Westfield 400kV Substation Extension

Flood Risk Assessment

August 2026

FAIRHURST

CONTROL SHEET

CLIENT: **SP Energy Networks (SPEN)**

PROJECT TITLE: **Westfield 400kV Substation Extension**

REPORT TITLE: **Flood Risk Assessment**

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CONTENTS

1. Introduction

Fairhurst was appointed by SP Energy Networks (SPEN) to carry out a Flood Risk Assessment (FRA) for a proposed extension to the existing Westfield 275 kV Substation. The proposed development is located east of Ballingry in the Fife Council Local Authority Area (NGR: NT 19127 97661). A plan of the location of the proposed development in relation to the local area is provided in **Figure 1**.

This report forms an assessment of flood risk for the development as a whole in accordance with National Planning Framework 4 (NPF4). Flood risk at the site has primarily been assessed in relation to fluvial risk from watercourses adjacent to site; however, other potential sources of flood risk have also been considered.

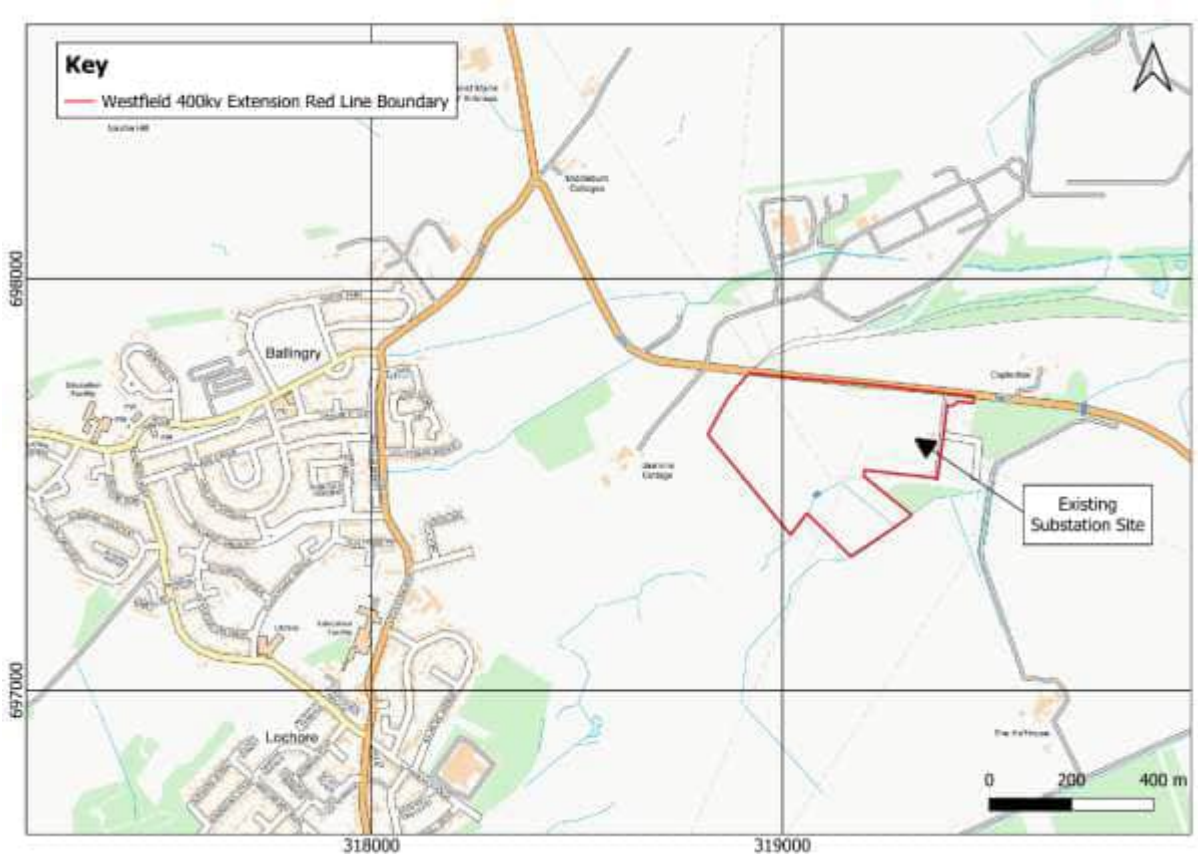


Figure 1: Site Location Plan

2. Planning Policy

2.1 National Planning Framework 4

In consideration of planning applications, planning authorities require to be satisfied that due account has been taken of NPF4, and the Scottish Government's online Planning Advice on Flood Risk. It is necessary to show that adequate protection against flooding exists or can be provided for the proposed development and that the development does not increase flood risk to others.

Policy 22 of the NPF4, Flood Risk and Water Management', sets out the requirements for development proposals at risk of flooding or in a flood risk area. The policy states:

a) *Development proposals at risk of flooding or in a flood risk area will only be supported if they are for:*

   i. *essential infrastructure where the location is required for operational reasons;*

   ii. *water compatible uses;*

   iii. *redevelopment of an existing building or site for an equal or less vulnerable use; or.*

   iv. *redevelopment of previously used sites in built up areas where the LDP has identified a need to bring these into positive use and where proposals demonstrate that long-term safety and resilience can be secured in accordance with relevant SEPA advice.*

   The protection offered by an existing formal flood protection scheme or one under construction can be taken into account when determining flood risk.

   In such cases, it will be demonstrated by the applicant that:

   - *all risks of flooding are understood and addressed;*
   - *there is no reduction in floodplain capacity, increased risk for others, or a need for future flood protection schemes;*
   - *the development remains safe and operational during floods;*
   - *flood resistant and resilient materials and construction methods are used; and*
   - *future adaptations can be made to accommodate the effects of climate change.*

   Additionally, for development proposals meeting criteria part iv), where flood risk is managed at the site rather than avoided these will also require:

   - *the first occupied/utilised floor, and the underside of the development if relevant, to be above the flood risk level and have an additional allowance for freeboard; and*
   - *that the proposal does not create an island of development and that safe access/ egress can be achieved.*

b) *Small scale extensions and alterations to existing buildings will only be supported where they will not significantly increase flood risk.*

c) *Development proposals will:*

   i. *not increase the risk of surface water flooding to others, or itself be at risk.*

   ii. *manage all rain and surface water through sustainable urban drainage systems (SUDS), which should form part of and integrate with proposed and existing blue-green infrastructure. All proposals should presume no surface water connection to the combined sewer;*

   iii. *seek to minimise the area of impermeable surface.*

NPF4 provides the following clarification: *"For planning purposes, at risk of flooding or in a flood risk area means land or built form with an annual probability of being flooded of greater than 0.5% which must include an appropriate allowance for future climate change."*

2.2 Local Planning Policy

Fife Council adopted FIFEplan (Fife's Local Development Plan) in September 2017. FIFEplan details Fife Council's vision for the entire authority area and sets out how land can be used by developers for the next 10 to 20 years. Policy 12: 'Flooding and the Water Environment' outlines the criteria that new developments must meet in terms of flooding and acceptable flood risk. FIFEplan was published prior to the release of NPF4, and therefore makes reference to the policies set out in Scottish Planning Policy (SPP). Policy 12 states:

'Assessing and mitigating flood risk

1. In applying this policy, the flood risk framework in Scottish Planning Policy will be used to assess and guide development decisions in terms of coastal and watercourse flood risk and surface water flooding. Regard should be given to the flood maps prepared by the Scottish Environment Protection Agency (SEPA). The SEPA Flood Maps provide a nationally consistent strategic tool which can be used to identify general areas at risk of flooding. Development proposals will be required to be implemented in a manner that does not cause on site, off-site, or cumulative catchment flooding. The implementation of this policy will take into account changes to flood frequency and/or severity associated with predicted climate change.

2. New development should avoid the functional floodplain and medium to high risk areas (an annual probability of coastal or watercourse flooding greater than 0.5% 1:200 years). This particularly applies to essential infrastructure and the most vulnerable uses. If essential infrastructure or the most vulnerable uses are proposed in areas where the risk of flooding is 0.1% (1:1,000 years) or greater a flood risk assessment will be required. Low to medium risk areas (where annual probability of flooding is between 0.1% and 0.5% or 1:1,000 years to 1:200 years) are generally not suitable for civil infrastructure.

3. Development will be required to use water-resistant materials and construction where appropriate.

4. Development which has a detrimental impact on a functional floodplain will not be supported. However, some areas of the functional flood plain are already developed and so new development in the functional floodplain will require to be assessed against advice and the flood risk framework in *Scottish Planning Policy*.

5. In applying this policy, the Council expects that new development will not result in an increase in the vulnerability of a site to flooding. Land Use Vulnerability Guidance prepared by the Scottish Environment Protection Agency (SEPA) provides a framework to assist the assessment of vulnerability of different types of land use to the impact of flooding, from most vulnerable uses to water compatible uses. This guidance will be used alongside the SPP risk framework in considering where a change of use may increase vulnerability to flood risk by imposing greater risks.

Water Conveyance and Surface Water Flooding

6. In assessing flood risk, development proposals will be expected to show they will have a neutral or better effect on the capacity of flood storage or conveyance areas, and on the flow of a watercourse channel.

7. Development will be encouraged to provide drainage solutions that avoid excessive channel modification, excepting works aimed at achieving more natural watercourses and wetlands or that have a beneficial effect on the management of flood risk. Previously

culverted watercourses should be opened out whenever possible. Redundant water engineering installations should be removed provided that no increase in flood risk elsewhere has been demonstrated. Drainage assessments, for foul and surface water, may be required in areas of constrained drainage. Sustainable drainage systems (SuDS) should be well designed and maintained to provide adequate solutions for proposed development.

8. If detrimental impacts are identified then a solution must be agreed with the Council prior to permission being granted. Developers will in some instances be required to provide contributions to address settlement wide flooding issues which their development will impact on. These are highlighted in the settlement proposals tables.'

Policy 12 also includes additional requirements in relation to impacts on the water environment and coastal development and erosion. Buffer strips must be provided around all watercourses and still water.

2.3 SPEN Substation Flood Resilience Policy

Per the Technical Specification for the project, the proposed substation extension must be designed in accordance with the requirements of SPEN's Substation Flood Resilience Policy, as applicable to substations at all voltages within SP Energy Networks. This policy requires the following for grid and primary substations (i.e., those with an operating voltage at, or in excess of, 33kV):

- New substation sites:
    - The general approach to protecting equipment will be to construct the site outside of a flood risk area. If this is not reasonably practicable, the approach to protecting plant, and equipment, will be to construct the site, or install the plant and equipment, above the design flood level as set out within this policy, including freeboard where applicable. The relevant levels are:
        - **Design Flood Level:** 1 in 1000 year flood risk return period, with allowance for climate change.
        - **Minimum Freeboard:** 600 mm above the design flood level, to account for uncertainties in data modelling and local effects of flooding such as wind induced waves.
- Existing substation sites:
    - A variety of flood protection measures will be used as appropriate, to protect existing equipment to the design flood level. Any flood protection installed on existing substations shall be designed and constructed to protect against the design flood level as set out within this policy, including freeboard where applicable. The relevant design levels are the same as for new substation sites, detailed above.

2.4 SEPA Guidance

The following SEPA Guidance has been taken into account in this Flood Risk Assessment:

- Flood risk and land use vulnerability guidance (July 2024)
- Flood risk standing advice for planning authorities (July 2024)
- Climate change allowances for flood risk assessments in land use planning (February 2025)

3. Development Site

3.1 Existing Conditions

The proposed extension site is located to the west of the existing Westfield Substation and covers a total area of approximately 16.7 hectares (ha), as illustrated in **Figure 2**. Site access is from the B9097 to the north.

A topographical survey was carried out by L&M Survey Services in January 2025 for the site area, as shown on Drawing No. '*16866*' Sheet 1 to 15 in **Appendix A**. The site is located above 82 metres Above Ordnance Datum (mAOD) and is bounded to the west and south by agricultural land, to the north by the B9097, and to the east by the existing Westfield Substation. Ground levels within the site generally slope down from west to east and south-east. The B9097 is sited on an embankment which is raised above adjacent ground levels.

A cross-sectional survey was carried out by Aspect in March 2024 of the watercourses in the vicinity of the site, as shown on Drawing No. '*A9483*' in **Appendix A**. Two unnamed watercourses are shown to the south of the site. Watercourse 1 (**Figure 2**) flows from south-west to north-east, parallel to the site boundary, then turns to flow south-east before discharging into Watercourse 2. There is a short culvert section shown on this Watercourse 1. Following the confluence, Watercourse 2 continues in a north-easterly direction and is subsequently culverted under the B9097.

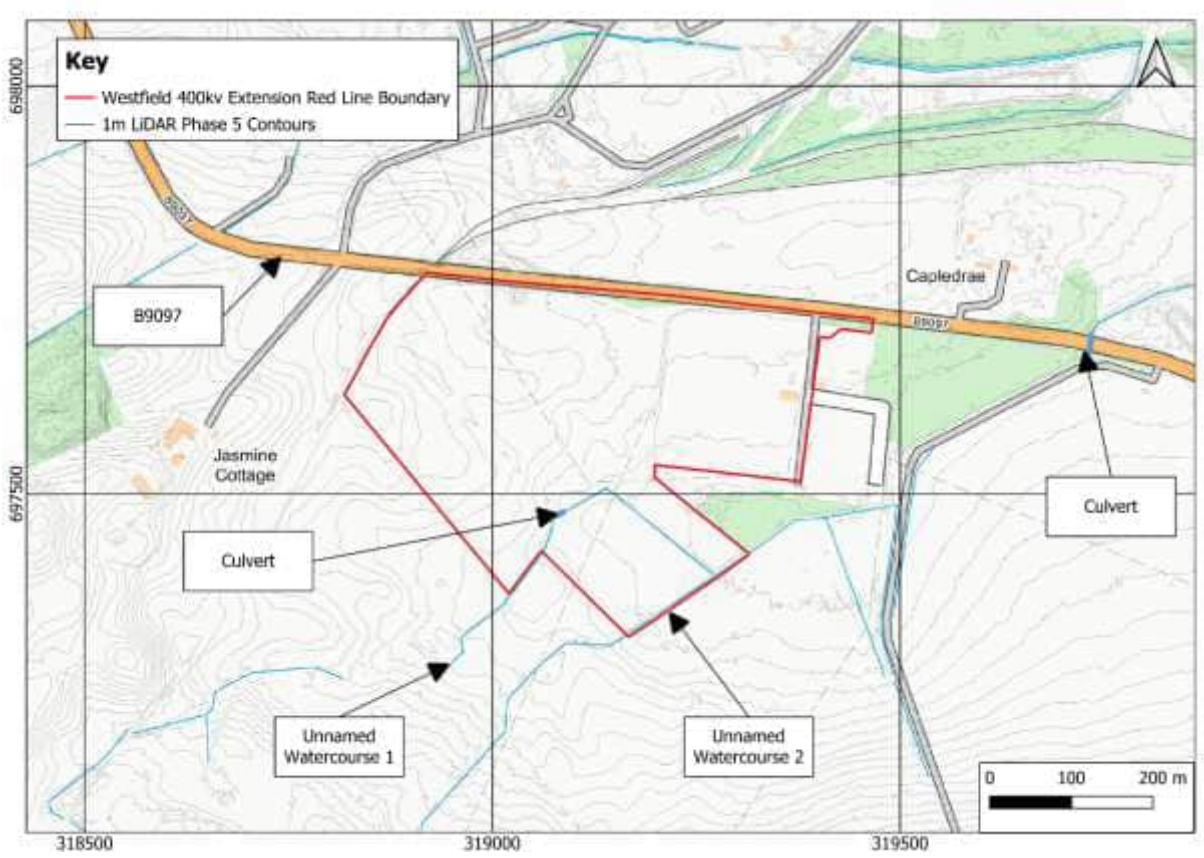


Figure 2: Existing Conditions

3.2 Proposed Development

The proposed development comprises the 400kV extension to the existing 275/132kV Westfield substation and the decommissioning of the 275kV elements of the existing Westfield Substation. The proposed Westfield 400kV Substation Extension is located immediately west of the existing 275/132kV Westfield Substation at central grid reference 319213, 697641.

The Westfield Substation Extension will include the installation of five 400/132kV transformers and one 400/275kV transformer. The proposed development will utilise Gas Insulated Switchgear (GIS) (with a non-SF6 dielectric gas) to house different electrical devices to switch, separate, transform, measure and distribute electricity. There will be a GIS building to house the 400kV GIS Switchgear and associated protection and control equipment. Other necessary electrical infrastructure will include earth switches, surge arresters, current and capacitive voltage transformers, and post insulators. In addition, there will be auxiliary systems and equipment, including for example distribution boards, a standby diesel generator and fuel tank (which will be integrally bunded), fuse boxes etc.

The proposed development layout is shown in **Appendix A**. The minimum proposed finished platform level is indicated to be 88.60 mAOD. A SuDS (Sustainable Drainage System) basin is proposed to be located immediately south-east of the platform. To accommodate this SuDS feature, Unnamed Watercourse 1 will be realigned around the eastern and southern perimeter of the basin, before reconnecting to the existing channel downstream of the SuDS basin. This is discussed further in **Section 5.2**.

3.3 Sources of Flood Risk Information

3.3.1 SEPA Flood Maps

SEPA's flood maps provide guidance on the possible extent, depth and velocity for different likelihoods ('High, Medium and Low') of fluvial, coastal and pluvial flooding, alongside various associated information. These maps are a strategic planning tool, the resolution of which does not take account of individual hydraulic structures or drainage infrastructure. These provide indicative flood risk information, rather than site-specific detail.

The SEPA flood maps indicate that the site lies outwith the flood risk areas associated with fluvial and coastal flooding. The SEPA flood maps indicate that the site may be at risk from pluvial flooding. Areas of low to high likelihood surface water flood risk are shown within the site area, associated with low-points in the topography, around the south-eastern and northern boundaries of the proposed development site.

Whilst the flood maps can be a useful tool for initially considering whether a site may be at risk of flooding, the following caveat is attached to their use:

> *"The Flood Maps are indicative and of a strategic nature. Whilst all reasonable effort has been made to ensure that the Flood Maps are accurate for their intended purpose, no warranty is given by SEPA in this regard… It is inappropriate for these Flood Maps to be used to assess flood risk to an individual property."*

More detailed analysis is required to fully understand the flood risk to any development site and is provided in **Section 5** of this report.

3.3.2 SEPA Reservoirs Map

In order to implement the Reservoirs (Scotland) Act 2011, SEPA produced reservoir inundation maps (RIMs). These maps illustrate the areas likely to be flooded by an uncontrolled release of water from a reservoir with storage volume of 25,000 m^3 or more. The RIMs indicate that the proposed development site is not at risk from reservoir breach inundation.

4. Potential Sources of Flood Risk

There are several potential sources of flooding that require consideration:

- **Coastal flooding:** Extreme sea levels and coastal waves have the potential to cause rapid inundation of a development, posing a threat to the welfare of occupants and potentially preventing emergency access to properties and essential infrastructure.
- **Fluvial flows:** Extreme fluvial flood events have the potential to cause rapid inundation of a development, posing a threat to the welfare of occupants and potentially preventing emergency access to properties and essential infrastructure.
- **Pluvial Overland flow:** Overland flow occurs when the infiltration capacity of the ground is exceeded in a storm event. This could result in water travelling as sheet flow overland or excess water being conveyed from one location to another via local road networks.
- **Infrastructure failure:** The failure of conveyance infrastructure such as culverts or bridges, or the failure of any man-made water storage or conveyance infrastructure that could increase the risk of flooding at the site.
- **Sewer flooding:** If the capacity of sewers is exceeded in an extreme event, or a blockage occurs, surcharging of the network can result in surface flooding. The local drainage network should be considered with a view to assessing flood risk to the site.
- **Groundwater:** High groundwater levels could exacerbate flooding occurring at low points on any given site, potentially contributing to flood risk from other sources.

5. Flood Risk Analysis

Potential sources of flood risk identified for consideration in **Section 4** are discussed below.

5.1 Coastal Flooding

The proposed development is located over 10 km from the nearest coast and over 80 mAOD. The inland location and elevation of the site mean it is not at risk from tidal inundation or coastal waves.

5.2 Fluvial Flows

The primary source of flood risk to the proposed site is fluvial flows from the two unnamed watercourses identified in the vicinity of the site. Hydraulic modelling of the watercourses has been undertaken to provide a quantitative assessment of the fluvial flood risk to the proposed development. Details of the hydrology and hydraulic model are provided in **Appendix B** and **Appendix C**.

Consideration has been made of both the 1 in 200 year plus climate change (+CC) event – in line with NPF4 requirements – and the 1 in 1000 year +CC event – in line with SPEN's Substation Flood Resilience Policy (see **Section 2.3**).

5.2.1 1 in 200 Year +CC Event

The results of the hydraulic modelling study for the 1 in 200 year +CC event are fully presented in **Appendix C**, with associated flood extents provided in **Appendix D**.

The hydraulic modelling results indicate the peak flood level within the vicinity of the site would be 85.08 mAOD. The proposed substation platform is located entirely outwith the area at risk of flooding in a 1 in 200 year +CC event.

A SuDS (Sustainable Drainage System) basin is proposed to be located immediately south-east of the platform within the current area at risk of flooding. To accommodate this SuDS feature, it is proposed that Unnamed Watercourse 1 will be realigned around the eastern and southern perimeter of the basin, before reconnecting to the existing channel downstream of the SuDS basin. The SuDS basin and watercourse realignment will be be designed to ensure that there is no loss of floodplain capacity and no increase in flood risk for others.

It is intended that the optimal diversion design and its flood risk implications will be determined during the detailed design phase, taking on board comments and requirements stipulated by SEPA and the local authority following the Planning Permission in Principal consultation.

5.2.2 1 in 1000 Year +CC Event

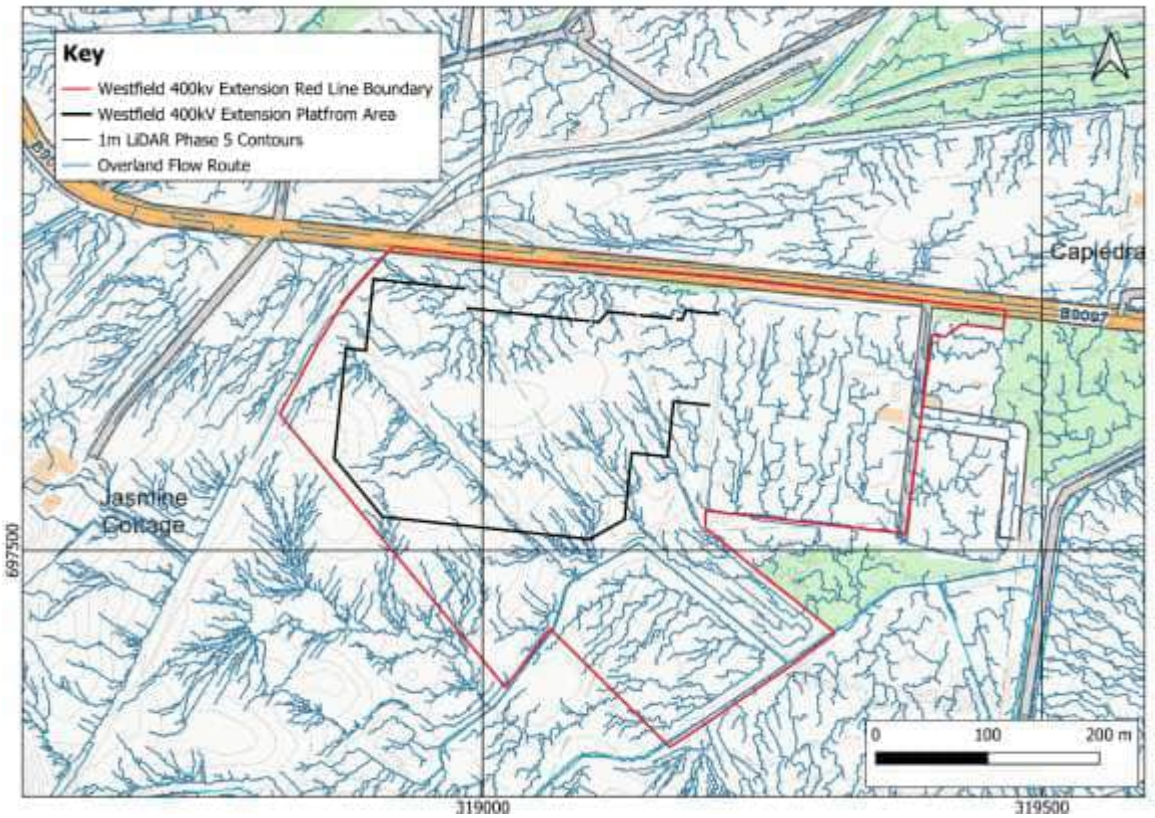
The results of the hydraulic modelling study for the 1 in 1000 year +CC event are fully presented in **Appendix C**, with associated flood extents provided in **Appendix D**. The hydraulic modelling results indicate the peak flood level within the vicinity of the site would be 85.13 mAOD during the 1 in 1000 year +CC event.

To accord with SPEN's Substation Flood Resilience Policy platform levels and / or vulnerable plant items and equipment should be located a minimum of 600 mm above the 1 in 1000 year +CC flood level. The proposed finished platform level (**Appendix A**) is 88.60 mAOD, while peak water level

within the vicinity of the site is 85.08 mAOD. Therefore, the proposed finished platform level is sufficient to provide the required freeboard.

5.3 Pluvial Overland Flow

Potential overland flow routes through the development site have been assessed using QGIS watershed analysis tools, Lidar Phase 5 and topographic survey data. Flow routes are shown in blue in **Figure 3**.



Contains Phase 5 LiDAR and Ordnance Survey data © Crown copyright and database rights 2024

Figure 3: Overland Flow Routes

The assessment indicates that local areas to the west and south slope towards the site and the associated surface water runoff would discharge into either Watercourse 1 or Watercourse 2.

Surface water flow generated within the site will be dealt with by a dedicated drainage system, designed to appropriate standards and incorporating Sustainable Drainage Systems (SuDS). The development proposes a SuDS basin to be located immediately south-east of the platform (**Appendix A**), which will be designed to limit discharge rates to the greenfield runoff rates and avoid increase in runoff to receptors elsewhere.

Residual flood risk will be mitigated by profiling ground levels to route flow around and away from vulnerable equipment, and by setting vulnerable equipment above surrounding ground.

5.4 Infrastructure Failure

In the event that structures along adjacent watercourse channels become blocked, there is the potential for flood levels upstream of these structures to increase, resulting in an increase in fluvial flood risk.

The topographic survey indicates that Watercourse 1 is culverted via a 0.8 m dia. pipe as indicated on **Figure 2**. This is assumed to provide access between the farm fields. Watercourse 2 is culverted underneath the B9097 via a 1.70 m diameter culvert.

Hydraulic modelling to test the impact of culvert blockage was therefore undertaken by omitting these crossings within the model, essentially representing a 100% blockage scenario. Details of the parameters used in the hydraulic modelling are provided in **Appendix C** and a summary of the results is provided below.

In the event of 100% blockage of these culverts, peak water levels at the site would be 85.10 mAOD during the 1 in 200 +CC event and 85.14 mAOD during the 1 in 1000 +CC flood event. The proposed finished platform level of 88.60 mAOD is sufficient to protect against the flood risk associated with culvert blockage.

The SEPA RIM does not show the site to be at risk in the event of an uncontrolled release of water from any reservoir covered by the Reservoirs (Scotland) Act 2011, and no other sources of infrastructure failure have been identified as potentially contributing to flood risk at the site.

5.5 Sewer Flooding

Sewer flooding can occur when prolonged or heavy rainfall exceeds the capacity of the sewer network, or if the sewer network becomes blocked.

Review of the Scottish Water Asset Database indicates that there are no Scottish Water assets within the vicinity of the site. SPEN drawings indicate that existing drainage infrastructure is located within the existing substation.

Should the capacity of any drainage/sewer infrastructure present on site be exceeded, associated flood waters can be managed by profiling ground levels to route flow around and away from vulnerable equipment, and by setting vulnerable equipment above surrounding ground. Furthermore, currently the existing Substation platform is located at a lower elevation than the proposed extension site, which would further limit the potential for sewer flooding to affect the new substation platform. Provided appropriate mitigation is implemented, the risk of flooding from sewer flow is considered to be low.

5.6 Groundwater Flooding

Groundwater is generally a contributing factor to flooding rather than the primary source. SEPA flood maps indicate areas where groundwater could influence the duration and extent of flooding from other sources. The proposed site is situated outwith groundwater influenced flood extents shown on these maps. Groundwater below the site is likely to be in hydraulic connectivity with the unnamed watercourses in the vicinity of the site. This is expected to limit the potential for emerging above ground on the site, which is at a higher elevation than the watercourse.

Groundwater flooding is, therefore, considered unlikely. In the event groundwater levels exceed the ground levels at the site, the excess water would follow the same flow patterns as for overland flow.

Residual risk from this source of flooding can be mitigated by setting vulnerable equipment above surrounding ground and profiling ground levels to route flood water around and away from buildings.

6. Conclusion and Recommendations

Fairhurst was appointed by SP Energy Networks (SPEN) to carry out a Flood Risk Assessment (FRA) for a proposed extension at the existing Westfield 275 kV Substation. Flood risk at the site has been primarily assessed in relation to pluvial flood risk; however, other potential sources of flooding have also been considered.

A 2D hydraulic model of the development area was constructed to quantify the fluvial flood risk to the proposed site. Results indicate that peak water levels at the site are 85.08 mAOD during the 1 in 200 year +CC event, and 85.13 mAOD during the 1 in 1000 year +CC event. The associated flood extents are shown on Drawings 165612/GIS/01 and 165612/GIS/02 in **Appendix D**.

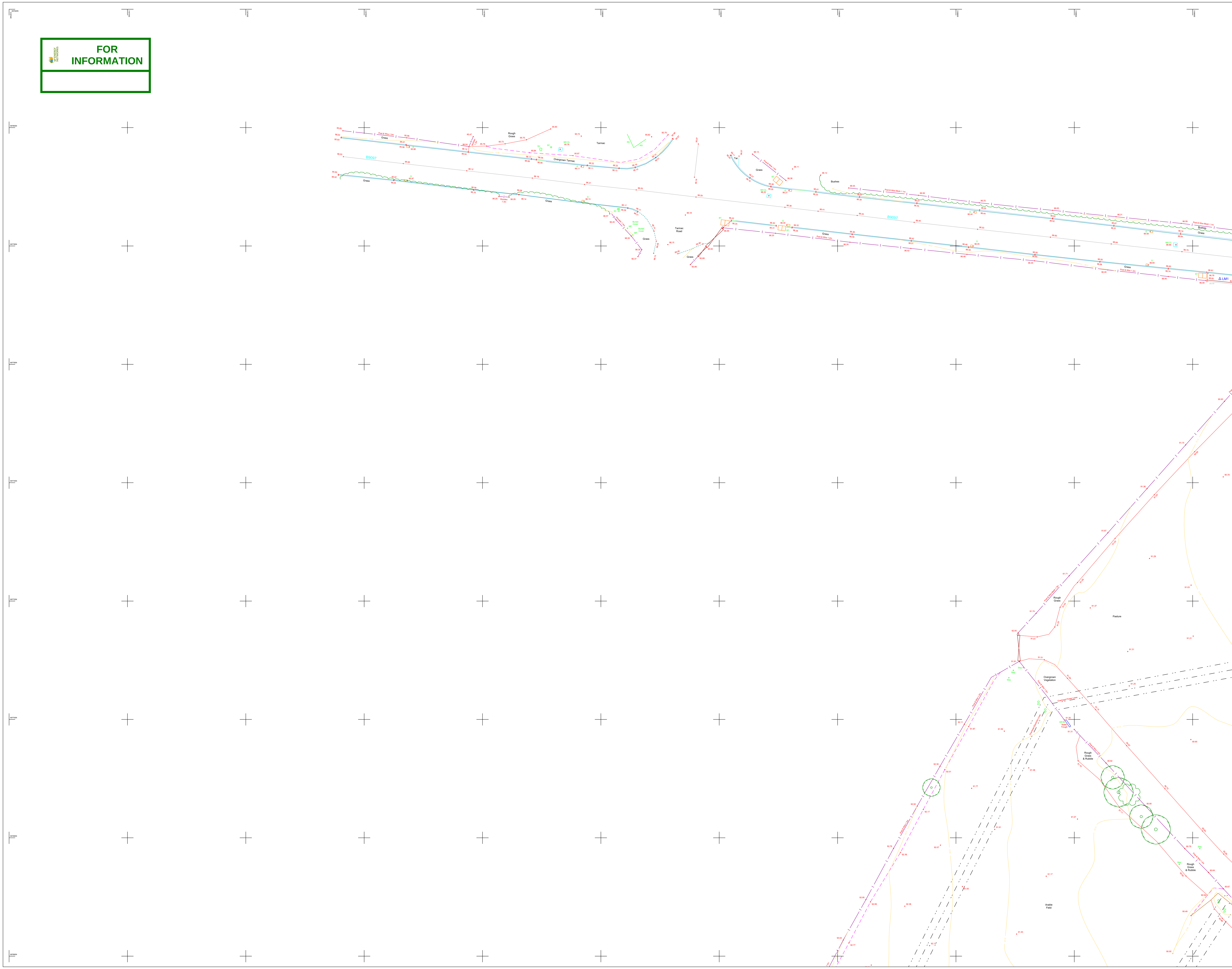
The proposed substation platform is located entirely outwith the area at risk of flooding in a 1 in 200 year +CC event. A SuDS (Sustainable Drainage System) basin is proposed to be located immediately south-east of the platform within the current area at risk of flooding. To accommodate this SuDS feature, it is proposed that Unnamed Watercourse 1 will be realigned around the eastern and southern perimeter of the basin, before reconnecting to the existing channel downstream of the SuDS basin. The SuDS basin and watercourse realignment should be designed to ensure that there is no loss of floodplain capacity and no increase in flood risk for others.

To accord with SPEN's Substation Flood Resilience Policy platform levels and / or vulnerable plant items and equipment should be located a minimum of 600 mm above the 1 in 1000 year +CC flood level. The proposed finished platform level (**Appendix A**) is 88.60 mAOD, while peak water level within the vicinity of the site is 85.08 mAOD. Therefore, the proposed finished platform level is sufficient to provide the required freeboard.

Flood risk from other sources, including coastal flooding, pluvial, groundwater, infrastructure failure and sewer flooding is considered to be low, and with appropriate mitigation of the fluvial flood risk, as outlined above, the proposed Substation extension is considered suitable under NPF4.

Appendix A

Drawings




LEGEND
Contour
Prominent Contour
Kerb
Low Kerb
Road Verge
Back of Footpath
Crash Barrier
Wall
Wall (To scale)
Wall Overhang
Concrete Base
Steps
Fence
Gate
Building
Building Minor
Building Overhang
Soffit Line
Top of bank
Bottom of bank
Change of Surface
Tactile Paving
Track (To scale)
Ditch
Water Line
Rock Outcrop
Hedge (To scale)
Foliage
Tree Area
Tree
Bush
Pipeline
Channel (To scale)
Overhead Line
Seat
Junction / Location Box
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Check Rail
Coping Edge
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Switch
Switch Equipment
Track Warning System
Twist Location
Clip
Missing Clip
Air Valve
Bed Level
Borehole
Rubbish Bin
Bollard
Bus Stop
British Telecom
Cable T.V.
Cable Riser
Camera
Culvert
Down Pipe
Drain
Electricity Pole
Earth Rod
Fire Hydrant
Floor Level
Gully
Gas Pipe
Gas Riser
Gas Valve
Inspection Cover Small
Inspection Cover Large
Invert Level
Illuminated Road Sign
Kerb Outlet
Lamp Post
Lifebelt
Meter
Circular Manhole
Manhole
Triangular Manhole
Monitor
Mooring Post
Marker Post
Post
Post Box
Pipe
Trial Pit
Rodding Eye
Road Sign
Spot Level
Stop Cock
Stay
Telephone
Tree Stump
Threshold Level
Telegraph Pole
Traffic Signal
Water Level
Axle Counter
Cant Marker
Crossing Nose
Expansion Joint
Flash Butt Weld
Insulated Joint
Mileage Marker
Non Insulated Joint
Thermic Weld
Eaves Level
Ridge Level

CONTROL STATION COORDINATES

STN	EASTING	NORTHING	LEVEL
LM1	318904.601	697774.443	96.829
LM2	319047.907	697766.068	93.818
LM3	319178.381	697747.249	89.741
LM4	319264.849	697745.892	87.671
LM5	319402.163	697721.038	86.348
LM6	319561.869	697710.260	85.107
LM7	319750.625	697677.018	84.573
LM8	319679.444	697632.863	82.846
LM9	319511.267	697546.629	83.292
LM10	319448.542	697470.747	83.118
LM11	319418.076	697434.866	82.938
LM12	319304.478	697425.262	82.811
LM13	319197.167	697522.318	84.097
LM14	319086.686	697684.045	88.840
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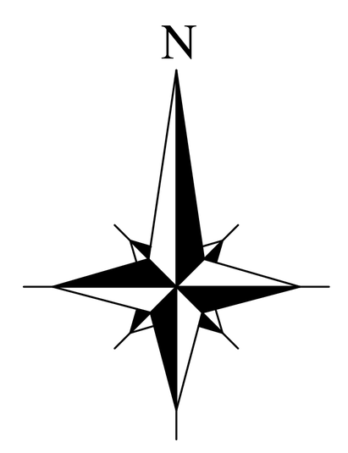

INDICATIVE OF NORTH

Notes:

All levels shown are relative to the O.S. active GPS network (OSGM15).

The co-ordinates shown on this plan are relative to the O.S. active GPS network (OSTN15).
The survey is orientated approximately to grid north.

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LAND • RAIL • UTILITY

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Client :

SP ENERGY NETWORKS
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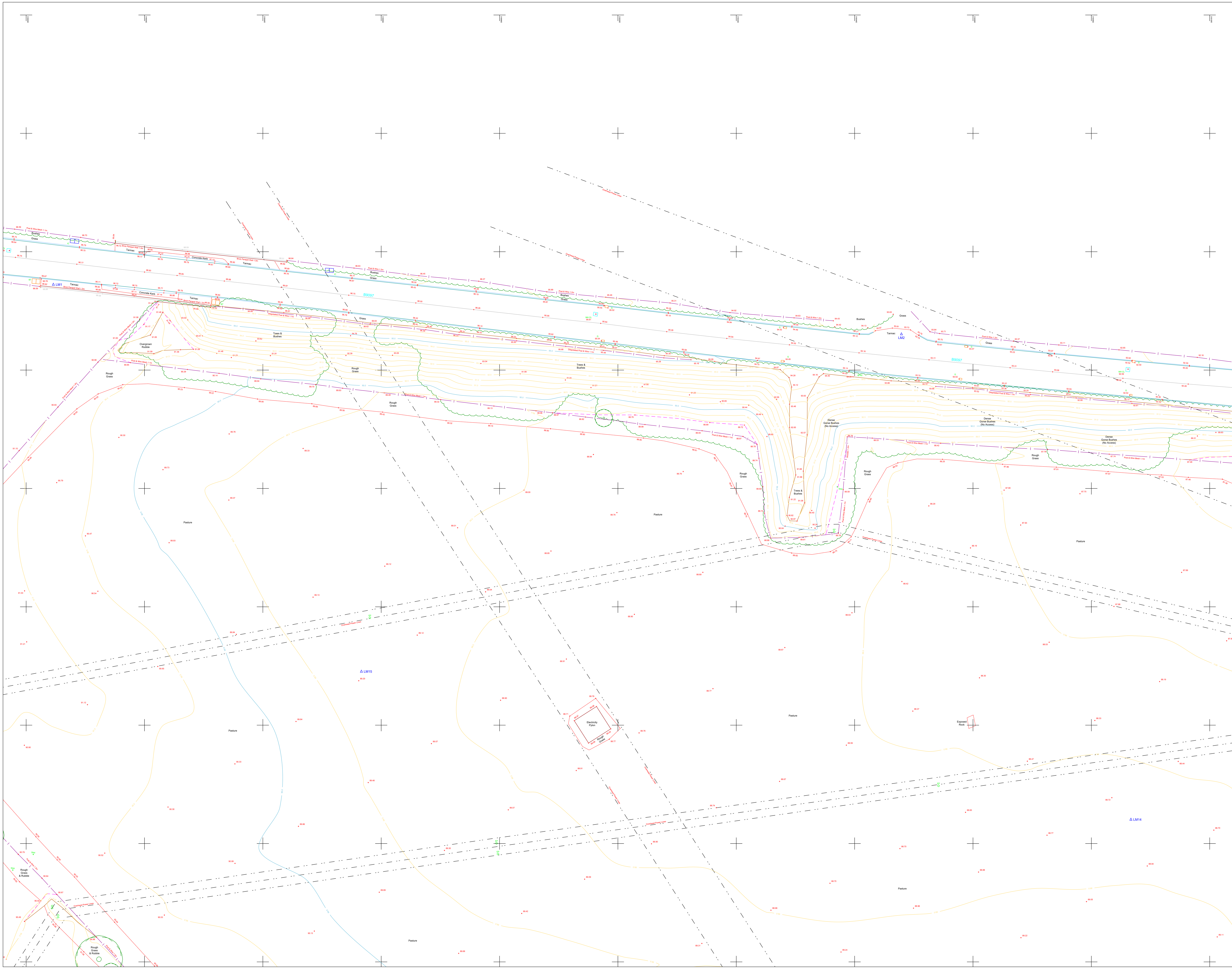
55 FULLERTON DRIVE
CAMBUSLANG, G32 8FA

Project Title :

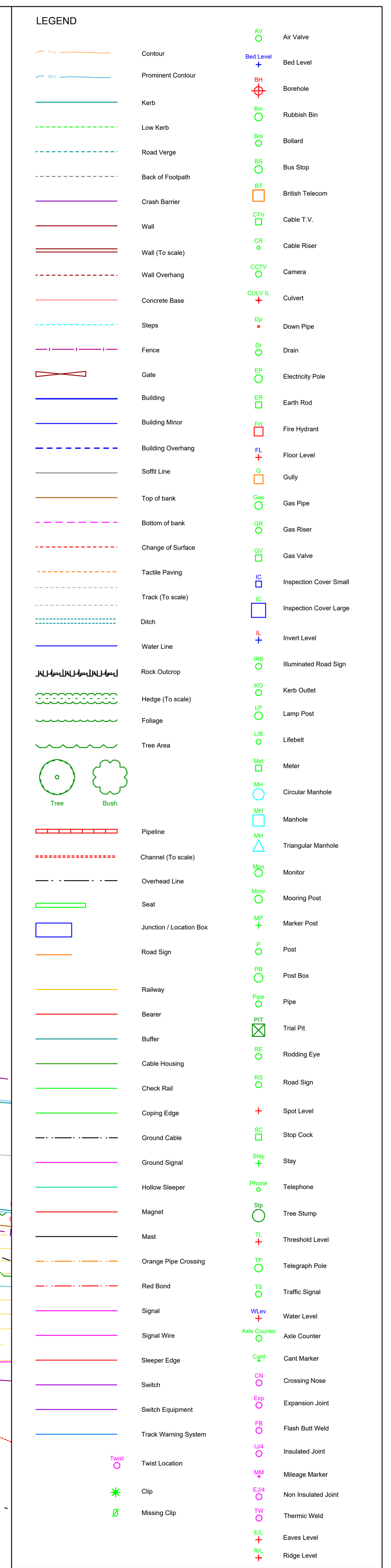
TOPOGRAPHICAL SURVEY
KINCARDINE TO TEALING
WESTFIELD
FIFE

Sheet Title :		Scale :	
SHEET 1 OF 15		1:200	
Surveyed date : 23/01/25	Issued date : 29/01/25	Enquiry No : 29907	Project No : 16866
Surveyed by : GB/CAA/SP	Processed by : GB/SP	Checked by : SMcM	Approved by : KRJA

A0 Sheet



LEGEND



CONTROL STATION COORDINATES

STN	EASTING	NORTHING	LEVEL
LM1	318904.601	697774.443	96.829
LM2	319047.907	697766.068	93.818
LM3	319178.381	697747.249	89.741
LM4	319264.849	697745.892	87.671
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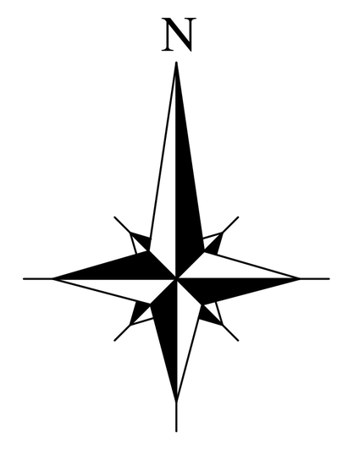
LM14	319086.686	697684.045	88.840
LM15	318956.654	697709.061	89.414
LM14A	319220.482	697728.169	87.664
LM14B	319204.910	697621.242	86.336



INDICATIVE OF NORTH

Notes:

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Email: info@lmsurveys.co.uk

Client :

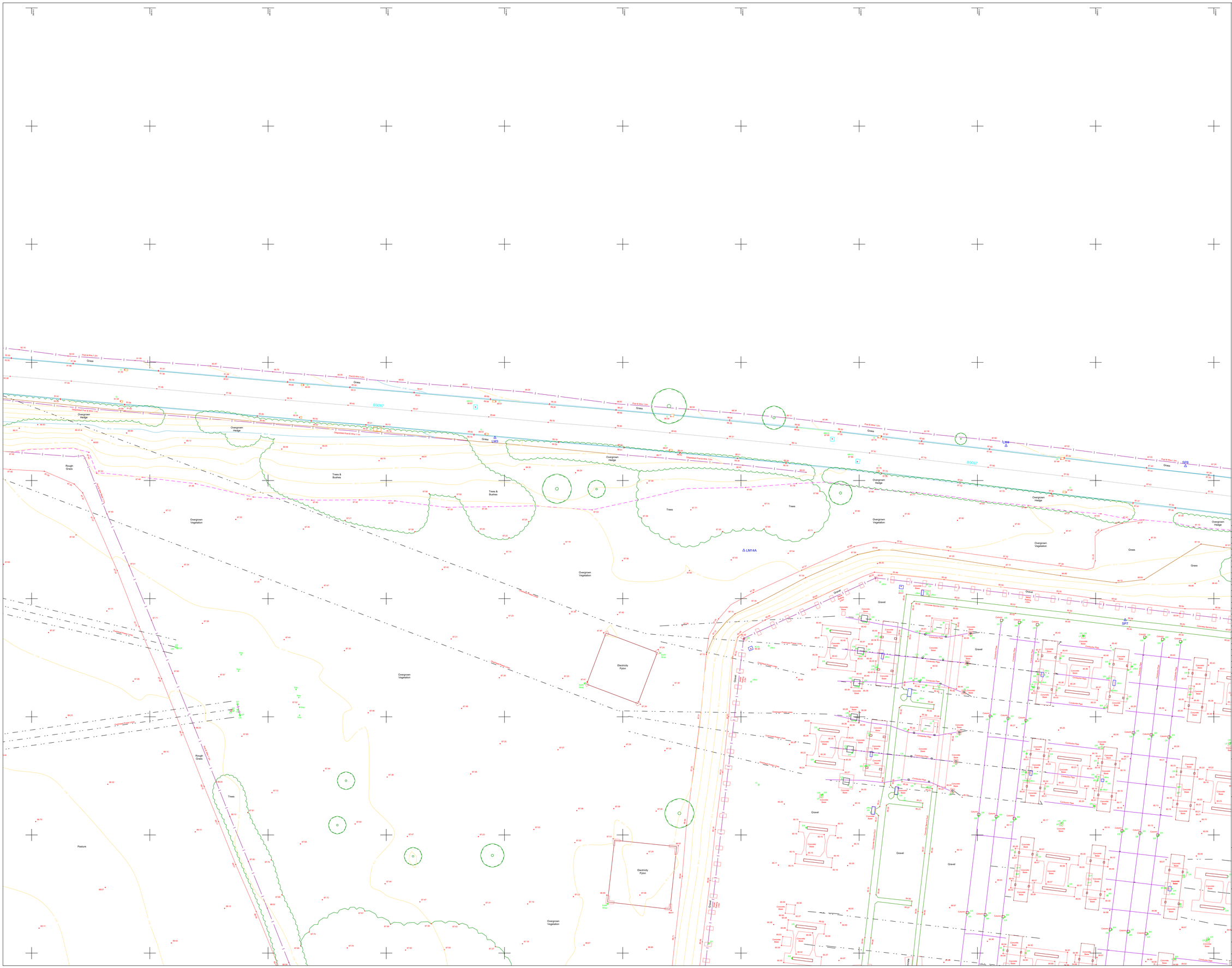
SP ENERGY NETWORKS
CAMBUSLANG DEPOT
55 FULLERTON DRIVE
CAMBUSLANG, G32 8FA

Project Title :

TOPOGRAPHICAL SURVEY
KINCARDINE TO TEALING
WESTFIELD
FIFE

Sheet Title :		Scale :	
SHEET 2 OF 15		1:200	
Surveyed date : 23/01/25	Issued date : 29/01/25	Enquiry No : 29907	Project No : 16866
Surveyed by : GB/CAA/SP	Processed by : GB/SP	Checked by : SMcM	Approved by : KRJA

A0 Sheet



LEGEND

Contour
Prominent Contour
Kerb
Low Kerb
Road Verge
Back of Footpath
Crash Barrier
Wall
Wall (To scale)
Wall Overhang
Concrete Base
Steps
Fence
Gate
Building
Building Minor
Building Overhang
Soffit Line
Top of bank
Bottom of bank
Change of Surface
Tactile Paving
Track (To scale)
Ditch
Water Line
Rock Outcrop
Hedge (To scale)
Foliage
Tree Area
Tree
Bush
Pipeline
Channel (To scale)
Overhead Line
Seat
Junction / Location Box
Road Sign
Railway
Beaver
Buffer
Cable Housing
Check Rail
Coping Edge
Ground Cable
Ground Signal
Hollow Sleeper
Magnet
Mast
Orange Pipe Crossing
Red Bond
Signal
Signal Wire
Sleeper Edge
Switch
Switch Equipment
Track Warning System
Twist Location
Clip
Missing Clip

Air Valve
Bed Level
Borehole
Rubbish Bin
Bollard
Bus Stop
British Telecom
Cable T.V.
Cable Riser
Camera
Culvert
Down Pipe
Drain
Electricity Pole
Earth Rod
Fire Hydrant
Flow Level
Gully
Gas Pipe
Gas Riser
Gas Valve
Inspection Cover Small
Inspection Cover Large
Invert Level
Illuminated Road Sign
Kerb Outlet
Lamp Post
Lifebelt
Meter
Circular Manhole
Manhole
Triangular Manhole
Monitor
Mooring Post
Marker Post
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Pipe
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Threshold Level
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Traffic Signal
Water Level
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Expansion Joint
Flash Butt Weld
Insulated Joint
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Non Insulated Joint
Thermic Weld
Eaves Level
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CONTROL STATION COORDINATES

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Doncaster
7 Balkholt Grove, Doncaster
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Tel: 01302 370741 Fax: 01563 533309
Email: info@lmsurveys.co.uk

Client:
SP ENERGY NETWORKS
CAMBUSLANG DEPOT
55 FULLERTON DRIVE
CAMBUSLANG, G32 8FA

Project Title:
TOPOGRAPHICAL SURVEY
KINCARDINE TO TEALING
WESTFIELD
FIFE

Sheet Title:		Scale:	
SHEET 3 OF 15		1:200	
Surveyed date:	Issued date:	Enquiry No:	Project No:
23/01/25	29/01/25	29907	16866
Surveyed by:	Processed by:	Checked by:	Approved by:
GB/CAA/SP	GB/SP	SM/cM	KRJA

A0 Sheet

LEGEND

- Contour
- Prominent Contour
- Kerb
- Low Kerb
- Road Verge
- Back of Footpath
- Crash Barrier
- Wall
- Wall (To scale)
- Wall Overhang
- Concrete Base
- Steps
- Fence
- Gate
- Building
- Building Minor
- Building Overhang
- Soffit Line
- Top of bank
- Bottom of bank
- Change of Surface
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- Track (To scale)
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- Water Line
- Rock Outcrop
- Hedge (To scale)
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- Tree
- Bush
- Pipeline
- Channel (To scale)
- Overhead Line
- Seat
- Junction / Location Box
- Road Sign
- Railway
- Bearer
- Buffer
- Cable Housing
- Check Rail
- Coping Edge
- Ground Cable
- Ground Signal
- Hollow Sleeper
- Magnet
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- Signal
- Signal Wire
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- Switch
- Switch Equipment
- Track Warning System
- Twist Location
- Clip
- Missing Clip
- Air Valve
- Bed Level
- Borehole
- Rubbish Bin
- Bollard
- Bus Stop
- British Telecom
- Cable T.V.
- Cable Riser
- Camera
- Culvert
- Down Pipe
- Drain
- Electricity Pole
- Earth Rod
- Fire Hydrant
- Finse Level
- Gully
- Gas Pipe
- Gas Riser
- Gas Valve
- Inspection Cover Small
- Inspection Cover Large
- Invert Level
- Illuminated Road Sign
- Kerb Outlet
- Lamp Post
- Lifebelt
- Meter
- Circular Manhole
- Manhole
- Triangular Manhole
- Monitor
- Mooring Post
- Marker Post
- Post
- Post Box
- Pipe
- Trial Pit
- Robbing Eye
- Road Sign
- Spot Level
- Stop Cock
- Stay
- Telephone
- Tree Stump
- Threshold Level
- Telegraph Pole
- Traffic Signal
- Water Level
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CONTROL STATION COORDINATES

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N

INDICATIVE OF NORTH

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Doncaster
7 Bullcroft Grove, Doncaster
DN4 8DL
Tel: 01302 570741 Fax: 01563 533309
Email: info@lmsurveys.co.uk

Client :

SP ENERGY NETWORKS

CAMBUSLANG DEPOT

55 FULLERTON DRIVE

CAMBUSLANG, G32 8FA

Project Title :

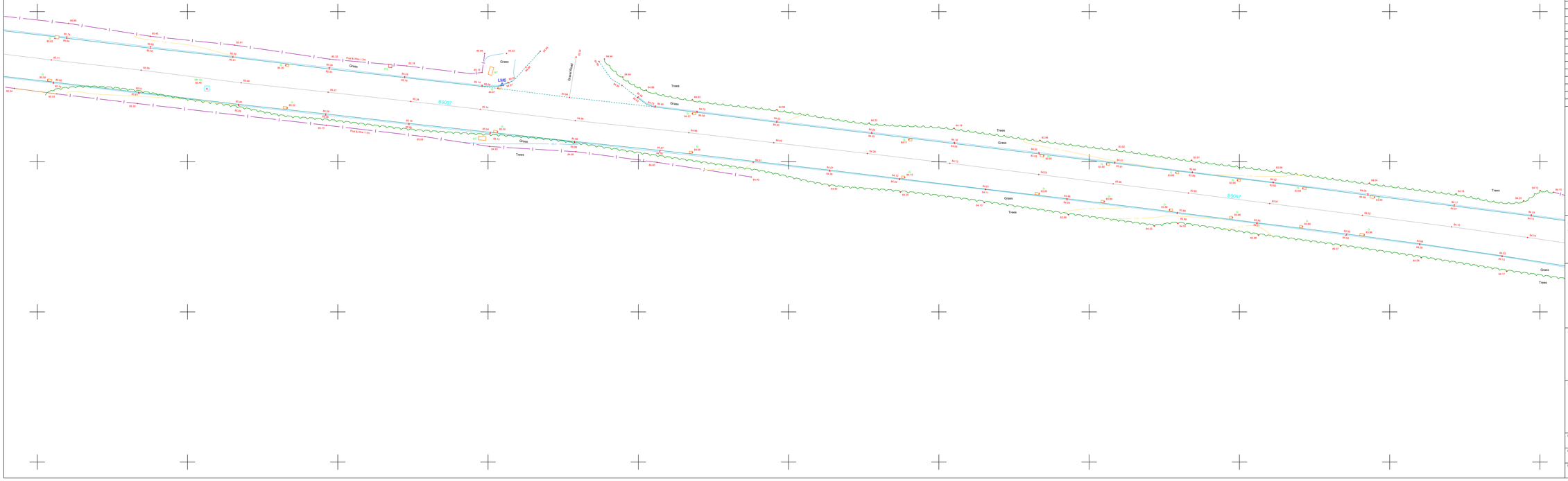
TOPOGRAPHICAL SURVEY

KINCARDINE TO TEALING

WESTFIELD

FIFE

Sheet Title :		Scale :
SHEET 4 OF 15		1:200
Surveyed date : 23/01/25	Issued date : 29/01/25	Enquiry No : 29907	Project No : 16866
Surveyed by : GB/CAA/SP	Processed by : GB/SP	Checked by : SM/cM	Approved by : KRJA



LEGEND

Contour
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Client :
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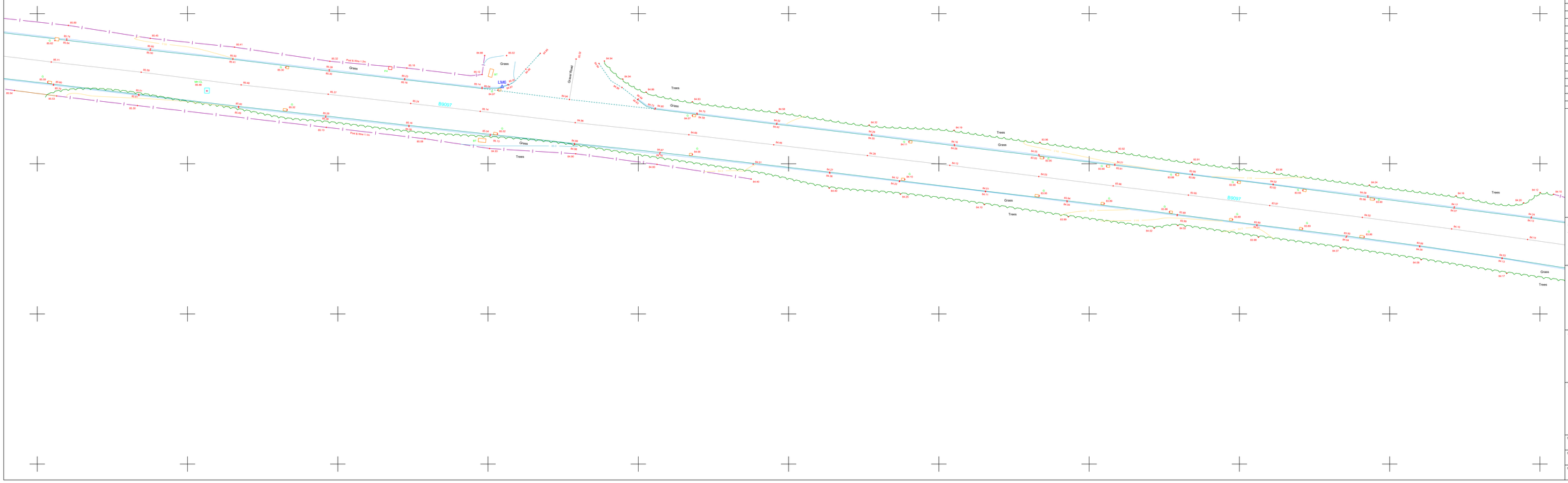
CAMBUSLANG DEPOT
55 FULLERTON DRIVE
CAMBUSLANG, G32 8FA

Project Title :
TOPOGRAPHICAL SURVEY
KINCARDINE TO TEALING
WESTFIELD
FIFE

Sheet Title :		Scale :	
SHEET 5 OF 15		1:200	
Surveyed date :	Issued date :	Enquiry No :	Project No :
23/01/25	29/01/25	29907	16866
Surveyed by :	Processed by :	Checked by :	Approved by :
GB/CAA/SP	GB/SP	SMcM	KRJA

A0 Sheet



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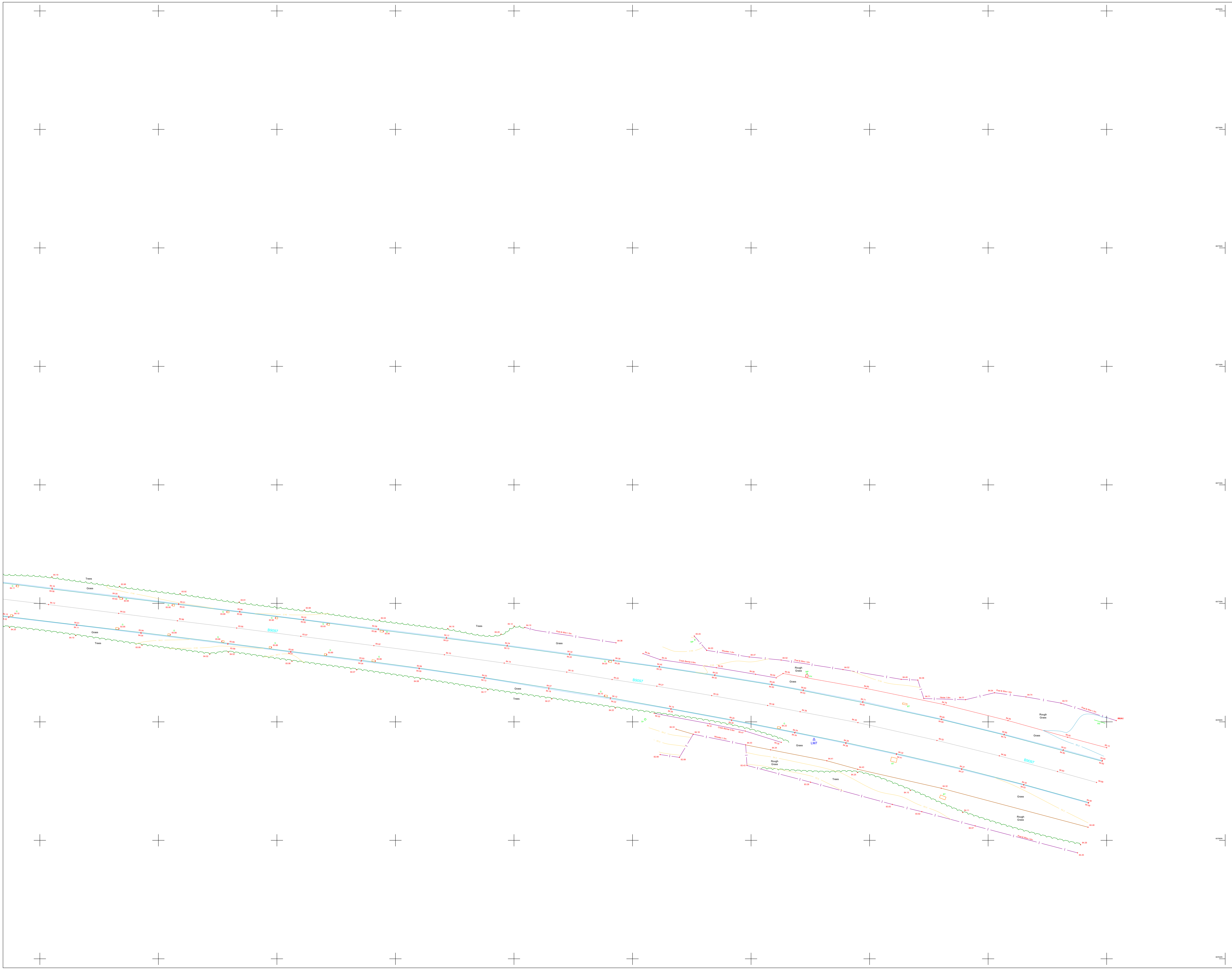
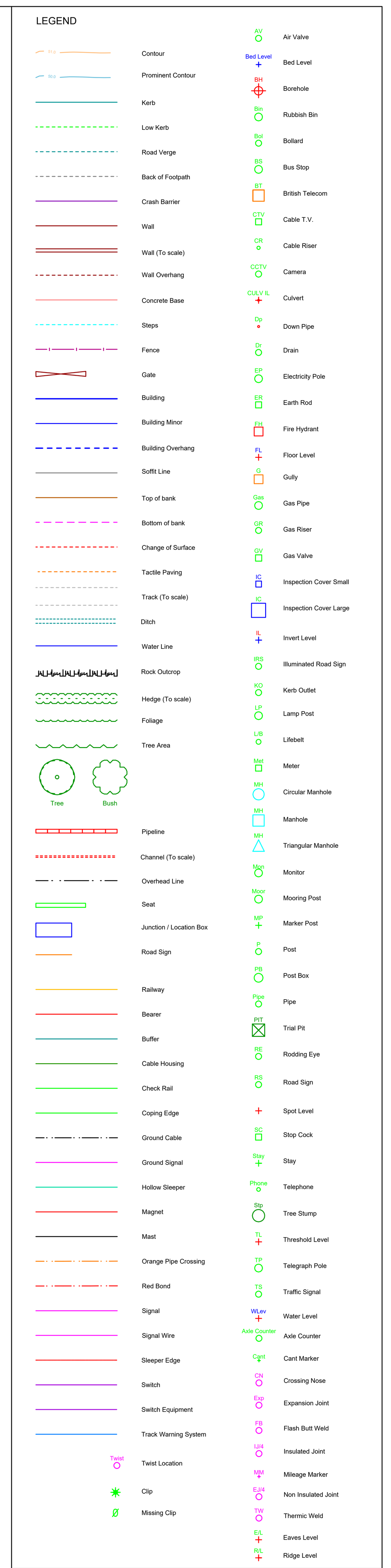
Project Title :
TOPOGRAPHICAL SURVEY
KINCARDINE TO TEALING
WESTFIELD
FIFE

Sheet Title :		Scale :	
SHEET 6 OF 15		1:200	
Surveyed date :	Issued date :	Enquiry No :	Project No :
23/01/25	29/01/25	29907	16866
Surveyed by :	Processed by :	Checked by :	Approved by :
GB/CAA/SP	GB/SP	SMcM	KRJA

A0 Sheet

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LM14	319086.686	697684.045	88.840
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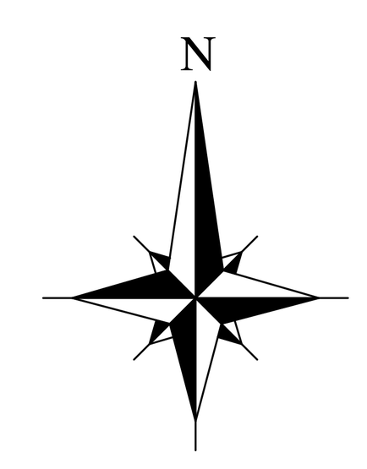
LM14A	319220.482	697728.169	87.664
LM14B	319204.910	697621.242	86.336



INDICATIVE OF NORTH

Notes:

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Client :

SP ENERGY NETWORKS

CAMBUSLANG DEPOT

55 FULLERTON DRIVE

CAMBUSLANG, G32 8FA

Project Title :

TOPOGRAPHICAL SURVEY

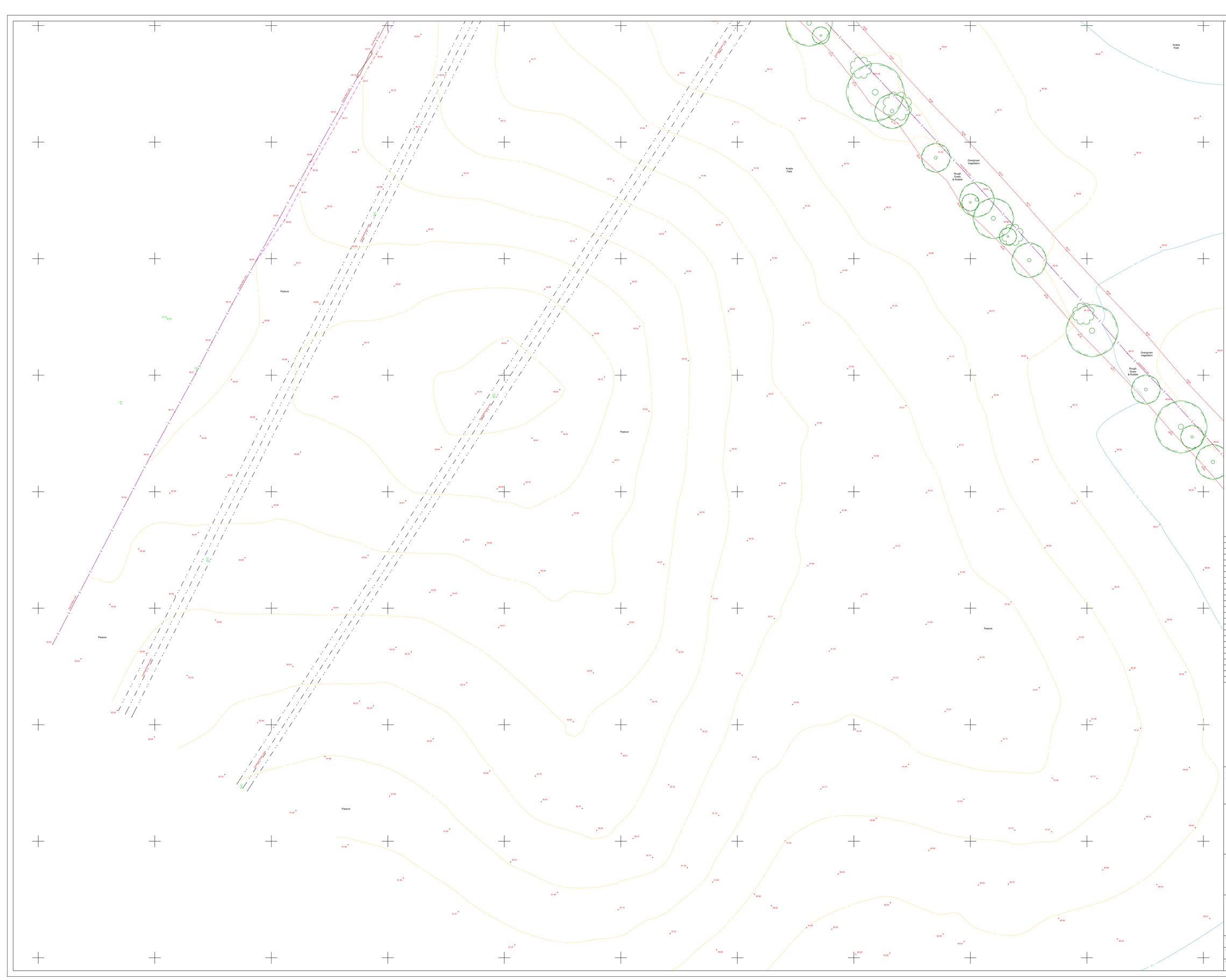
KINCARDINE TO TEALING

WESTFIELD

FIFE

Sheet Title :		Scale :	
SHEET 7 OF 15		1:200	
Surveyed date : 23/01/25	Issued date : 29/01/25	Enquiry No : 29907	Project No : 16866
Surveyed by : GB/CAA/SP	Processed by : GB/SP	Checked by : SMcM	Approved by : KRJA

A0 Sheet



LEGEND

Contour
Prominent Contour
Kerb
Low Kerb
Road Verge
Back of Footpath
Crash Barrier
Wall
Wall (To scale)
Wall Overhang
Concrete Base
Steps
Fence
Gate
Building
Building Minor
Building Overhang
Soffit Line
Top of bank
Bottom of bank
Change of Surface
Tactile Paving
Track (To scale)
Ditch
Water Line
Rock Outcrop
Hedge (To scale)
Foliage
Tree Area
Pipeline
Channel (To scale)
Overhead Line
Seat
Junction / Location Box
Road Sign
Railway
Beaver
Buffer
Cable Housing
Check Rail
Coping Edge
Ground Cable
Ground Signal
Hollow Sleeper
Magnet
Mast
Orange Pipe Crossing
Red Bond
Signal
Signal Wire
Sleeper Edge
Switch
Switch Equipment
Track Warning System
Twist Location
Clip
Missing Clip

Air Valve
Bed Level
Borehole
Rubbish Bin
Bollard
Bus Stop
British Telecom
Cable T.V.
Cable Riser
Camera
Culvert
Down Pipe
Drain
Electricity Pole
Earth Rod
Fire Hydrant
Finse Level
Gully
Gas Pipe
Gas Riser
Gas Valve
Inspection Cover Small
Inspection Cover Large
Invert Level
Illuminated Road Sign
Kerb Outlet
Lamp Post
Lifebelt
Meter
Circular Manhole
Manhole
Triangular Manhole
Monitor
Mooring Post
Marker Post
Post
Post Box
Pipe
Trial Pit
Rodding Eye
Road Sign
Spot Level
Stop Cock
Stay
Telephone
Tree Stump
Threshold Level
Telegraph Pole
Traffic Signal
Water Level
Axle Counter
Cert Marker
Crossing Nose
Expansion Joint
Flash Butt Weld
Insulated Joint
Mileage Marker
Non Insulated Joint
Thermic Weld
Eaves Level
Ridge Level

CONTROL STATION COORDINATES

STN	EASTING	NORTHING	LEVEL
LM1	318904.601	697774.443	96.829
LM2	319047.507	697760.068	93.818
LM3	319178.381	697747.249	89.741
LM4	319264.849	697745.892	87.671
LM5	319402.163	697721.038	86.348
LM6	319561.869	697710.260	85.107
LM7	319750.625	697677.018	84.573
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INDICATIVE OF NORTH

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Email: info@lmsurveys.co.uk

Client :
SP ENERGY NETWORKS
CAMBUSLANG DEPOT
55 FULLERTON DRIVE
CAMBUSLANG, G32 8FA

Project Title :
TOPOGRAPHICAL SURVEY
KINCARDINE TO TEALING
WESTFIELD
FIFE

Sheet Title :		Scale :	
SHEET 8 OF 15		1:200	
Surveyed date :	Issued date :	Enquiry No :	Project No :
23/01/25	29/01/25	29907	16866
Surveyed by :	Processed by :	Checked by :	Approved by :
GB/CAA/SP	GB/SP	SMcM	KRJA

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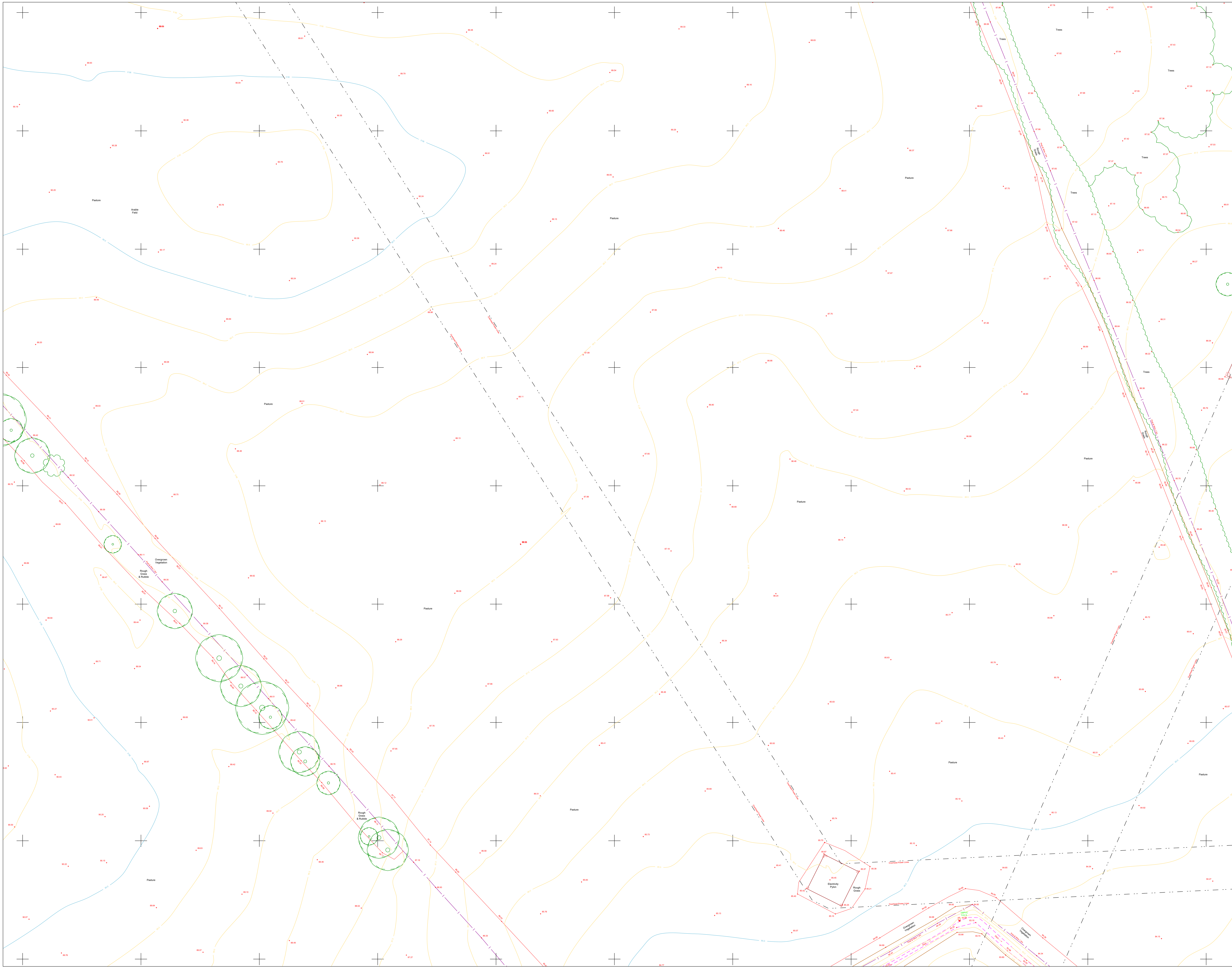

LEGEND

Track Warning System
Twist Location
Clip
Missing Clip
Flash Butt Weld
Insulated Joint
Mileage Marker
Non Insulated Joint
Thermic Weld
Eaves Level
Ridge Level

CONTROL STATION COORDINATES			
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LM14B	319204.910	697621.242	86.336

N

INDICATIVE OF NORTH

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Client :

SP ENERGY NETWORKS

CAMBUSLANG DEPOT

55 FULLERTON DRIVE

CAMBUSLANG, G32 8FA

Project Title :

TOPOGRAPHICAL SURVEY

KINCARDINE TO TEALING

WESTFIELD

FIFE

Sheet Title :		Scale :	
SHEET 9 OF 15		1:200	
Surveyed date : 23/01/25	Issued date : 29/01/25	Enquiry No : 29907	Project No : 16866
Surveyed by : GB/CAA/SP	Processed by : GB/SP	Checked by : SMcM	Approved by : KRJA

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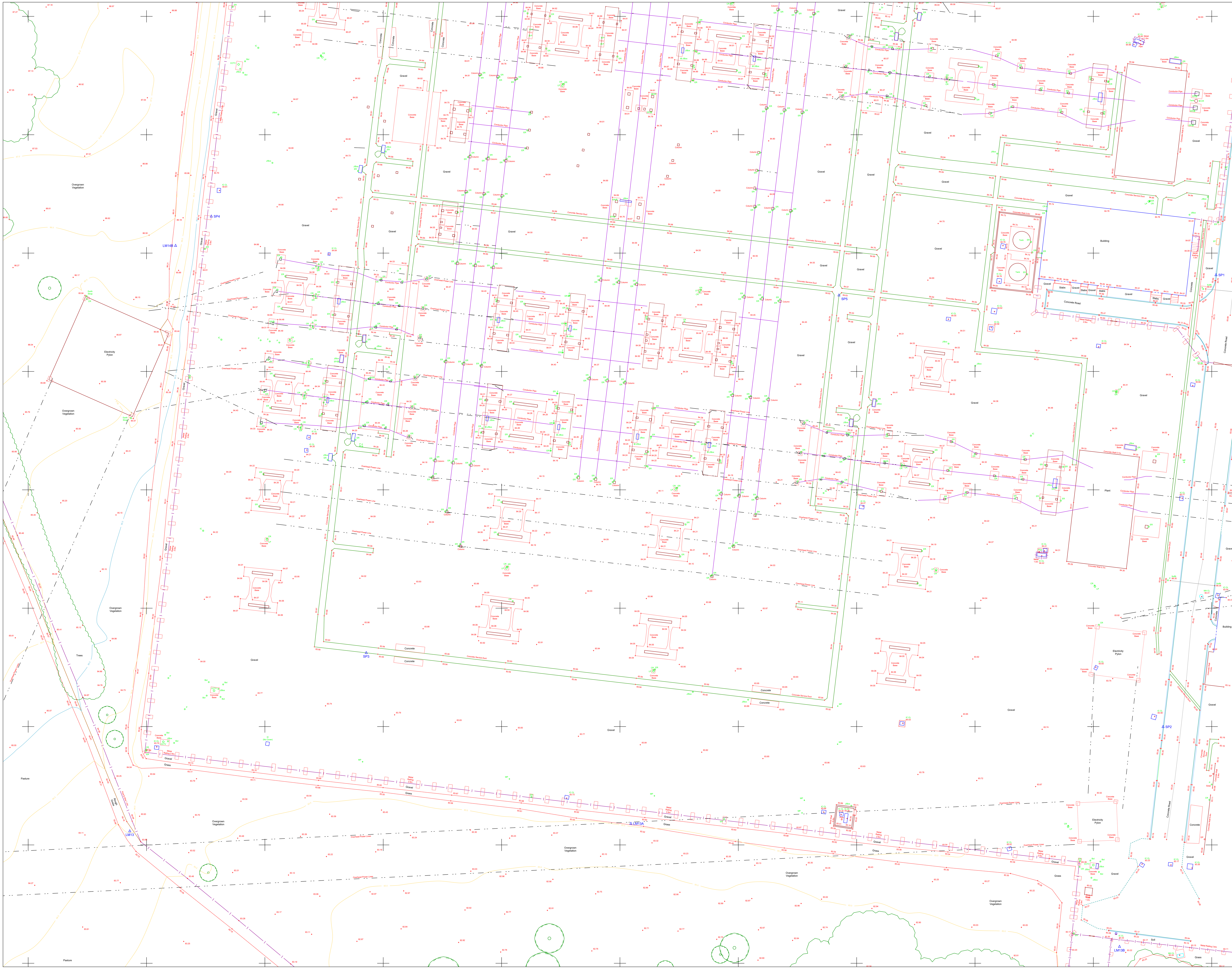

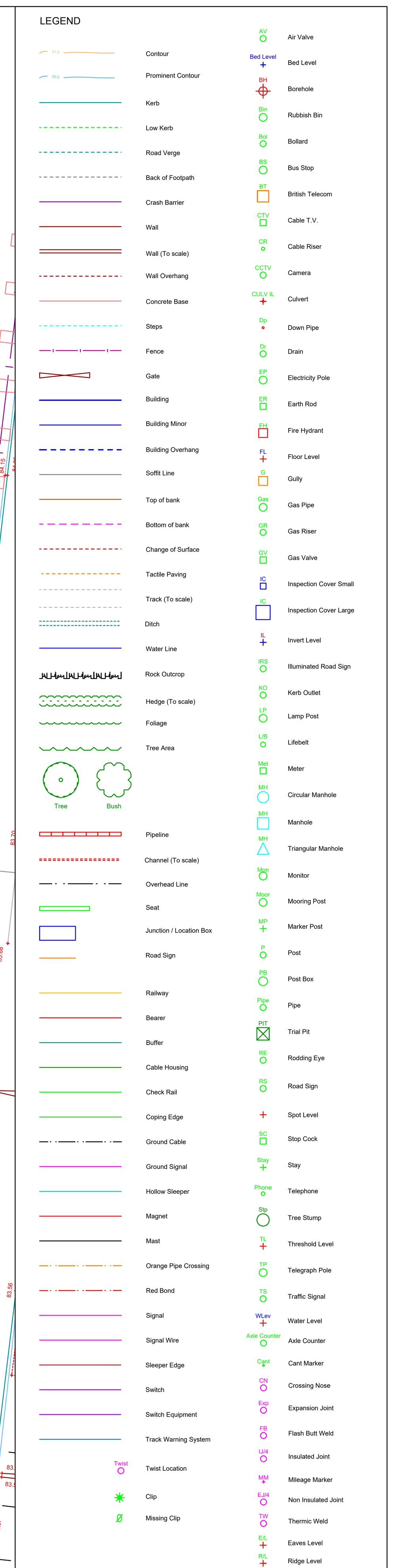

LEGEND
Contour
Prominent Contour
Kerb
Low Kerb
Road Verge
Back of Footpath
Crash Barrier
Wall
Wall (To scale)
Wall Overhang
Concrete Base
Steps
Fence
Gate
Building
Building Minor
Building Overhang
Soffit Line
Top of bank
Bottom of bank
Change of Surface
Tactile Paving
Track (To scale)
Ditch
Water Line
Rock Outcrop
Hedge (To scale)
Foliage
Tree Area
Tree
Bush
Pipeline
Channel (To scale)
Overhead Line
Seat
Junction / Location Box
Road Sign
Railway
Bearer
Buffer
Cable Housing
Check Rail
Coping Edge
Ground Cable
Ground Signal
Hollow Sleeper
Magnet
Mast
Orange Pipe Crossing
Red Bond
Signal
Signal Wire
Sleeper Edge
Switch
Switch Equipment
Track Warning System
Twist Location
Clip
Missing Clip
Air Valve
Bed Level
Borehole
Rubbish Bin
Bollard
Bus Stop
British Telecom
Cable T.V.
Cable Riser
Camera
Culvert
Down Pipe
Drain
Electricity Pole
Earth Rod
Fire Hydrant
Floor Level
Gully
Gas Pipe
Gas Riser
Gas Valve
Inspection Cover Small
Inspection Cover Large
Invert Level
Illuminated Road Sign
Kerb Outlet
Lamp Post
Lifebelt
Meter
Circular Manhole
Manhole
Triangular Manhole
Monitor
Mooring Post
Marker Post
Post
Post Box
Pipe
Trial Pit
Rodding Eye
Road Sign
Spot Level
Stop Cock
Stay
Telephone
Tree Stump
Threshold Level
Telegraph Pole
Traffic Signal
Water Level
Axle Counter
Cant Marker
Crossing Nose
Expansion Joint
Flash Butt Weld
Insulated Joint
Mileage Marker
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Thermic Weld
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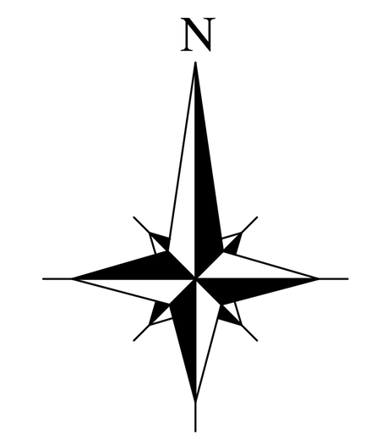

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Client :

SP ENERGY NETWORKS

CAMBUSLANG DEPOT

55 FULLERTON DRIVE

CAMBUSLANG, G32 8FA

Project Title :

TOPOGRAPHICAL SURVEY

KINCARDINE TO TEALING

WESTFIELD

FIFE

Sheet Title : SHEET 10 OF 15		Scale : 1:200	
Surveyed date : 23/01/25	Issued date : 29/01/25	Enquiry No : 29907	Project No : 16866
Surveyed by : GB/CAA/SP	Processed by : GB/SP	Checked by : SMcM	Approved by : KRJA

A0 Sheet

LEGEND

- Contour
- Prominent Contour
- Kerb
- Low Kerb
- Road Verge
- Back of Footpath
- Crash Barrier
- Wall
- Wall (To scale)
- Wall Overhang
- Concrete Base
- Steps
- Fence
- Gate
- Building
- Building Minor
- Building Overhang
- Soffit Line
- Top of bank
- Bottom of bank
- Change of Surface
- Tactile Paving
- Track (To scale)
- Ditch
- Water Line
- Rock Outcrop
- Hedge (To scale)
- Foliage
- Tree Area
- Tree
- Pipeline
- Channel (To scale)
- Overhead Line
- Seat
- Junction / Location Box
- Road Sign
- Railway
- Beaver
- Buffer
- Cable Housing
- Check Rail
- Coping Edge
- Ground Cable
- Ground Signal
- Hollow Sleeper
- Magnet
- Mast
- Orange Pipe Crossing
- Rail Bond
- Signal
- Signal Wire
- Sleeper Edge
- Switch
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- Twist Location
- Clip
- Missing Clip
- Air Valve
- Bed Level
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- Rubbish Bin
- Bollard
- Bus Stop
- British Telecom
- Cable T.V.
- Cable Riser
- Camera
- Culvert
- Down Pipe
- Drain
- Electricity Pole
- Earth Rod
- Fire Hydrant
- Flow Level
- Gully
- Gas Pipe
- Gas Riser
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- Inspection Cover Small
- Inspection Cover Large
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- Lamp Post
- Lifebelt
- Meter
- Circular Manhole
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- Monitor
- Mooring Post
- Marker Post
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- Trial Pit
- Rodding Eye
- Road Sign
- Spot Level
- Stop Cock
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- Telephone
- Tree Stump
- Threshold Level
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- Flash Butt Weld
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CONTROL STATION COORDINATES

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Client :

SP ENERGY NETWORKS

CAMBUSLANG DEPOT

55 FULLERTON DRIVE

CAMBUSLANG, G32 8FA

Project Title :

TOPOGRAPHICAL SURVEY

KINCARDINE TO TEALING

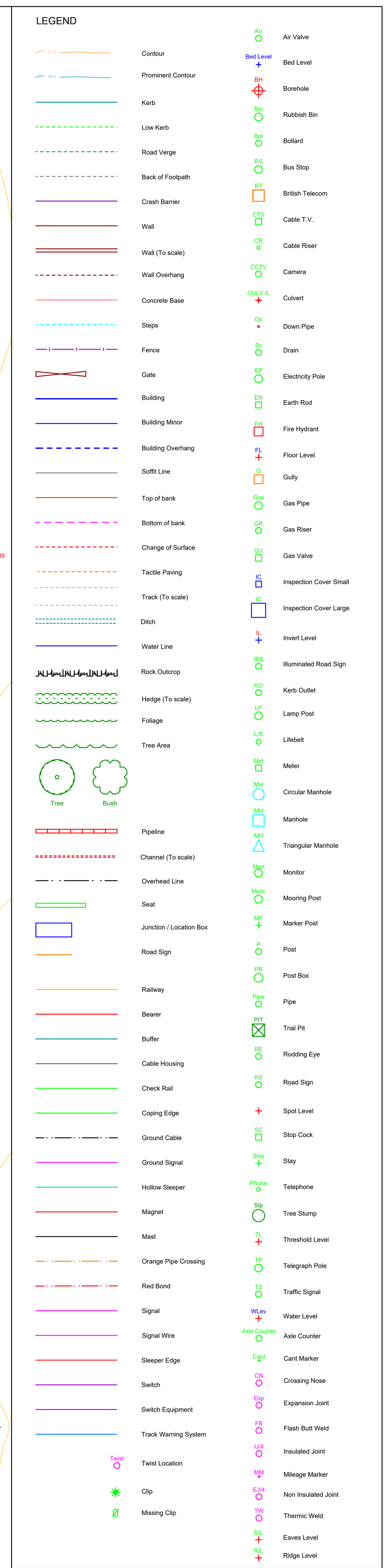
WESTFIELD

FIFE

Sheet Title :		Scale :	
SHEET 11 OF 15		1:200	
Surveyed date :	Issued date :	Enquiry No :	Project No :
23/01/25	29/01/25	29907	16866
Surveyed by :	Processed by :	Checked by :	Approved by :
GB/CAA/SP	GB/SP	SM;M	KRJA

A0 Sheet

LEGEND



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Client :

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55 FULLERTON DRIVE

CAMBUSLANG, G32 8FA

Project Title :

TOPOGRAPHICAL SURVEY

KINCARDINE TO TEALING

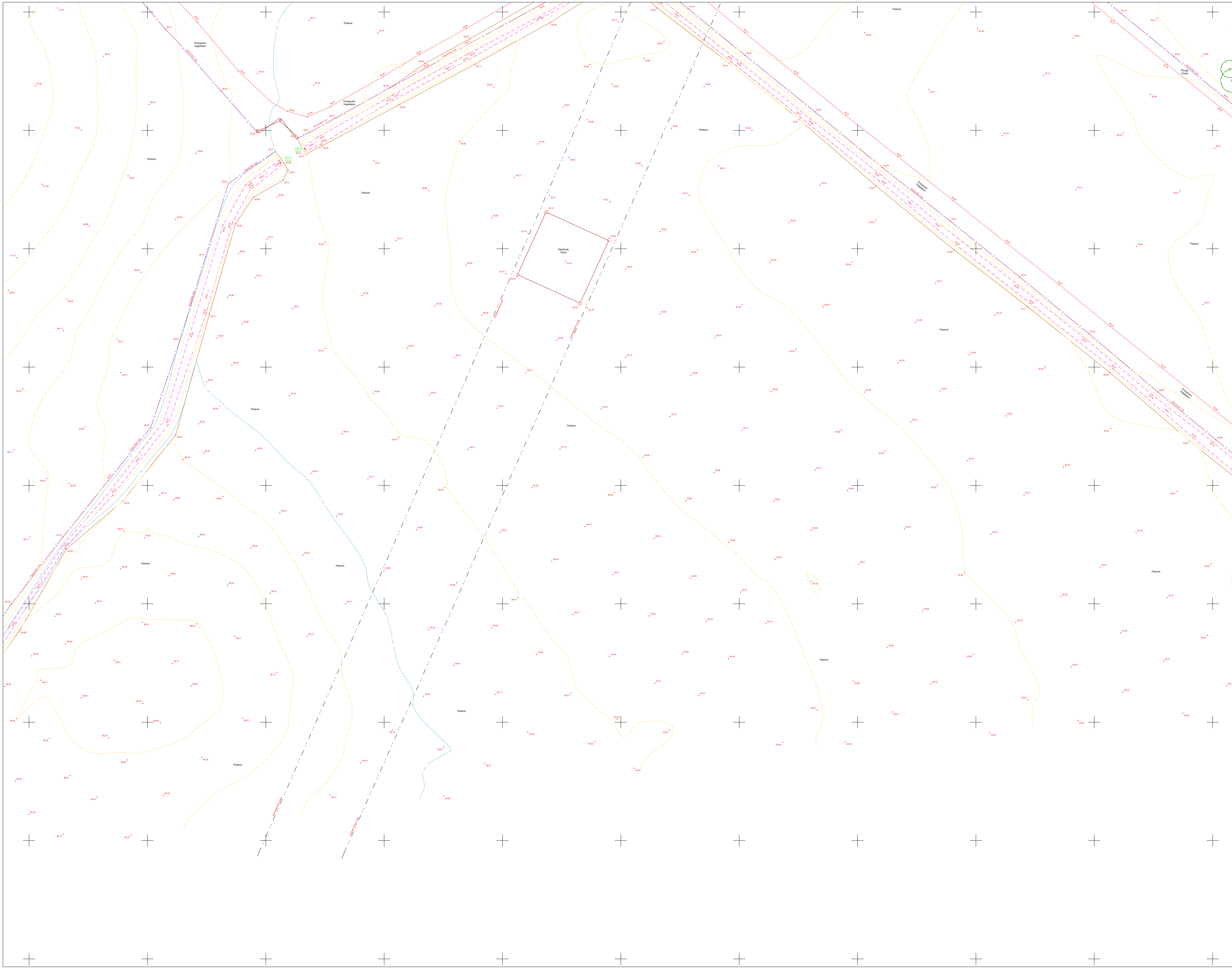
WESTFIELD

FIFE

Sheet Title : SHEET 12 OF 15	Scale : 1:200

Surveyed date : 23/01/25	Issued date : 29/01/25	Enquiry No : 29907	Project No : 16866
Surveyed by : GB/CAA/SP	Processed by : GB/SP	Checked by : SMcM	Approved by : KRJA

A0 Sheet



LEGEND

- Contour
- Prominent Contour
- Kerb
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- Wall (To scale)
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- Ground Signal
- Hollow Sleeper
- Magnet
- Mast
- Orange Pipe Crossing
- Red Bond
- Signal
- Signal Wire
- Sleeper Edge
- Switch
- Switch Equipment
- Track Warning System
- Twist — Twist Location
- Clip
- Missing Clip

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- Bed Level — Bed Level
- BH — Borehole
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- Bol — Bollard
- BS — Bus Stop
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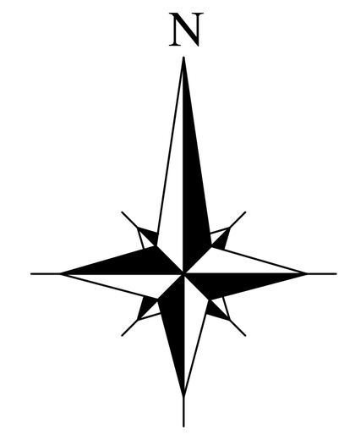
- CR — Cable Riser
- CCTV — Camera
- CULV IL — Culvert
- Dp — Down Pipe
- Dr — Drain
- EP — Electricity Pole
- ER — Earth Rod
- FH — Fire Hydrant
- FL — Floor Level
- G — Gully
- Gas — Gas Pipe
- GR — Gas Riser
- GV — Gas Valve
- IC — Inspection Cover Small
- IC — Inspection Cover Large
- IL — Invert Level
- IRS — Illuminated Road Sign
- KO — Kerb Outlet
- LP — Lamp Post
- L/B — Lifebelt
- Met — Meter
- MH — Circular Manhole
- MH — Manhole
- MH — Triangular Manhole
- Mon — Monitor
- Moor — Mooring Post
- MP — Marker Post
- P — Post
- PB — Post Box
- Pipe — Pipe
- PIT — Trial Pit
- RE — Rodding Eye
- RS — Road Sign
- Spot Level
- SC — Stop Cock
- Stay — Stay
- Phone — Telephone
- Stp — Tree Stump
- TL — Threshold Level
- TP — Telegraph Pole
- TS — Traffic Signal
- WLev — Water Level
- Axle Counter — Axle Counter
- Cant — Cant Marker
- CN — Crossing Nose
- Exp — Expansion Joint
- FB — Flash Butt Weld
- IJ/4 — Insulated Joint
- MM — Mileage Marker
- EJ/4 — Non Insulated Joint
- TW — Thermic Weld
- E/L — Eaves Level
- R/L — Ridge Level

CONTROL STATION COORDINATES

STN	EASTING	NORTHING	LEVEL
LM1	318904.601	697774.443	96.829
LM2	319047.907	697766.068	93.818
LM3	319178.381	697747.249	89.741
LM4	319264.849	697745.892	87.671
LM5	319402.163	697721.038	86.348
LM6	319561.869	697710.260	85.107
LM7	319750.625	697677.018	84.573
LM8	319679.444	697632.863	82.846
LM9	319511.267	697546.629	83.292
LM10	319448.542	697470.747	83.118
LM11	319418.076	697434.866	82.938
LM12	319304.478	697425.262	82.811
LM13	319197.167	697522.318	84.097
LM14	319086.686	697684.045	88.840
LM15	318956.654	697709.061	89.414
LM14A	319220.482	697728.169	87.664
LM14B	319204.910	697621.242	86.336

N



INDICATIVE OF NORTH

Notes:

All levels shown are relative to the O.S. active GPS network (OSGM15).

The co-ordinates shown on this plan are relative to the O.S. active GPS network (OSTN15).
The survey is orientated approximately to grid north.

L&M Survey Services
LAND • RAIL • UTILITY

Kilmarnock
Netherton House, West Netherton Street,
Kilmarnock, KA1 4BU
Tel: 01563 533368 Fax: 01563 533309
Email: info@lmsurveys.co.uk

Livingston
Shairps Business Park, Houston Road
Livingston, EH54 5FD
Tel: 01506 896231 Fax: 01563 533309
Email: info@lmsurveys.co.uk

Doncaster
7 Bullrush Grove, Doncaster
DN4 8SL
Tel: 01302 570741 Fax: 01563 533309
Email: info@lmsurveys.co.uk

Client :

SP ENERGY NETWORKS

CAMBUSLANG DEPOT

55 FULLERTON DRIVE

CAMBUSLANG, G32 8FA

Project Title :

TOPOGRAPHICAL SURVEY

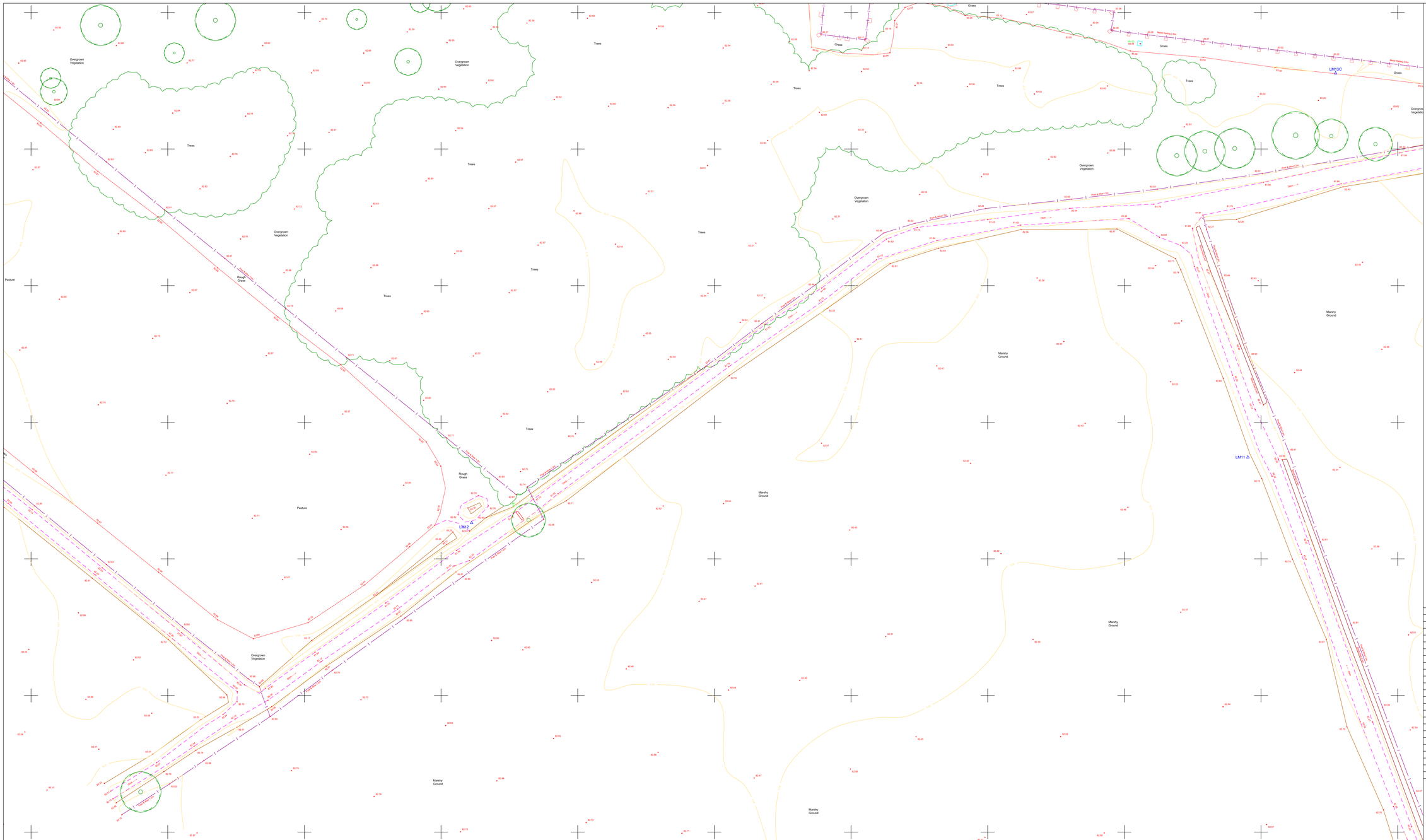
KINCARDINE TO TEALING

WESTFIELD

FIFE

Sheet Title :		Scale :	
SHEET 13 OF 15		1:200	
Surveyed date : 23/01/25	Issued date : 29/01/25	Enquiry No : 29907	Project No : 16866
Surveyed by : GB/CAA/SP	Processed by : GB/SP	Checked by : SMcM	Approved by : KRJA

A0 Sheet



LEGEND

- Contour
- Prominent Contour
- Kerb
- Low Kerb
- Road Verge
- Back of Footpath
- Crash Barrier
- Wall
- Wall (To scale)
- Wall Overhang
- Concrete Base
- Steps
- Fence
- Gate
- Building
- Building Minor
- Building Overhang
- Soffit Line
- Top of bank
- Bottom of bank
- Change of Surface
- Tactile Paving
- Track (To scale)
- Ditch
- Water Line
- Rock Outcrop
- Hedge (To scale)
- Foliage
- Tree Area
- Tree
- Bush
- Pipeline
- Channel (To scale)
- Overhead Line
- Seat
- Junction / Location Box
- Road Sign
- Railway
- Beaver
- Buffer
- Cable Housing
- Check Rail
- Coping Edge
- Ground Cable
- Ground Signal
- Hollow Sleeper
- Magnet
- Mast
- Orange Pipe Crossing
- Rail Bond
- Signal
- Signal Wire
- Sleeper Edge
- Switch
- Switch Equipment
- Track Warning System
- Twist Location
- Clip
- Missing Clip
- Air Valve
- Bed Level
- Borehole
- Rubbish Bin
- Bollard
- Bus Stop
- British Telecom
- Cable T.V.
- Cable Riser
- Camera
- Culvert
- Down Pipe
- Drain
- Electricity Pole
- Earth Rod
- Fire Hydrant
- Flow Level
- Gully
- Gas Pipe
- Gas Riser
- Gas Valve
- Inspection Cover Small
- Inspection Cover Large
- Invert Level
- Illuminated Road Sign
- Kerb Outlet
- Lamp Post
- Lifebelt
- Meter
- Circular Manhole
- Manhole
- Triangular Manhole
- Monitor
- Mooring Post
- Marker Post
- Post
- Post Box
- Pipe
- Trial Pit
- Rodding Eye
- Road Sign
- Spot Level
- Stop Cock
- Stay
- Telephone
- Tree Stump
- Threshold Level
- Telegraph Pole
- Traffic Signal
- Water Level
- Axle Counter
- Cert Marker
- Crossing Nose
- Expansion Joint
- Flash Butt Weld
- Insulated Joint
- Mileage Marker
- Non Insulated Joint
- Thermic Weld
- Eaves Level
- Ridge Level

CONTROL STATION COORDINATES

STN	EASTING	NORTHING	LEVEL
LM1	318904.601	697774.443	96.829
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LM14B	319204.910	697621.242	86.336

INDICATIVE OF NORTH

Notes:
All levels shown are relative to the O.S. active GPS network (OSGM15).

The co-ordinates shown on this plan are relative to the O.S. active GPS network (OSTN15).
The survey is orientated approximately to grid north.

L&M Survey Services
LAND + RAIL + UTILITY

Kilmarnock
Unit 2 Riverside House, West Netherton Street, Kilmarnock, KA1 4BU
Tel: 01563 533368 Fax: 01563 533309
Email: info@lmsurveys.co.uk

Livingston
Shanta Business Park, Houston Road Livingston, EH54 5FQ
Tel: 01506 414141 Fax: 01563 533309
Email: info@lmsurveys.co.uk

Doncaster
7 Bullcarr Grove, Doncaster DN4 8DL
Tel: 01302 370741 Fax: 01563 533309
Email: info@lmsurveys.co.uk

Client :

SP ENERGY NETWORKS

CAMBUSLANG DEPOT

55 FULLERTON DRIVE

CAMBUSLANG, G32 8FA

Project Title :

TOPOGRAPHICAL SURVEY

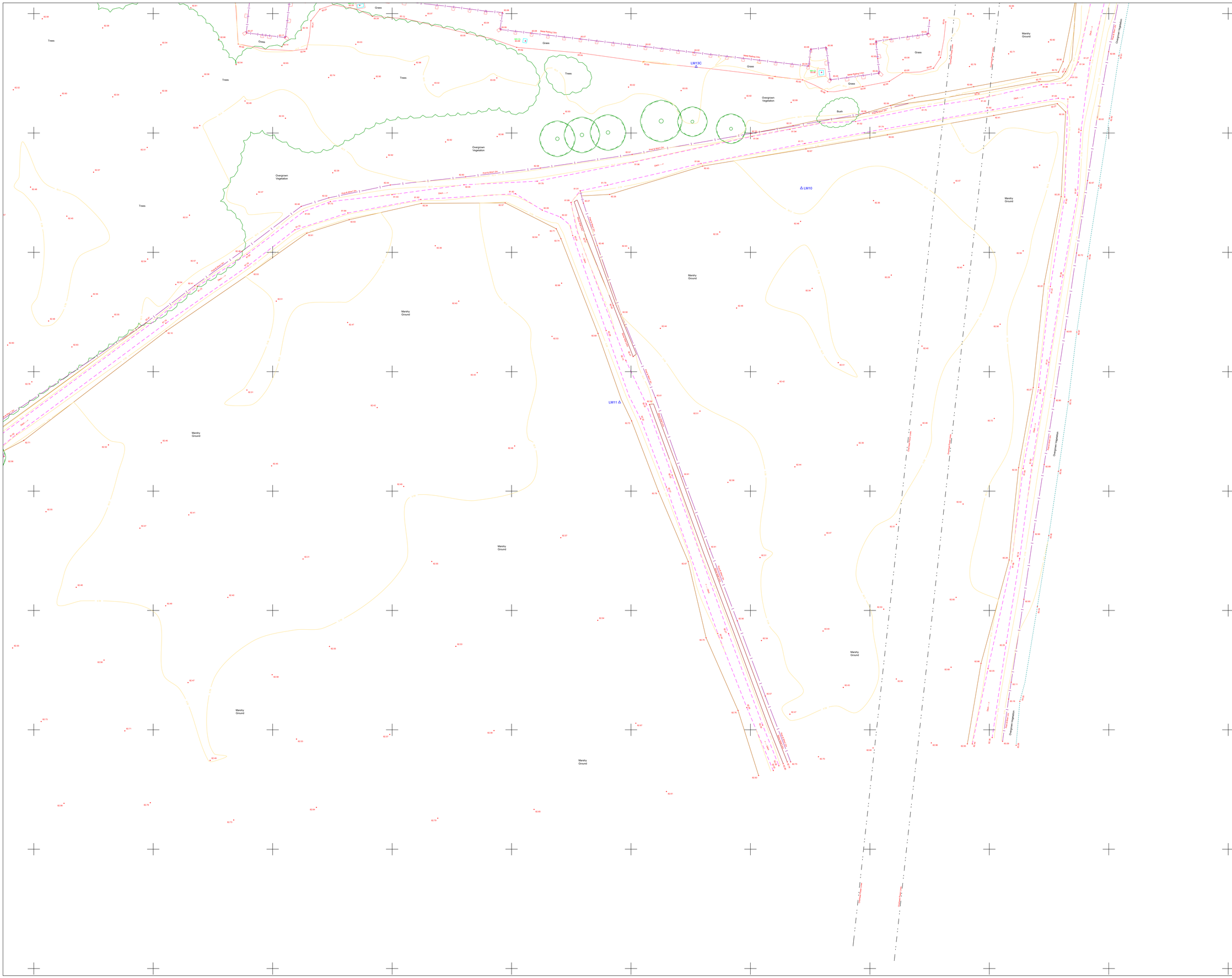
KINCARDINE TO TEALING

WESTFIELD

FIFE

Sheet Title :		Scale :	
SHEET 14 OF 15		1:200	
Surveyed date :	Issued date :	Enquiry No :	Project No :
23/01/25	29/01/25	29907	16866
Surveyed by :	Processed by :	Checked by :	Approved by :
GB/CAA/SP	GB/SP	SMcM	KRJA

A0 Sheet



LEGEND

Contour
Prominent Contour
Kerb
Low Kerb
Road Verge
Back of Footpath
Crash Barrier
Wall
Wall (To scale)
Wall Overhang
Concrete Base
Steps
Fence
Gate
Building
Building Minor
Building Overhang
Soffit Line
Top of bank
Bottom of bank
Change of Surface
Tactile Paving
Track (To scale)
Ditch
Water Line
Rock Outcrop
Hedge (To scale)
Foliage
Tree Area
Tree
Bush
Pipeline
Channel (To scale)
Overhead Line
Seat
Junction / Location Box
Road Sign
Railway
Beaver
Buffer
Cable Housing
Check Rail
Coping Edge
Ground Cable
Ground Signal
Hollow Sleeper
Magnet
Mast
Orange Pipe Crossing
Rail Bond
Signal
Signal Wire
Sleeper Edge
Switch
Switch Equipment
Track Warning System
Twist Location
Clip
Missing Clip

CONTROL STATION COORDINATES

STN	EASTING	NORTHING	LEVEL
LM1	319904.601	697774.443	96.829
LM2	319947.907	697766.068	93.818
LM3	319178.381	697747.249	89.741
LM4	319264.849	697745.892	87.671
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LAND ● RAIL ● UTILITY

Kilmarnock
Rathbone House, West Netherton Street, Kilmarnock, KA1 4BU
Tel: 01563 533368 Fax: 01563 533309
Email: info@lmsurveys.co.uk

Livingston
Shakira Business Park, Houston Road Livingston EH54 5FD
Tel: 07595 896231 Fax: 01563 533309
Email: info@lmsurveys.co.uk

Doncaster
7 Bullcarr Grove, Doncaster DN4 8DL
Tel: 07852 370741 Fax: 01563 533309
Email: info@lmsurveys.co.uk

Client :

SP ENERGY NETWORKS

CAMBUSLANG DEPOT

55 FULLERTON DRIVE

CAMBUSLANG, G32 8FA

Project Title :

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KINCARDINE TO TEALING

WESTFIELD

FIFE

Sheet Title :	Scale :
SHEET 15 OF 15	1:200

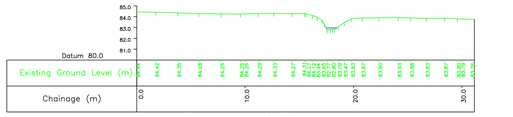
Surveyed Date :	Issued date :	Enquiry No :	Project No :
23/01/25	29/01/25	29907	16866

Surveyed by :	Processed by :	Checked by :	Approved by :
GB/CAA/SP	GB/SP	SM/cM	KRJA

A0 Sheet

'UB 05
E: 319160.382
N: 697513.510

UB 05'
E: 319139.319
N: 697490.557



Section No UB 05
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Vertical Scale 1: 200

'UB 10
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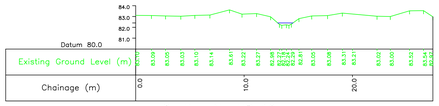
N: 697384.822

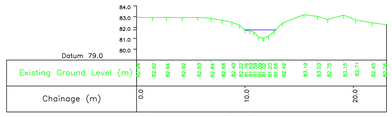
UB 10'
E: 319240.625
N: 697361.425



Section No UB 10
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 15
E: 319449.623
N: 697491.258

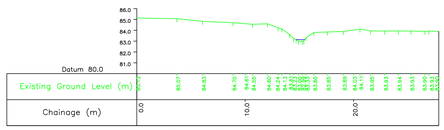
UB 15'
E: 319451.586
N: 697468.274



Section No UB 15
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 04
E: 319129.686
N: 697518.527

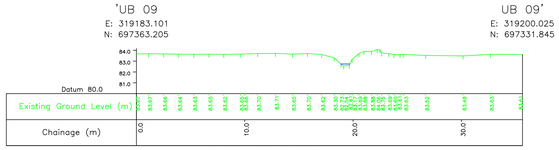
UB 04'
E: 319144.558
N: 697494.961



Section No UB 04
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 09
E: 319183.101
N: 697363.205

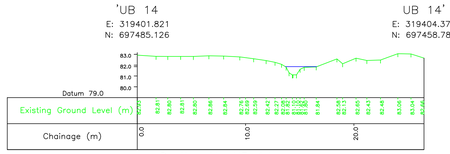
UB 09'
E: 319200.025
N: 697331.845



Section No UB 09
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 14
E: 319401.821
N: 697485.126

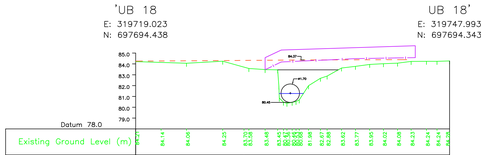
UB 14'
E: 319404.373
N: 697458.782



Section No UB 14
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 18
E: 319719.023
N: 697694.438

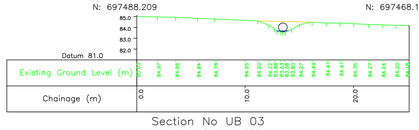
UB 18'
E: 319747.993
N: 697694.343



Section No UB 18
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 03
E: 319079.201
N: 697488.209

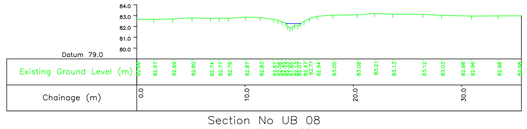
UB 03'
E: 319094.370
N: 697468.171



Section No UB 03
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 08
E: 319280.102
N: 697411.464

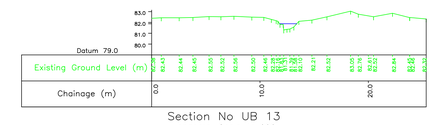
UB 08'
E: 319251.198
N: 697390.856



Section No UB 08
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 13
E: 319352.518
N: 697471.344

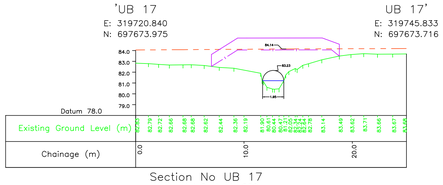
UB 13'
E: 319363.133
N: 697448.338



Section No UB 13
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 17
E: 319720.840
N: 697673.975

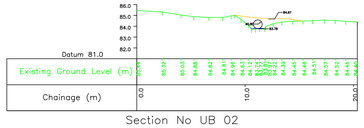
UB 17'
E: 319745.833
N: 697673.716



Section No UB 17
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 02
E: 319075.475
N: 697483.059

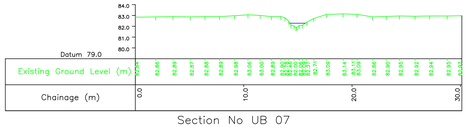
UB 02'
E: 319087.860
N: 697466.916



Section No UB 02
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 07
E: 319243.954
N: 697442.503

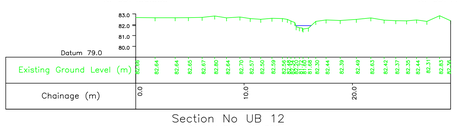
UB 07'
E: 319225.621
N: 697418.582



Section No UB 07
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 12
E: 319300.120
N: 697436.538

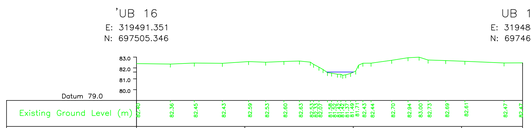
UB 12'
E: 319323.118
N: 697418.772



Section No UB 12
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 16
E: 319491.351
N: 697505.346

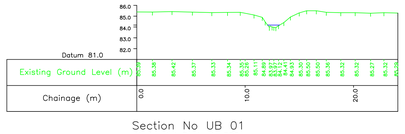
UB 16'
E: 319488.5
N: 697469.5



Section No UB 16
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 01
E: 319051.810
N: 697436.357

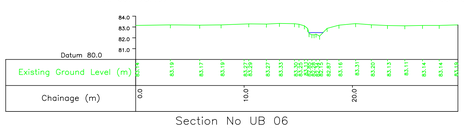
UB 01'
E: 319070.085
N: 697420.601



Section No UB 01
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 06
E: 319208.057
N: 697473.497

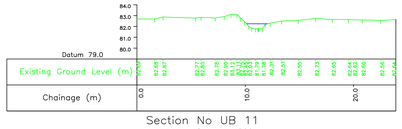
UB 06'
E: 319188.488
N: 697451.107



Section No UB 06
Horizontal Scale 1: 200
Vertical Scale 1: 200

'UB 11
E: 319270.693
N: 697411.412

UB 11'
E: 319284.880
N: 697392.172



Section No UB 11
Horizontal Scale 1: 200
Vertical Scale 1: 200

Link Feature Legend

- Fence
- Metal
- Deck Level
- Water Line
- Ground Level
- Section Detail
- Walls
- Pipe

Notes:

Horizontal Control points are relative to the NATIONAL GRID.

All levels are relative to ORDNANCE DATUM.

The datum was established using corrected OS Rinex data and post processed using Business Centre Software.

Revision Table

CONTROL STATION COORDINATES

STN	EASTING	NORTHING	LEVEL

Aspect
Land + Hydrographic Surveys
CHARTERED SURVEYORS
Thornhouse Business Centre
Ballot Road
Irvine
KA12 0HW
Tel : 01294 313399
Fax : 01294 313389
E-mail: mail@aspectsurveys.com
Web: www.aspectsurveys.com

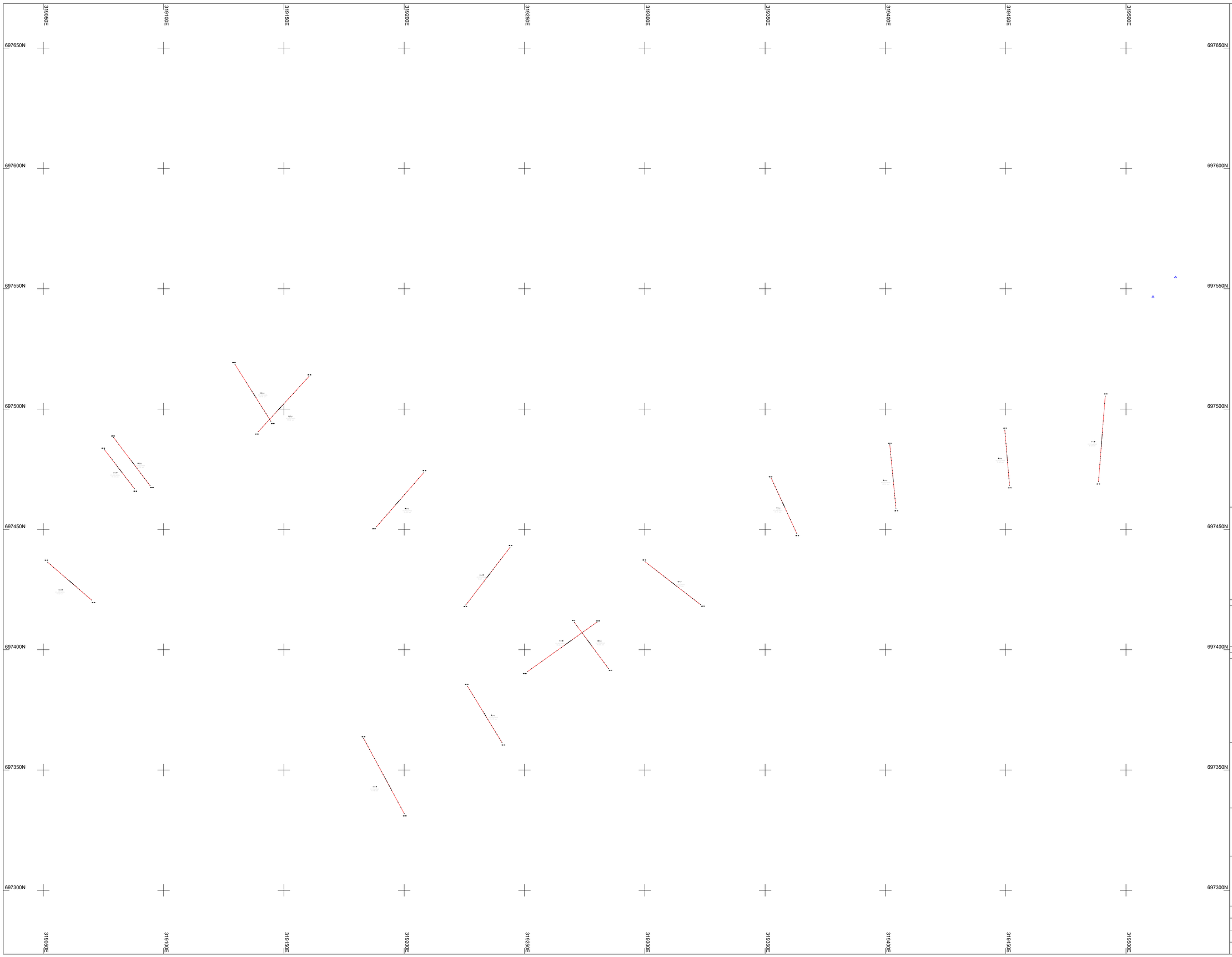
Client :

FAIRHURST
4TH FLOOR, TAY HOUSE
300 BATH STREET
GLASGOW
G2 4JR

Project Title :

RIVER CROSS SECTION SURVEY
WESTFIELD
BALLINGRY

Project No: A9483	Scale : 1:200
Surveyed date : 7th March 2024	Issued date : 18th March 2024
Surveyed by : AJS	Checked by: DM
Sheet No. : 1 of 2	Plot Scale: 1:1 @ A0



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- Metal
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- Ground Level
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- Pipe

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Revision Table

CONTROL STATION COORDINATES

STN	EASTING	NORTHING	LEVEL

Aspect
Land + Hydrographic Surveys
CHARTERED SURVEYORS
Thornhouse Business Centre
Ballot Road
Irvine
KA12 OHW
Tel : 01294 313399 Fax : 01294 313389
E-mail: mail@aspectsurveys.com
Web: www.aspectsurveys.com

Client :

FAIRHURST
4TH FLOOR, TAY HOUSE
300 BATH STREET
GLASGOW
G2 4JR

Project Title :

RIVER CROSS SECTION SURVEY
WESTFIELD
BALLINGRY

Project No: A9483	Scale : 1:500
Surveyed date : 7th March 2024	Issued date : 18th March 2024
Surveyed by : AJS	Checked by: DM
Sheet No. : 2 of 2	Plot Scale: 1:1 @ A0

N

Site Boundary

Existing Westfield Substation

Permeable Gravel

GIS Control Building

Access and Internal Roads

Footpath for Access and Maintenance

TKUP Transformers

Transformers for Customer Connections

Transformer Bunded Areas

Perimeter Security Fencing

Perimeter Access Track

Landscape Bunds

SuDS Ponds

Ditch Diversion

Temporary Construction Compounds

0 20 40 60 80 100 m

SP Energy Networks

edp

Stantec

purpose of issue **PLANNING**

date	**16 DECEMBER 2025**
drawing number	**edp8754_d018c**
scale	**1:2,500 @ A3**
drawn by	**DJo**
checked	**LMa**
QA	**RBa**

client
SP Energy Networks

project title
Westfield Substation Extension

drawing title
Figure 3.1: Proposed (Indicative) Site Plan

Appendix B

Hydrology

B.1 Introduction

Hydraulic modelling was undertaken to provide a quantitative assessment of the fluvial flood risk to proposed development from two unnamed watercourses (**Appendix C**). Derivations of flows for these watercourses are detailed in this appendix.

B.2 Catchment

The unnamed Watercourse 2, at the downstream extent of the site, drains an area of approximately 1.99 km^2, delineated based on Phase 5[1] LiDAR data (**Figure B-1**). Watercourse 1 drains an area of approximately 0.88 km^2 at the confluence point with Watercourse 2. No gauging station is available on these watercourses; therefore, catchment descriptors were utilised to estimate runoff volumes (**Section B.3**). Catchment descriptors were extracted from the Flood Estimation Handbook (FEH) Web Service. The FEH web service generates catchments based on a 50 metre (m) grid interval Integrated Hydrological Digital Terrain Model (IHDTM); as a result, the web service has the potential to misrepresent the contributing catchment when compared to the catchment defined based on more detailed Phase 5 LiDAR data – as illustrated in **Figure B-1**.

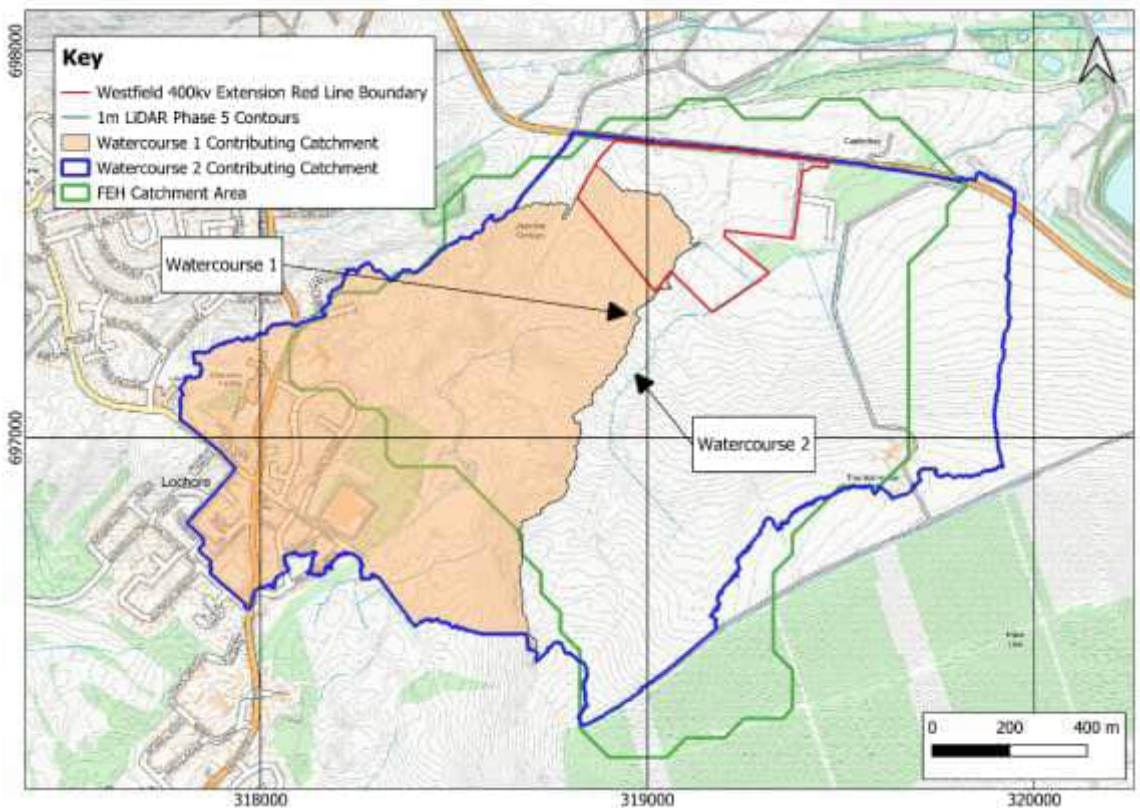


Figure B-1: Contributing Catchment

[1] Scottish Public Sector LiDAR (Phase 5), initially captured by Fugro for SP Energy Network (SPEN) from 2020 to 2021. The data has 0.5m grid resolution.

B.3 Peak Flow Estimation

NPF4 requires that new development be assessed against a 1 in 200 year flood, with allowances for climate change. SPEN Substation Flood Resilience Policy (SUB-01-018 Issue 3) requires all grid and primary substations to be protected to a 1 in 1000 year flood risk return period, with an allowance for climate change. This section details the methods utilised to derive these flows for the unnamed watercourses.

Catchment descriptors were utilised to derive runoff for a range of return periods using FEH Rainfall Runoff (FEH RR) and Revitalised Flood Hydrograph (ReFH2) methodologies. The catchment area is too small for the FEH statistical method to be appropriate, therefore this method has been discounted.

Current SEPA guidance on applying climate change allowances in FRAs for land use planning recommends that climate change be accounted for in small catchments (less than 30 km^2) by applying a defined increase in peak rainfall intensity, which varies depending on the location of the catchment (SEPA, 2023). The site is situated in the Tay River Basin Region and as such a 39% increase in rainfall has been applied to the derived 1 in 200 year and 1 in 1000 year flows by adjusting the design rainfall, to provide an estimate of the 1 in 200 year + climate change (+ CC) and 1 in 1000 year +CC flood flows.

Flow estimates using both the FEH RR and ReFH2 methods are detailed in **Table B-1**. SEPA recommend that the most conservative estimates (i.e., the method resulting in the largest flows) are adopted, and therefore the estimates derived using the FEH RR method have been utilised going forward.

Table B-1: Comparison of Peak Flow Estimates

Watercourse	Watercourse 1		Watercourse 2	
Return Period	FEH (m^3/s)	REFH2 (m^3/s)	FEH (m^3/s)	REFH2 (m^3/s)
200 year + 39% CC	2.28	1.93	2.86	2.49
1000 year + 39% CC	3.29	2.67	4.12	3.42

Appendix C

Hydraulic Modelling

C.1 Introduction

Hydraulic modelling was undertaken to provide a quantitative assessment of the fluvial flood risk from watercourses 1 and 2, using a 2D model. Full details of the modelling study are presented within this appendix and summarised in the main report.

C.2 Model Construction

C.2.1 Model Extent

A 2D hydraulic model of the unnamed Watercourses 1 and 2 has been constructed using the industry standard TUFLOW software packages. The set-up of the model is shown in **Figure C-1**.

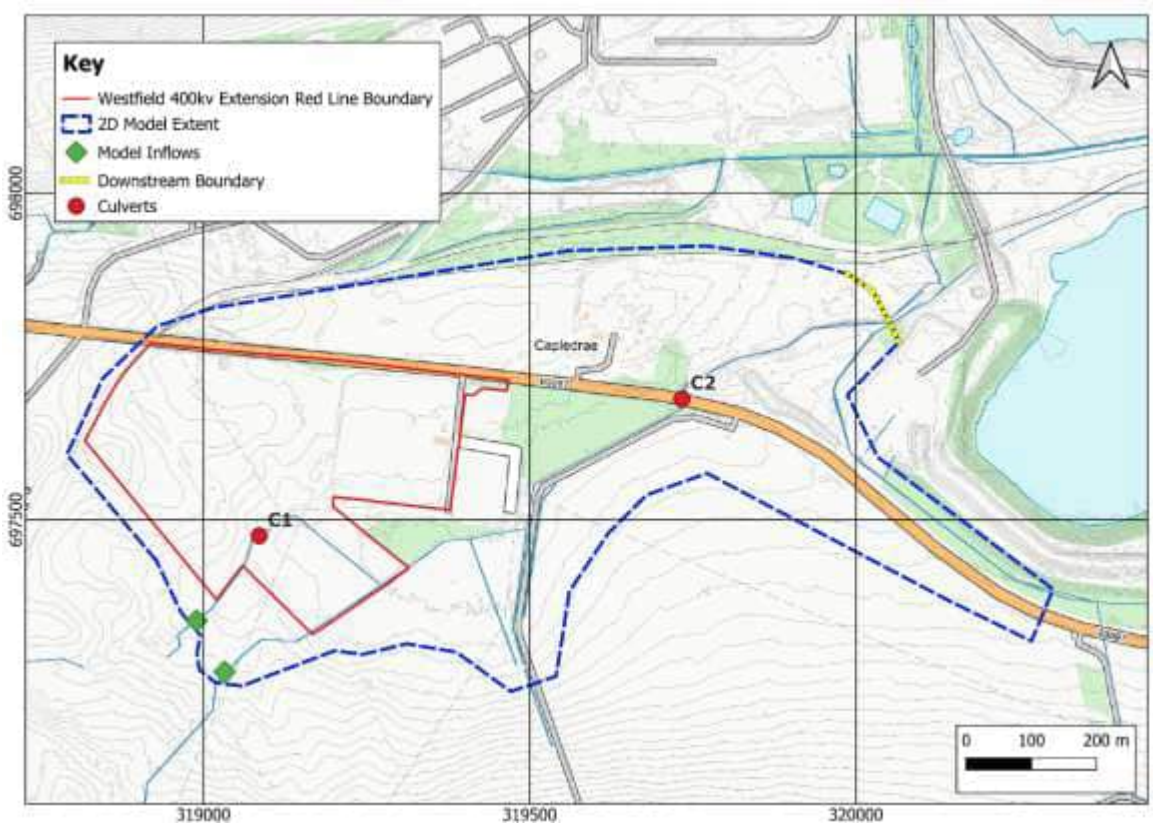


Figure C-1: Model Set-up

The 2D domain covers an area of 0.61 km^2 (**Figure C-1**) and has been constructed using a combination of LiDAR Phase 5 data, supplemented by topographic survey data within the site area (Drawing No. '*16866*' Sheet 1 to 15, **Appendix A**). The 2D domain extends over 800 m downstream (north-east) of the site, covering the B9097 embankment. This ensures that identified flood mechanisms are adequately accounted for and that the downstream boundary conditions, detailed in **Section C.2.3** do not influence the simulated level at the proposed site. A fixed mesh of 1 m cell size was applied in the discretisation of the surface topography and found sufficient to resolve flow pathways.

Details of existing culvert crossings identified in the cross-sectional survey have been included within the model, with details contained in **Table C-1**.

Table C-1: Watercourse Structures

Name	Description & Approximate Dimensions	Representation in Model
C1	Circular crossing, 0.8 m in diameter that conveys Watercourse 1	1D network (1d_nwk)
C2	Circular crossing, 1.70 m in diameter that conveys Watercourse 2 underneath the B9097	1D network (1d_nwk)

C.2.2 Model Roughness

The composition of bed material within a watercourse has a significant influence on the way that water flows through the watercourse channel. This is represented within the hydraulic model using Manning's roughness values. Throughout the 2D model, Manning's roughness value of 0.035 was used for the channels of the unnamed watercourses. This value is considered to be representative of the relatively straight channels of agricultural ditches.

Manning's roughness values within the 2D domain were set to a global value 0.04 to the agricultural fields. Higher roughness values of 0.1 and 3 were applied to wooded area and buildings respectively. A lower value of 0.022 was applied to roads, pathways and paved areas. The existing Westfield Substation platform was represented with a value of 0.03.

Sensitivity testing has been undertaken on these roughness values, as described in **Section C.3.3**.

C.2.3 Boundary Conditions

The inflows to the model are "QT" (flow - time) type boundary conditions. The inflow hydrograph is based on the peak flows estimated by the FEH R-R method (see **Appendix B**).

The downstream boundary of models is an "HQ" (normal depth) type boundary with the slope set indicative of the respective average slope.

Sensitivity testing has been undertaken on the downstream boundary, as described in **Section C.3.3**.

C.3 Model Runs & Results

C.3.1 Baseline Scenario

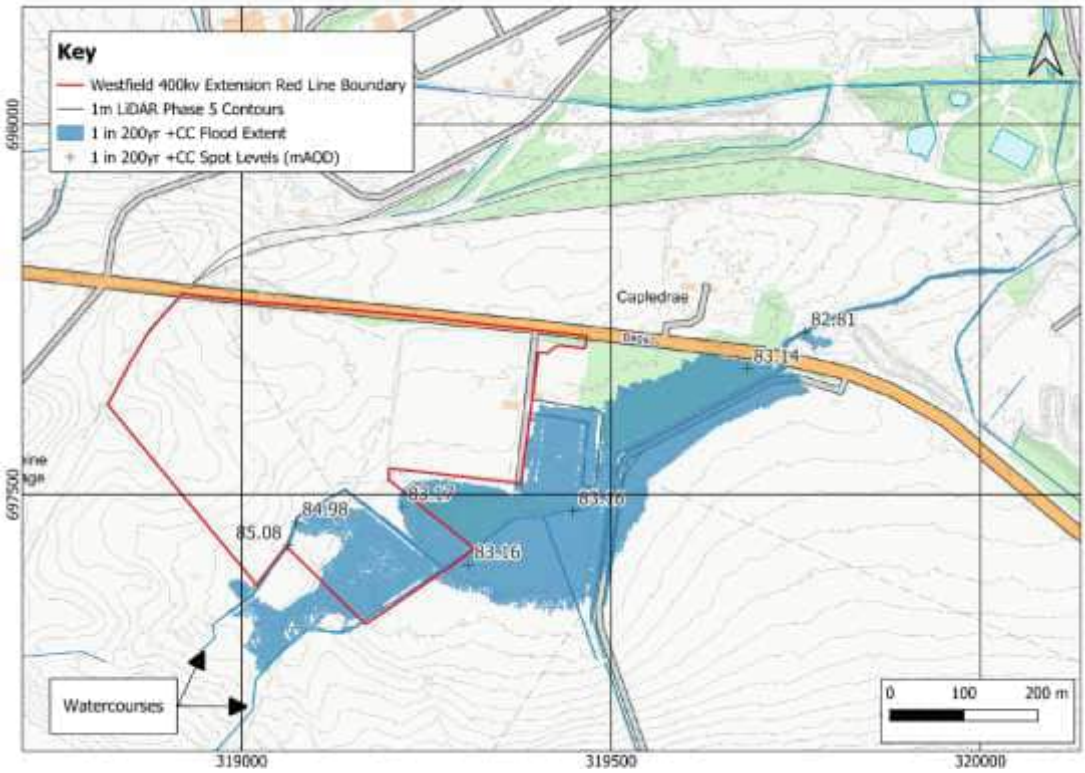
The baseline model scenario has used the hydraulic model set up as described above, for a 1 in 200 year + 39% climate change (+ CC) and 1 in 1,000 +CC year inflow at the upstream boundary, as per the hydrology derived in **Appendix B**.

1 in 200 year +CC Results

The flood extent for the 1 in 200 year +CC flood event is shown in **Figure C-2**. The results identify a peak water level of 85.08 mAOD at the site.

1 in 1000 year +CC Results

The flood extent for the 1 in 1000 year +CC flood event is shown in **0**. The results identify a peak water level of 85.13 mAOD at the site.



Contains LiDAR data and Ordnance Survey data © Crown copyright and database rights 2025

Figure C-2: 1 in 200 year +CC Flood Extent and Levels

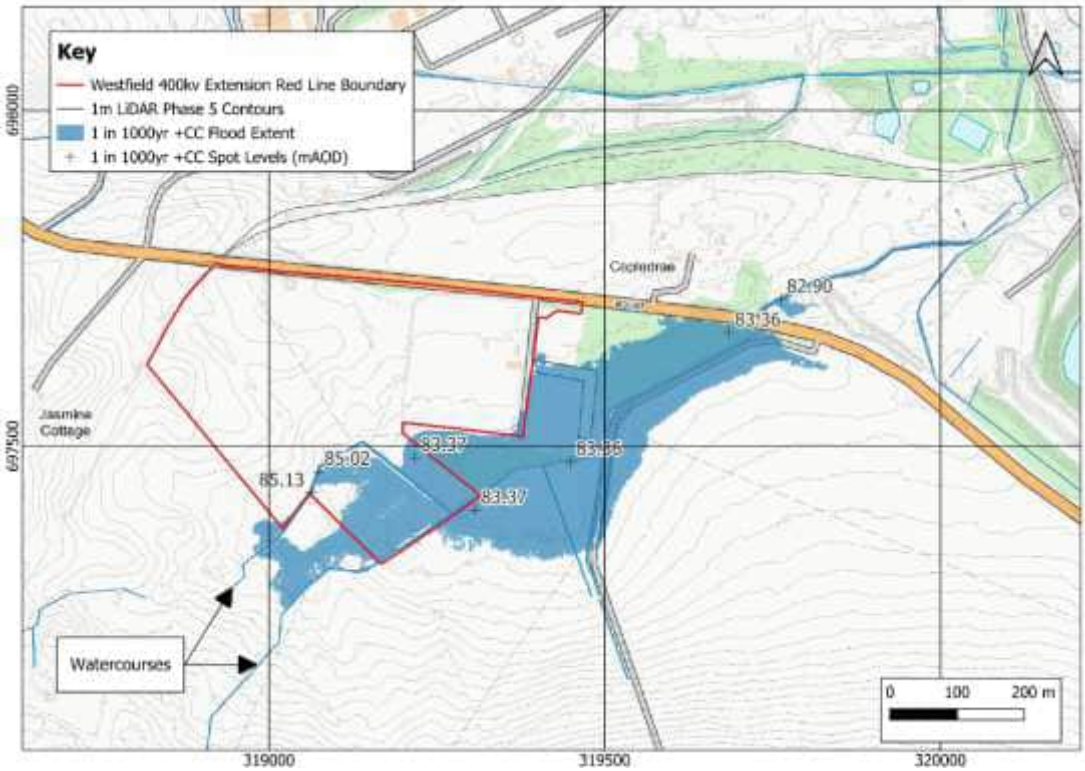


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Figure C-3: 1 in 1000 year +CC Flood Extent and Levels

C.3.2 Blockage Scenarios

Should crossings C1 and C2 (see **Figure C-4**) become blocked, there is potential for increased volumes of water to be routed overland and increased flooding to occur within the site area. Modelling has, therefore, also been carried out for the 1 in 200 year +CC and 1 in 1000 year +CC events with 100% blockage of each crossing.

The results of the hydraulic modelling study are presented in **Table C-2** upstream of each blocked structure for both scenarios. Results indicate that blockage causes an increase in water levels immediately upstream of the blocked crossing, with knock on impacts on the wider flood extent and water levels. The blockage scenarios result in wider flood extents, caused by the presence of the B9097 embankment which acts as a barrier to flow, as shown in **Figure C-4** and **Figure C-5**. The results show that a 100% blockage of C1 and C2 increases water depths in the site, by up to around 452 mm during the 1 in 200 year +CC event, and up to 517 mm during the 1 in 1000 year +CC event. The finished platform level is to be set at 88.60 mAOD, which is more than 3.0 m above the peak water levels during the blockage scenarios.

Table C-2: Culvert Blockage Scenario Peak Water Level Results

Event	1 in 200 +CC		1 in 1000 +CC	
Scenario	**Baseline**	**Blockage**	**Baseline**	**Blockage**
C1	84.90	84.99	84.94	85.02
C2	83.12	83.62	83.36	83.89

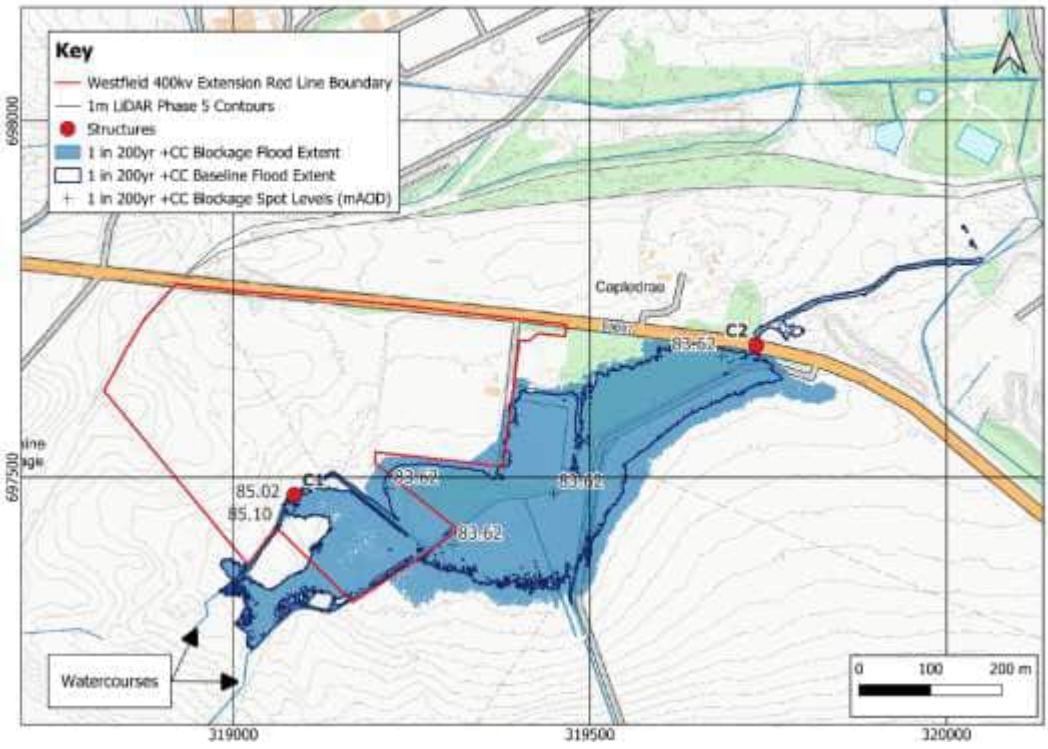

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Figure C-4: 1 in 200 year +CC Blockage Flood Extent and Levels

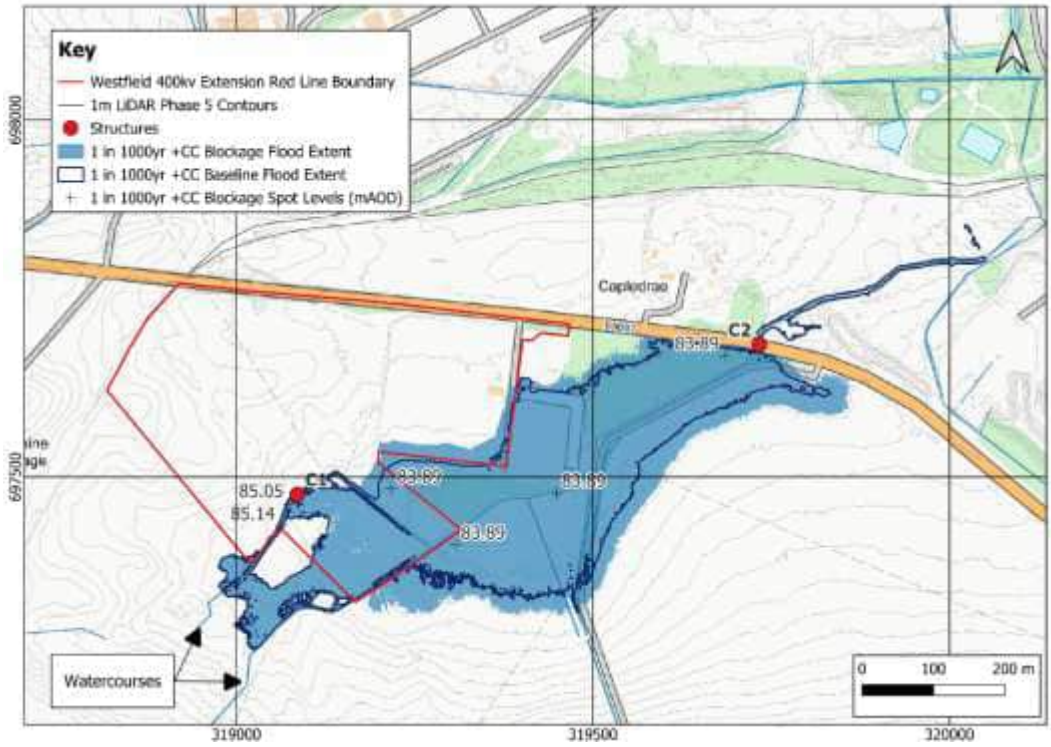

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Figure C-5: 1 in 1000 year +CC Blockage Flood Extent and Levels

C.3.3 Sensitivity Testing

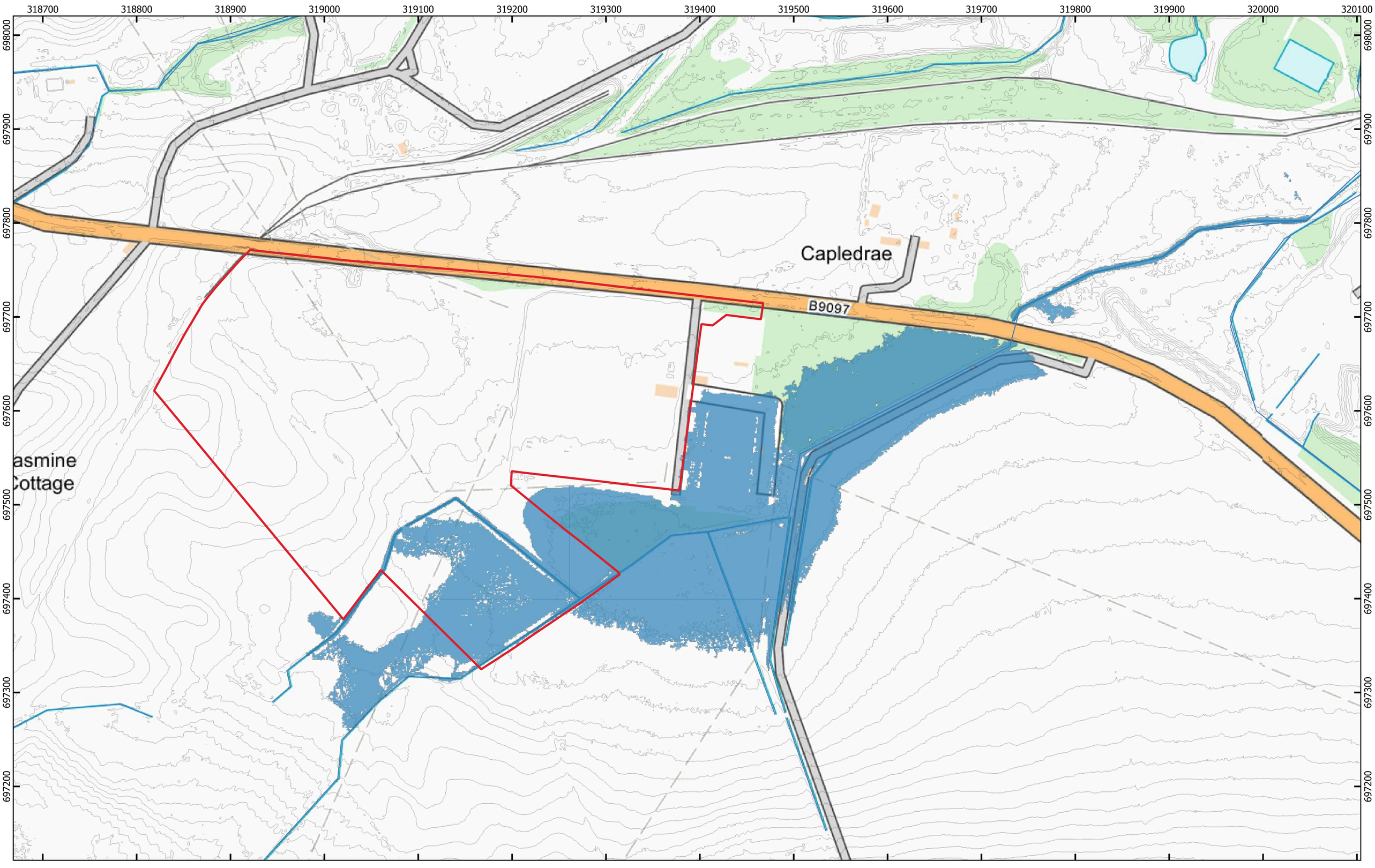
All hydraulic modelling carries a degree of uncertainty resulting from a variety of factors including roughness and downstream boundary slope. Sensitivity testing has, therefore, been carried out to assess how the model reacts to variations in these parameters and in doing so better understand the risks. This includes:

- Manning's Roughness – baseline Manning's n increased by 20%
- Downstream boundary – baseline bed slope reduced by 50%

The results of the sensitivity runs carried out for the site model do not differ significantly from the baseline model results, therefore the sensitivity of this model is deemed to be low. Peak water levels are, therefore, considered to be reasonably well represented within the model results. The recommended 600 mm freeboard above 1000 year + CC flood levels is, therefore, considered sufficient.

Appendix D

Flood Extent Drawings



Rev.	Date	Revision Details	Drawn	Checked	Approved
02	16/01/26	Updated Red Line Boundary	EI	SM	SM

Legend

1 in 200 year +CC Flood Extent

Westfield 400kV Extension Red Line Boundary

Notes: Flood levels derived from Tuflow model M03_001. Flood extent derived using topographic survey carried out by L&M Surveys in January 2025 and Phase 5 Lidar data.

Client: SP ENERGY NETWORKS

Project Title: Westfield 400kV Substation Extension

Drawing Title: 1 in 200 year +CC Flood Extent

0 50 100 m

Scale - 1:3500

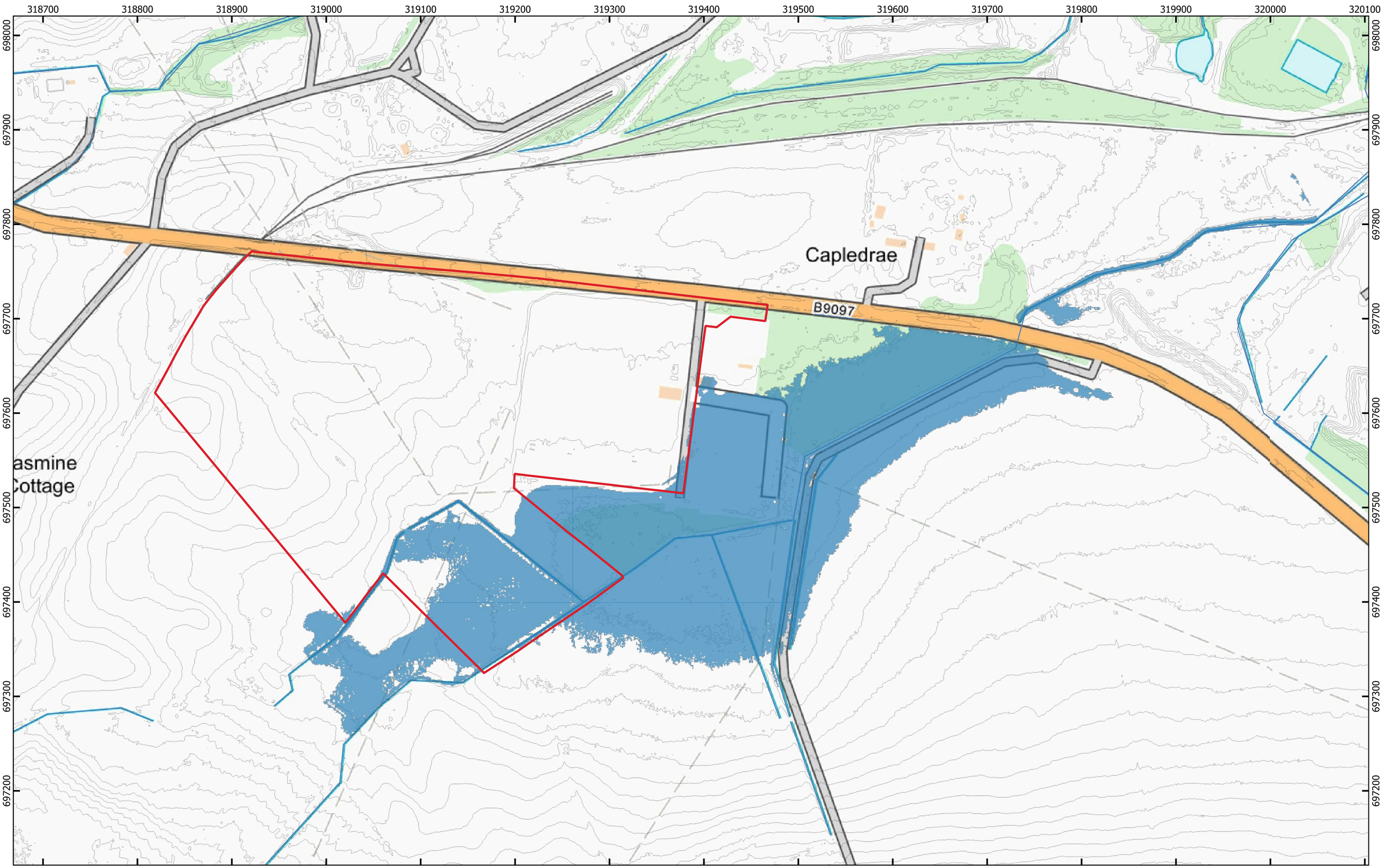
FAIRHURST

Drawn:	Checked:	Approved:
EI	SM	SM
02/05/25	02/05/25	02/05/25

Drawing No.: 165612/GIS/001

Revision: 02

Status: FINAL



Rev.	Date	Revision Details	Drawn	Checked	Approved
02	16/01/26	Updated Red Line Boundary	EI	SM	SM

Legend

1 in 1000 year +CC Flood Extent

Westfield 400kV Extension Red Line Boundary

Notes: Flood levels derived from Tuflow model M03_001. Flood extent derived using topographic survey carried out by L&M Surveys in January 2025 and Phase 5 Lidar data.

Client: SP ENERGY NETWORKS

Project Title: Westfield 400kV Substation Extension

Drawing Title: 1 in 1000 year +CC Flood Extent

0 50 100 m

Scale - 1:3500

FAIRHURST

Drawn:	Checked:	Approved:
EI	SM	SM
02/05/25	02/05/25	02/05/25

Drawing No.: 165612/GIS/002

Revision: 02

Status: FINAL