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Land off Ewenny Road, Maesteg

Drainage Strategy Report

November 2013

Waterman Transport & Development Limited

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Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2008, BS EN ISO 14001: 2004 and BS OHSAS 18001:2007)

Issue	Date	Prepared by	Checked by	Approved by
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03	Nov 2013	B Whyman	G Tulip	G Tulip

Comments

Comments

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The conclusions resulting from this study and contained in this report are not necessarily indicative of future conditions or operating practices at or adjacent the site.

Much of the information presented in this report is based on Topographical and Drainage CCTV survey information provided by others. That information has neither been checked nor verified by Waterman Transport & Development Ltd.

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1. Introduction

Waterman Transport and Development Ltd. (WTDL) have been commissioned to undertake a Drainage Strategy report to support a planning application for a proposed mixed use development at the former Cooper Standard/Budelpack site off Ewenny Road, Maesteg. Pontardawe Coal and Metals Company Ltd. intend to redevelop the site with the following development mix;

- 2 no. Fast Food restaurants – each 3,500 ft² (325 m²)
- Family Pub/Restaurant – 6,000 ft² (557 m²)
- 3 no. Non-Food retail units - each 1,590 ft² (147m²)
- Bulky Goods Retail – 5,000 ft² (454 m²)
- Food Retail – 6,000 ft² (557 m²)
- Extra Care Facility – 29,708ft² (2,760 m²)
- 10 no. B1 Employment Units – each 2,500 ft² (232 m²)
- 1 no. B1 Employment Unit – 10,000 ft² (929 m²)
- Residential Development – 115 dwellings

The site masterplan is shown on drawing GA2795(05)010 produced by Powell Dobson Architects.

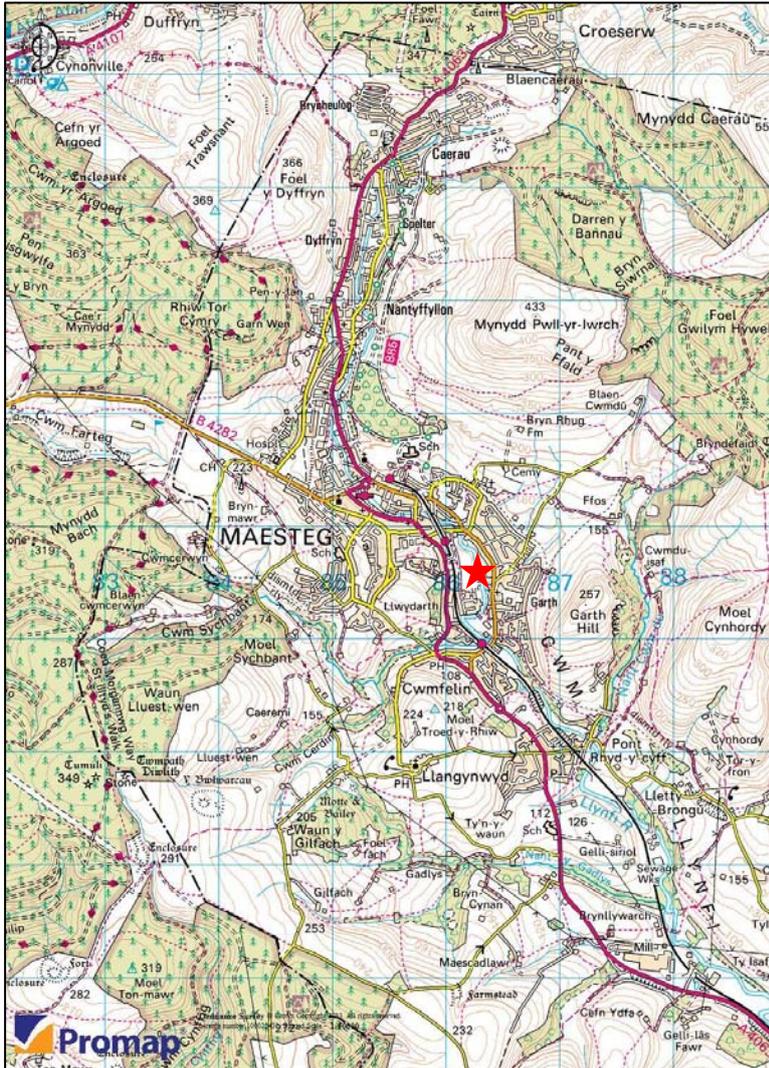
The objectives of this report are to;

- Identify suitable outfall locations for the Surface Water and Foul Drainage from the proposed development.
- Establish whether there is sufficient capacity within the Foul sewerage network for the development.
- Undertake hydraulic calculations to identify peak design flows or restrictions for the development and any subsequent attenuation requirements.
- Consult with the appropriate authorities such as Dwr Cymru Welsh Water (DCWW), National Resources Wales (NRW) and the Local Authority.
- Provide a schematic layout of the proposed foul and surface water drainage proposals.

2. Existing Site

2.1 General Description

The proposed redevelopment site is located in the South Eastern area of Maesteg and centred around the National Grid Reference E: 286182, N:190571. The site is bounded by Oakwood Drive to the West, a builder's yard to the north, River Llynfi to the east and a residential estate to the south. A site location plan is included in Figure 1 below;



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Figure 1: Site Location Plan

Historically the site has housed large light industrial units and associated services yards and car parking areas. The site is currently unoccupied and the existing buildings have been demolished to ground slab level.

The site can currently be accessed by 6 no. vehicular access points off Oakwood Drive and subsequently

Ewenny Road and either A4063 Bethania Street to the West or the B4282 Bridgend Road to the east.

Two topographical surveys have been undertaken on the site, split between the northern and southern parts of the site. JME3D Land and Engineering Surveyors have produced a topographical survey for the northern portion of the site post demolition (Drawing No. JME3D-20085-TOPO). John Vincent surveys Ltd have produced a topographical survey for the southern portion of the site (Drawing No. 127/10). Copies of both survey drawings are included within Appendix A.

The topographical information for the site indicates that the site is relatively flat with existing levels generally around 113m AOD in the northern portion and around 112.8m AOD in the southern portion.

2.2 Hydrology

No existing watercourses cross the development site. The River Llynfi runs adjacent the eastern boundary of the site, flowing north to south. A tributary, the Nant Y Twlc, joins the River Llynfi close to the south eastern corner of the site.

2.3 Geology

A Site Investigation report has been produced by Johnson Poole & Bloomer Consultants in October 2010. The intrusive investigation established that the ground floor slab for the existing buildings were between 0.15 – 0.25m thick. The existing buildings overlay a thin horizon of “engineering fill”, typically comprising brown sandy gravel of stone with concrete. The mantle of Made ground comprised a variable sequence of “colliery spoils” varying in grading from gravelly clays to silty sandy gravel of mudstones, with rare coal and sandstones. The thickness of made ground varied between 1.8m to 11.60m beneath the site, the thickness increasing in a southerly and easterly direction beneath the site. Limited investigation of the natural soils beneath the Made ground was undertaken. The majority of the natural superficial soils comprised “granular”, variably graded sandy gravels and cobbles extending to depths of between 11.50 and 18.40m below ground level.

2.4 Hydrogeology

The Environment Agency maps indicate that the site is not within a groundwater source protection zone. No groundwater inflows were recorded in any of the windowless samples undertaken as part of the site investigation. Groundwater was recorded in some Boreholes, standing water levels ranged from 3.17m to 8.90m below ground level.

3. Surface Water Drainage

3.1 Existing Surface Water Drainage Regime

Welsh Water records indicate there are no Public Surface water sewers within or adjacent to the site, the sewerage network in the vicinity is generally of a combined type. A drainage CCTV survey has been undertaken on the southern portion of the site which has identified a private surface water drainage system. There are two surface networks, one draining the building in the south eastern corner via 300mm dia. PVC pipe, the other network serves two buildings in the south western corner. This line varies in diameter between 225mm and 400mm prior to discharging via a 300mm dia outfall in the River Llynfi. The alignment and position of this outfall section is unknown, likewise the systems serving the northern portion of the site. It is assumed that this area of the site ultimately discharges into the River Llynfi unrestricted, in a similar fashion to the southern portion.

An existing drainage layout drawing no. CIV14930-SA-90-0001 Rev A01 is included within Appendix B which shows both surface and foul water drainage systems.

3.2 Surface Water Drainage Proposals

The proposed surface water system and subsequent flows should discharge by one of the following mechanisms, shown below in order of preference;

- a) Infiltration/Soakaways on site
- b) Discharge to the nearest watercourse
- c) Discharge to the nearest Public Surface Water Sewer or Highway Drain

Soakaway testing in accordance with BRE Digest 365 will need to be undertaken across the site to establish whether there is sufficient infiltration within the underlying strata. The site investigation report does not comment on the viability of an infiltration drainage solution on the site.

In the absence of infiltration rates for this site and potential for the existence of contamination on site, this report will consider the option of discharging into the nearest watercourse, the River Llynfi, replicating the existing surface water drainage regime.

An analysis of the drainage catchment area of the site has been undertaken on aerial imagery pre demolition stage. Drawing CIV14930-SA-90-0002 Rev A01 included within Appendix C shows that the site is generally covered in impermeable area, with large factory buildings, car parks, service yards and roads. The existing impermeable area measures approximately 7.288ha, this should not be dissimilar to the impermeable area of the site post demolition.

An analysis of the proposed drainage catchment area as shown in drawing CIV14930-SA-90-0002 Rev A01 in Appendix C, indicates that the proposed impermeable area is approximately 4.978ha. The proposed redevelopment therefore significantly reduces the surface water run-off rates and volumes exiting from the site into the River Llynfi, on the assumption that the northern portion of the site drains to the River Llynfi. The magnitude in reduction is in the order of 32%, therefore on the basis that the site currently discharges to the River unrestricted, the surface water discharge from the development should be unrestricted into the River Llynfi via the existing surface water outfall positions.

Table 1 overleaf outlines approximate discharges from the site pre and post development for various storm return periods calculated using the Modified Rational method, with average rainfall intensities based on a 15min storm duration;

Table 1: Comparison of Surface Water Discharges Pre & Post Development

Development Stage	Imp. Area (Ha)	1 in 1 Yr (l/s)	1 in 30 Yr (l/s)	1 in 100 Yr (l/s)	1 in 100 Yr+30% (l/s)
Pre Development SW Discharge	7.288	490	1,197	1,540	2,003
Post Development SW Discharge	4.978	335	817	1,052	1,368
Betterment	-	155	380	488	635

An indicative layout for the proposed surface water drainage system is shown on drawing CIV14930-SA-90-0004 Rev A01 included within Appendix E. The network has been designed on the basis of outfalling at the existing points in the south eastern corner. Initial inspection of the outfall levels suggest that a gravity route could be achieved from the northern extents of the site assuming a minimum finished floor level of 113.1m AOD (assuming the northern most unit is raised by 600mm above existing ground levels). The proposed invert level would be around 107.7m AOD based on a 1 in 200 gradient, resulting in a drain approximately 4.8m deep at the south eastern boundary. The existing invert levels at the outfall points are 104.2m AOD and 103.7m AOD respectively.

3.3 Sustainable Drainage Systems (SuDs)

SuD techniques should be considered and integrated into the development's surface water proposals where appropriate during the detailed design stage of the development. Consideration should be given to the benefit of SuDs, not only for their ability for storing surface water and delaying run-off but their Water Quality treatment benefits. Table 2 overleaf identifies suitable SuDs techniques that could be integrated into the scheme;

Table 2: SuDs Suitability Appraisal

SUDS Group	Technique	Water Quality Treatment Potential					Site Suitability
		Total Suspended Solids Removal	Heavy Metals Removal	Nutrient Removal	Bacteria Removal	Treatment of Suspended Sediments	
Retention	Retention Pond	H	M	M	M	H	✘
	Subsurface Storage	L	L	L	L	L	✘
Wetland	Shallow Wetland	H	M	H	M	H	✘
	Extended detention wetland	H	M	H	M	H	✘
	Pond/Wetland	H	M	H	M	H	✘
	Pocket Wetland	H	M	H	M	H	✘
	Submerged Gravel Wetland	H	M	H	M	H	✘
	Wetland Channel	H	M	H	M	H	✘
Infiltration	Infiltration Trench	H	H	H	M	H	Tbc
	Infiltration Basin	H	H	H	M	H	✘
	Soakaway	H	H	H	M	H	Tbc
Filtration	Surface Sand Filter	H	H	H	M	H	✘
	Sub-Surface Sand Filter	H	H	H	M	H	✘
	Perimeter Sand Filter	H	H	H	M	H	✓
	Bioretention/Filter Strips	H	H	H	M	H	✓
	Filter Trench	H	H	H	M	H	✓
Detention	Detention Basin	M	M	L	L	L	✘
Open Channels	Conveyance Swale	H	M	M	M	H	✓
	Enhanced Dry Swale	H	H	H	M	H	✓
	Enhanced Wet Swale	H	H	M	H	H	✓
Source Control	Green Roof	-	-	-	-	H	✓
	Rain Water Harvesting	M	L	L	L	-	✓
	Permeable Pavement	H	H	H	H	H	✓

The SuD Manual design guide shall be used to select and detail the preferred SuDs options. The guidance also suggests the appropriate level of treatment to surface water run-off prior to discharging from the site to minimise the risk of pollution to the receiving waters. Table 3 overleaf shows the designation of treatment levels based on implementing a SuDs treatment train;

Table 3: Number of SuDs Treatment Train Components

Run-Off Catchment Characteristics	Receiving Water Sensitivity		
	Low	Medium	High
Roofs Only	1	1	1
Residential Roads, Parking areas, Commercial Zones	2	2	2
Refuse Collection/Industrial Areas/Loading Bays/Lorry Parks/Highways	3	3	3

The mixed development proposals therefore necessitate different treatment levels for different zones of the masterplan. Roof drainage will be segregated where possible, with drainage serving Roads and commercial areas going through two levels of treatment. The industrial unit and associated service yard area within the south eastern portion of the site would require three levels of treatment prior to discharging from the site.

4. Foul Water Drainage

4.1 Existing Foul Water Drainage

Dwr Cymru Welsh Water records show that there is a 600mm dia. cast iron Public Combined Sewer traversing through the north east corner of the site. The topographic survey has not located any manhole chambers associated with this Sewer. A drainage investigation is currently being procured to identify the position of the existing sewer in order to provide sufficient constraint information for the proposed masterplan. The depth of the sewer is also unknown, this will influence the easement requirements for the sewer.

Another DCWW Public Combined Sewer crosses the southern end of the site, this is a 225mm dia. sewer that enters the western boundary and exits the south eastern corner adjacent to the surface water outfalls. The sewer subsequently crosses the River Llynfi. The drainage CCTV survey picks up details of this sewer which shows foul connections from the previous buildings on site.

The layout of the existing foul drainage network is shown on drawing CIV14930-SA-90-0001 Rev A01 included in Appendix B.

Existing Foul Flow Assessment

Record drawings of the existing facilities or metered water supply information are not available at the time of writing this report. The assessment of the existing foul flows will therefore be based on measured nett area. The previous facilities on site included the Coopers Standard Site (15,100 m² of Industrial Development) and the Council site (14,500 m² of Industrial Development).

Using the DCWW Sewerage Design Manual;

Site Area = 2.96 Ha

Light Industrial / Storage / Warehouse = 10 m³/Ha/Day

Therefore the daily usage for the site = 29.6 m³/Day

Assuming an 8 hour operation , the average flow = 1.03 l/s

Using a Peaking Factor of 2, the peak foul design flow = **2.06 l/s**

4.2 Foul Water Drainage Proposals

The proposed foul drainage network is shown on drawing CIV14930-SA-90-0004 Rev A01 included in Appendix D.

The depths of the existing foul network are unknown, however is assumed that proposed finished floor levels will be set approximately 600mm above existing levels. The drainage CCTV survey indicates that previous facilities in the southern portion of the site were served by gravity systems. It is therefore proposed to gravitate the foul system of the site into the 225mm diameter combined sewer. There may be opportunities to direct some flow from the northern section of the site into the existing 600mm dia sewer, however further investigation work of the 600mm dia sewer is required to establish whether there are any lateral connections from the site going into the sewer.

Proposed Foul Flow Assessment

At this stage no internal layout drawings of the units are provided, therefore the foul flow calculations will be based on the area of the facilities and estimated populations.

Using the DCWW Sewerage Design Manual;

115 Residential Dwellings

Population = 288 (assuming 2.5 persons per dwelling)

Domestic per capita consumption = 180l/hd/day

Average Flow = 51,840 l/day = 0.6 l/s

Using a peaking factor of 2, the peak design flow = 1.2 l/s

Fast Food Restaurant (650m²)

Design Flow = 12 l/hd/day

Population = 217 (assume 1 person per 3m²)

Average Flow = 2,604 l/day = 0.03 l/s

Using a peaking factor of 2, the peak design flow = 0.06 l/s

Family Pub Restaurant (557m²)

Design Flow = 15l/hd/day

Population = 186 (assume 1 person per 3m²)

Average flow = 2,790 l/day = 0.03l/s

Using a peaking factor of 2, the design flow = 0.06 l/s

Retail (1,462m²)

Design flow = 45l/hd/day

Population = 92 (assume 1 person per 16m²)

Daily Usage = 4,275 l/day

Assuming an 8 hour operation, the average flow = 0.4 l/s

Using a peaking factor of 2 =0.8 l/s

Extra Care Facility (2,760m²)

Design Flow = 350l/bed/day

Population = Assume maximum of 60 beds

Daily usage = 21m³/day

Average flow = 0.24 l/s

Using a peaking factor of 2 = 0.48 l/s

Employment Units (3,249 m²)

Design flow = 55 l/hd/day

Population = 232 (assume 1 person per 14m²)

Daily Usage = 12,760 l/day

Assuming an 8 hour operation, the average flow = 1.18 l/s

Using a peaking factor of 2 = 2.36 l/s

Therefore the total proposed peak foul design flow, based on a peaking factor of 2 = **4.96 l/s**. The calculations indicate an approximate increase of 2.9l/s in the peak design flow as a result of the redevelopment of the site. Calculations for the existing flows do not include any allowances for Trade Effluent and it is not known whether the previous occupants benefited from a Trade Effluent license.

4.3 Section 185 Diversion

The masterplan proposals require the diversion of the 225mm dia. combined sewer at the south of the site which also serves properties to the west of the site off Bethania Street. The diversion route would generally follow the road network and be provided with an appropriate easement. A potential S185 diversion route is shown within the drainage strategy drawing in Appendix D.

DCWW should be engaged early on regarding the S185 diversion once sufficient base information has been obtained regarding the existing system. DCWW will determine whether the design of the diversion would be undertaken by themselves or the developer.

4.4 DCWW Consultation

A preplanning enquiry has been submitted to Welsh Water highlighting the relatively small increase in foul flows into the combined sewerage system. We are currently awaiting a formal response from DCWW with regards to capacity of the existing sewerage system.

5. Conclusions & Recommendations

An infiltration solution would be the preferred option for surface water disposal. The feasibility of a soakaway solution will need to be fully investigated prior to agreeing the discharge of surface water from the site into the River Llynfi, mimicking the current drainage arrangements for the site. A comparison of the site's impermeable area pre demolition and the impermeable area for the proposed redevelopment shows that the redevelopment would significantly reduce the surface water discharge and runoff volume entering the River Llynfi from the site. Drainage surveys undertaken have not established any restriction to the surface water discharge from the site. It is proposed therefore to discharge the surface water from the redevelopment unrestricted into the River Llynfi. This is subject to assessment of the capacity of the existing outfalls into the River, to check they do not act as throttles in certain design storms.

Foul drainage from the development will continue to discharge to the 225mm dia combined sewer at the south of the site. Initial assessments comparing the proposed foul flow and historic foul flows for the site indicate that the redevelopment would only result in an increase of approximately 3 l/s in the peak design flow. A pre planning enquiry has been submitted to DCWW and we are awaiting a formal response regarding the capacity of the existing sewerage network.

A Section185 diversion of the 225mm combined sewer will be required to deliver the masterplan layout. The diversion would generally be accommodated within the internal site roads and be provided with the necessary easements. Once depths of the existing sewer are established, DCWW will need to be consulted at an early stage to agree the diversion under the Water Industry Act.

Recommendations

- A soakaway solution shall be fully explored prior to agreeing a surface water discharge to the River Llynfi.
- Additional drainage survey information is required for the northern section of the site; to establish the position and easement of the existing 600mm diameter Public combined sewer. The Sewer and River Bank will need to be checked to ensure there are no additional drainage outfalls serving the site to the north.
- The position of the 400mm dia surface water needs to be confirmed within the south east corner of the site.
- Depth to invert measurements are required for existing drainage in the southern part of the site to inform the hydraulic design of the S185 diversion and also the tie-in levels for the proposed surface water system if the existing surface water outfalls are to be utilised.

APPENDICES

A. Topographical Survey

B. Existing Drainage Layout



- NOTES:**
1. DRAINAGE SHOWN IS BASED ON WELSH WATER RECORDS MAPS AND CCTV DRAINAGE SURVEY UNDERTAKEN BY BRIDGEND COUNTY COUNCIL
 2. THIS DRAWING IS FOR INFORMATION ONLY. THE CONTRACTOR SHALL CONFIRM THE POSITION OF ALL DRAINAGE INFRASTRUCTURE ON SITE

- KEY:**
- CS — EXISTING DWCC COMBINED SEWER (BRIDGEND COUNTY BOROUGH COUNCIL)
 - CS — EXISTING DWCC COMBINED SEWER (DOWN RECORDS)
 - SS — EXISTING PRIVATE SURFACE WATER SEWER
 - FS — EXISTING PRIVATE FOUL SEWER

Rev	Date	Description	By
A01	30.10.13	PRELIMINARY ISSUES	JMW

Project Title: **EWENNY ROAD MAESTEG**

Project Title: **EXISTING DRAINAGE LAYOUT**

Client: **PONTARDAWE COAL AND METAL COMPANY LTD**



38 Cathedral Road Cardiff CF11 9LL
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Drawing Status: PRELIMINARY				
Designed by	JMW	Checked by	BW	Project No
Drawn by	JMW	Date	OCTOBER 2013	14930
Scales: B A1 work to figured dimensions only			1:1000	Computer File No: CIV14930-SA-90-001 A01.dwg
Publication	Zone	Category	Number	Revision
CIV	SA	90	0001	A01

C. Drainage Catchment Plans



Ewenny Road, Maesteg, Pen-y-bont ar Ogwr CF34, UK

NOTES:

1. AREA MEASUREMENTS ARE BASED ON A SCALED HISTORICAL AERIAL IMAGE TAKEN PRE-DEMOLITION.

KEY:

- 72,880m² IMPERMEABLE AREA
- 1,922m² PERMEABLE AREA

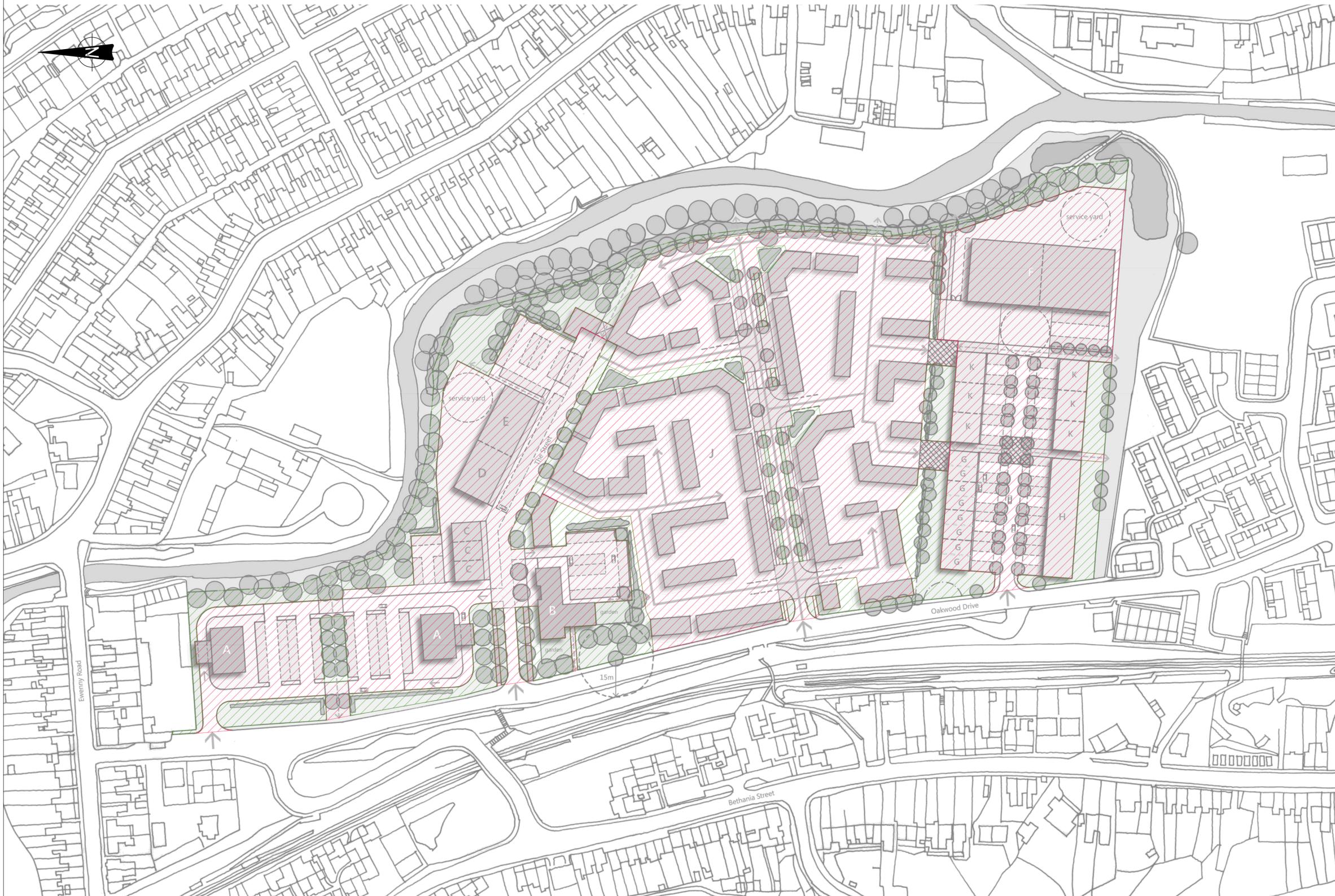
Rev	Date	Description	By
A01	30:10:13	PRELIMINARY ISSUE	LJ

Project		EWENNY ROAD MAESTEG	
Title		EXISTING DRAINAGE CATCHMENT AREA	
Client		PONTARDAWE COAL & METAL COMPANY LTD.	



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Scales @ A1 work to figured dimensions only				Computer File No CIV14930-SA-90-002 A01.dwg
1:1000				
Publisher	Zone	Category	Number	Revision
CIV	SA	90	0002	A01



NOTES:
 1. THE IMPERMEABLE AREA MEASUREMENTS ASSUME THE RESIDENTIAL ZONE WILL BE APPROXIMATELY 65% IMPERMEABLE.

KEY:
 49,777m² IMPERMEABLE AREA
 26,398m² PERMEABLE AREA

A02	11:11:13	SITE LAYOUT AMENDED	BW
A01	30:10:13	PRELIMINARY ISSUE	LJ
Rev	Date	Description	By

Amendments
 Project **EWENNY ROAD MAESTEG**

Title
PROPOSED DRAINAGE CATCHMENT AREA

Client
 PONTARDAWE COAL & METAL COMPANY LTD



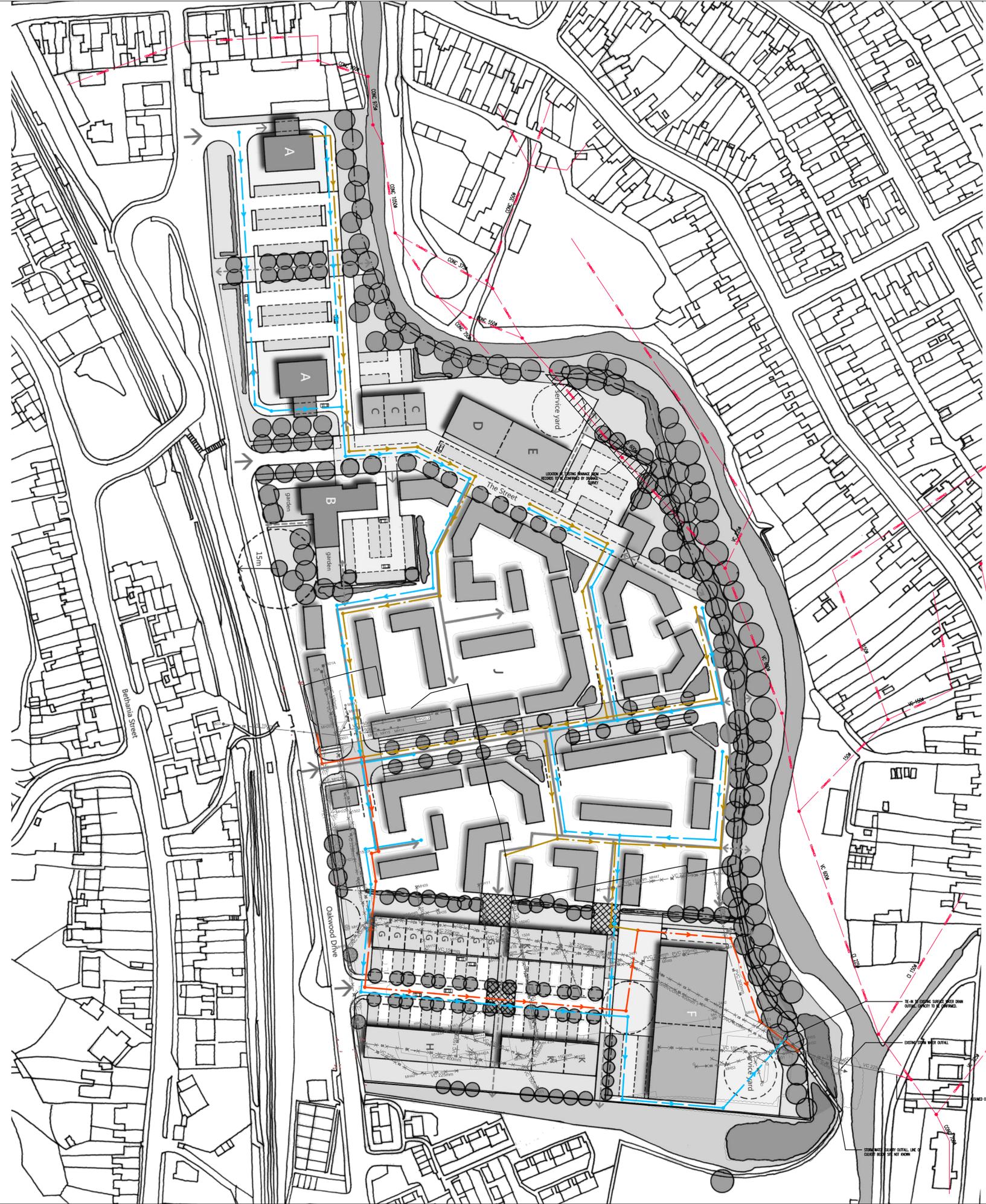
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Drawing Status
PRELIMINARY

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Scales @ A1 work to figured dimensions only		1:1000	Revision		
Publisher	Zone	Category	Number	Revision	
CIV	SA	90	0003	A02	

D. Drainage Strategy Plan



NOTES:

1. EXISTING SERVICES SHOWN ARE INDICATIVE ONLY BASED ON UTILITY RECORD DRAWINGS.
2. DRAINAGE LAYOUT ARE SCHEMATIC ONLY AND SUBJECT TO DETAILED DESIGN

KEY:

- × × × × × × × × EXISTING DRAINAGE TO BE ABANDONED
- PROPOSED S104 FOUL SEWER
- PROPOSED SW DRAIN
- PROPOSED S185 COMBINED SEWER DIVERSION (225mmØ)

A02	11:11:13	SITE LAYOUT UPDATED	BW
A01	30:10:13	PRELIMINARY ISSUE	LJ
Rev	Date	Description	By

Project		EWENNY ROAD MAESTEG	
Title		PROPOSED DRAINAGE STRATEGY	
Client		PONTARDAWE COAL & METAL COMPANY LTD.	



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Publisher	Zone	Category	Number	Revision					
CIV	SA	90	0004	A02					

UK and Ireland Office Locations

