



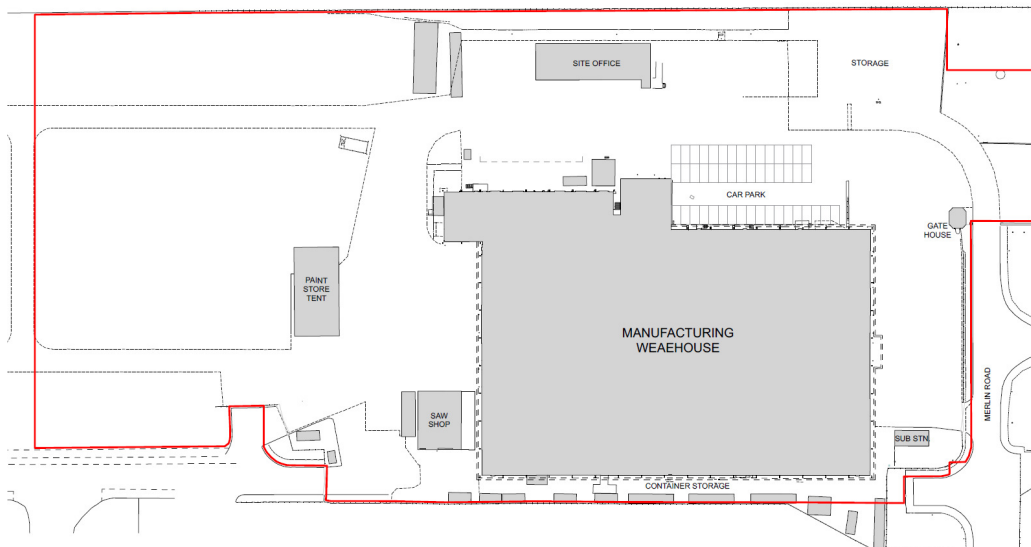
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**Proposed Alterations to manufacturing
facility at Carnaby Industrial Estate,
Lancaster Road, Carnaby YO15 3QY**

Elliott's Off-Site Solutions

**Flood Risk Assessment and Drainage
Strategy Statement**

December 2020



P3264

FACT-AVE-ZZ-XX-RP-S-00001 P02

Revision History	
Initial Issue	23 December 2020
Prepared By:	Checked:
Steve Bowles Senior Engineer	Graham Helme Director

Rev No	Date	Description	By	Checked
0	23.12.2020	Initial Issue	SAB	
1	06.01.2021	Planning Application Issue	SAB	
2	07.04.2021	Updated site layout	PAS	

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1 INTRODUCTION

Avie Consulting Ltd has been commissioned by Elliott's Off-Site Solutions to carry out a Flood Risk Assessment and Drainage Strategy report to support a Planning Application for changes to their existing manufacturing facility at Carnaby Industrial Estate, Carnaby near Bridlington.

The aim of this report is to allow the Planning Authority to assess the site in accordance with the National Planning Policy Framework published by the Department of Communities and Local Government.

2 PROPOSED DEVELOPMENT

The site comprises an existing modular building manufacturing facility. The proposals include some additional building provision to improve the workflow and accommodate additional capacity.

Please refer Appendix A for Preliminary Site Development Proposals.

The site is located on Merlin Road, within the Carnaby Industrial Estate, some 3.5km west of Bridlington town centre at Ordnance Survey grid reference TA142644. The nearest post code is YO15 3QY.

The site is bounded as follows:

To the North – Arable land.

To the East – Arable land.

To the South – Carnaby Industrial Estate

To the West – Arable land.

The site falls generally from the south at approximately 12m AOD the north at approximately 11m AOD.

Site location plan is shown in Figure 1



Figure 1

3 FLOOD RISK ASSESSMENT CRITERIA

The EA flood data was obtained, the site under consideration is within Flood Zone 1 according to the latest version of the Indicative Floodplain Map produced by the Environment Agency.

Additionally, the GOV.UK website and the Burnley Strategic Flood Risk Assessment identify the site area within the redline boundary as being within Flood Zone 1.

Indicative Floodplain Map for the site is shown in figure 2 below.

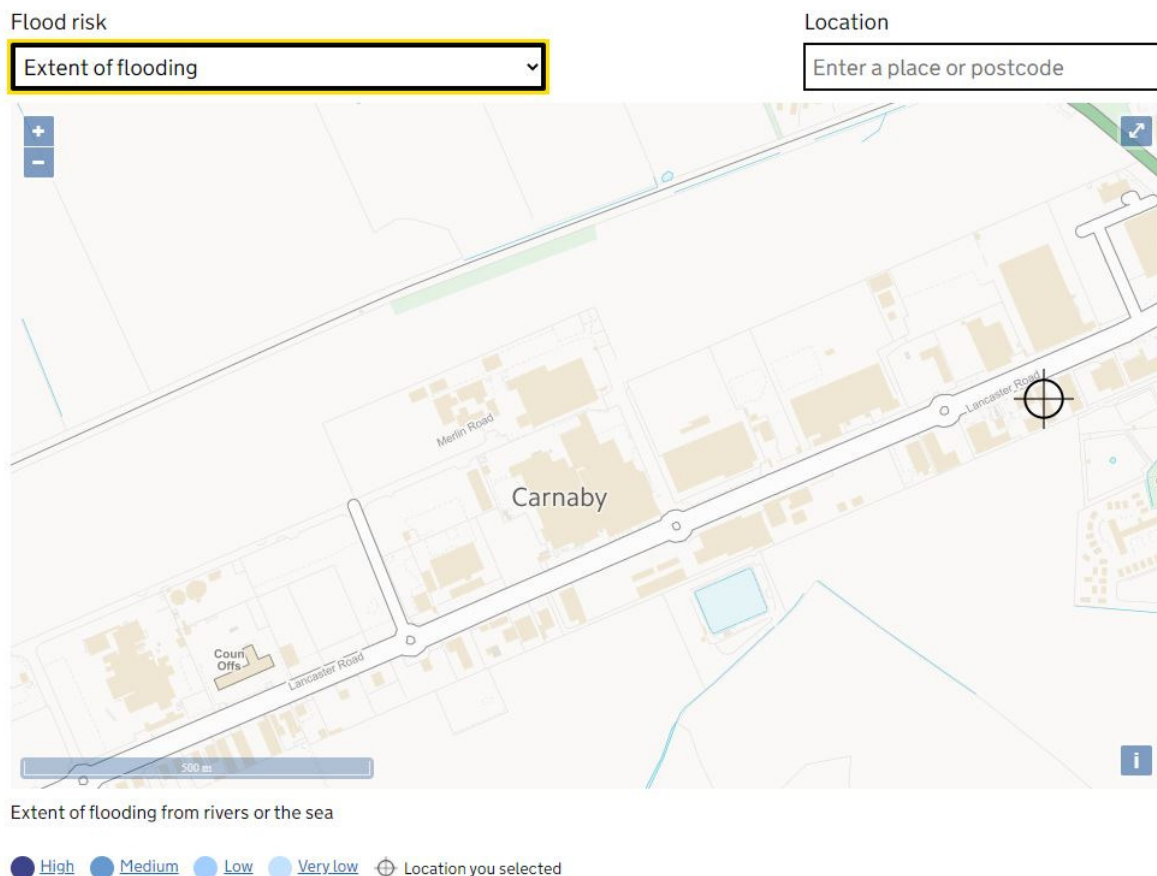


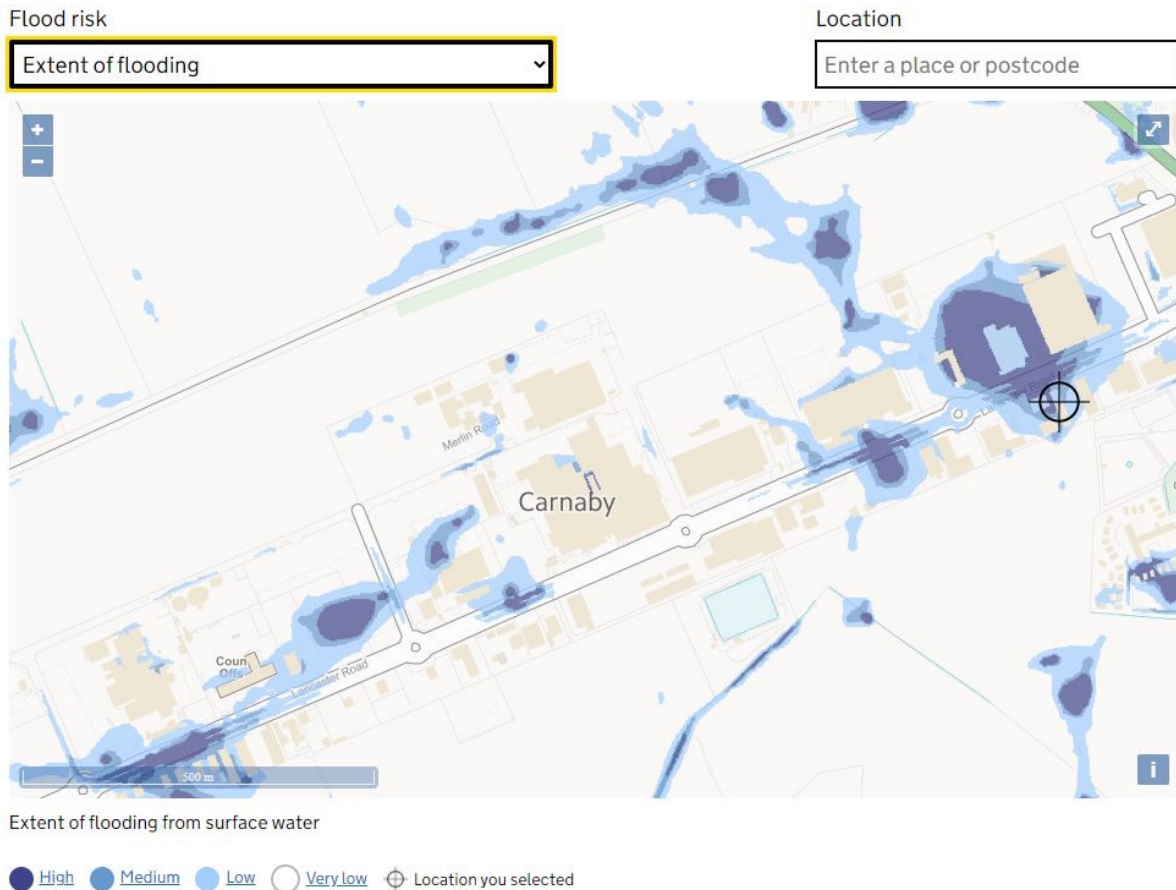
Figure 2

As the site lies within Flood Zone 1 the flood risk assessment needs to consider the following:

- Flooding from other sources such as rivers, tidal, sewers and overland flooding
- The potential for the development to increase flooding elsewhere through the addition of hard surfaces
- The effect of the new development on surface water run-off
- EA data set accuracy

4 EXISTING FLOOD DEFENCES

The site does not benefit from any flood defences and does not require any.



5 SOURCES OF FLOODING

As part of the flood risk assessment consideration should be given to the following sources of flooding and what effect these could have on the development.

5.1 Flooding from Rivers / Watercourses

The closest watercourse to the site lies north of the site across arable land and the Hull/Bridlington rail line.

As can be seen on the Surface Water flood risk map above, the risk of flooding from this source is **LOW**.

5.2 Flooding from the Sea

The site is more than 3km from the sea and more than 10m above sea level, as such the risk of flooding from tidal waters is considered to be **LOW**.

5.3 Flooding from Land

The effect of intense rainfall needs to be considered and the local Topography of the land assessed.

The surface water flood risk mapping available on the GOV.uk website shows an area of surface water flood risk associated with the unnamed watercourse on the north side of the Hull/Bridlington rail line, but this does

not encroach on the site. There are also some small areas of surface water flooding shown within the site, but these appear to be a consequence of the age of the site and the standard that the onsite drainage would have been designed to. These will be addressed as part of the works if they fall within the remit of the improvements.

The proposed development will include a surface water drainage system that will be designed to accommodate severe storm events up to and including 100-year return period events with a further allowance for climate change.

As such the risk of flooding from this source is considered to be **LOW**.

5.4 Flooding from Groundwater

Groundwater flooding occurs when water levels in the ground rise above surface elevations, particularly in low lying areas. On the basis that the nearby superficial geology is identified as alluvium overlying chalk, groundwater flooding is not expected to be an issue

As such the risk of flooding from this source is considered to be **LOW**.

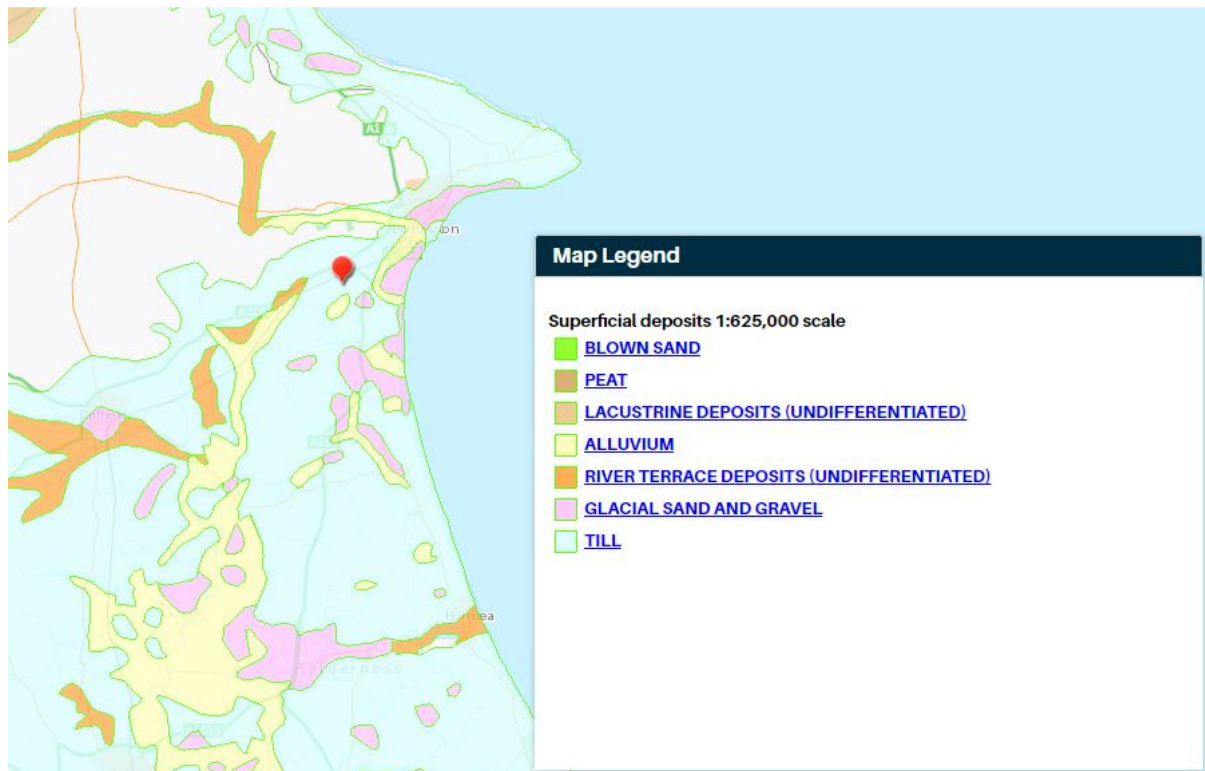


Figure 3

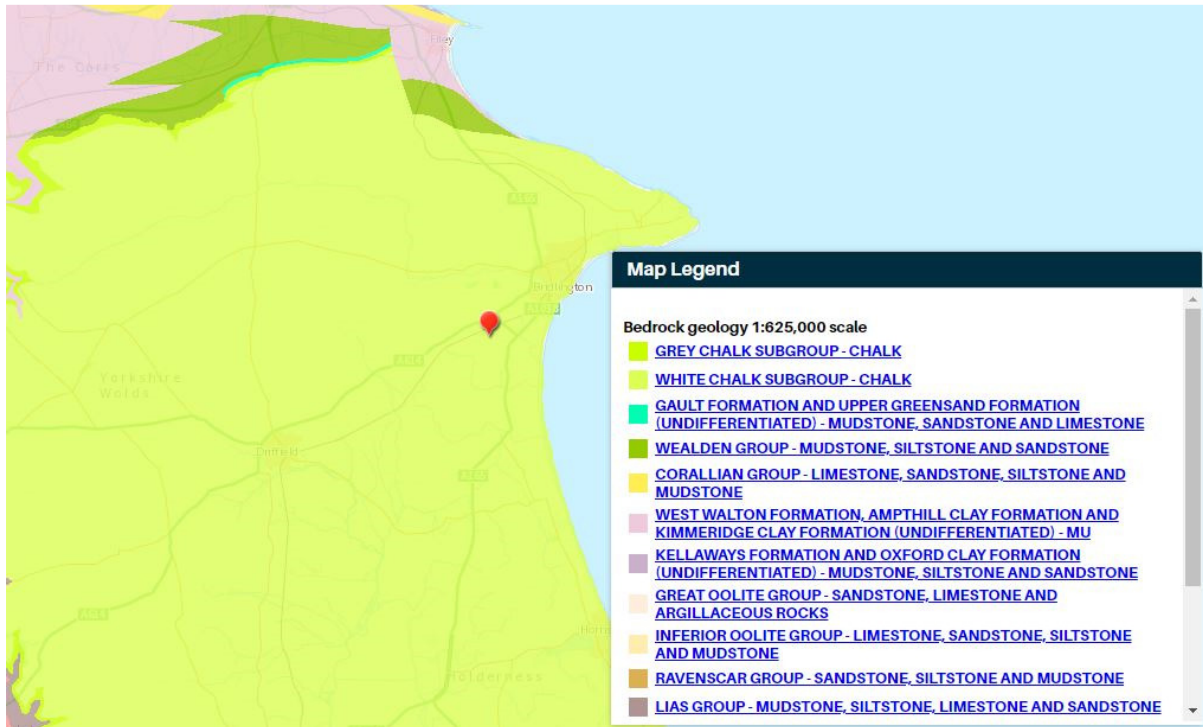


Figure 4

5.5 Flooding from Sewers

Sewer records have been requested from Yorkshire Water but have not yet been received.

The flood extents on the EA flood maps only take into account main rivers and therefore risk from sewers / culverts are not shown. The worst-case scenario would be for the system to block with water exiting the manhole covers. By inspection of the topographical survey water flow would be away from the development.

No recorded incidents to the local sewers and given the sites topography we consider the risk of flooding from this source to be **LOW**.

6 FLOOD RISK SUMMARY

Sources of Flooding	Risk			Control Measures
	High	Medium	Low	
Rivers:			X	None required
Sea			X	None required
Land			X	None required
Groundwater			X	None required
Existing sewers			X	None required

7 INCREASE TO OFFSITE FLOODING

The development should be designed to limit the surface water run-off to existing surface water discharge flow rates or better.

The site is classified as brownfield Development. Given that the site is currently almost entirely impermeable, the new facilities will not have any adverse impact on flood risk either on site or downstream of it. Further, the site investigation results may suggest that infiltration to ground will work in this location. Should this be implemented, the proposed development will reduce flood risk by removing surface water from the public sewer network.

8 FLOOD RISK VULNERABILITY

The vulnerability of the proposed development is assessed in accordance with the Technical Guidance to the National Planning Policy Framework published by the Department for Communities and Local Government in March 2012.

The report should consider if the development is acceptable for the Flood Zone Classification in accordance with Table 3 within the NPPF.

The proposed development is Industrial and is classified as "**Less vulnerable**" according to the NPPF.

The site is indicated on the flood maps to be in Flood Zone 1.

Table 3: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability Classification (from Table 2)		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b	Exception Test required	✓	✗	✗	✗

- ✓ Development is appropriate
- ✗ Development should not be permitted

Utilising the Flood Zone Compatibility Table above, the development is deemed appropriate for the site and flood risk classification Flood Zone 1

As part of the assessment the following development constraints require consideration and recommendation made as to how to mitigate any flood risk appropriately.

8.1 Finished Floor Levels

The EA flood mapping indicates that there are limited areas of Surface water flooding on the site. This is believed to be associated with the age of the existing structures on the site and is proposed to be dealt with by the below ground drainage system to be provided as part of the proposed development wherever practicable.

Finished floor levels will need to be at or around external ground levels due to the nature of the business undertaken on site. it may be prudent to include cut-off drainage channels across door thresholds wherever level access is required. Where level access is not required, the building FFL should be raised 150mm above external ground levels in accordance with good practice.

8.2 Existing Flood Volumes

No loss of existing flood volume will occur as a result of the proposed development as it is within flood zone 1 according to the indicative flood maps.

8.3 Flood Routing

Flood Routing paths are to be maintained on site by ensuring levels allow flows to move through the site without affecting properties. This is expected to be mainly along the proposed development infrastructure as the plots will be raised above the existing ground levels to afford them protection from the passage of surface water through the site. given that the proposed works require limited amounts of works in parts of the site rather than site wide the levels across the existing site are not proposed to be altered in most instances, so this is not deemed to be an issue.

8.4 Emergency Access

The site is in flood zone 1 according to the level information reviewed and as such emergency access is not anticipated to be an issue and no specific route is required to be identified.

9 CLIMATE CHANGE ALLOWANCES

The EA have published revised climate change allowances rainfall intensity, such the climate change allowance are as follows in table 2.

Table 2 peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

Table 2.

Therefore, the site drainage design should be checked utilising Climate Change Allowance of 40%

The proposed surface water drainage and attenuation system will need to be designed to accommodate a 40% climate change allowance.

10 PROPOSED DRAINAGE STRATEGY

10.1 Surface Water

The existing manufacturing facility is understood to discharge surface and foul water to the public sewer network. It is understood that site investigations including trial pits and boreholes are to be undertaken to support the design of the proposed works.

In accordance with good practice and council policies, new offsite surface water flows should be reduced by the introduction of an attenuation system following the hierarchy as laid out in the approved document H of Building Regulations with respect to Sustainable Urban Drainage Systems (SuDS).

Discharge to Ground

The results of the site investigation work described above are not yet available at the time of writing this report, but the site is underlain by chalk bedrock. It may be possible to discharge surface water into the bedrock or the superficial soils. The rates of infiltration will need to be measured as part of the ground investigation works to allow a detailed design to be undertaken.

Discharge to a Surface Water Body

There are no water courses in sufficiently proximity to the site to allow a discharge to watercourse, so this option has been discounted. If infiltration rates measured on the site are too variable or too low for viable infiltration facilities to be provided, a discharge to sewer will need to be considered.

Discharge to Surface Water Sewer

The location of YW sewers is not yet known but given the existing discharge to sewer and the absence of confirmed infiltration rates, it is currently assumed that the proposed works will need to be attenuated and discharged to sewer at rates to be agreed with the LLFA and Yorkshire Water. This will represent a betterment on the existing surface water discharge regime and is in line with flood risk policy/best practice.

Discharge to Combined Sewer

It is preferable to discharge surface water to ground or to a surface water sewer. This option is not proposed to be used unless infiltration rates are too low to use and there are no surface water sewers available.

10.2 Foul Water

The developments new foul flows are proposed to be gathered by gravity and discharged to the public sewer in Merlin Road.

11 PROPOSED DRAINAGE SCHEME

Given that the existing development is believed to discharge surface water to sewer and that the results of site investigations/infiltration testing are not yet known, it is proposed that the new development will follow the same principle and discharge surface water to sewer at rates to be agreed with the LLFA and Yorkshire Water.

Proposed Discharge Rate

As the site may be able to discharge surface water by soakaways, the discharge rate will be whatever can be achieved through detailed design considering the infiltration rates (to be measured at appropriate locations and depths in accordance with BRE 365) and the spatial constraints of the site. If the site is to continue discharging surface water to sewer, the rate will need to be agreed with the LLFA.

Volume of Runoff

Unless infiltration is proven to be viable, the volume of surface water run-off will not be changed by the proposed below ground drainage system.

12 DRAINAGE IMPACT

Whether the final surface water drainage design proposes to discharge surface water to public sewer at, or close to, greenfield runoff rates or makes use of infiltration techniques to discharge surface water to ground, the proposed development will represent an improvement over the existing surface water discharge from the site. This is in line with current policy for dealing with flood risk and climate change.

13 GENERAL REMARKS

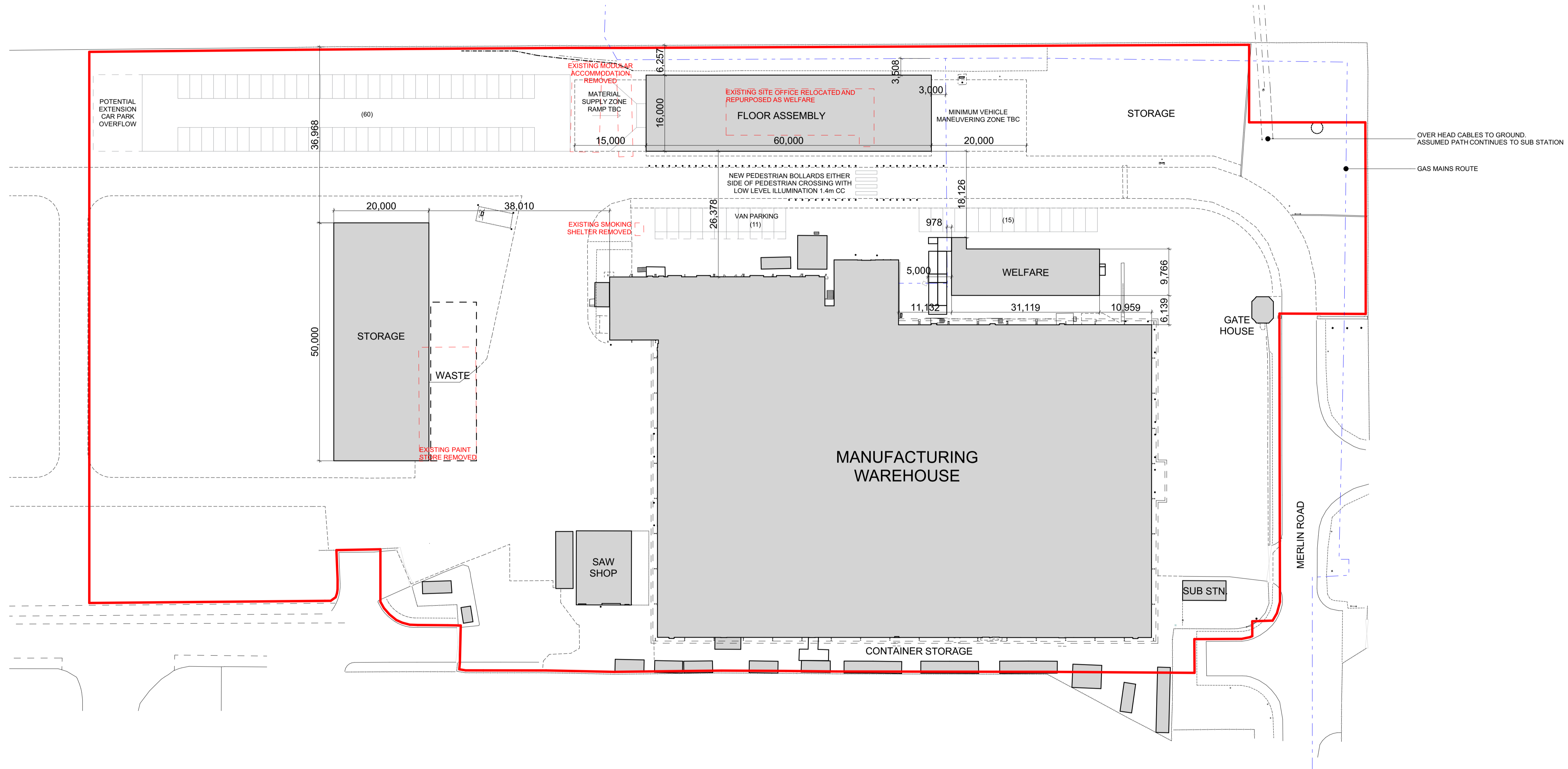
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14 RECOMMENDATIONS / CONCLUSIONS

- The site under consideration is located in Flood Zone 1 according to the Indicative Floodplain Map on the GOV.UK website, as such in Flood Risk terms, the proposed development is appropriate for the site.
- Infiltration soakaways may be appropriate, and this will need to be proven by intrusive investigation to allow detailed design to be undertaken.
- Industrial Development is classified as “Less Vulnerable” and is appropriate under the National Planning Policy Framework on this redevelopment site in terms of Flood Risk in flood zone 1.
- It is recommended that finished floor levels are set at a minimum of 150mm above the lowest proposed ground level unless level access is required to facilitate the movement of modular buildings in and out of the building.
- Flood Routing paths will be maintained on site by ensuring levels allow flows to move through the site without affecting buildings.
- Foul water discharges should collect by gravity wherever possible or to a pumping facility where they can be pumped to the existing Yorkshire Water sewer in Merlin Road.



APPENDIX A
Site Development Proposal



PROPOSED SITE PLAN

1:500

Rev	Description	Date	By	Chk
Revisions				Suitability
Project				PL

Carnarby Factory Changes - Elliotts

Client

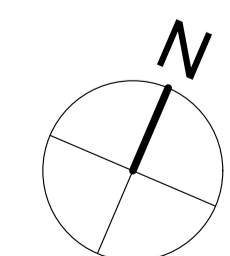


Title

PROPOSED SITE PLAN

Drawing No.	Revision
FACT-HLM-00-00-DR-A-000110(PL)	-

Scale @ A1	Drawn
1:500	SG
Date	Checked
04/01/2021	HLM



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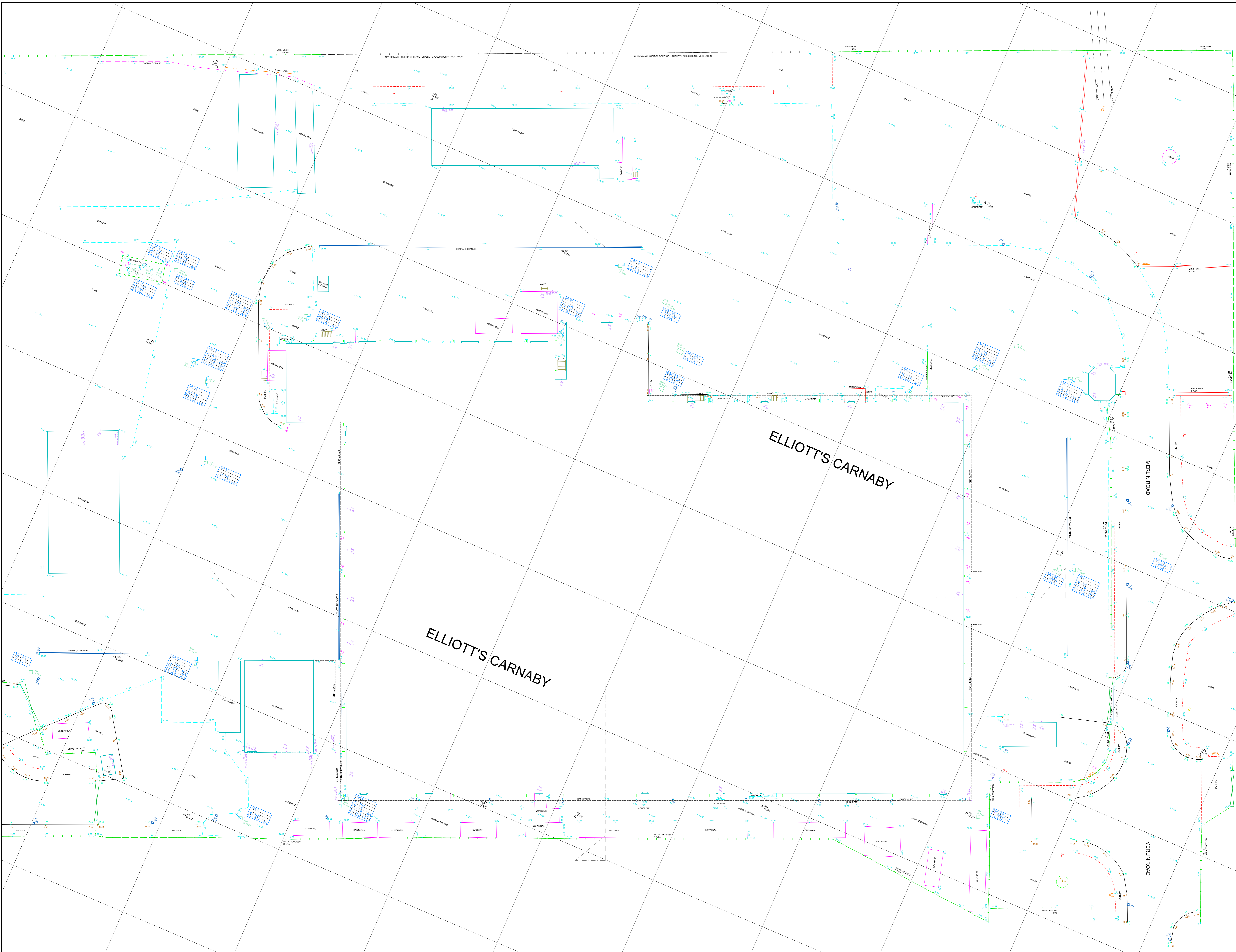
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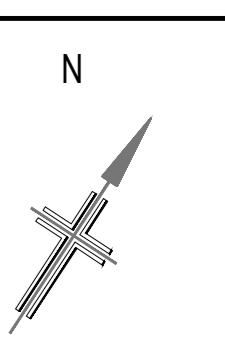


P3264
Elliott's Off-Site Solutions, Carnaby

APPENDIX B
Topographic Survey



Notes
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Grid OS National Grid.
 Using the OS GPS Network and applying OSTN15 transformation and then removing the scale factor for true distances with a one-step transformation centred on S1

Datum OS Level Datum.
 Using the OS GPS Network and applying OSGM15 National Geoid Model to obtain local area corrections.

Station Listing

Station	Easting	Northing	Level
S1	514246.550	464506.836	11.820
S2	514184.372	464471.458	10.648
S3	514126.853	464430.333	11.873
S4	514163.160	464359.158	12.117
S5	514223.765	464384.667	12.127
S6	514284.125	464411.098	12.152
S7	514291.882	464457.753	12.093
SSA	514115.344	464475.012	13.354
S3B	514154.118	464486.272	12.440
S4A	514141.901	464378.985	13.700
S4B	514128.079	464341.959	12.046
SSA	514200.026	464381.103	13.816
SSA	514255.033	464398.626	11.938
S7A	514316.367	464435.614	12.282

KEY

AIR VALVE	AV	HERB OUTLET	HO
BENCH MARK	BM	LAMP POST	LP
BRI	BRI	MANHOLE (CIRCULAR)	MC
BOLLARD	BO	MANHOLE (RECTANGULAR)	MR
BORER HOLE	BH	MANHOLE (TRIANGULAR)	MT
BRITISH TELECOM COVER	BT	MARKER POST	MP
BUS STOP	BS	GALLY	GA
CABLE TV COVER	CT	ROOFING EYE	RE
CABLE TV SUPPLY	CS	SOIL POST	SP
COLUMN	CO	TELECOM COVER	TC
DROPPED KERB	DK	TELEGRAPH POLE	TP
EARTHING POINT	EP	THRESHOLD LEVEL	TL
ELECTRICITY COVER	EC	TRAFFIC LIGHT	TR
ELECTRICITY POLE	EP	TRIAL PIT	TP
FIRE HYDRANT	FH	WASH OUT	WO
GAS VALVE	GV	WATER METER	WM
GATE	GA	WATER STOP COCK	WSC
INSPECTION COVER (CIRCULAR)	IC	WATER STOP VALVE	WSV
INSPECTION COVER (RECTANGULAR)	IR		
INVERT LEVEL	IL	CHAMBER BASE LEVEL	CL
MANHOLE TO BASE	MTB	WATER SURFACE LEVEL	WSL
DEPTH OF TREE TRUNK	G	LENGTH TO MANHOLE	LM
HEIGHT TO TOP OF TREE CANOPY	H	DIAMETER OF TREE TRUNK	D
		MULTI HOLE TREE	MHT

Rev	Date	Drawn	Description	Check

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Title
 TOPOGRAPHICAL
 SURVEY

Surveyed	BH TW	Drawn	BH
Check	DA	Date	17/11/2020
Scale	1:200	Job No	P20-01182
		Sheet Size	A0
		Rev	01

DWG Ref
 Project Number Origin Zone Level Desc Type Role Sheet
 P20-01182 METEXT XX TOP M3 G 001



APPENDIX C
Proposed Drainage Strategy

Floor Assembly:
Existing drainage is 13.33 L/Sec. Proposed discharge to be 30% less than existing in order to comply with Brownfield development guidelines
New proposed discharge 9.30 L/Sec.

Proposed impermeable area 960m², same as existing area

Concrete bed and surround (150mm thick) to drain runs in trafficked areas with less than 1.2m cover.






Storage:
Existing drainage is 13.88 L/Sec. Proposed discharge to be 30% less than existing in order to comply with Brownfield development guidelines
New proposed discharge 9.71 L/Sec.

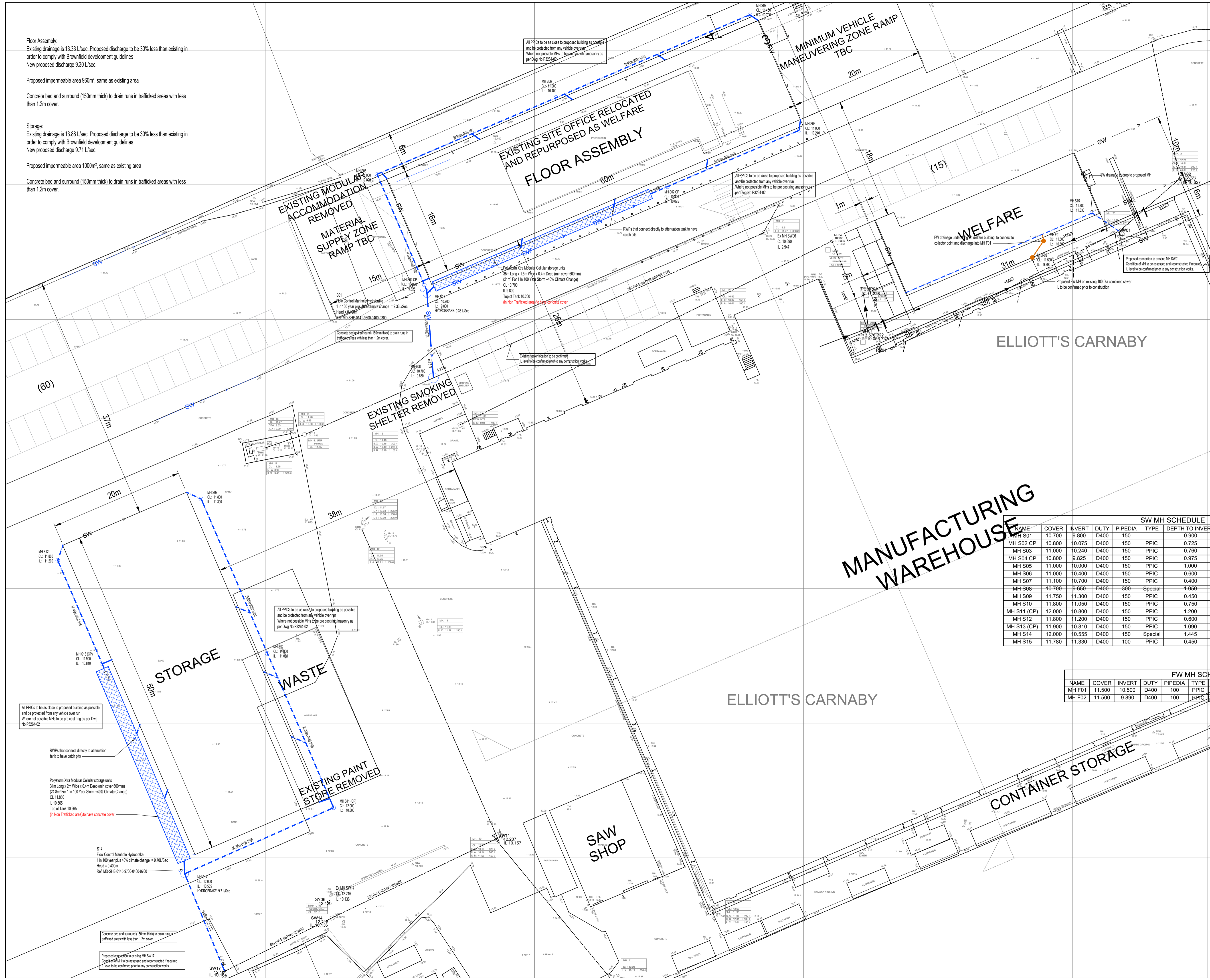
Proposed impermeable area 1000m², same as existing area

Concrete bed and surround (150mm thick) to drain runs in trafficked areas with less than 1.2m cover.

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- All dimensions & levels to be checked by the contractor prior to commencement of work, any discrepancy shall be reported immediately to Avie Consulting Ltd
- All work shall be carried out in accordance with Local Authority, statutory authority, health & safety requirements and regulations.
- The drawings shall be read in accordance with all other contract documents relevant at that time of issue and during the period of the contract.
- The contractor must ensure the overall stability of the works is adequate at all stages of the construction.
- No allowance has been made for cutouts, holes, notches, etc. for services. All of these are to be agreed prior to the start of the works.

KEY:
 PROPOSED SURFACE WATER DRAIN
 PROPOSED FOUL WATER DRAIN
 EXISTING SW DRAIN
 EXISTING FOUL DRAIN
 EXISTING COMBINED DRAIN



ELLIOTT'S CARNABY

MANUFACTURING WAREHOUSE

ELLIOTT'S CARNABY

CONTAINER STORAGE

SAW SHOP

SW MH SCHEDULE

NAME	COVER	INVERT	DUTY	PIPEDIA	TYPE	DEPTH TO INVERT	DEPTH TO SOFFIT	Diameter	HYDROBRAKE
MH S01	10.700	9.800	D400	150	PPIC	0.900	0.750	1.200	9.33 L/Sec
MH S02 CP	10.800	10.075	D400	150	PPIC	0.725	0.575	0.600	
MH S03	11.000	10.240	D400	150	PPIC	0.760	0.610	0.600	
MH S04 CP	10.800	9.825	D400	150	PPIC	0.975	0.825	0.600	
MH S05	11.000	10.000	D400	150	PPIC	1.000	0.850	0.600	
MH S06	11.000	10.400	D400	150	PPIC	0.600	0.450	0.600	
MH S07	11.100	10.700	D400	150	PPIC	0.400	0.250	0.600	
MH S08	10.700	9.650	D400	300	Special	1.050	0.750	1.500	
MH S09	11.750	11.300	D400	150	PPIC	0.450	0.300	0.600	
MH S10	11.800	11.050	D400	150	PPIC	0.750	0.600	0.600	
MH S11 (CP)	12.000	10.800	D400	150	PPIC	1.200	1.050	0.600	
MH S12	11.800	11.200	D400	150	PPIC	0.600	0.450	0.600	
MH S13 (CP)	11.900	10.810	D400	150	PPIC	1.090	0.940	0.600	
MH S14	12.000	10.555	D400	150	Special	1.445	1.295	1.200	9.7 L/Sec
MH S15	11.780	11.330	D400	100	PPIC	0.450	0.350	0.600	

FW MH SCHEDULE

NAME	COVER	INVERT	DUTY	PIPEDIA	TYPE	DEPTH TO INVERT	DEPTH TO SOFFIT	Diameter
MH F01	11.500	10.500	D400	100	PPIC	1.000	0.900	0.600
MH F02	11.500	9.890	D400	100	PPIC	1.610	1.510	0.600

C01	Construction Issue	P.A.S.	P.A.S.	01/04/2021
B	Check dimensions added	P.A.S.	P.A.S.	31/03/2021
A	Updated and revised to match proposed building positions and sizes	P.A.S.	P.A.S.	30/03/2021
0	Initial issue	P.A.S.	P.A.S.	28/03/2021
Rev	Details	By	Chk	Date

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Client: Elliott Off-Site Solutions

Project: Carnaby Manufacturing Site Improvements

Title: Proposed Drainage Layout

Drawn: P.A.S. Checked: S.A.B. Date: Mar 2021 Scale: 1:250 Original Dwg size: A1

Drawing Number: FACT-AVE-ZZ-XX-DR-D-00001 Rev: C01