

60 Wallgrove Road, Eastern Creek “Minchinbury Employment Park”



SSDA Approval Civil Infrastructure Report

June 2015

Mirvac

Number	Revision	Details	Date	Amended by
5001	01	For Approval	15/05/14	Frank Xie

AT&L and Associates Pty Ltd (ABN 96 130 882 405)

This report has been prepared for Mirvac in accordance with the terms and conditions of appointment. AT&L and Associates.

Copyright in the drawings, information and data recorded in this document (the information) is the property of AT&L and Associates. This document and the information are solely for the use of the authorised recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that for which it was supplied by AT&L and Associates. AT&L and Associates takes no responsibility for any loss or damage caused by any error or omission arising from reliance on it.

Author: Frank Xie.....

Signed:



Reviewer: Michael Guinane.....

Signed:



This page has been intentionally left blank

GLOSSARY OF ABBREVIATIONS

AT & L	AT & L and Associates Pty Ltd
BCC	Blacktown City Council
DA	Development Application
LGA	Local Government Authority
NBN	National Broadband Network
NOR	Notice of Requirements
REF	Review of Environmental Factors
RMS	Roads & Maritime Services
SCATES	Sydney Coordinated Adaptive Traffic Signal System
TBA	To Be Assigned
TCS	Traffic Control Signal
TELSTRA	Telecommunications Company
JEMENA	Gas Company
VPA	Voluntary Planning Agreement
SSDA	State Significant Development Application
WSUD	Water Sensitive Urban Design
OSD	On-Site Detention
SEARS	Secretary's Environmental Assessment Requirements

This page has been intentionally left blank

1 Executive Summary

The Site, known as 60 Wallgrove Road Eastern Creek, is a 21.8ha parcel of land located in the Blacktown City Council LGA. The site is situated between the Great Western Highway to the north, the M4 Western Motorway to the south, Wallgrove Road to the east and Pine Grove Memorial Park to the west. The site is better identified as Lot 1 in DP 1040948.

The subject site is currently leased to the Commonwealth and is utilised for the purposes of Animal Quarantine. The Lease to the Commonwealth expires on 31st December 2015.

On the 29th of June 2010, the Deputy Director-General approved a Concept Plan Application from Afteron Limited. In July 2011. The Concept Plan Approval has since been modified three times to extend the time to enter into a VPA, extend the lapse date of the approval and provide for larger industrial buildings including a revised approach to stormwater management.

This report is to support the State Significant Development Application (SSDA) for development of the site, including the proposed internal and external infrastructure consisting of lead-in services to the site (water, power, sewer, and communications), the signalised entry intersection on Wallgrove Road, the internal access road, lot configurations, stormwater infrastructure and internal services reticulation.

This report will address the requirements outlined in the SSD 6962 – Secretary’s Environmental Assessment Requirements dated 22nd of April 2015.

It is the intent of this report to detail the following civil infrastructure items in order to progress the designs with individual approval Authorities:

- Stormwater Management
 - On Site Detention (OSD)
 - Piped and Overland Flows
 - Water Sensitive Urban Design
 - Sedimentation and Erosion Control
- Infrastructure Services
 - External lead-in services provisioning
 - Signalised intersection on Wallgrove Road and related works
 - Internal services reticulation
- Sedimentation and Erosion Control
- Road and Car Park Design
 - Internal access Road
 - Individual lot car park design

This report should be read in conjunction with the following reports:

- *State of Waterways – Management Plan, Minchinbury Creek Dated April 2005*
Civil Engineers & Project Managers

- *Minchinbury Employment Park – Section 75W, Civil Infrastructure Project Approval Report by AT&L Dated September 2014*

Contents

GLOSSARY OF ABBREVIATIONS	2
1 EXECUTIVE SUMMARY.....	4
2 INTRODUCTION	8
2.1 SITE DETAILS.....	8
2.2 DEVELOPMENT APPROVAL.....	8
2.3 STATE SIGNIFICANT DEVELOPMENT APPLICATION.....	9
3 STORMWATER MANAGEMENT	11
3.1 EXISTING SITE	11
<i>Western Catchment.....</i>	<i>11</i>
<i>Eastern Catchment</i>	<i>11</i>
3.2 COUNCIL REQUIREMENTS AND RECOMMENDATIONS	11
4 HYDRAULICS AND HYDROLOGY.....	13
4.1 GENERAL DESIGN PRINCIPLES.....	13
4.1.1 <i>Hydrology</i>	<i>13</i>
4.1.2 <i>Hydraulics.....</i>	<i>14</i>
4.2 ON-SITE DETENTION (OSD)	15
4.2.1 <i>Pre-development Catchment Characteristics</i>	<i>15</i>
4.2.2 <i>Post-development Catchment.....</i>	<i>15</i>
4.2.3 <i>Post-Development Results.....</i>	<i>16</i>
4.3 OVERLAND FLOWS	17
4.4 WATER SENSITIVE URBAN DESIGN (WSUD)	17
4.4.1 <i>Policy and Guidelines.....</i>	<i>17</i>
4.4.2 <i>Objectives</i>	<i>18</i>
4.4.3 <i>MUSIC Analysis.....</i>	<i>19</i>
4.5 RAINWATER HARVESTING.....	19
4.6 SEDIMENT AND EROSION CONTROL (CONSTRUCTION).....	19
5 INFRASTRUCTURE SERVICES.....	20
5.1 SEWERAGE	20
5.2 WATER SUPPLY	20
5.3 COMMUNICATIONS	20
5.4 POWER SUPPLY	21
5.5 RMS INTERSECTION	21
5.6 INTERNAL SERVICES RETICULATION.....	21
6 ROAD / CAR PARK DESIGN	22
6.1 HORIZONTAL AND VERTICAL GEOMETRY.....	22
6.2 PAVEMENT	22
7 CONCLUSION	22
APPENDIX A.....	23
DRAINS DATA AND RESULTS, MUSIC MODEL	23

Civil Engineers & Project Managers

APPENDIX B.....	24
APPENDIX C.....	29
SYDNEY WATER – WATER	29
APPENDIX D.....	30
OTHER SERVICES –	30
COMMUNICATIONS AND ELECTRICAL	30
APPENDIX E	31
RMS - INTERSECTION DESIGN DRAWINGS (AT&L)	31
APPENDIX F	32
CIVIL	32
STORMWATER DESIGN DRAWINGS (AT&L)	32

Figures

Figure 1 – Locality Plan (© whereis.com)	8
Figure 2 – Proposed Masterplan	9

2 Introduction

2.1 Site Details

The Site of the future Minchinbury Employment Park (MEP), known as 60 Wallgrove Road, Eastern Creek, is a 21.8ha parcel of land located in the Blacktown City Council LGA. The site is situated between the Great Western Highway to the north, the M4 Western Motorway to the south, Wallgrove Road to the east and Pine Grove Memorial Park to the west. The site is better identified as Lot 1 in DP 1040948. Refer Figure 1 – Locality Plan.

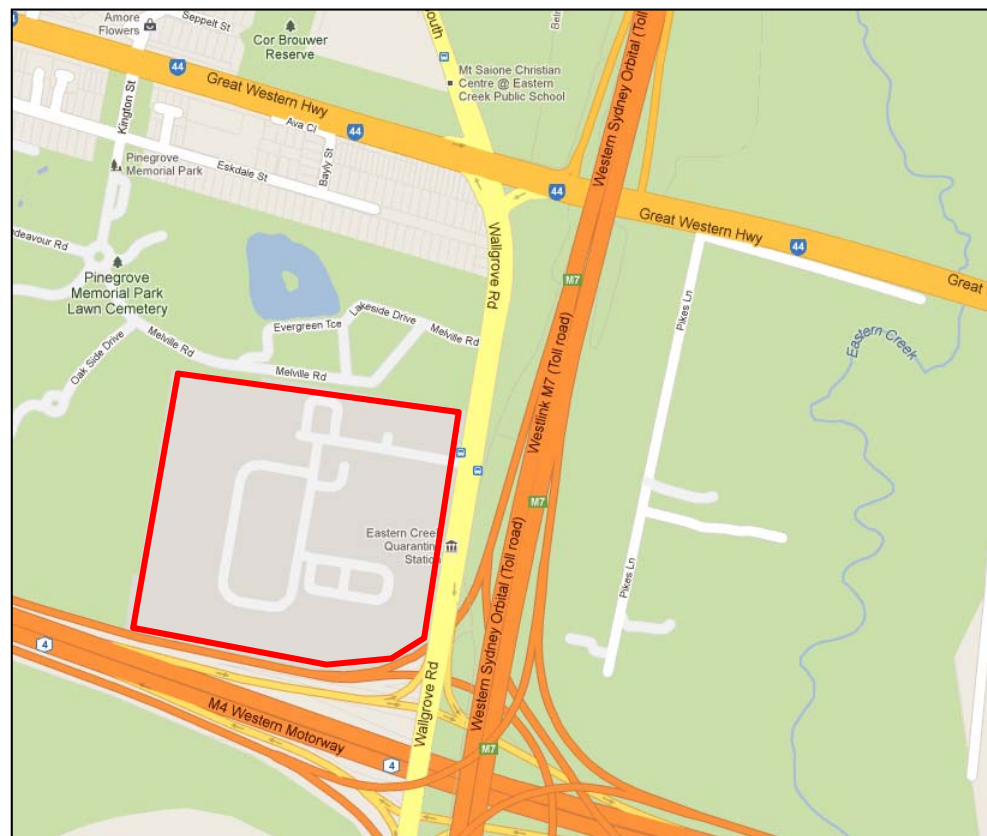


Figure 1 – Locality Plan (© whereis.com)

2.2 Development Approval

On the 29th of June 2010, the Deputy Director-General approved a Concept Plan Application (CPA) from Afteron Limited. Since this approval, the CPA has been modified three times:

- Modification 1 extended the requirement for the VPA to be entered into prior to the release of any subdivision or occupation certificate and was approved by a delegate of the Minister on 4 July 2011.

Civil Engineers & Project Managers

- Modification 2 extended the lapse date of the approval to 1 October 2016 and was approved by a delegate of the Minister on 13 December 2013.
- Modification 3 provides for larger industrial buildings with the flexibility of being split into multiple tenancies, a modified internal road layout, repositioning of the Wallgrove Road intersection, and a revised approach to onsite stormwater management. Modification 3 was approved by a delegate of the Minister on 5 March 2015.

2.3 State Significant Development Application

This report has been prepared to support a State Significant Development (SSD) application for the following revised masterplan:



Figure 2 – Proposed Masterplan

This SSD application seeks development approval for:

- Demolition of all existing structures on the site;
- Clearance of all vegetation on the site;
- Bulk earthworks across the site;

Civil Engineers & Project Managers

- Construction of multiple warehouse structures and distribution related facilities across the site;
- Construction of reticulated site services and site infrastructure, including on-site stormwater detention structures;
- Construction of the internal access road that will be capable of accommodating both heavy and light vehicles;
- Construction of lead-in services including electricity, sewer and potable water; and
- Construction of a new traffic signalised intersection at Wallgrove Road to provide entry into the site.

3 Stormwater Management

3.1 Existing Site

60 Wallgrove Road Eastern Creek (the 'Site') is approximately 21.8 Ha in area and is located within the BCC local government area. The sites sub-catchments falls within the "Minchinbury Creek Catchment Area" (outlined in; State of the Waterways - Management Plan, 2005).

The site is bound by Pinegrove Cemetery to the north and west, Wallgrove Road to the east and M4 Motorway to the South.

The existing site is divided into two sub-catchments:

- Western catchment; and
- Eastern catchment

Western Catchment

The existing western catchment is approximately 11.46 Ha in area. The majority of this area consists of grassland and vegetation (90%). The remaining areas are access tracks and medium sized sheds. The catchment generally falls towards the northern boundary via naturally formed swales. This eventually is drained by a 525 diameter headwall, located at the boundary of the site and Pinegrove Cemetery.

Eastern Catchment

The existing eastern catchment is approximately 10.42 Ha in area. The majority of this area consists of grassland and vegetation (61%). The remaining areas are access tracks and medium sized sheds. The catchment generally falls towards the eastern boundary via naturally formed swales. These areas are drained by a 1050 diameter headwall located on the eastern boundary adjacent to Wallgrove Road.

3.2 Council Requirements and Recommendations

A summary of Blacktown City Council requirements and recommendations outlined within the SEARS are listed below:

- OSD requirements are to be detailed hydrological modelling for the detention basins and consideration of the install of a multi-stage outlet to constrain the full range of peak flows including the 1, 2, 5, 10, 20, 50 and 100 year ARI to pre-development levels.

- Details of the site drainage system including how run off from upstream catchments will be managed along the identification of drainage flow paths.
- Identification of waterway stability targets for each catchment; calculated in accordance with council guidelines.
- A detailed WSUD strategy that achieves runoff water quality targets in accordance with Council's current guidelines.
- Details of a program to be developed in consultation with council, to monitor stormwater controls and stormwater quantity and quality, including flows and impacts to the local creek system and amounts of pollutants discharging to local waters.
- Assessment to address any potential direct and indirect impacts to Blacktown City Council Reserves. This includes impacts to endangered Cumberland Plain Woodland vegetation located within the Council Reserve and changes to the current drainage patterns that may impact on existing biodiversity values within the wetland.

A summary of Blacktown City Council DCP requirements are listed below:

- WSUD to achieve target reductions:
 - 85% Total Suspended Solids (TSS)
 - 65% Total Phosphorus (TP)
 - 45% Total Nitrogen (TN)
 - 90% Total Hydrocarbons
 - 90% Gross Pollutants (GP)
- Finished Floor Levels (FFL) to have minimum 300mm freeboard to 100 year overland flows.
- In accordance with Blacktown City Council DCP Part R, rainwater tanks must be installed within the developed site with the aim to reduce the water demand for the development by a minimum of 80%. Rainwater tanks are an effective system to provide non-potable water for reuse for irrigation, toilets and other non-potable water uses. The rainwater tanks should be designed in accordance with *Rainwater Tank Design and Installation Handbook, Australian Rainwater Industry Development Group, November 2008*.

The Blacktown City Council requirements and recommendations have been addressed in this report.

4 Hydraulics and Hydrology

4.1 General Design Principles

DRAINS modelling software has been used to calculate the Hydraulic Grade Line (HGL) of the stormwater system. DRAINS data files and output results are attached in Appendix A

4.1.1 Hydrology

- Pipe drainage shall be designed to accommodate the 20 year ARI storm event in accordance with Blacktown City Council requirements for industrial subdivisions
- The combined piped and overland flow paths shall be designed to accommodate the 100-year ARI storm event
- Where trapped low points are unavoidable and potential for flooding private property is a concern, an overland flowpath capable of carrying the total 100-year ARI storm event shall be provided. Alternatively, the pipe and inlet system may be upgraded to accommodate the 100 year ARI storm event
- Rainfall intensities shall be as per the Intensity-Frequency-Duration table in accordance with the Australian Rainfall and Runoff volume 2
- Times of concentration for each subcatchment shall be determined using the kinematic wave equation. Minimum time of concentration is 5 mins and the maximum is 20 mins
- Runoff coefficients shall be calculated in accordance with the AR&R. The fraction impervious shall be determined from analysis of the subcatchments
- Flow width in gutter shall not exceed 2m for the minor design storm event.
- Velocity depth ratios shall not exceed 0.4 for all storms up to and including the 100 year ARI event
- Blockage factors of 20% and 50% shall be adopted for pits on grade and at sags respectively for all storm events
- The maximum spacing between pits shall be 60m
- The minimum lintel size within a sag shall be 2.4m
- The minimum lintel size for any road drainage pit shall be 0.9m

Civil Engineers & Project Managers

4.1.2 Hydraulics

- A hydraulic grade line HGL design method shall be adopted for all road pipe drainage design. The HGL shall be shown on all drainage long sections
- The minimum underground pipe size shall be 300mm diameter.
- The minimum pipe grade shall be 0.5%
- All pipes shall be Rubber Ring jointed
- The minimum cover over pipes shall be 450mm in grassed areas and 600mm within carriageways
- Where minimum cover cannot be achieved due to physical constraints the pipe class shall be suitably increased
- All trafficable pipes shall be Class 3 Reinforced Concrete Pipes or Fibre Reinforced Cement equivalent
- The pipe friction coefficients to be adopted shall be:

Materials	Mannings – n	Colebrook-White – k	Min. Pipe Class
RCP	0.012	0.3	3
FRC	0.01	0.15	3

Table 1 - Pipe Details

- All pipes shall be designed for the ultimate service loads and where applicable, construction loads will be designed for.
- Pipes discharging to the overland flow path shall adopt a minimum tailwater level equivalent to respective overland flow level.
- Where the tailwater level is unknown 150mm freeboard shall be adopted
- Pit Loss coefficients shall be calculated in accordance with Missouri Charts
- A minimum 150mm freeboard shall be maintained between pit HGL and pit surface levels
- Overland flowpaths shall maintain a minimum of 300mm freeboard to all habitable floor levels
- Pits deeper than 1.2m shall contain step irons at 300mm centres

4.2 On-Site Detention (OSD)

The On-Site Detention (OSD) requirements are specified by Blacktown City Council. Consideration of a multi-stage outlet to restrict the peak flows (1, 2, 5, 10, 20, 50 and 100 years ARI) to pre-development levels.

The existing site is split into two catchments, eastern and western. Both catchments are similar in size.

4.2.1 Pre-development Catchment Characteristics

As the site is split into an eastern and western catchment the following information are used model the pre-development catchments.

Western Catchment

Total Area = 11.46 Ha

Percentage of impervious area = 10% (1.175 Ha)

Percentage of pervious area = 90% (10.285 Ha)

Existing flow path length = 375m

Existing flow path slope = 2.4%

Existing flow path roughness = 0.015 (impervious), 0.035 (pervious)

Eastern Catchment

Total Area = 10.42Ha

Percentage of impervious area = 39% (4.12 Ha)

Percentage of pervious area = 61% (6.3 Ha)

Existing flow path length = 216m (pervious), 300 (impervious)

Existing flow path slope = 2.4% (pervious), 2% (impervious)

Existing flow path roughness = 0.015 (impervious), 0.035 (pervious)

4.2.2 Post-development Catchment

The post development catchments were separated into catchments of similar size to the pre-development areas.

To restrict the post development flow in each storms, the proposed development included an underground tank and an above ground detention basin.

Western Catchment

Total Area = 11.52 Ha

Civil Engineers & Project Managers

Percentage of impervious area = 92% (10.51 Ha)

Percentage of pervious area = 8% (1.01 Ha)

Inclusive of 0.5 Ha of landscaped bypassing the catchment

OSD Details

Underground OSD Tank volume = 3,450m³ at 100 year ARI

Primary outlet (low flows) = Orifice Plate

Secondary outlet (high flows) = Overflow Weir

Eastern Catchment

Total Area = 10.36 Ha

Percentage of impervious area = 82% (8.51 Ha)

Percentage of pervious area = 18% (1.85 Ha)

OSD Details

Above ground OSD Basin volume = 3,000m³ at 100 year ARI

Primary outlet (low flows) = Orifice Plate

Secondary outlet (high flows) = 900mm diameter pipe

4.2.3 Post-Development Results

Eastern Catchment – Detention Basin

ARI (Year)	Pre-Development Flow (m ³ /s)	Post-Development Flow (m ³ /s)
1	0.801	0.741
2	1.24	0.796
5	1.89	0.861
10	2.27	0.905
20	2.77	0.967
50	3.22	1.02
100	3.72	1.46

Civil Engineers & Project Managers

Western Catchment – Detention Tank

ARI (Year)	Pre-Development Flow (m ³ /s)	Post-Development Flow (m ³ /s)
1	0.289	0.286
2	0.694	0.361
5	1.28	0.430
10	1.67	0.467
20	2.19	0.511
50	2.79	0.708
100	3.34	1.23

Based on the above it is evident that Post Development, flow speeds are reduced and thus hydrological impacts to downstream catchments will be reduced.

4.3 Overland Flows

Overland flows within the site have been designed to be safely conveyed within the roads, car parking and loading docks.

The FFL of the building has been set above the 300mm freeboard requirement.

The site does not reside within a Flood Risk Zone according to Blacktown City Council's online spatial mapping system.

4.4 Water Sensitive Urban Design (WSUD)

4.4.1 Policy and Guidelines

The stormwater design considers the following guidelines:

- Australian Rainfall Quality (2006)
- Department of Environment and Climate Change NSW (DECC),
Management Urban Stormwater: Urban Design (Consultation Draft, 2008)

Civil Engineers & Project Managers

- Blacktown City Council Stormwater Quality Control Policy (2001, reviewed 2009)
- Landcom Water Sensitive Urban Design Policy (2009)

4.4.2 Objectives

These stormwater management objectives were applied to treating stormwater runoff from the development to meet pollution reduction targets outlined in Table 3.

Pollutants	Retention Objectives
Total Suspended Solids (TSS)	85%
Total Phosphorus	65%
Total Nitrogen (TN)	45%
Gross Pollutants	90%
Total Hydrocarbons	90%

Table 2 Pollutant Retention

In order to achieve these reductions, a treatment train approach will be implemented into the development where the stormwater treatment flow path for runoff would generally be:

1. Runoff from the roof of the proposed buildings will be collected by a rainwater tank to be re-used for toilet flushing, irrigation etc
2. Runoff from the roof of the proposed building not discharging to the rainwater tank will drain into storm-pits with Envirpods (by Stormwater 360) within to be treated.
3. Runoff from the proposed hardstand areas plus overflow from the rainwater tank would be collected within a piped system and discharge into underground tanks with proprietary treatment devices within to ensure the pollutants are filtered out and treated biologically. These tanks would also be used as the OSD tanks as described in Section 4.2.

The proposed stormwater management strategy is generally consistent with the WSUD addendum approved in CPA Mod 3, and has been optimised following detailed civil design.

4.4.3 MUSIC Analysis

The software package developed by the CRC for Catchment Hydrology termed "MUSIC" (Model for Urban Stormwater Improvement Conceptualisation) was used to assess the effectiveness of the proposed "treatment train" and therefore ensure compliance with the proposed objectives. Refer to Appendix A for MUSIC model data, results and catchment plan.

4.5 Rainwater Harvesting

Rainwater harvesting is generally designed based on a water balanced model assuming a non-potable demand of 1kL/Day/Ha, this equates to 21.88kL demand per day, based on a site area of 21.88Ha. Using a total tank volume of 110 kL (average 22 kL per Building) fed by a total roof area of 11.8 Ha, to meet the non-potable demand, yields approximately 15 kL per day, or approximately 70% of the expected non-potable demands.

This volume will be refined during the construction certificate stage of works when further details are known.

4.6 Sediment and Erosion Control (Construction)

Stormwater runoff generated from within the works area during construction will likely contain sediments and oils from construction machinery. A number of options are available for the removal of these contaminants from stormwater, some of which include:

- Wheel wash down/cattle grid at site access
- Sediment fence at downstream boundary
- Sediment basins
- Diversion banks
- Stabilisation of finished areas
- Cut off drains

Erosion and Sedimentation controls are to be installed and maintained in accordance with Department of Housing (1998), *Managing Urban Stormwater, Soils and Construction*, Fourth Edition. Following are possible levels of control that are to be constructed.

- Silt fences shall be installed along the base of excavated slopes and stockpiles to prevent runoff.
- Kerb inlet sediment traps are to be installed at the completion of the drainage works. Whilst works are underway, geotextile filter fabric fences are to be installed around open pits.

Detailed sediment and erosion control plans will be included with Construction Certificate applications.

Civil Engineers & Project Managers

5 Infrastructure Services

This SSD application seeks development approval to undertake the following essential infrastructure and lead-in services works.

5.1 Sewerage

The site will be serviced by a Sydney Water 225mm diameter sewer main approximately 320m in length from the site to the Eastern Creek sub-main located in Pikes Ln east of the M7.

Sydney Water issued a Letter of Approval dated 7 November 2013 for connection of the sewer main attached as Appendix B. The current sewer design drawings are attached as Appendix B. The Water Servicing Coordinator (WSC) is in the process of preparing a Section 73 Application to Sydney Water.

The servicing strategy for sewerage is generally consistent with that approved under CPA MOD3.

5.2 Water Supply

There is an existing 250mm diameter main which runs adjacent the site along the eastern boundary which connects into the trunk feeder mains in the Great Western Highway. Sydney Water has advised that this main is suitable for supply and connection to the site.

Sydney Water issued a Letter of Approval for adjustment of the water main on 15 January 2015 attached in Appendix C. The current water connection design drawings are attached in Appendix C.

The servicing strategy for water supply is generally consistent with that approved under CPA MOD3.

5.3 Communications

To accommodate the proposed development, the telecommunications network will require upgrading. To achieve this, Telstra may be required to augment the existing telecommunications network at Rooty Hill Exchange. Any infrastructure and services provided would be determined closer to the time of development commencement, and be dependent upon any changes to the government policies on the provision of infrastructure in new developments. Further discussions will be held with Telstra during detailed design.

Preliminary communications drawings are attached in Appendix D – Drawing C054.

5.4 Power Supply

The site will be serviced via construction of a new 11kV HV feeder from the North Eastern Creek Zone Substation. A Method of Supply Design Brief was received from Endeavour Energy on 23 October 2013. A Level 3 ASP design was subsequently submitted to Endeavour Energy on 7 March 2015 and is currently under review.

Level 3 ASP design drawings submitted to Endeavour Energy for approval are attached as Appendix D.

The servicing strategy for power supply is generally consistent with that approved under CPA MOD3.

5.5 RMS Intersection

The site will be serviced by a new dedicated signalised intersection on Wallgrove Road. Mirvac has met with RMS and Westlink M7 to confirm their requirements. As a result, CPA MOD3 approved the following commitments:

1. Construction of a new signalised traffic intersection approximately 40m south of the existing seagull intersection on Wallgrove Road;
2. Construction of a shared pedestrian/cycleway connection from the site entry to the existing M7 shared pedestrian/cycleway on the eastern side of Wallgrove Road; and
3. Construction of bus stops on both sides of Wallgrove Road.

Detailed RMS intersection design drawings were submitted to RMS for final approval on 4 May 2015 and are attached in Appendix E.

5.6 Internal Services Reticulation

The SSD application seeks development approval for construction of the internal access road and reticulation of internal site services including potable water, sewer, electricity, communications and gas (conduits for future provision).

Internal services coordination plans are contained within the SSD Civil Works Package and further included in Appendix F. (INSERT DAC091-093)

6 Road / Car Park Design

6.1 Horizontal and Vertical Geometry

The loading docks have generally been designed in accordance with AS 2890.1, AS 1428.1 and Council specifications.

A signalised intersection connects the Access Road to Wallgrove Road. The Access road have generally been designed in accordance with AS2890.1 and Council specifications.

6.2 Pavement

Pavement will be designed based on the requirements of Austroads Pavement Design Guide – A Guide to the Structural Design of Road Pavements.

7 Conclusion

Relevant services including sewer, water, electrical and telecommunications can be made available to the proposed development.

In the case of hydraulic Authority services, Sydney Water has issued an approval to connect to the main trunk line in the case for water service. WSC is in the process in preparing a section 73 application to Sydney Water to connect to the Eastern Creek sub-main.

Other services such as electrical power supply will be provided by Endeavour Energy and Level 3 ASP design drawings are submitted for approval. Telecommunication network will require upgrading will be provided by Telstra from existing Rooty Hill Exchange, to be confirmed at detailed design stage.

Drains modelling results indicates the pipe hydraulic capacity is adequate in the 20 years ARI. Stormwater on-site detention of restricting the post development flow to pre development flow are achieved in accordance with Blacktown council requirements.

Water quality design using a combination of storm filter cartridges and bio-basins to meet the WSUD and Blacktown council requirements. As shown in MUSIC modelling results.

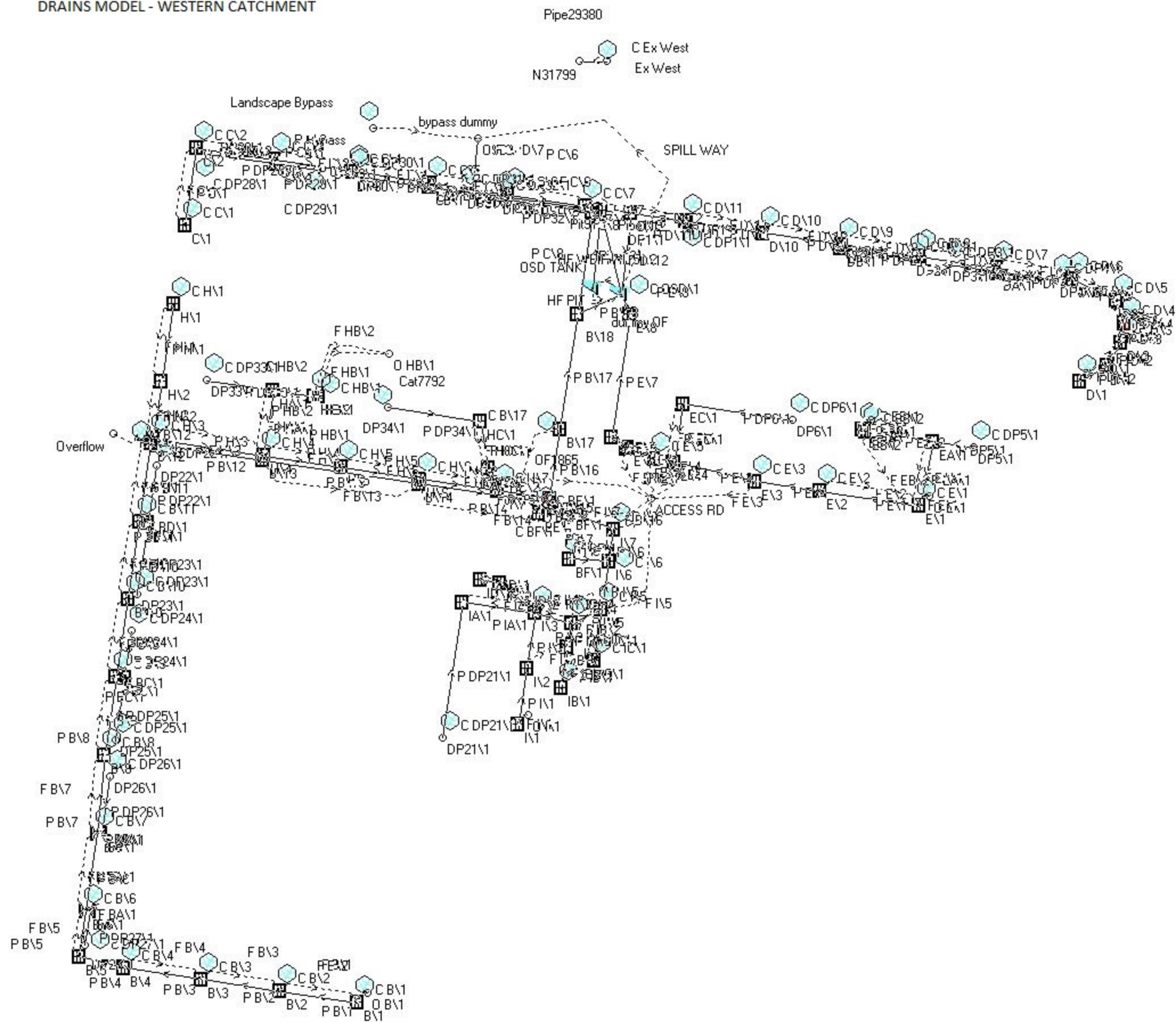
The relevant requirements as set out in Blacktown Council's "Engineering Guide for Development – 2005" which demonstrates specifications to be achieved in the Civil Engineering design drawings and supporting reports.

Appendix A

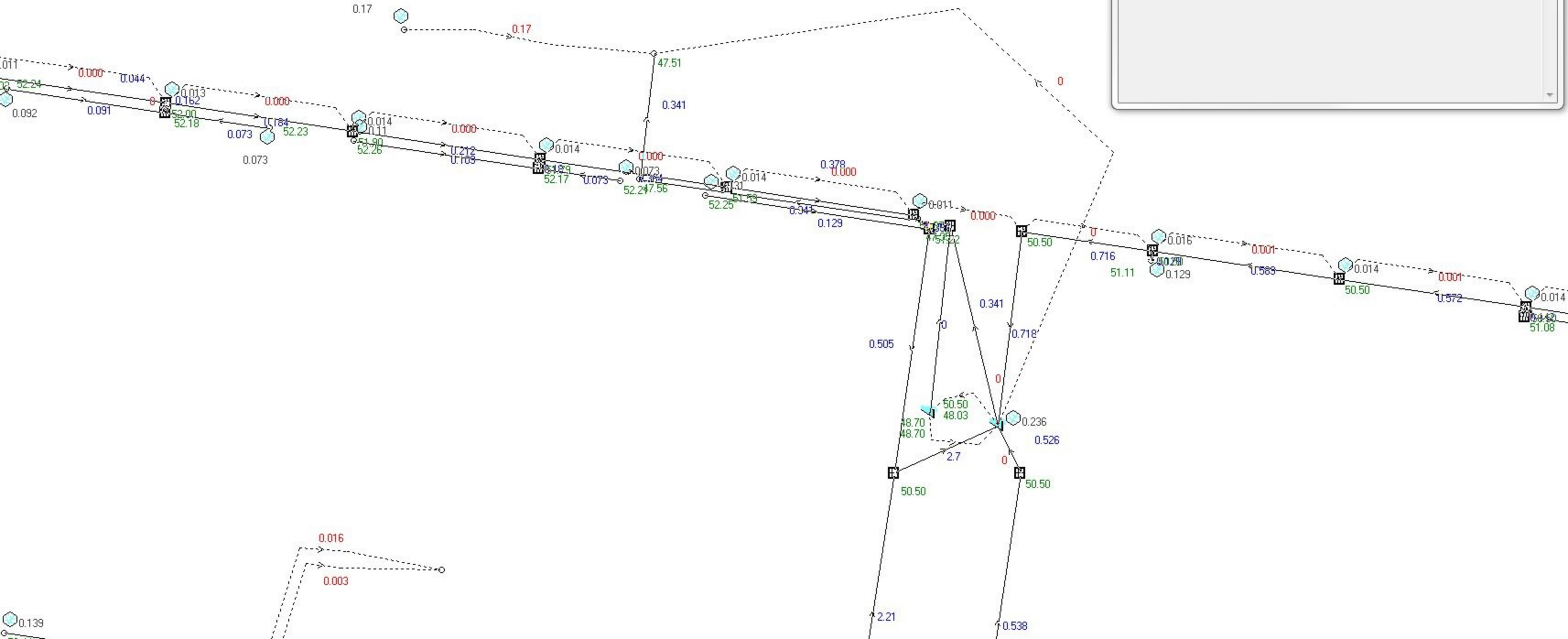
Drains 20 Year ARI Results

MUSIC Model Results

Civil Engineers & Project Managers



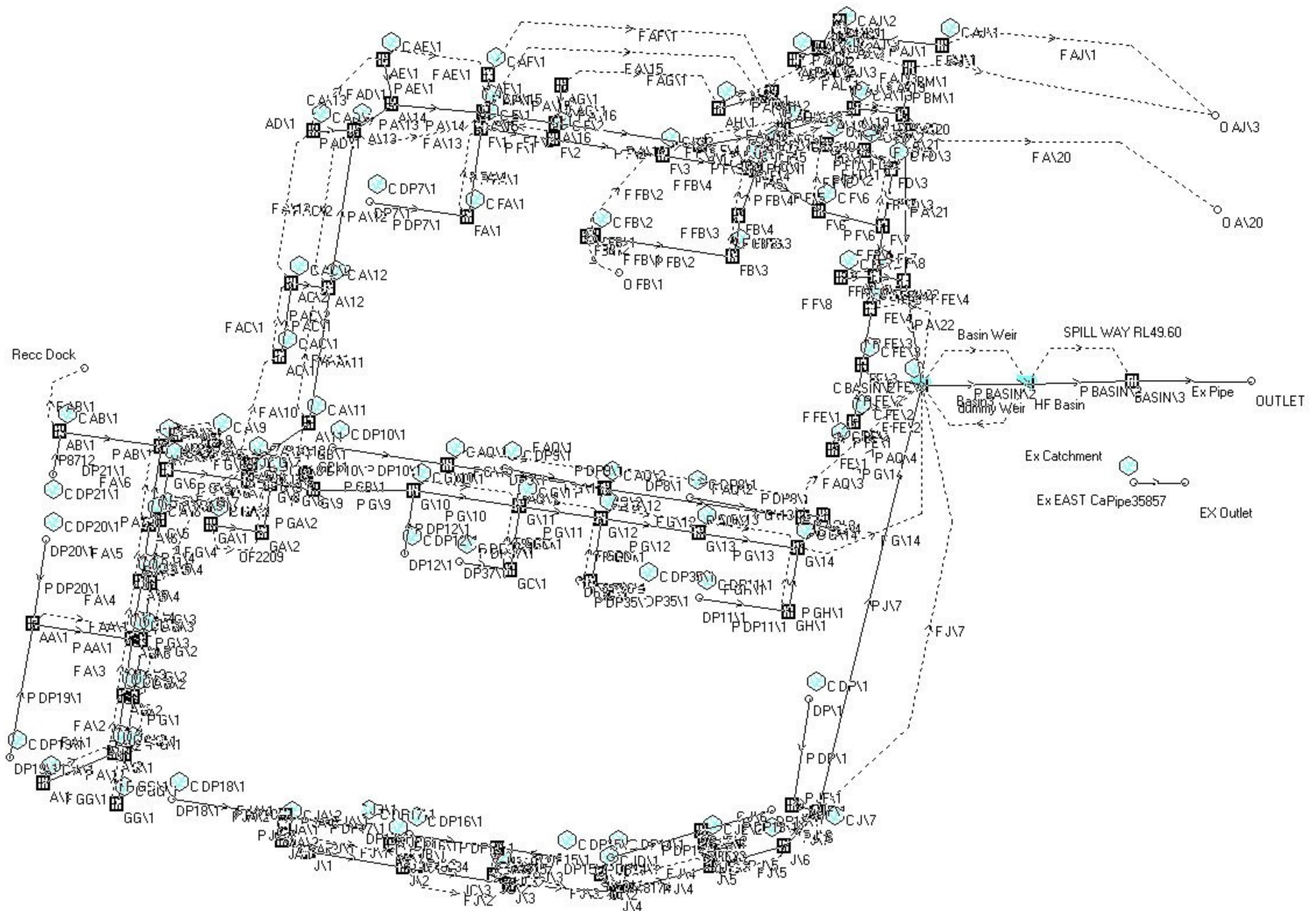
WESTERN CATCHMENT - RESULTS

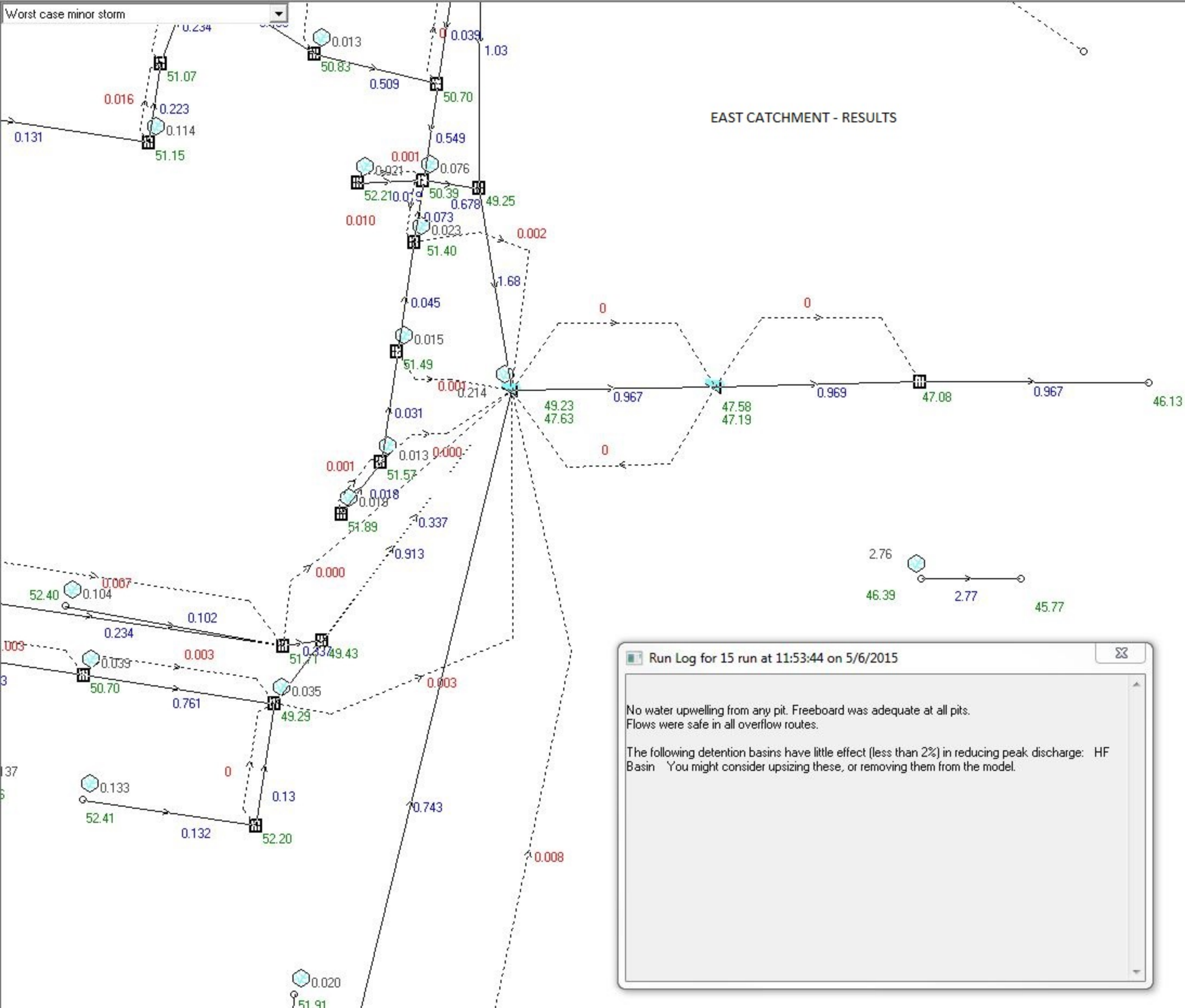


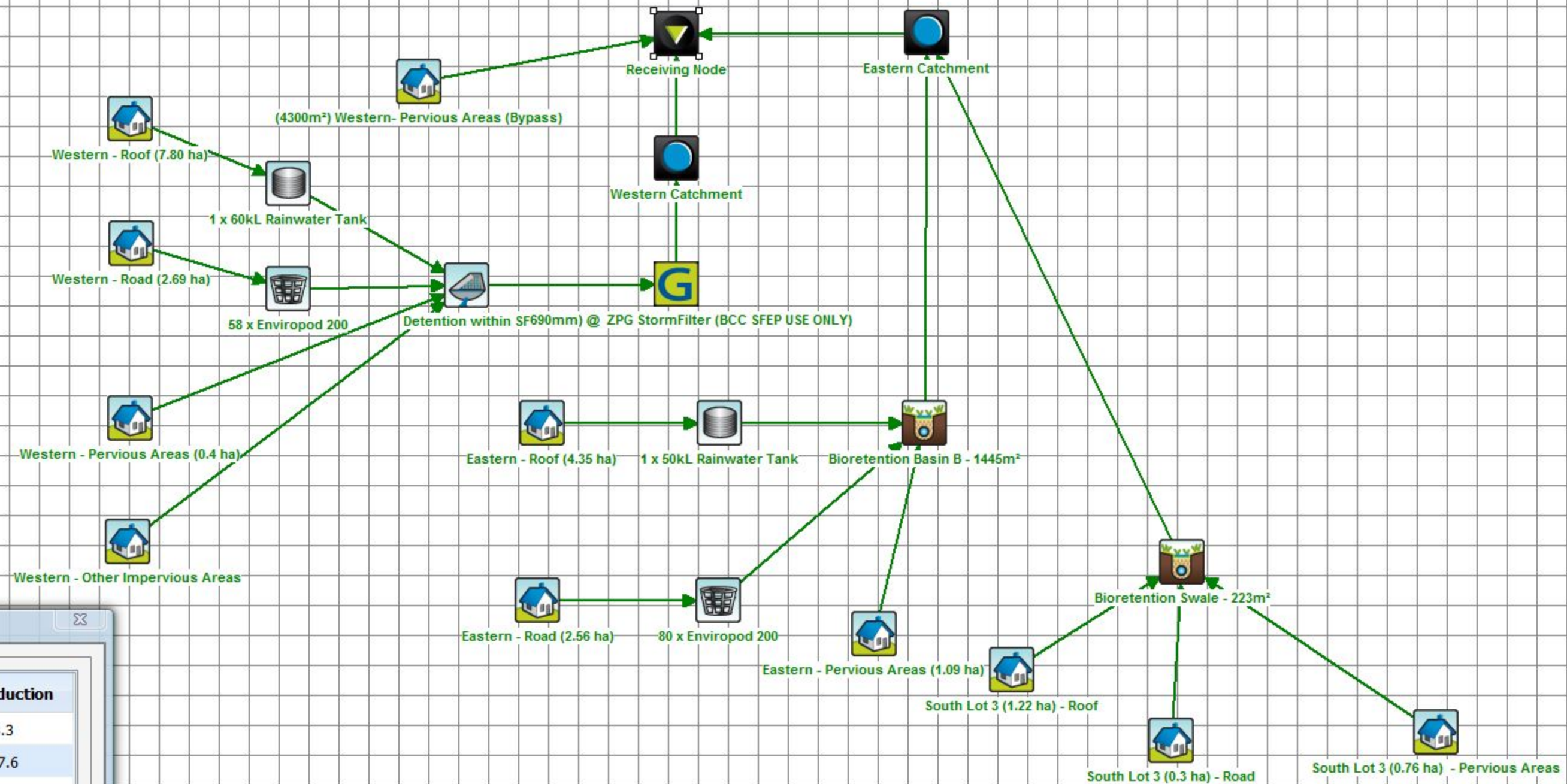
 Run Log for 15 run at 11:58:20 on 5/6/2015

No water upwelling from any pit.
Freeboard was less than 0.15m at B\1
Flows were safe in all overflow routes.

DRAINS MODEL - EASTERN CATCHMENT







Treatment Train Effectiveness - Receiving Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	145	140	3.3
Total Suspended Solids (kg/yr)	17100	2130	87.6
Total Phosphorus (kg/yr)	40	14	65
Total Nitrogen (kg/yr)	322	177	45.2
Gross Pollutants (kg/yr)	3630	0	100



Appendix B

Sydney Water - Sewer

Case Number: 135154

7 November 2013

AFTERON LIMITED
c/- MGP BUILDING & INFRASTRUCTURE SERVICE PL

**LETTER of APPROVAL
For
EXTENSION OF A SYDNEY WATER ASSET**

Applicant: AFTERON LIMITED
Your reference: 73231.001
Property location: 60 WALLGROVE RD, Eastern Creek
Your application date: 19 September 2013

Dear Applicant

Your application to extend to a sewer main at the above location is approved provided you do the following things:

1. You must enter into an agreement with Sydney Water in the form of the enclosed Deed.
2. You must engage your current or another authorised Water Servicing Coordinator (Coordinator) to manage the design and construction of the required works to Sydney Water's standards and procedures. Before you engage another Coordinator you must write and tell Sydney Water.

For a list of authorised Coordinators either visit www.sydneywater.com.au > Building and Developing > Developing Your Land or call 13 20 92. Coordinators will give you a quote or information about costs for services/ works including Sydney Water costs.

The Coordinator generally will be the single point of contact between you and Sydney Water. They can answer most questions you might have about our process and charges.

Civil Engineers & Project Managers

3. After you engage a Coordinator, you and your accredited Developer Infrastructure Providers (Providers) will need to sign and lodge both copies of the enclosed Deed with your nominated Coordinator. After Sydney Water has signed the documents, one copy will be returned to the Coordinator.

The Deed sets out for this project:

- your responsibilities;
- Sydney Water's responsibilities; and
- the Provider's responsibilities.

You must do all the things that we ask you to do in that Deed.

If Sydney Water does not receive the signed Deed for our signing by 7 November 2014 you will need to re-apply (and pay another application fee).

Note: The Coordinator must be fully authorised by us for the whole time of the Deed.

4. If you need to enter a neighbouring property, you must have the written permission of the relevant property owners and tenants. You must use Sydney Water's **Permission to Enter** form(s) for this. You can get copies of these forms from your Coordinator or the Sydney Water website. Your Coordinator can also negotiate on your behalf.

Please make sure that you address all the items on the form(s) including payment of compensation and whether there are other ways of designing and constructing that could avoid or reduce their impacts. You will be responsible for all costs of mediation involved in resolving any disputes. Please allow enough time for entry issues to be resolved.

5. You must not start work on the existing sewer main or the proposed extension until Sydney Water advises your Coordinator.

If any work on our assets is carried out without that advice or final approval, Sydney Water will take action to have work on the site stopped. We will apply the provisions of Section 45 of the Sydney Water Act 1994.

6. Construction of these works will require you to pay project management, survey, design and construction costs **directly to your Providers**. Additional costs payable to Sydney Water may include:
- water main shutdown and disinfection;
 - connection of new water mains to Sydney Water system(s);
 - design and construction audit fees;
 - contract administration, Operations Area Charge & Customer Redress prior to project finalisation;
 - creation or alteration of easements etc.;
 - water usage charges where water has been supplied for building activity purposes prior to disinfection of a newly constructed water main.

Note: Payment for any Goods and Services (including Customer Redress) provided by Sydney Water will be required prior to the release of the Bank Guarantee or Cash Bond.

Your Coordinator can tell you about these costs.

7. Should you request to have Sydney Water contribute to the cost of any upsizing work, this can only be considered after:
- You have obtained a minimum of three separate quotations from Sydney Water Accredited Developer Infrastructure Providers for the construction and completion of the works
 - Your Coordinator has ensured that all quotes submitted are compliant and presented in Sydney Water's standard Schedule of Rates format. The design and project management fees are also to be presented in this format. Sydney Water will contribute to these fees but only after we have assessed them as reasonable. (The rates must be based on normal industry standards.)
 - Sydney Water's Estimating Engineer has reviewed the quotes and, if considered to be above market rates, has requested additional information
 - The quotes must be submitted to Sydney Water before the commencement of construction

8. Because this work involves construction on a "live" Sydney Water sewer main, you must also:
- Your Building Plans are approved prior to temporary pipework and excavation,
 - You submit your temporary pipework design (if required) with your permanent wastewater deviation design for approval,
 - Accept in writing to bonding conditions that will be provided in the Bond Agreement,
 - Submit your Bond and signed Bond Agreement,
 - Submit the Construction Commencement Notice for construction of the temporary pipework,
 - Have your temporary pipework constructed by a listed provider, and then
 - Complete your permanent deviation works

After we receive a copy of the successful tender for the work, we can calculate the amount of this bond. We will then send you that other agreement which will tell you this amount. You must lodge the bond and the completed agreement with Sydney Water before you start constructing the work.

The bond will be released after you have completed the construction of the works. (This includes lodgement of Work As Constructed plans and production and/or recreation of documentation and reports and completion of all the excavation and landscaping works needed for the total project.)

9. Work as Constructed (WAC) plans.
- Preliminary WAC plans with the assumed connection construction shown must be submitted via email to the Case Manager at Sydney Water, prior to the joint Pre-connection inspection this is because the existing sewer is a existing 750mm trunk sewer.
 - The preliminary WAC plans are required to be accepted by the Case Manager prior to the connection being arranged.
 - The ITP must be amended to include a hold point for the submission of preliminary WAC plans prior to the joint inspection and acceptance of the WAC plan prior to connection.

In addition, the following specific conditions apply:

- Sydney Water has no objections for a 300mm lead-in main extension from the Eastern Creek 750mm sub main to the proposed lot.
- The proposed wastewater infrastructure for this development will be sized & configured according to the Sewerage Code of Australia WSA 02-2002-2.2 (Sydney Water Edition 1 – Version 3)

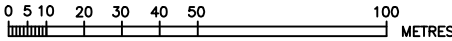
END

Managers

Appendix C

Sydney Water – Water

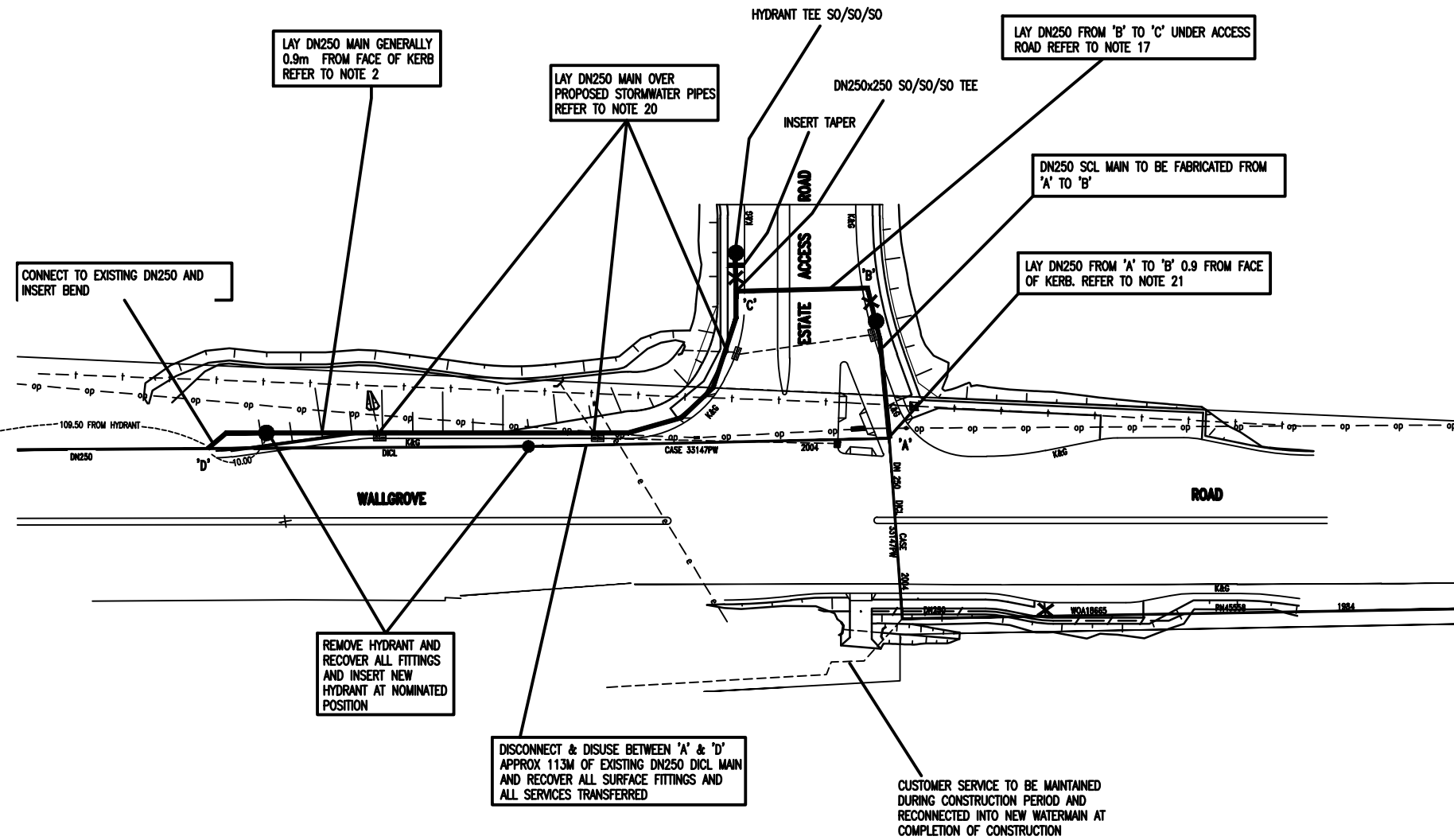
Civil Engineers & Project Managers



NOTES :-

1. WATER SERVICING COORDINATOR:
MGP P/L (C/- LANDPARTNERS LIMITED)
LEVEL 2, 23-29 SOUTH ST,
RYDALMERE NSW 2116 PH: 02 9685 2000

SURVEY, DESIGN AND FINAL PLANS PREPARED BY:
LANDPARTNERS LIMITED
LEVEL 2, 23-29 SOUTH ST,
RYDALMERE NSW 2116 PH: 02 9685 2000
FOR: MIRVAC PROJECTS PTY. LTD.
2. MAIN TO BE LAID AT STANDARD DEPTH BELOW TOP OF KERB AND ROAD SURFACES EXCEPT WHERE SHOWN OTHERWISE.
3. MAIN LAID UNDER MAJOR ROADWAY CROSSING AS PER DTC-1120. THE CONSTRUCTOR TO HAVE A COPY OF THIS PLAN ON SITE AT ALL TIMES
4. MAINLAYING NOT TO PROCEED PRIOR TO FINISHED SURFACE LEVEL & NEW KERB LINES ARE PEGGED BY SURVEYOR.
5. LOCATION AND DEPTH OF EXISTING UNDERGROUND SERVICES AND STRUCTURES INCLUDING PROPOSED WATER CONNECTION LOCATION TO BE CONFIRMED BY CONSTRUCTOR PRIOR TO CONSTRUCTION. SITE CHECK NECESSARY.
6. CONTRACTOR TO OBTAIN COPY OF UNDERGROUND SERVICES SEARCH AND KEEP COPY ON SITE AT ALL TIMES.
7. NO AMENDMENTS ARE TO BE MADE TO THIS DESIGN WITHOUT APPROVAL FROM THE DESIGNER.
9. PRECAUTIONS MAY BE NECESSARY IN VICINITY OF POWER POLES.
10. MEASURES TO PROTECT THE ENVIRONMENT ARE DETAILED IN THE REVIEW OF ENVIRONMENTAL (R.E.F.) REPORT. THE CONSTRUCTOR SHALL COMPLY WITH ALL REQUIREMENTS IN ANY REVIEW OF ENVIRONMENTAL FACTORS (R.E.F.) REPORT.
11. TEES AND BENDS NOT TO BACKFILLED UNTIL THEIR LOCATION HAS BEEN DETERMINED BY SURVEY FOR WORK AS EXECUTED PURPOSES BY THE WATER SERVICING CO-ORDINATOR.
12. THE MINIMUM NUMBER OF COMPACTION TESTS REQUIRED TO SATISFY THE WATER SUPPLY CODE OF AUSTRALIA ARE:
PIPE EMBEDMENT ZONE: TO BE CERTIFIED BY CONSTRUCTOR ON IT:
TRENCH FILL ZONE - TRAFFICABLE: 1
TRENCH FILL ZONE: NON-TRAFFICABLE: 5
13. RESTORATION OF ROAD PAVEMENT, DRIVEWAYS AND FOOTPATHS TO BE CARRIED OUT TO THE SATISFACTION OF BLACKTOWN CITY COUNCIL, RMS AND AFFECTED PROPERTY OWNERS.
14. PROPOSED MAIN SUBJECT TO VARIABLE DISTANCE FROM P.L., EXISTING MAIN TO REMAIN IN SERVICE DURING CONSTRUCTION.
15. DISUSED DN250 ENCASED WATER MAIN BETWEEN 'A' & 'D' TO BE COMPLETELY FILLED WITH LOW STRENGTH GROUT (<5MPa) SIMILAR MATERIAL OR SAND. PLUG AND SEAL BOTH OPENINGS ON DISUSED MAIN AGAINST WATER INFILTRATION.
16. THE WORKS DETAILED HEREON ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE SYDNEY WATER SUPPLY CODE OF AUSTRALIA (WSA 03-2011-3.1) EDITION 2014. THE CONTRACTOR TO HAVE A COPY OF THESE DOCUMENTS ON SITE AT ALL TIMES.
17. MAIN TO BE LAID UNDER ESTATE ACCESS RD. FROM 'B' TO 'C', TO BE INSTALLED AS PER DTC-1120. THE CONSTRUCTOR TO HAVE A COPY OF THIS PLAN ON SITE AT ALL TIMES.
18. HORIZONTAL BENDS THRUST BLOCK TO BE INSTALLED AS PER DTC-1110. THE CONSTRUCTOR TO HAVE A COPY OF THIS PLAN ON SITE AT ALL TIMES.
19. STOP VALVE TO BE INSTALLED AS PER DTC-1115. THE CONSTRUCTOR TO HAVE A COPY OF THIS PLAN ON SITE AT ALL TIMES.
20. MAIN LAID OVER STORMWATER PIPES TO MAINTAIN A 150 MINIMUM VERTICAL CLEARANCE AND A 600 MINIMUM HORIZONTAL CLEARANCE.
21. JOINING OF DN250 MAIN TO EXISTING MAIN AT 'A' TO BE AS PER DTC-1130. THE CONTRACTOR IS TO HAVE A COPY OF THE PLAN ON SITE AT ALL TIMES



ENVIRONMENTAL REQUIREMENTS

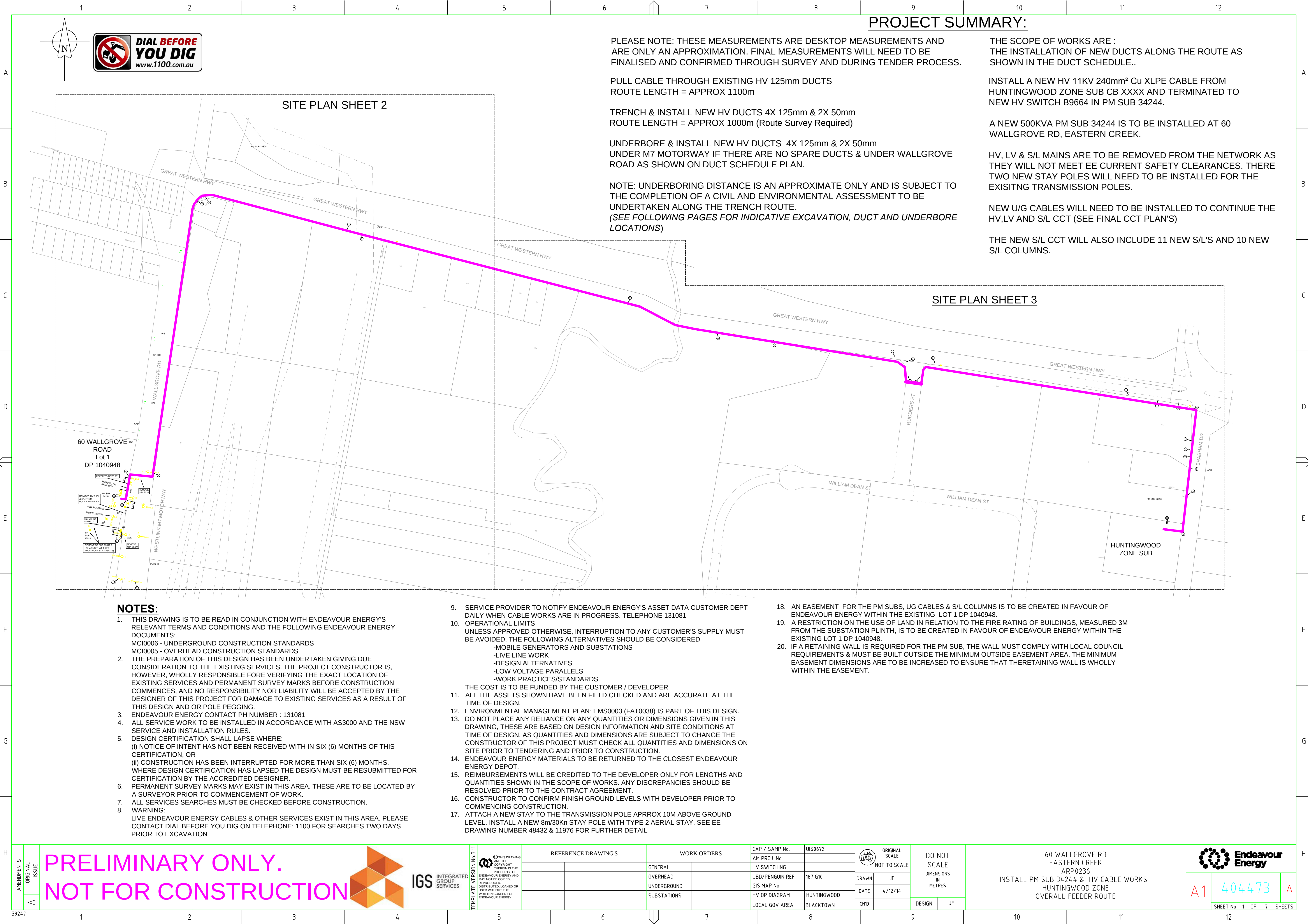
1. THE MAIN CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS IN ANY REVIEW OF ENVIRONMENTAL FACTORS.
2. SILT STOP FENCES OR STRAW BALE FILTERS ARE TO BE INSTALLED DOWNSLOPE OF ALL WORKS PRIOR TO ANY CONSTRUCTION ACTIVITY.
3. EXTENT OF CLEARING TO BE KEPT TO A MINIMUM.
4. TOPSOIL FROM CONSTRUCTION ACTIVITY IS TO BE STRIPPED AND STOCKPILED PRIOR TO CONSTRUCTION ACTIVITY FOR LATER REUSE IN SITE RESTORATION.
5. ALL STOCKPILES IF ERODABLE MATERIALS ARE TO BE SURROUNDED BY STRAW BALES STAKED INTO GROUND OR SILT STOP FENCES.
6. ALL DISTURBED AREAS ARE TO BE RESTORED, STABILISED AND REVEGETATED WITHIN THE COUNCIL RESERVE ADJACENT TO SUBACO CREEK IMMEDIATELY UPON COMPLETION OF CONSTRUCTION ACTIVITIES.
7. SILT CONTROLS, SITE RESTORATION AND ENVIRONMENTAL REQUIREMENTS TO BE CARRIED OUT TO THE SATISFACTION OF THE SUPERINTENDENT.

1	ISSUE FOR TENDER,	DAS	20/11/14
No.	AMENDMENT DESCRIPTION	BY	DATE

PLAN TO BE READ IN CONJUNCTION WITH CURRENT SYDNEY WATER STANDARDS SYDNEY WATER CORPORATION	UTILITIES						WORK AS CONSTRUCTED CERTIFICATION						PIPE SCHEDULE					SYDNEY WATER CORPORATION SYDNEY WATER Case No. 142116PW WATERMAIN ADJUSTMENT 60 WALLGROVE ROAD EASTERN CREEK BLACKTOWN				
	TYPE		DATE	REF.	TYPE		DATE	REF.	DEVELOPER	WATER SERVICE CO-ORDINATOR					SIZE DN	TYPE	CLASS		LENGTH	PIPE JOINING METHOD / NOTES		
	ENDEAVOUR ENERGY		E	21/11/14	42637172										250	DIOL	PN35		110m			
	GAS: GUP		GUP	21/11/14	42637176										250	SCL	5 THK		50m	273 O.D.		
	OPTUS		OPT	21/11/14	42637174																	
	WATER: DN100 Water			21/11/14	42637177																	
	SEWER: S		S	21/11/14	42637177																	
	TELSTRA: TEL		TEL	21/11/14	42637178																	
PRIOR TO COMMENCEMENT OF EXCAVATION FOR PROPOSED AND EXISTING SERVICES CONTACT :-							CONSTRUCTOR											AUSTRALIAN HEIGHT DATUM				
PAV BEFORE YOU DIG PH 1800 ELECTRICITY: ENDEAVOUR ENERGY PH 99531181 GAS: JENEMA PH 1300888000 TELECOMMUNICATIONS: TELSTRA PH 1800653835							COMPLETED						W.A.C. PREPARED					SCALES				
							DESIGNER											PLAN 1:1000 SECTION { HOR. VERT.				
							I CERTIFY THAT THE WORKS HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THE WORK AS CONSTRUCTED DRAWINGS.						DESIGN HEAD 120 m					BOUNDARY TRAPS REQUIRED.				
																		CROSS SECTIONS NATURAL				
																		LENGTHS, DEPTHS & LEVELS ARE IN METRES.				
																		SHEET . 1 . OF . 1 . File No. N/A				

Appendix D

Other Services – Communications and Electrical



PROJECT SUMMARY:

PLEASE NOTE: THESE MEASUREMENTS ARE DESKTOP MEASUREMENTS AND ARE ONLY AN APPROXIMATION. FINAL MEASUREMENTS WILL NEED TO BE FINALISED AND CONFIRMED THROUGH SURVEY AND DURING TENDER PROCESS.

PULL CABLE THROUGH EXISTING HV 125mm DUCTS
ROUTE LENGTH = APPROX 1100m

TRENCH & INSTALL NEW HV DUCTS 4X 125mm & 2X 50mm
ROUTE LENGTH = APPROX 1000m (Route Survey Required)

UNDERBORE & INSTALL NEW HV DUCTS 4X 125mm & 2X 50mm
UNDER M7 MOTORWAY IF THERE ARE NO SPARE DUCTS & UNDER WALLGROVE ROAD AS SHOWN ON DUCT SCHEDULE PLAN.

NOTE: UNDERBORING DISTANCE IS AN APPROXIMATE ONLY AND IS SUBJECT TO THE COMPLETION OF A CIVIL AND ENVIRONMENTAL ASSESSMENT TO BE UNDERTAKEN ALONG THE TRENCH ROUTE.
(SEE FOLLOWING PAGES FOR INDICATIVE EXCAVATION, DUCT AND UNDERBORE LOCATIONS)

THE SCOPE OF WORKS ARE :
THE INSTALLATION OF NEW DUCTS ALONG THE ROUTE AS SHOWN IN THE DUCT SCHEDULE..

INSTALL A NEW HV 11KV 240mm² Cu XLPE CABLE FROM HUNTINGWOOD ZONE SUB CB XXXX AND TERMINATED TO NEW HV SWITCH B9664 IN PM SUB 34244.

A NEW 500KVA PM SUB 34244 IS TO BE INSTALLED AT 60 WALLGROVE RD, EASTERN CREEK.

HV, LV & S/L MAINS ARE TO BE REMOVED FROM THE NETWORK AS THEY WILL NOT MEET EE CURRENT SAFETY CLEARANCES. THERE TWO NEW STAY POLES WILL NEED TO BE INSTALLED FOR THE EXISITNG TRANSMISSION POLES.

NEW U/G CABLES WILL NEED TO BE INSTALLED TO CONTINUE THE HV, LV AND S/L CCT (SEE FINAL CCT PLAN'S)

THE NEW S/L CCT WILL ALSO INCLUDE 11 NEW S/L'S AND 10 NEW S/L COLUMNS.

NOTES:

- 1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ENDEAVOUR ENERGY'S RELEVANT TERMS AND CONDITIONS AND THE FOLLOWING ENDEAVOUR ENERGY DOCUMENTS:
MCI0006 - UNDERGROUND CONSTRUCTION STANDARDS
MCI0005 - OVERHEAD CONSTRUCTION STANDARDS
- 2. THE PREPARATION OF THIS DESIGN HAS BEEN UNDERTAKEN GIVING DUE CONSIDERATION TO THE EXISTING SERVICES. THE PROJECT CONSTRUCTOR IS, HOWEVER, WHOLLY RESPONSIBLE FORE VERIFYING THE EXACT LOCATION OF EXISTING SERVICES AND PERMANENT SURVEY MARKS BEFORE CONSTRUCTION COMMENCES, AND NO RESPONSIBILITY NOR LIABILITY WILL BE ACCEPTED BY THE DESIGNER OF THIS PROJECT FOR DAMAGE TO EXISTING SERVICES AS A RESULT OF THIS DESIGN AND OR POLE PEGGING.
- 3. ENDEAVOUR ENERGY CONTACT PH NUMBER : 131081
- 4. ALL SERVICE WORK TO BE INSTALLED IN ACCORDANCE WITH AS3000 AND THE NSW SERVICE AND INSTALLATION RULES.
- 5. DESIGN CERTIFICATION SHALL LAPSE WHERE:
(i) NOTICE OF INTENT HAS NOT BEEN RECEIVED WITH IN SIX (6) MONTHS OF THIS CERTIFICATION, OR
(ii) CONSTRUCTION HAS BEEN INTERRUPTED FOR MORE THAN SIX (6) MONTHS. WHERE DESIGN CERTIFICATION HAS LAPSED THE DESIGN MUST BE RESUBMITTED FOR CERTIFICATION BY THE ACCREDITED DESIGNER.
- 6. PERMANENT SURVEY MARKS MAY EXIST IN THIS AREA. THESE ARE TO BE LOCATED BY A SURVEYOR PRIOR TO COMMENCEMENT OF WORK.
- 7. ALL SERVICES SEARCHES MUST BE CHECKED BEFORE CONSTRUCTION.
- 8. WARNING:
LIVE ENDEAVOUR ENERGY CABLES & OTHER SERVICES EXIST IN THIS AREA. PLEASE CONTACT DIAL BEFORE YOU DIG ON TELEPHONE: 1100 FOR SEARCHES TWO DAYS PRIOR TO EXCAVATION

- 9. SERVICE PROVIDER TO NOTIFY ENDEAVOUR ENERGY'S ASSET DATA CUSTOMER DEPT DAILY WHEN CABLE WORKS ARE IN PROGRESS. TELEPHONE 131081
- 10. OPERATIONAL LIMITS
UNLESS APPROVED OTHERWISE, INTERRUPTION TO ANY CUSTOMER'S SUPPLY MUST BE AVOIDED. THE FOLLOWING ALTERNATIVES SHOULD BE CONSIDERED
-MOBILE GENERATORS AND SUBSTATIONS
-LIVE LINE WORK
-DESIGN ALTERNATIVES
-LOW VOLTAGE PARALLELS
-WORK PRACTICES/STANDARDS.
THE COST IS TO BE FUNDED BY THE CUSTOMER / DEVELOPER
- 11. ALL THE ASSETS SHOWN HAVE BEEN FIELD CHECKED AND ARE ACCURATE AT THE TIME OF DESIGN.
- 12. ENVIRONMENTAL MANAGEMENT PLAN: EMS0003 (FAT0038) IS PART OF THIS DESIGN.
- 13. DO NOT PLACE ANY RELIANCE ON ANY QUANTITIES OR DIMENSIONS GIVEN IN THIS DRAWING. THESE ARE BASED ON DESIGN INFORMATION AND SITE CONDITIONS AT TIME OF DESIGN. AS QUANTITIES AND DIMENSIONS ARE SUBJECT TO CHANGE THE CONSTRUCTOR OF THIS PROJECT MUST CHECK ALL QUANTITIES AND DIMENSIONS ON SITE PRIOR TO TENDERING AND PRIOR TO CONSTRUCTION.
- 14. ENDEAVOUR ENERGY MATERIALS TO BE RETURNED TO THE CLOSEST ENDEAVOUR ENERGY DEPOT.
- 15. REIMBURSEMENTS WILL BE CREDITED TO THE DEVELOPER ONLY FOR LENGTHS AND QUANTITIES SHOWN IN THE SCOPE OF WORKS. ANY DISCREPANCIES SHOULD BE RESOLVED PRIOR TO THE CONTRACT AGREEMENT.
- 16. CONSTRUCTOR TO CONFIRM FINISH GROUND LEVELS WITH DEVELOPER PRIOR TO COMMENCING CONSTRUCTION.
- 17. ATTACH A NEW STAY TO THE TRANSMISSION POLE APPROX 10M ABOVE GROUND LEVEL. INSTALL A NEW 8m/30Kn STAY POLE WITH TYPE 2 AERIAL STAY. SEE EE DRAWING NUMBER 48432 & 11976 FOR FURTHER DETAIL

- 18. AN EASEMENT FOR THE PM SUBS, UG CABLES & S/L COLUMNS IS TO BE CREATED IN FAVOUR OF ENDEAVOUR ENERGY WITHIN THE EXISTING LOT 1 DP 1040948.
- 19. A RESTRICTION ON THE USE OF LAND IN RELATION TO THE FIRE RATING OF BUILDINGS, MEASURED 3M FROM THE SUBSTATION PLINTH, IS TO BE CREATED IN FAVOUR OF ENDEAVOUR ENERGY WITHIN THE EXISTING LOT 1 DP 1040948.
- 20. IF A RETAINING WALL IS REQUIRED FOR THE PM SUB, THE WALL MUST COMPLY WITH LOCAL COUNCIL REQUIREMENTS & MUST BE BUILT OUTSIDE THE MINIMUM OUTSIDE EASEMENT AREA. THE MINIMUM EASEMENT DIMENSIONS ARE TO BE INCREASED TO ENSURE THAT THERETAINING WALL IS WHOLLY WITHIN THE EASEMENT.

REFERENCE DRAWING'S		WORK ORDERS	
	GENERAL		
	OVERHEAD		
	UNDERGROUND		
	SUBSTATIONS		

CAP / SAMP No.	UIS0672
AM PROJ. No.	
HV SWITCHING	
UBD/PENGUIN REF	187 G10
GIS MAP No	
HV OP DIAGRAM	HUNTINGWOOD
LOCAL GOV AREA	BLACKTOWN

ORIGINAL SCALE	NOT TO SCALE
DRAWN	JF
DATE	4/12/14
CH'D	
DESIGN	JF

60 WALLGROVE RD
EASTERN CREEK
ARP0236
INSTALL PM SUB 34244 & HV CABLE WORKS
HUNTINGWOOD ZONE
OVERALL FEEDER ROUTE

A1

404473

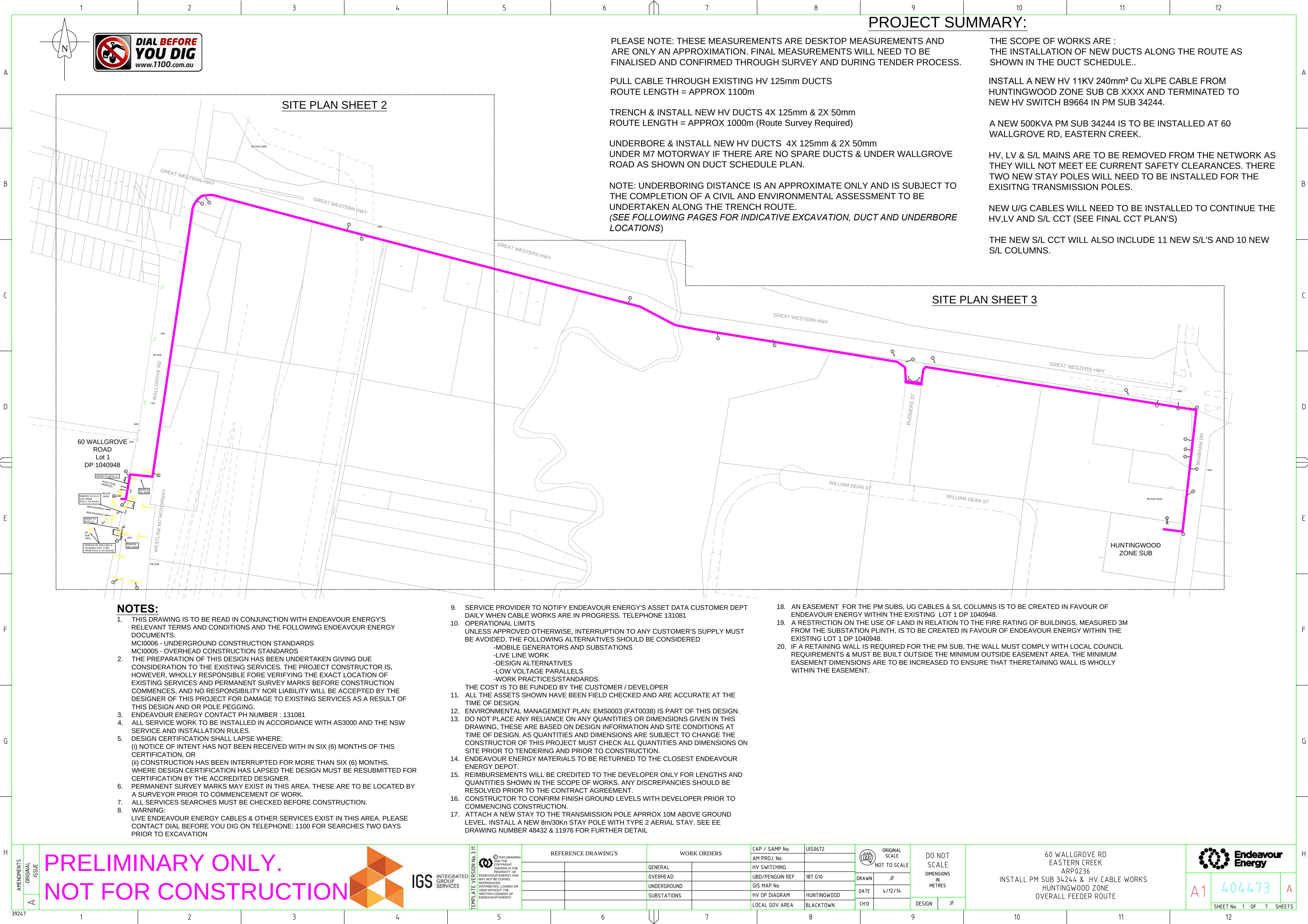
A

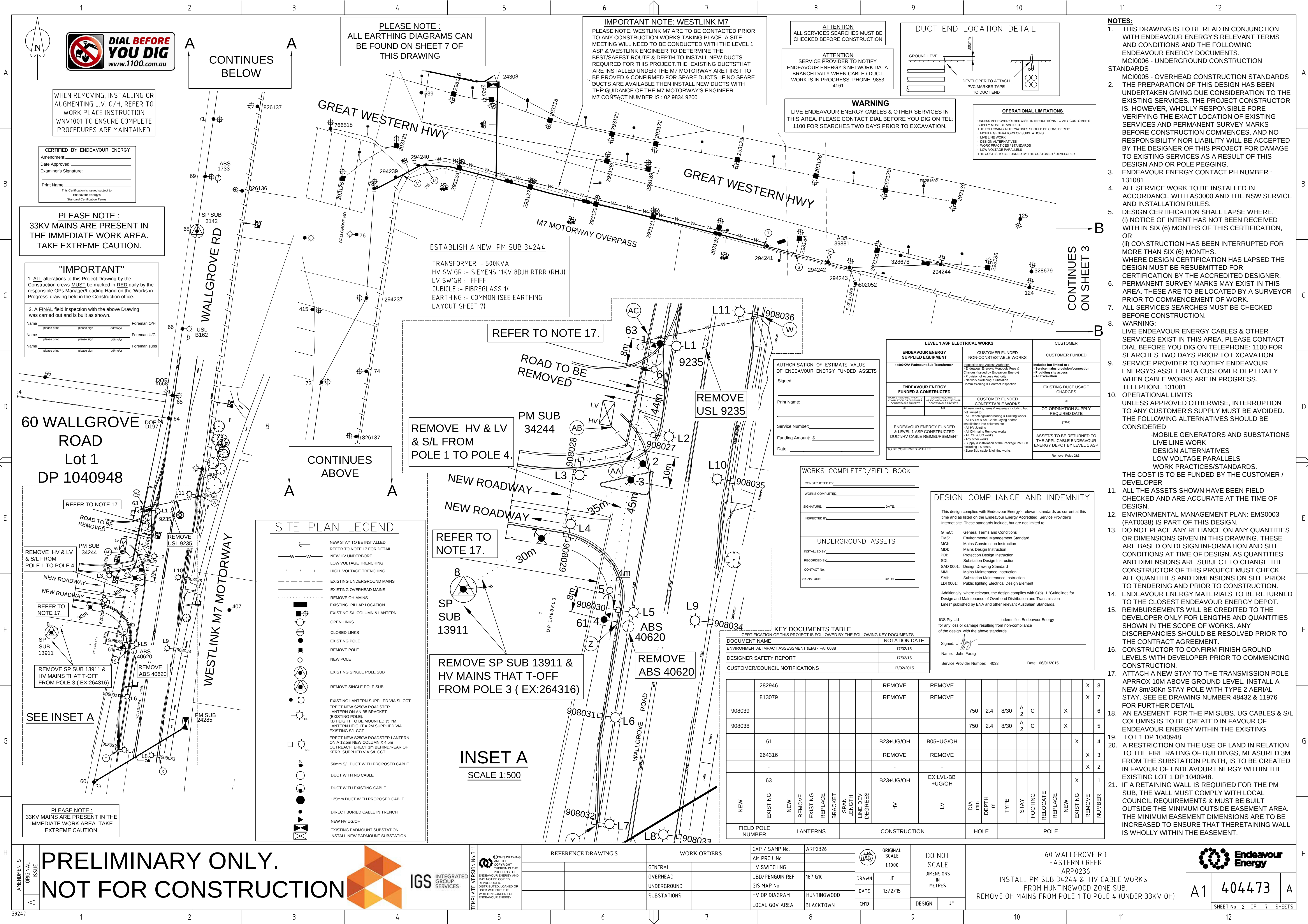
SHEET No 1 OF 7 SHEETS

PRELIMINARY ONLY.
NOT FOR CONSTRUCTION



THIS DRAWING AND THE COPYRIGHT THEREIN IS THE PROPERTY OF ENDEAVOUR ENERGY AND MAY NOT BE COPIED, REPRODUCED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT THE WRITTEN CONSENT OF ENDEAVOUR ENERGY





- NOTES:**
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ENDEAVOUR ENERGY'S RELEVANT TERMS AND CONDITIONS AND THE FOLLOWING ENDEAVOUR ENERGY DOCUMENTS:
MC10006 - UNDERGROUND CONSTRUCTION STANDARDS
 - MC10005 - OVERHEAD CONSTRUCTION STANDARDS
 - THE PREPARATION OF THIS DESIGN HAS BEEN UNDERTAKEN GIVING DUE CONSIDERATION TO THE EXISTING SERVICES. THE PROJECT CONSTRUCTOR IS, HOWEVER, WHOLLY RESPONSIBLE FOR VERIFYING THE EXACT LOCATION OF EXISTING SERVICES AND PERMANENT SURVEY MARKS BEFORE CONSTRUCTION COMMENCES, AND NO RESPONSIBILITY NOR LIABILITY WILL BE ACCEPTED BY THE DESIGNER OF THIS PROJECT FOR DAMAGE TO EXISTING SERVICES AS A RESULT OF THIS DESIGN AND OR POLE PEGGING.
 - ENDEAVOUR ENERGY CONTACT PH NUMBER : 131081
 - ALL SERVICE WORK TO BE INSTALLED IN ACCORDANCE WITH AS3000 AND THE NSW SERVICE AND INSTALLATION RULES.
 - DESIGN CERTIFICATION SHALL LAPSE WHERE:
(i) NOTICE OF INTENT HAS NOT BEEN RECEIVED WITHIN SIX (6) MONTHS OF THIS CERTIFICATION, OR
(ii) CONSTRUCTION HAS BEEN INTERRUPTED FOR MORE THAN SIX (6) MONTHS. WHERE DESIGN CERTIFICATION HAS LAPSED THE DESIGN MUST BE RESUBMITTED FOR CERTIFICATION BY THE ACCREDITED DESIGNER. PERMANENT SURVEY MARKS MAY EXIST IN THIS AREA. THESE ARE TO BE LOCATED BY A SURVEYOR PRIOR TO COMMENCEMENT OF WORK.
 - ALL SERVICES SEARCHES MUST BE CHECKED BEFORE CONSTRUCTION.
 - WARNING:**
LIVE ENDEAVOUR ENERGY CABLES & OTHER SERVICES EXIST IN THIS AREA. PLEASE CONTACT DIAL BEFORE YOU DIG ON TELEPHONE: 1100 FOR SEARCHES TWO DAYS PRIOR TO EXCAVATION.
 - OPERATIONAL LIMITS
UNLESS APPROVED OTHERWISE, INTERRUPTION TO ANY CUSTOMER'S SUPPLY MUST BE AVOIDED. THE FOLLOWING ALTERNATIVES SHOULD BE CONSIDERED
-MOBILE GENERATORS AND SUBSTATIONS
-LIVE LINE WORK
-DESIGN ALTERNATIVES
-LOW VOLTAGE PARALLELS
-WORK PRACTICES/STANDARDS.
THE COST IS TO BE FUNDED BY THE CUSTOMER / DEVELOPER
 - ALL THE ASSETS SHOWN HAVE BEEN FIELD CHECKED AND ARE ACCURATE AT THE TIME OF DESIGN.
 - ENVIRONMENTAL MANAGEMENT PLAN:** EMS0003 (FAT0038) IS PART OF THIS DESIGN.
 - DO NOT PLACE ANY RELIANCE ON ANY QUANTITIES OR DIMENSIONS GIVEN IN THIS DRAWING. THESE ARE BASED ON DESIGN INFORMATION AND SITE CONDITIONS AT TIME OF DESIGN. AS QUANTITIES AND DIMENSIONS ARE SUBJECT TO CHANGE THE CONSTRUCTOR OF THIS PROJECT MUST CHECK ALL QUANTITIES AND DIMENSIONS ON SITE PRIOR TO TENDERING AND PRIOR TO CONSTRUCTION.
 - ENDEAVOUR ENERGY MATERIALS TO BE RETURNED TO THE CLOSEST ENDEAVOUR ENERGY DEPOT.
 - REIMBURSEMENTS WILL BE CREDITED TO THE DEVELOPER ONLY FOR LENGTHS AND QUANTITIES SHOWN IN THE SCOPE OF WORKS. ANY DISCREPANCIES SHOULD BE RESOLVED PRIOR TO THE CONTRACT AGREEMENT.
 - CONSTRUCTOR TO CONFIRM FINISH GROUND LEVELS WITH DEVELOPER PRIOR TO COMMENCING CONSTRUCTION.
 - ATTACH A NEW STAY TO THE TRANSMISSION POLE APPROX 10M ABOVE GROUND LEVEL. INSTALL A NEW 8m/30kN STAY POLE WITH TYPE 2 AERIAL STAY. SEE EE DRAWING NUMBER 48432 & 11976 FOR FURTHER DETAIL
 - AN EASEMENT FOR THE PM SUBS, UG CABLES & S/L COLUMNS IS TO BE CREATED IN FAVOUR OF ENDEAVOUR ENERGY WITHIN THE EXISTING LOT 1 DP 1040948.
 - A RESTRICTION ON THE USE OF LAND IN RELATION TO THE FIRE RATING OF BUILDINGS, MEASURED 3M FROM THE SUBSTATION PLINTH, IS TO BE CREATED IN FAVOUR OF ENDEAVOUR ENERGY WITHIN THE EXISTING LOT 1 DP 1040948.
 - IF A RETAINING WALL IS REQUIRED FOR THE PM SUB, THE WALL MUST COMPLY WITH LOCAL COUNCIL REQUIREMENTS & MUST BE BUILT OUTSIDE THE MINIMUM OUTSIDE EASEMENT AREA. THE MINIMUM EASEMENT DIMENSIONS ARE TO BE INCREASED TO ENSURE THAT THE RETAINING WALL IS WHOLLY WITHIN THE EASEMENT.

LEVEL 1 ASP ELECTRICAL WORKS		CUSTOMER
ENDEAVOUR ENERGY SUPPLIED EQUIPMENT	CUSTOMER FUNDED NON-CONTESTABLE WORKS	CUSTOMER FUNDED
1500KVA Padmount Sub Transformer	Disconnection and Access Authority - Endeavour Energy's Monopoly Fees & Charges (Issued by Endeavour Energy) - Provision of Access Authority - Network Scaffolding, Substation Commissioning & Contract Inspection	Includes but limited to: - Service mains provision/connection - Providing site access - All Excavation
ENDEAVOUR ENERGY FUNDED & CONSTRUCTED	CUSTOMER FUNDED CONTESTABLE WORKS	EXISTING DUCT USAGE CHARGES
Source required prior to construction of customer contestable project	All new works, items & materials including but not limited to: - All Trenching/Underboring & Ducting works - All HV LV & St. Cable Laying and/or Installation into columns etc. - All HV Joining - All OH mains Removal works - Any other works - Supply & Installation of the Package PM Sub including TX costs - Zone Sub cable & joining works	Nil CO-ORDINATION SUPPLY REQUIRED DATE (TBA)
ENDEAVOUR ENERGY FUNDED & LEVEL 1 ASP CONSTRUCTED DUCT/HV CABLE REIMBURSEMENT	TO BE CONFIRMED WITH EE	ASSETS TO BE RETURNED TO THE APPLICABLE ENDEAVOUR ENERGY DEPOT BY LEVEL 1 ASP Remove Poles 2&3

AUTHORISATION OF ESTIMATE VALUE OF ENDEAVOUR ENERGY FUNDED ASSETS

Signed: _____

Print Name: _____

Service Number: _____

Funding Amount: \$ _____

Date: _____

WORKS COMPLETED/FIELD BOOK

CONSTRUCTED BY: _____

WORKS COMPLETED: _____

SIGNATURE: _____ DATE: _____

INSPECTED BY: _____

UNDERGROUND ASSETS

INSTALLED BY: _____

RECORDED BY: _____

CONTACT NO.: _____

SIGNATURE: _____ DATE: _____

DESIGN COMPLIANCE AND INDEMNITY

This design complies with Endeavour Energy's relevant standards as current at this time and as listed on the Endeavour Energy Accredited Service Provider's Internet site. These standards include, but are not limited to:

- GT&C: General Terms and Conditions
- EMS: Environmental Management Standard
- MC1: Mains Construction Instruction
- MDI: Mains Design Instruction
- PDI: Protection Design Instruction
- SDI: Substation Design Instruction
- SAD 0001: Design Drawing Standard
- MMI: Mains Maintenance Instruction
- SMI: Substation Maintenance Instruction
- LDI 0001: Public Lighting Electrical Design Element

Additionally, where relevant, the design complies with Cb1-1 "Guidelines for Design and Maintenance of Overhead Distribution and Transmission Lines" published by ENA and other relevant Australian Standards.

IGS Pty Ltd indemnifies Endeavour Energy for any loss or damage resulting from non-compliance of the design with the above standards.

Signed: _____

Name: John Farag

Service Provider Number: 4033

Date: 06/01/2015

KEY DOCUMENTS TABLE

DOCUMENT NAME	NOTATION DATE
ENVIRONMENTAL IMPACT ASSESSMENT (EIA) - FAT0038	17/02/15
DESIGNER SAFETY REPORT	17/02/15
CUSTOMER/COUNCIL NOTIFICATIONS	17/02/2015

FIELD POLE NUMBER	LANTERNS	CONSTRUCTION	HOLE	POLE
282946		REMOVE	REMOVE	X 8
813079		REMOVE	REMOVE	X 7
908039			750 2.4 8/30 A 2 C	X 6
908038			750 2.4 8/30 A 2 C	X 5
61		B23+UG/OH	B05+UG/OH	X 4
264316		REMOVE	REMOVE	X 3
				X 2
63		B23+UG/OH	EX-LVL-BB +UG/OH	X 1
NEW				
EXISTING				
NEW				
REMOVE				
EXISTING				
REPLACE				
BRACKET				
SPAN				
LENGTH				
LINE DEV				
DEGREES				
HV				
LV				
DIA				
mm				
DEPTH				
m				
TYPE				
STAY				
FOOTING				
RELOCATE				
REPLACE				
NEW				
EXISTING				
REMOVE				
NUMBER				

REFERENCE DRAWING'S		WORK ORDERS	
GENERAL		OVERHEAD	
UNDERGROUND		UNDERGROUND	
SUBSTATIONS			

CAP / SAMP No.	ARP2326
AM PROJ. No.	
HV SWITCHING	187 G10
GIS MAP No	
HV OP DIAGRAM	HUNTINGWOOD
LOCAL GOV AREA	BLACKTOWN

ORIGINAL SCALE 1:1000

DRAWN JF

DATE 13/2/15

CH'D

DO NOT SCALE DIMENSIONS IN METRES

DESIGN JF

60 WALLGROVE RD
EASTERN CREEK
ARP0236
INSTALL PM SUB 34244 & HV CABLE WORKS
FROM HUNTINGWOOD ZONE SUB.
REMOVE OH MAINS FROM POLE 1 TO POLE 4 (UNDER 33KV OH)

Endeavour Energy

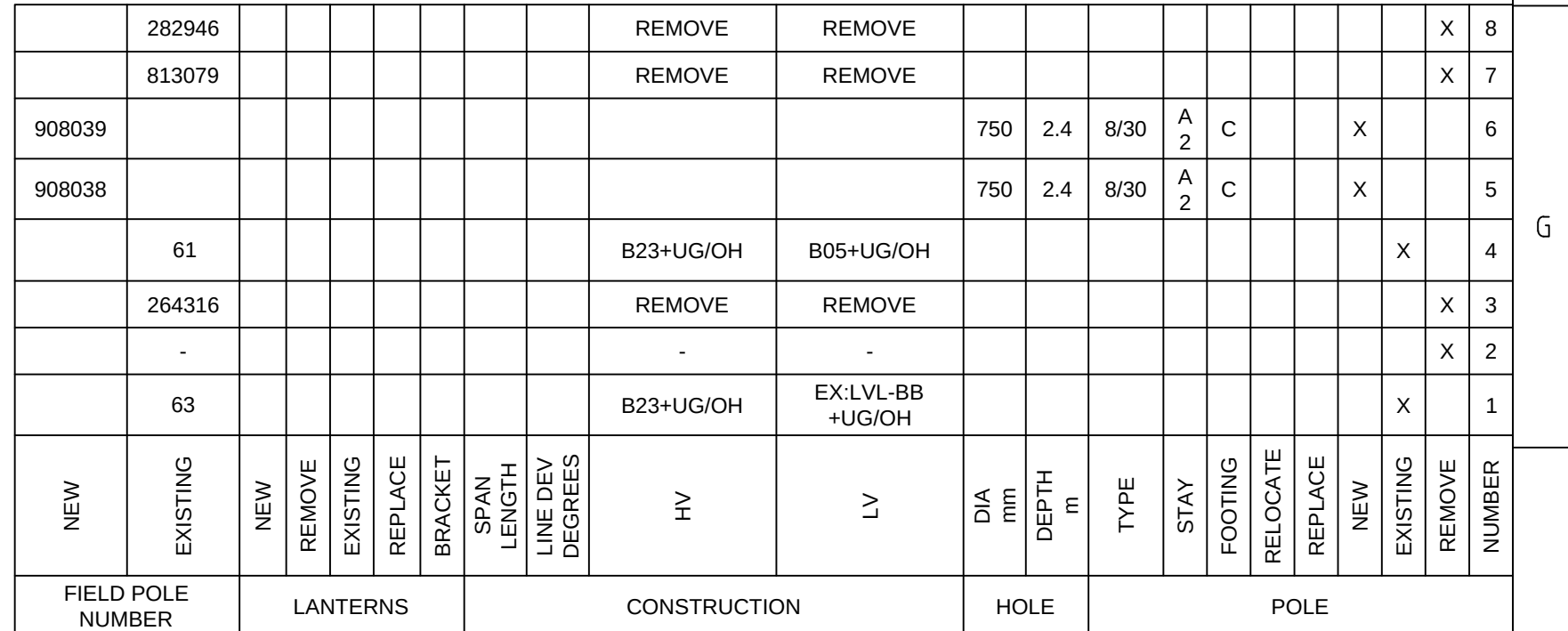
A1 404473 A

SHEET No. 2 OF 7 SHEETS

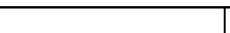
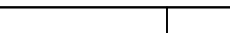
PRELIMINARY ONLY.
NOT FOR CONSTRUCTION

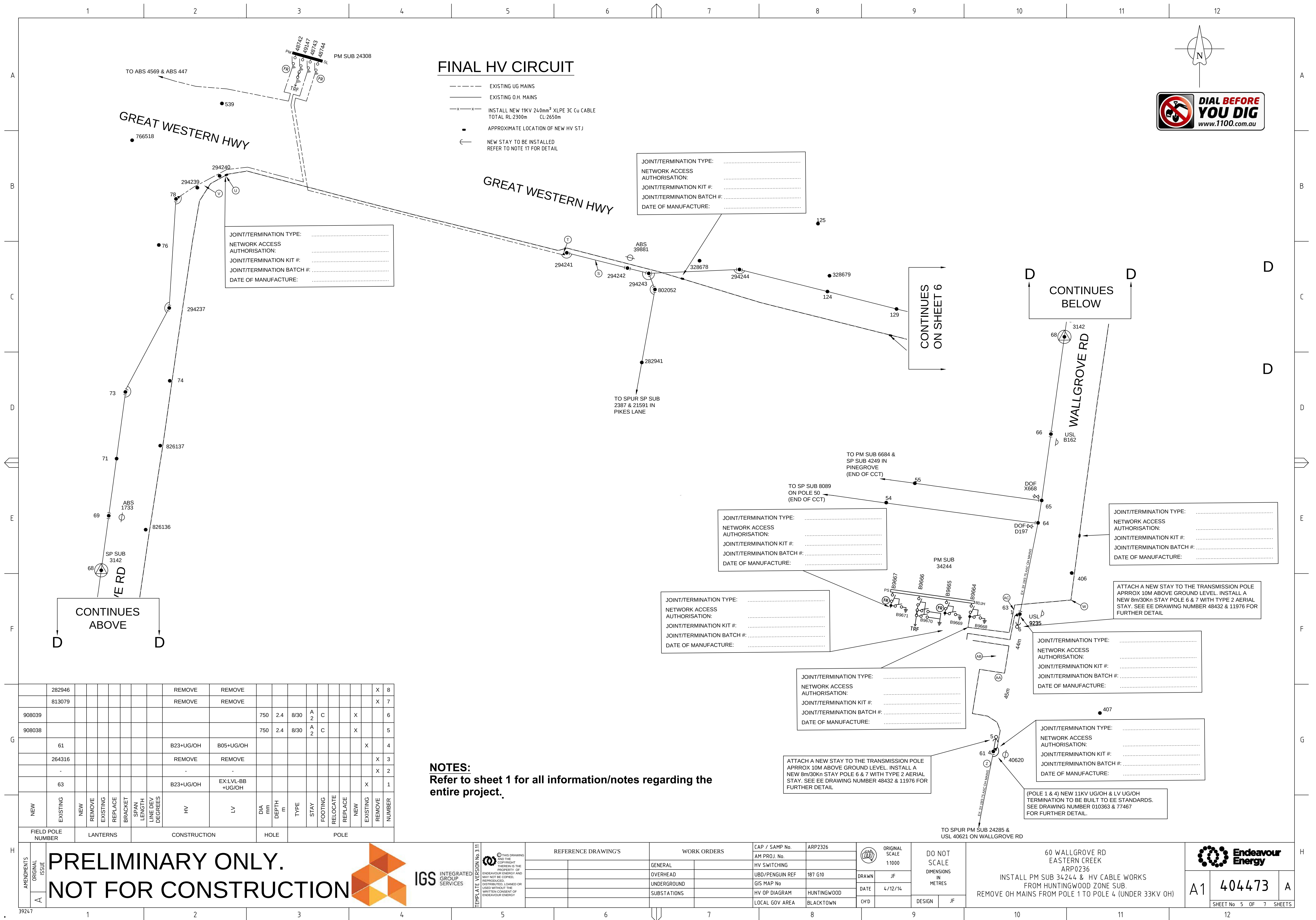


THIS DRAWING AND THE INFORMATION THEREIN IS THE PROPERTY OF ENDEAVOUR ENERGY AND MAY NOT BE COPIED, REPRODUCED, DISTRIBUTED, LOANED OR USED WITHOUT THE WRITTEN CONSENT OF ENDEAVOUR ENERGY



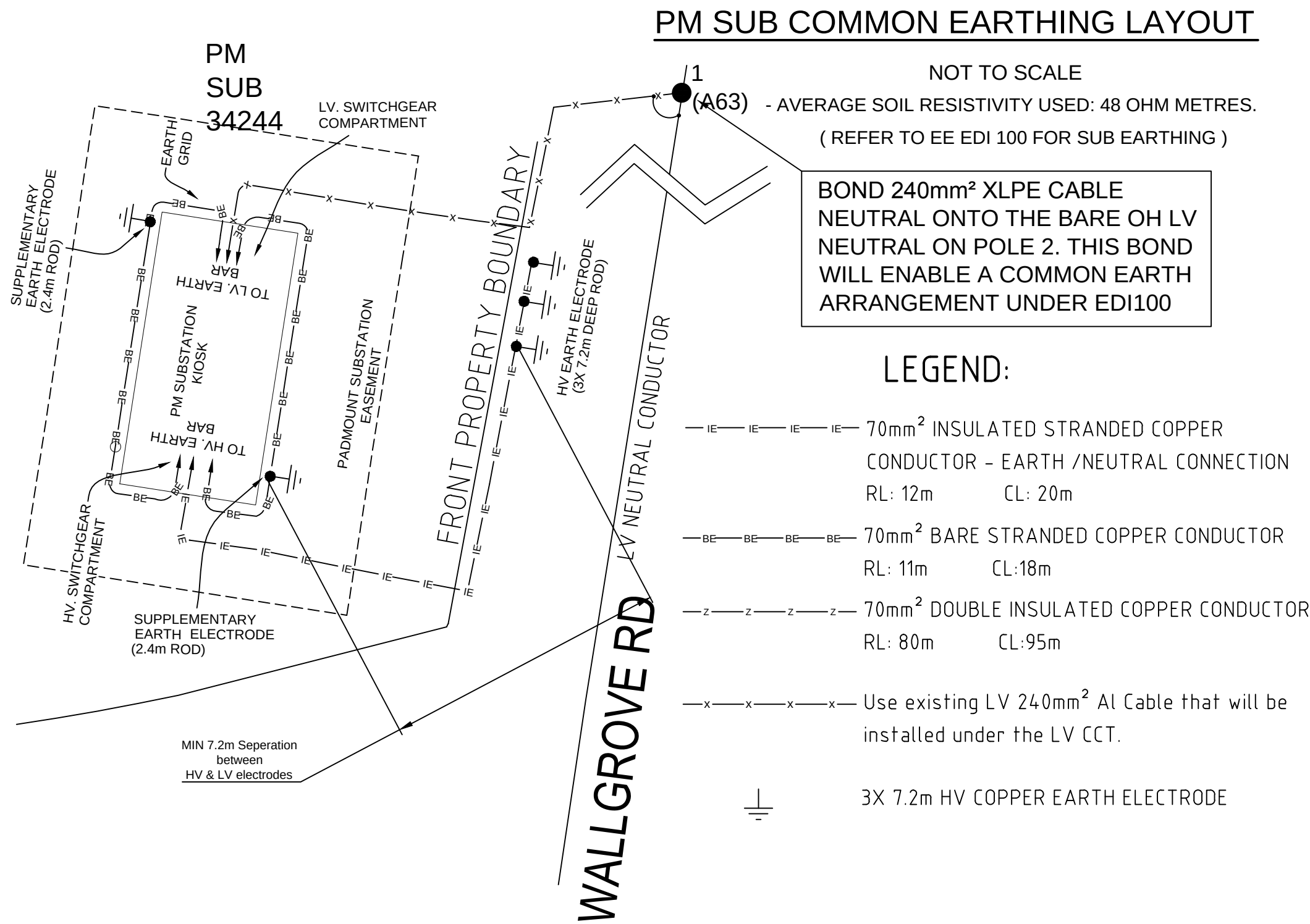
2	New	L1	A63	250W SHP WP IE (ANNUITY)	1540517	1	???	Wood Pole	IE/B5	/	1	???	B5 Bracket	IEB5	???	5°	V3	Blacktown City Council(100%)
1	New	L2,L3,L4,L5,L6,L7,L8,L9,L10,L11		250W SHP COL IE (LEGACY)	1540517	10	???	12m Eden EB	IE10.01A	Type 2/	10	???	4.5m Outreach Major Road	IE4.5PCS	????	5°	V3	Blacktown City Council(100%)
ITEM ID	STATE	NEW	EXISTING	DESCRIPTION	PART NO	QTY	RATE CODE	DESCRIPTION	PART NO	FOOTING (BOLT/FOUNDATION)	QTY	RATE CODE	DESCRIPTION	PART NO	RATE CODE	UPCAST	CATEGORY	CHARGE TO
		SL NUMBER	SUPPORT NUMBER	LUMINAIRE			COLUMN/POLE				BRACKET/OUTREACH							
LIGHTING EQUIPMENT SCHEDULE																		

AMENDMENTS ORIGINAL ISSUE	PRELIMINARY ONLY. NOT FOR CONSTRUCTION	 IGS INTEGRATED GROUP SERVICES	 Endeavour Energy	60 WALLGROVE RD EASTERN CREEK ARP2326 INSTALL PM SUB 3424.4 & HV CABLE WORKS FROM HUNTINGWOOD ZONE SUB. REMOVE OH MAINS FROM POLE 1 TO POLE 4 (UNDER 33KV OH)	 Endeavour Energy	A1 404473 A	SHEET No 4 OF 7 SHEETS	39247	1	2	3	4	5	6	7	8	9	10	11	12

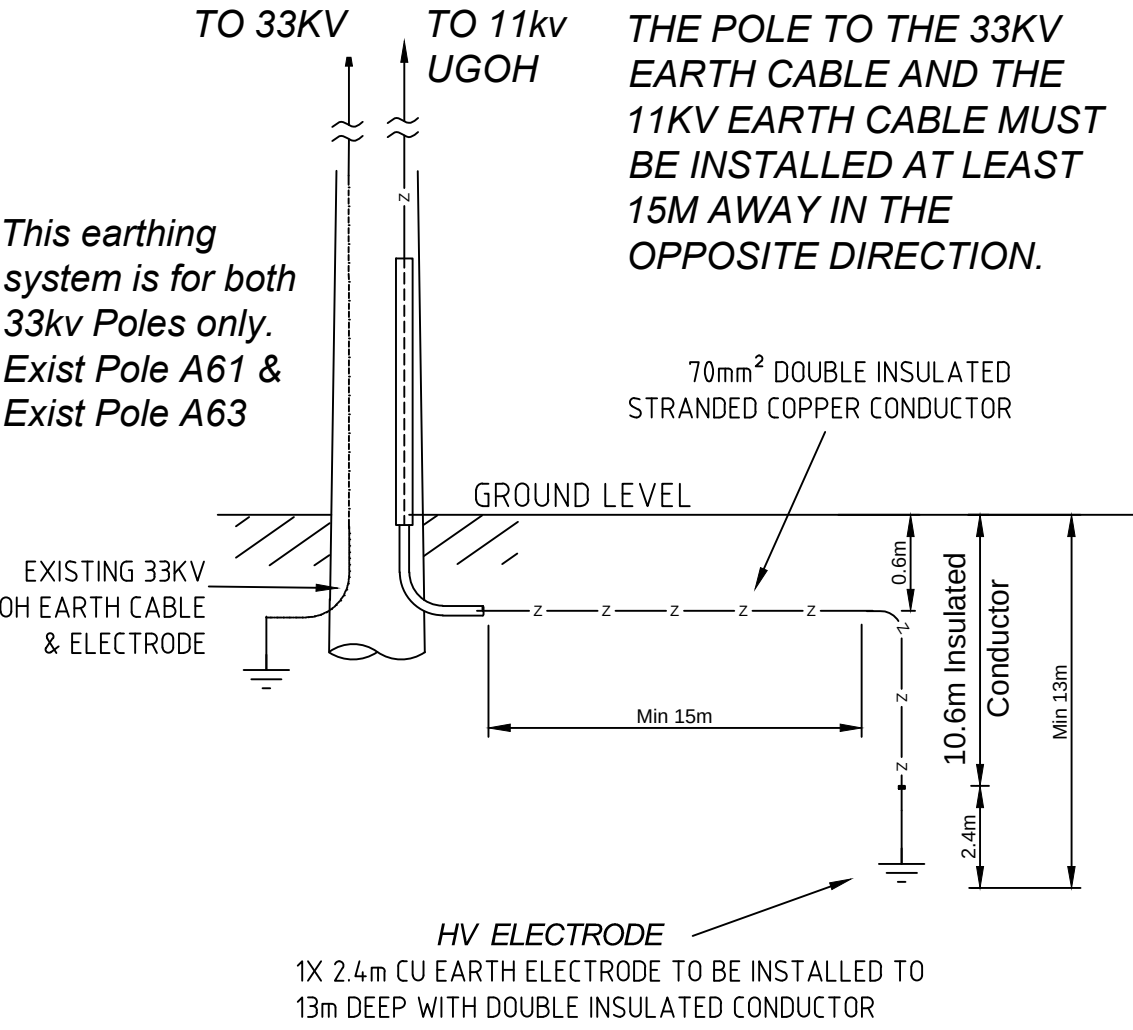




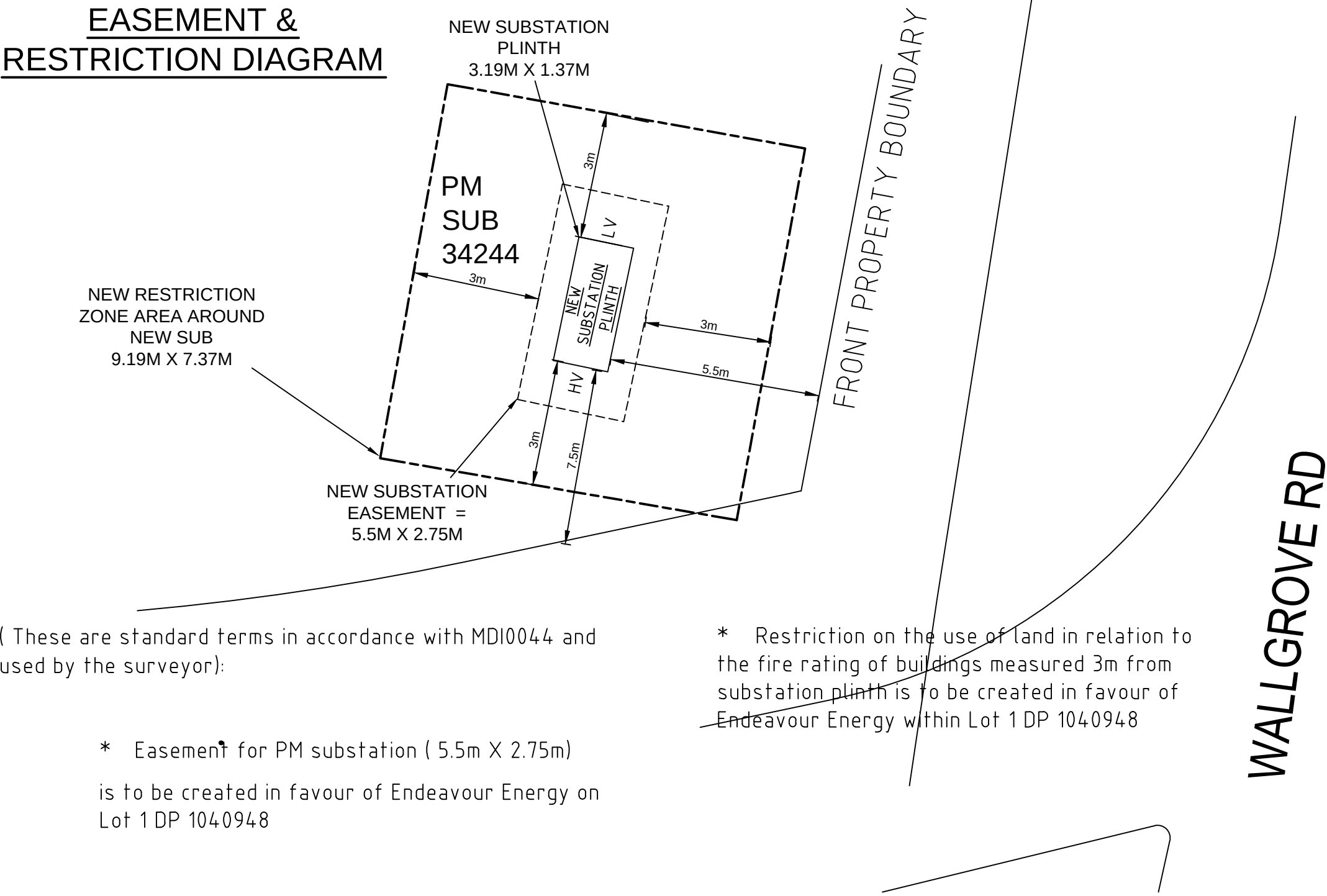
NOTES:
Refer to sheet 1 for all information/notes regarding the entire project.



EARTHING DIAGRAM FOR HV UG/OH



EASEMENT & RESTRICTION DIAGRAM



Earthing data to be capture to GIS	
Substation No.	34244
Installation Type	Underground
Earthing System Type	Common
Soil Resistivity Average in Ohms	48 ohm metres
HV Separate Earthing Grid Resistance (Separate Earthing Only)	N/A
Size / No. of HV Electrodes (Separate Earthing Only)	N/A
LV Separate Earthing Grid Resistance (Separate Earthing Only)	N/A
Size / No. of LV Electrodes (Separate Earthing Only)	N/A
Combined Earth Resistance in Ohms (For Common Earthing)	0.34 Ohm
Size / No. of Combined Electrodes (Common Earthing)	3X 7.2M Electrodes
Size / No. of the Supplementary Electrode	2X 2.4M Electrodes
Bonding Conductor Size in mm2 (Insulated / Bare)	70mm ² BARE
Connection Type (CAD or Crimp)	Crimp
Ambient Temperature / Weather Condition	28 deg C
Date of Soil Test	9/12/2015
Insulated depth from Ground Level (in Metres)	12 (m)
Length of MEN Connection Cable (in Metres)	40 (m)
Total length of Earth Electrode System Cable (incl. Insulated & Bare in Metres)	78 (m)
Measured Earth Resistance in Ohms (to be measured by L1 ASP on commissioning)	0.035 Ohm

**PRELIMINARY ONLY.
NOT FOR CONSTRUCTION**



© THIS DRAWING AND THE COPYRIGHT THEREIN IS THE PROPERTY OF ENDEAVOUR ENERGY AND MAY NOT BE COPIED, REPRODUCED, OR DISTRIBUTED LOANED OR USED WITHOUT THE WRITTEN CONSENT OF ENDEAVOUR ENERGY

REFERENCE DRAWING'S		WORK ORDERS	
		GENERAL	
		OVERHEAD	
		UNDERGROUND	
		SUBSTATIONS	

CAP / SAMP No.	ARP2326
AM PROJ. No.	
HV SWITCHING	
UBD/PENGUIN REF	187 G10
GIS MAP No	
HV OP DIAGRAM	HUNTINGWOOD
LOCAL GOV AREA	BLACKTOWN

ORIGINAL SCALE	1:1000
DRAWN	JF
DATE	4/12/14
CH'D	

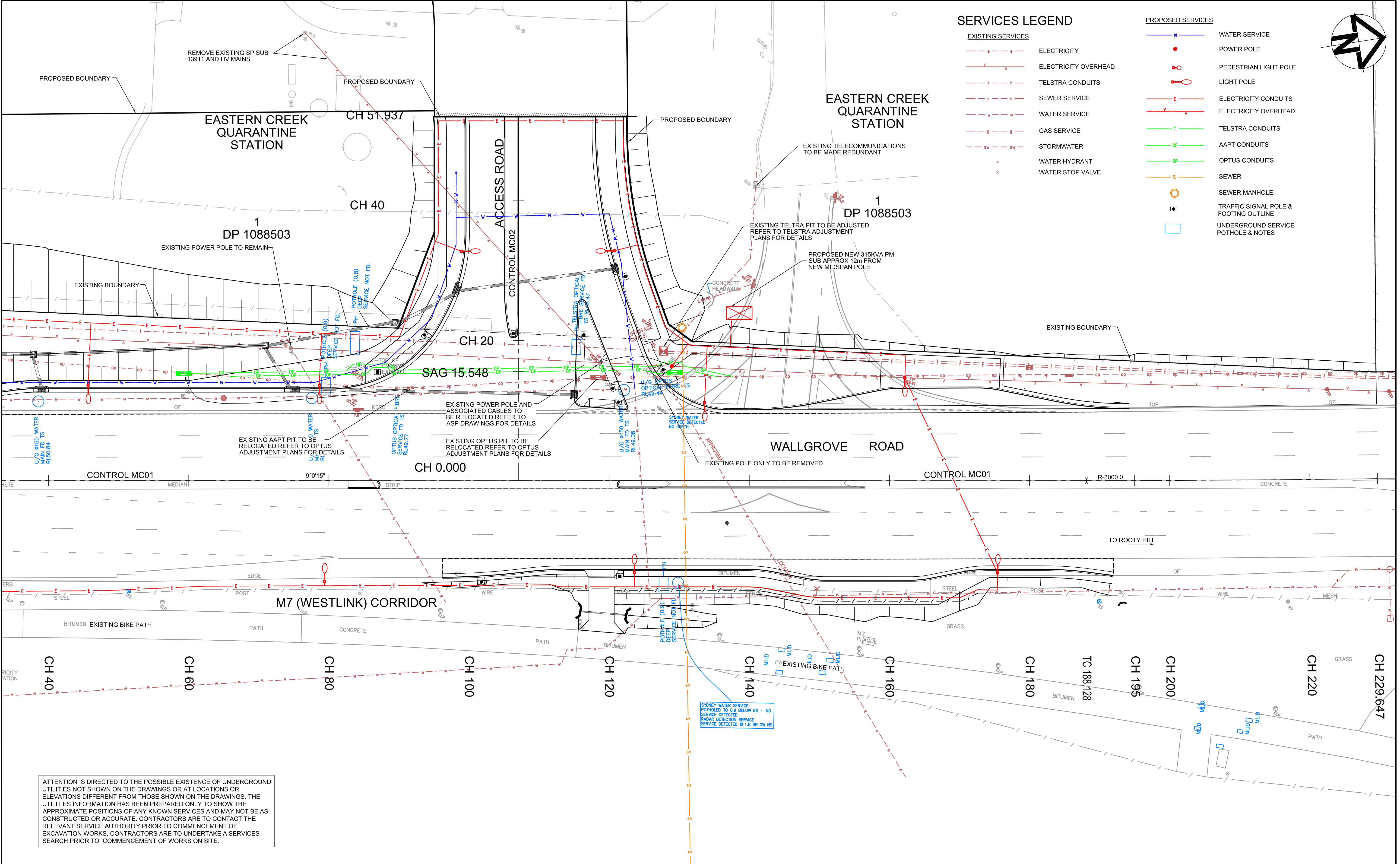
DO NOT SCALE	DIMENSIONS IN METRES
DESIGN	JF

60 WALLGROVE RD
EASTERN CREEK
ARP0236
INSTALL PM SUB 34244 & HV CABLE WORKS
FROM HUNTINGWOOD ZONE SUB.
REMOVE OH MAINS FROM POLE 1 TO POLE 4 (UNDER 33KV OH)

Endeavour Energy

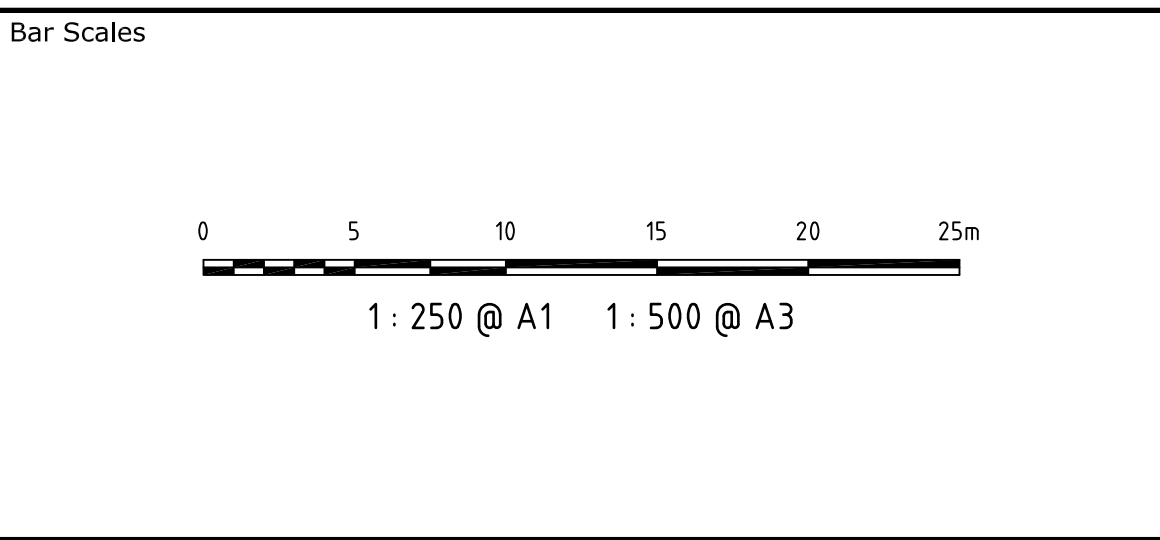
A1 404473 A

SHEET No 7 OF 7 SHEETS



ATTENTION IS DIRECTED TO THE POSSIBLE EXISTENCE OF UNDERGROUND UTILITIES NOT SHOWN ON THE DRAWINGS OR AT LOCATIONS OR ELEVATIONS DIFFERENT FROM THOSE SHOWN ON THE DRAWINGS. THE UTILITIES INFORMATION HAS BEEN PREPARED ONLY TO SHOW THE APPROXIMATE POSITIONS OF ANY KNOWN SERVICES AND MAY NOT BE AS CONSTRUCTED OR ACCURATE. CONTRACTORS ARE TO CONTACT THE RELEVANT SERVICE AUTHORITY PRIOR TO COMMENCEMENT OF EXCAVATION WORKS. CONTRACTORS ARE TO UNDERTAKE A SERVICES SEARCH PRIOR TO COMMENCEMENT OF WORKS ON SITE.

Issue	Description	Date
D	RE-ISSUED FOR RMS APPROVAL	08-05-15
C	RE-ISSUED FOR RMS APPROVAL	30-01-15
B	RE-ISSUED FOR RMS APPROVAL	15-12-14
A	ISSUED FOR RMS APPROVAL	31-10-14



THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L

Client

Scales	1:250
Grid	
Height Datum	
RMS Plan Registration Number	DS2014/006429

Project

PROPOSED INTERSECTION WALLGROVE ROAD

Title

UTILITIES RELOCATION AND CO-ORDINATION PLAN SHEET 1

Civil Engineers and Project Managers

Suite 702, 154 Pacific Hwy
St Leonards NSW 2065
ABN 96 130 882 405
Tel: 02 9439 1777
Fax: 02 9460 8413
www.atl.net.au
info@atl.net.au

Status	FOR APPROVAL	A1
Drawing No.	C054	Issue
Project No.	12-108	D