Summary of existing information from desktop study

Previous reports

Information was obtained from previous work carried out by AECOM, landowners of 300 to 310 Princes Highway, St Peters (Lots 1 & 2/DP788037) and reports provided by WDA.

St Peters Brick-Shale Quarry, Canal Road, Geology and Alternative Rehabilitation Proposal, Branagan, D.F. and Norman, A.R. May 1985 (Ref 3)

This report examines the geology of the site and discusses the influence of the geology on the stability of the slopes as they stood in 1985. The report also addresses the rehabilitation of the quarry and discusses alternative proposals to preserve significant geological features as a community asset.

Information on geological features at the quarry, including the bedding, jointing and faults, are summarised in the report and extracts are presented in Figure 5 and Table 8

Figure 5 Significant geological features, extract from Ref 3

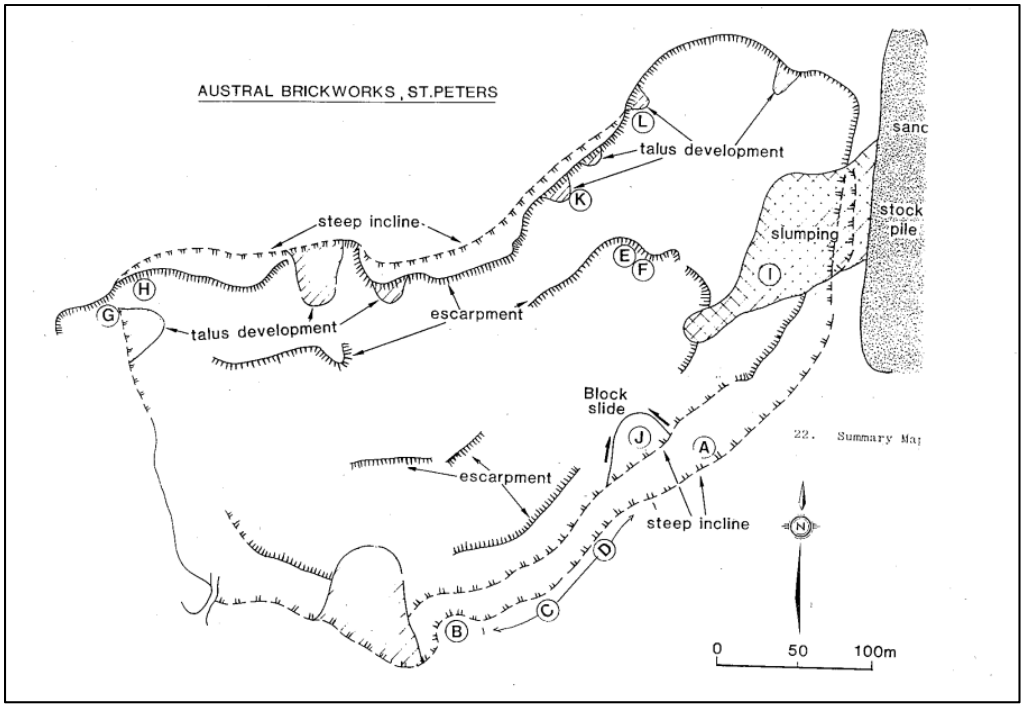


Table 8 Significant geological features Figure 5

Location	Feature
A	Ashfield shale and Botany Sands Contact
B	Botany Sands/Laterite/Shale Contact
C-D	Fossil Shell occurrence in Sand
E	Intersecting faults
F	Fault and Joint Zone
G & H	Fault through weathered Shale
I	Man-made slump
J	Old Slip Area

Location	Feature
K, L	Talus Cones and Block Failure
M, N	Groundwater ingress

Evidence of instability around the quarry included:

- Feature I, Slumping / debris flow of the stockpile material located at the north eastern corner of the quarry (area known as Bradshaw Mountain);
- Feature J, a mass siltstone block slide at the southern boundary of the quarry;
- Talus developments which had stabilised at an angle of 32° at various locations around the site; and
- Frequent rock falls noted at various locations around the quarry wall.

The report suggests that the cause of the various slope failures is linked to groundwater flow into the quarry at a number of points and to the presence of consistent near vertical joints orientated at 020°. The quarry was identified as 'not static' even though excavation of the shale had ceased at the time of the report. Stabilisation measures recommended in the report included either buttressing the unstable slopes or controlled removal of the unstable areas.

Since this report the site has undergone landfilling activities which has buried the majority of the features identified and fill buttresses (probably uncontrolled) were placed against the old quarry walls.

Department of Main Roads (DMR), Materials Division, F5 Southern Western Freeway. Fairford Road, Padstow to Euston Road, St Peters. Second Supplementary Stability Assessment of Quarry Face – Austral Brick CO. Warren Gash, D.J. February 1987. (Ref 4):

The report presents the results of the site investigation carried out for the proposed F5 development, to be constructed to the south of the quarry in the vicinity of Feature J, the block failure (lateral spread) shown in Figure 5 The scope of the site investigation included drilling six boreholes, installation of inclinometers and laboratory testing on recovered samples. The boreholes were drilled to depths of between 9.1 m and 35.4 m.

The results of the boreholes indicated 10 m to 12 m Fill, Botany Sands and Residual Soils, underlain by Ashfield Shale. Groundwater was observed between 1.1 m and 3.6 m depth.

During the site investigation works, additional tension cracks were observed which were considered to be linked to the existing block failure (lateral spread) Feature J. Consequently, it was considered that the block slide (lateral spread) may be larger than originally anticipated. The report made no recommendations for further action.

Department of Main Road (DMR), Materials Service Section, F5 Southern Western Freeway. Construction between Princes Highway at Tempe and Campbell Road at St Peters. Stability at St Peters Brick Pit. Warren Gash, D.J. April 1989. (Ref 5):

This report presents the results of further investigation works carried out in the vicinity of the existing block failure for the proposed F5 Development. The site investigation comprised the drilling of eleven boreholes (including two inclined boreholes), water pressure testing, installation of four piezometers and four inclinometers. The boreholes were drilled to depths of between 22.5 m and 44.1 m. A horizontal borehole was also drilled 76.75 m into the side of the quarry wall.

The borehole data indicated approximately 8.2 m to 12.6 m of Fill, Botany Sands and Residual Soils underlain by Ashfield Shale. Groundwater was encountered in selected boreholes locations during drilling between the depths of 0.3 m to 3 m. Groundwater levels measured within piezometers indicated groundwater depth ranging from 6.2 m to 15.6 m. The report concluded that there were potentially two groundwater levels, including a perched groundwater table on the clayey materials overlying the Ashfield Shale and another within the bedrock (Ashfield shale).

The report identified shear zones within the shale, potentially associated with the block failure, at RL -25.5 m AHD and RL-19.5 m. The report considered that the driving force behind the movement of the block was groundwater and that controlling the groundwater may help stabilise the block failure.

The report suggests that:

- attempting to control the perched groundwater within the Botany Sands would be unwise and would potentially increase the volume of water to be managed by the quarry.
- a series of horizontal drains could be drilled into the shale to help stabilise the quarry face until the quarry had been filled.

Anchoring the block was not considered a suitable remediation measure due to the possibility or development of a larger block failure behind the existing failure.

Dames and Moore, Stability of St Peters Brick Pit Adjacent to the proposed F5 South-Western Freeway Campbell Road to Canal Road, St Peters. Barry McMahon, April 1989. (Ref 6)

The report reviews the available information gathered by the Roads and Transport Authority (RTA), evaluates the stability of the block and weighs up the possible impact of the proposed F5 development on the stability of the quarry. Potential limitations on the proposed F5 development were also investigated as part of the report.

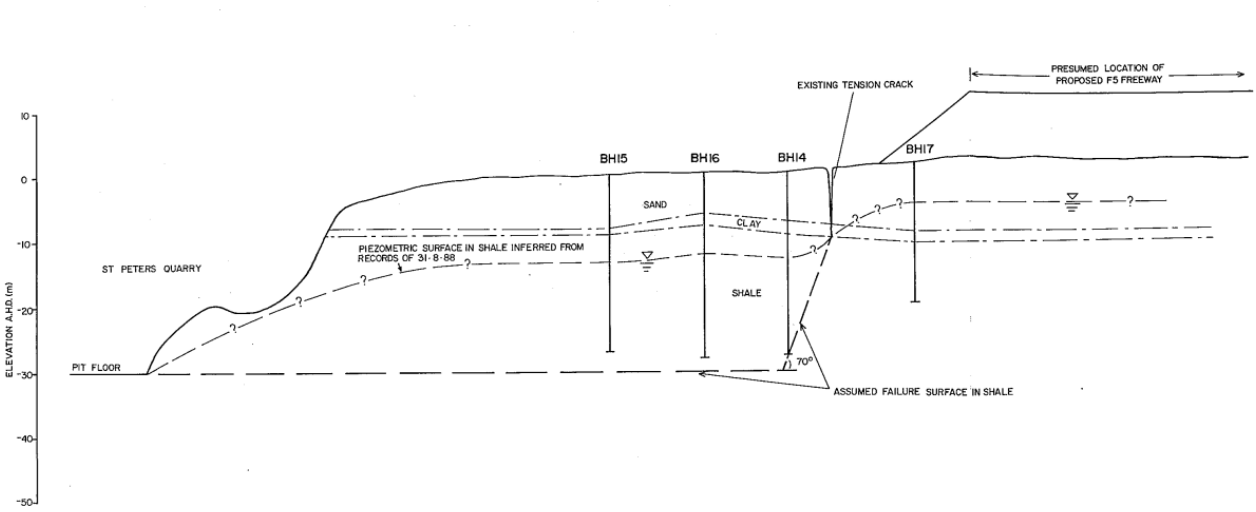
The report concluded that there was a great deal of uncertainty surrounding the following:

- The extent and rate of ground movement, and whether there would be a progressive increase in the amount of movement;
- The cause of the inferred ground movements and whether they represented the movement of a marginally stable slide block due to hydrostatic pressures or were caused by ongoing creep associated with residual stress relief as a result of former quarrying within the shale;
- Whether there was a slowing down in the rate of the ground movement after the construction of the horizontal drain and subsequent lowering of the groundwater table.

Due to the instability of the site and the impact of the proposed freeway development adjacent to the quarry, the report recommended that the height of the embankment for the freeway be limited to a maximum of 5 m. It was also considered that the whole length of the quarry wall adjacent to the proposed freeway development could be at risk of instability due to the construction of the embankment.

A conceptual cross-sectional model of the presumed block was developed as part of the report and is reproduced in Figure 6

Figure 6 Cross-section of Slide Area – Presumed failure surface, extract from Ref 6



The preferred option to stabilise the slope included lowering the groundwater by the placement of horizontal drains near the base of the pit. This was considered to be the most economical means of stabilising the slope. However, the assessment also concluded that the lowering of the piezometric surface using horizontal drains would still limit the allowable height of the embankment of the freeway adjacent to the quarry.

The St Peters Brickpits: Their Geology, Operation and Reclamation, and the adjacent Quaternary shoreline. McNally, G.H. and Branagan, D.F., 1998, Environmental Geology of the Botany Basin. (Ref 7):

The intention of this paper was to assess the environmental problems associated with the rehabilitation of shale quarry following landfilling. The paper also provides a summary of the geological features of the quarry including geological structures observed in the Ashfield Shale and a description of the Quaternary sediments.

The paper reports that considerable slope instability in the walls of the quarry was recorded as shown Figure 7. The majority of the debris attributed to spalling of the exposed siltstone quarry faces (talus) and slumping of the overlying Quaternary sediments. Two main types of failures were identified:

- block failures due to the persistent NNE trending joints and bedding planes within the shale; and
- slumping of the surficial materials (loose fill, residual soil, colluvium and botany sands).

A large block failure occurred on the northern side of the quarry in 1963. Tension cracks also opened up between Cowper Street and Bishop Street in St Peters damaging several houses within 100 m of the quarry. The tension cracks were parallel to the quarry face and appeared to have formed along existing joints. It was suggested that the block failure may have caused cracking on the opposite side of the Princes Highway approximately 160 m away. The paper identified the likely failure mechanism as stress relief combined with block movement along the bedding. Groundwater and blasting in the quarry were also considered to be contributing factors to the block failure. The location of the 1963 block failure is shown in Figure 7. Figure 8 shows a conceptual cross section of the quarry reproduced from the paper.

The paper indicates talus and landslide debris (or debris flow) around 1980 located at the north eastern corner of the quarry shown in the area now occupied by Bradshaw Mountain. The paper identifies this talus as likely being a result of overloading the edge of the quarry and combined with the influence of groundwater.

Figure 7 Site Elevation Plan extract from Ref 7

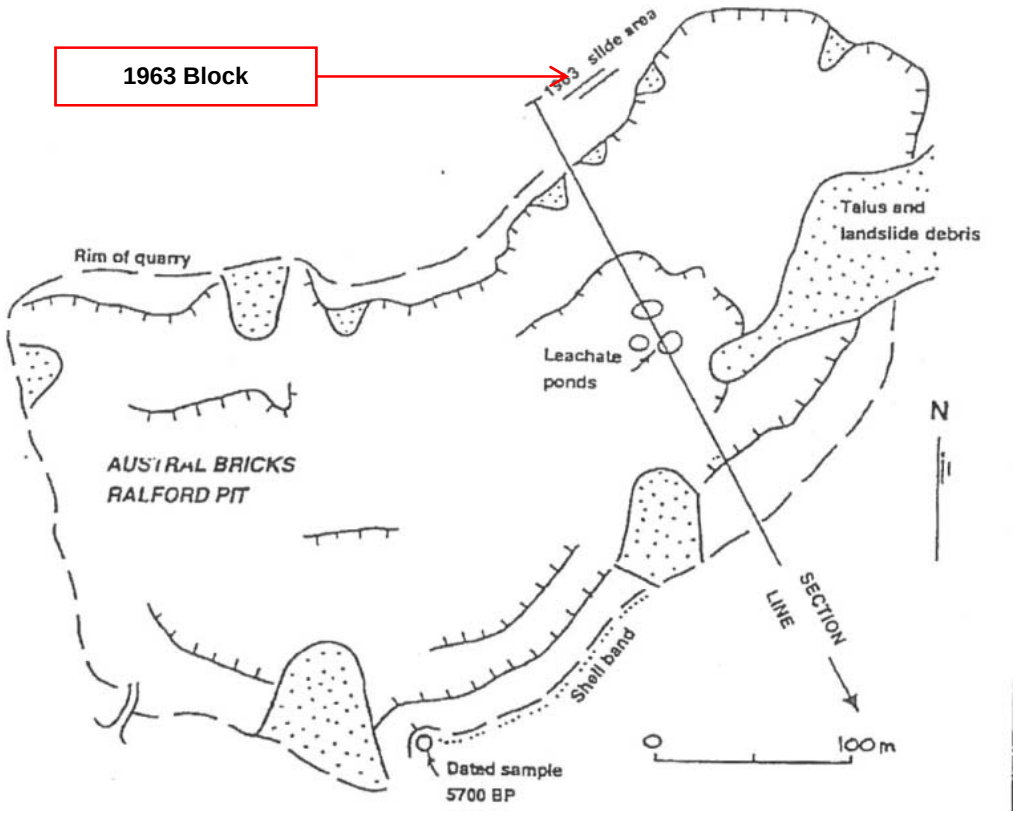
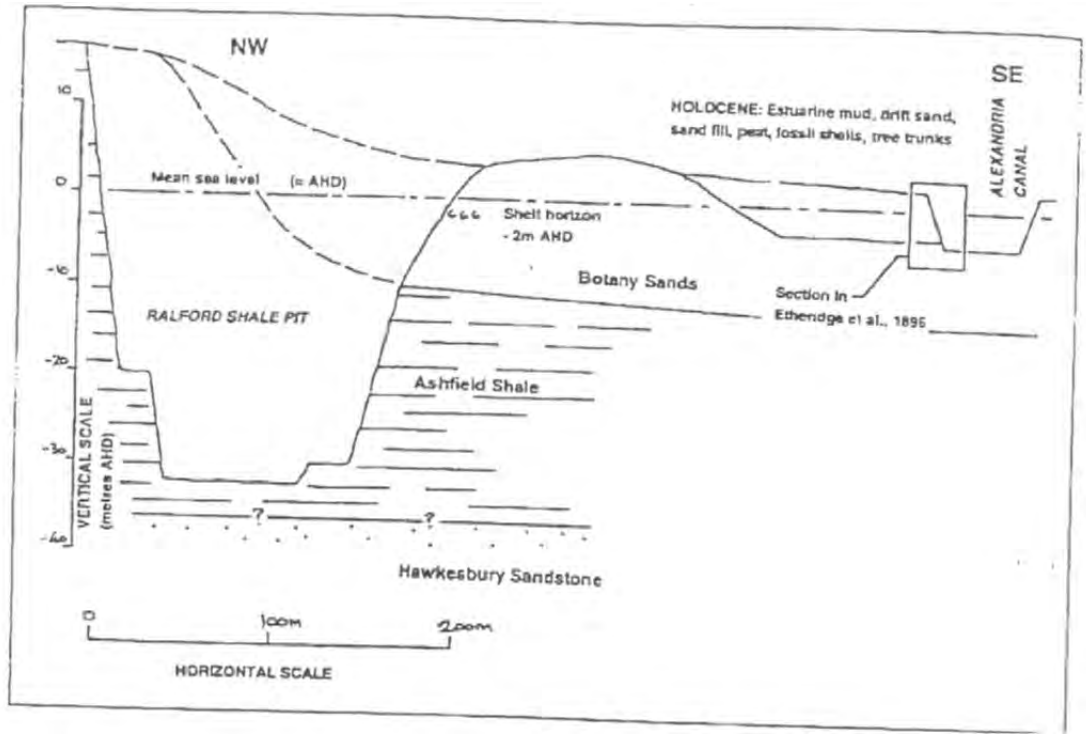


Figure 8 Conceptual cross section of the quarry, extract from Ref 7



Assessment of Landslip – Stormwater Pipeline St Peters, Douglas Partners, January 2000. (Ref 8):

The report summarises the assessment of a landslip that occurred on the south eastern boundary of the site, affecting a 30 m to 40 m section of recently constructed stormwater pipeline. However the exact location of the landslip is not clear as the site plan showing the area of failure is missing.

The landslip back scarp was approximately 1 m high and lay 2 m behind the pipeline. Numerous tension cracks were observed at the crest of the slope. Excavation carried out around the landslip exposed fill comprising waste material, overlying an estuarine/alluvial profile of very soft to soft peat/peaty clay, underlain by clayey sands with numerous shells on the eastern side of the trench. The western side on the trench exposed fill which is reported as being an old excavation quarry face.

Groundwater was observed coming from the peaty layer (on the eastern side of the trench), eroding the underlying soft material. A dam had been constructed at the base of the slope to restrict water flow to the quarry floor. Failed materials had travelled downslope and into this dam.

Slope Failure, Waste Transfer Station, Albert St, St Peters, Review of Documents – Draft Report, Geotechnique to City of Sydney Council, January 2001. (Ref 9):

This letter report is a review of the available documents received from the City of Sydney Council in relation to design and construction of a stormwater pipeline that failed due to a landslide. The purpose of the review was to determine the likely reasons for slope failure, responsibility of parties involved and probability of a similar incident occurring again. The report concluded that the placement of the embankment to support the pipeline, combined with the heavy rainfall prior to failure contributed to the slope failure.

Several documents were referenced as part of the review, some of which have been reviewed as part this desktop study (Ref 3 and Ref 7). However, not all documents were available for review as part of this desktop study, including:

- A risk assessment carried out by Woodward-Clyde in July 1997 that classed the southern face of the quarry as ‘low to moderate’ risk. It concluded that this area contained ‘less favourable’ slope and geological conditions at the site and that slope failure would not result in the loss of life or damage to structures, as there were no structures at that time in the vicinity of the southern boundary.

- A hydrogeological study carried out by Woodward-Clyde in August 1998 for the Botany Sands, which concluded that rainfall directly recharges the aquifer and contributes to the seepage into the quarry/landfill. It was considered that heavy rainfall/groundwater seepage into the quarry may trigger a landslide on the southern side.

Gravity Storm Drain, Waste Transfer Station, St Peters – Geotechnical Investigation Report, Geotechnique to City of Sydney Council, 28 February 2001. (Ref 10):

This report presents the results of a geotechnical site investigation carried out in the vicinity a recently constructed Gravity Stormwater Drain (GSD). The site investigation included geological mapping along the GSD alignment, which was approximately 825 m in length, and the drilling of eight boreholes between 5.85 m and 13.5 m depth. The location and chainages of the GSD and boreholes are not clear, as the site/location plan is missing from the document (Appendix A of the report). However the report breaks the alignment into three sections Southern, Eastern and Northern.

Potential sheet failures (block failures) of the shale face were identified at various locations in the Northern Section of the alignment. It was reported that the continuous undercutting of the quarry face would eventually undermine the GSD within an estimated 5 years.

Based on the survey and aerial photographs it is inferred that this is within the vicinity of Slope 3 located on the northern side of the quarry.

Observations along the southern section of the alignment included:

- tension cracks in the fill batter at several locations
- groundwater seepage and soil piping at several locations

The report concluded that based on the above information the probability of failure in this Southern Section was between 10^{-1} and 10^{-2} (Likely to almost certain) and the risk to the structure was considered to be very high. Based on the descriptions provided in the report as well as survey and aerial photographs, it is inferred that this slope is located on the west side of the site, possibly in the vicinity of and south of Slope 5.

The ground conditions along the Eastern section of the GSD comprised a section of deep landfill which was identified as being likely to be subjected to continuous creep and settlement.

It is unclear if these issues identified were addressed following completion of the report.

Geotechnical Opinion 238-310 Princes Highway St Peters, NSW, J&K Pty Ltd to Rocca Building Pty Ltd, November 2005. (Ref 11)

The report presents the results of geotechnical inspection of the quarry face below 238-310 Princes Highway, which was carried out on behalf of the landowners concerned about the effects of the instability of the exposed quarry face adjacent to the property boundary. The exposed vertical quarry walls were approximately 7 m to 9 m high with the base of the pit approximately 10 m to 12 m deep. The exposed quarry face is reported to be of variable quality with surficially weathered shale. Large pillars of shale were recorded as detaching from the quarry walls along open joints in the rock face. It was suggested that a 15 m exclusion zone be maintained at the base of the quarry face.

Geotechnical Opinion 238-310 Princes Highway St Peters, NSW, J&K Pty Ltd to Rocca Building Pty Ltd, 13 March 2014 (Ref 12):

This report was carried out on behalf of the landowners of 300 to 310 Princes Highway, St Peters (Lots 1 & 2 DP788037 following further to instability adjacent to the property. Since the previous inspection carried out (Ref 11) a buttress has been placed against the slope (Stockpile 21).

The authors concluded that the berm or buttress had been placed against the quarry wall in the intervening 7 to 8 years. The lower section of the berm was reportedly battered at an estimated slope angle of 40°. The upper section of the berm was battered at around 60 to 70° from horizontal. The berm did not reach the full height of the slope and a gully/depression had formed in some places between the quarry slope and the berm. Observations made during this site visit are consistent with the observations made as part of this assessment.

Reported evidence of slope failure included tension cracks and leaning fence posts behind the crest of the slope. Sections of the berm had failed and slumped at the time of writing the report and back scarps were observed in the slope.

Recommendations to stabilise the slope included:

- Flattening the slope with a batter no steeper than 1V:2H, extending to the crest of the quarry wall/boundary.
- Placement of engineered fill to buttress the slope below their property
- Marry the crest of the berm into crest of the cutting, promoting runoff and reducing infiltration of water into slope
- Vegetate the slope as soon as possible after placement of berm.

Factual Geotechnical Investigation report, WestConnex Stage 2, AECOM to the WestConnex Delivery Authority, 27 March 2015 (Ref 13):

The report was carried out to assist with the proposed WestConnex Stage 2 development, which extends from St Peters to Kingsgrove. As part of the investigation 22 geotechnical boreholes were drilled within the quarry (SPI site) and surrounding area. Figure 9 shows the location of boreholes which were carried out in the vicinity of the SPI site during these investigations.

The soils surrounding the quarry and landfill are typically Fill, underlain by Quaternary Sediments (Botany Sands), overlying Residual Soils. Based on the boreholes surrounding the quarry/landfill the Botany Sands gradually decreased in thickness from Alexandra Canal at the south of the site towards the north of the site. This material was not observed in boreholes locate near the Princes Highway. The borehole information suggests the boundary of the Botany Sands is parallel to Alexandra Canal which is aligned roughly east to west. The thickness of fill surrounding the site varied from 0.2 m to 7 m. Fill within the landfill/quarry was recorded depths of up to 40.3 m near the southern boundary of the site. Quaternary sediments and fill surrounding the quarry/landfill was generally underlain by residual soils that were typically between 1 m to 3 m thick and comprised silty clay/gravelly clay derived from Ashfield Shale.

Bedrock encountered in the boreholes comprised Ashfield Shale overlying Mittagong Formation and Hawkesbury Sandstone. The Ashfield Shale is estimated to be up to 60m thick in the vicinity of the site. The weathered thickness of the shale generally ranged from 1 m to 8 m.

Discontinuities observed within the boreholes will likely contribute to potential instability of the quarry faces. These include sub-horizontal bedding, extremely weathered seams and crushed zones combined with the various joints set. Shear seams and potential faults zones were also observed in (BH055, located in) the north eastern corner of the site and (BH119, located near) the north western boundary of the site. The orientation of the potential faults/shear zone is unknown. A dyke shown in the Sydney 1:100,000 Geological Series Sheet 9130 (1983), was not observed in the boreholes carried in this area.

Figure 9 Stage 2 Geotechnical Investigation Borehole Locations

AECOM Memorandum Alexandria Landfill: Volumetric Survey Data and EPL Compliance - 2002 to 2015, 8 March 2015, AECOM. (Ref 14)

This memorandum presents the results of a volumetric assessment for environmental remediation during the period of the former land owners (Alexandria Landfill Pty Ltd). The assessment included survey information from AAM Pty Ltd between the period of June 2002 to December 2014.

As part of this volumetric assessment, the extent of Stockpile 21 (Bradshaw Mountain) was evaluated as part of a volumetric survey of carried out by both Vekta Pty Ltd and AAM Pty Ltd during this period to determine how much material was to be removed as part of the EPA clean-up notice. Figure 10 indicates the approximate extents of Stockpile 21 based on the volumetric survey information during that period.

Figure 10 Extent of Stockpile 21 - Extract from AECOM Memorandum March 2015 (Ref 14)

Letter to Westconnex Delivery Authority, Proposed Slope Stabilisation Works - Concept Design St Peter Interchange (SPI), 2 July 2015, AECOM (Ref 15)

This letter outlines the proposed temporary stabilisation plan for the slope failure that occurred in May 2015 (Slope 2). The proposed temporary stabilisation includes the construction of a fill buttress over the existing steep fill slope, using compacted fill sourced from various stockpiles within the SPI site or imported fill.

The letter forms part of the detailed design of the temporary stabilisation of the slope as shown in Figure 11

Figure 11 Construction of Temporary Stabilisation Buttress – 14 October 2015.

Drawings for *"Proposed Sydney Park Business Centre", T.C Plunnett and Associates Pty Ltd for Walker Development Pty Ltd. 1987 (Ref 16)*

These drawings are for the commercial buildings at 300 Princes Highway, St Peters. The existing buildings consist of a ground level slab suspended by reinforced concrete beams founded on piles. The tilt up panel walls (at the edge of the building) are founded on an edge beam located along the edge of the existing edge of the quarry at the time of construction. The drawing indicated the edge beam is not directly supported by piles; it is supported by concrete beams that cantilever to piles away from the cliff face.

The cliff face of the quarry at the southern side of the building is shown on the footing plan. The drawing indicates that the cliff face is beyond the boundary of the property of the commercial building located to the east and within the boundary of the building located to the west.

Letter to Westconnex Delivery Authority, Structural Assessment - 300 Princes Highway adjacent to St Peters Interchange, 16 June 2015, AECOM (Ref 17)

This letter report presents the findings of a structural assessment of the commercial building carried out in the vicinity of the slope failure that occurred on 5 May 2015. The assessment was carried out to check the potential impact of a slope failure partially undermining the existing building.

The assessment suggested that the existing structure has been designed to accommodate settlement occurring at the edge of the beam of the structure adjacent to SPI. The report advised that the beam supporting the edge beams was considered to be within the acceptable serviceability deflection limits. However, further geotechnical information would be required to complete the structural assessment, including information on the existing pile foundation depth and reinforcement details.

Subsequent to the letter, the slope suffered further instability and the buttress was constructed by WDA.

Letter to Westconnex Delivery Authority, Slope Stability Assessment and Final Design - Westconnex - St Peters Interchange (SPI), 25 June 2015, AECOM (Ref 18)

This letter report presents the result a of the slope stability analysis carried out for the design of the temporary slope stabilisation option for Slope 2. The results of the analysis indicate that the proposed stabilisation solution achieves a calculated Factor of Safety (FOS) greater than1.3 when water is kept out of the fill buttress. However, the FOS falls to below 1.3 under fully saturated conditions. The analysis demonstrated the stability of the Slope 2 is sensitive to groundwater levels.

The letter proposed final design of the temporary slope met the target FOS provided the fill buttress remains unsaturated with a batter slope of 1.5H:1V with drains to be installed in the slope at regular intervals to prevent water ingress into the slope.

Aerial photographs and survey

Aerial photographs from 1930 to 2014 and historical survey information from 1991 through to 2015 in Appendix D and Appendix E respective were reviewed.

The location of the slopes that have been selected for assessment are shown in Figure A2 of Appendix A.

Slope 1

Aerial photographs indicated that excavation of the quarry faces at Slope 1 commenced between 1930 and 1943 and probably ceased when the quarry closed between 1975 and 1980. The eastern part of the slope was typically in shadow, suggesting the slope is steeply dipping, whilst the western part of the slope appears to be flatter. Survey information from 1999 indicates that the base of the quarry was approximately RL-15m to RL-16m AHD at the base of Slope 1.

The survey indicated the western side of the slope was battered towards the east at 45° and the eastern side of the slope battered towards the south at approximately 70°. The area has subsequently been filled by landfilling activities from December 2002 through to 2015 forming a buttress against Slope 1.

Slope 2 and 3

Excavation in the vicinity of Slope 2 commenced prior to 1930. Slope 3 was gradually excavated from west to east from 1943 through to 1975 when the quarry closed.

Survey information of Slope 2 and 3 indicate these slopes are battered at 80° and are likely near vertical in places. Survey information from 1991 indicates the base of the quarry below Slope 2 and 3 is approximately RL-17m to RL-18m AHD. A manmade access track was constructed between 1986 and 1989 that grades down from the eastern part of the site to the base of the pit at the western end.

Industrial buildings, presumably associated with brickwork were located above Slope 2 and 3 prior to 1930. These buildings were demolished between 1978 and 1986. Commercial buildings above Slope 2 were constructed prior to 1989. The site above Slope 3 was left vacant until 1994 and is now occupied by a hotel and other commercial buildings. The area surrounding Slope 2 was subsequently filled by landfilling activities from December 2002 through to 2015, forming a buttress against Slope 2. Approximately 13 m of fill material has been place at the base of Slope 3 since 1991.

Aerial photographs of the site between 1961 and 1978 indicated that houses in the vicinity of the block failure that occurred in 1963 were demolished adjacent to slope 3.

Slope 4

Air photographs of Slope 4 indicated that site was occupied by industrial building which were probably associated with the brickwork or quarrying from 1943. These buildings were demolished between 1961 and 1978. Fill was stockpiled in this area from 1978.

Slope 5 and 6

Excavations in the vicinity of Slopes 5 and 6 commenced prior to 1943. Air photographs of the site indicate an access ramp to the base of the pit was constructed prior to 1951 and altered between 1961 and 1978. Survey information indicates Slope 5 and 6 was battered between 45° and 70° in 1991. Based on the air photographs and survey information batter angle of the exposed quarry face cannot be assessed is in this area at this time.

Industrial buildings, presumably associated with brickworks were located above Slopes 5 and 6 prior to 1930. These buildings were demolished between 1978 and 1986. Commercial buildings at the top of the slopes were constructed around 1989.

Appendix C

Slope Risk Assessment

Slope Risk Analysis
Summary Report Version 4

Slope Identification No.	**Slope 1**					Date	1-Jun-2015	
Inspection Date	1-Jun-2015		Completed By:	Peter Plummer		Checked By:	David Coles	
Slope Data	Slope Class	Embankment/ Cut	Max Slope Height (m)	9	Av. Slope Angle (^{o})	45	Material	Soil (Fill)
	Description:		Princes Highway, St Peters					
Location								
Roadloc Coordinates	Road No	-	Start Link No	-	Finish Link No	-	L or R?	L
			Start Distance	-	Finish Distance	-	Length	50m
GPS Coordinates (WGS84/GDA94)	Start		Latitude		Longitude		Elevation	
	Finish		Latitude		Longitude		Elevation	
MGA Coordinates	Start		Zone	56H	Easting	331341	Northing	6245735
	Finish		Zone	56H	Easting	331390	Northing	6245759
Plan Reference No.	-				Plan Start Chainage		L or R?	
Locality Name	Proposed St Peters Interchange Site - Westconnex							
Road Data	AADT		21267 (South)	Year of Count	Model 0131	Speed Limit (km/hr)		60
	No of Lanes	Prescribed Direction	2	Counter Direction	3	Site Distance Adequate? (Y/N)		Y
Risk Analysis								
Hazard/Failure Mechanism	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Hazard Type	Rotational (Large)	Rotational (small)						
Failure Dynamics Ratings								
Scale of Failure Rating - for Volume (S1 - S5)	S3	S4						
Scale of Failure Rating - for Block Size (S1 - S5)								
Velocity of Failure Rating (R1 - R5)	R1	R1						
Likelihood Rating (L1 - L6)	L4	L4						
Consequence Class Ratings								
Temporal Probability (T1 - T5)	T2	T2						
Vulnerability (V1 - V5)	V4	V4						
Consequence Class for Loss of Life (C1 - C5)	C3	C3						
Consequence Class for property damage etc (C1 - C5)	C3	C3						
Risk Analysis Ratings								
Slope Attribute Score								
Event Magnitude (M1 - M5)	M2	M2						
Hazard Classification (H1 - H5)	H3	H3						
Assessed Risk Level (ARL1 - ARL5)	ARL4	ARL4						

Slope Risk Analysis
Summary Report Version 4

Hazard/Failure Mechanism	1	2	3	4	5	6	7	8
Elements at Risk								
Buildings								
Infrastructure								
Services	Yes	Yes						
Other	Pedestrian	Pedestrian						
Support and Remediation								
Existing support, stabilisation, control or management measures (list)	None							
Need for further investigation? (Y/N)	Y	Possible remedial		Flatten Slope, Soils Nails, Rock anchors, engineered retaining wall				

Comments: Heavy vegetation cover on slope hides potential failures and slope condition. Previous quarry face not identified during visual inspection.

Reports

Author(s)	Organisation	Title	File/Reference No
AECOM	AECOM	Desktop Study and Slope Risk Assessment	

Sketches and Photographs

File Name	Caption
P1	View looking north east along the slope face (slope obscured by vegetation)
P2	Low point of the slope, evidence of ponding water
P3	View looking south west adjacent to the existing warehouse
P4	View looking north at slope face

Slope Risk Analysis
Summary Report Version 4
Supporting Information

For Each Hazard or Failure Mechanism	1	2	3	4	5	6	7	8
Scale Dimensions for volume								
Length (m)	8	3						
Height (m)	4	2						
Width (m)	8	3.5						
Estimated volume (m^3)	256	21						
Scale dimensions for block size								
Length (m)								
Height (m)								
Width (m)								
Type of triggering mechanism	Erosion & rainfall	Erosion & rainfall						

Slope Risk Analysis
Summary Report Version 4

Slope Identification No.	**Slope 3**					Date	1-Jun-2015	
Inspection Date	1-Jun-2015		Completed By:	Peter Plummer		Checked By:	David Coles	
Slope Data	Slope Class	Cut	Max Slope Height (m)	15-18	Av. Slope Angle (^{o})	70-90°	Material	Rock -Shale
	Description:		Bishop Street (Private Roads to Commercial properties)					
Location								
Roadloc Coordinates	Road No	-	Start Link No	-	Finish Link No	-	L or R?	L
			Start Distance	-	Finish Distance	-	Length	160m
GPS Coordinates (WGS84/GDA94)	Start		Latitude		Longitude		Elevation	
	Finish		Latitude		Longitude		Elevation	
MGA Coordinates	Start		Zone	56H	Easting	331510	Northing	6245754
	Finish		Zone	56H	Easting	331628	Northing	6245808
Plan Reference No.	-				Plan Start Chainage	-	L or R?	-
Locality Name	Proposed St Peters Interchange Site - Westconnex							
Road Data	AADT		>270	Year of Count	N/A	Speed Limit (km/hr)		50
	No of Lanes	Prescribed Direction	1	Counter Direction	N/A	Site Distance Adequate? (Y/N)		Y
Risk Analysis								
Hazard/Failure Mechanism	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Hazard Type	Rotational Failure							
Failure Dynamics Ratings								
Scale of Failure Rating - for Volume (S1 - S5)	S3							
Scale of Failure Rating - for Block Size (S1 - S5)								
Velocity of Failure Rating (R1 - R5)	R1							
Likelihood Rating (L1 - L6)	L4							
Consequence Class Ratings								
Temporal Probability (T1 - T5)	T4							
Vulnerability (V1 - V5)	V4							
Consequence Class for Loss of Life (C1 - C5)	C5							
Consequence Class for property damage etc (C1 - C5)	C5							
Risk Analysis Ratings								
Slope Attribute Score	-							
Event Magnitude (M1 - M5)	M2							
Hazard Classification (H1 - H5)	H3							
Assessed Risk Level (ARL1 - ARL5)	ARL5							

Slope Risk Analysis
Summary Report Version 4

Hazard/Failure Mechanism	1	2	3	4	5	6	7	8
Elements at Risk								
Buildings								
Infrastructure	Access Road							
Services								
Other								
Support and Remediation								
Existing support, stabilisation, control or management measures (list)	None, buffer zone at base of slope for Slump failures, Large block and Small block failures							
Need for further investigation? (Y/N)	Y	Possible remedial	Flatten Slope, Rock anchors, buttress against the slope					
Comments: Slump failures, Large block and Small block failures will currently not impact road uses								

Reports

Author(s)	Organisation	Title	File/Reference No
AECOM	AECOM	Desktop Study and Slope Risk Assessment	

Sketches and Photographs

File Name	Caption
Plate 3-1	View looking west along the overall exposed quarry face
Plate 3-2	View looking east along the overall exposed quarry face
Plate 3-3	View looking north at exposed quarry face with fill material overlying the weathered shale
Plate 3-4	Talus build-up and fill material (bricks) at the base of the slope
Plate 3-5	View looking east along the overall slope, talus build-up
Plate 3-6	View looking west along the overall slope, talus build-up
Plate 3-7	overhanging section of exposed cut face where previous small block has fallen out
Plate 3-8	Talus build-up (spalling, small blocks and bricks)

Slope Risk Analysis
Summary Report Version 4
Supporting Information

For Each Hazard or Failure Mechanism	1	2	3	4	5	6	7	8
Scale Dimensions for volume								
Length (m)	10							
Height (m)	4							
Width (m)	8							
Estimated volume (m^3)	320							
Scale dimensions for block size								
Length (m)								
Height (m)								
Width (m)								
Type of triggering mechanism	Rainfall and Erosion							

Slope Risk Analysis Summary
Report Version 4

Slope Identification No.	Slope 4					Date	1-Jun-2015	
Inspection Date	1-Jun-2015		Completed By:	Peter Plummer		Checked By:	David Coles	
Slope Data	Slope Class	Wall	Max Slope Height (m)	16	Av. Slope Angle (^{o})	45	Material	Fill
	Description:		Campbell Lane, Woodley Street and Holland Street, Alexandria and St Peters					
Location								
Roadloc Coordinates	Road No	-	Start Link No	-	Finish Link No	-	L or R?	-
			Start Distance	-	Finish Distance	-	Length	200m
GPS Coordinates (WGS84/GDA94)	Start		Latitude		Longitude		Elevation	
	Finish		Latitude		Longitude		Elevation	
MGA Coordinates	Start		Zone	56H	Easting	331860	Northing	6245882
	Finish		Zone	56H	Easting	331910	Northing	6245745
Plan Reference No.					Plan Start Chainage		L or R?	
Locality Name	Campbell Lane, Woodley Street and Holland Street, Alexandria and St Peters							
Road Data	AADT		>270	Year of Count	N/A	Speed Limit (km/hr)		50
	No of Lanes	Prescribed Direction	1	Counter Direction	N/A	Site Distance Adequate? (Y/N)		Y
Risk Analysis								
Hazard/Failure Mechanism	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Hazard Type	Overturning	Global Failure	Boulder roll					
Failure Dynamics Ratings								
Scale of Failure Rating - for Volume (S1 - S5)		S3						
Scale of Failure Rating - for Block Size (S1 - S5)	S2		S2					
Velocity of Failure Rating (R1 - R5)	R1	R1	R1					
Likelihood Rating (L1 - L6)	L2	L2	L2					
Consequence Class Ratings								
Temporal Probability (T1 - T5)	T4	T4	T4					
Vulnerability (V1 - V5)	V4	V5	V4					
Consequence Class for Loss of Life (C1 - C5)	C5	C5	C5					
Consequence Class for property damage etc (C1 - C5)	C5	C5	C5					
Risk Analysis Ratings								
Slope Attribute Score								
Event Magnitude (M1 - M5)	M2	M2	M2					
Hazard Classification (H1 - H5)	H2	H2	H2					
Assessed Risk Level (ARL1 - ARL5)	ARL4	ARL4	ARL4					

Slope Risk Analysis Summary
Report Version 4

Hazard/Failure Mechanism	1	2	3	4	5	6	7	8
Elements at Risk								
Buildings	houses	houses	houses					
Infrastructure	Power poles	Power poles	Power poles					
Services								
Other	Pedestrians	Pedestrians	Pedestrians					

Support and Remediation			
Existing support, stabilisation, control or management measures (list)	P		
Need for further investigation? (Y/N)	Y	Possible remedial	Install piles to support the masonry wall.

Comments: Significant amount of cracking and deterioration of the masonry wall. Wall beginning to fail and slope towards the road.

Reports

Author(s)	Organisation	Title	File/Reference No
AECOM	AECOM	Desktop Study and Slope Risk Assessment	

Sketches and Photographs

File Name	Caption
Plate 4-1	View looking east at gravity wall and boulders
Plate 4-2	View looking east at leaning gravity wall down Campbell Lane
Plate 4-3	View looking east at vegetation growth on top of the gravity wall down Campbell Lane
Plate 4-4	View looking boulders just above the gravity wall on Campbell Lane
Plate 4-5	View looking boulders just above the gravity wall on Campbell Lane
Plate 4-6	View looking East down Campbell Lane towards Woodley Street
Plate 4-7	View looking South down Woodley Street at gravity wall
Plate 4-8	View looking South down Woodley Street at gravity wall
Plate 4-9	View looking South at Corner Woodley Street and Holland Road

Slope Risk Analysis Summary Report Version 4

Supporting Information

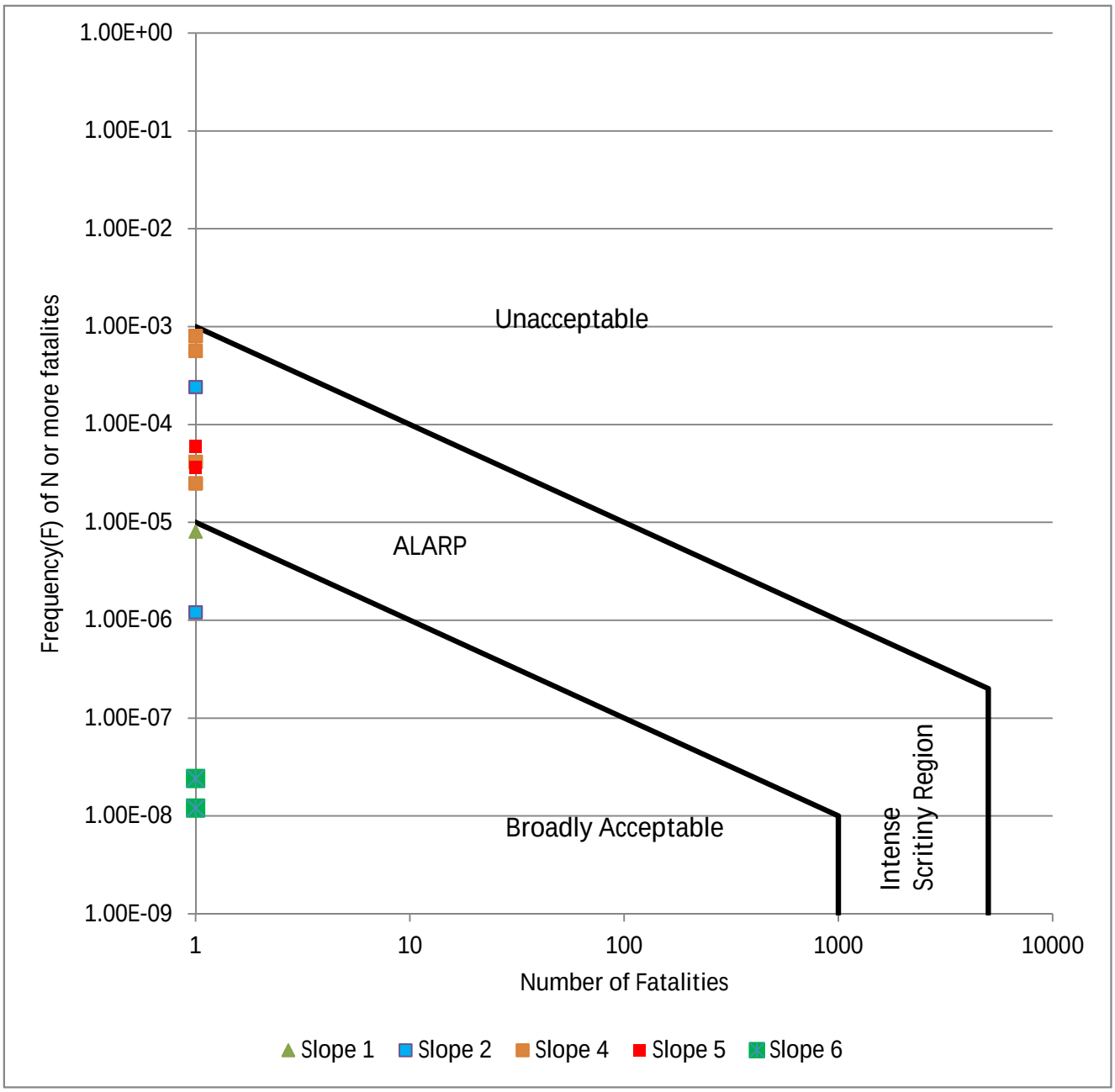
For Each Hazard or Failure Mechanism	1	2	3	4	5	6	7	8
Scale Dimensions for volume								
Length (m)		6						
Height (m)		6						
Width (m)		6						
Estimated volume (m^3)		216						
Scale dimensions for block size								
Length (m)	1		1					
Height (m)	1		1					
Width (m)	0.5		0.5					
Type of triggering mechanism	Heavy Rainfall erosion	Heavy Rainfall erosion	Heavy Rainfall erosion					

Risk for loss of Life

$R_{(LoL)} = P_{(H)} \times P_{(S:H)} \times P_{(T:S)} \times V_{(D:T)}$

$P_{(H)}$ is the annual probability of the landslide
$P_{(S:H)}$ is the probability of spatial impact by the landslide impacting building (location) taking into account the travel distance and direction
$P_{(T:S)}$ is the temporal spatial probability. (e.g. of the building or location being occupied by the individual) given the spatial impact and allowing for the possibility of evacuation given there is a warning of the landslide occurrence.
$V_{(D:T)}$ is the vulnerability of the individual (probability of loss of life of the individual given the impact)
$R_{(LoL)}$ is the risk (annual loss of loss of life (death) of an individual)

Slope	Element at risk	Hazard Mechanism	$P_{(H)}$	$P_{(S:H)}$	$P_{(T:S)}$	$V_{(D:T)}$	$R_{(LoL)}$	Number of People	Number of People x Vunerability	Acceptance Criteria	Acceptance Criteria	Comment		
Slope 1	**Pedestrians**	Rotational Large	0.01	0.1	0.08	0.1	8.00E-06	1	1	0.0001	Okay		**Maximum**	**Rank**
		Rotational Small										unlikely to impact element at risk	8.00E-06	4
Slope 2	**People within the commercial building**	Rotational Large	0.2	0.1	0.24	0.05	2.40E-04	5	1	0.0001	Unacceptable		**Maximum**	**Rank**
		Rotational Small										unlikely to impact element at risk	2.40E-04	2
	People within the commercial building (post stabilisation)	Rotational Large	0.001	0.1	0.24	0.05	1.20E-06	5	1	0.0001	Okay			
		Rotational Small										unlikely to impact element at risk		
Slope 4	**Pedestrians**	Overturning	0.01	1	0.08	1	8.00E-04	1	1	0.0001	Unacceptable			
		Boulders roll	0.01	1	0.08	0.7	5.60E-04	1	1	0.0001	Unacceptable			
		Global Failure	0.01	1	0.08	1	8.00E-04	1	1	0.0001	Unacceptable			
	Person within houses most at risk	Overturning										unlikely to impact element at risk		
		Boulders roll	0.01	0.1	0.83	0.05	4.15E-05	1	1	0.0001	Okay			
		Global Failure	0.01	0.1	0.83	0.05	4.15E-05	1	1	0.0001	Okay			
	Other people within the house	Overturning										unlikely to impact element at risk		
		Boulders roll	0.01	0.1	0.5	0.05	2.50E-05	4	1	0.0001	Okay		**Maximum**	**Rank**
		Global Failure	0.01	0.1	0.5	0.05	2.50E-05	4	1	0.0001	Okay		8.00E-04	1
Slope 5	**People within the commercial building**	Topple (Large)	0.05	0.1	0.24	0.05	6.00E-05	5	1	0.0001	Okay			
		Topple (Small)										unlikely to impact element at risk		
		Rotational Failure (Slump)										unlikely to impact element at risk	**Maximum**	**Rank**
		Lateral Spread	0.015	1	0.24	0.01	3.60E-05	5	1	0.0001	Okay		6.00E-05	3
Slope 6	**People within the commercial building**	Topple (Large)	0.00001	0.1	0.24	0.05	1.20E-08	5	1	0.0001	Okay			
		Topple (Small)										unlikely to impact element at risk		
		Rotational Failure (Slump)										unlikely to impact element at risk	**Maximum**	**Rank**
		Lateral Spread	0.00001	1	0.24	0.01	2.40E-08	5	1	0.0001	Okay		2.40E-08	5


1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
1.00E-06
1.00E-07
1.00E-08
1.00E-09
Frequency(F) of N or more fatalites
Unacceptable
ALARP
Broadly Acceptable
Intense Scritiny Region
1
10
100
1000
10000
Number of Fatalities
Slope 1
Slope 2
Slope 4
Slope 5
Slope 6

Appendix D

Aerial Photographs

Figure D1 Historical aerial photograph - 1930

Figure D2 Historical aerial photograph - 1943

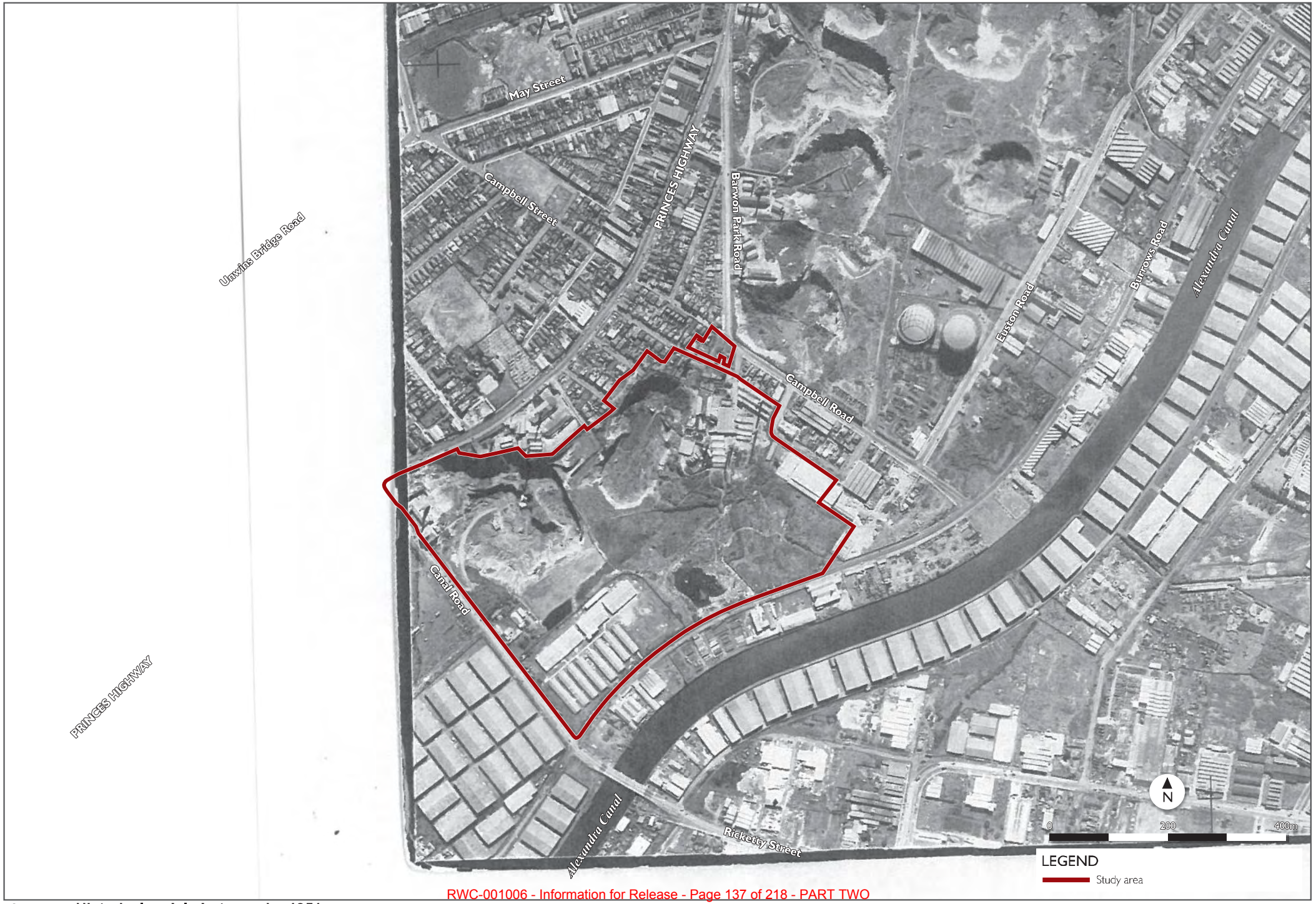


Figure D3 Historical aerial photograph - 1951

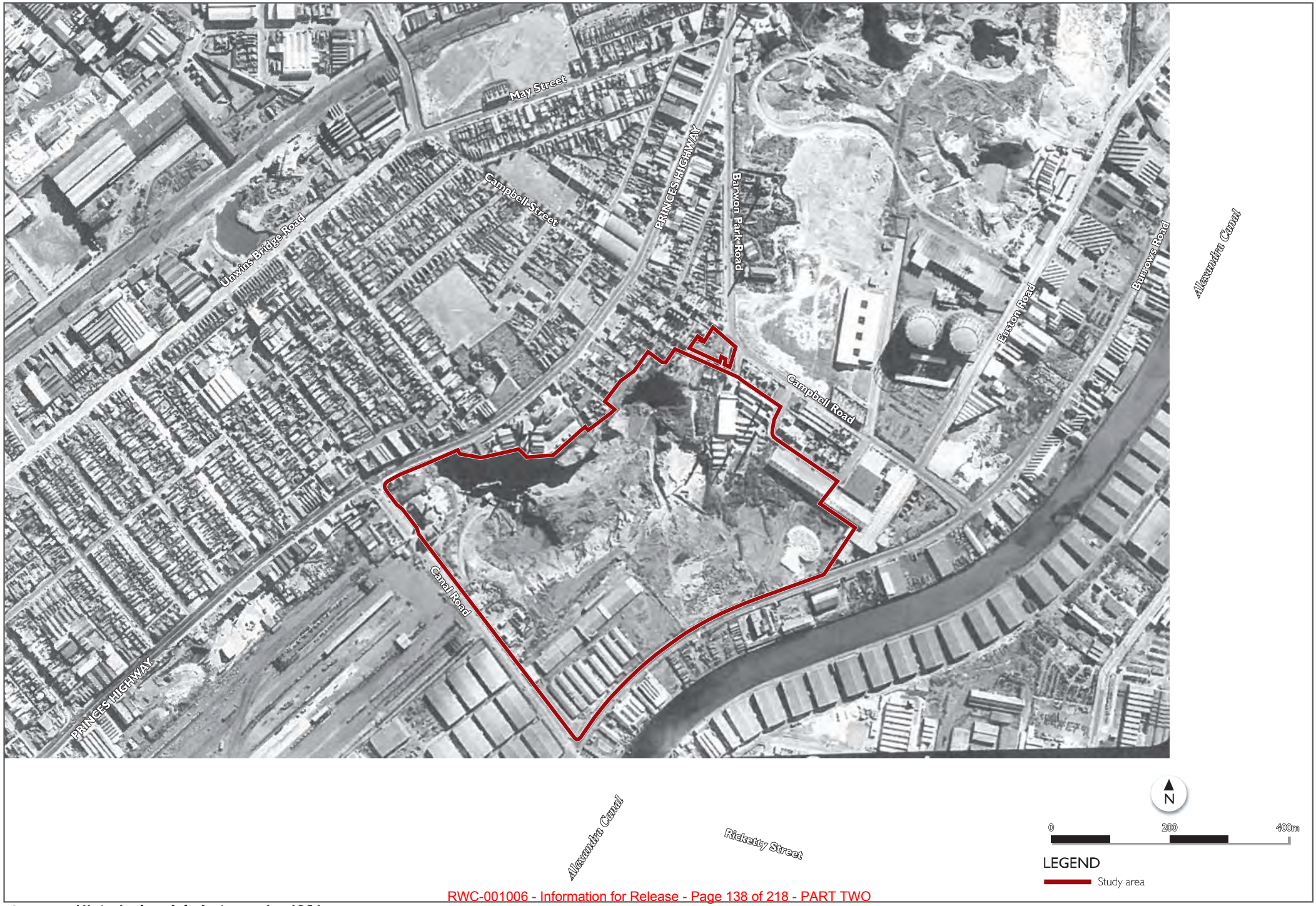


Figure D4 Historical aerial photograph - 1961

Figure D5 Historical aerial photograph - 1978

Figure D6 Historical aerial photograph - 1986

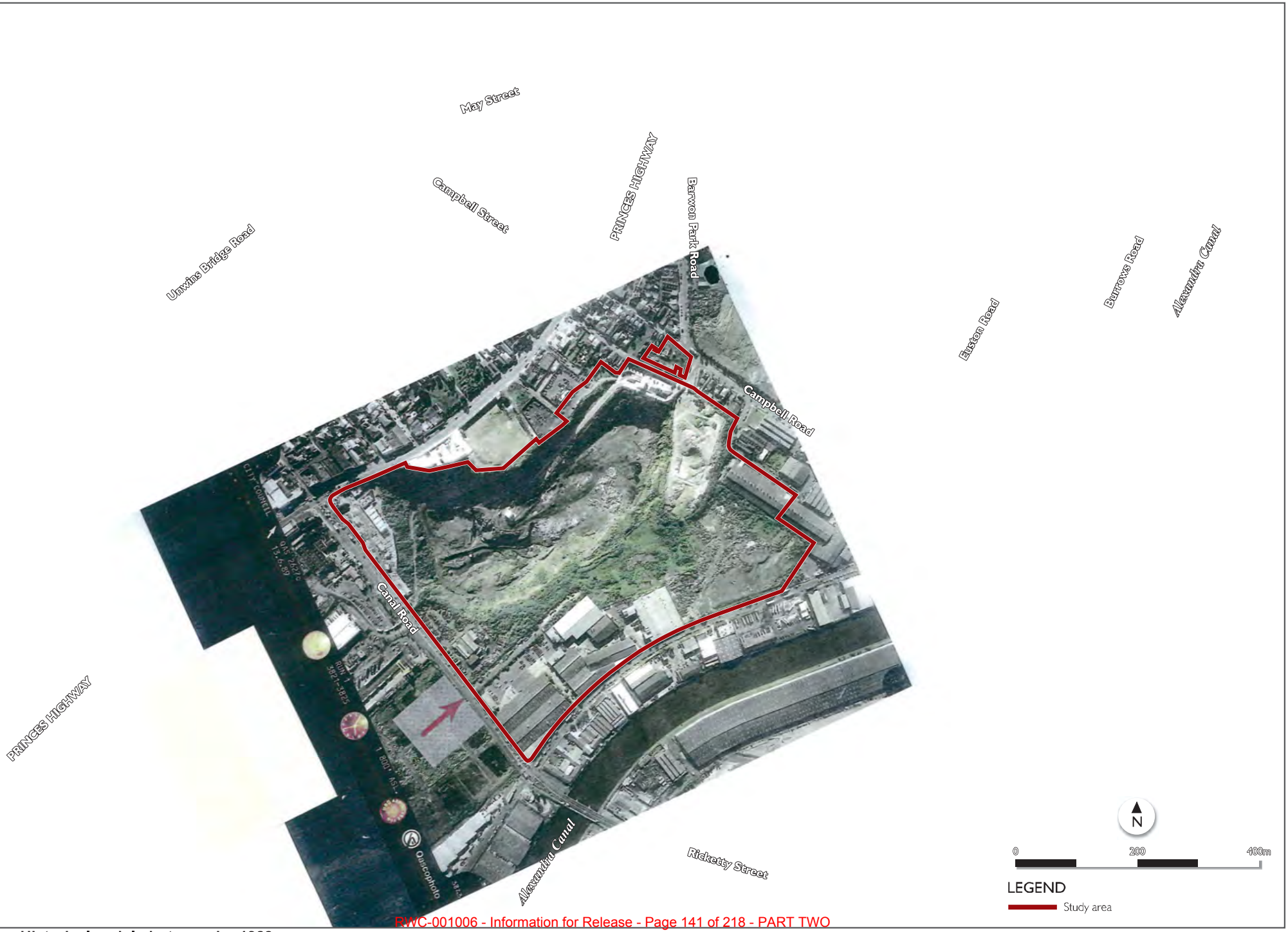


Figure D7 Historical aerial photograph - 1989

Figure D8 Historical aerial photograph - 1990

Figure D9 Historical aerial photograph - 1991

Figure D10 Historical aerial photograph - 1992

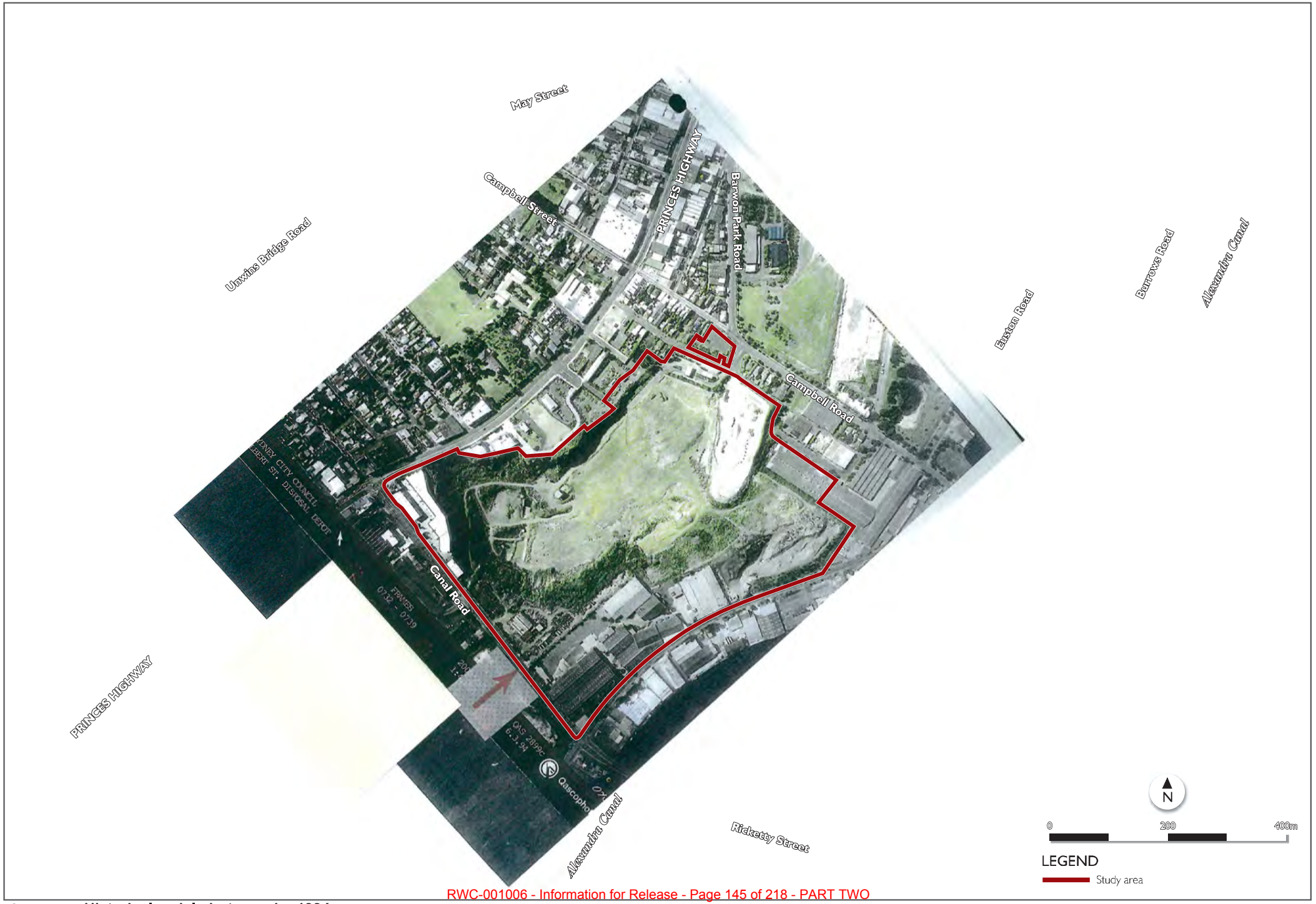


Figure D11 Historical aerial photograph - 1994

Figure D12 Historical aerial photograph - 1996

Figure D13 Historical aerial photograph - January 1997

Figure D14 Historical aerial photograph - June 1997

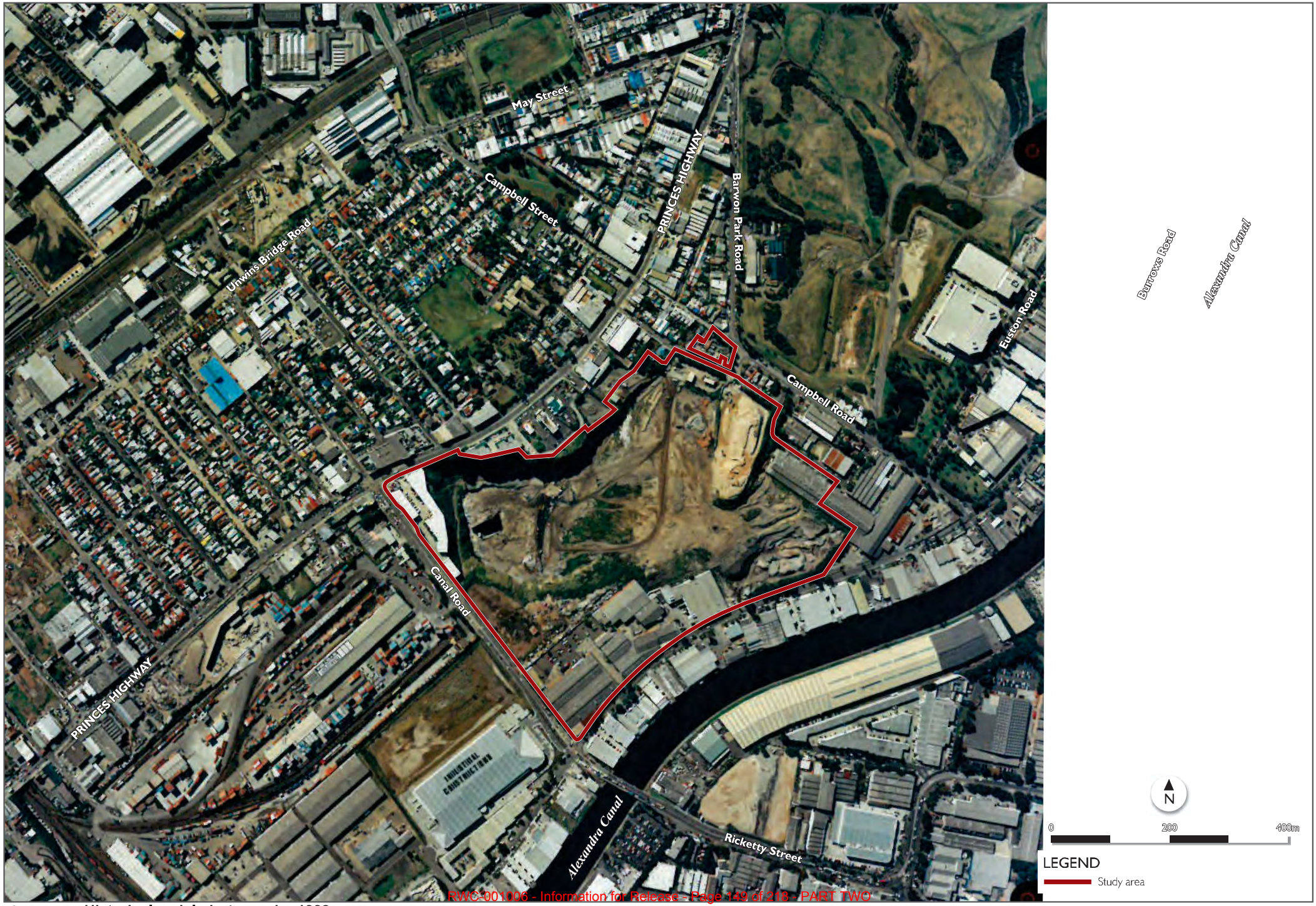


Figure D15 Historical aerial photograph - 1999

Figure D16 Historical aerial photograph - 2004

Figure D17 Historical aerial photograph - 2007

Figure D18 Historical aerial photograph - 2013

Appendix E

Historical Surveys

DATUM Horizontal		ISG
Vertical		AHD
VERTICAL INTERVAL		1 metre
DATE OF PHOTOGRAPHY		23-APR-91
JOB REFERENCE		14565

ALBERT ST DISPOSAL DEPOT

SCALE 1:1,000

QASCO (NSW) Pty Limited
12/9 Sever Hills Road, Baulkham Hills, N S W 2153
Telephone (02) 6398822 Telex AA121632
Facsimile (02) 686 2620

April 1991

MARCH 1994

N 1246100 E 316100 E 316200 E 316300 E 316400 E 316500 E 316600 E 316700 E 316800

N 1246000

N 1245900

N 1245800

N 1245700

N 1245600

N 1245500

N 1245400

Co-ordinate System	ISG
Level Datum	AHD
Aerial Photography	QAS 2899c
Date of Photography	06-MAR-94
Flying Height	
Scale of Photography	1:4,000
Date of Compilation	April, 1994
Contour Interval	1 m

CLIENT

SYDNEY CITY COUNCIL

SCALE

1:1000

ALBERT STREET DISPOSAL DEPOT

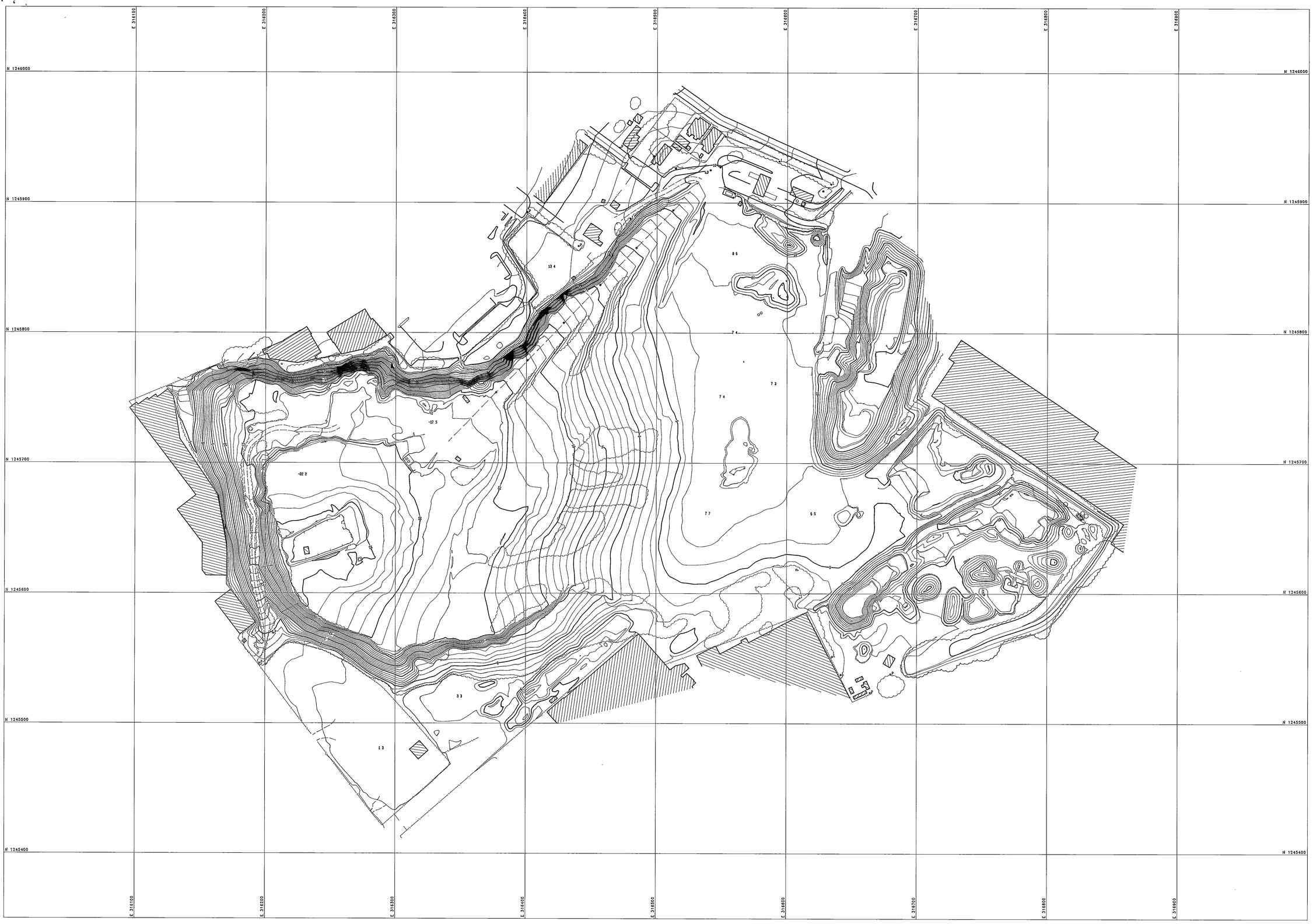
Sheet Index

QASCO (NSW) Pty Limited
12/9 Seven Hills Road, Baulkham Hills, NSW 2153
Telephone (02) 639 8822
Facsimile (02) 686 2620

SHEET

Reference 14930

PP2



The Council of the City of Sydney

Co-ordinate System	ISG
Level Datum	AHD
Aerial Photography	QAS 3245c
Date of Photography	1-6-1999
Flying Height	670 m ASL
Scale of Photography	1 : 4400
Date of Compilation	June, 1999
Contour Interval	1 m

ALBERT STREET DISPOSAL DEPOT

SCALE - 1 : 1000

SHEET
1 OF 1

Reference:
15634

QASCO (NSW) PTY LIMITED
A C N 000 905 917
12/9 Seven Hills Road, Baulkham Hills, N S W , 2153
P O Box 233, Baulkham Hills, N S W , 2153
Telephone (02) 9639 8822
Facsimile (02) 9686 2620

SCHEDULE OF MGA CO-ORDINATES

	EASTING	NORTHING
1	331339.96	6245739.97
2	331396.91	6245765.33
3	331400.01	6245758.37
4	331436.50	6245753.77
5	331499.60	6245768.44
6	331516.06	6245754.73
7	331559.07	6245759.31
8	331612.34	6245809.11
9	331616.64	6245802.85
10	331654.10	6245831.97
11	331661.42	6245839.06
12	331644.74	6245852.19
13	331670.26	6245886.93
14	331693.18	6245904.33
15	331716.44	6245937.05
16	331740.53	6245926.12
17	331742.20	6245918.94
18	331761.96	6245942.37
19	331851.55	6245903.98
20	331841.42	6245866.89
21	331839.40	6245806.85
22	331834.96	6245791.74
23	331834.74	6245771.49
24	331835.33	6245760.38
25	331835.35	6245759.02
26	331832.52	6245673.64
27	331866.91	6245679.10
28	331890.41	6245682.87
29	331917.41	6245745.93
30	332034.62	6245669.91
31	332002.01	6245641.47
32	331725.75	6245532.70
33	331695.40	6245571.37
34	331611.78	6245501.38
35	331581.14	6245472.22
36	331553.81	6245459.66
37	331540.36	6245474.36
38	331506.77	6245510.60
39	331481.92	6245528.88
40	331468.05	6245540.06
41	331436.25	6245548.30
42	331411.45	6245524.72
43	331394.03	6245546.66
44	331408.35	6245558.04
45	331385.33	6245587.04
46	331384.97	6245616.44
47	331377.18	6245655.47
48	331347.36	6245697.74
49	331339.93	6245739.96

	EASTING	NORTHING
A	331522.94	6245755.28
B	331468.50	6245714.85
C	331492.62	6245689.29
D	331504.32	6245677.33
E	331519.27	6245669.46
F	331556.92	6245636.60
G	331572.73	6245625.63
H	331586.84	6245614.11
I	331591.73	6245611.28
J	331632.32	6245597.69
K	331646.73	6245594.59
L	331657.49	6245594.34
M	331673.01	6245597.36
N	331687.98	6245603.84
O	331699.55	6245610.60
P	331694.75	6245626.77
Q	331675.80	6245698.41
R	331674.15	6245711.13
S	331674.75	6245725.54
T	331672.79	6245735.73
U	331659.56	6245770.22
V	331639.23	6245784.29
W	331629.91	6245789.50
X	331625.01	6245792.56
Y	331616.64	6245802.85

Name	Volume Method	Survey NET Volume (m³)
Jun-02		
Landfill Premises	To December 2014	-258,636
Recycling Premises	To December 2014	-513,407

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Australia 2113
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Fax: +61 2 8879 1633
Web: www.aamgroup.com
Email: info@aamgroup.com
Drawing No: 24425A

Alexandria Volume Analysis June 2002

20 0 20 40 60 80 100m

Previous Six Month Survey Change
Cut Contour 1m
Fill Contour 1m
SP21 Boundary

N W E S

Coordinate System: MGA94 Zone 56
Vertical Datum: AHD

Date of Compilation: 16 February 2015

SCHEDULE OF MGA CO-ORDINATES

	EASTING	NORTHING
1	331339.96	6245734.97
2	331396.91	6245765.33
3	331400.01	6245758.37
4	331436.50	6245753.77
5	331499.60	6245768.44
6	331514.04	6245754.73
7	331559.07	6245759.31
8	331612.34	6245809.11
9	331616.64	6245802.85
10	331654.10	6245831.97
11	331661.42	6245839.06
12	331644.74	6245852.19
13	331670.26	6245886.93
14	331693.18	6245904.33
15	331716.44	6245937.05
16	331740.53	6245920.12
17	331746.20	6245918.94
18	331761.96	6245942.37
19	331805.55	6245903.98
20	331814.42	6245866.89
21	331839.40	6245806.85
22	331834.94	6245791.74
23	331834.74	6245771.49
24	331835.33	6245760.38
25	331835.35	6245759.02
26	331832.52	6245673.64
27	331866.91	6245679.10
28	331890.41	6245682.87
29	331917.41	6245745.93
30	332034.62	6245669.91
31	332002.01	6245641.47
32	331725.75	6245532.70
33	331685.60	6245571.37
34	331611.78	6245501.38
35	331581.14	6245472.22
36	331553.81	6245459.65
37	331540.36	6245474.34
38	331506.77	6245510.60
39	331481.92	6245528.88
40	331460.05	6245560.06
41	331436.25	6245548.30
42	331411.45	6245524.72
43	331394.93	6245516.66
44	331408.35	6245558.04
45	331385.33	6245581.04
46	331384.97	6245616.44
47	331377.18	6245655.47
48	331347.36	6245691.74
49	331339.93	6245739.96

	EASTING	NORTHING
A	331522.94	6245755.28
B	331468.50	6245714.85
C	331492.62	6245689.29
D	331504.32	6245677.33
E	331519.27	6245669.46
F	331556.92	6245636.60
G	331572.73	6245625.63
H	331586.84	6245614.11
I	331591.73	6245611.28
J	331632.32	6245597.69
K	331646.73	6245594.59
L	331657.69	6245594.34
M	331673.07	6245597.36
N	331687.98	6245603.84
O	331699.55	6245610.60
P	331694.15	6245626.77
Q	331675.80	6245698.41
R	331674.15	6245711.13
S	331674.35	6245725.54
T	331672.79	6245735.73
U	331659.56	6245770.22
V	331639.23	6245784.29
W	331629.91	6245789.50
X	331625.01	6245792.56
Y	331616.64	6245802.85

Name	Volume Method	Survey NET Volume (m³)
Dec-14		
Landfill Premises	From June 2002	258,636
Landfill Premises	Six Month Change	120
Recycling Premises	From June 2002	513,407
Recycling Premises	Six Month Change	4,009
SP 21	From June 2002	165,618
SP 21	Six Month Change	-15,537

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Email: info@aamgroup.com
Drawing No: 24425A

Alexandria Volume Analysis December 2014

20 0 20 40 60 80 100m

Previous Six Month Survey Change
Cut Contour 1m
Fill Contour 1m
SP21 Boundary

N W E S

Coordinate Systems MGA94 Zone 56
Vertical Datum AHD

Date of Compilation: 16 February 2015

Project:	Managing Contractor-St Peters Interchange Site Preparation Works		
Report No	1	**Project Director**	Ken Reynolds
Reporting Period	Jul-15	**Project Manager**	Ben Greentees
Project Start Date	Jun-15	**Project Number**	D/00657
Project Forecast Completion Date	Nov-15		

PROJECT OVERVIEW

Site preparation works within Alexandria Landfil including removal of stockpiles , remediation of contaminated stockpiles and processing of recyclable material stockpiles. Emergency slope stability works.

DASHBOARD REPORTING KEY	According to plan	Not according to plan but can be managed to meet expected performance	Not according to plan, cannot be managed to meet expected performance and requires new management strategy

Redacted

Delivery Program		• The start date for works was delayed, production of PMP took longer and start of works on the emergency slope stability has been delayed due to REF reviews, and section 88 requirments.

Redacted

Reimbursable Work Notices		RWN 01- emergency slope stabilisation works signed , works commenced. RWN 02 - Submitted, not signed Wards to redjust costs inline with with payment schedule.

Redacted

Redacted

ACHIEVEMENTS / ISSUES THIS MONTH

Redacted

2	Work on emergency slope stability started, with REF for Bradshaw mountain submitted for signing.

Redacted

4	Section 88 completed for slope stability works for exemption to land fill levy.
5	

Redacted

Green

Orange

Red

FINANCIALS

Financials	Business Case	Approved Budget	SMC Budget	Cost this month		Cost to Date		Cost to Complete		Forecast Cost to Complete	Overrun	Comments	Status
				Cost Month	Variance to Month	Cost to Date	Variance to Date	Forecast Cost	Variance to Complete				
Redacted													

VARIATIONS

Description	Budget	Revised Budget	Cost to Date	Commit ments	Cost to Complete	Forecast at Completion	Variance to Budget	Variance to Budget YTD	Status	Return to Green Date
MC Contract										
Emergency slope stability works	$2,300,000		$43,369		$2,256,631					

PROJECT PROGRESS & MILESTONES

Redacted

4.2 Variations Pending

A variation to the scope of works has been ordered in a letter sent on Reimbursable Work Notice 001 date 7th July 2015 to align the scope of work for the Emergency Slope stabilization of the high wall in the South western end of the ALF. Design was conducted by Aecom, a workshop run by WDA and Ward CEE to agree methodology. Price submitted by Ward CEE and approved on 7th July 2015. Payment will be direct cost basis in line with rates supplied. Work started 22th July 2015.

Variation Summary Table

The following variations were identified or approved during the reporting period:

No	Description of scope	Date Issued	Comment
1	Emergency Slope stabilisation Works	7/7/15	Work ongoing. Estimated value $2,500,000
2			

Redacted

Redacted

Ward CEE started on site with setting up site office late in June, works on the Emergency Slope stabilization started after confirmation of stockpile classification. REF has been prepared for the use of “Bradshaw Mountain” stockpile material currently on adjacent site but not yet approved for use. Access road and initial works started on Wednesday 22nd July .Ward CEE submitted RWN for consideration for Cat 3 stockpiles, reviewed by WDA project manager, adjusted and re-submitted on 31st July . Work is due to start on stockpile 343 (General Solid Waste) on 3rd August.

Redacted

6. Risk Management

Redacted

6.3 Risk Issues / Actions

The following key issues or actions have been identified or closed during the current reporting cycle:

No	Issue	Actions	Date action Required
1	Slope stability south west corner	Emergency slope stability works started as per Aecom design Works by Ward CEE	September 2015

Redacted

7. Technical

7.1 Technical Summary

Technical Issues / Actions

The following key issues or actions have been identified or closed during the current reporting cycle:

No	Issue	Actions	Date action Required
1	Interface between contaminated fill materials and proposed slope stability works	Demarcation layers placed to ensure no cross contamination of imported clean and existing contaminated	Completed in design review of Aecom design.

Redacted

8. Construction

8.1 Construction Summary

Preliminary works have commenced to enable the commencement of substantial construction. Ward CEE have set up offices on site, testing of existing stockpile is under way, and access road for emergency slope stability area has started.

Redacted

Redacted

8.2 Construction Issues / Actions

The following key issues or actions have been identified or closed during the current reporting cycle:

No	Issue	Actions	Date action Required
1	Recording exact loads in and out of site for emergency works	Methodology for TARE-ing the trucks needs to be agreed	Completed.

Redacted

Redacted

	Approved Spend to date (landslip stabilisation)RWN 01	$ 2,153,538.15		signed

Redacted

3 Environmental Management

Key Risk Area	Comments
Redacted	
Erosion	Early earthworks undertaken by WCEE have disturbed several discrete areas of the site under the soil management of WCEE. WDA are inspecting these areas jointly with WCEE to ensure the erosion and pollution risk is controlled. WCEE have made improvements to the existing haul road through the landfill premises to allow safe and reliable access to the landslip stabilisation area.
Redacted	

Access Road works for Emergency Slope stability access.

Project:	Managing Contractor-St Peters Interchange Site Preparation Works		
Report No	2	**Project Director**	Ken Reynolds
Reporting Period	Aug-15	**Project Manager**	Ben Greentee
Project Start Date	Jun-15	**Project Number**	D/00657
Project Forecast Completion Date	Dec-15		

PROJECT OVERVIEW

Site preparation works within Alexandria Landfil including removal of stockpiles and processing of recyclable material stockpiles. Emergency slope stability works.

DASHBOARD REPORTING KEY	According to plan	Not according to plan but can be managed to meet expected performance	Not according to plan, cannot be managed to meet expected performance and requires new management strategy

EXECUTIVE SUMMARY

Redacted

ACHIEVEMENTS / ISSUES THIS MONTH

Redacted

2	Work on emergency slope stability continued, with REF for Bradshaw mountain approved. Section 88 for EPA levy removal submitted and awaiting approval

Redacted

Redacted

RISKS - TOP 5

FINANCIALS

Financials	Business Case	Approved Budget	SMC Budget	Cost this month		Cost to Date		Cost to Complete		Forecast Cost at Completion	Contingency Drawdown	Comments	Status
				Cost Month	Variance to Month	Cost to Date	Variance to Date	Forecast Cost	Variance to Complete				
Redacted													
Emergency slope stability works		-		499,574		499,574		2,081,500		2,581,074	- 2,581,074	-ve variance offset against contingency	
Redacted													

4. Financial / Commercial Management

Redacted

Variation Summary Table

The following variations were in progress, identified or approved during the reporting period.

No	Description of scope	Date Issued	Approved Value ($)	Comment
1	Emergency slope stabilisation works	6/7/15	2,153,538	Work commenced in July and is ongoing.

5	Mt Bradshaw testing	10/8/15	50,753	Commenced and in progress. To enable material to be used in the emergency slope stabilisation works

Redacted

Redacted

Redacted

4	Section 88 for EPA levy exemption for importing materials from Mt Bradshaw to the landslip stabilisation	Section 88 exemption has been submitted to the EPA. Works will commence in September for removal of material from Mt Bradshaw for incorporation into the landslip stabilisation. EPA for the Section 88 exemption is required otherwise WDA will be liable for the levy. Potentially 60,000 tonne x $133.10 = ~ $8M total	First payment is due 56 days from commencement – i.e. end of October 2015

5. Program

5.1 Program Summary

Managing Contractor work has commenced on a number of fronts this month:

Redacted

- Landslip stabilisation works continued

Redacted

Four days were lost due to wet weather on the landslip stabilisation works.

Redacted

Works on the emergency slope stabilisation continued. The REF was approved for the use of "Bradshaw Mountain" stockpile material currently on the adjacent site, however there was deliberation over whether commencement could occur prior to Section 88 approval. Work did commence on removal of Mt Bradshaw in late August, but there was a significant quantity of topsoil to remove, in which, there was an unexpected asbestos find that delayed use of the material for a week. This slowed production on the landslip until resolution at the end of August.

Redacted

Redacted

5.4 Progress Summary

Redacted

The following project milestones were planned during this reporting period and the last:

Milestone	Planned Date*	Actual Date	Comment
Redacted			
Commencement of landslip stabilisation works	23rd Jul 2015	23rd Jul 2015	Works progressed slowly at commencement owing to blending of onsite stockpiles while waiting for Mt Bradshaw approval. Work on hold 24th to 27th due to wet weather in this

			area
Commencement of Cat 1 stockpiles	22nd Aug 2015	23rd July 2015	Early stockpiles were incorporated into the landslip

Redacted

6. Risk Management

Redacted

6.3 Risk Issues / Actions

The following key issues or actions have been identified or closed during the current reporting cycle:

No	Issue	Actions	Date action Required
1	Slope stability south west corner	Emergency slope stability works started as per Aecom design Works by Ward CEE	Work in progress

Redacted

7. Technical

7.1 Technical Summary

Technical Issues / Actions

The following key issues or actions have been identified or closed during the current reporting cycle:

No	Issue	Actions	Date action Required
1	Interface between contaminated fill materials and proposed slope stability works	Demarcation layers placed to ensure no cross contamination of imported clean and existing contaminated	Completed in design review of Aecom design. Now occurring on site.

Redacted

Redacted

1 Executive Summary & Current Risk Profile

Site clean-up works are continuing through August with the Principal Contractor showing an early priority on the stockpile removal and landslip remediation work areas. There are multiple discrete areas of the site that are being worked simultaneously and the focus for these has been bulk earthworks productivity. These aspects have highlighted the importance of erosion and sedimentation (ERSED) planning as well as site runoff management as core issues. The CEMP sub-plans required of the contractor continue to be submitted progressively following award of PC status.

Redacted

2 Environmental Management

Key Risk Area	Comments
Redacted	
Stormwater	WAMC propose to construct diversion bunds between storm water and leachate infrastructure within the landfill portion of the site to separate the two and prevent mixing. These diversions bunds may be constructed at the same time as the landslip remediation. Reliability improvements made to stormwater collection sump.
Redacted	
Redacted	

Redacted

Landslip stabilisation works

Project:	Managing Contractor-St Peters Interchange Site Preparation Works		
Report No	3	Project Director	Ken Reynolds
Reporting Period	Sep-15	Project Manager	Ben Greentee
Project Start Date	Jun-15	Project Number	D/00657
Project Forecast Completion Date	Jan-16		

PROJECT OVERVIEW

Site preparation works within Alexandria Landfil including removal of stockpiles and processing of recyclable material stockpiles. Emergency slope stability works.

DASHBOARD REPORTING KEY	According to plan		Not according to plan but can be managed to meet expected performance		Not according to plan, cannot be managed to meet expected performance and requires new management strategy	

EXECUTIVE SUMMARY

Redacted

Green

Orange

Red

Landslip Stabilisation - placement of bench 3 and modification to access ramp – plant working at heights and on slopes at top of embankment. Risk workshop planned.

Redacted

ACHIEVEMENTS / ISSUES THIS MONTH

Redacted

2	Work on emergency slope stability production increased. Section 88 for EPA levy removal verbally approved by EPA.

Redacted

5	

Redacted

ISSUES - TOP 5

Redacted

2	Stormwater separation and control	proposal required for new storm water storage pond Redacted	Redacted Project manager to look at stormwater retention pond, location and cost.	
3	WDA issue with securing funding release.	To confirm the RMS has released all funds for ongoing management of contract	Overall funding has been agreed..	
4	Community interaction and complaints	Combined comms approach with WDA. Works to be undertaken in accordance with EPA licences.	Increased protester movement this month, planned and unplanned. Police have been onsite a number of times. Hauling activities have been delayed	
5	Productivity target of 4,000 tonne per day to be hauled	Need to have at least two major operations running	Works have ramped up in September it is expected that this target should be met regularly once Stockpile 21 resumes	

FINANCIALS

Financials	Business Case	Approved Budget	SMC Budget	Cost this month		Cost to Date		Cost to Complete		Forecast Cost at Completion	Contingency Drawdown	Comments	Status
				Cost Month	Variance to Month	Cost to Date	Variance to Date	Forecast Cost	Variance to Complete				
Redacted													
Variations													
Emergency slope stability works		-		398,508		888,266		1,692,808		2,581,074	- 2,581,074	-ve variance offset against contingency	
Redacted													
Redacted													
Redacted													

1. Executive Summary

Redacted

Redacted The landslip stabilisation works have achieved better production rates now that material from Bradshaw Mountain is being used, and it is on schedule to be complete in November.

Redacted

4. Financial / Commercial Management

Redacted

Variation Summary Table

The following variations were in progress, identified or approved during the reporting period.

No	Description of scope	Date Issued	Approved Value ($)	Comment
1	Emergency slope stabilisation works	6/7/15	2,153,538	Work commenced in July and is ongoing.
5	Mt Bradshaw testing	10/8/15	50,753	Commenced and in progress. To enable material to be used in the emergency slope stabilisation works

Redacted

20	Fortnightly surveys Redacted and landslip	25/9/15	22,995	First survey completed at end of September and will be ongoing

Redacted

Redacted

*Wards progress claim number 6 under review at time of monthly report writing.

4.2.2 Commercial Issues / Actions

The following key issues or actions have been identified or closed during the current reporting cycle:

No	Issue	Actions	Date action Required
Redacted			
2	Section 88 for EPA levy exemption for importing materials from Mt Bradshaw to the landslip stabilisation	Section 88 exemption has been submitted to the EPA. Works will commence in September for removal of material from Mt Bradshaw for incorporation into the landslip stabilisation. EPA for the Section 88 exemption is required otherwise SMC will be liable for the levy. Potentially 60,000 tonne x $133.10 = ~ $8M total	EPA meeting in Sept verbally confirm that Section 88 will be approved and we will not be liable for levy

5. Program

5.1 Program Summary

Areas of WCEE work in progress:

Redacted

- Landslip stabilisation works continue. Productivity significantly increased now that Bradshaw Mountain is being fully utilised;

Redacted

Redacted

4/9/15	Inclement weather	Landslip Haulage offsite*	1 day

Redacted

23-25/9/15	Inclement weather	Landslip Haulage offsite*	3 days
26/9/15	Inclement weather	Landslip	0.5 days
		Total*	Redacted

Redacted

Redacted

Redacted

Landslip Stabilisation	18/11/15	18/11/15	• Slow start due to being required to blend site stockpiles • Potentially catching up program due to changed construction methodology and being able to utilize dump trucks and dozer more effectively during the higher construction levels • Use of Brashaw mountain has increase productivity

Redacted

Redacted

5.4 Progress Summary

Redacted

The following project milestones were planned during this reporting period and the last:

Milestone	Planned Date	Actual Date	Comment
Commencement of Cat 1 stockpiles	22nd Aug 2015	23rd July 2015	Early stockpiles were incorporated into the landslip

Redacted

Redacted

6. Risk Management

Redacted

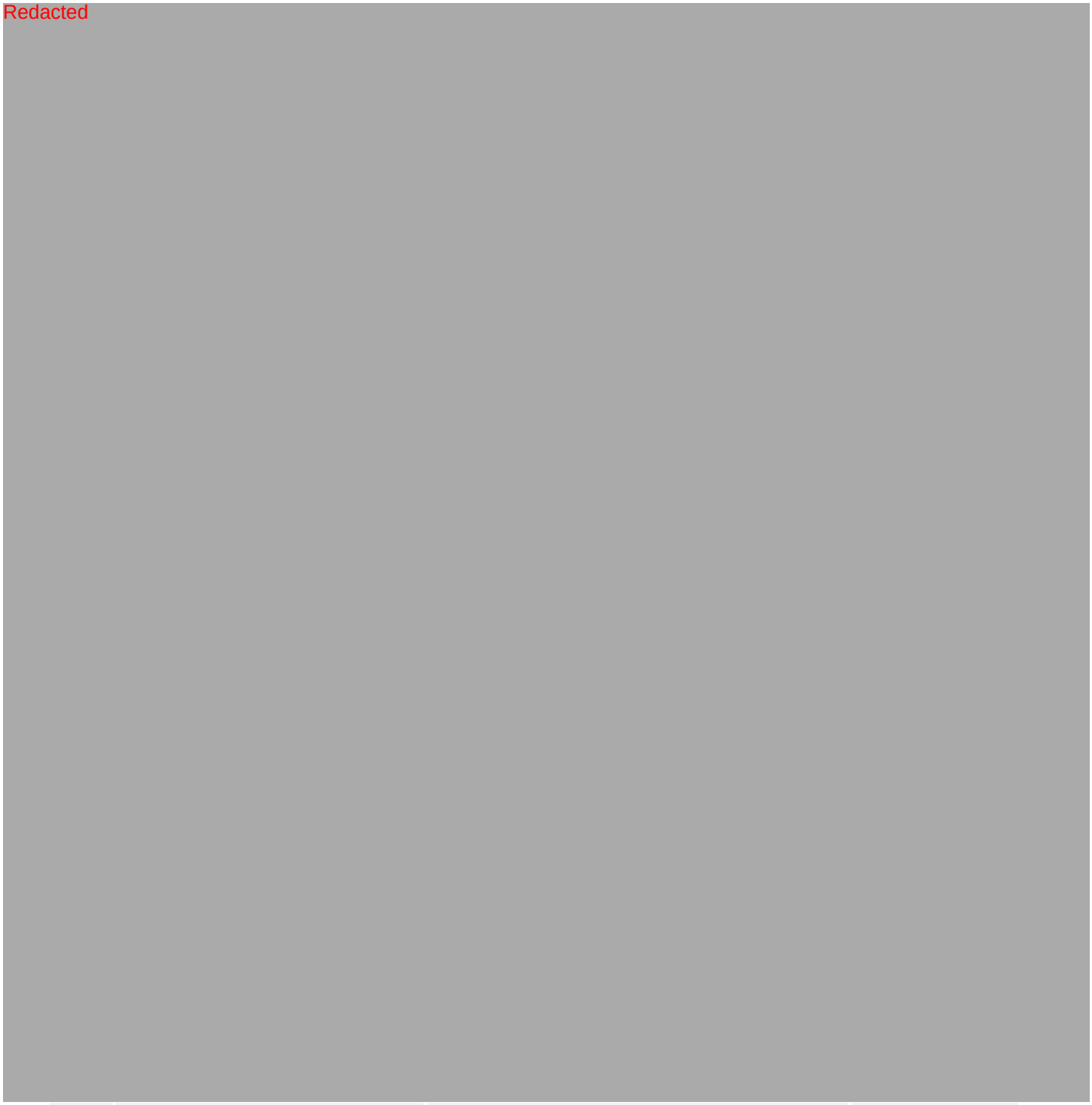
6.3 Risk Issues / Actions

The following key issues or actions have been identified or closed during the current reporting cycle:

No	Issue	Actions	Date action Required
1	Slope stability south west corner	Emergency slope stability works started as per Aecom design. Works by Ward CEE	Work in progress due for completion in Nov 2015

Redacted

Redacted



11	Landslip Stabilisation - Placement of bench 3 and modification to access ramp – plant working at heights and on slopes	Restricted access Aerial Spotter Positive communication Install berms (half wheel diameter) For bulk excavation full counter weight, (detail / trimming / drainage exempt)	

7. Technical

7.1 Technical Summary

Technical Issues / Actions

The following key issues or actions have been identified or closed during the current reporting cycle:

No	Issue	Actions	Date action Required
1	Completion of landslip stabilisation and tie-in to adjacent property	Aecom to finalise design for tie-in	October 2015

Redacted

COST STATEMENT

PROJECT TITLE :	SPI - SPW
CLIENT :	WDA
PROJECT No :	
MONTH :	Sept 15
PREPARED BY :	Ben Greentree

		SPISPW	BUDGET				TO DATE			TO COMPLETE			AT COMPLETION						COSTS		
	COST TYPE	DESCRIPTION	UNIT	QNTY	BUDGET RATE	BUDGET TOTAL	QNTY	RATE	COSTS	QNTY	RATE	COSTS	QNTY AT COMP	% QNTY CHANGE	RATE	COSTS	BUDGET	VARIANCE	PREVIOUS AT COMPLETION	MOVEMENT	General Comment
1	2	3	4		6 7 / 5	7	18 ENTRY	19 20 / 18	20 ENTRY	23 28 - 18	24 ENTRY	25 23 x 24	28 ENTRY	29 (28 - 5) / 5	30 31 / 28	31 20 + 25	32 28 x 6	33 32 - 31	34	35 34 - 31	
Redacted																					
RWN		DIRECT COSTS & VARIATIONS																			
4		**Category 1 - Sands and Gravels**	tonne	34,000.00	176.33	5,995,125	23,493	194.94	4,579,827	6,017	254.90	1,533,760	29,510	(13.2%)	207.17	6,113,586	5,995,125	-118,461	6,113,586	0	
1		290 a																			went to landslip
1		290 b																			went to landslip
Redacted																					
1		350																			went to landslip
1		365																			went to landslip
1		378																			went to landslip
1		380																			went to landslip
1		381																			went to landslip
1		396																			went to landslip
1		404																			went to landslip
1		412 b																			went to landslip
1		412 c																			went to landslip
																					went to landslip
Redacted																					
Redacted																					

COST STATEMENT

PROJECT TITLE :	SPI - SPW
CLIENT :	WDA
PROJECT No :	
MONTH :	Sept 15
PREPARED BY :	Ben Greentree

		SPISPW	BUDGET				TO DATE			TO COMPLETE			AT COMPLETION						COSTS		
	COST TYPE	DESCRIPTION	UNIT	QNTY	BUDGET RATE	BUDGET TOTAL	QNTY	RATE	COSTS	QNTY	RATE	COSTS	QNTY AT COMP	% QNTY CHANGE	RATE	COSTS	BUDGET	VARIANCE	PREVIOUS AT COMPLETION	MOVEMENT	General Comment
1	2	3	4	5.00	6	7	18	19	20	23	24	25	28	29	30	31	32	33	34	35	
Redacted																					
	RWN Budget	Variations (Emergency and Minor Works)																			
1	2,153,538	Landslip Stabilisation	m3	31,000.00	0.00	0	16,000	55.52	888,266	15,000	112.85	1,692,808	31,000		83.26	2,581,074	0	-2,581,074	2,581,074	0	
Redacted																				-0	
																				0	
																				0	
																				-0	
																				0	
																				0	
																				0	
																				-6,210	new variations added this month
																				-8,101	new variations added this month
																				-22,995	new variations added this month
																				-2,921	new variations added this month
																				-26,047	new variations added this month
																				-100,002	new variations added this month
																				8,985	credit from Claim 4
																				0	

3 Environmental Management

Key Risk Area	Comments
Redacted	
Stormwater	WAMC propose to construct diversion bunds between storm water and leachate infrastructure within the landfill portion of the site to separate the two and prevent mixing. These diversions bunds may be constructed at the same time as the landslip remediation. Materials to construct these bunds have been imported and are on stand-by for these works.
Redacted	

7 Upcoming Works & Developing Risks

Redacted

Works on these stockpiles will continue alongside works to stabilize the landslip.

Redacted

PROJECT HAZARD LOG

NO:	WORKPLACE ACTIVITY (In Sequence)	TYPE OF HAZARD	RISK SCORE (SWMS will be created for high risk)	Control Action Requirements (Before Activity is Commenced)	Action By:
Redacted					
		Slope failure of haul road, vehicle stability		Temporary batters should be assessed by a geotechnical engineer and batters appropriate for site conditions adopted.	
		Redacted			
Redacted					

PROJECT HAZARD LOG

NO:	WORKPLACE ACTIVITY (In Sequence)	TYPE OF HAZARD	RISK SCORE (SWMS will be created for high risk)	Control Action Requirements (Before Activity is Commenced)	Action By:
7.15	Determine design / location of access ramp	Redacted Slope failure of haul road, vehicle stability Redacted	15	Redacted Redacted Inspection following wet weather Maintain slope of 1:4 Dust suppression/water cart Redacted	WCEE-SM

PROJECT HAZARD LOG

NO:	WORKPLACE ACTIVITY (In Sequence)	TYPE OF HAZARD	RISK SCORE (SWMS will be created for high risk)	Control Action Requirements (Before Activity is Commenced)	Action By:
8. Management for Removal of Asbestos and or Contaminated Stockpile					
Redacted					
8.2	Testing and classification of stockpiles	Redacted Stockpile stability Redacted	8	Redacted Prepare SAQP Redacted	WCEE-EPRM
Redacted					

Redacted

Redacted

Landslip stabilisation works

Project:	Stage 2 - New M5		
Report No	5	Project Director	Ken Reynolds
Reporting Period	Oct-15	Project Manager	Ben Greentree
Project Start Date	Dec-14	Project Number	D/00657
Project Forecast Completion Date	Jun-16		

Dashboard Report - Section 2A - Non Financial

PROJECT OVERVIEW

Site preparation works within Alexandria Landfil including removal of stockpiles and processing of recyclable material stockpiles. Emergency slope stability works.

DASHBOARD REPORTING KEY	According to plan	Not according to plan but can be managed to meet expected performance	Not according to plan, cannot be managed to meet expected performance and requires new management strategy

EXECUTIVE SUMMARY

Redacted

Design Packages		Aecom are working on batter slope stability assessment, final drainage details for the landslip buttress and an excavation profile for the safe removal of SP21

Redacted

ACHIEVEMENTS / ISSUES THIS MONTH

Redacted

2	Environmental risks greatly reduced with Redacted and stabilisation of batters.

Redacted

5	ct

Redacted

Projects by end of November 2015.

Redacted

1.5. Issues and Actions

No	Issue	Actions	Date action Required
1	Subsidence of slope	~31,000 m^3 has been completed to date – earthworks are complete. Risk of landslip greatly reduced. Posi-track erosion protection of batters planned for early November.	Closed

Redacted

		October.	
4	SP21 excavation profile and slope stability	Aecom to be engaged to assess safe batter slopes and to provide design drawings, plan and section at SP21a, b, and interface with landslip buttress. LDS to be advised of new batter profile	Early November prior to re-commencement of SP21 removal
Redacted			
6	Landslip drainage and completion works – plant and personnel work at heights	Investigate whether excavation on berms can be removed to eliminate plant on working at heights – Aecom. Risk workshop to be held and project hazard log to be updated to show how shotcreting is to be undertaken.	Closed – concrete drains removed Prior to shotcreting works occurring

2. Environmental Management

2.1. Summary

Redacted

All stockpiles in the central and southern areas of the site have been removed and the landslip stabilisation batter is complete. The environmental focus in these areas now becomes progressive stabilisation. Mt Bradshaw has experienced a decline in work activities after the completion of the stabilisation batter. This provided SMC the opportunity to formally stabilise the northern end of Mt Bradshaw using its own topsoil then laying coir netting and hydromulch. This location in particular was at the highest risk of causing a Notifiable Event since February 2015. It had been temporarily covered with geofabric in May then again in June and August with the final stabilisation treatment eliminating the pollution risk altogether – a great result. Redacted

2.2. System issues

Redacted

SMC's Environment and Site Management personnel continue to inspect the Principal Contractor's works closely to assess and control the changing environmental risk. As a result of large portions of the site being completed and moving into the stabilisation phase the environmental risk was deemed to have reduced, inspections were changed from a weekly frequency to a fortnightly frequency.

Redacted

2.4. Issues and Actions

No	Issue	Actions	Date action Required

Redacted

- Landslip stabilisation works earthworks completed. Drainage works are only items outstanding.

Redacted

Redacted

13/10/15	Inclement weather	Landslip	0.5 day

Redacted

22/10/15	Inclement weather	Landslip	1 day
23/10/15	Inclement weather	Landslip	0.5 day
27-29/10	Inclement weather	Landslip	3 day

3.3. Key activities for next reporting period

- Category 2 removal to be completed

6. Technical

6.1. Summary

Aecom are currently working on the following items which are expected to be complete in November:

- Landslip buttress drainage design
- Stockpile 21 cut profiles and slope stability
- Site slope stability risk assessment

6.2. Progress this reporting period

Work continued on the dot points above.

6.3. Key activities for next reporting period

As above

6.4. Opportunities

Nil

6.5. Issues and Actions

The following key issues or actions have been identified or closed during the current reporting cycle:

No	Issue	Actions	Date action Required
1	Completion of landslip stabilisation and tie-in to adjacent property	Aecom to finalise design for tie-in	November 2015

Redacted

Redacted

6	Landslip drainage and completion works – plant and personnel work at heights	Investigate whether excavation on berms can be removed to eliminate plant on working at heights – Aecom. Risk workshop to be held and project hazard log to be updated to show how shotcreting is to be undertaken	Closed – concrete drains removed Prior to shotcreting works occurring

Financial

12. Commercial Management

12.1. Summary

Redacted

There were a number of cost movements this month, mainly due to the following:

- Category 1 final material quantities were much higher than expected (resulting in ~$1M over budget), however a significant portion of these materials were used in the landslip buttress drainage layer and foundation works meaning they did not need to be hauled offsite.
- Landslip buttress work productivity increases meant work came in less than expected (~$1M) owing to the use of Mt Bradshaw material. It was expected that the top two berms would be constructed by pushing material up with a dozer, but instead, a larger ramp was constructed enabling trucks to deposit material to higher levels.

Redacted

12.4.2.1. Approved Changes (Variations) Summary Table

Redacted

Variation Summary Table

The following variations were in progress, identified or approved during the reporting period.

No	Description of scope	Date Issued	Approved Value ($)	Comment
1	Emergency slope stabilisation works	6/7/15	2,153,538	Work commenced in July and is ongoing. Drainage works left to complete

Redacted

Reimbursable Works Notices Summary Table

The following reimbursable works notices were reviewed, approved or actioned during the month. These items are known to be part of the Managing Contractor's scope.

	the landslip stabilisation	Mt Bradshaw for incorporation into the landslip stabilisation. EPA for the Section 88 exemption is required otherwise SMC will be liable for the levy. Potentially 60,000 tonne x $133.10 = ~ $8M total	88 will be approved and we will not be liable for levy

Redacted

Redacted

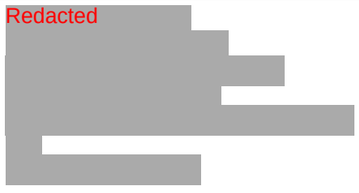
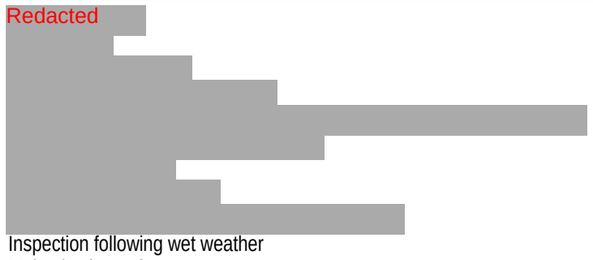
Redacted

Redacted

Redacted

7.7	Survey landslide area and Bradshaw Mountain Site condition report	Redacted Rock Fall/Slope failure	15	Redacted See Previous preventative actions for rock fall. Maintain exclusion zone of 10m from slope during rainfall and immediately after rainfall	WCEE/SP Survey	Prior to operation	10	Closed

Redacted

7.15	Determine design / location of access ramp	Redacted  Slope failure of haul road, vehicle stability Construction vibration and excavation resulting in slope failure/Rock Fall. Engulfment, struck by falling debris	15	Redacted  Inspection following wet weather Maintain slope of 1:4 Dust suppression/water cart Incorporate erosion and sedimentations controls into design via an ESCP produced and implemented. See previous prevention measure (item XX) See Previous preventative actions for Clear large shrubs/trees	WCEE-SM	During operation	10	Ongoing

Redacted

Redacted

7.25	Other	Inclement weather Miscellaneous	8	Rain event checklist Review Bureau of Metrology Adjoining properties unforeseen events layup all plant on high ground Produce and implement a rain shutdown plan ESCP. A supply of geofabric, sandbags, ag pipes and other environmental materials to be maintained on site close to the works to be available in an emergency. Works to be suspended if rain is approaching/ imminent – workers directed to implement erosion control works.	WCEE-SM	During inclement weather	5	Ongoing

Redacted

Redacted

Landslip stabilisation works – earthworks complete

PROJECT TITLE :	SPI - SPW
CLIENT :	WDA
PROJECT No :	
MONTH :	Oct 15
PREPARED BY :	Ben Greentree

SPISPW	BUDGET				TO DATE			TO COMPLETE			AT COMPLETION						COSTS	
DESCRIPTION	UNIT	QNTY	BUDGET RATE	BUDGET TOTAL	QNTY	RATE	COSTS	QNTY	RATE	COSTS	QNTY AT COMP	% QNTY CHANGE	RATE	COSTS	BUDGET	VARIANCE	PREVIOUS AT COMPLETION	MOVEMENT
3	4	5.00	6	7	18	19	20	23	24	25	28	29	30	31	32	33	34	35
Redacted																		
Variations (Emergency and Minor Works)																		
Landslip Stabilisation	m3	31,000.00	0.00	0	31,829	39.61	1,260,870	1,000	62.00	62,000	32,829	5.9%	40.30	1,322,870	0	-1,322,870	2,581,074	1,258,204
Redacted																		