Energy from Waste (EFW) Plant, Eastern Creek

Development Application - Civil Infrastructure

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The design described in this report is considered to have been finalised.

Signature	**Date**
Andrew Tweedie Civil Engineer (Author)	24/02/2015
Mark Marsic Lead Designer	24/02/2015
Anthony McLandsborough Director	24/02/2015

Notes: The finalisation signatures shown above do not provide evidence of approval to the design. Approval signatures are shown on the title sheet of the design plans.

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1 PROJECT DESCRIPTION

The proposed development involves the construction of an Energy from Waste (EFW) electricity generation plant for The Next Generation NSW Pty Ltd (TNG) in Eastern Creek approximately 36km west of the Sydney CBD.

The development involves the construction and operation of an Electrical Generation Plant, which will allow for unsalvageable and uneconomic residue waste from the Genesis Xero Material Processing Centre (MPC) and Waste Transfer Station (WTS) to be used for generation of electrical power. The EFW Plant is proposed to be located on Lots 2 and 3, DP 1145808.

This development site is part of a proposal to construct and operate an Energy from Waste Plant using as fuel, residual waste which would otherwise be land filled, to allow for a "green" electricity generation facility. The plant, powered by burning non-recyclable combustible waste material, will have a capacity for up to 1.35 million tonnes of waste material per annum, as follows:

The residual waste will be sourced from the neighbouring Genesis Facility and will enter the site via conveyor and private under pass culvert as well as from third parties via the public road network.

The proposed EFW Facility will provide employment of a total of up to 55 staff upon operation, working over 3 shifts (i.e. not on site at any one time)

The project is identified as State Significant Development (SSD) under Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011 being:

Cl. 20 Electricity generating works and heat or co-generation:

Development for the purpose of electricity generating works or heat or their co-generation (using any energy source, including gas, coal, biofuel, distallate, waste, hydro, wave, solar or wind power) that:

(a) has a capital investment value of more than $30 million, or
(b) has a capital investment value of more than $10 million and is located in an environmentally sensitive area of State significance

The proposal has a capital investment value of greater than $30 million and therefore is classified as a SSD.

The site which is accessed off Honeycomb Drive at Eastern Creek is surrounded by land owned by ACN 114 843 453 Pty Ltd and ThaQuarry Pty Ltd, Australand, Hanson, Jacfin, the Department of Planning and Infrastructure and Sargents. All the surrounding land is earmarked under the "Western Sydney Employment Area State Environmental Planning Policy" (WSEA SEPP) to be redeveloped for higher end industrial and employment uses over the next decade. Refer to Figure 1 for site location plan.

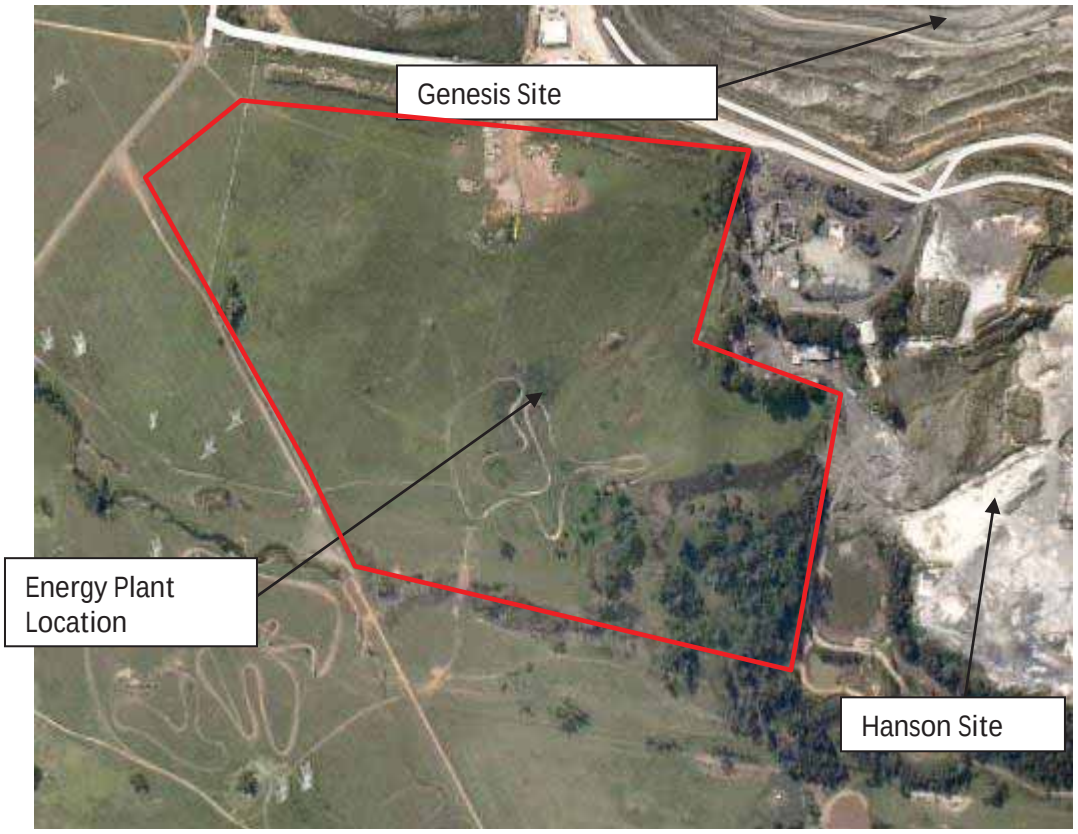


Figure 1 - Site Location Plan

The site has a total area of approximately 56 Ha including the Riparian Corridor, with a specific development area circa 9Ha.

The proposed works will, in addition to the Energy from Waste Electricity Generation Facility, include the adoption of a plan of subdivision and the following ancillary works:

- Earthworks associated with the balance of the site
- Internal roadways;
- Provision of a direct underpass connection (Precast Arch and Conveyor Culvert) between TNG Facility and the Genesis Xero Waste Facility;
- Staff amentities and ablutions;
- Staff carparking facilities;
- Water detention and treatment basins;
- Services (Sewerage, Water Supply, Communications, Power Supply)

Further to the above physical works associated with the proposed Energy from Waste Facility, this application seeks approval for the subdivision Lot 1, 2 and 3 in DP 114805 in order to create additional lots to allow for future development of land not associated with the Energy from Waste Facility and the Genesis Xero Material Processing Plant.

2 INTRODUCTION

AT&L have been engaged by TNG to undertake the Civil Design for the Development Application for the new Energy from Waste (EFW) electricity generation plant.

This report should be read in conjunction with the following AT&L Development Applications 14-187 drawings dated February 2015:

C000	COVER SHEET AND LOCALITY PLAN
C001	NOTES AND LEGENDS
C002	GENERAL ARRANGEMENT PLAN
C003	TYPICAL SECTIONS SHEET 1
C004	TYPICAL SECTIONS SHEET 2
C005	TYPICAL SECTIONS SHEET 3
C006	TYPICAL SECTIONS SHEET 4
C007	ESTATE ROAD TYPICAL SECTIONS AND DETAILS
C009	BULK EARTHWORKS CUT AND FILL PLAN
C010	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 1 OF 7
C011	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 2 OF 7
C012	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 3 OF 7
C013	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 4 OF 7
C014	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 5 OF 7
C015	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 6 OF 7
C016	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 7 OF 7
C020	ESTATE ROAD LONGITUDINAL SECTIONS SHEET 1 OF 3
C021	ESTATE ROAD LONGITUDINAL SECTIONS SHEET 2 OF 3
C022	ESTATE ROAD LONGITUDINAL SECTIONS SHEET 3 OF 3
C030	PAVEMENT PLAN
C040	EROSION AND SEDIMENTATION CONTROL
C041	EROSION AND SEDIMENTATION CONTROL DETAILS

Summary

This report generally covers the following items:

- Stormwater Management
  - On Site Detention (OSD)
  - Piped and Overland Flows
  - Water Sensitive Urban Design (WSUD)
  - Sedimentation and Erosion Control
- Review of Flooding
- Services Infrastructure
- Road / Car Park and Pavement

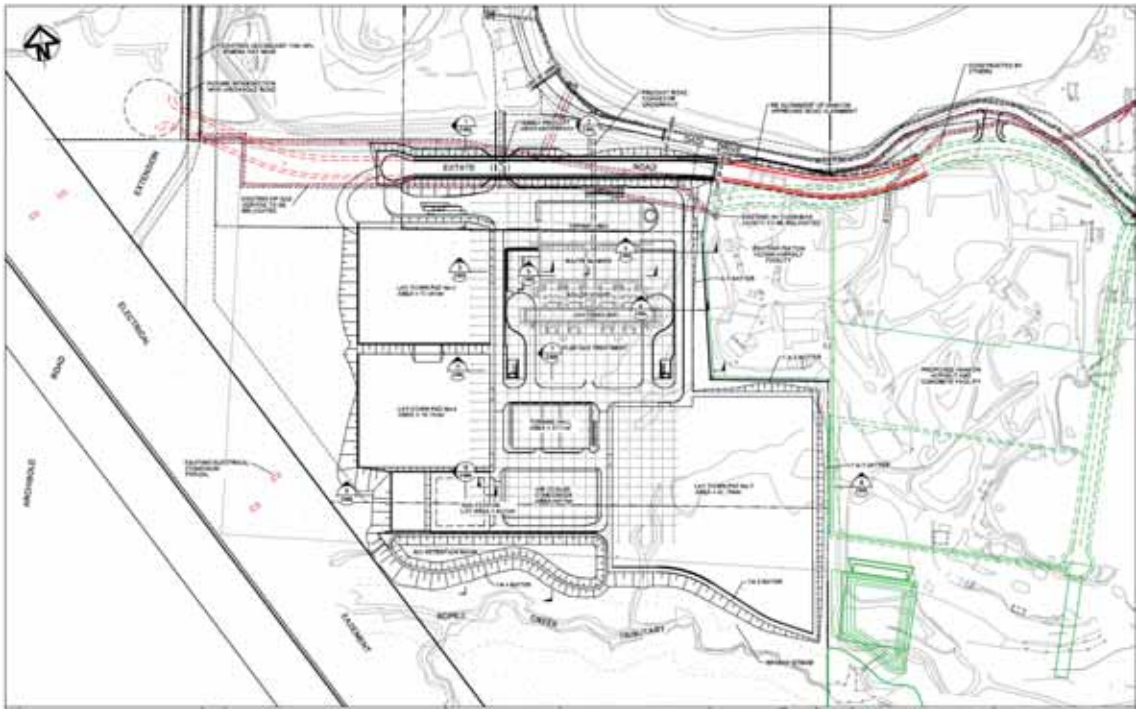


Figure 2 - Site Plan

3 STORMWATER MANAGEMENT

3.1 The Site

The subject site is legally described as Lots 2 and 3 in DP 1145808. The developed site approximately 21.4Ha in area and is located within the Blacktown City Council Local Government area (LGA).

The site is currently undeveloped and classified as a "Greenfield" site. The site generally falls from the north east corner at RL78.99 down to the south west corner at RL 54.2 adjacent a Ropes Creek tributary to the south of the development. This tributary drains to the west of the site and connects into Ropes Creek. It should be noted there is a 40m riparian zone over this tributary creek (measured 20m either side from the top of bank). Refer to Civil drawings as mentioned in Section 2 for the riparian zone boundary.

It is proposed to drain all stormwater from the development into the tributary creek to the south of the site via a bio-retention basin.

3.2 Council Requirements

As the site falls within the Blacktown City Council LGA the civil and stormwater design principles have been designed to comply with the BCC Engineering Guide for Development. Confirmation was received from Blacktown City Council that the On Site Detention calulcations for this area should confirm with the Blacktown City Council Stormwater Management SEPP 59- Eastern Creek Precinct Plan (Stage 3). The area of the site falls within the Ropes Creek Tributary Catchment as indicated in Figure 10 of the SEPP 59-Eastern Creek Precinct Plan.

A summary of Council requirements adopted for this catchment is as follows:

"Detention Basins and wetlands:

- *Will need to include appropriate safety features, especially with regard to edge treatments*
- *Shall be designed to prevent induced salinity*
- *Shall be sized to attenuate peak flows to a maximum of rural flows over a range of storms from the critical 2 year ARI event up to and including the critical 100 year ARI event*
- *Shall be sized to limit pollutant export loads to the levels specified in the water quality section of this Precinct Plan*

The detention basins shall be designed to attenuate flows to a maximum of the rural flowrates. This shall be addressed over a range of storms from the 2 year ARI to the 100 year ARI. The objective of this is to achieve a more natural flow regime in the creek systems as well as providing flood attenuation in major flood events (the attenuation of flows may be assisted with the incorporation of WSUD techniques). The affects of the PMF on the basin shall be assessed and measures

prepared to avoid catastrophic failure. Where required the basins shall be referred to the Dam Safety Committee for assessment.

- 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. 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*.

4 HYDRAULICS & HYDROLOGY

4.1 General Design Principles

DRAINs modelling software has been used to calculate the Hydraulic Grade Line (HGL) of the stormwater system. DRAINs model is 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 rations 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

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 375mm 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)

As mentioned within Section 3.2 Blacktown City Council have confirmed the OSD for this site should be designed to comply with the Blacktown City Council Stormwater Management SEPP 59 – Eastern Creek Precinct Plan (Stage 3)As a result the following OSD parameter and conditions apply to this development

The detention basin will be designed to attenuate peak flows to a miximum rual flows over a range of storms from the critical 2 year ARI event up to and including the critical 100 year ARI event.

This OSD will be achieved by the construction of an open basin to the south of the site. All stormwater generated from site will discharge into this basin.

The discharge from the basin will be controlled with a pit and pipe structure and designed to ensure the maximum PSD is not exceeded for all storms up to the 100 year ARI event. This outlet pipe will discharge into the creek via a headwall and energy dissipater. Refer to Civil drawings for all outlet details.

It should be noted the OSD basin will be positioned outside the riparian zone of the Ropes Creek tributary.

Results

The results of the drains model indicate the following targets are achieved:

- Actual Maximum combined discharge (100 year ARI event) = 2,220 L/s
- Actual Minimum combined OSD volume = 10,010m^3 (Capacity of the Basin from Base of Basin RL 55.85 to Weir of Basin RL 57.8 AHD)

The OSD achieves mitigation of peak flows for the 2 year, 10 year, 20 year and 100 year ARI for the discharge out of basin. (*See table 2*)

Duration	2 YR ARI (m^3/s)		10 YR (m^3/s)		20 YR ARI (m^3/s)		100 YR ARI (m^3/s)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
	2.4	1.7	4.97	2.1	5.90	2.13	7.95	2.22

Table 2- Pre-Post Developed Flows (With OSD)

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.

Flood modeling carried out by Brown Consulting in March 2010 for Blacktown City Council form the basis of the existing flood levels for the creek to the south of the site. The 100 year ARI flood level determined in this Brown Report adjacent to the

proposed basin has been adopted as the tailwater level for hydraulic modeling of the basin and stormwater network. This level has been assigned as 52.8m AHD. Refer to Brown Report within Appendix C.

A Stormwater Management Report carried out by Storm_Consulting in November 2008 titled "Site Surface Water Management Plan" also forms the basis to determine existing overland flows from external catchments. This Storm_Consulting report discusses stormwater management for the ThaQuarry site to the north and north east of the TNG site.

A review of this Storm-Consulting report indicates the OSD basins within the AN 114 843 453 Pty Ltd and ThaQuarry Pty Ltd site compensate for 100 year storm events from their site. It is also evident overland flows from this site do not affect the TNG site as runoff is directed to the west into the adjacent Ropes Creek. The construction of the new access road to the north of the TNG will also prevent overland flows from the north affecting the site. Overland flows will be directed to the west into the adjacent Ropes Creek.

4.4 Water Sensitive Urban Design (WSUD)

4.4.1 Policy and Guidelines

Water Sensitive Urban Design encompasses all aspects of urban water cycle management, including water supply, wastewater and stormwater management. WSUD is intended to minimise the impacts of development upon the water cycle and achieve more sustainable forms of urban development.

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)
- Blacktown City Council Stormwater Quality Control Policy (2001, reviewed 2009)
- Landcom Water Sensitive Urban Design Policy (2009)
- Blacktown City Council Stormwater Management SEPP 59 – Eastern Creek Precinct Plan (Stage 3)

4.4.2 MUSIC Analysis

The MUSIC Model for Urban Stormwater Improvement Conceptualisation (MUSIC, Version 5.00.10) was used to evaluate pollutant loads from the developed site for Post-development (treated) conditions based on the proposed site development.

A conceptual view of the MUSIC model used in this report can be found in Appendix B.

4.4.3 Catchment Areas and MUSIC Parameters

All building lot catchment areas were assumed to be 50% roofed. Of the non-roofed areas, 80% of this area was assumed to be impervious. To provide a more accurate model, separate catchment nodes were created to simulate the roofed area and non-roofed areas for each lot.

MUSIC model input parameters for these catchments including rainfall-runoff, base flow concentration and stormflow concentration parameters were selected as per the Draft MUSIC Modelling Guidelines for New South Wales. The parameters used for the various catchment areas can be seen in tables 4, 5, 6 and 7.

Rainfall-Runoff Parameters

Parameter	Unit	Figure
Rainfall Threshold	mm/day	1.40
Soil Storage Capacity	Mm	170
Initial Storage	% of Capacity	30
Field Capacity	Mm	70
Infiltration Capacity Coefficient	a	210.0
Infiltration Capacity Coefficient	b	4.7
Initial Depth (Ground Water)	mm	10
Daily Recharge Rate	%	50.00
Daily Baseflow Rate	%	5.00
Daily Seepage Rate	%	0.00

Table 3 - Rainfall-Runoff Parameters - All Catchment Areas

Base Flow/Stormflow Concentration Parameters – Impervious (Roofed) Areas

Pollutant	Baseflow Concentration Parameter – Mean (log mg/L)	Baseflow Concentration Parameter – Std Dev (log mg/L)	Stormflow Concentration Parameters – Mean (log mg/L)	Stormflow Concentration Parameters – Std Dev (log mg/L)
TSS	0.000	0.000	1.300	0.320
Phosphorus	0.000	0.000	-0.890	0.250
Nitrogen	0.000	0.000	0.300	0.190

Table 4 - Base Flow/Stormflow Concentration Parameters - Impervious (Roofed) Areas

Base Flow/Stormflow Concentration Parameters – Pervious Areas

Pollutant	Baseflow Concentration Parameter – Mean (log mg/L)	Baseflow Concentration Parameter – Std Dev (log mg/L)	Stormflow Concentration Parameters – Mean (log mg/L)	Stormflow Concentration Parameters – Std Dev (log mg/L)
TSS	1.200	0.170	2.150	0.320
Phosphorus	-0.850	0.190	-0.600	0.250
Nitrogen	0.110	0.120	0.300	0.190

Table5 - Base Flow/Stormflow Concentration Parameter - Pervious Areas

Base Flow/Stormflow Concentration Parameters – Road

Pollutant	Baseflow Concentration Parameter – Mean (log mg/L)	Baseflow Concentration Parameter – Std Dev (log mg/L)	Stormflow Concentration Parameters – Mean (log mg/L)	Stormflow Concentration Parameters – Std Dev (log mg/L)
TSS	1.200	0.170	2.430	0.320
Phosphorus	-0.850	0.190	-0.300	0.250
Nitrogen	0.110	0.120	0.340	0.190

Table6 - Base Flow/Stormflow Concentration Parameters – Road

Parameters used for the Bioretention basin were based off guidelines

provided by FAWB – Stormwater Biofiltration Systems – Version 1, 2009, and were modified accordingly. Parameters used to model the bioretention basin are shown in the table 8 below.

Parameter	Unit	Figure
Extended Detention Depth	m	0.30
Surface Area	m^2	2000
Filter Area	m^2	1900
Unlined Filter Media Perimeter	M	0.01
Saturated Hydraulic Conductivity	mm/hour	125
Filter Depth	m	0.50
TN Content of Filter Media	mg/kg	900
Orthophosphate Content of Filter Media	mg/kg	30.0
Exfiltration Rate	mm/hour	0.00
Base Lined	-	Yes
Vegetation Properties	-	Effective Nutrient Removal Plants
Overflow Weir Width	m	10.00
Underdrain Present	-	Yes
Submerged Zone	-	No

Table 7 - Bioretention Basin Parameters

Results

Stormwater quality treatment for "the site" will ultimately be provided by the proposed WSUD biodiversity basin south of the site. A total surface area of **2,400m²** of the basin will be dedicated to bio-retention. Refer to MUSIC model within Appendix B.

MUSIC modellings results presented as mean annual loads at the receiving node indicate that adopted target reductions are achieved, as shown in Table 9.

Pollutant	Sources (Kg/yr)	Residual Load (Kg/yr)	Reduction (%)	Target Reduction (%)
Total Suspended Solids	146,000	141,000	87.4	85
Total Phosphorus	62.2	17.3	72.2	65
Total Nitrogen	39	166	51.1	45
Gross Pollutants	3800	0	100	90

Table 8 - Pollutant Loads- Combined

4.5 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.

5 FLOODING

Flood modeling carried out by Brown Consulting in March 2010 for Blacktown City Council form the basis of the existing flood levels for the creek to the south of the site. The 100 year ARI flood level determined in this Brown Report adjacent to the proposed basin has been adopted as the tailwater level for hydraulic modeling of the basin and stormwater network. This level has been assigned as 52.8m AHD. Refer to Brown Report within Appendix C.

Based on this modeling carried out by Browns, the proposed flood levels of the creek do not adversely affect the proposed site. Flood levels associated with the creek are at least 2m below the proposed finished levels of the site.

6 PROPOSED UNDERPASSES

Two underpasses are proposed to cross the estate road to provide private connectivity between the proposed TNG plant and the existing Genesis facility. These underpasses are described below;

- **Humes Precast Arch** will be constructed to allow for unimpeded vehicle access between the TNG and Genesis facilities. The arch proposed will be approx. 18m wide with 6m overhead clearance. The arch will be precast in nature with precast wing walls to suit the estate road over. During detailed design an alternative bridge structure may be design and constructed depending on the final construction costs.
- **Conveyor Culvert** will be constructed to allow for a conveyor to connect the Genesis plant to the TNG bunker. The culvert is proposed to be approx. 3.6m wide and 2.4m high and precast in nature. The final size, location and depth is subject to detailed design.

Initial discussions have been had with BCC regarding the ownership of the underpasses and the licenses and or deeds that will be required to operate the underpasses under a public roadway. TNG and BCC agreed to prepare draft agreements for review. These agreement will be prepared as part of the detail documentation stage.

7 INFRASTRUCTURE SERVICES

Services including sewer, water, power and telecommunication can be made available to the site.

Internal reticulation to be coordinated at the Construction Certificate (CC) stage of works.

7.1 Sewerage

There are no existing sewer mains within the area of the proposed development.

Sydney Water are proposing to construct the Ophir sewer carrier main which will be installed east of Ropes Creek to the west of the site. Discussions have been entered into with Sydney Water to construct the lead in sewer main from the TNG site to this carrier sewer.

7.2 Water Supply

There is an existing 375mm Ductile Iron Cement Lined (DICL) water main within the access road off Honeycomb Drive. This water main runs across the northern boundary of the site. It is assumed water for the site can be accessed from this main.

Refer to the existing water drawings within Appendix D.

7.3 Communications

From Dial Before You Dig records there does not appear to be any telecommunications cables adjacent the site. The closest telecommunications cables are within Honeycomb Drive to the east of the site. In order to service the site, extensions from this existing network will be required

Refer to existing Telstra drawings within Appendix D.

7.4 Power Supply

Existing electricity cables are located within Honeycomb Drive to the north of the site. It is assumed the power for the development can be connected to this supply.

Refer to existing electrical drawings within Appendix D.

7.5 Services to be Relocated

A number of services including Gas and High Voltage power will be affected by the works and will be relocated to suit proposed works. Initial discussions have commenced with the relevant Authorities regarding the design and relocation works. These discussions will continue once the DA is approved.

8 ROAD / CAR PARK DESIGN

8.1 Horizontal and Vertical Geometry

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

All roads have been designed generally in accordance with Australian Standards to accommodate B-Double truck movements.

8.2 Pavement

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

9 ESTATE ROAD DESIGN

The proposed estate road is intended to match the existing Honeycomb Road cross section. As shown below in Drawing C007.

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

10 CONCLUSION

Services including sewer, water, electrical and telecommunications can be made available to the site.

The relevant requirements as set out in Council's Guidelines are demonstrated to be achieved in the Civil Engineering design drawings and supporting reports.

A summary of the stormwater management strategy for the proposed development is as follows:

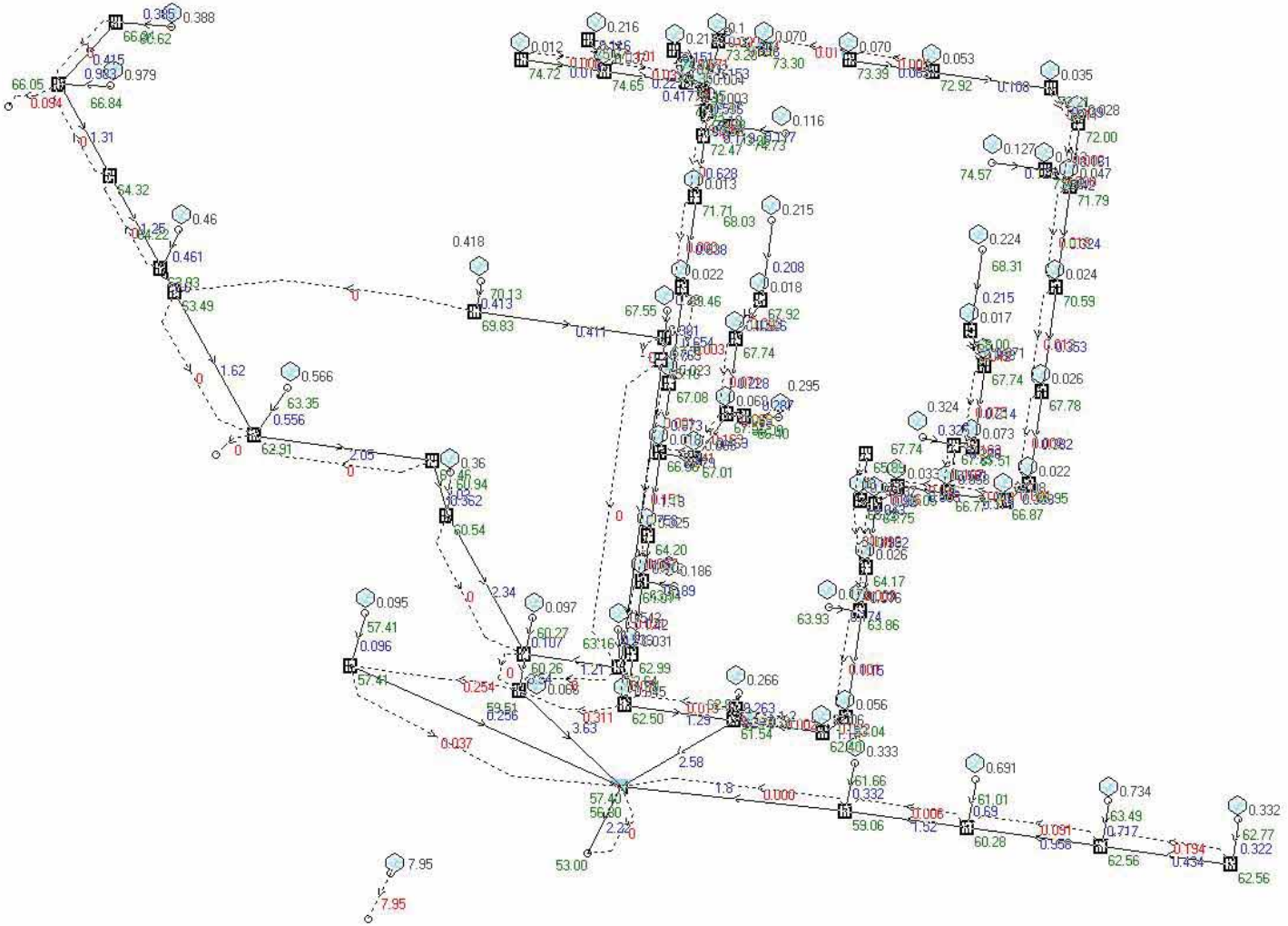
- The stormwater generated from site will drain to the south into a bio-retention basin to be detained and treated. A pit and pipe system will control the outflow to ensure post developed flows do not exceed pre developed flow for all storms up to the 100 year ARI events. An outlet from the basin will discharge into the existing Ropes Creek tributary to the south of the site

This report has demonstrated that a storm water system consistent with good management practices can be provided for the proposed development.

Appendix A

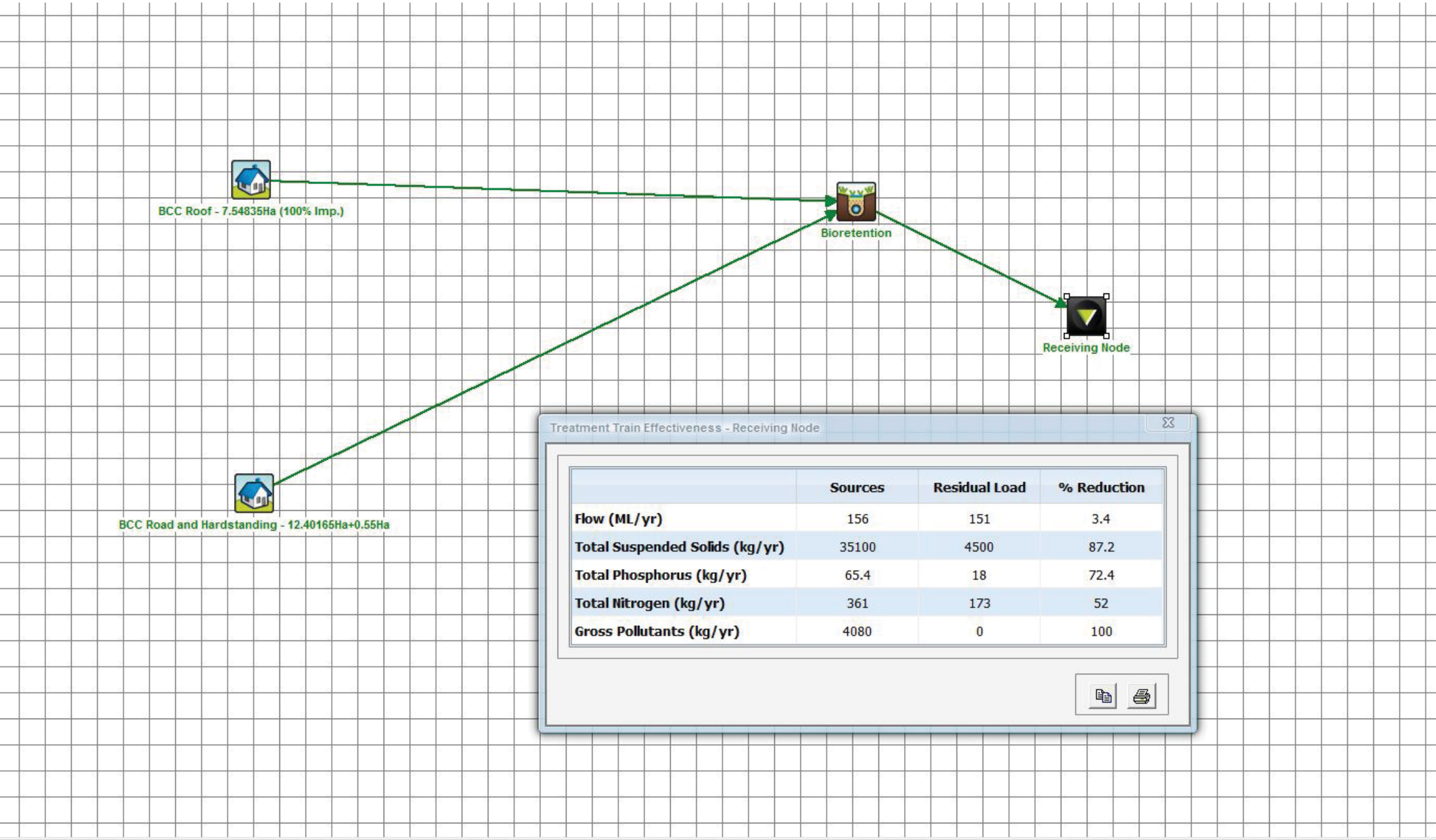
DRAINs Model

Worst case major storm



Appendix B

MUSIC Data and Results



Treatment Train Effectiveness - Receiving Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	156	151	3.4
Total Suspended Solids (kg/yr)	35100	4500	87.2
Total Phosphorus (kg/yr)	65.4	18	72.4
Total Nitrogen (kg/yr)	361	173	52
Gross Pollutants (kg/yr)	4080	0	100

Appendix C

Existing Flood Report for Blacktown City Council

file note

Contact	Dennis Bagnall
Author	Georg Eberl
Date	17 March 2010
Subject	SEPP 59 EASTERN CREEK ROPES CREEK TRIBUTARY CATCHMENT
File No	145-187-29
Follow up	

☐ Telephone ☐ Conference ☐ Conversation with

Ropes Creek Tributary Design Summary

1. Background

The design of stormwater infrastructure for this catchment was awarded to Brown Consulting NSW. Detailed site investigations were undertaken including survey and geotechnical investigations except for the Hanson owned site where permission to enter was not granted. Some information relating to general site conditions was provided by Hanson.

It is noted that the existing watercourse has been realigned within the land currently owned by Dial a Dump. It is Councils understanding that the watercourse is to be reinstated to generally its original alignment. Therefore, to determine existing conditions and riparian corridor locations, survey information and Council's ALS data pre-dating the creek realignment were used.

Council's adopted Precinct Plan specified minimum Core Riparian Zones of 40m from top of bank both sides plus 10m vegetated buffers. The zoning map in the WSEA SEPP have zoned the section of the watercourse immediately downstream of the SEPP59 precinct boundary (transmission easement) as environmental conservation with a total width of approximately 65m. To be consistent with the current WSEA SEPP, the total riparian zone width for this design has been set at approximately 30m from top of bank both sides.

This Study has been undertaken to identify and address various measures to mitigate the impact of development on downstream catchments from a stormwater quantity and quality perspective.

2. Study Objectives

The key objectives of the Study required the determination of:

- The volume of stormwater storage required in an earth-formed detention basin to prevent an overall increase in peak flows due to development up to the 100 ARI storm.
- The area of bio-filtration treatment required to remove pollutants from stormwater discharge to acceptable levels.

3. Methodology

XPRAFTS hydrologic model was prepared to represent the site catchment in the existing and developed conditions. The model was used to derive peak flows at critical locations and for determining the detention storage required to not exceed existing state total catchment peak flows.

Basic design parameters are generally as per Council standards and a summary of the catchment data for existing and proposed conditions is provided in Appendix A. Noted that were no initial and continuing losses are listed, Council's standard ARBM loss model values have been used.
The existing conditions flows are based on the assumed pre Quarry operations landform.

A MUSIC model was prepared for the site to model the developed state pollutant export from the catchment. The model was used to determine the areas of bio- filtration (vegetated swale and infiltration trench) required to reduce stormwater pollutants to acceptable levels as specified by Council's Stormwater Quality Control Policy.

4. Results

The table below shows the existing and developed peak flows together with mitigated peak flows due to detention basin at the outlet point for the site.

PEAK FLOWS AT OUTLET TO ROPES CREEK		
ARI	EXISTING	MITIGATED
Years	(m^3/s)	(m^3/s)
2	5.86	4.67
5	8.55	
10	9.94	
20	11.69	
50	13.15	
100	15.48	12.8

(Final model results will vary slightly due to refinement of discharge control from basin. Modelling does not include climate change impacts)

The storage volume required to achieve the mitigated peak flows was design not to exceed predevelopment flows along the full length of the study area. The estimated detention storages are summarised in the table below.

Stormwater Quality modelling was conducted using MUSIC. The proposed bio-retention areas listed in the table below are required to treat runoff from proposed future public roads and assumes full on lot treatment in accordance with Council's Stormwater Quality Control Policy requirements

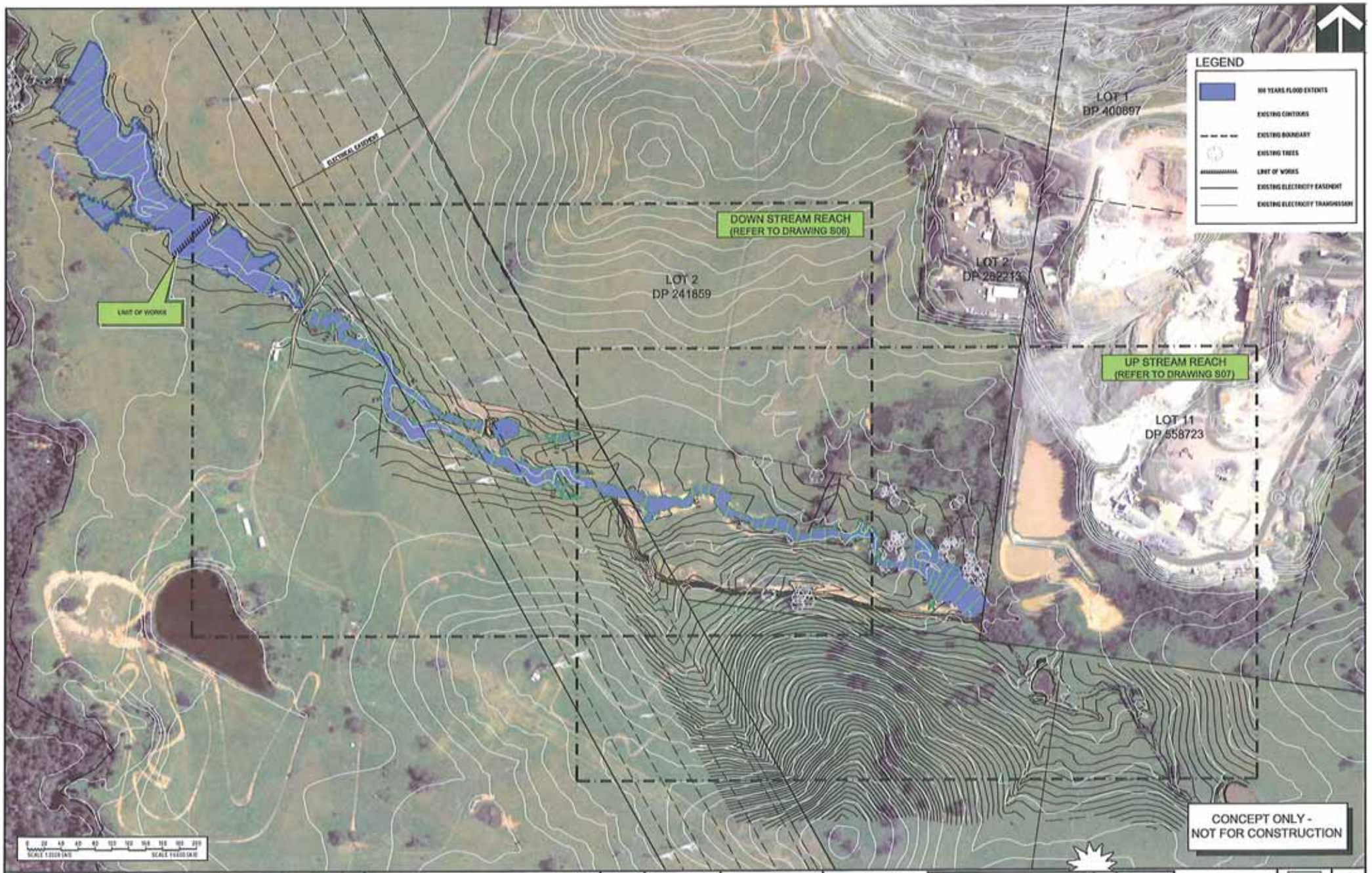
BASIN SUMMARY				
BASIN NAME	XPRAFTS NODE	PRIMARY OUTLET	STORAGE	BIO-RETENTION
			(m3)	(m2)
RC1.1	5.03 B3	1m Weir RL56.3	13700	600
RC2.1	4.02 B2	1.5m Weir RL58.3	20850	800
RC3.1	2.03 B1	2.4m Weir RL62.3	17940	1000

5. Conclusions

Results demonstrate that peak flows increase due to development but can be mitigated by detention basins with approximately 50,000 m^3 of detention storage. The required detention storage has been achieved by the concept stage detention basins as shown on the Concept Plan.

Water quality requirements have been achieved and a bio-retention rain garden area of 2400 m^2 will be incorporated in the detention basin during detail design.

Appendices – XPRAFTS output results



PREPARED BY:

BROWN

REV	DATE	DESCRIPTION	CHECKED	APPROVED	DATE
B	03.04.09	CLIENT REVIEW	PB	RP	03.04.09
A	23.12.08	CONCEPT DESIGN	PB	RP	23.12.08

PUBLIC UTILITIES LEGEND

WATER MAINS	GAS	TELSTRA	
HYDRANT	GAS VALVE	TELSTRA PIT	
STOP VALVE	ELECTRICITY	TELSTRA PILLAR	
WATER METER	ELECTRICITY PIT	TELSTRA POLE	
WATER TAP	POWER POLE		
SEWER	POWER LIGHT POLE		
SEWER LAMPHOLE	LIGHT POLE		
SEWER MANHOLE	STAY POLE		

DATUM	AHD
GRID	MGA
SHEET SIZE	A1
TITLE BLOCK VERSION	A
SURVEYED	CONICS
DESIGNED	PB
CADD	KT
VERIFIED	RP
DATE	DEC 08

APPROVED

MANAGER INVESTIGATION AND DESIGN

DATE

CLIENT

DATE

COUNCIL CHAMBERS 62 FLUSHCOMBE ROAD BLACKTOWN
ALL MAIL: GENERAL MANAGER PO BOX 63, BLACKTOWN NSW 2148
TELEPHONE: (02) 9839 6000 FAX: (02) 9831 7961
DX: 8117 BLACKTOWN

PROJECT TITLE: SEPP 59 EASTERN CREEK
ROPES CREEK TRIBUTARY

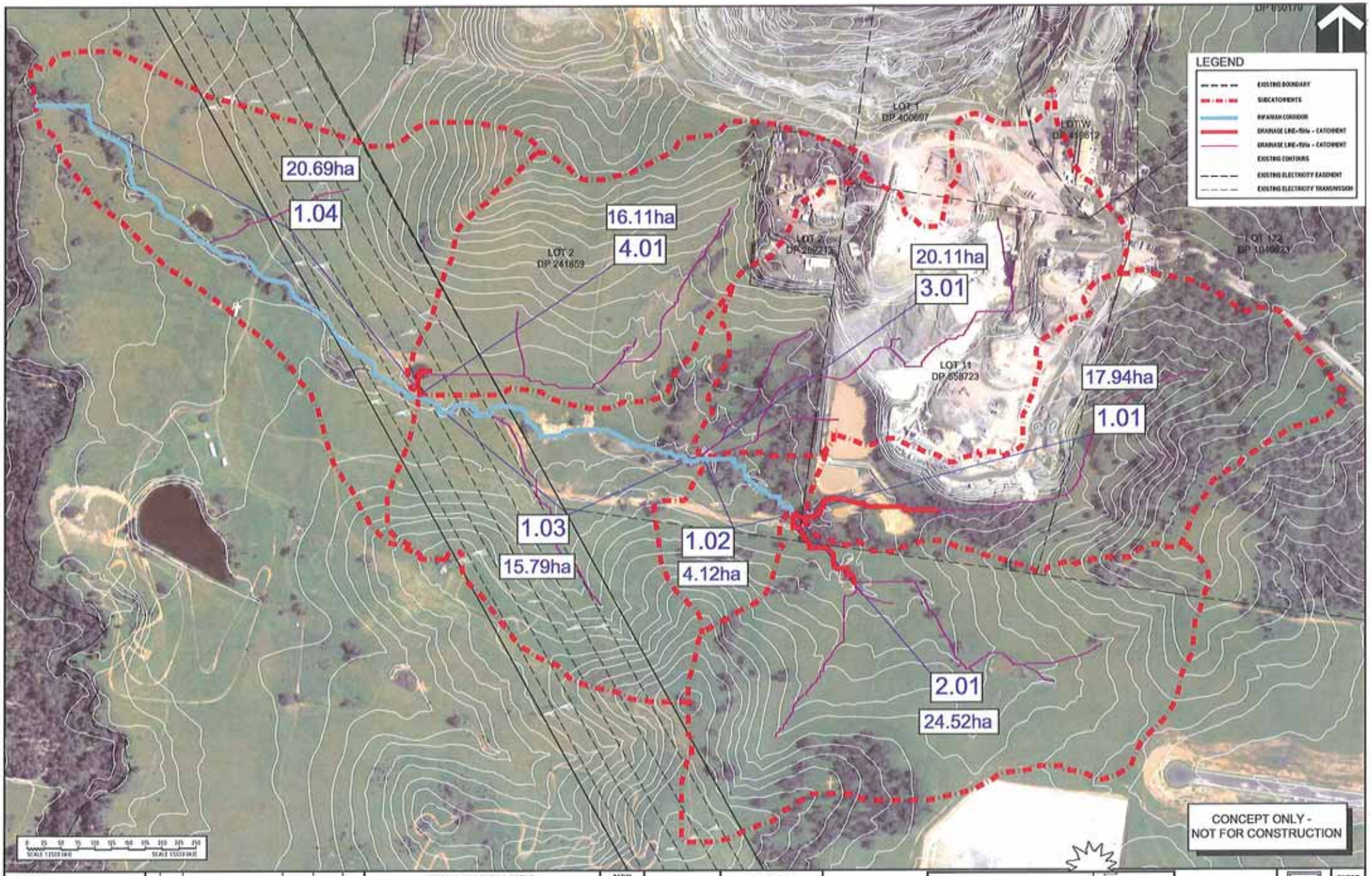
SHEET TITLE: PLAN SHOWING OVERALL SITE TOPOGRAPHY & CONSTRAINTS

CAD FILE:	FILE No:	DRAWING No:
X07083.D	152-121-QBI	X07083.D.00.01

INVESTIGATION AND DESIGN

SHEET 1 OF 3 SHEETS

REV B



PREPARED BY: BROWN

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B	02.04.09	CLIENT REVIEW	PB	RP	02.04.09
A	23.12.08	CONCEPT DESIGN	PB	RP	23.12.08

PUBLIC UTILITIES LEGEND

WATER MAINS	GAS	TELSTRA
HYDRANT	GAS VALVE	TELSTRA PIT
STOP VALVE	ELECTRICITY	TELSTRA PILLAR
WATER METER	ELECTRICITY PIT	TELSTRA POLE
WATER TAP	POWER POLE	
SEWER	POWER LIGHT POLE	
SEWER LAMPHOLE	LIGHT POLE	
SEWER MANHOLE	STAY POLE	

DATUM: AHD
GRID: MGA
SHEET SIZE: A1
TITLE BLOCK VERSION: A

SURVEYED: CONICS
DESIGNED: PB
CADD: KT
VERIFIED: RP
DATE: DEC 08

APPROVED
MANAGER INVESTIGATION AND DESIGN
DATE
CLIENT
DATE

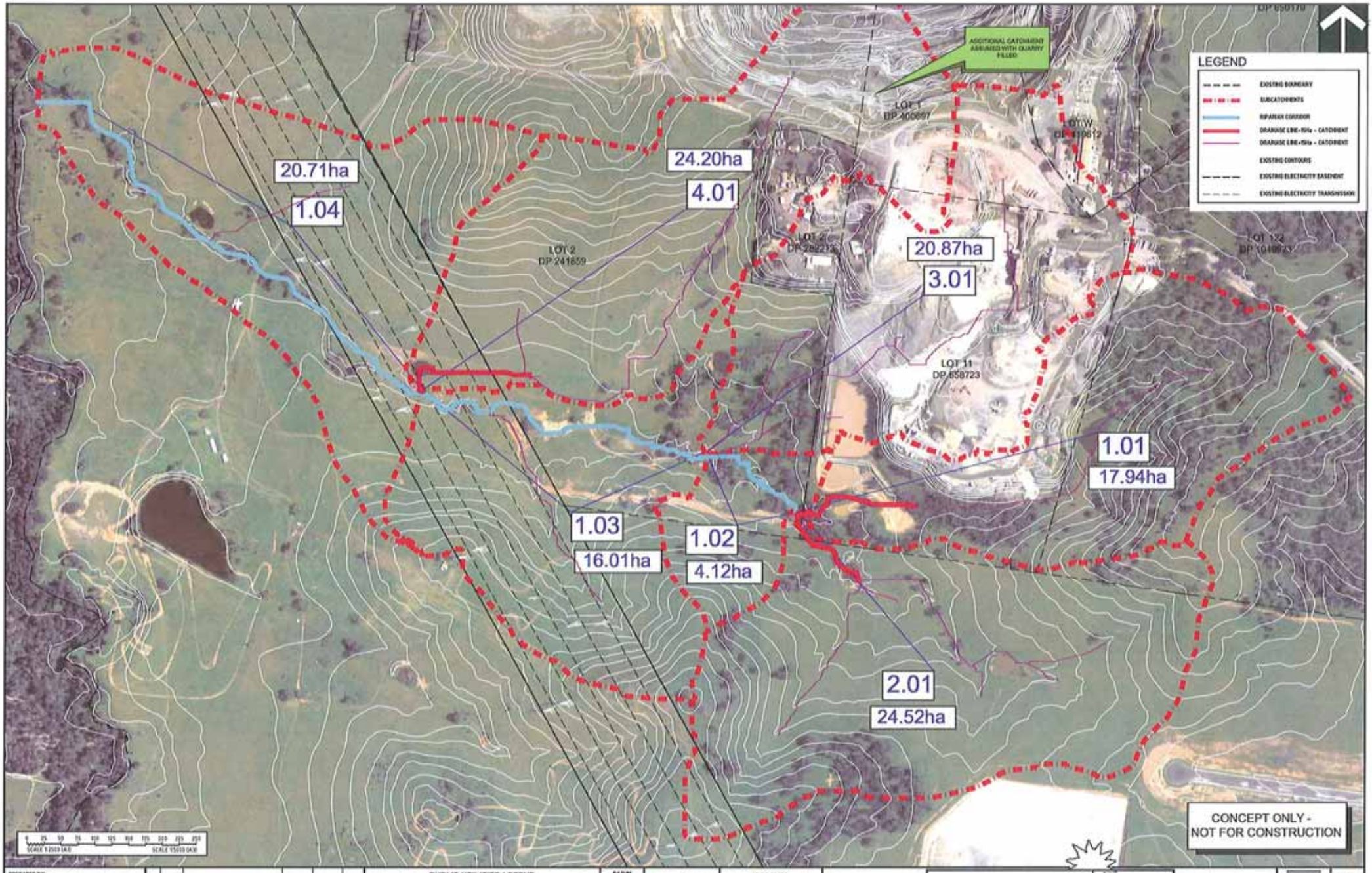
COUNCIL CHAMBERS 62 FLUSHCOMBE ROAD,BLACKTOWN
ALL MAIL: GENERAL MANAGER PO BOX 63, BLACKTOWN NSW 2148
TELEPHONE: (02) 9839 6000 FAX: (02) 9839 5961
DX: 8117 BLACKTOWN

PROJECT TITLE: SEPP 59 EASTERN CREEK
ROPES CREEK TRIBUTARY
SHEET TITLE: EXISTING CATCHMENT AREA PLAN WITH CURRENT LAND USE

CAD FILE: X07083.D
FILE No: 152-121-081
DRAWING No: X07083.D.00.02

INVESTIGATION AND DESIGN

SHEET 2 OF 3 SHEETS
REV B



PREPARED BY:

BROWN

REV	DATE	DESCRIPTION	CHECKED	APPROVED	DATE
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A	21.12.08	CONCEPT DESIGN	PB	RP	21.12.08

PUBLIC UTILITIES LEGEND

WATER MAINS	GAS	TELSTRA
HYDRANT	GAS VALVE	TELSTRA PIT
STOP VALVE	ELECTRICITY	TELSTRA PILLAR
WATER METER	ELECTRICITY PIT	TELSTRA POLE
WATER TAP	POWER POLE	
SEWER	POWER LIGHT POLE	
SEWER LAMPHOLE	LIGHT POLE	
SEWER MANHOLE	STAY POLE	

DATUM: AHD
GRID: MGA
SHEET SIZE: A1
TITLE BLOCK VERSION: A

SURVEYED: CONICS
DESIGNED: PB
CADD: KT
VERIFIED: RP
DATE: DEC 09

APPROVED
MANAGER INVESTIGATION AND DESIGN
DATE
CLIENT
DATE

COUNCIL CHAMBERS 62 FLUSHCOMBE ROAD BLACKTOWN
ALL MAIL: GENERAL MANAGER PO BOX 63, BLACKTOWN NSW 2148
TELEPHONE: (02) 9839 6000 FAX: (02) 9839 6900
DX: 8117 BLACKTOWN

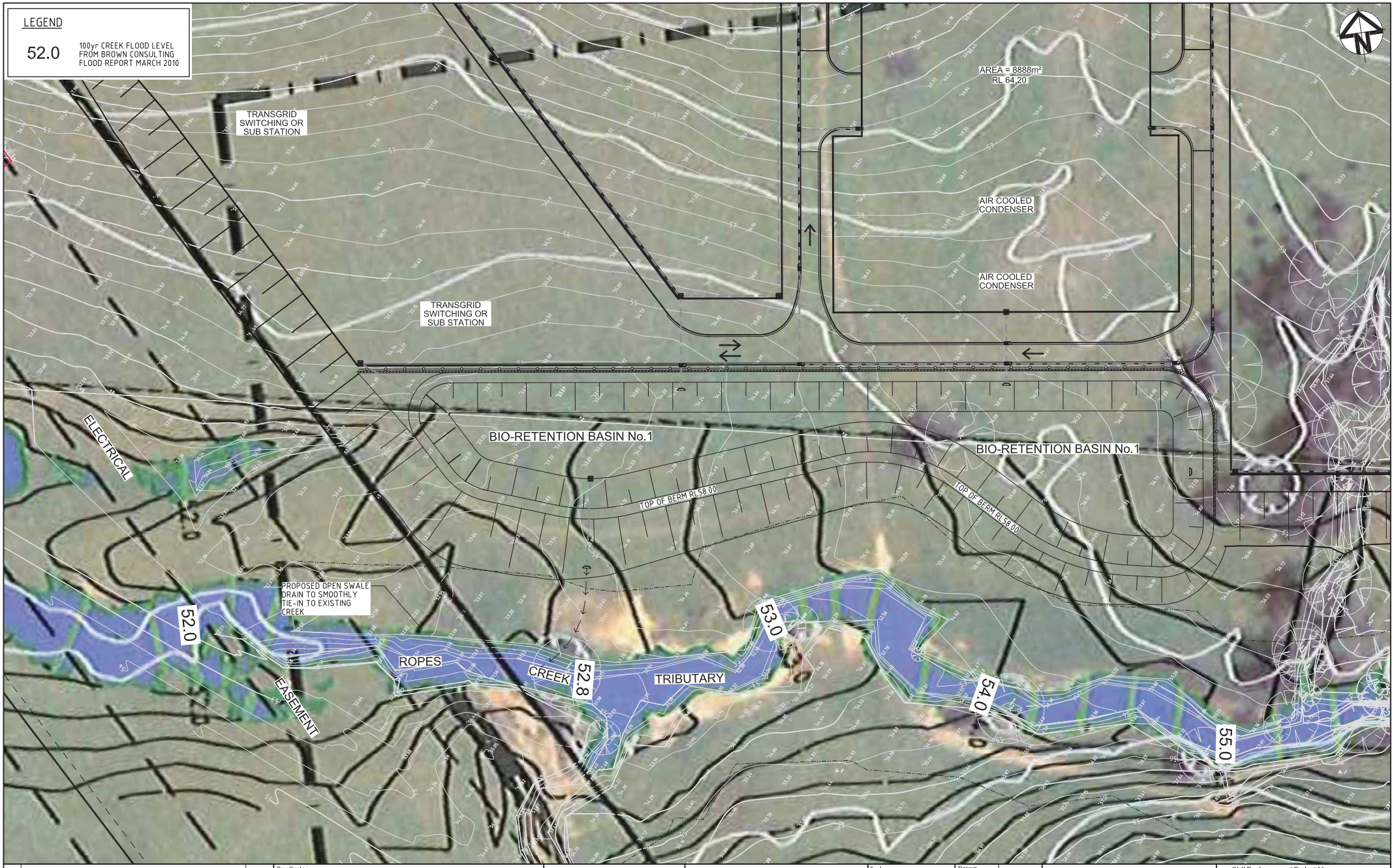
PROJECT TITLE: SEPP 59 EASTERN CREEK
ROPES CREEK TRIBUTARY

SHEET TITLE: EXISTING CATCHMENT AREA PLAN WITH ASSUMED ADDITIONAL CATCHMENT

CAD FILE: X07083.D
FILE No: 152-121-08I
DRAWING No: X07083.D.00.03

INVESTIGATION AND DESIGN

SHEET 3 OF 3 SHEETS
REV B



P1	ISSUE FOR INFORMATION	14-05-14
Issue	Description	Date

Bar Scales

0 10 20 30 40 50m

1 : 500 @ A1 1 : 1000 @ A3

Client

BROOKFIELD MULTIPLEX AUSTRALASIA

Scales	1 : 500 @ A1	Drawn	TS
		Designed	TS
Grid	MGA	Checked	AT
Height Datum	AHD	Approved	

Project

THE NEXT GENERATION

Title

FLOOD PLAN

CIVil Engineers and Project Managers
at&l
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: PRELIMINARY ONLY NOT TO BE USED FOR CONSTRUCTION — A1

Drawing No.	Project No.	Issue
SKC33	14-187	P1

100mm on Original

F:\14-187 TNG\Drgs\Civil\Sketches\SKC33 Flood Plan.dwg

Appendix D

Dial Before You Dig Records

AARNet

Sequence Number: 33862790

Address:Wonderland Drive, Eastern Creek, NSW, 2766

Create Date: 06/05/2014 **Scale** 1:1500

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Enquiry Area

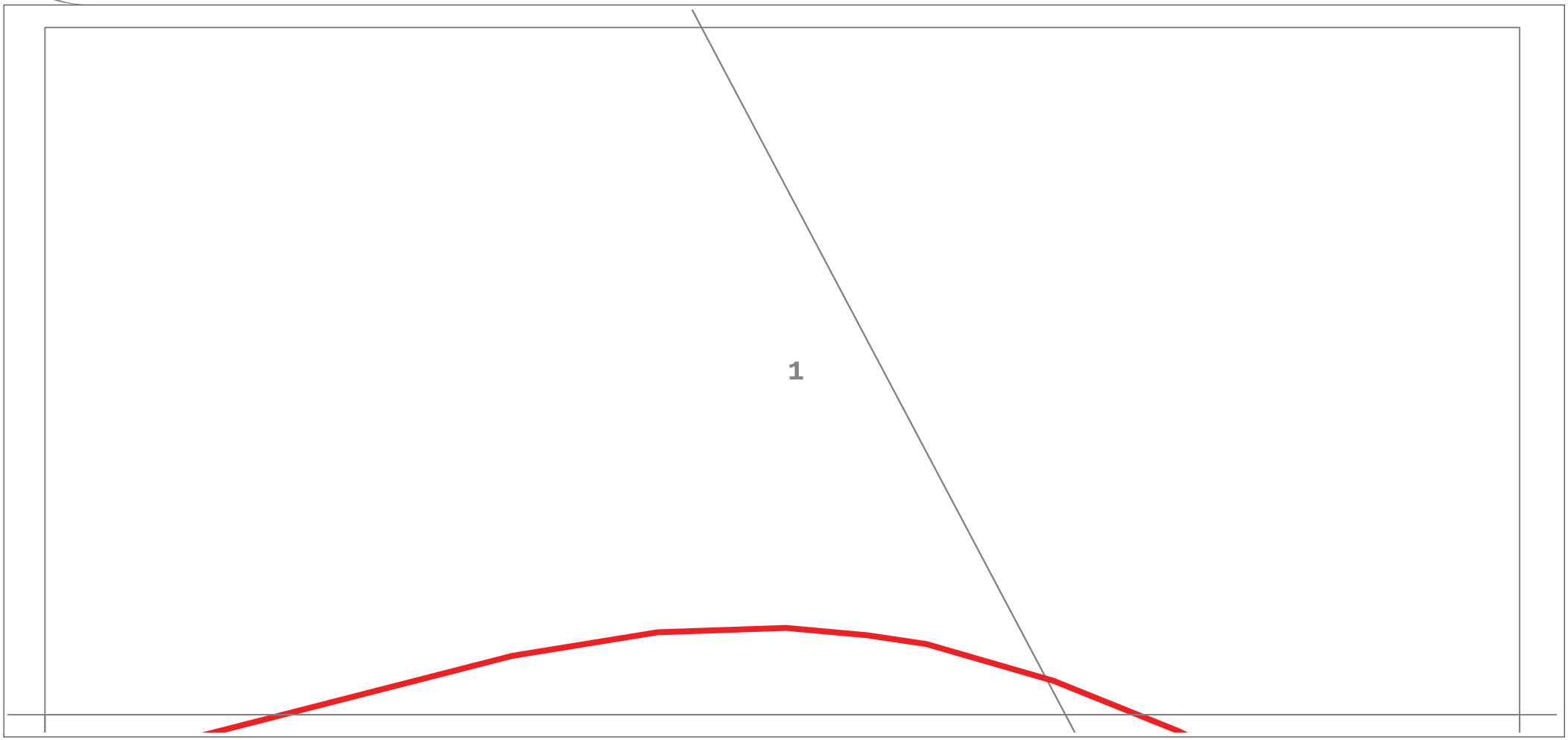
AARNet Assets

Cadastre

AARNet

Sequence Number: 33862790

Address:Wonderland Drive, Eastern Creek, NSW, 2766



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Enquiry Area

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Cadastre

AARNet

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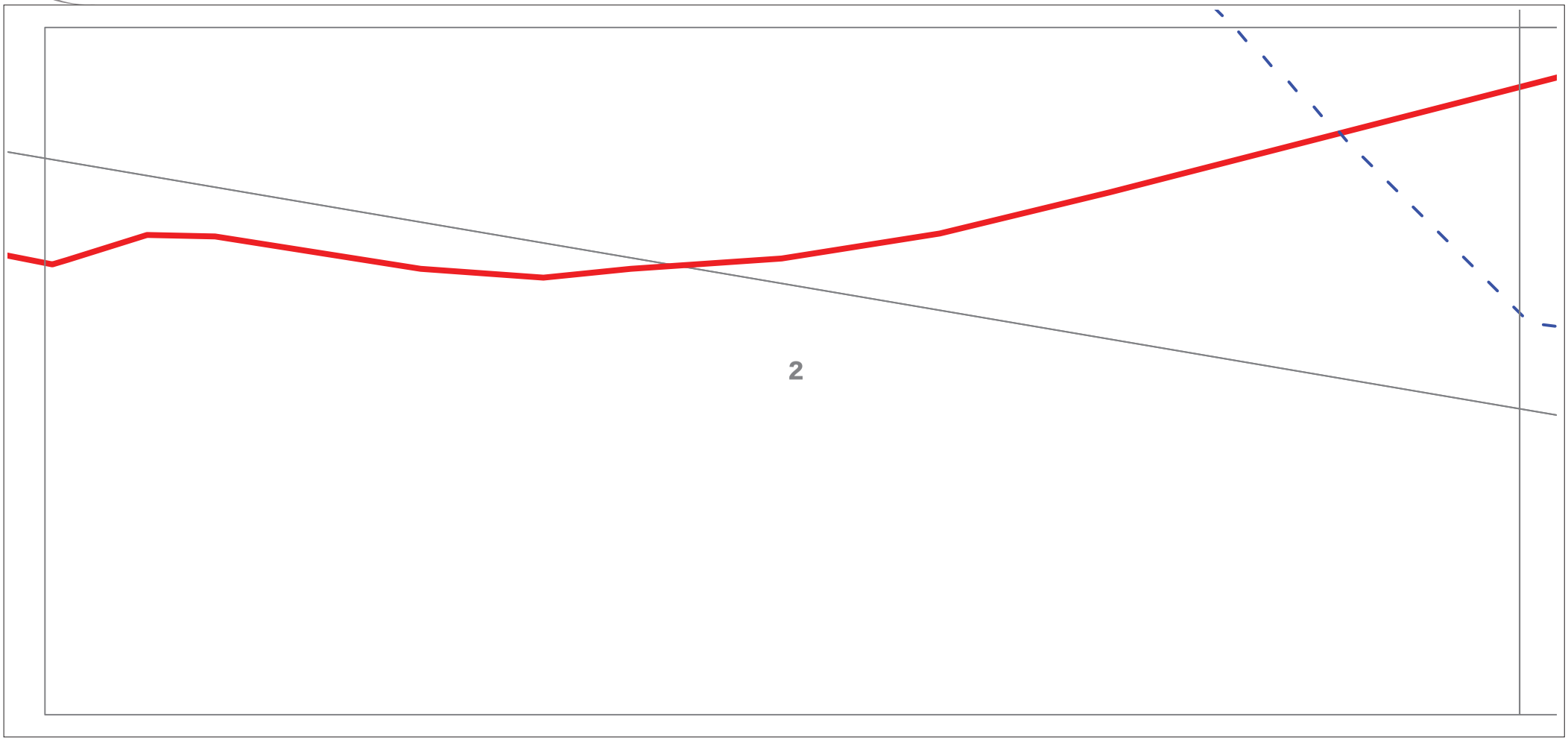

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Enquiry Area

AARNet Assets

Cadastre

AARNet

Sequence Number: 33862790

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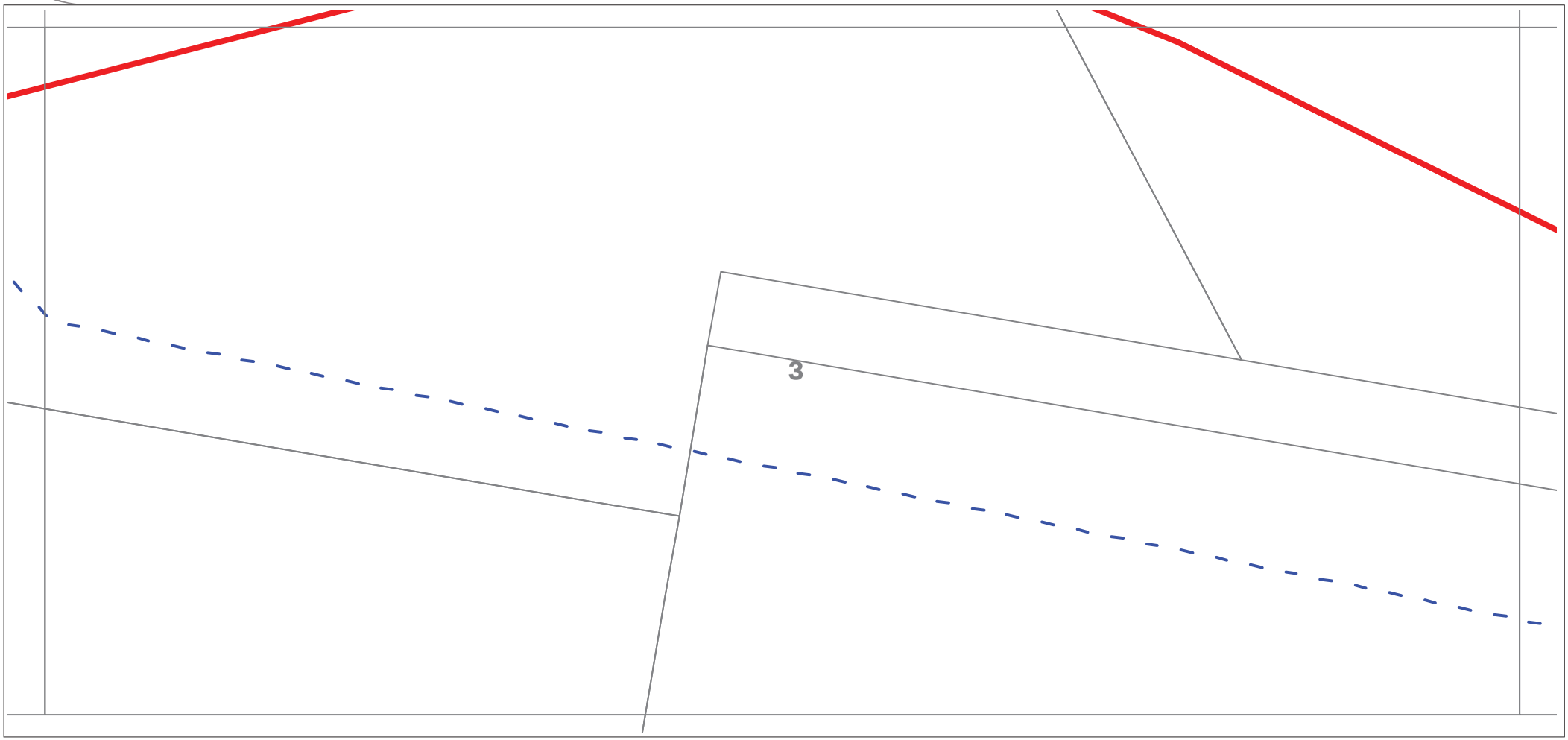

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Enquiry Area

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Cadastre

AARNet

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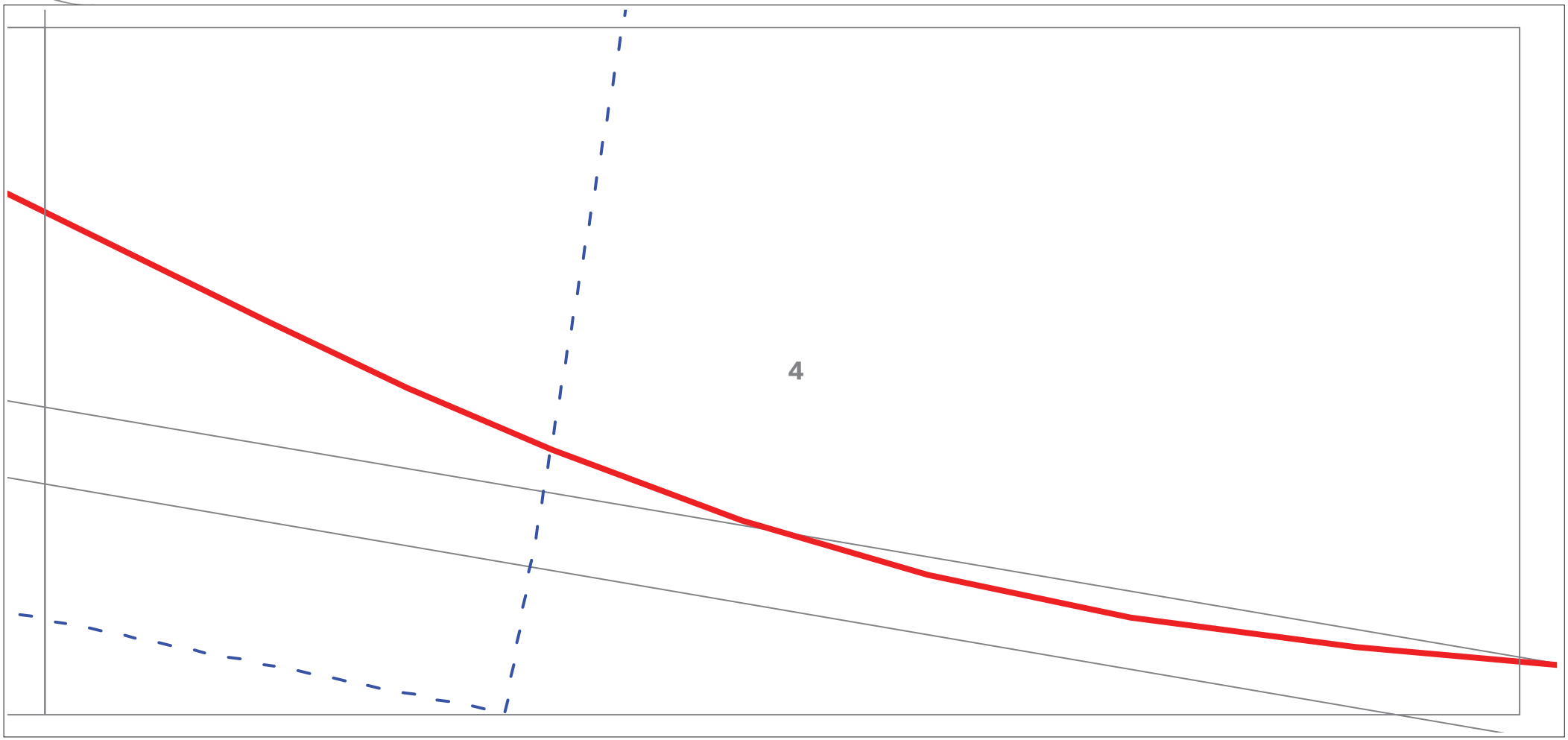

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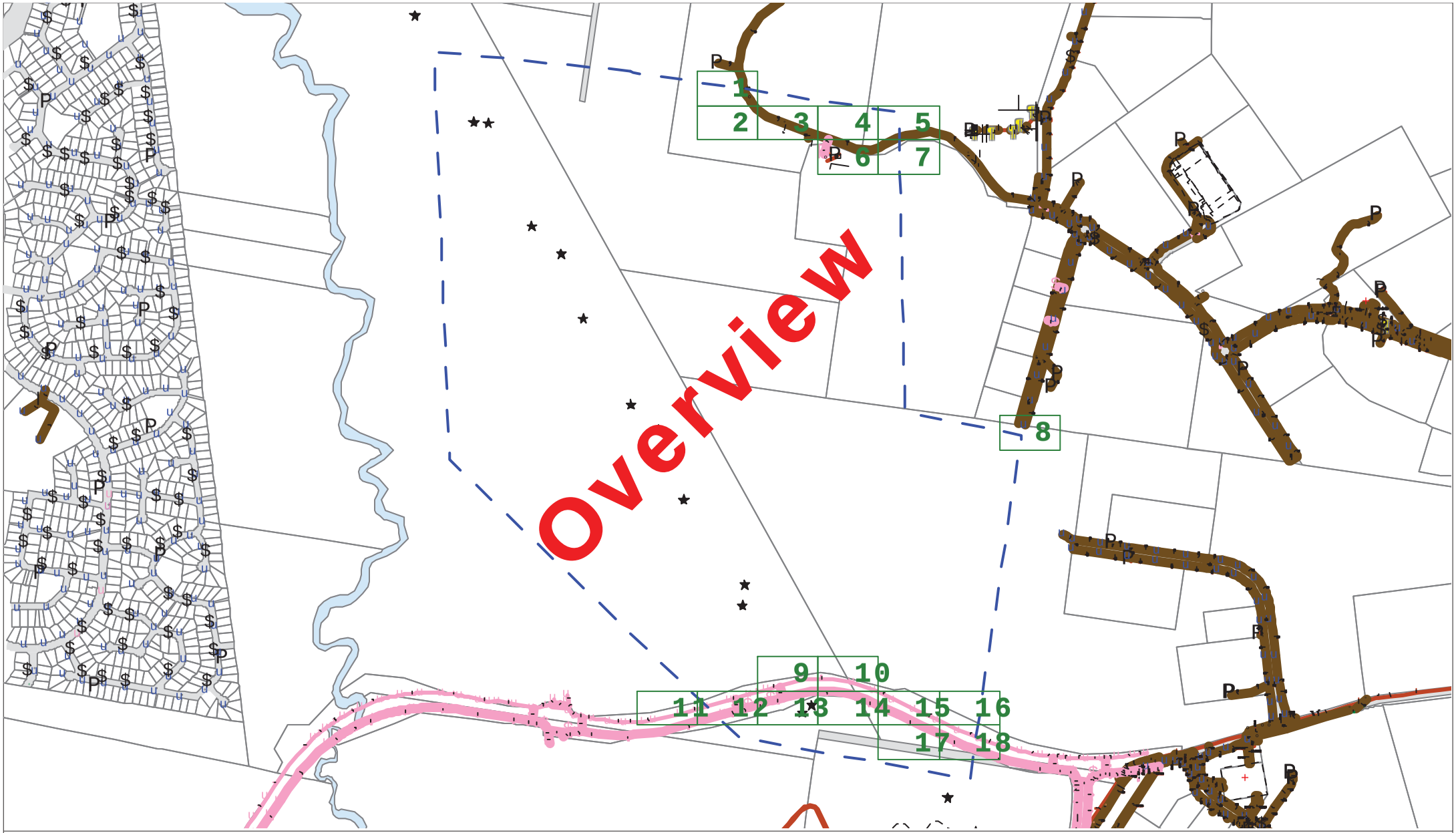
Enquiry Area

AARNet Assets

Cadastre



Endeavour Energy

ENDEAVOUR ENERGY WARNING

This plan shows the approximate location of underground cables relative to fixtures existing when the cables were laid, and has been prepared solely for Endeavour Energy's own use. Endeavour Energy has taken all reasonable steps to ensure that the information is accurate as possible but will accept no liability for inaccuracies in the information shown on such plans from any cause whatsoever arising. Persons excavating are expected to exercise all due care in the vicinity where cables are indicated and will be held responsible for any damage caused to Endeavour Energy's property.

ALL ELECTRICAL APPARATUS SHALL BE CONSIDERED LIVE UNTIL PROVED DE-ENERGISED.
Contact with live electrical apparatus will cause severe injury or death.

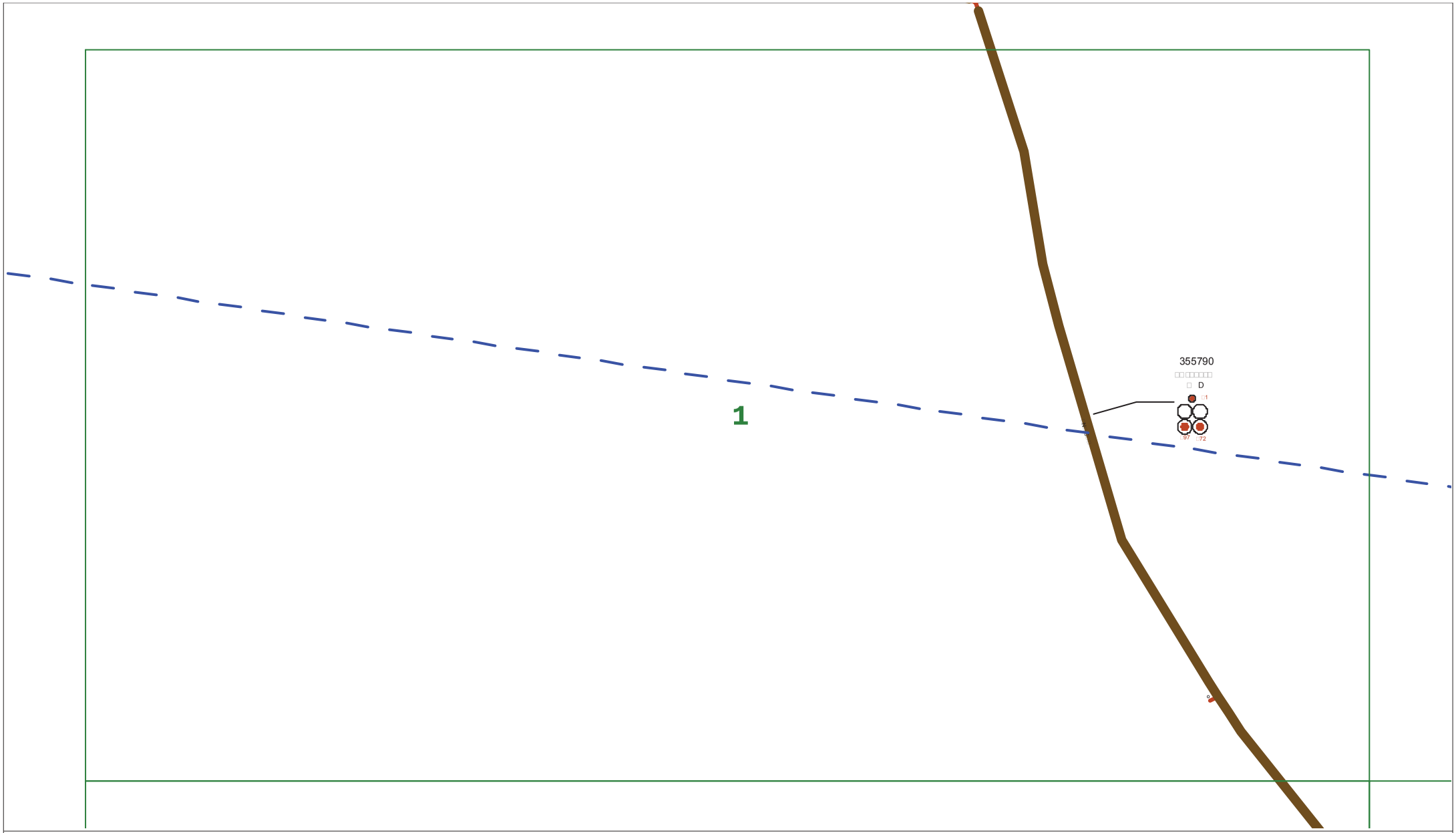
Those excavating near Endeavour Energy's cables should be aware that **ASBESTOS OR ASBESTOS - CONTAINING MATERIAL MAY BE PRESENT** in Endeavour Energy's underground assets and that Organo-Chloride Pesticides(OCP) may be present in some sub-transmission trenches.

WARNING
ASBESTOS

N

DO NOT SCALE

DBYD Sequence Number:	33862785
Issued Date:	07/05/2014



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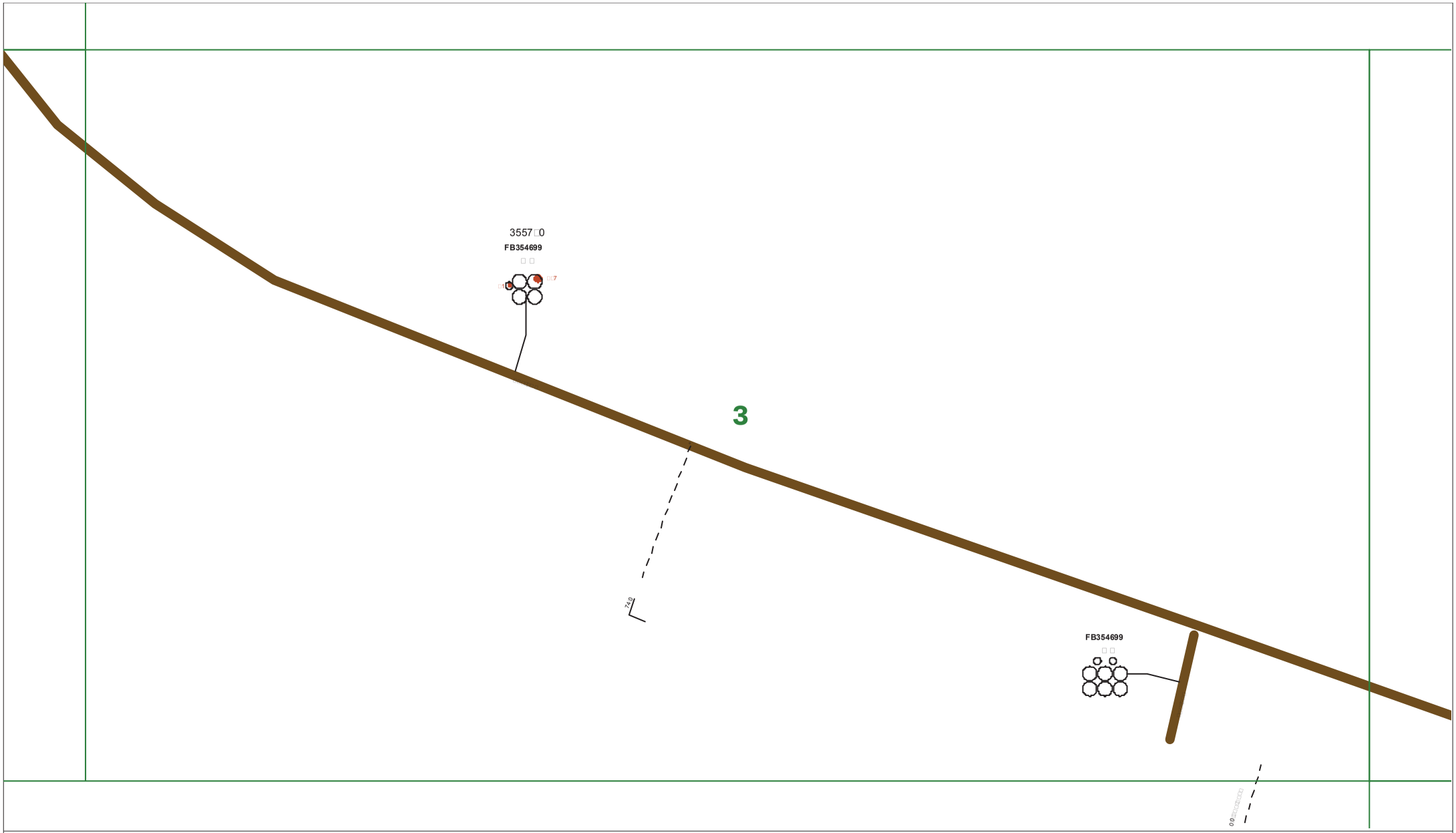

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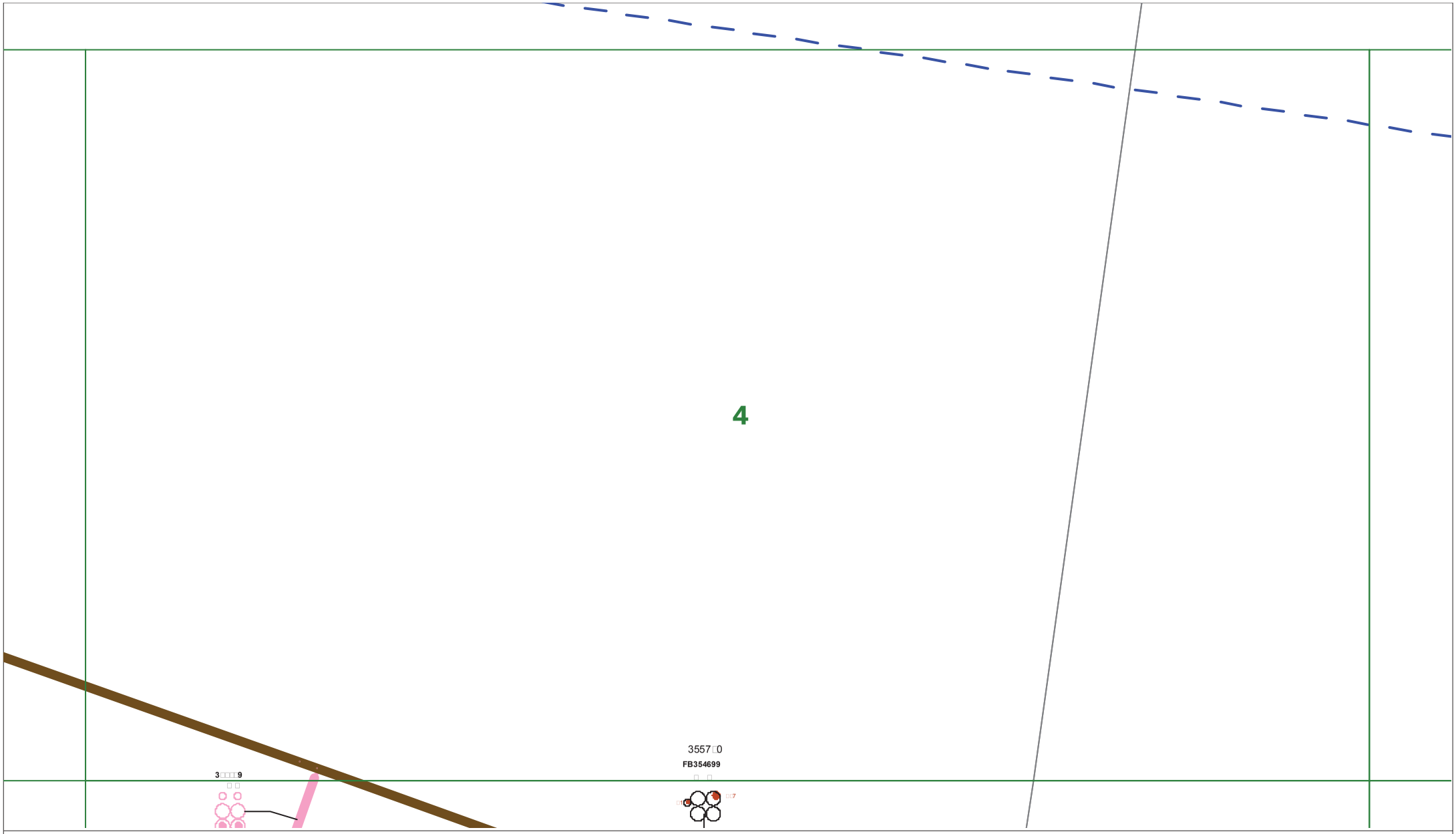

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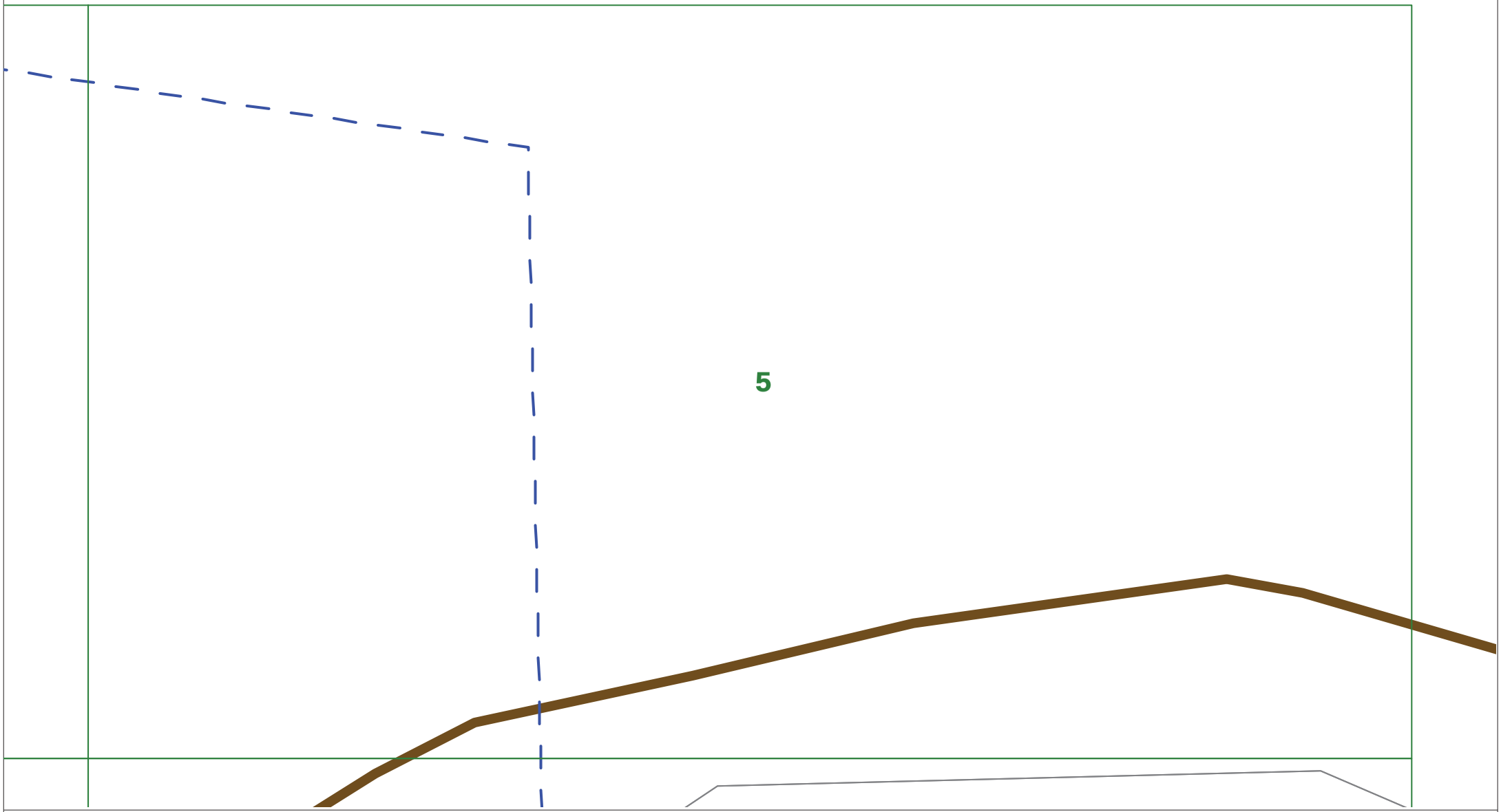

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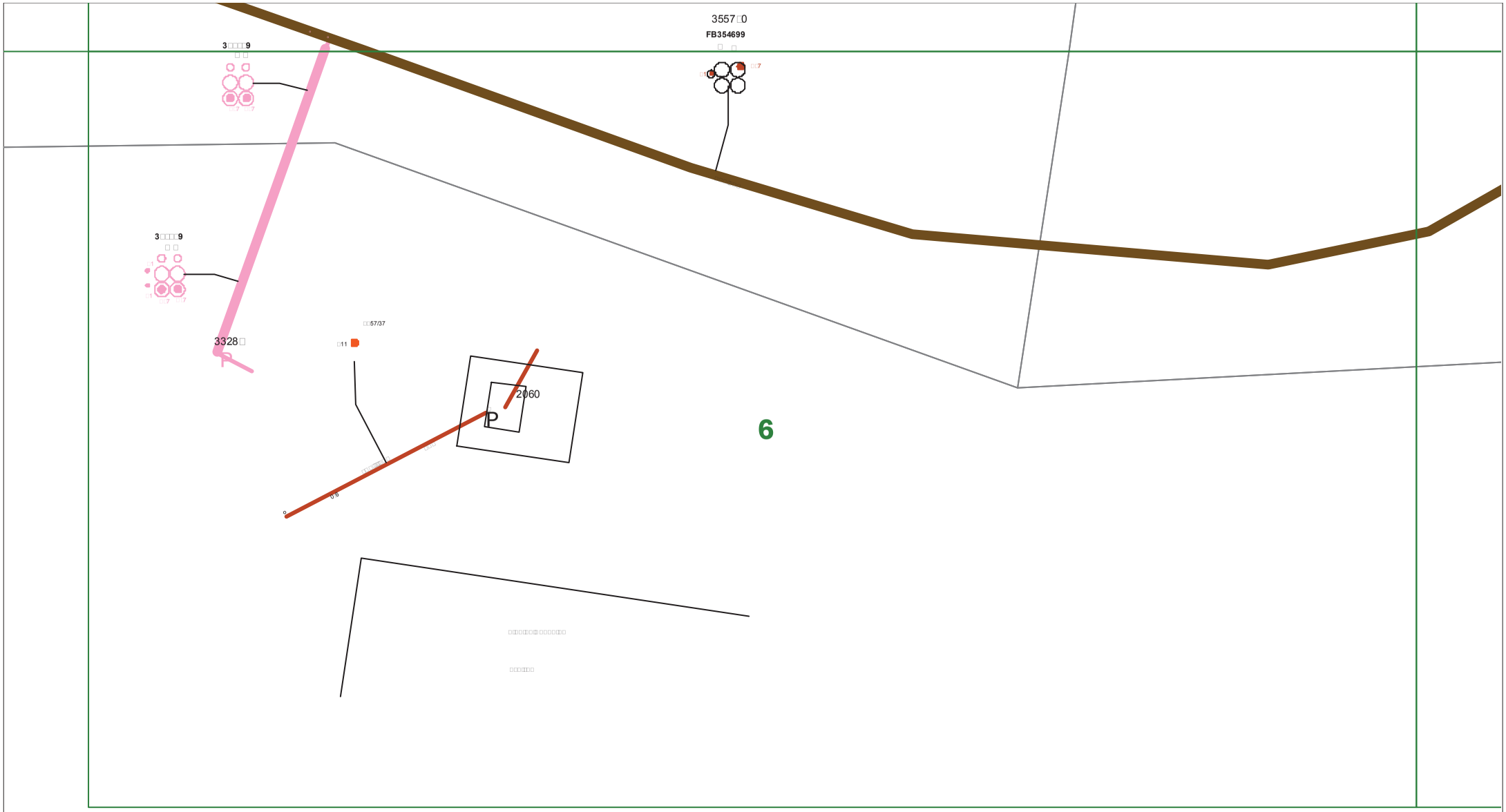

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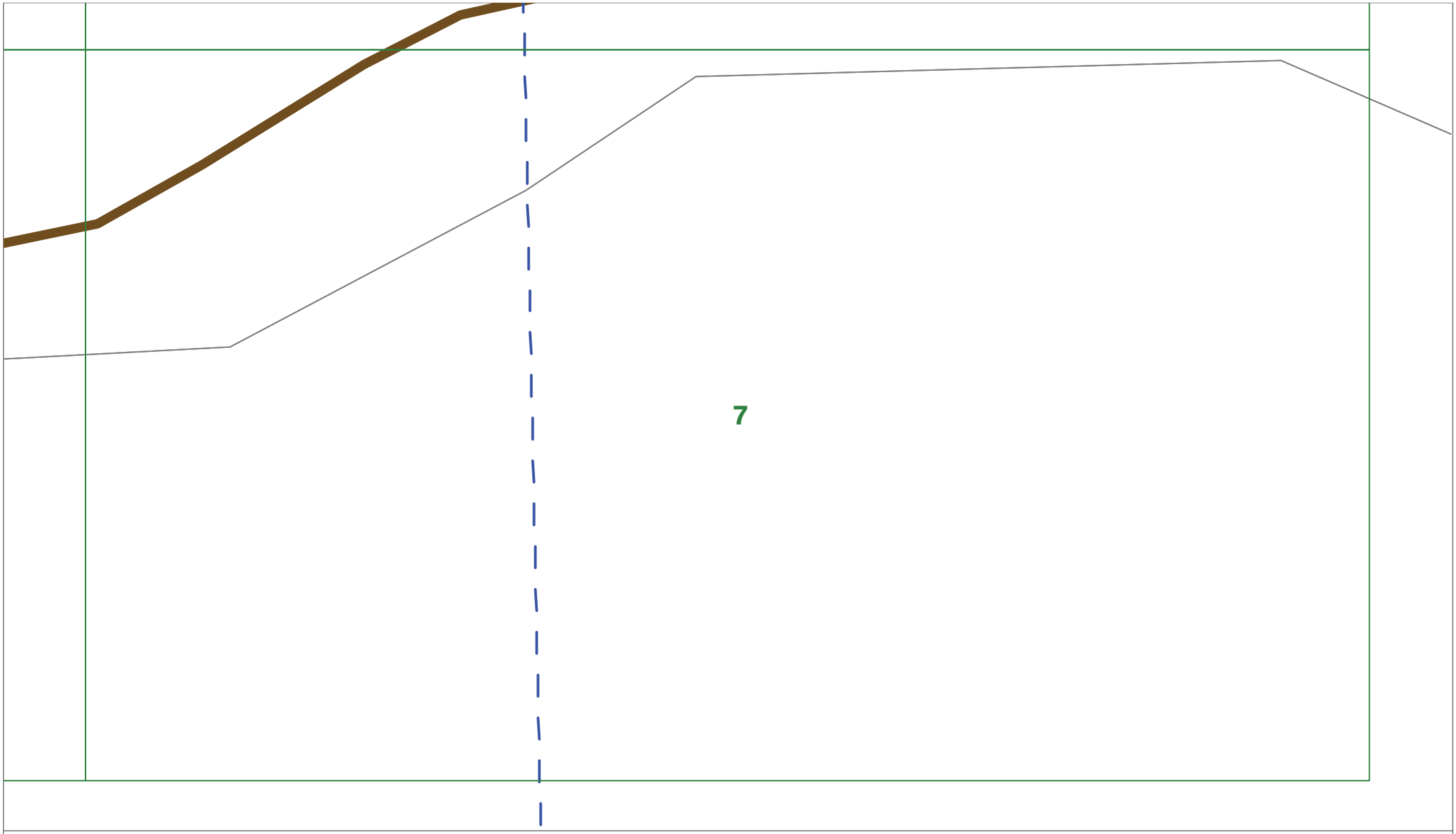

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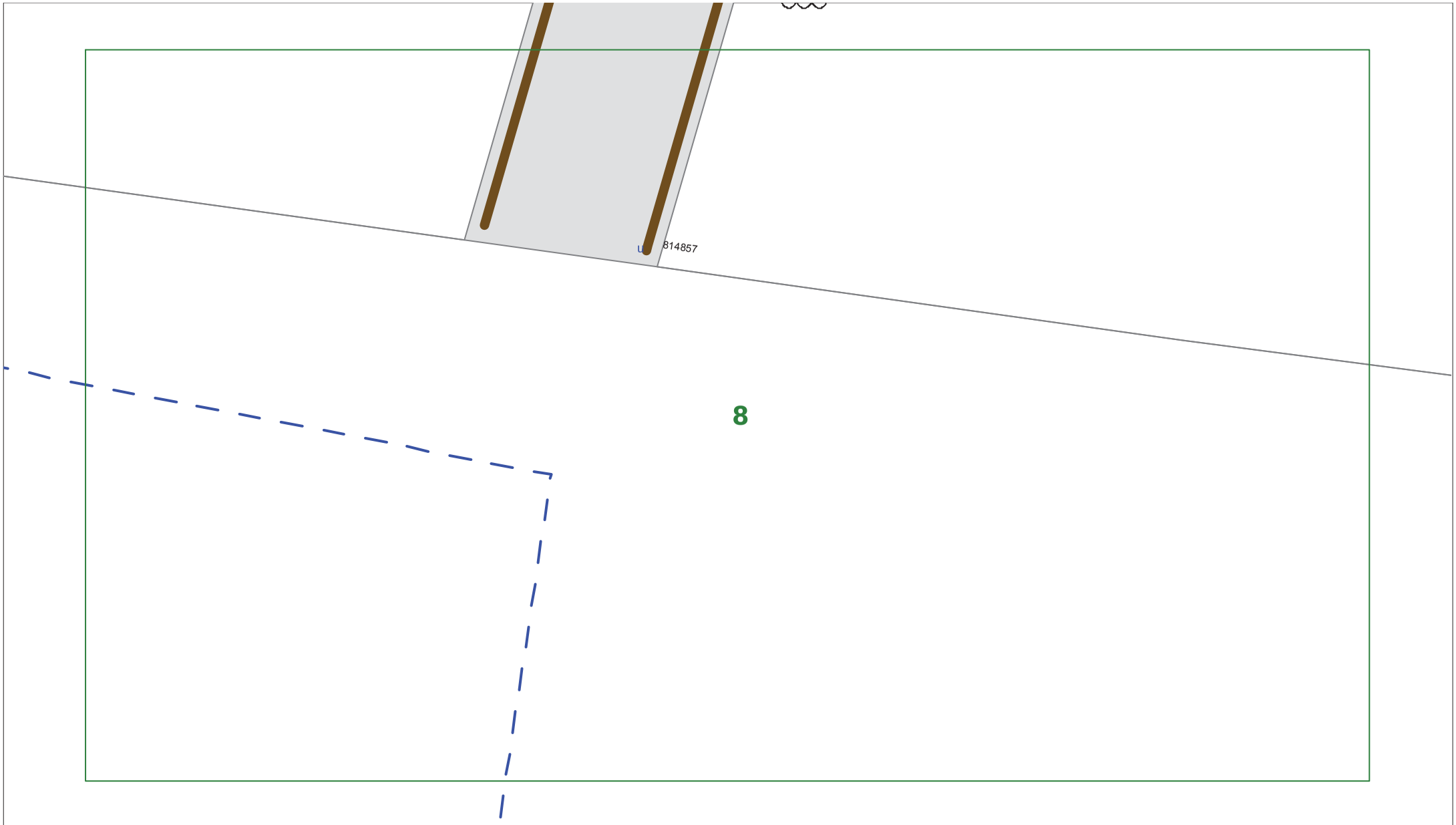

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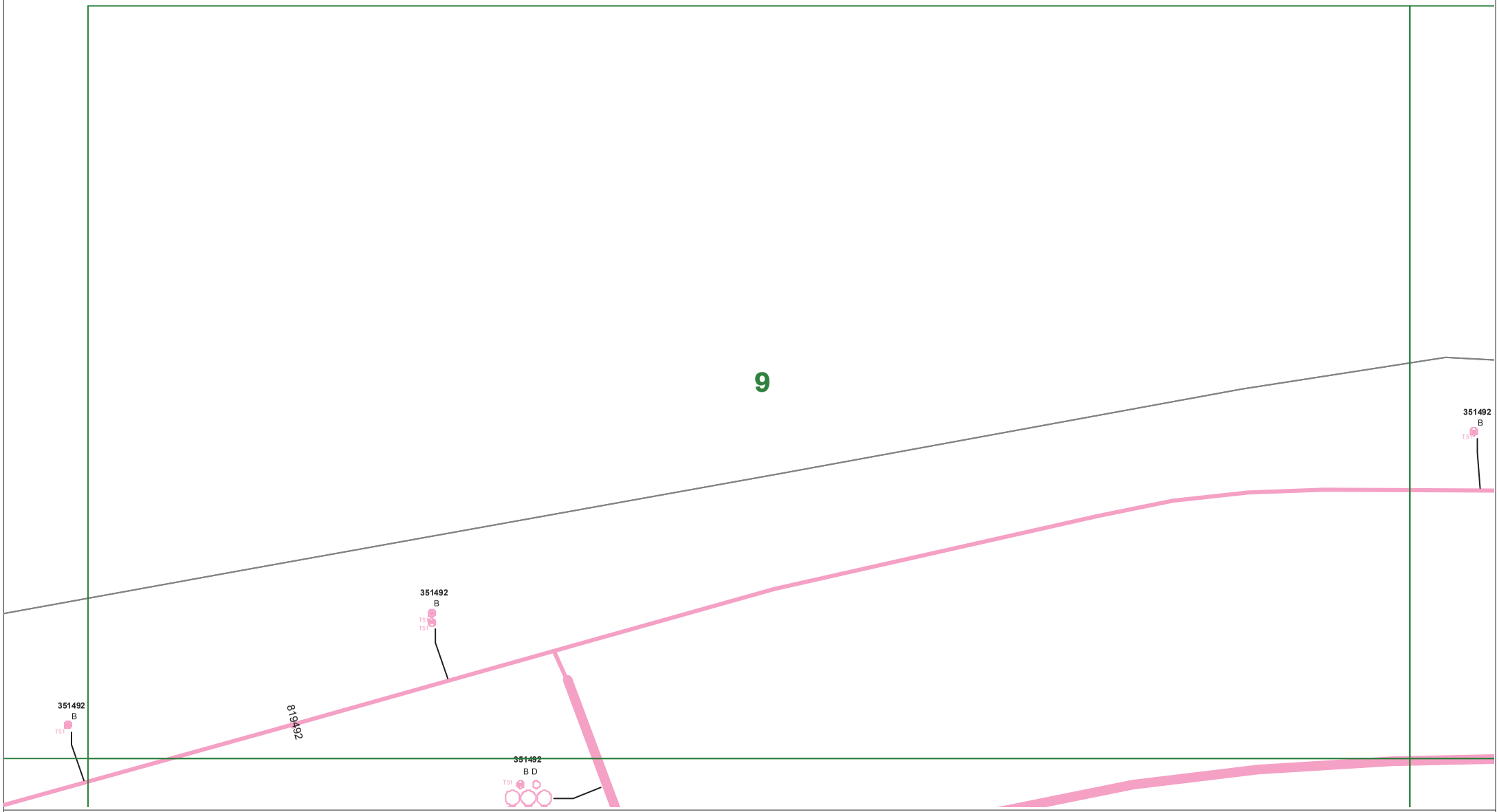

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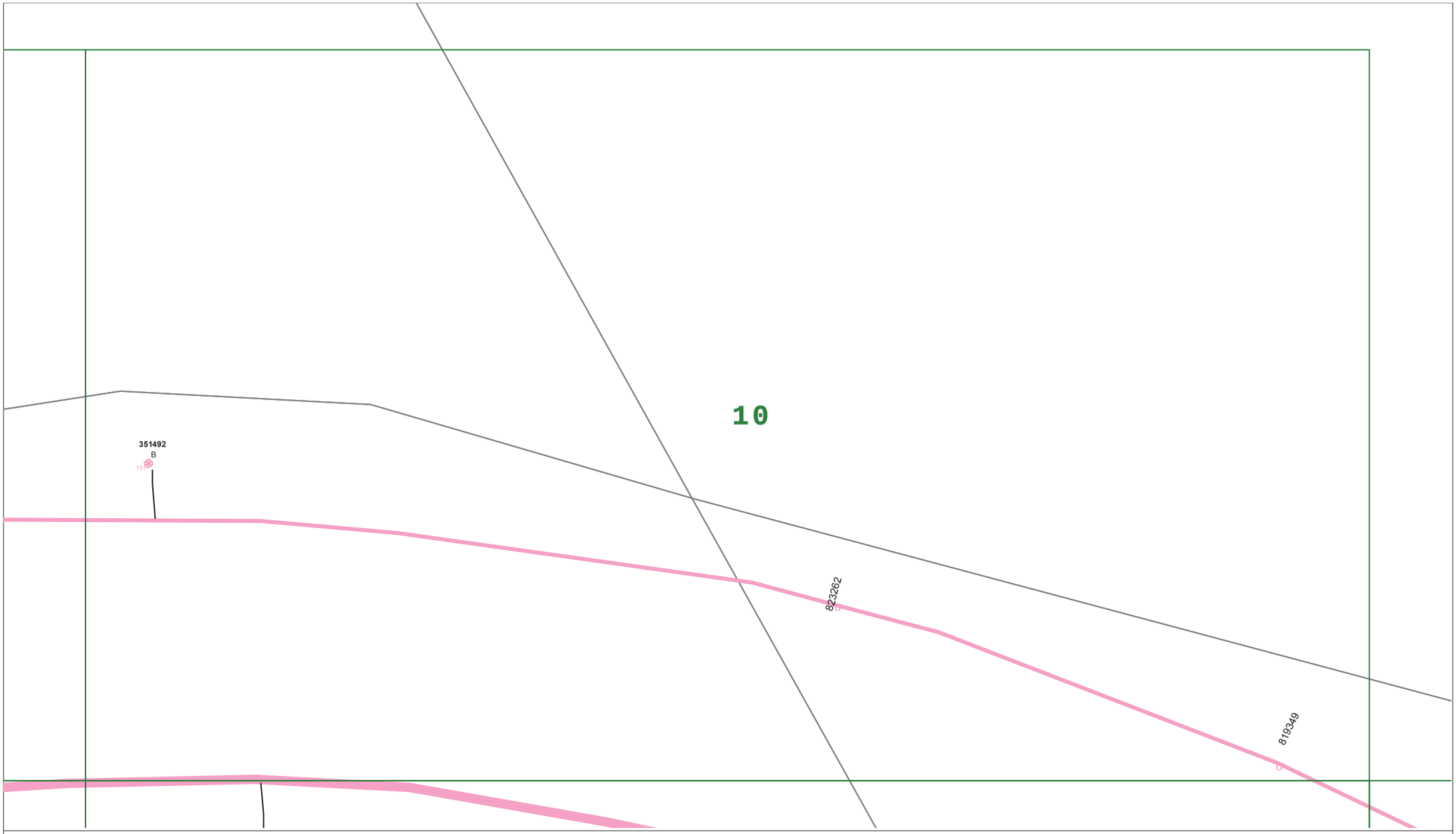
ALL ELECTRICAL APPARATUS SHALL BE CONSIDERED LIVE UNTIL PROVED DE-ENERGISED.
Contact with live electrical apparatus will cause severe injury or death.

Those excavating near Endeavour Energy's cables should be aware that **ASBESTOS OR ASBESTOS - CONTAINING MATERIAL MAY BE PRESENT** in Endeavour Energy's underground assets and that Organo-Chloride Pesticides(OCP) may be present in some sub-transmission trenches.

N

DO NOT SCALE

DBYD Sequence Number:	33862785
Issued Date:	07/05/2014



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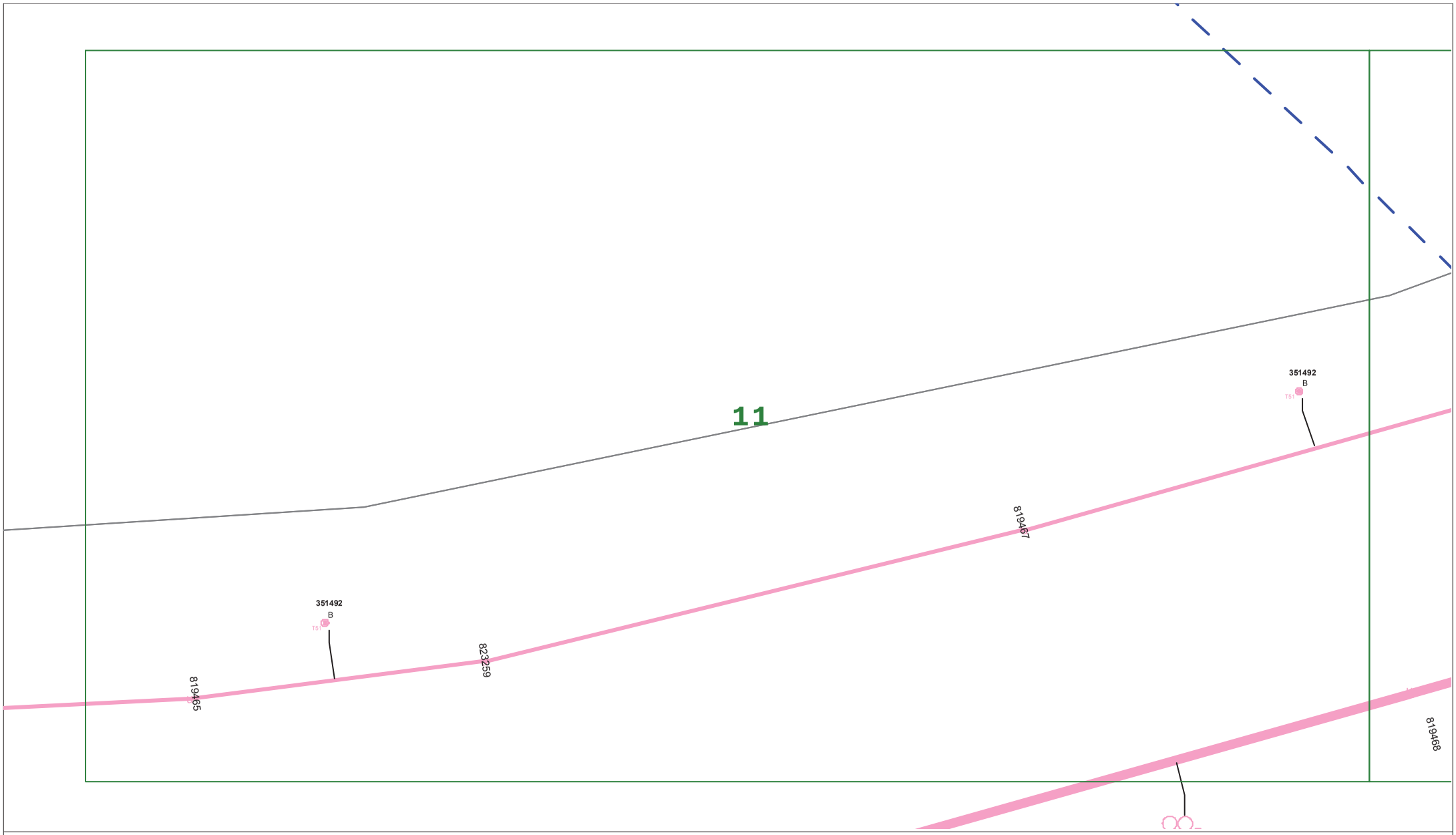

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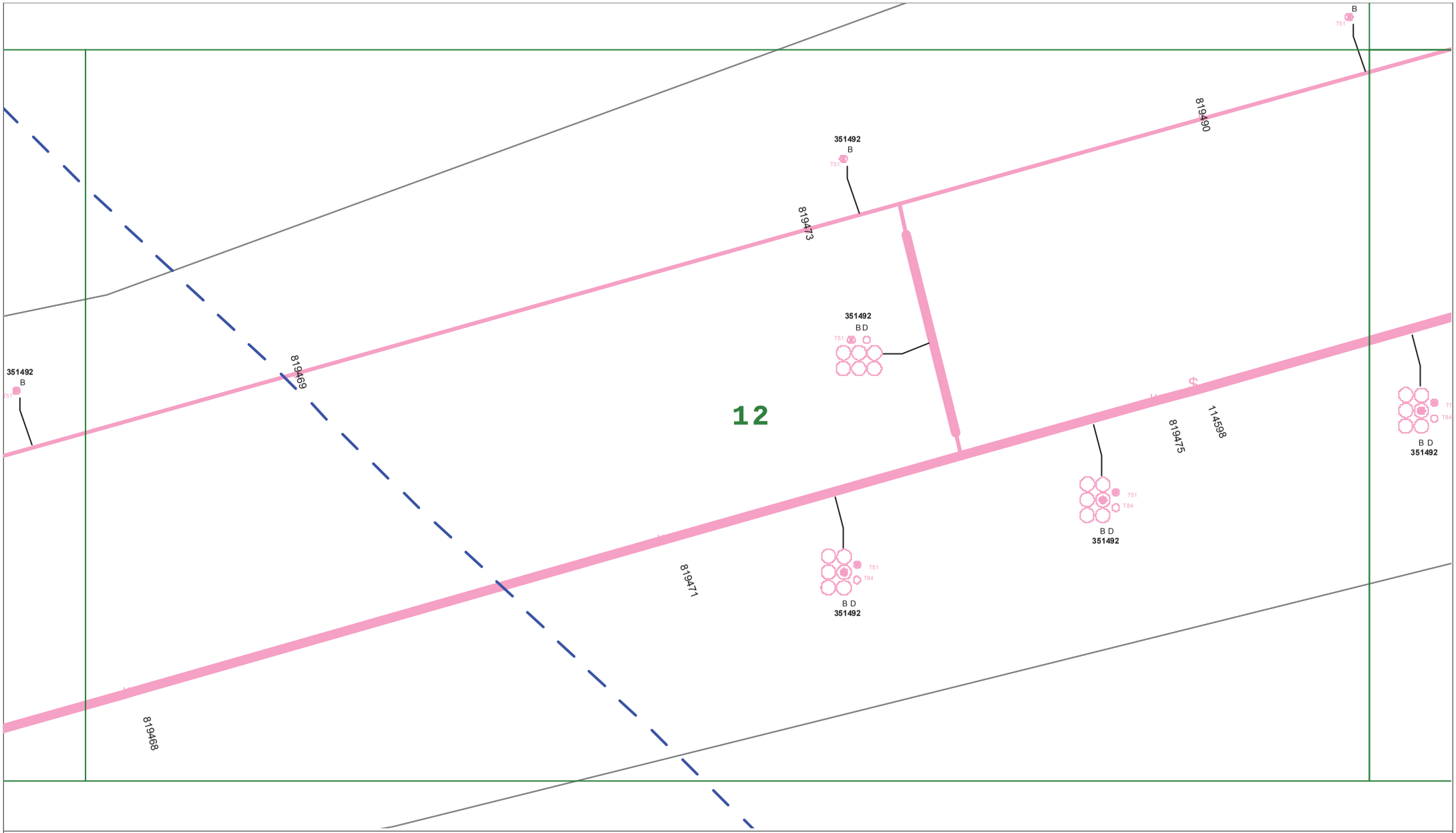

Endeavour Energy

WARNING
ASBESTOS

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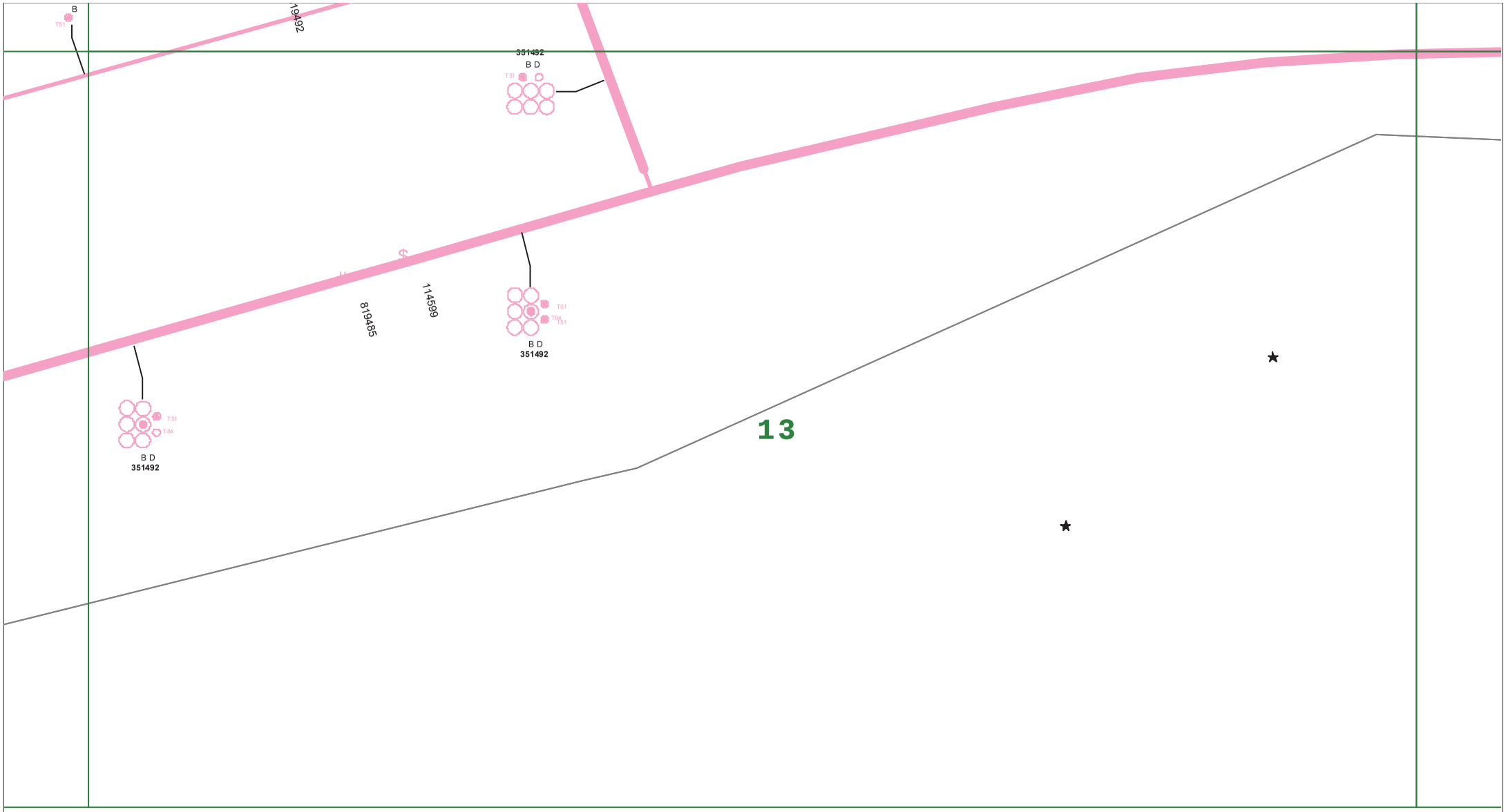

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WARNING
ASBESTOS

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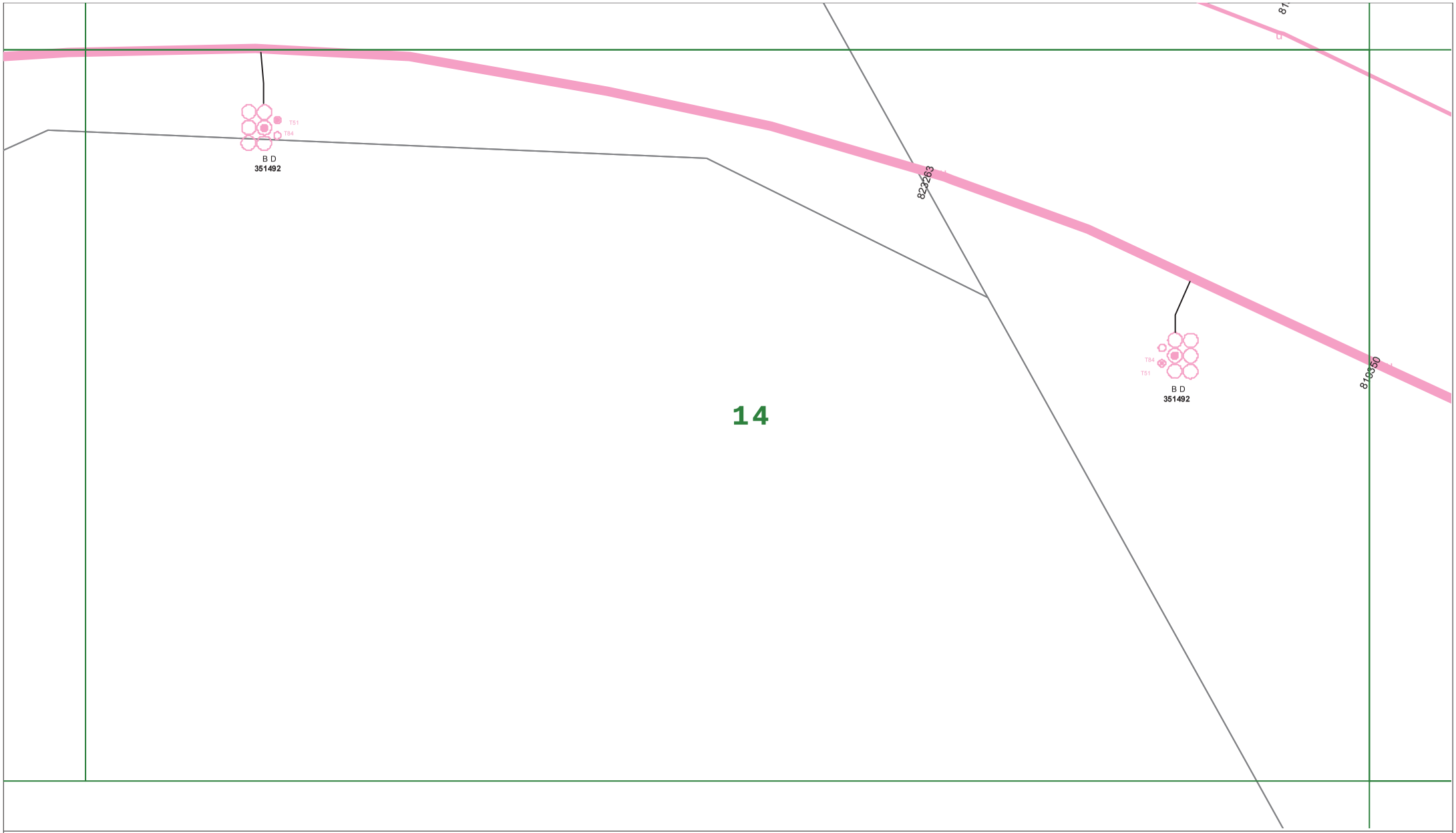

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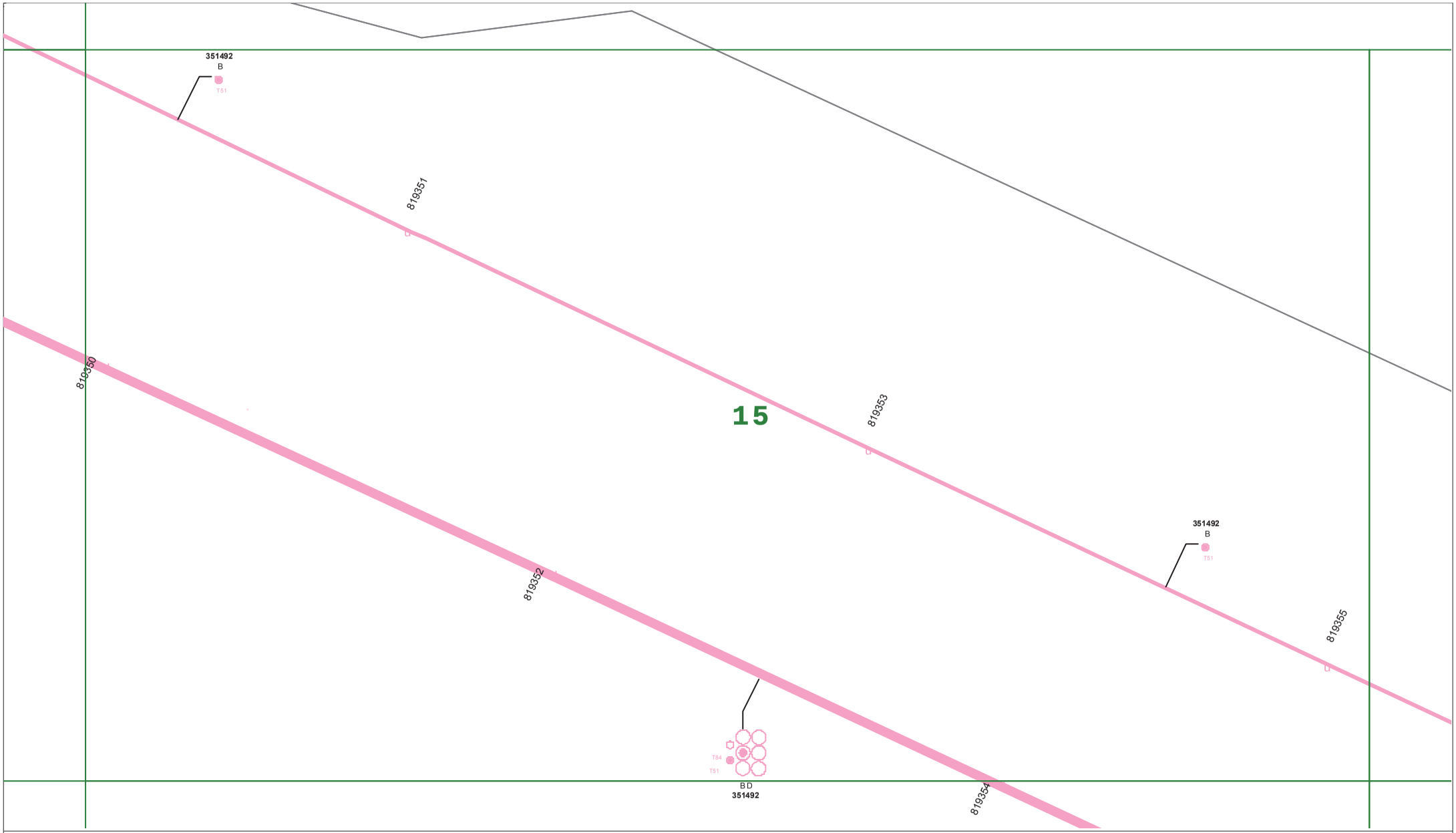

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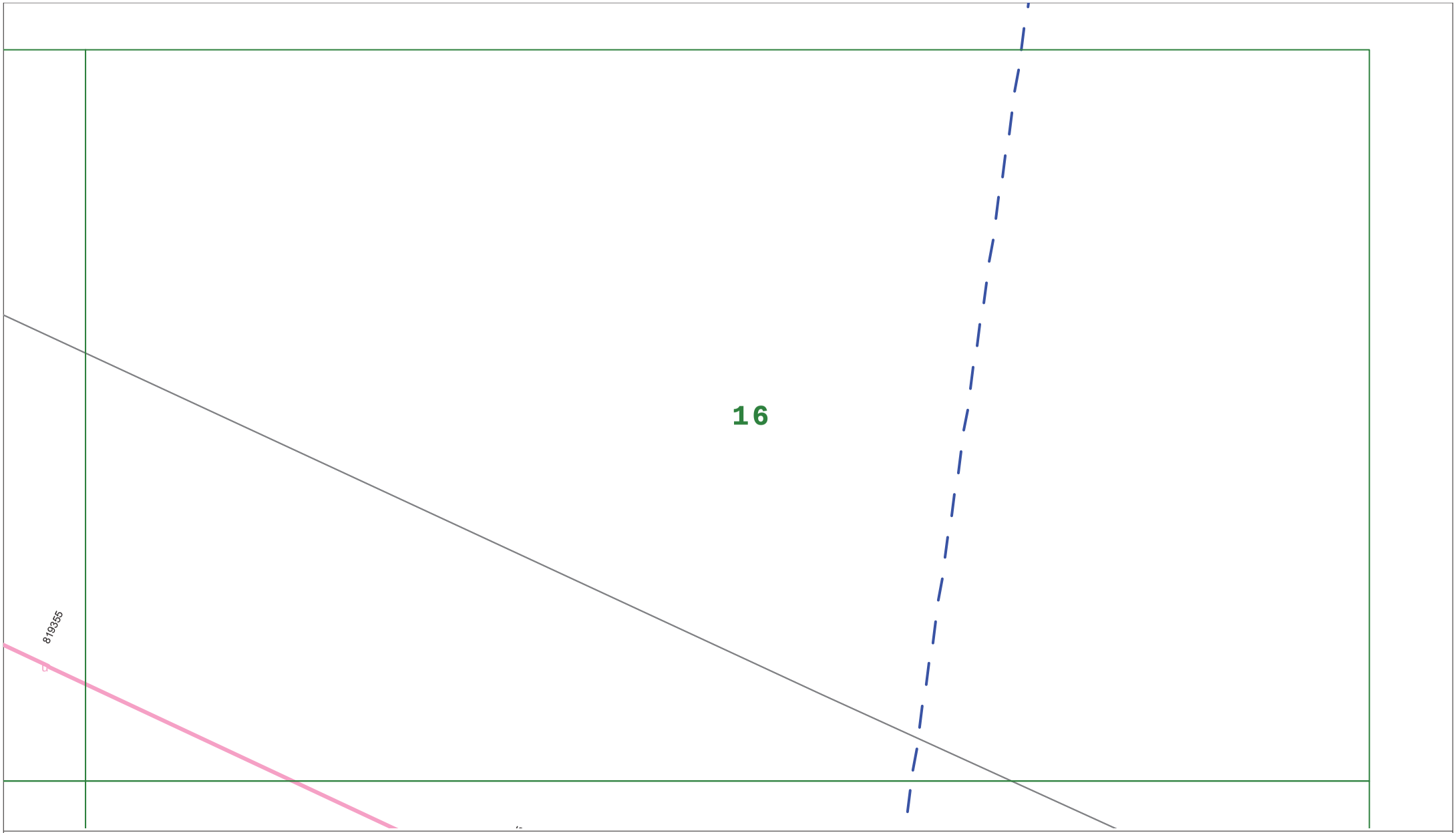

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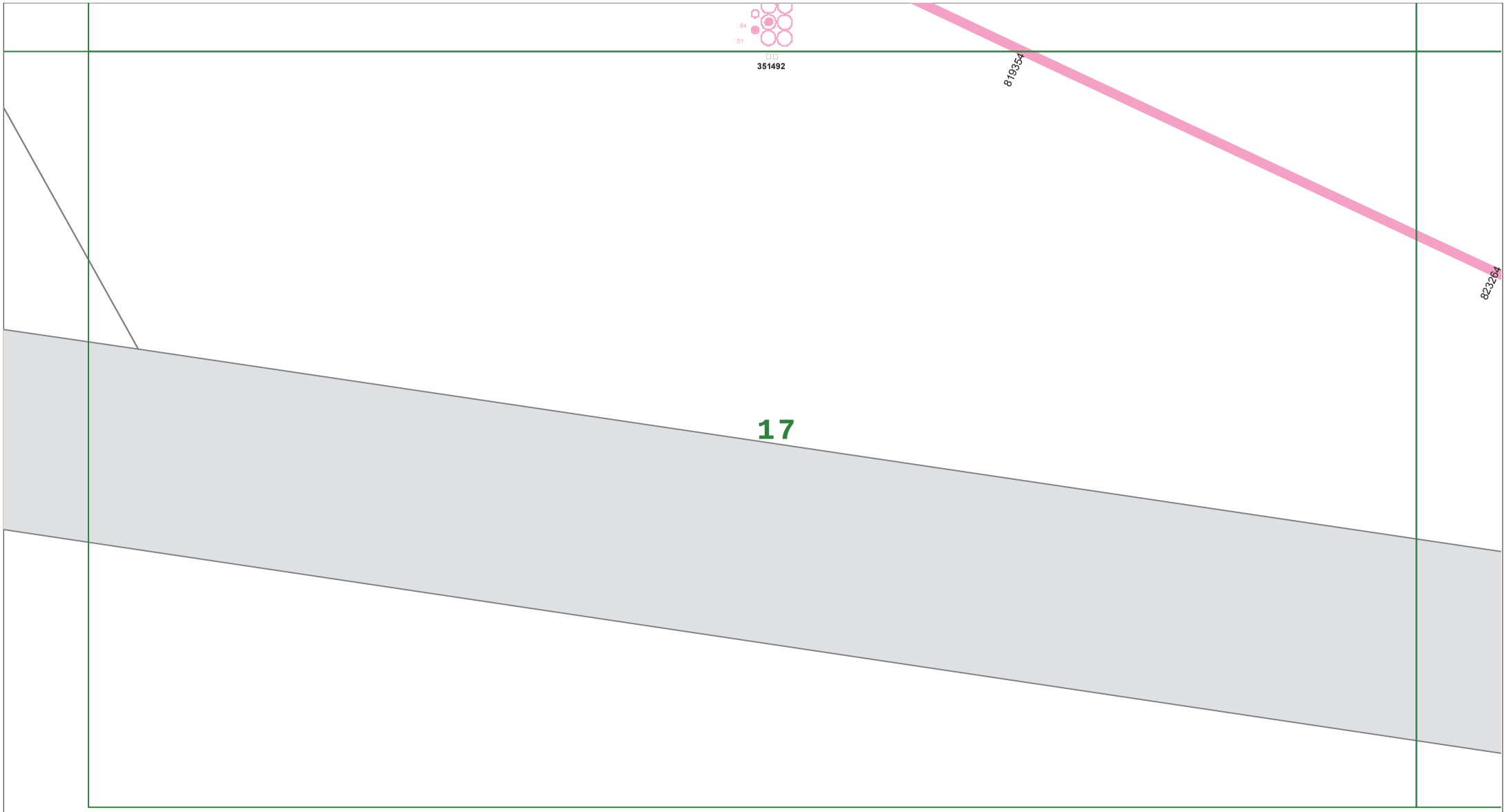

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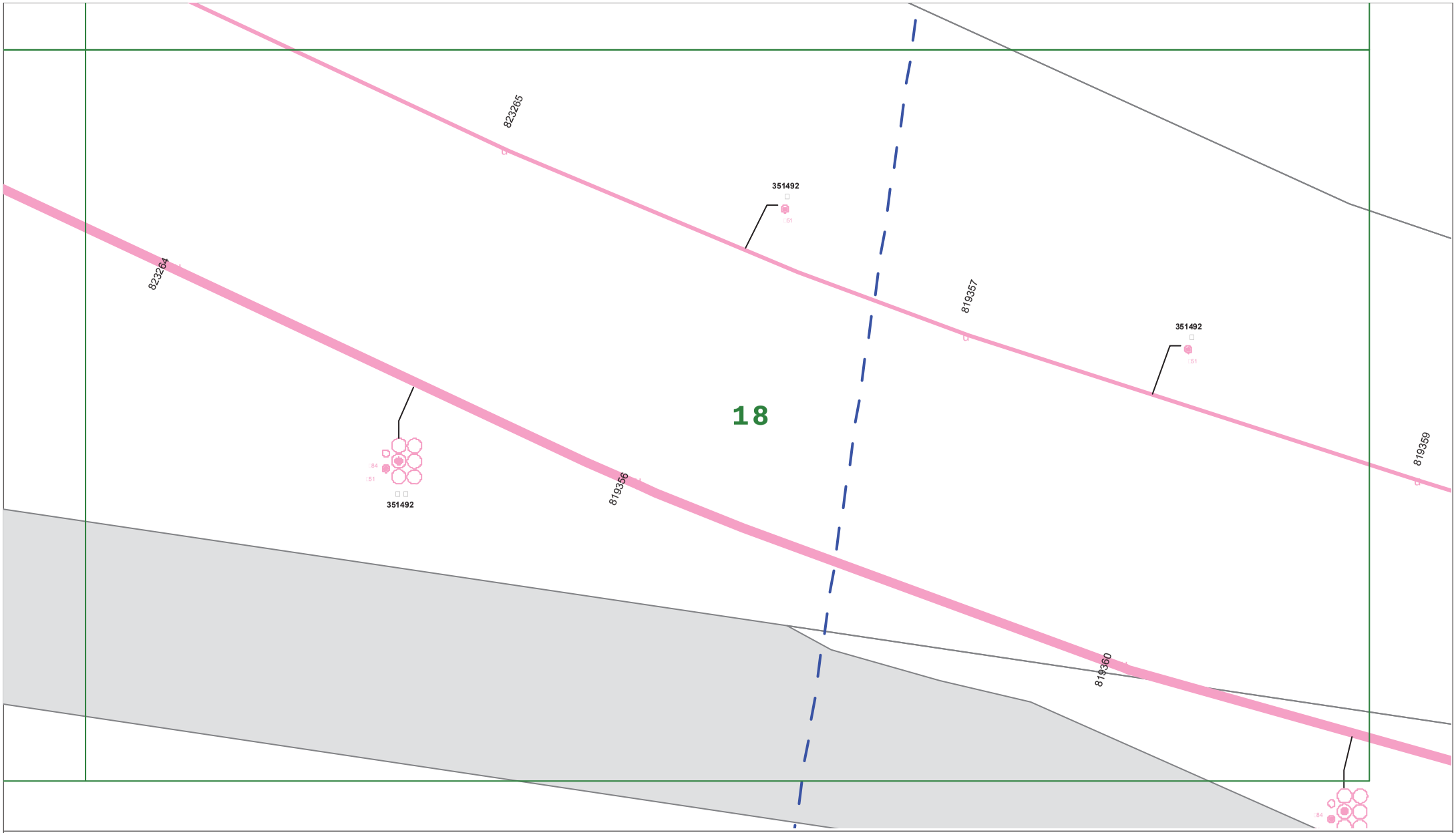

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WARNING
ASBESTOS

N

DO NOT SCALE

DBYD Sequence Number:	33862785
Issued Date:	07/05/2014

HORSLEY PARK IA

SCALE 1:2000

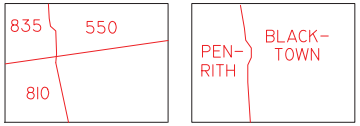
50 0 50 100 150 200

THIS MAP UPDATED ON 23/11/09
THIS PLAN IS DIAGRAMATIC ONLY. DISTANCES SCALED FROM THIS PLAN MAY NOT BE ACCURATE.

DATE ALTERED:..... BY:.....

SM9D	RH7C	RH7D
EP3B	HPIA	HPIB
EP3D	HPIC	HPID

ADJOINING MAPS



NETWORK AREA MUNICIPALITY AREA

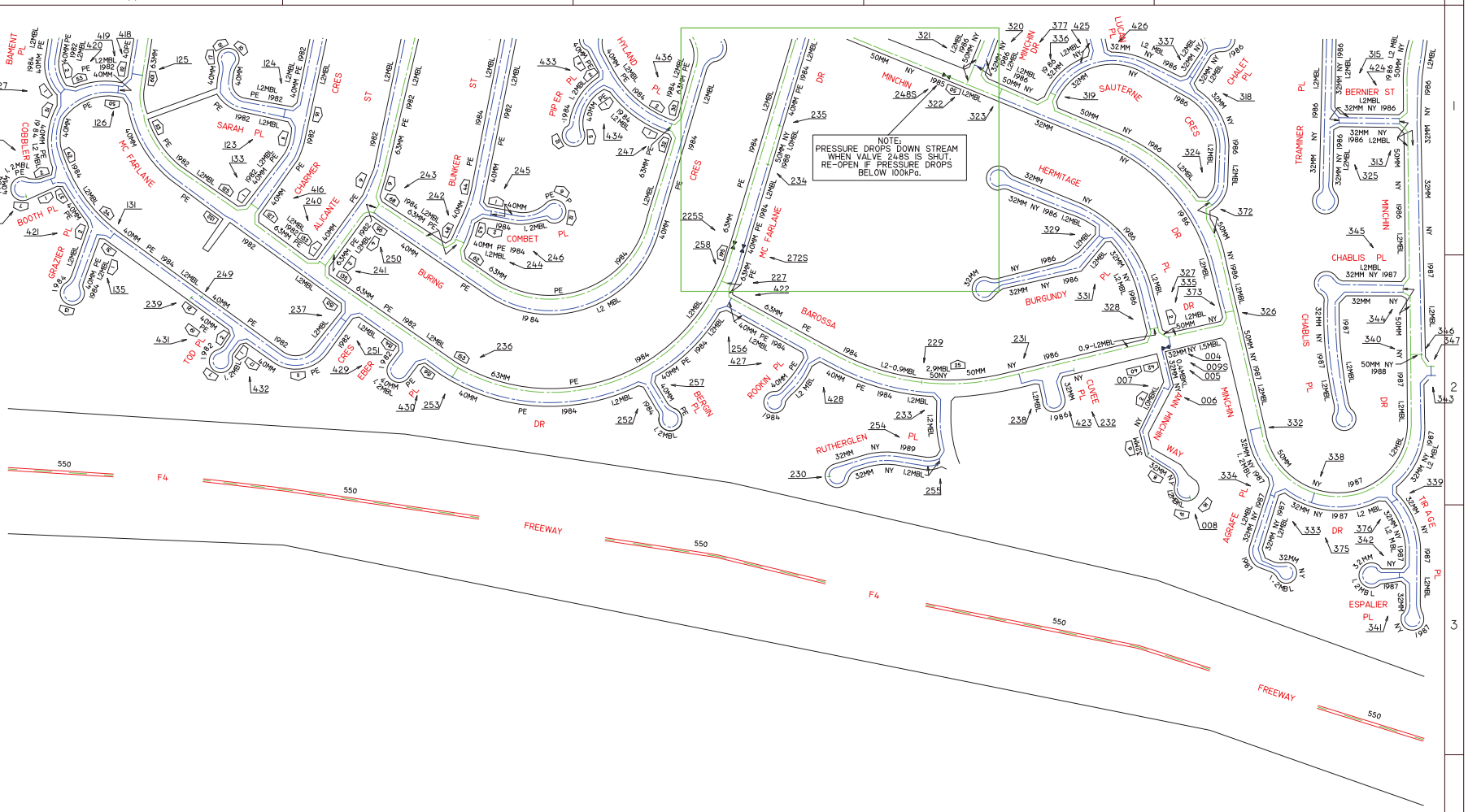
Jemena

KEY

MAX ALLOWABLE OPERATING PRESSURE

T	TRUNK MAIN	7000 kPa
P	PRIMARY MAIN	3500 kPa
S	SECONDARY MAIN	1050 kPa
		300 kPa
		210 kPa
		7 kPa
400		400 kPa
100		100 kPa
		2 kPa
	PROPOSED MAINS	
PR 11-2 3	STEEL MAIN PROJECT NUMBER	
P	PRESSURE MONITORING STATION	
	VALVE	
	SYSTEM PRESSURE REGULATOR	
S	SIPHON	
123	NETWORK NODES	
123S	ITEM DETAIL SKETCH AVAILABLE	
598	VALVE NUMBER (OLD NUMBERING)	
6NB	6 INCH CAST IRON MAIN	
150MM	150MM STEEL MAIN	
110MM PE/NY	110MM POLYETHYLENE/NYLON MAIN	
6NB 50MM NY	50MM NYLON INSERTED INTO 6NB MAIN CAST IRON MAIN	
1.2MBL	DISTANCE IN METRES OF MAIN FROM BUILDING LINE (TOLERANCE OF 0.4M)	
1957	YEAR LAID	
	MUNICIPALITY BOUNDARY	
	NETWORK BOUNDARY	
83	HOUSE NUMBER	

HORSLEY PARK IA



HORSLEY PARK IB

SCALE 1:2000

50 0 50 100 150 200

THIS MAP UPDATED ON 12/07/2012
THIS PLAN IS DIAGRAMATIC ONLY. DISTANCES SCALED FROM THIS PLAN MAY NOT BE ACCURATE.

DATE ALTERED:..... BY:.....

RH7C	RH7D	RH8A
HPIA	HPIB	HP2A
HPIC	HPID	HP2C

ADJOINING MAPS

550	BLACKTOWN

NETWORK AREA | MUNICIPALITY AREA

Jemena

KEY

MAX ALLOWABLE OPERATING PRESSURE

T	TRUNK MAIN	7000 kPa
P	PRIMARY MAIN	3500 kPa
S	SECONDARY MAIN	1050 kPa
		300 kPa
		210 kPa
		7 kPa
400		400 kPa
100		100 kPa
		2 kPa

PROPOSED MAINS

PR 1-2 3 — STEEL MAIN PROJECT NUMBER

P — PRESSURE MONITORING STATION

VALVE

SYSTEM PRESSURE REGULATOR

S — SIPHON

123 — NETWORK NODES

1235 — ITEM DETAIL SKETCH AVAILABLE

(298) — VALVE NUMBER (OLD NUMBERING)

6NB — 6 INCH CAST IRON MAIN

150MM — 150MM STEEL MAIN

110MM PE/NY — 110MM POLYETHYLENE/NYLON MAIN

(6)NB 50MM NY — 50MM NYLON INSERTED INTO 6NB MAIN CAST IRON MAIN

1.2MBL — DISTANCE IN METRES OF MAIN FROM BUILDING LINE (TOLERANCE OF 0.4M)

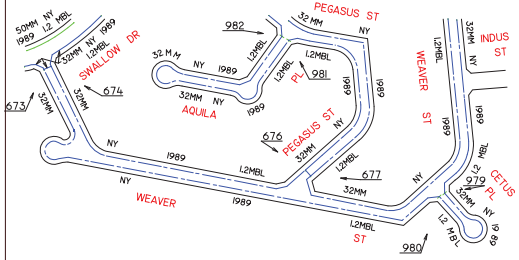
1957 — YEAR LAID

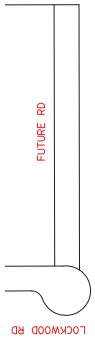
MUNICIPALITY BOUNDARY

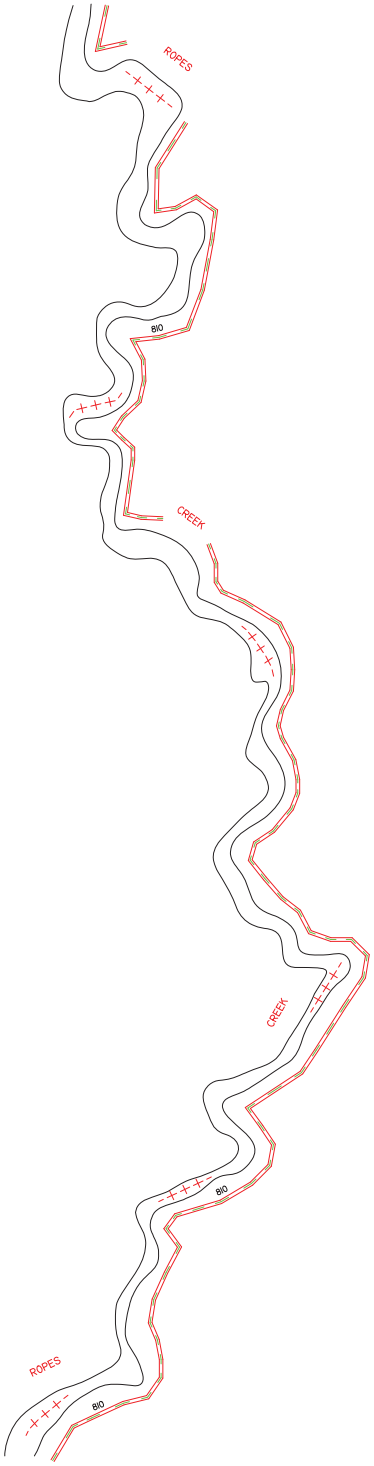
NETWORK BOUNDARY

(23) — HOUSE NUMBER

HORSLEY PARK IB







HORSLEY PARK 4A

SCALE 1:2000

50 0 50 100 150 200

THIS MAP UPDATED ON 15/07/97
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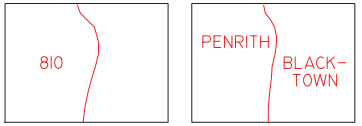
EP3D	HP1C	HP1D
EP6B	HP4A	HP4B
EP6D	HP4C	HP4D

ADJOINING MAPS



NETWORK AREA MUNICIPALITY AREA

Jemena

KEY

MAX ALLOWABLE OPERATING PRESSURE

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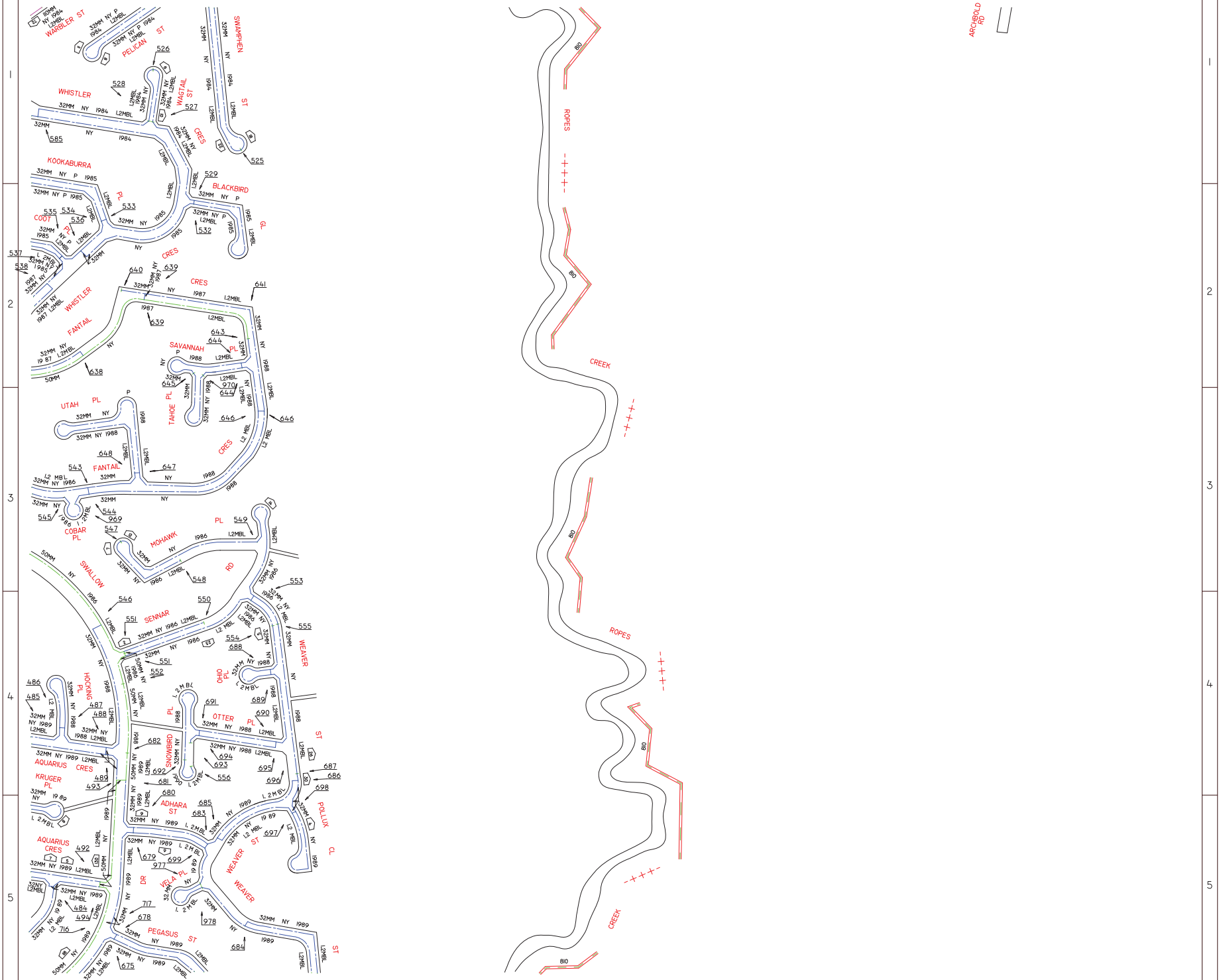
P	PRIMARY MAIN	3500 kPa
S	SECONDARY MAIN	1050 kPa
		300 kPa
		210 kPa
		7 kPa
400		400 kPa
100		100 kPa
		2 kPa
	PROPOSED MAINS	
PR 11-2 3	STEEL MAIN PROJECT NUMBER	
P	PRESSURE MONITORING STATION	
	VALVE	
	SYSTEM PRESSURE REGULATOR	
S	SIPHON	
123	NETWORK NODES	
123S	ITEM DETAIL SKETCH AVAILABLE	
698	VALVE NUMBER (OLD NUMBERING)	
6NB	6 INCH CAST IRON MAIN	
150MM	150MM STEEL MAIN	
110MM PE/NY	110MM POLYETHYLENE/NYLON MAIN	
6NB 50MM NY	50MM NYLON INSERTED INTO 6NB MAIN CAST IRON MAIN	
1.2MBL	DISTANCE IN METRES OF MAIN FROM BUILDING LINE (TOLERANCE OF 0.4M)	
1957	YEAR LAID	
	MUNICIPALITY BOUNDARY	
	NETWORK BOUNDARY	
83	HOUSE NUMBER	

HORSLEY PARK 4A



HORSLEY PARK IC

SCALE 1:2000

50 0 50 100 150 200

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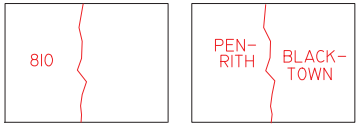
EP3B	HP1A	HP1B
EP3D	HP1C	HP1D
EP6B	HP4A	HP4B

ADJOINING MAPS



NETWORK AREA MUNICIPALITY AREA

Jemena

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P	PRIMARY MAIN	3500 kPa
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400		400 kPa
100		100 kPa
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	PROPOSED MAINS	
PR 11-2 3	STEEL MAIN PROJECT NUMBER	
P	PRESSURE MONITORING STATION	
	VALVE	
	SYSTEM PRESSURE REGULATOR	
S	SIPHON	
123	NETWORK NODES	
123S	ITEM DETAIL SKETCH AVAILABLE	
(598)	VALVE NUMBER (OLD NUMBERING)	
6NB	6 INCH CAST IRON MAIN	
150MM	150MM STEEL MAIN	
110MM PE/NY	110MM POLYETHYLENE/NYLON MAIN	
(6)NB 50MM NY	50MM NYLON INSERTED INTO 6NB MAIN CAST IRON MAIN	
1.2MBL	DISTANCE IN METRES OF MAIN FROM BUILDING LINE (TOLERANCE OF 0.4M)	
1957	YEAR LAID	
	MUNICIPALITY BOUNDARY	
	NETWORK BOUNDARY	
83	HOUSE NUMBER	

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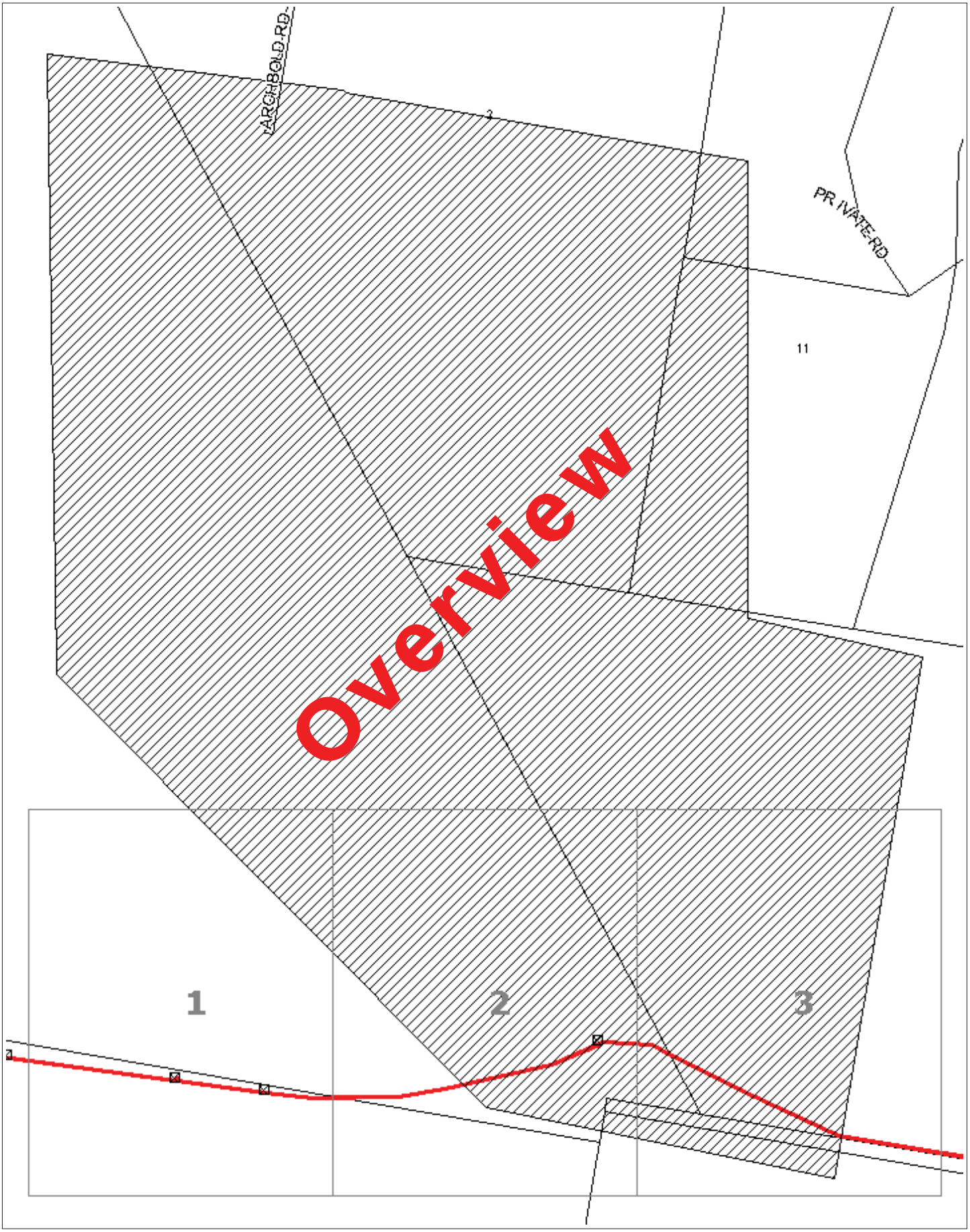

Sequence Number: 33862787

Date Generated: 06/05/2014

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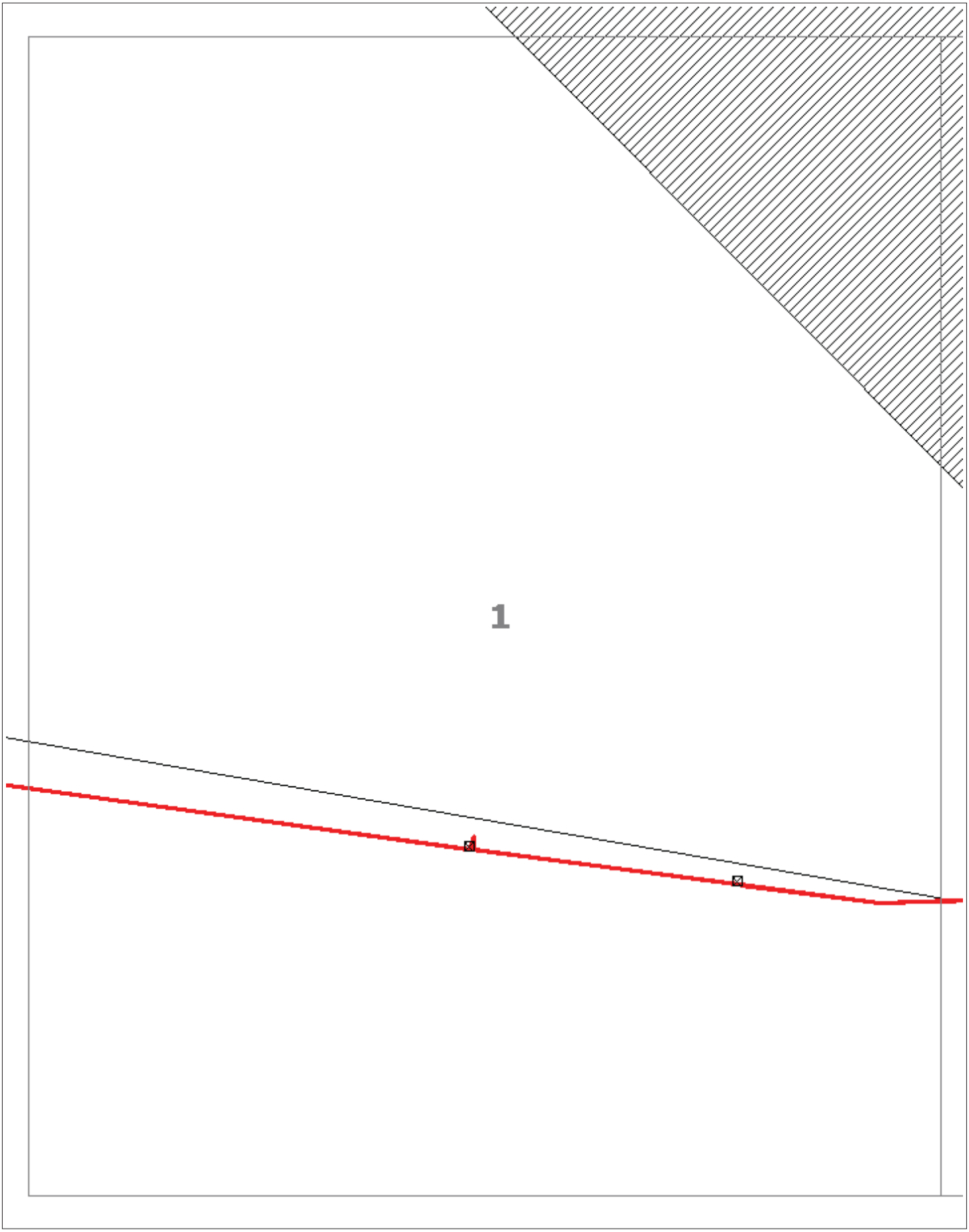
Email: Fibre.Locations@optus.net.au
For urgent onsite assistance contact 1800 505 777
Optus Limited ACN 052 833 208



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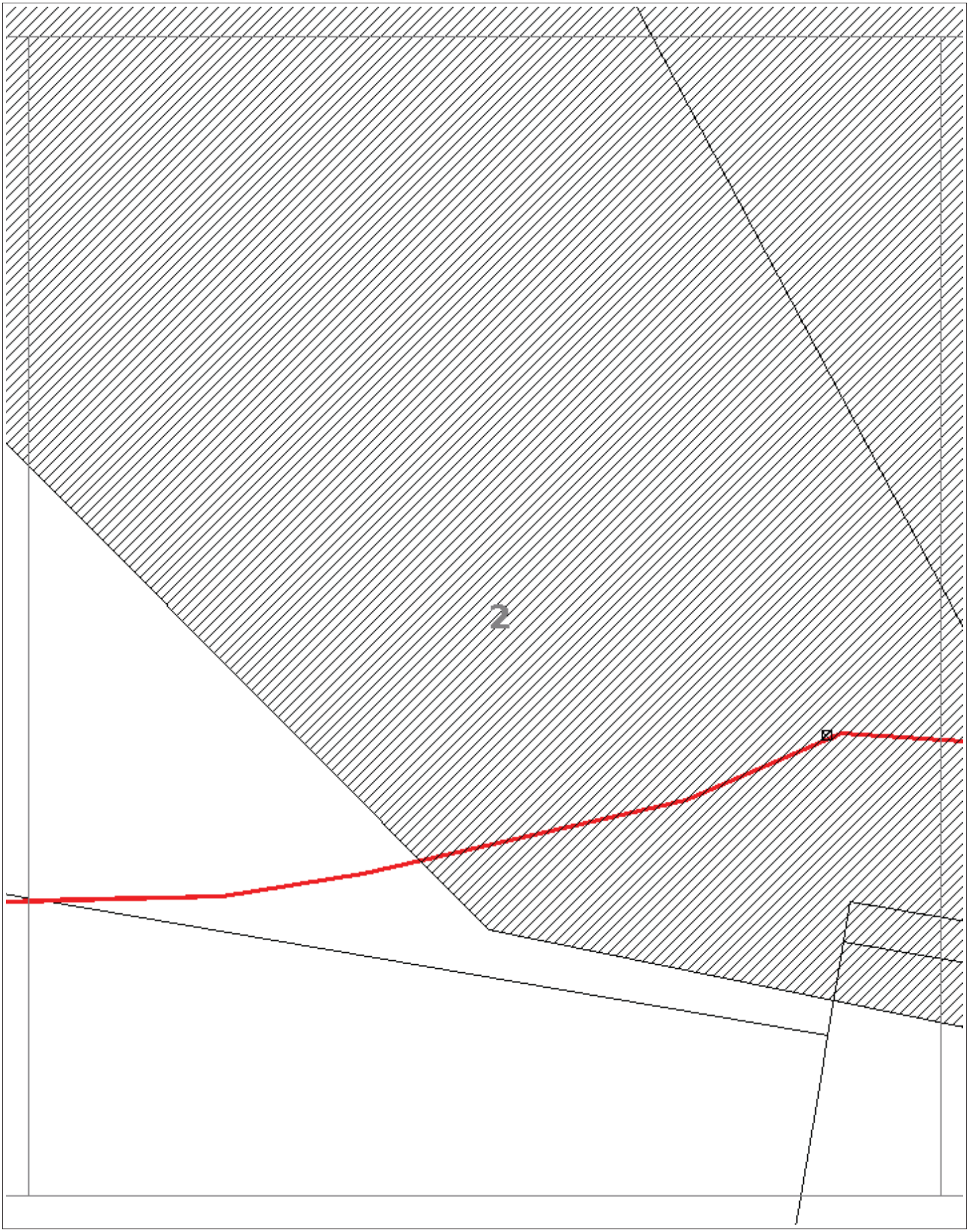

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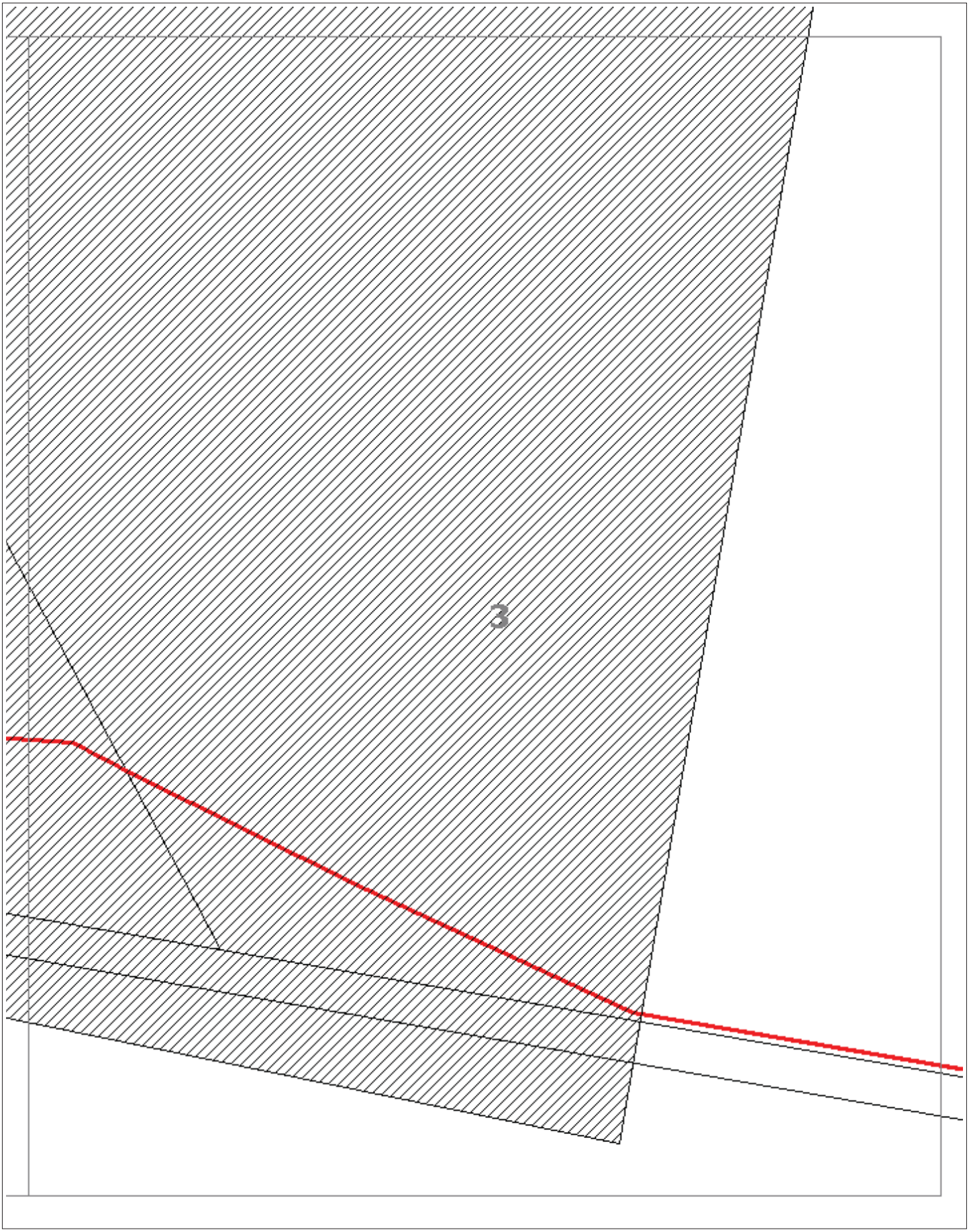

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