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Quality Assurance Record

Contributors for Townsend Water Engineering Limited:

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5	14/12/2023	A. Osborne	C. Townsend	C. Townsend	5 th Issue
6	19/04/2024	A. Osborne	C. Townsend	C. Townsend	6 th Issue

Limitation of Liability and Use

The work described in this report was undertaken for the party or parties stated; for the purpose or purposes stated; to the time and budget constraints stated. No liability is accepted for use by other parties or for other purposes, or unreasonably beyond the terms and parameters of its commission and its delivery to normal professional standards.

1. INTRODUCTION

1.1 Purpose of this Report

Townsend Water Engineering Ltd. has been appointed by Mr Andrew Brown at *Kellen Homes* for a Flood Risk Assessment (FRA) for a residential development of 191 dwellings, including access, car parking, landscaping, open space and associated engineering and infrastructure including an electric substation and foul water pump station, prepared in support of the full planning permission for the aforementioned development.

The report is based on the available flood risk information for the site detailed in Section 1.2 and prepared in accordance with the planning policy requirements set out in Section 1.3. The scope of the FRA is consistent with the 'Site Specific Flood Risk Assessment Checklist' from the National Planning Policy Framework (NPPF) and accompanying Planning Practice Guidance (PPG):

<https://www.gov.uk/guidance/flood-risk-and-coastal-change#Site-Specific-Flood-Risk-Assessment-checklist-section>

1.2 Sources of Information and Consultation

This Report has been informed by:

- Existing Site Plan drawings and respective topographic plan delivered by *Kellen Homes Limited*;
- EA Product 4 data;
- Defra Magic Map <https://magic.defra.gov.uk/magicmap.aspx>;
- The EA online flood maps;
- <https://flood-map-for-planning.service.gov.uk/>; and
- <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>.

1.3 Policy Context

This report has been prepared in accordance with the relevant national, regional and local planning policy and statutory guidance as follows:

1. National policy contained within the National Planning Policy Framework (NPPF) dated December 2023,, issued by Communities and Local Government with reference to Section 14 'Meeting the challenge of climate change, flooding and coastal change';
2. The NPPF Planning Practice Guidance (PPG) released in March 2014 ('Flood Risk and Coastal Change' section) and updated in July 2021 to incorporate the EA 'Flood Risk Assessments: Climate Change Allowances' guidance.

1.4 Structure of this Report

The Report has been prepared based on the following structure:

1. Section 2 refers to spatial planning considerations by reference to the proposed land use, flood zoning and NPPF vulnerability;
2. Section 3 presents the assessment of existing flood risk at the site;

3. Section 4 presents the proposed development and findings of flooding;
4. Section 5 presents the drainage strategy; and
5. Section 6 provides a summary of the assessments.

Additional Appendices are provided that deal with the following:

Appendix A: Topographical Survey;

Appendix B: Proposed Layout;

Appendix C: Confirmation of discharges from statutory bodies; and

Appendix D: Concept Drainage Design.

2. SPATIAL PLANNING CONSIDERATION

2.1 Location and Background

The location of the proposed development site is shown in Figure 1 and Figure 2, with location details found in Table 1. The site is located at Castleton Sidings, Rochdale, OL11 3BZ (Grid Ref: 388024, 410335). (Table 1: Site Details). The proposed development is for a full planning application for 191 dwellings comprising:

“Full planning application for residential development, including access, car parking, landscaping, open space and associated engineering and infrastructure including an electric substation and foul water pump station”.

The entire development site is approximately 9.02ha and is currently a disused railway depot that has been mostly demolished, with some old railway tracks still in existence. There is a 600mm culvert crossing the middle of the site from South to North, the culvert outfalls into *Trub Brook* in the South-East. According to *United Utilities* Sewer Maps, there is a combined sewer on the Northern boundary.

To the North of the site is a golf course, further North is a residential area. There is a railway to the East, further East is a field and a residential area. To the South are woods followed by a railway and fields. To the West is the golf course, and to the South-West is a pond. Please see Figure 1 and Figure 2 indicating these features.

Table 1: Site Details

Reference	Value
OS X (Eastings)	388024
OS Y (Northings)	410335
Nearest Post Code	OL11 3BZ
Nat. Grid	SD880103

Grid reference details taken from the site Grid Reference Finder

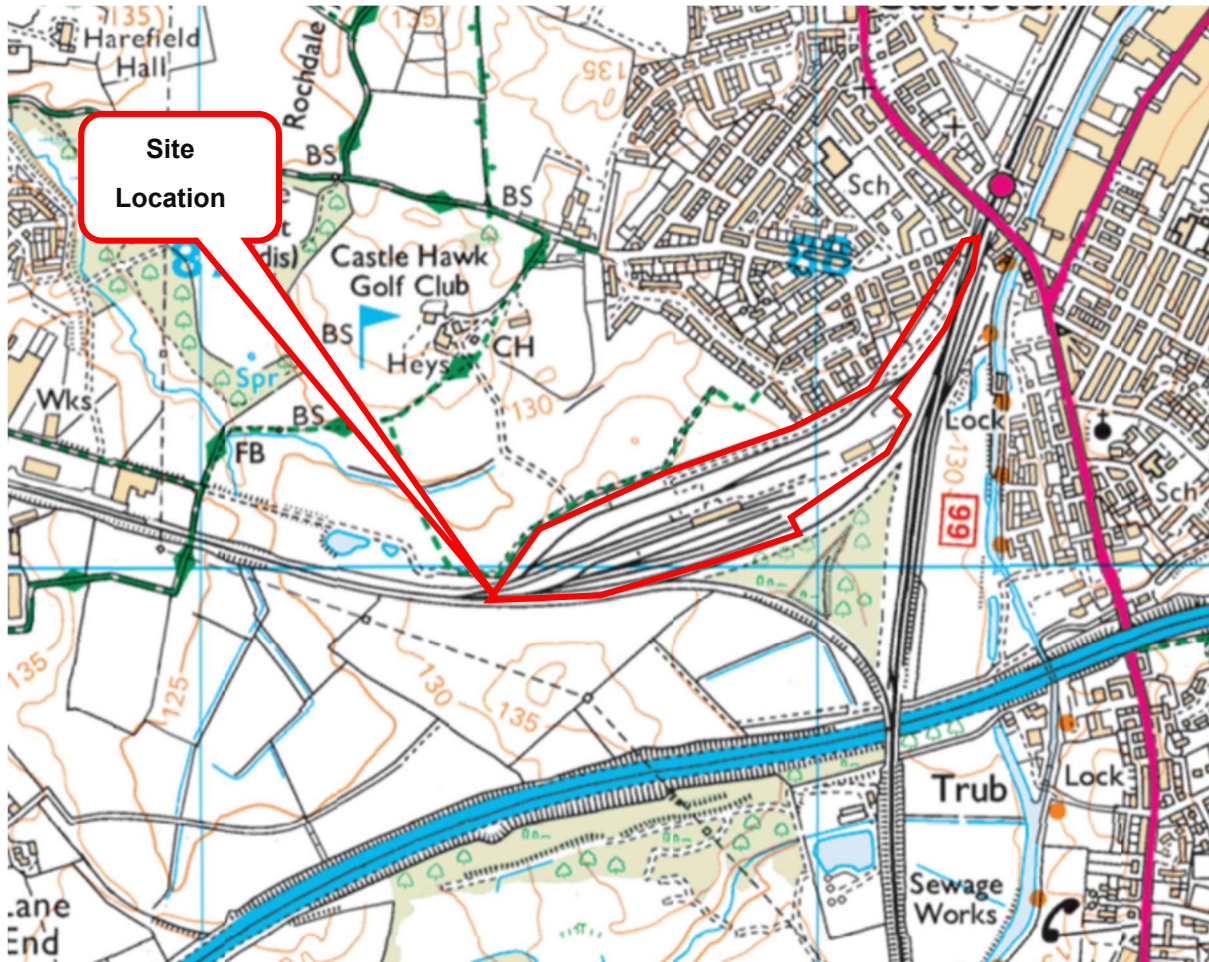


Figure 1: Site location (Source: Bing Map)

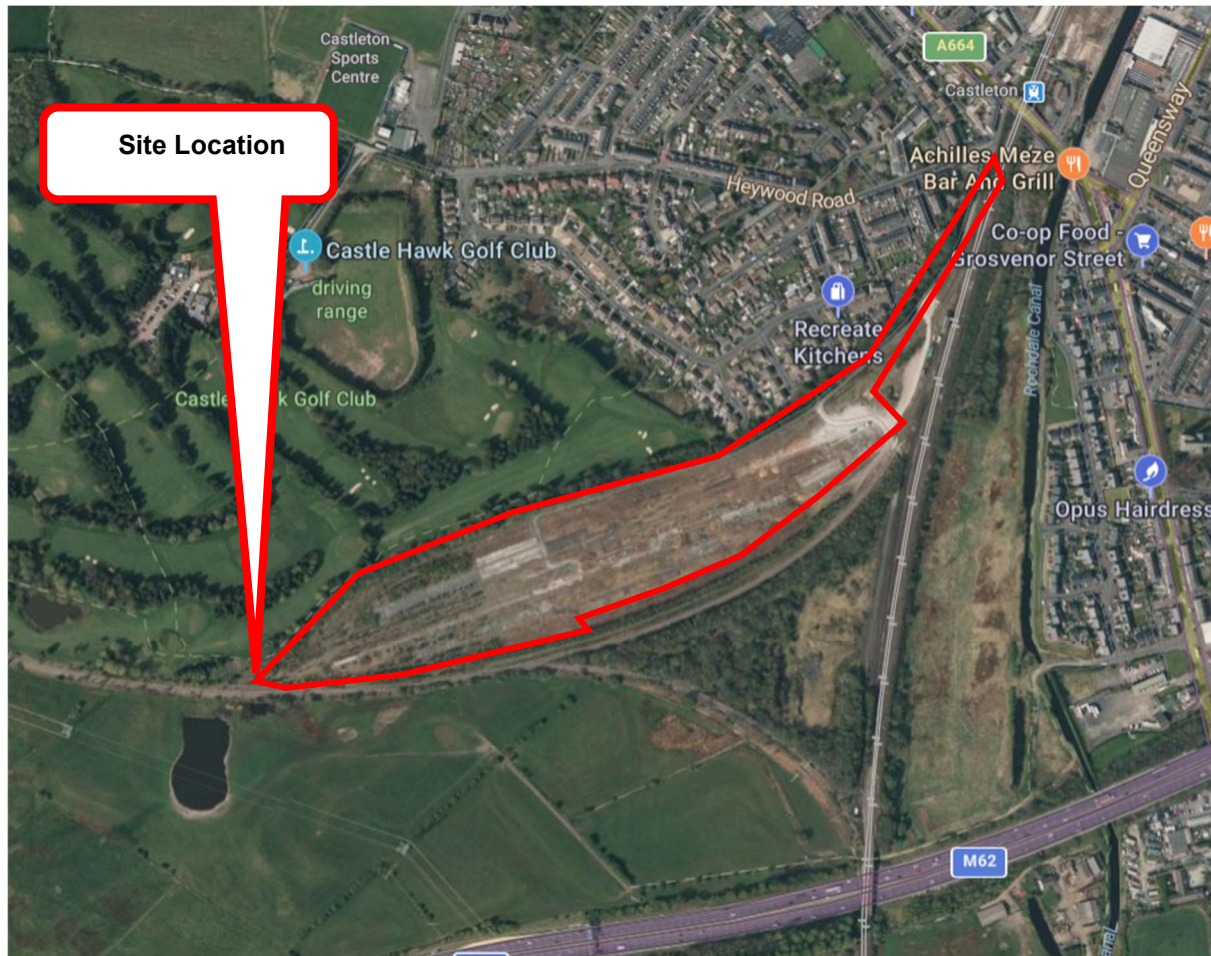


Figure 2: Aerial View of the site (Source: Bing Maps)

2.2 Topography

The existing ground elevations on site is shown in the topographic survey (Appendix A). The survey indicates that the site is highest in the North-East corner and lowest to the South-West. Ground levels vary between 136mAOD and 130mAOD. The ground sweeps down to the South-West, towards *Trub Brook* watercourse.

2.3 Geology and Soil

A Geo-Environmental report Published by EP3 in May 2021 was undertaken for the site. Trial pits and window samples were undertaken. The results of these tests indicate that the site is underlain with clay and contaminated made ground. This suggests that soakaways are not suitable for this site.

2.4 Flood Zone and Surface Water flooding

The existing site is within a Flood Zone 1, please see Figure 3. An area with a 0.1% chance of flooding (1 in 1000 year event plus climate change). This suggests that the site is at low risk of flooding.

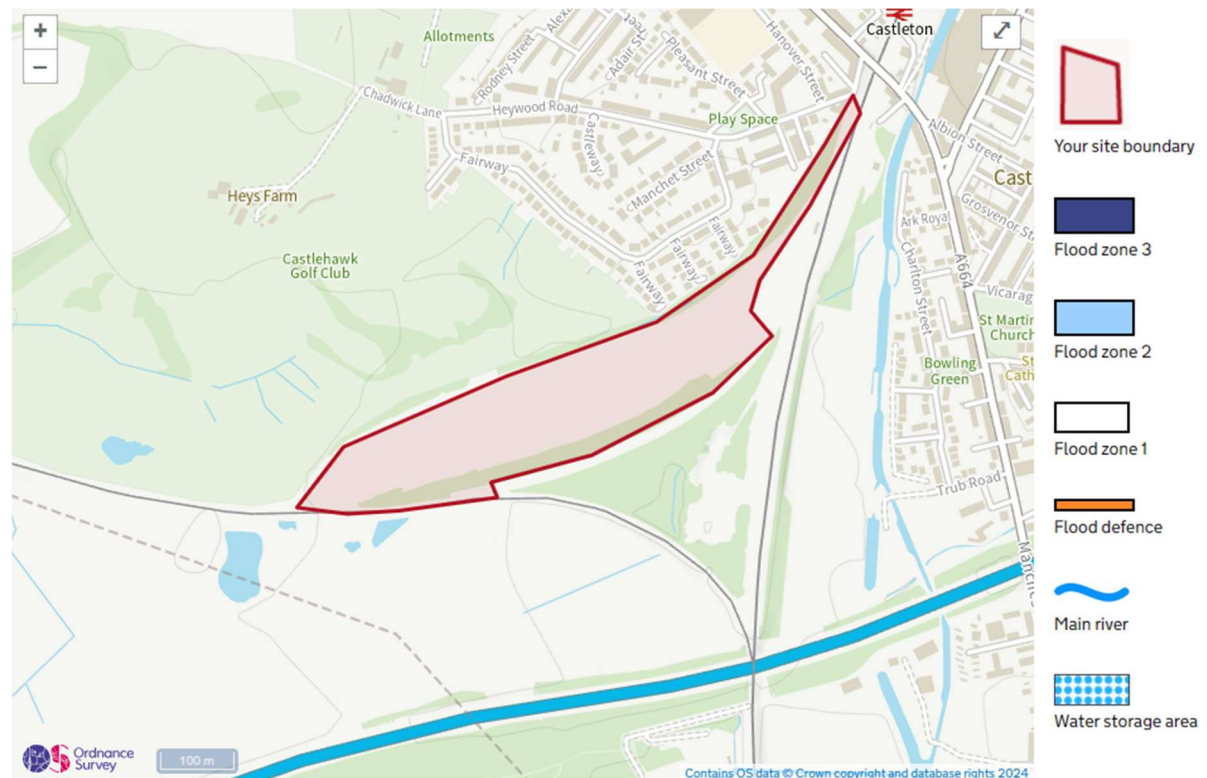


Figure 3: Flood Risk Maps

The existing site is predominantly at low risk of surface water flooding, this means that this area has a chance of flooding of between 0.1% and 1% each year. However, as shown in Figure 4: Flood Risk Maps: Surface Water (Source: EA Open Dataset), there are some areas at a high risk of surface water flooding. The layout has taken this into account and no housing has been placed within these areas.

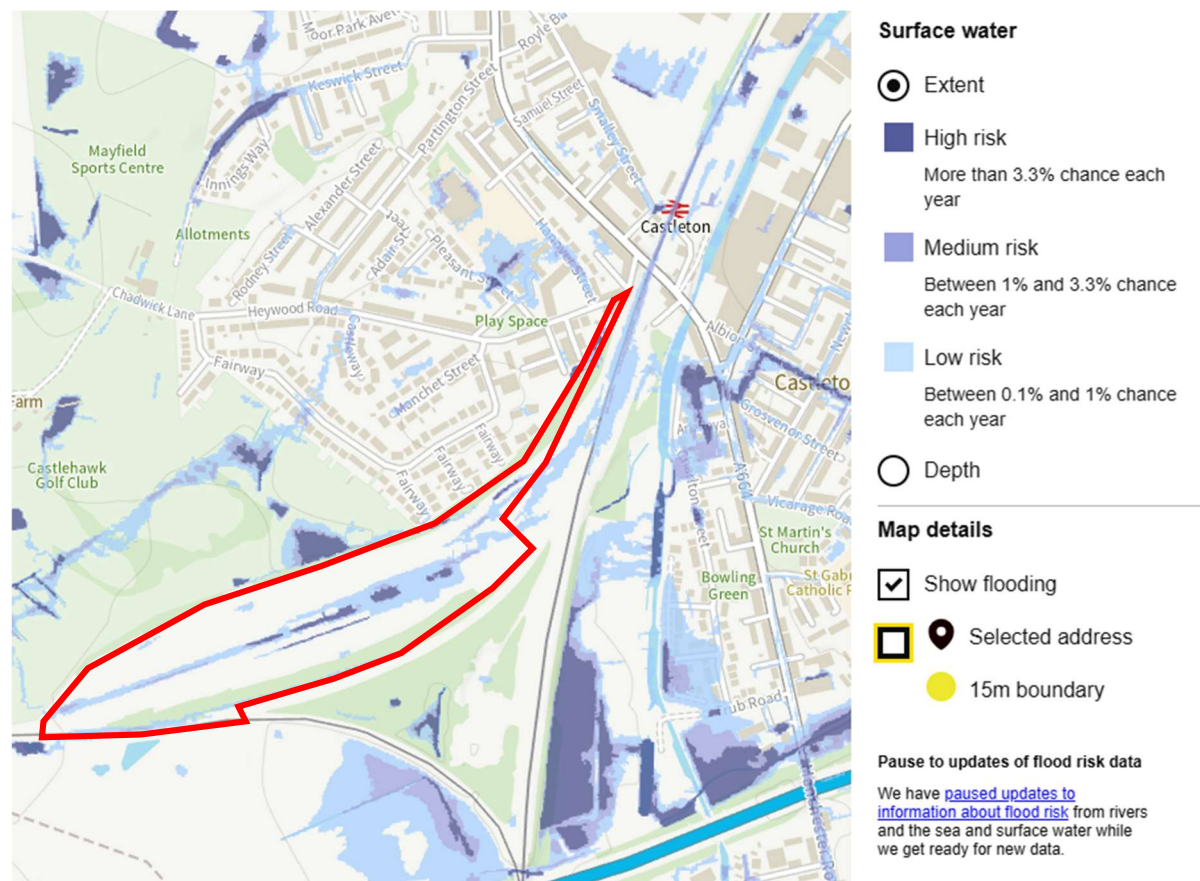


Figure 4: Flood Risk Maps: Surface Water (Source: EA Open Dataset)

Furthermore surface water flooding will be mitigated by the inclusion of a new drainage systems which will attenuate up to and including the 1 in 100 year event plus climate change. Therefore, the site is believed to be at low risk of surface water flooding.

2.5 NPPF Vulnerability

The development will be classed as 'More Vulnerable' under the NPPF vulnerability classification (Table 2). The flood risk vulnerability and flood zone compatibility are displayed in Table 3: Flood Risk Vulnerability and flood zone compatibility (Source: NPPF Technical Guide). As noted in Section 2.4, the site is within Flood Zone 1 according to the EA flood risk map for planning.

Table 2: Flood Risk Vulnerability Classification (Source: NPPF Technical Guide)

More vulnerable (MV)
Hospitals, residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels
Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
Non-residential uses for health services, nurseries and educational establishments.
Landfill and sites used for waste management facilities for hazardous waste ⁶ .
Sites used for holiday or short let caravans and camping, subject to a specific warning and evacuation plan. ⁷

Table 3: Flood Risk Vulnerability and flood zone compatibility (Source: NPPF Technical Guide)

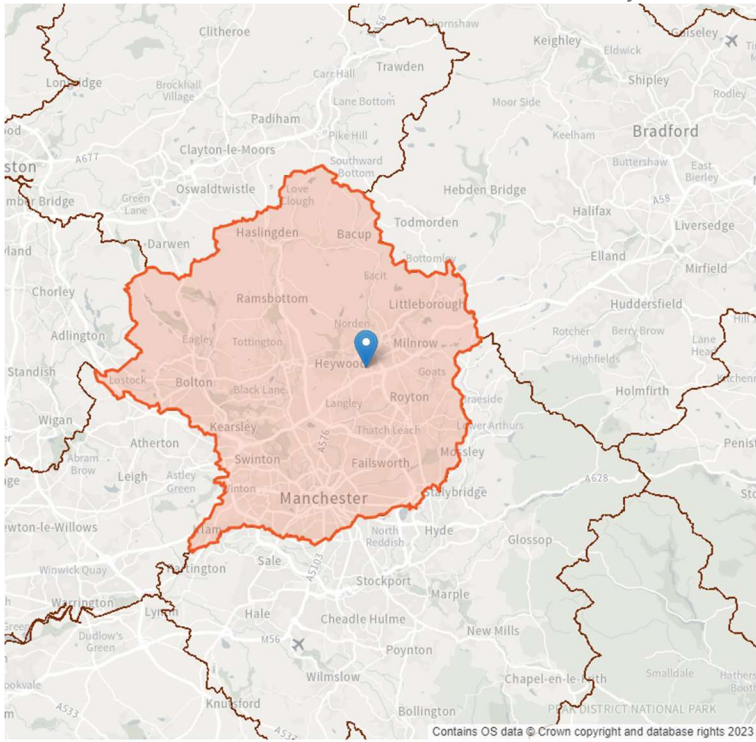
Flood Zone	Definition	Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
1	$T > 1,000$	✓	✓	✓	✓	✓
2	$100 < T_{fluv} < 1,000$ $200 < T_{tidal} < 1,000$	✓	✓	Exc. Test	✓	✓
3a	$T_{fluv} < 100$ $T_{tidal} < 200$	Exc. Test	✓	✗	Exc. Test	✓
3b (functional flood plain)	$T_{fluv} < 20$	Exc. Test	✓	✗	✗	✗

As the site is within a Flood Zone 1, the site passes the sequential test. Please see Table 3: Flood Risk Vulnerability and flood zone compatibility (Source: NPPF Technical Guide). The small parts of surface water flooding have been left as public open space or road. This is discussed in more detail in section 3.

2.6 Climate Change Allowances for Peak Rainfall Intensity

The Environment Agency and NPPF require a consideration of the impacts of climate change in Flood Risk Assessments (FRA). In May 2022, the Environment Agency updated the climate change allowances required in Flood Risk Assessments (Environment Agency, 2022); this advice updates previous climate change allowances to support the NPPF (DCLG, 2021). Table 4: Peak rainfall intensity allowance shows anticipated changes in small catchments, recommending a progressive increase, reaching 45% for the 'Upper End' allowance by 2070. This allowance would be recommended for this proposed development, which is classified as 'More Vulnerable' and has been taken to have a 100-year design life. The 45% climate change allowance is based on the 90th percentile, meaning that there is a 90% chance that rainfall will not increase by more than the 45% increment.

Table 4: Peak rainfall intensity allowance



**Irwell Management
Catchment peak rainfall
allowances**

**3.3% annual exceedance
rainfall event**

Epoch		
	Central allowance	Upper end allowance
2050s	25%	35%
2070s	30%	40%

**1% annual exceedance
rainfall event**

Epoch		
	Central allowance	Upper end allowance
2050s	25%	40%
2070s	30%	45%

*Use '2050s' for development with a lifetime up to 2060 and use the 2070s epoch for development with a lifetime between 2061 and 2125.

3. FLOOD HAZARD FOR EXISTING SITE

3.1 Source of Flood Risk

Flood sources and their possibilities are shown below.

3.1.1 Flood Risk from Fluvial Sources

The proposed development is in a flood zone 1. Therefore, the site is considered to be at low risk of fluvial flooding.

There is a 600mm culvert running through the site from North to South. It is proposed to fill in the culvert within the site. A CCTV survey was undertaken and indicates that the culvert only drained the site. Therefore, it is acceptable to remove the culvert. The drainage catchment that the culvert drains will be incorporated into the new drainage system.

3.1.2 Surface Water

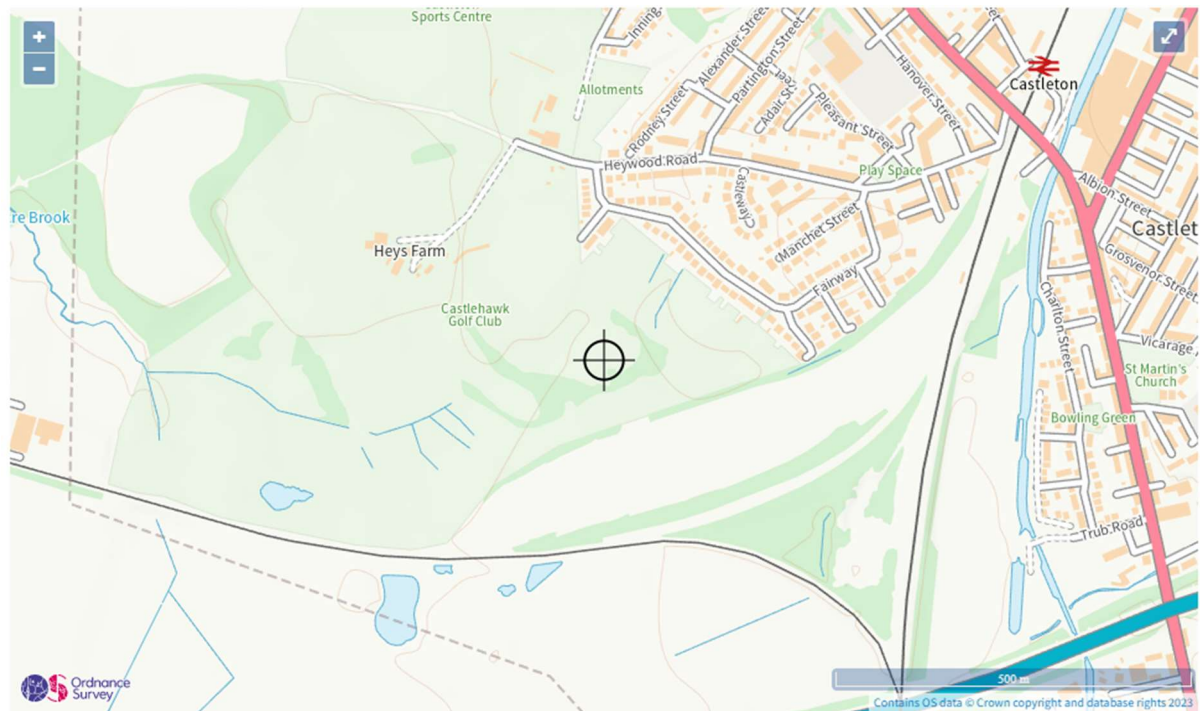
section 2.4, some areas of the site are at a medium to high risk of surface water flooding; no houses will be placed in these areas. Please see Figure 4.

Furthermore, surface water flooding will be mitigated by the inclusion of a new drainage systems which will attenuate up to and including the 1 in 100 year event plus climate change. Therefore the site is believed to be at low risk of surface water flooding.

3.1.3 Flood Risk from Reservoir /Canals / Other Artificial Sources

Figure 5, indicates that the site is not within potential risk of flooding in the event of a breach from reservoirs(over 25,000 m³ of water. Flooding from reservoir is considered to be extremely unlikely and the risk of flooding to the site considered to be low.

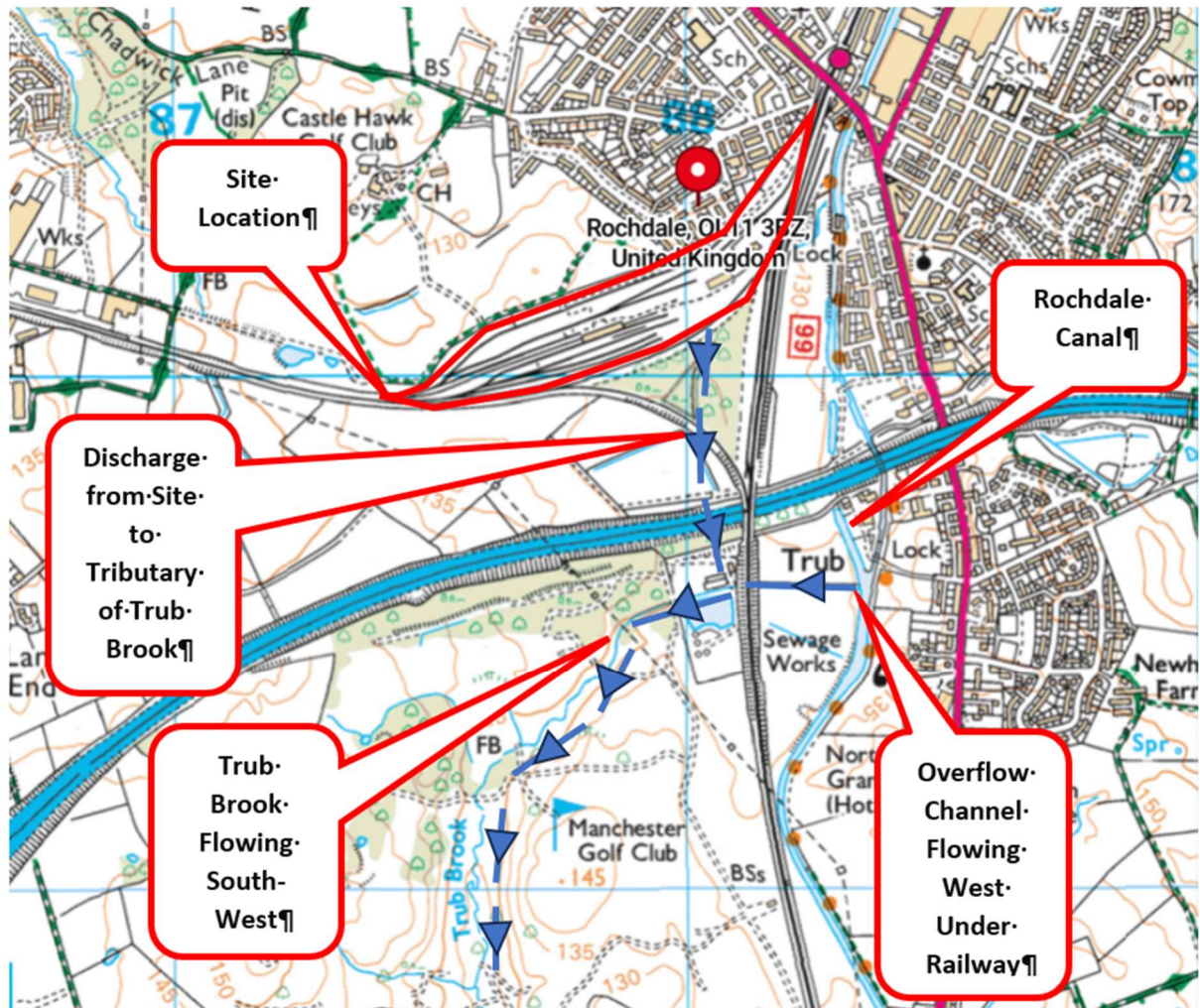
Rochdale canal is 260m East of the site. The canal is believed to be of no flood risk to the site as there is an embankment between the site and Rochdale canal. Furthermore the canal is higher than the watercourse and so water flows from the canal to Trub brook. The site has no effect on Trub Brook. Therefore, there is no flood risk from canals or other artificial sources as there are no artificial sources within the vicinity of the site.



Maximum extent of flooding from reservoirs:

● when river levels are normal ■ when there is also flooding from rivers ⊕ Location you selected

Figure 5: Extent of Flooding from Reservoirs (Source: EA Flood Warning Information Service)



3.1.4 Flood Risk from Groundwater

According to SFRA, the site is at low risk from groundwater. Therefore, the risk of groundwater flooding is low for this site.

3.1.5 Flood Risk from Sewers

The proposed site has no surface water sewers crossing it and therefore, the existing flood risk from sewers is believed to be low.

There is a combined sewer in the Northern corner of the site. This will be where the foul water will drain. It is believed this is in working order and does not flood the site.

4. ASSESSMENT OF FLOOD RISK FOR PROPOSED DEVELOPMENT

4.1 Development Proposals

It is proposed to create 191 residential dwellings, including access, car parking, landscaping, open space and associated engineering and infrastructure including an electric substation and foul water pump station at Castleton Sidings, Rochdale, OL11 3BZ, as shown on the indicative masterplan Figure 6.

The development area is 9.02ha according to the client. The total developable area is 6.3917ha and the impermeable area is 1.9317ha. Please see appendix B.

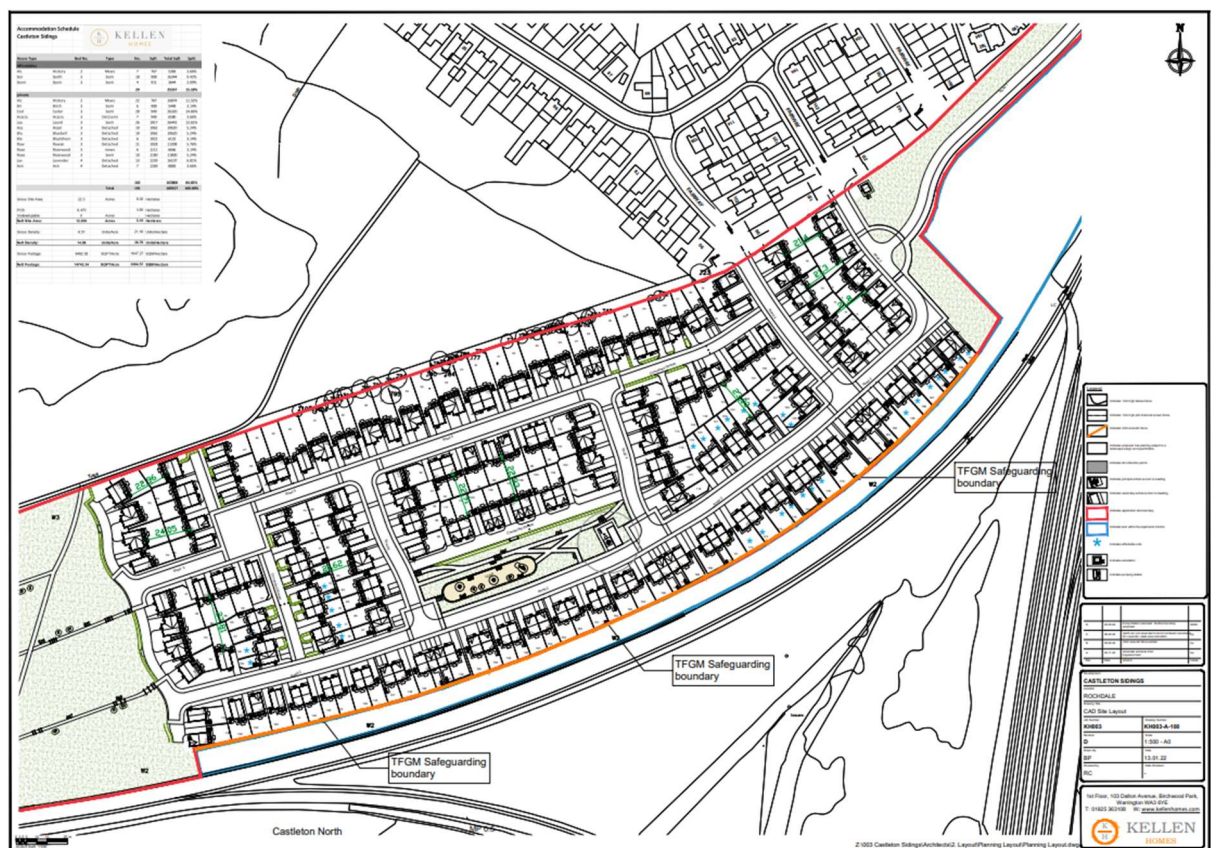


Figure 6: Proposed Site (Source: Client)

4.2 Fluvial Flood Management

The site is within a flood Zone 1; therefore, it is believed that fluvial flooding is at low risk.

4.3 Water Quality

The site has no effect on the Rochdale canal as it is downstream of the Canal.

5. DRAINAGE STRATEGY

5.1.1 Surface Water

The existing site is a brownfield site, which drains via a culvert ultimately into the watercourse *Trub Brook* to the South of the site.

5.2 Infiltration Rates

As said in section 2.3, infiltration does not work on this site due to the underlying clay and contaminated made ground.

5.3 Run-off

Brownfield rates have been agreed with Rochdale County Council at 90l/s. Please see appendix C.

5.4 Surface water drainage strategy

5.4.1 Hierarchy of Discharge

As detailed in section 2.3, infiltration is not feasible at this site. Therefore, it is proposed to drain into the existing 150mm culverted watercourse and outfall into *Trub Brook*.

5.4.2 Sizing of SUDS features

As discussed in section 4.1 of this report, the proposed impermeable surface area of the dwellings and associated features is 1.9317ha . It is intended that the proposed surface water system will be adopted by *United Utilities*.

The discharge will be restricted to 90l/s via a Hydrobreak in the 1 in 100 year event plus climate change. The storage will be held primarily in oversized pipes up to and including the 1 in 100 year event plus 45% climate change.

Modelling of the surface water runoff to the design parameters was carried out using the Source Control of Info Drainage, an industry leading software which allows design and analysis of SuDS features. Original model results are displayed in Appendix D: Info Drainage modelling results. The following conservative assumptions and design parameters have been set within the Hydraulic model:

- Dwellings, walkways, parking spaces and access roads area equals 1.9317ha;
- Rainfall intensity was obtained using the Flood Studies Report (FSR) methodology, and increased by 45%, the upper end allowance for climate change over the 100 years design life of the proposed residential development (Appendix D), in line with the requirements of the NPPF;
- No runoff losses have been assumed in the modelling, therefore, all the design rainfall landing on the impermeable surfaces is expected to reach the attenuation basin;
- As per the conclusions in Section 3.3, the soil has been modelled with an infiltration rate of zero (0.0) m/hr;
- A Hydro-Break has been used to restrict the discharge to 90l/s; and
- A flood risk permit will be required for the outfall.

Please see Appendix D for the design.

5.4.3 Maintenance Plan

Structures which manage surface water runoff require little maintenance, however a regular maintenance schedule e.g., after heavy rainfall, should be established by the site owners to reduce the risk of blockage within the drainage system and ensure the design remains in good working order. It is proposed for the drainage system to be adopted by United Utilities. The following maintenance will be undertaken for the geocellular storage:

Table 5: Operation and Maintenance Requirements for geocellular tanks

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks			
	Maintenance schedule	Required action	Typical frequency
	Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
		Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
		For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
		Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
	Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
	Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
		Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

6. SUMMARY & CONCLUSIONS

A summary of the main conclusions for the FRA is presented below:

- Development proposals are for a full planning application for 191 residential dwellings, including access, car parking, landscaping, open space and associated engineering and infrastructure including an electric substation and foul water pump station at Castleton Sidings, Rochdale OL11 3BZ;
- The development site is approximately 9.02ha. The impermeable area is 1.9317ha;
- The site is within a Flood Zone 1;
- The existing 600mm diameter culvert that crosses the site will remain in situ and be utilised as our surface water discharge point;
- All forms of flooding (Fluvial, Surface Water, Ground Water, Infrastructure and Sewer) at this site is low;
- The proposed development passes the sequential test;
- According to Site Investigations, infiltration does not work at the site due to the underlying contaminated ground;
- The discharge will be set at 90l/s this has been agreed with the LLFA. The site will discharge to the culvert that flows to *Trub Brook* on the Southern border of the site. A flood risk permit will be required from the *Environment Agency* for the outfall;
- The proposed development will have storage up to and including the 1 in 100 year event plus climate change of 45%;
- The public drainage will be offered up to *United Utilities* or NAV; and
- The attenuation for the 1 in 100 year event plus climate change will be held in offline cellular storage.

7. REFERENCES

Author	Date	Title/Description
Department for Communities and Local Government	Mar 2012	Technical Guidance to the National Planning Policy Framework
Ministry of Housing, Communities and Local Government.	Feb 2019	National Planning Policy Framework

Appendix A: Topographical Survey



NOTES
PLAN GRID IS LOCAL BASED UPON O.S. NATIONAL GRID SITE CENTRED ON SURVEY STATION PSL3. SCALE FACTOR=1 ALL LEVELS RELATE TO ORDNANCE DATUM, (OSGM15) ESTABLISHED USING THE O.S. NATIONAL ACTIVE GPS NETWORK

SHEET LAYOUT

Sheet 1 of 5

Sheet 2 of 5

Sheet 3 of 5

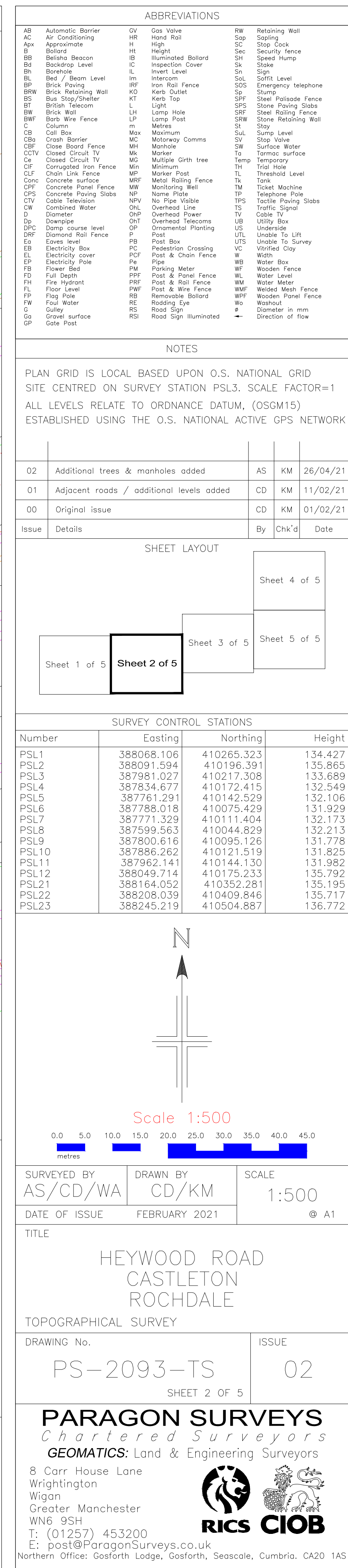
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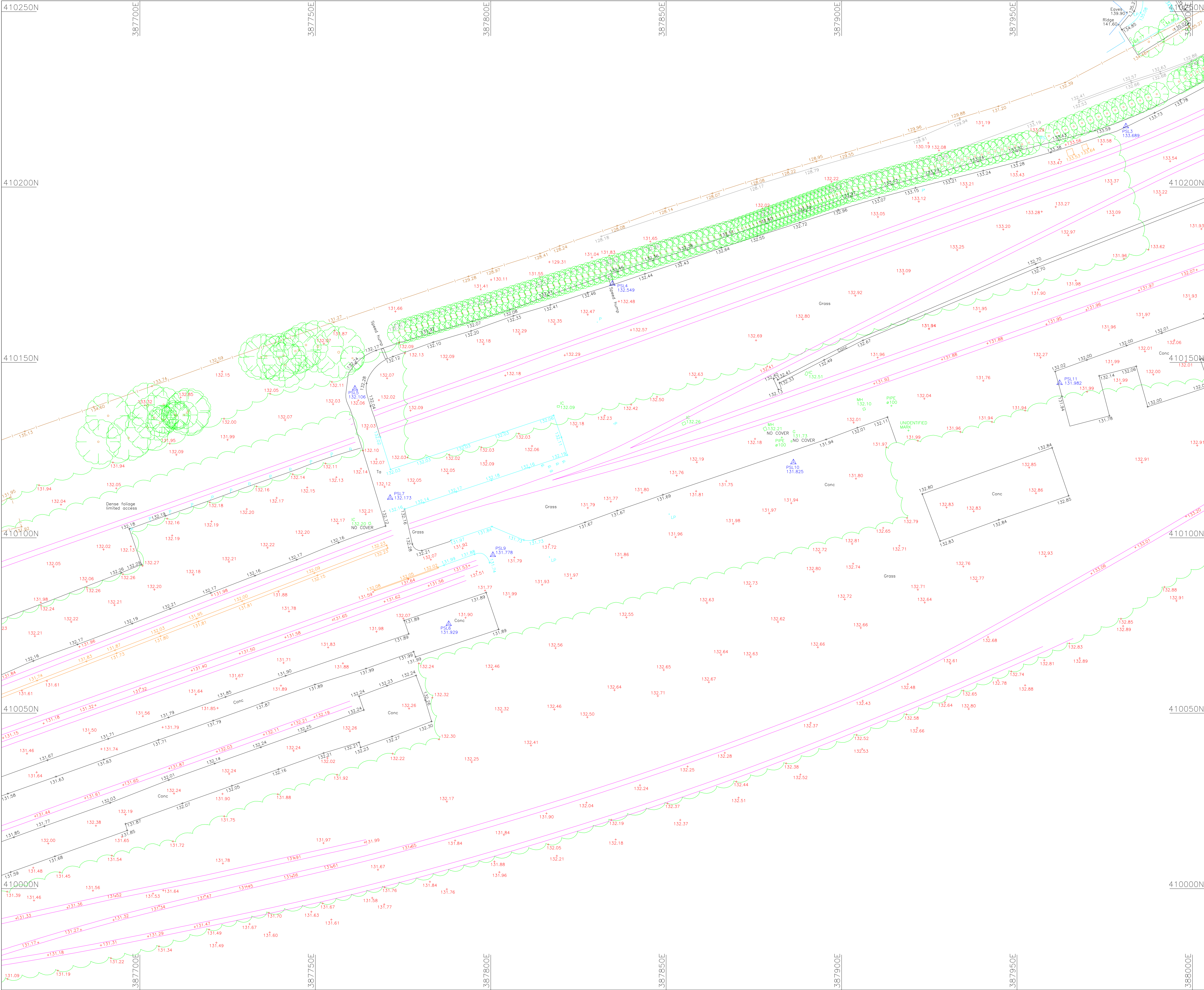
Sheet 5 of 5

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The image contains two logos. On the left is the RICS logo, which consists of a black circle containing a white lion passant guardant, with the letters 'RICS' in bold black capital letters below it. On the right is the CIOB logo, which features a detailed black and white illustration of a lion standing on a pedestal, with the letters 'CIOB' in bold black capital letters below it.





ABBREVIATIONS		
AB Automatic Barrier	GV Gas Valve	RW Retaining Wall
AC Air Conditioning	HR Hand Rail	SC Sapping Level
Apx Approximate	H High	SC Stop Lock
B Ballard	HL Height	SH Security fence
BB Bellina Beacon	IB Illuminated Bollard	SH Speed Hump
BD Backdrop Level	IC Inspection Cover	SK Slope
Bh Borehole	IL Invert Level	SL Sign
BL Bed / Beam Level	im Intercom	SOL Soft Level
BP Brick Paving	IRF Iron Rail Fence	SOS Emergency telephone
BRW Brick Retaining Wall	KO Kerb Outlet	Sp Stump
BS Bus Stop/Shelter	KT Kerb Top	SPT Steel Palisade Fence
BT British Telecom	L Light	SPS Stone Paving Slabs
BW Brick Wall	LH Lamp Hole	SRF Steel Railing Fence
BWF Barb Wire Fence	LP Lamp Post	SRW Stone Retaining Wall
C Column	m Metres	ST Sloy
CB Call Box	Max Maximum	Sul Sump Level
CBU Curb Barrier	MC Manhole	SW Surface Water
CBF Close Board Fence	MH Manhole	Ta Tarmac surface
CCTV Closed Circuit TV	Mk Marker	Temp Temporary
Ca Closed Circuit TV	MO Multiple	TL Threshold Level
CLF Chain Link Fence	MP Manure Post	TL Trial Hole
Conc Concrete surface	MRF Metal Railing Fence	Tk Tank
COP Concrete Panel Fence	MW Monitoring Wall	TM Ticket Machine
CPS Concrete Paving Slabs	NP Name Plate	TP Telephone Pole
CTV Cable Television	NPV No Pipe Visible	TPS Traffic Paving Slabs
CW Combined Water	OhL Overhead Line	TS Traffic Signal
D Diameter	OHF Overhead Power	TV Cable TV
Dp Downpipe	OHT Overhead Telecoms	UB Utility Box
DRK Damp course level	OP Post	US Underside
DRF Diamond Fence	P Post	UTL Unable To Lift
Eo Eaves level	PC Pedestrian Crossing	UTS Unable To Survey
EB Electricity Box	PCF Post & Chain Fence	VC Virtual City
EL Electricity cover	PCF Post & Chain Fence	W Width
EP Electricity Pole	PE Pipe	WB Water Box
FB Flower Bed	PM Parking Meter	WF Wooden Fence
FD Full Depth	PL Post & Panel Fence	WL Water Level
FI Fire Hydrant	PRF Post & Rail Fence	WM Water Meter
FL Floor Level	PWF Post & Wire Fence	WMF Welded Mesh Fence
FP Flag Pole	RE Removable Bollard	WPF Wooden Panel Fence
FW Foul Water	RE Rodding Eye	Wo Washout
G Gully	RS Road Sign	# Diameter in mm
Ga Gravel surface	RSI Road Sign Illuminated	→ Direction of flow
GP Gate Post		

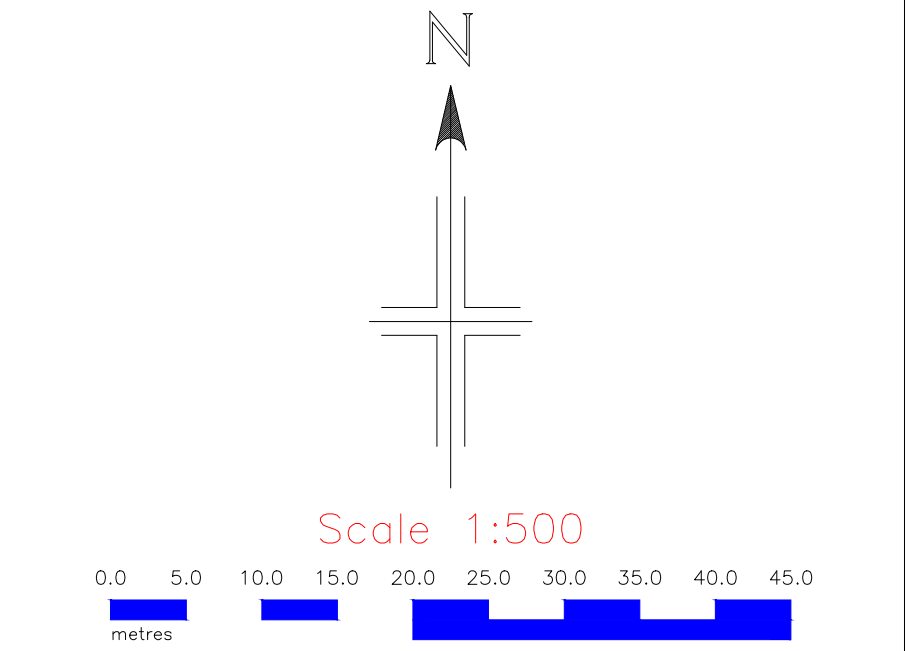
NOTES

PLAN GRID IS LOCAL BASED UPON O.S. NATIONAL GRID
SITE CENTRED ON SURVEY STATION PSL3. SCALE FACTOR=1
ALL LEVELS RELATE TO ORDNANCE DATUM, (OSGM15)
ESTABLISHED USING THE O.S. NATIONAL ACTIVE GPS NETWORK

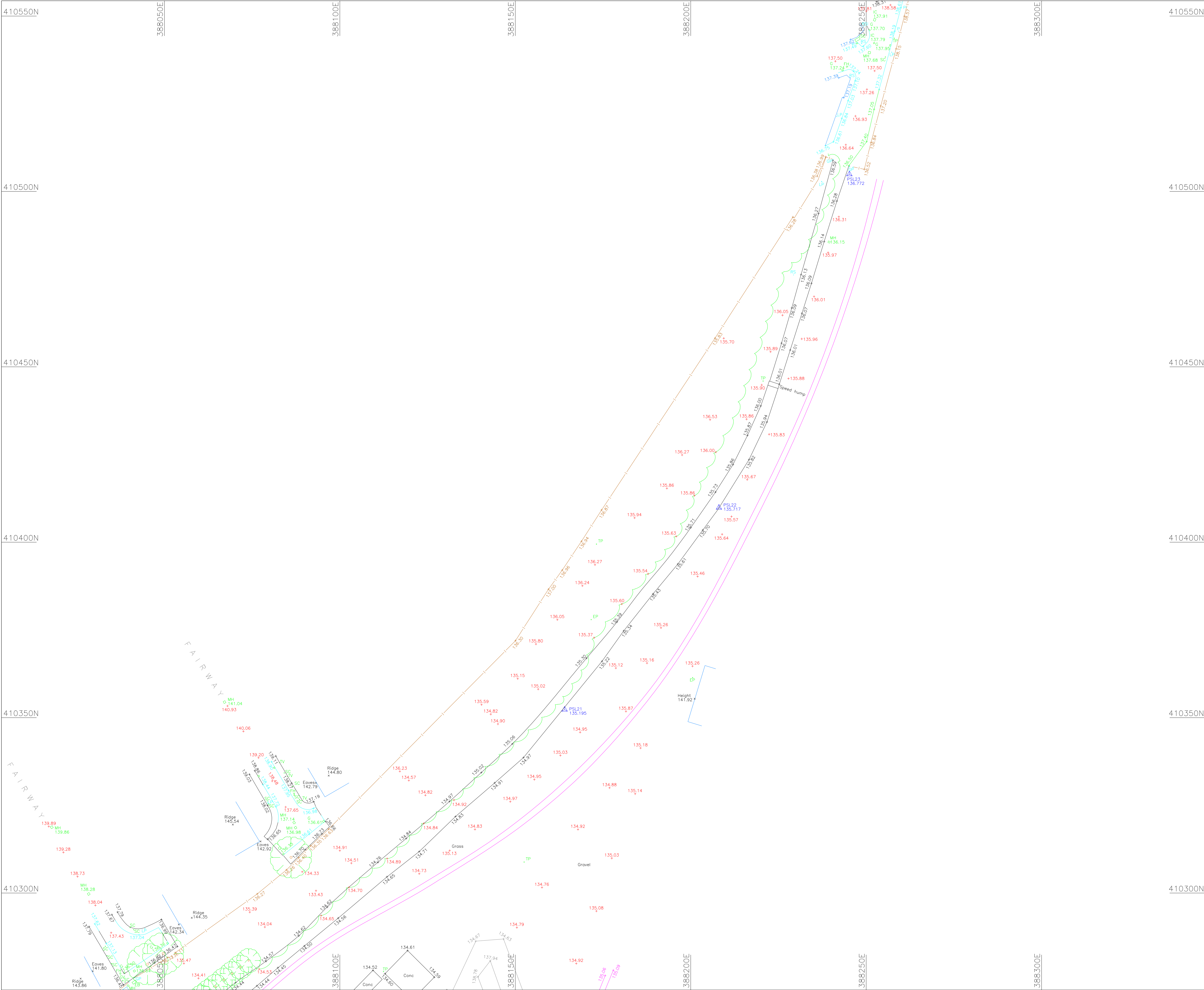
Issue	Details	By	Chk'd	Date
02	Additional trees & manholes added	AS	KM	26/04/21
01	Adjacent roads / additional levels added	CD	KM	11/02/21
00	Original issue	CD	KM	01/02/21

SHEET LAYOUT		
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		Sheet 5 of 5

SURVEY CONTROL STATIONS			
Number	Easting	Northing	Height
PSL1	388068.106	410265.323	134.427
PSL2	388091.594	410196.391	135.865
PSL3	387981.027	410217.308	135.889
PSL4	387934.677	410172.415	132.549
PSL5	387761.291	410142.529	132.106
PSL6	387788.018	410075.429	131.929
PSL7	387771.329	410111.404	132.173
PSL8	387599.563	410044.829	132.213
PSL9	387800.616	410095.126	131.778
PSL10	387886.262	410121.519	131.825
PSL11	387962.141	410144.130	131.982
PSL12	388049.714	410175.233	135.792
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PSL22	388208.039	410409.846	135.717
PSL23	388245.219	410504.887	136.772



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TITLE HEYWOOD ROAD CASTLETON ROCHDALE TOPOGRAPHICAL SURVEY		
DRAWING No. PS-2093-TS		ISSUE 02
SHEET 3 OF 5		
PARAGON SURVEYS <i>Chartered Surveyors</i> GEOMATICS: Land & Engineering Surveyors 8 Carr House Lane Wrightington Wigan Greater Manchester WN6 9SH T: (01257) 453200 E: post@ParagonSurveys.co.uk Northern Office: Gosforth Lodge, Gosforth, Seascale, Cumbria. CA20 1AS		



ABBREVIATIONS		
AB Automatic Barrier	GV Gas Valve	RW Retaining Wall
AC Air Conditioning	HB Hand Rail	SC Sapping Level
Apx Approximate	H High	SC Stop Lock
B Ballard	HL Height	SA Security Fence
BB Bellona Beacon	IB Illuminated Bollard	SH Speed Hump
BD Backdrop Level	IC Inspection Cover	SK Slope
Bh Borehole	IL Invert Level	SN Sign
BL Bed / Beam Level	im Intercom	SOL Solft Level
BP Brick Paving	IRF Iron Rail Fence	SOS Emergency telephone
BRW Brick Retaining Wall	KO Kerb Outlet	Sp Stump
BS Bus Stop/Shelter	KT Kerb Top	SPT Steel Palisade Fence
BT British Telecom	L Light	SPS Stone Paving Slabs
BW Brick Wall	LH Lamp Hole	SRF Steel Railing Fence
BWF Barb Wire Fence	LP Lamp Post	SRW Stone Retaining Wall
C Column	m Metres	St Sloy
CB Cell Box	Max Maximum	Sul Sump Level
CBH Cruth Barrier	MC Motorway Comms	SV Stop Valve
CBF Close Board Fence	MH Manhole	SW Surface Water
CCTV Closed Circuit TV	Mk Marker	Ta Tarmac surface
Ca Closed Circuit TV	MO Multiple Girth tree	Temp Temporary
CIF Corrugated Iron Fence	Min Minimum	TH Trial Hole
CLF Chain Link Fence	MP Marker Post	TL Threshold Level
Conc Concrete surface	MRF Metal Railing Fence	Tk Tank
CPT Concrete Panel Fence	MM Monitoring Wall	TM Ticket Machine
CPS Concrete Paving Slabs	NP Name Plate	TP Telephone Pole
CTV Cable Television	NPV No Pipe Visible	TPS Tactile Paving Slabs
CW Combined Water	OhL Overhead Line	TS Traffic Signal
D Diameter	OHIP Overhead Power	TV Cable TV
Dp Downspipe	OHT Overhead Telecoms	UB Utility Box
DRC Damp course level	OP Ornamental Planting	US Underside
DRF Diamond Rail Fence	P Post	UTL Unable To Lift
Eo Eaves level	PB Post Box	UTS Unable To Survey
EB Electricity Box	PC Pedestrian Crossing	VC Virtual City
EP Electricity Pole	PCR Post & Chain Fence	W Width
FB Flower Bed	Pe Pipe	WB Water Box
FD Full Depth	PM Parking Meter	WF Wooden Fence
FH Fire Hydrant	PF Post & Panel Fence	WL Water Level
FL Floor Level	PRF Post & Rail Fence	WM Water Meter
FP Flag Pole	PWF Post & Wire Fence	WMP Welded Mesh Fence
FW Foul Water	RB Removable Bollard	WPF Wooden Panel Fence
G Gully	RE Rodding Eye	Wo Washout
Ga Gravel surface	RS Road Sign	# Diameter in mm
GP Gate Post	RSI Road Sign Illuminated	→ Direction of flow

NOTES

PLAN GRID IS LOCAL BASED UPON O.S. NATIONAL GRID
SITE CENTRED ON SURVEY STATION PSL3. SCALE FACTOR=1
ALL LEVELS RELATE TO ORDNANCE DATUM, (OSGM15)
ESTABLISHED USING THE O.S. NATIONAL ACTIVE GPS NETWORK

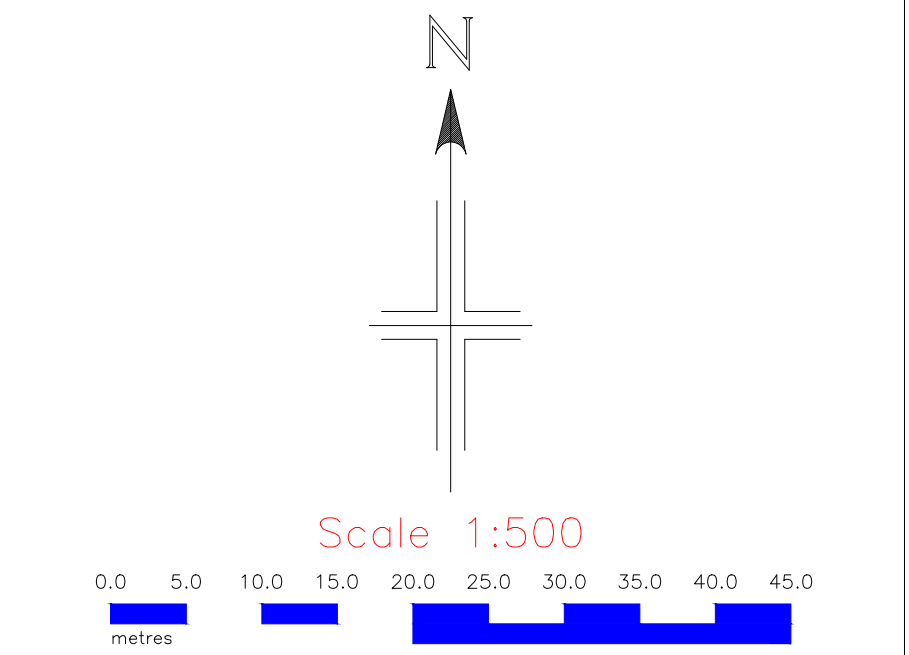
02	Additional trees & manholes added	AS	KM	26/04/21
01	Adjacent roads / additional levels added	CD	KM	11/02/21
00	Original issue	CD	KM	01/02/21
Issue	Details	By	Chk'd	Date

SHEET LAYOUT

Sheet 4 of 5

Sheet 1 of 5 Sheet 2 of 5 Sheet 3 of 5 Sheet 5 of 5

SURVEY CONTROL STATIONS			
Number	Easting	Northing	Height
PSL1	388068.106	410265.323	134.427
PSL2	388091.594	410196.391	135.865
PSL3	387981.027	410217.308	133.689
PSL4	387834.677	410172.415	132.549
PSL5	387761.291	410142.529	132.106
PSL6	387788.018	410075.429	131.929
PSL7	387771.329	410111.404	132.173
PSL8	387599.563	410044.829	132.213
PSL9	387800.616	410095.126	131.778
PSL10	387886.262	410121.519	131.825
PSL11	387962.141	410144.130	131.982
PSL12	388049.714	410175.233	135.792
PSL21	388164.052	410352.281	135.195
PSL22	388208.039	410409.846	135.717
PSL23	388245.219	410504.887	136.772

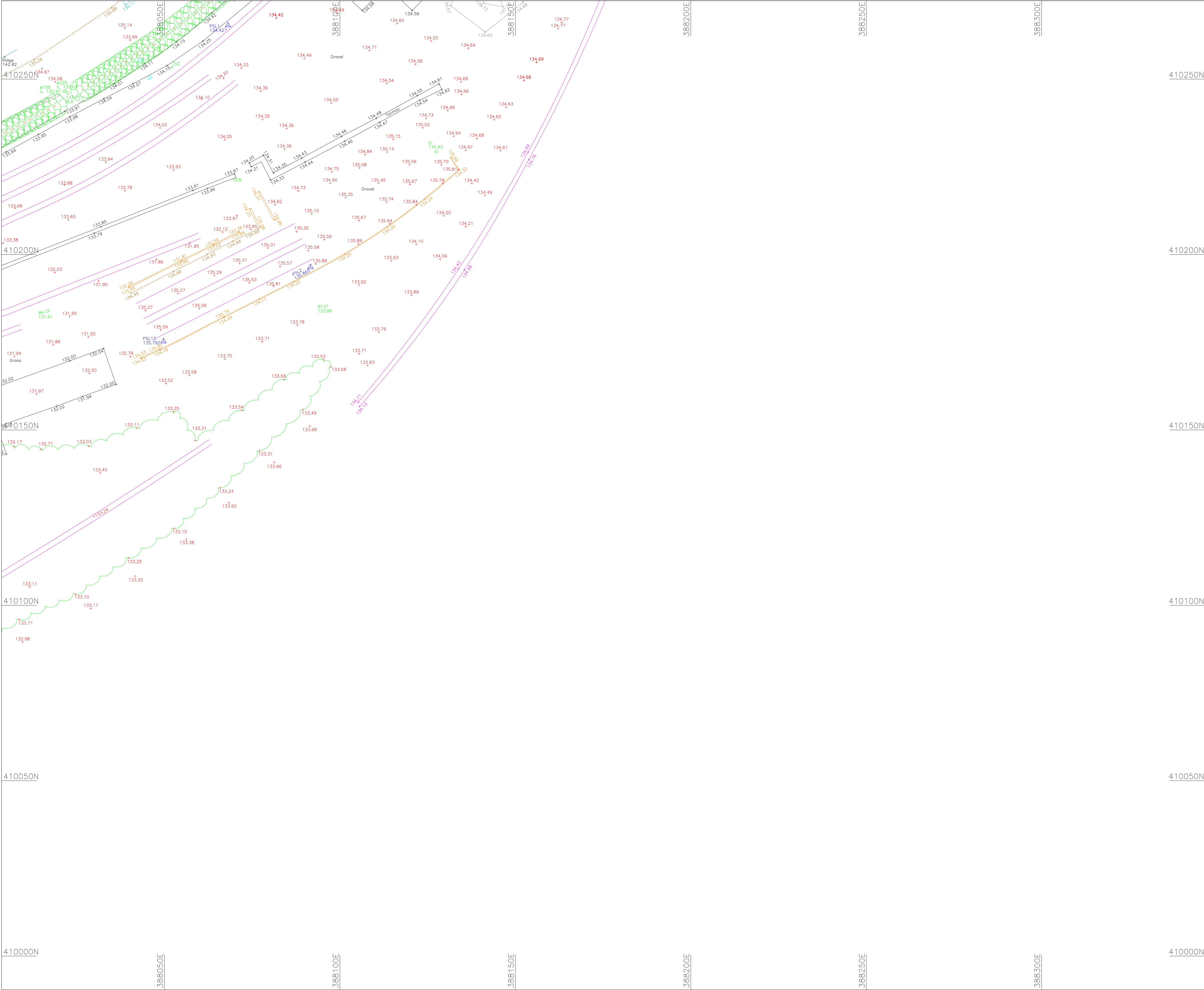


SURVEYED BY AS/CD/WA	DRAWN BY CD/KM	SCALE 1:500
DATE OF ISSUE FEBRUARY 2021		© A1
TITLE HEYWOOD ROAD CASTLETON ROCHDALE		
TOPOGRAPHICAL SURVEY		
DRAWING No. PS-2093-TS		ISSUE 02
SHEET 4 OF 5		

PARAGON SURVEYS
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GEOMATICS: Land & Engineering Surveyors

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RICS CIOB



ABBREVIATIONS

AB Automatic Barrier	GV Gas Valve	RW Retaining Wall
AC Air Conditioning	HR Hand Rail	Sap Sapling
Apx Approximate	H High	SC Stop Cock
B Bollard	HT Height	Sec Security Fence
BB Bellina Beacon	IB Illuminated Bollard	SH Speed Hump
Bd Building Level	IC Inspection Cover	Sk Slope
Bh Borehole	IL Invert Level	Sn Sign
BL Bed / Beam Level	im Intercom	SOL Soft Level
BL Brick Paving	IRF Iron Rail Fence	SOS Emergency telephone
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CIF Corrupted Iron Fence	Min Minimum	TH Threshold Level
CLF Chain Link Fence	MP Manure Post	TL Trial Hole
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D Diameter	OHF Overhead Power	TV Cable TV
Dp Damp pipe	OHT Overhead Telecoms	UB Utility Box
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Ea Eaves level	PB Post Box	UTL Unable To Lift
EB Electricity box	PC Pedestrian Crossing	UTS Unable To Survey
EL Electricity Pole	PCF Post & Chain Fence	VC Virtual City
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		Direction of flow

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SITE CENTRED ON SURVEY STATION PSL3. SCALE FACTOR=1

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02	Additional trees & manholes added	AS	KM	26/04/21
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00	Original issue	CD	KM	01/02/21

Issue	Details	By	Chk'd	Date
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SHEET LAYOUT

Sheet 1 of 5

Sheet 2 of 5

Sheet 3 of 5

Sheet 4 of 5

Sheet 5 of 5

SURVEY CONTROL STATIONS

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PSL22	388208.039	410409.846	135.717
PSL23	388245.219	410504.887	136.772

Scale 1:500

0.0 5.0 10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0

metres

SURVEYED BY	DRAWN BY	SCALE
AS/CD/WA	CD/KM	1:500
DATE OF ISSUE	FEBRUARY 2021	© A1

TITLE

HEYWOOD ROAD
CASTLETON
ROCHDALE

TOPOGRAPHICAL SURVEY

DRAWING No.	ISSUE
PS-2093-TS	02
SHEET 5 OF 5	

PARAGON SURVEYS

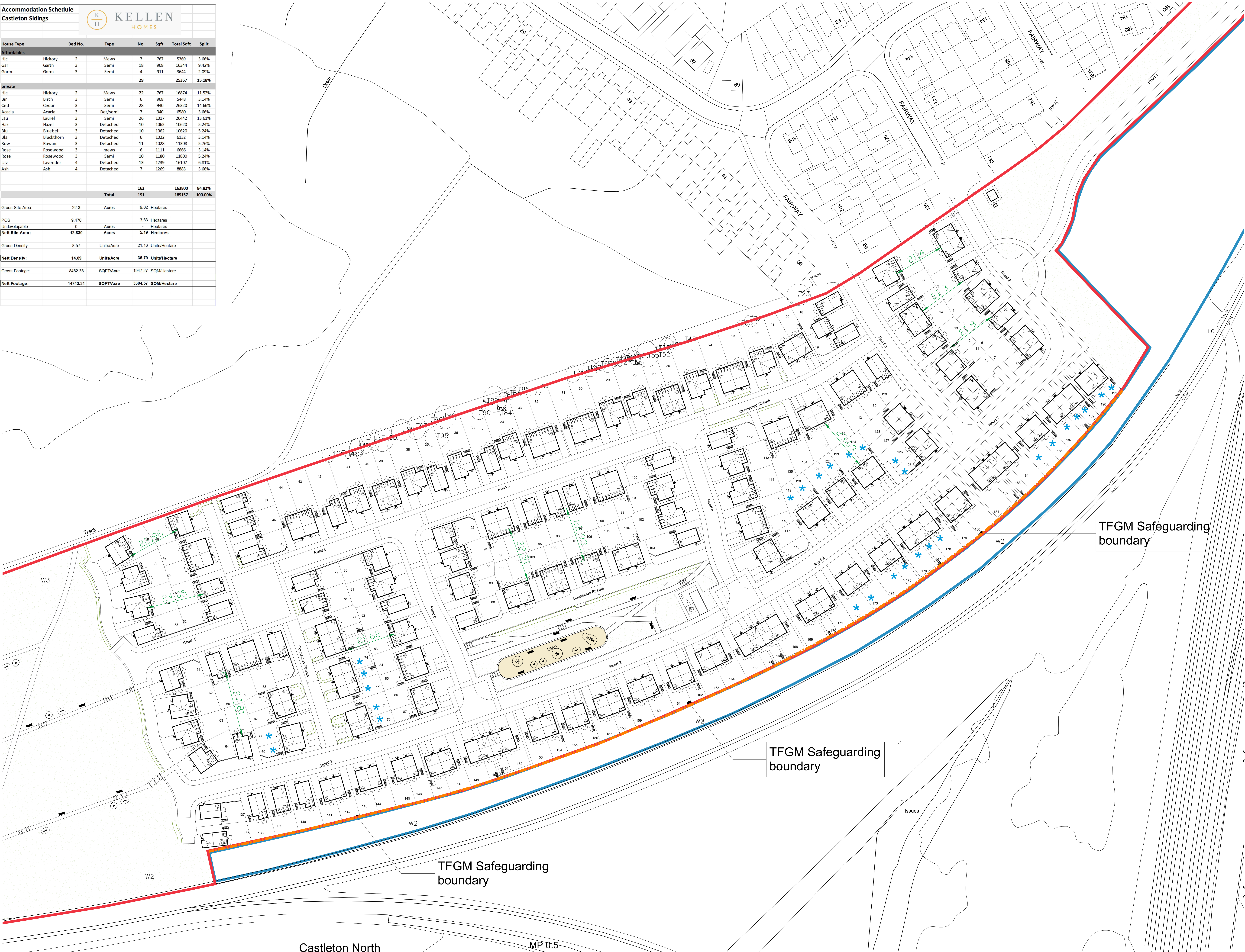
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Appendix B: Proposed Layout

Accommodation Schedule							
Castleton Sidings							
K H KELLEN HOMES							
House Type		Bed No.	Type	No.	Sqft	Total Sqft	Split
Affordables							
Hic	Hickory	2	Mews	7	767	5369	3.66%
Gar	Garth	3	Semi	18	908	16344	9.42%
Gorm	Gorm	3	Semi	4	911	3644	2.09%
				29	25357	15.18%	
private							
Hic	Hickory	2	Mews	22	767	16874	11.52%
Bir	Birch	3	Semi	6	908	5448	3.14%
Ced	Cedar	3	Semi	28	940	26320	14.66%
Acacia	Acacia	3	Det/semi	7	940	6580	3.66%
Lau	Laurel	3	Semi	26	1017	26442	13.61%
Haz	Hazel	3	Detached	10	1062	10620	5.24%
Blu	Bluebell	3	Detached	10	1062	10620	5.24%
Bla	Blackthorn	3	Detached	6	1022	6132	3.14%
Row	Rowan	3	Detached	11	1028	11308	5.76%
Rose	Rosewood	3	mews	6	1111	6666	3.14%
Rose	Rosewood	3	Semi	10	1180	11800	5.24%
Lav	Lavender	4	Detached	13	1239	16107	6.81%
Ash	Ash	4	Detached	7	1269	8883	3.66%
				162		163800	84.82%
Total				191		189157	100.00%
Gross Site Area:							
		22.3	Acres	9.02	Hectares		
POS							
		9.470	Acres	3.83	Hectares		
Undevelopable							
		0	Acres	-	Hectares		
Nett Site Area:							
		12.830	Acres	5.19	Hectares		
Gross Density:							
		8.57	Units/Acre	21.16	Units/Hectare		
Nett Density:							
		14.89	Units/Acre	36.79	Units/Hectare		
Gross Footage:							
		8482.38	SQFT/Acre	1947.27	SQM/Hectare		
Nett Footage:							
		14743.34	SQFT/Acre	3384.57	SQM/Hectare		



Legend	
	Indicates 1.8m high feature fence
	Indicates 1.8m high plot divisional screen fence
	Indicates 2.8m acoustic fence
	Indicates proposed tree planting subject to a landscape design and specification
	Indicates bin collection points
	Indicates principle entrance door to dwelling
	Indicates secondary entrance door to dwelling
	Indicates application site boundary
	Indicates land within the Applicants Control
	Indicates affordable units
	Indicates substation
	Indicates pumping station

Rev	Date	Amended	Initials
D	20.03.24	Pump Station relocated. Outline boundary amended	MAW
C	06.03.24	Garth on unit amended to bath, hob, beam, substation for Lavender, sales area relocation	tp
B	05.02.24	2.8m acoustic fence added	tp
A	03.11.23	Amended entrance from Heywood road	tp

Development	
CASTLETON SIDINGS	
Location	
ROCHDALE	
Drawing Title	
CAD Site Layout	
Job Number	Drawing Number
KH003	KH003-A-100
Revision	Scale
D	1:500 - A0
Drawn By	Date
BP	13.01.22
Checked by	Date Checked
RC	-

1st Floor, 103 Dalton Avenue, Birchwood Park,
Warrington WA3 6YE
T: 01925 363108 W: www.kellenhomes.com



Appendix C: LLFA confirmation of Discharge

Charles Townsend

From: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Sent: 09 July 2021 12:24
To: ElannaHerod@campbellreith.com; Tom Foster
Cc: GarryTaylor@campbellreith.com
Subject: RE: QUESTIONS re. Confirmation of future Discharge of rate - to culvert : Castleton, Rochdale - Discharge Rate Enquiry
Attachments: Land Ownership queries - Castleton Sidings - notes.pdf
Follow Up Flag: Follow up
Flag Status: Flagged

Hello Elanna and Tom

I looked at the Campbell Reith CAD drawing of the brownfield areas for the site and I'm happy with your calculation with 30% reduction i.e. SW discharge flow rate of 90 l/s (rounded up from 87.6 l/s).
The design of your proposed vortex control should be for this. I'm not sure what attenuation measures you will include?

A pond is less expensive than a buried attenuation tank?
One way to reduce runoff is to have some impermeable surfaces for parking areas.
Perhaps there is scope for a pond on the southern boundary? However, I leave the details to you.

It's worth noting that Land Registry does not have a known owner for Areas A and B on the appended Plan. Area C is the farmer, as you know.

Stephen McCann
Drainage & Flooding Engineer
Highways, Property & Strategic Housing



☎ 01706 924606
📠 07552 570262
✉ stephen.mccann@rochdale.gov.uk

Rochdale Borough Council
Floor 2, Number One Riverside
Smith Street, Rochdale, OL16 1XU

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Please consider the environment before printing this email.

From: ElannaHerod@campbellreith.com <ElannaHerod@campbellreith.com>
Sent: 08 July 2021 12:35
To: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Cc: Tom Foster <TomFoster@kellenhomes.com>; GarryTaylor@campbellreith.com
Subject: RE: QUESTIONS re. Confirmation of future Discharge of rate - to culvert : Castleton, Rochdale - Discharge Rate Enquiry

Good afternoon Stephen,

Thank you for your email. Please find attached the CAD file of the brownfield areas at Castleton for your review.

Kind Regards

Elanna Herod
Project Engineer

CampbellReith
consulting engineers

No. 1 Marsden Street
Manchester
M2 1HW

Tel: +44 (0)161 819 3062
www.campbellreith.com

From: "Stephen McCann" <Stephen.McCann@Rochdale.Gov.UK>
To: "ElannaHerod@campbellreith.com" <ElannaHerod@campbellreith.com>
Cc: "Tom Foster" <TomFoster@kellenhomes.com>
Date: 01/07/2021 13:23
Subject: RE: QUESTIONS re. Confirmation of future Discharge of rate - to culvert : Castleton, Rochdale - Discharge Rate Enquiry

Hello Elanna,
See below for my responses in [Blue Text](#)

Stephen McCann
Drainage & Flooding Engineer
Highways, Property & Strategic Housing



 [01706 924606](tel:01706924606)
 [07552 570262](tel:07552570262)
 stephen.mccann@rochdale.gov.uk

Rochdale Borough Council
Floor 2, Number One Riverside
Smith Street, Rochdale, OL16 1XU

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For news and social media updates go to www.rochdale.gov.uk/news

Please consider the environment before printing this email.

From: ElannaHerod@campbellreith.com <ElannaHerod@campbellreith.com>

Sent: 30 June 2021 13:22

To: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>

Subject: Re: Confirmation of future Discharge of rate - to culvert : Castleton, Rochdale - Discharge Rate Enquiry

Good morning Stephen,

I hope you are well.

Did you manage to visit the Castleton Sidings site to have a look at the culvert?

No. I've been twice but could not get into the site. There is a massive chain and padlock to the sidings and a Danger sign so I couldn't get in. If you want me to be able to visit, I'll need a very clear sketch about how to access the site to find the culvert.

The existing hardstanding areas on the site equate to 1 Ha and are anticipated to be positively drained discharging to the existing culvert on site, which is considered to be an ordinary watercourse based on an assessment of historic maps.

Therefore, in response to your email below and our previous conversations I have reassessed the existing runoff rate for the site based on the inclusion of the hardstanding areas.

Using the modified rational method and a rainfall depth of 24.3mm taken from the FEH web service for the 1 in 2 year critical storm event the QBAR brownfield runoff rate is calculated to be 64.6Ha

For the remaining greenfield areas, which equates to 5.6Ha, I have used the FSR Method within the MicroDrainage software. The table below shows the existing combined runoff rate.

Existing Runoff Rate

Return Period	Brownfield runoff rate (l/s)	Greenfield runoff rate (l/s)	Total (l/s)
QBAR	64.6	42.4	107

In order to provide a betterment we have reduced the brownfield runoff rate by 30%. We are therefore proposing to restrict flows from the development to 87.6 l/s as tabulated below.

Proposed Runoff Rate

Return Period	Reduced Brownfield runoff rate (l/s)	Greenfield runoff rate (l/s)	Total (l/s)
QBAR	45.2	42.4	87.6

I have attached a sketch showing the areas of hardstanding currently on site as well as the revised brownfield and greenfield runoff rate calculations.

Can you please review the above information and confirm if the proposed development can be restricted to the proposed rate of 87.6 l/s?

Before I formally comment upon your Brownfield and Reduced runoff rates

If you want me to confirm your Brownfield and Reduced runoff rates, I'll need a CAD drawing of the hardstanding areas so I can cross-check correlate with your calcs.

However, the more critical issue you have is:-

Will you be able to discharge to a recognised watercourse?

Today I have looked again at maps and can see that the 'culvert-drain' probably exits to a ditch which has been artificially straightened. Your discharge point is not, as far as I can tell an 'ordinary watercourse' but an artificial land-drain. Consequently one needs to consider the impact on the land-owners through which this ditch runs before it finally arrives at the Trub Brook Stream, after crossing under the M62. I previously asked if you knew the land-owners, but got no response. I have therefore asked a colleague to give me land-registry information for areas A, B and C – see appended Land Ownership. There are also queries that I am raising with you on the LLFA Notes. If I am provided with some guidance on how to get to the site, I will go and look next week and I may be able to answer one of two of those questions.

The Developer must (as you and Tom Foster are doing) try to discharge to a watercourse but the responsibility to work out all the issues around it do not devolve to me, as Drainage Officer. I can try to assist, but I am not focussed on this particular task. Stephen McCann

Kind Regards

Elanna Herod
Project Engineer

CampbellReith
consulting engineers

No. 1 Marsden Street
Manchester
M2 1HW

Tel: +44 (0)161 819 3062
www.campbellreith.com

From: "Stephen McCann" <Stephen.McCann@Rochdale.Gov.UK>
To: "ElannaHerod@campbellreith.com" <ElannaHerod@campbellreith.com>
Date: 10/06/2021 14:23
Subject: Confirmation of future Discharge of rate - to culvert : Castleton, Rochdale - Discharge Rate Enquiry

Hi Elanna,

I have now had time to consider your email and agree that the Greenfield rate for the whole site of 47 l/s will be accepted from a Planning viewpoint.

Although I am agreeing that the rate of 47 l/s surface water discharge is appropriate, I still don't know what other 3rd party landowners may think about the Developer using the 'culvert'. I will go to site to have look. In the meantime, perhaps you can advise me (or ask Tom Foster) of the extent of Kellen Homes ownership. I'll then ask my colleague to lookup who owns the downstream sections.

Stephen McCann
Drainage & Flooding Engineer
Highways, Property & Strategic Housing



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Please consider the environment before printing this email.

From: ElannaHerod@campbellreith.com <ElannaHerod@campbellreith.com>

Sent: 10 June 2021 12:35

To: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>

Subject: RE: 13655: Castleton, Rochdale - Discharge Rate Enquiry

Hi Stephen,

Thank you for your email.

I will pass your query regarding the ownership of the culvert to Kellen Homes. I do not believe we have any information regarding the condition of the culvert under the railway line and M62. If required could a drainage survey be conditioned as part of the forthcoming application?

I have also re-calculated the brownfield and greenfield runoff rate for the site. Based on the site investigation undertaken at the site I do not believe the HR Wallingford methodology provided the correct SPR value as the ground is predominantly underlain by clay. I have therefore attached the greenfield runoff rate calculated through MicroDrainage which provides a better representative of the soil conditions on site, a summary of the results is tabulated below.

Greenfield runoff rate based on developable area (6.31Ha)

QBAR - 47.3 l/s

1 in 1 year - 41.1 l/s

1 in 30 year - 80.2 l/s

1 in 100 year - 98.4 l/s

Combined Brownfield and Greenfield runoff rates.

Table 1: Existing Runoff Rates

Return Period	Brownfield 0.67Ha (l/s)	Greenfield 5.6Ha (l/s)	Combined Rate (l/s)
1	38.5	36.5	75.0
30	75.3	71.2	146.5
100	92.1	87.3	179.4

In order to provide a betterment we are proposing to reduce the existing brownfield rate by 30%.

Table 2: Proposed Runoff Rates

Return Period	Brownfield (-30%) (l/s)	Greenfield (l/s)	Combined Rate (l/s)
1	27.0	41.1	68.1
30	52.7	3.0	132.9
100	64.5	3.7	162.9

Can you please confirm if you are happy for us to use the proposed combined rate in Table 2 or if we need to restrict proposed flows to the QBAR rate of 47.3 l/s? I have attached the amended calculations and an extract from the site investigation report for your reference.

Kind Regards

Elanna Herod
Project Engineer

From: "Stephen McCann" <Stephen.McCann@Rochdale.Gov.UK>
To: "ElannaHerod@campbellreith.com" <ElannaHerod@campbellreith.com>
Date: 10/06/2021 11:38
Subject: RE: 13655: Castleton, Rochdale - Discharge Rate Enquiry

Hello Elanna,

I'm trying to answer more than one question below but if I've left any of your questions unanswered, just ask me again.

Now that I've looked at the footpath, I can see how to get to the site, which I will try to do next week. I tried to approach from the north east which was blocked by locked gates by railway authorities.

Feel free to forward this email to Tom Kellen or not – I don't know so I just leave it to you.

Using the 'culvert' to discharge the attenuated surface water flows

Although it is logical that the developer should discharge surface water flows to the identified 'culvert'. To my mind, the Developer needs to confirm that the route of the 'culvert' is viable in the long term and that any interested landowner is aware of the issue. I checked on the Council's land-registry and the Council does not own any land along the route of the 'culvert'.

As far as I can tell the 'culvert' is not classed as an ordinary watercourse i.e. it is not a historical stream that has been piped (culverted); I haven't done a historical map search yet so feel free to challenge that initial guess. If classed as an Ordinary Watercourse, then any landowner must accept attenuated discharge into the watercourse but if the culvert is only a private drain, then they will need to approve the connection. I haven't done historical search because I currently busy with numerous issues and the onus is on the Developer to provide the solution.

Although I have said before that the 'culvert' looks to be the most sustainable drainage solution, this doesn't mean that any other land-owners / third parties will accept this as a 'solution'.

Please can you answer the questions on the LLFA Notes sheet or ask Tom to answer them? If you don't know the answer, you can write "not known".

Future attenuated discharge rates

I have looked at your 'Brownfield SW runoff rates' spreadsheet. I can see that you have stated that 50mm/hr is assumed to be for average 1 in 2 year storm. I question that value; I understand that the runoff rate in Rochdale is much close to 25mm/hr. Please can you either provide background evidence for your rainfall rate or re-do the calc? As LLFA, I would look for the Developer restricting the SW from the site to be Qbar OR you can have a 'complex' hydrobrake with 2 controls.

North West SuDS ProForma

It looks like this is a new form that the Council wants Applicants to complete but I am not 'up-to-speed' with what you have to complete.

I don't know if you or Tom Foster have a contact to help you complete the form - so you can ask them if you are uncertain of any aspects to it?

As far as I understand it, the Drainage Conditions will be recommended by me to Planning and I'll probably be sent the completed SuDS form so you can simply put any queries on that form.

regards

Stephen McCann

Drainage & Flooding Engineer
Highways, Property & Strategic Housing



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From: ElannaHerod@campbellreith.com <ElannaHerod@campbellreith.com>

Sent: 07 June 2021 11:44

To: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>

Subject: 13655: Castleton, Rochdale - Discharge Rate Enquiry

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Good morning Stephen,

I am currently working on the drainage strategy for the site located at the former Castleton Railway Sidings in Rochdale, OL11 3AU. I believe you have already been in discussions with our Client Tom Foster at Kellen Homes and have agreed in principle a surface water connection into the existing 1200mm dia culvert located within the site. I would therefore like to seek confirmation of the allowable discharge rate to the culvert from the proposed development.

The developable area extends to approximately 6.3Ha and is predominantly greenfield. However, the site still contains areas of hardstanding associated with the the former access roads and buildings equating to approx 0.67Ha. An intrusive site investigation concluded that the ground conditions were unfavourable for infiltration and there are no watercourses within close proximity to the site. It is therefore anticipated that the roads and buildings formerly drained to this culvert.

Using the modified rational method and the HR Wallingford Greenfield Runoff Estimation tool the existing runoff rate from the site is calculated as follows:

Table 1: Existing Runoff Rates

Return Period	Brownfield 0.67Ha (l/s)	Greenfield 5.6Ha (l/s)	Combined Rate (l/s)
QBAR	n/a	1.8	1.8
1	77.1	1.6	78.7
30	150.6	3.0	153.6
100	184.2	3.7	187.9

In order to provide a betterment we are proposing to reduce the existing brownfield rate by 30%.

Table 2: Proposed Runoff Rates

Return Period	Brownfield (-30%) (l/s)	Greenfield (l/s)	Combined Rate (l/s)
1	53.9	1.6	55.5
30	105.4	3.0	108.4
100	129.0	3.7	132.7

Can you please confirm if the combined rates in Table 2 are acceptable in principle for the discharge of surface water runoff from the proposed development into the existing on-site culvert? I have attached a copy of the calculations for your review.

If require any additional information or would like to discuss further please don't hesitate to contact me.

Kind Regards

Elanna Herod
Project Engineer

CampbellReith
consulting engineers

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Ownership queries - Castleton Sidings.docx" deleted by Elanna Herod/CRH] [attachment "LLFA notes & queries re. drainage from Castleton Sidings.docx" deleted by Elanna Herod/CRH]

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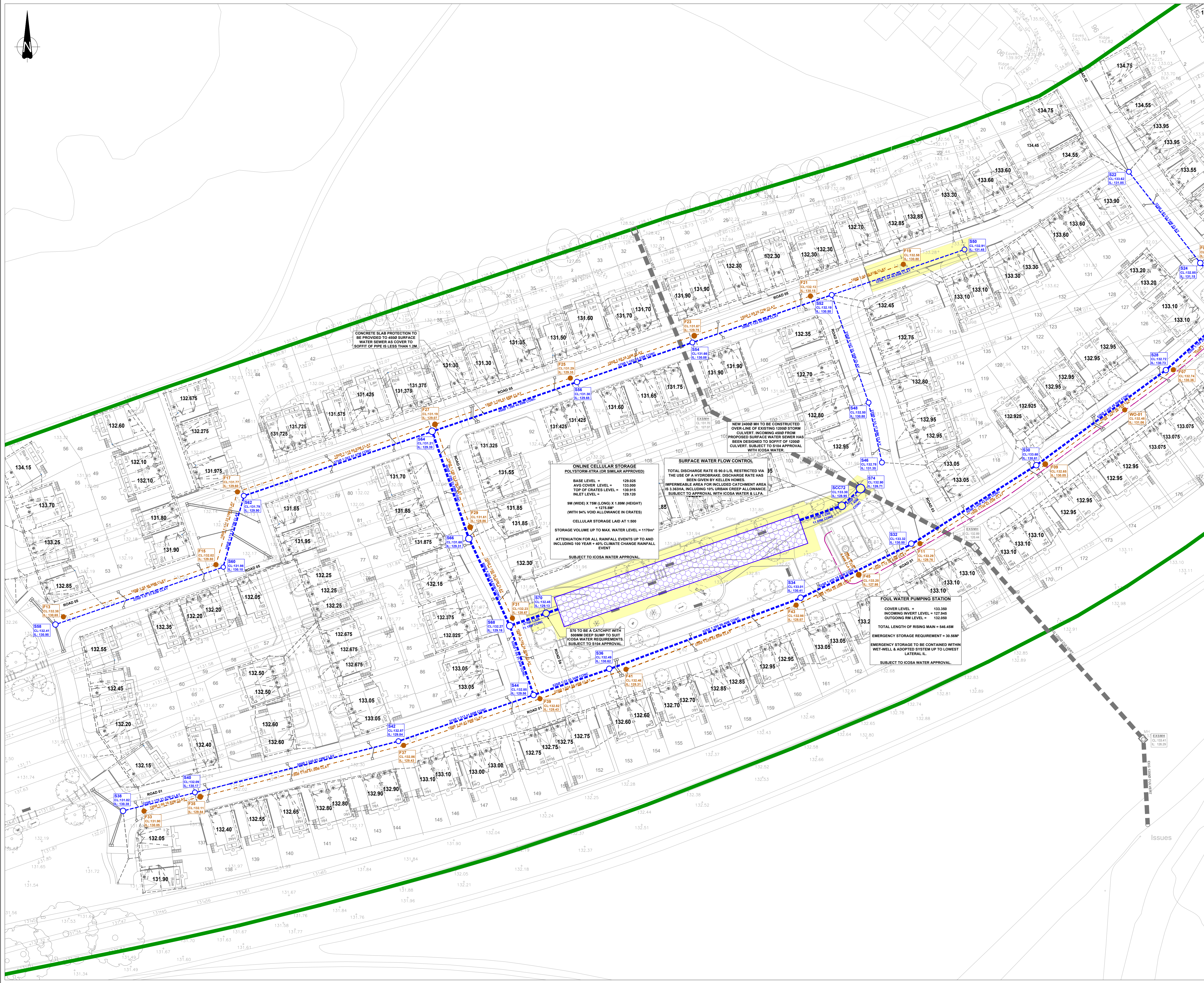
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Appendix D; Concept Drainage Design



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GENERAL NOTES

- This drawing is to be read in conjunction with relevant architectural and engineering drawings.
- Any discrepancies between the details shown and actual on site conditions to be reported immediately to the engineer prior to commencement of works.
- This drawing is not intended to show details of ground conditions or ground contaminants. Each area of ground relied upon to support any structure depicted (including drainage) must be investigated by the Contractor any areas of formation for said structures which do not accord with the anticipated conditions as described in the site investigation report are to be immediately notified to the Engineer, where applicable. Any suspect fluid ground or ground contaminants on or within the ground should be further investigated by a suitable expert. Any earthworks shown indicate typical slopes for guidance only and should be investigated further by a suitable geotechnical expert.
- Where existing trees are shown to be retained they should be subject to a full Arboricultural inspection for safety. All trees are to be planted so as to ensure they are a minimum of 5 metres from buildings and 3 metres from drainage and services, where applicable. A foundation is to be provided to accommodate the proposed tree planting, where applicable.

ADAPTABLE ROADS AND SEWERS

- Roads, footways and parking bays which form part of the highway to be adopted under Section 104 of the Highways Act 1980 shall comply with the requirements of the Adopting Authority.
- Sewers to be adopted under Section 104 of the Water Industries Act 1991 shall comply with the Sewerage Sector Guidance (SSG) "Design & Construction Guidance" with any amendments specified by the Adopting Water Authority.
- All pipes to be used in adoptable areas shall be either clayware to BS EN 295 or concrete to BS EN 1916 and BS 5911: Part 1 with Class 3 bedding unless otherwise stated. With approval of the Adopting Authority solid wall concentric external rib reinforced uPVC pipes complying with the relevant provisions of BS EN 13476 may be used.
- Where cover to a pipe is more than 1200mm under adoptable carriageway the trench shall be filled to formation of the carriageway with well compacted DT1 Type 1 material.
- Where cover to a pipe is less than 1200mm under adoptable carriageway it shall be provided with concrete protection in accordance with the specification of the adopting authority and back filled to formation of the carriageway with well compacted DT1 Type 1 material. Where concrete bed and surround is specified flexibility of joints is to be maintained by using compressible bitumen impregnated fibreboard at each pipe joint.
- All existing drainage invert levels, diameters and locations are to be checked by the Contractor prior to the commencement of any proposed drainage work. Any difference between actual and drawn details is to be reported to the Engineer immediately.
- Positions of existing services/utility undertakers apparatus adjacent to or crossing proposed sewers is to be checked by the Contractor prior to starting work.

SECTION 104 LEGEND

DRAINAGE

- S104 SURFACE WATER MANHOLE & SEWER
- S104 SURFACE WATER MANHOLE REFERENCE
- S104 FOUL WATER MANHOLE & SEWER
- S104 FOUL WATER MANHOLE REFERENCE
- S104 FOUL WATER RISING MAIN
- S104 ONLINE CELLULAR STORAGE CRATES
- S38 HIGHWAY GULLY & CONNECTION TO SEWER
- S38 SURFACE WATER MANHOLE & SEWER
- S38 SURFACE WATER MANHOLE REFERENCE
- PRIVATE SURFACE WATER PLOT DRAINAGE
- PRIVATE FOUL WATER PLOT DRAINAGE
- EXISTING SURFACE WATER MANHOLE & SEWER
- EXISTING COMBINED WATER MANHOLE & SEWER
- EXISTING MANHOLE REFERENCE

GENERAL

- 00.00 FINISHED FLOOR LEVEL
- S104 SEWER EASEMENT
- DEVELOPMENT BOUNDARY

FOUL WATER PUMPING STATION

COVER LEVEL = 133.30
INCOMING INVERT LEVEL = 127.345
OUTGOING RM LEVEL = 132.050
TOTAL LENGTH OF RISING MAIN = 546.45M
EMERGENCY STORAGE REQUIREMENT = 30.56M³
EMERGENCY STORAGE TO BE CONTAINED WITHIN WET-CELL & ADOPTED SYSTEM UP TO LOWEST LATERAL I.L.
SUBJECT TO ICOSA WATER APPROVAL

ONLINE CELLULAR STORAGE
POLYSTORM-XTRA (OR SIMILAR APPROVED)

BASE LEVEL = 129.025
AUG COVER LEVEL = 133.000
TOP OF CRATES LEVEL = 130.915
INLET LEVEL = 129.120

9M (WIDE) X 75M (LONG) X 1.89M (HEIGHT) = 127.80M³
(WITH 94% VOID ALLOWANCE IN CRATES)
CELLULAR STORAGE LAID AT 1:500
STORAGE VOLUME UP TO MAX. WATER LEVEL = 1170M³
ATTENTION FOR ALL RAINFALL EVENTS UP TO AND INCLUDING 100 YEAR + 40% CLIMATE CHANGE RAINFALL EVENT
SUBJECT TO ICOSA WATER APPROVAL

SURFACE WATER FLOW CONTROL

TOTAL DISCHARGE RATE IS 90.0 L/S. RESTRICTED VIA THE USE OF A HYDROBRIDGE. DISCHARGE RATE HAS BEEN GIVEN BY KELLEN HOMES.
IMPERMEABLE AREA FOR INCLUDED CATCHMENT AREA IS 3.363HA, INCLUDING 10% URBAN CREEP ALLOWANCE. SUBJECT TO APPROVAL WITH ICOSA WATER & LLFA.

CONCRETE SLAB PROTECTION TO BE PROVIDED TO AROUND SURFACE WATER SEWER AS COVER TO SOFFIT OF PIPE IS LESS THAN 1.2M.

775 TO BE A CATCHPIT WITH 600MM DEEP SUMP TO SUIT ICOSA WATER REQUIREMENTS. SUBJECT TO S104 APPROVAL.

Rev.	Description	Date	By
A	Location of foul pump station amended & drainage updated to suit latest layout.	15/04/2024	LJ
-	First Issue	11/03/2024	LJ

Drawing Status

Client: **KELLEN HOMES**

Project: **Heywood Road, Castleton, Rochdale**

Title: **Section 104 Agreement Plan**
Sheet 2 of 2

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Scale: **A1 @ 1:250** Drawn: **LB**
Date: **March 2024** Checked: **LJ**
File: **23147 dwgs / civils / current** **23147-BGC-D-100S104 (ii) - A**