc).
	Along the carpark kerb on Flora Street	
Water level monitoring		• Immediately prior to commencement of dewatering. • During dewatering – daily.
Vibrating wire piezometers		Data to be collected: • Immediately prior to commencement of dewatering. • During dewatering – every 3 days. • Upon completion of dewatering – weekly for the following 1 month (and as directed by PSM, ie after rain event etc).

5. TRIGGER LEVELS

A three (3) tier monitoring status system will be adopted. Under this system, an "orange" trigger is associated with the situation where the monitoring results require action.

A "red" trigger indicates that the monitoring movement at the crest is significantly higher than expected, and results in stopping any works, eg dewatering, that have the potential to increase movement until required actions have been completed.

Table 2 presents our proposed trigger levels and actions.

For both orange and red trigger levels, review of monitoring includes reviewing the monitoring data in terms of accuracy, reliability and methodology. This may result in PSM requesting a revision of the monitoring frequency, or methodology, and implementation of additional monitoring instrumentation.

TABLE 2
PROPOSED TRIGGER LEVELS AND ACTIONS

TRIGGER LEVELS	SURVEY MONITORING POINT – TOTAL MOVEMENT (mm)		ACTIONS
	AT THE CREST OF SOUTHERN BATTER	ALONG THE CARPARK KERB ON FLORA STREET	
Green	<10	<10	1. No action required.
Orange	10	10	1. PSM to notify Developer. 2. PSM to review monitoring: • Accuracy • Reliability • Methodology • Trends 3. PSM to review results and compare with dewatering progress. 4. Surveyor to complete survey of all monitoring points. 5. PSM to undertake geotechnical walkover inspection. 6. PSM to assess cause of movement and expected further movement. 7. PSM to advise (where required): • Additional monitoring • Increase frequency of monitoring 8. PSM to assess tolerable movements.
Red	25	25	1. All actions associated with orange trigger level. 2. Developer to notify Council. 3. Cease dewatering, and assess if movement is greater than tolerable. Work to recommence only when PSM has completed all required actions. 4. PSM to assess requirement for batter support and provide advice.

6. REPORTING

All monitoring data should be submitted to PSM for assessment within two (2) days of survey.

PSM will provide the following reports to the Developer:

- A baseline monitoring report that verifies the system is installed in accordance with this plan.
- A monthly monitoring report during dewatering.
- A separate report when a trigger level is reached, summarising the actions undertaken by PSM.
- A monitoring report upon completion of dewatering.
- A final report one month after completion of dewatering.

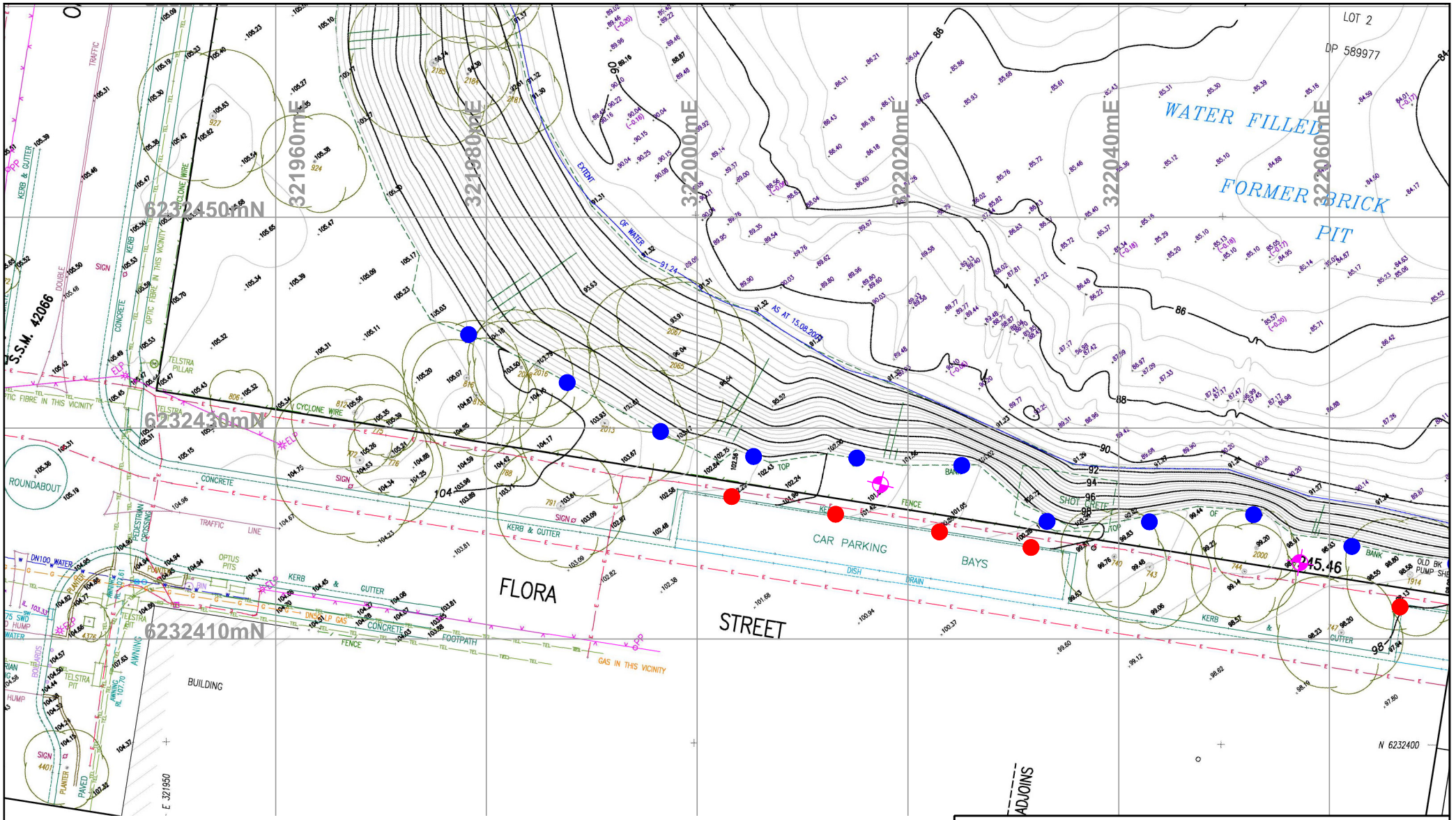
Should you have any queries regarding this letter, please do not hesitate to contact the undersigned.

For and on behalf of
PELLS SULLIVAN MEYNINK

GARRY MOSTYN
Principal

AGUSTRIA SALIM
Senior Geotechnical Engineer

Encl. Figure 1 Plan - Instrument Locations – Sheet 1 of 2
Figure 2 Plan - Instrument Locations – Sheet 2 of 2



LEGEND:

- VIBRATING WIRE PIEZOMETER
- SURVEY MONITORING POINTS ALONG THE CREST
- SURVEY MONITORING POINTS ALONG THE KERB

0 5 10 15 20

Scale (m)

N

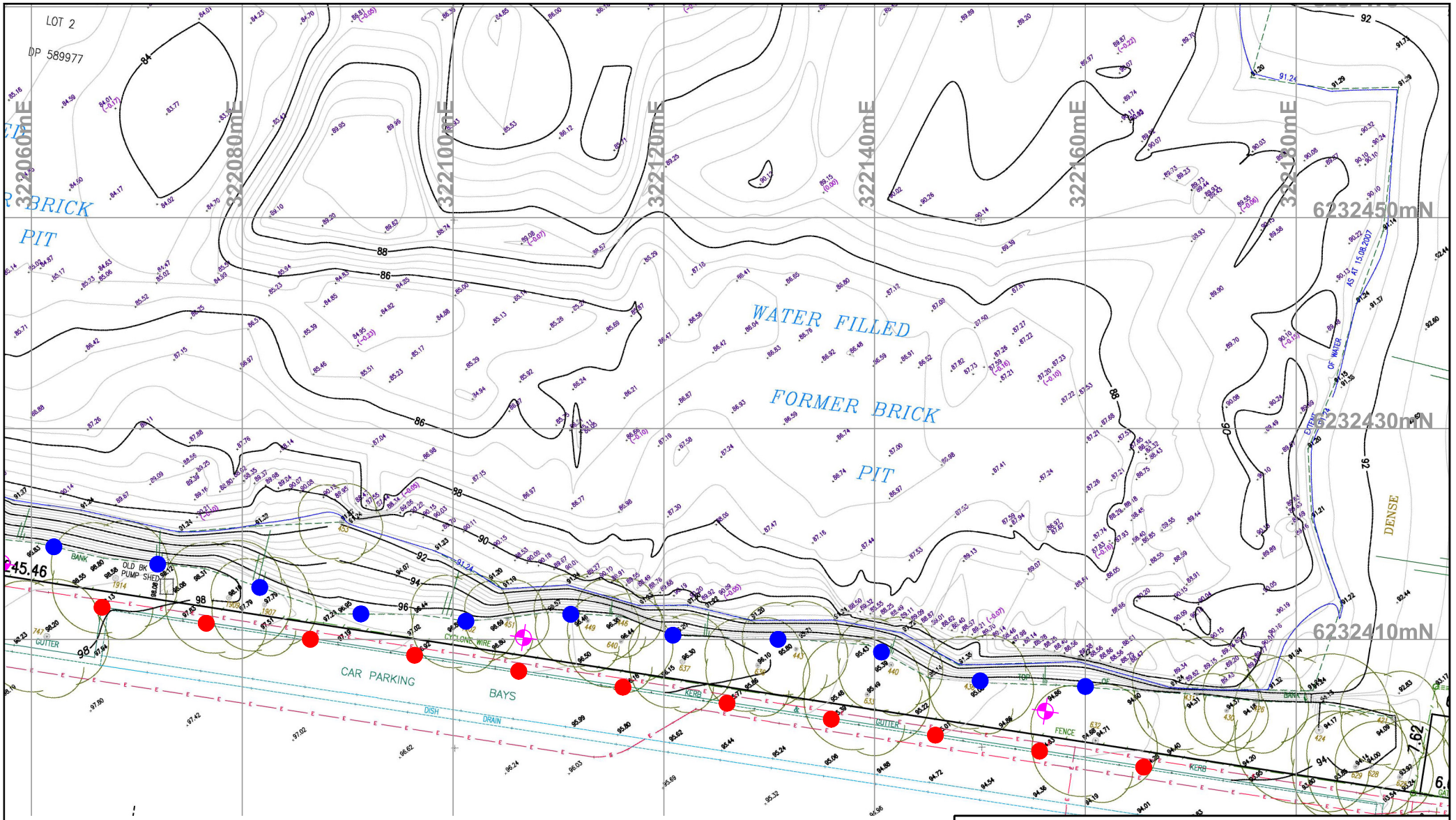
PSM

Pells Sullivan Meynink

Ionic Management Pty Ltd
Kirrawee Brick Pit
Geotechnical Monitoring Plan

PLAN - INSTRUMENT LOCATIONS
SHEET 1 OF 2

PSM2124-009L	FIGURE 1



LEGEND:

- VIBRATING WIRE PIEZOMETER
- SURVEY MONITORING POINTS ALONG THE CREST
- SURVEY MONITORING POINTS ALONG THE KERB

0 5 10 15 20

Scale (m)

N

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Geotechnical Monitoring Plan

PLAN - INSTRUMENT LOCATIONS
SHEET 2 OF 2

PSM2124-009L	FIGURE 2