



LINK LOGISTICS PARK ELLESMERE PORT, CHESHIRE

FLOOD RISK ASSESSMENT & DRAINAGE STATEMENT



*Shepherd Gilmour Infrastructure Ltd,
3rd Floor Phoenix House,
45 Cross Street,
Manchester, M2 4JF*



Report Title: Link Logistics Park, Ellesmere Port, Cheshire
Flood Risk Assessment & Drainage Statement


Client: Firethorn Developments Limited

Report Status: Version: Rev 04

Date of First Issue: 05.02.2021

Date of Last Issue: 10.03.2021

Prepared by: _____
Dean O'Reilly BSc (Hons)

Checked & Approved: 

Version	Date	Initials	Comments
01	05.02.2021	JJ	First Issue
02	15.02.2021	JJ	Second Issue
03	26.02.2021	DOR	Third Issue
04	10.03.2021	DOR	Layout updated



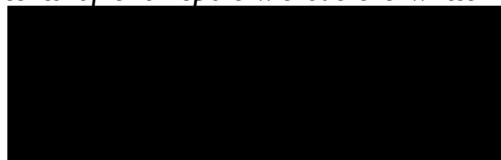
Limitations

All findings, recommendations and conclusions contained in this report are based on information provided to us during investigations. Shepherd Gilmour Infrastructure Ltd. has created the report based on the assumption that all the information is accurate and accepts no liability should additional information exist or become available.

Unless otherwise requested by the client, Shepherd Gilmour Infrastructure Ltd. is not obliged to and disclaims any obligation to update the report for events taking place after the date noted on the report.

Shepherd Gilmour Infrastructure Ltd. makes no representation whatsoever concerning the legal significance of its findings or the legal matters referred to in the report. The information presented and conclusions drawn are based on statistical data and are for guidance purposes only. The study provides no guarantee against the flooding of the study site or elsewhere, nor of the absolute accuracy of water levels, flow rates, and associated probabilities.

This report has been prepared for the sole use of the client. No other third parties may rely upon or reproduce the contents of this report without the written permission of Shepherd Gilmour Infrastructure Ltd.



CONTENTS

Contents.....	4
List of Tables	4
List of Figures.....	5
List of Appendices.....	6
SECTION 1 SITE INVESTIGATION	7
INTRODUCTION	7
EXISTING SITE DESCRIPTION	7
PROPOSED SITE LAYOUT	8
SECTION 2 POTENTIAL SOURCES OF FLOODING	10
FLUVIAL/TIDAL FLOOD RISK.....	10
CANAL FLOOD RISK.....	13
GROUNDWATER FLOOD RISK.....	13
ARTIFICIAL WATERBODIES.....	14
PLUVIAL RUNOFF.....	15
CRITICAL DRAINAGE AREA	15
FLOOD RISK OVERVIEW	16
SECTION 3 FLOOD RISK ANALYSIS	18
GROUNDWATER FLOODING.....	18
PLUVIAL FLOODING.....	18
SECTION 4 FLOOD ZONE REQUIREMENTS.....	19
SECTION 5 EXISTING DRAINAGE INFORMATION	21
PUBLIC SEWERS	21
PRIVATE DRAINAGE.....	22
PREDEVELOPMENT ENC.....	22
SECTION 6 SUSTAINABLE DRAINAGE STRATEGY	23
PROPOSED RUNOFF DESTINATION.....	24
SUSTAINABLE DRAINAGE TECHNIQUES.....	25
CLIMATE CHANGE ALLOWANCE	26
SECTION 7 SURFACE WATER TREATMENT	28
CIRIA REPORT C753.....	28
PRELIMINARY RUNOFF TREATMENT.....	28
SECTION 8 PRELIMINARY DRAINAGE STRATEGY.....	31
SURFACE WATER STRATEGY.....	31
FOUL WATER STRATEGY	32
SECTION 9 FUTURE DRAINAGE MAINTENANCE	34
SECTION 10 CONCLUSION.....	36
LIST OF TABLES	
TABLE 2.1 POTENTIAL SOURCES OF FLOODING OVERVIEW	17

TABLE 4.1 FLOOD RISK CLASSIFICATION (NPPF).....	19
TABLE 6.1 EXISTING SITE ANALYSIS.....	23
TABLE 6.2 WALLINGFORD PROCEDURE VOLUME 3 VARIABLES.....	23
TABLE 6.3 RETURN PERIOD RAINFALL INTENSITY.....	23
TABLE 6.4 EXISTING PEAK RUNOFF RATES.....	24
TABLE 6.5 PROPOSED PEAK RUNOFF RATES.....	24
TABLE 6.6 SOIL CLASSIFICATION.....	25
TABLE 6.6 SUDS TECHNIQUES.....	26
TABLE 6.7 RECOMMEND CLIMATE CHANGE GUIDANCE (EA).....	27
TABLE 7.1 POLLUTION HAZARD INDICES (CIRIA C753).....	28
TABLE 7.2 PROPOSED MITIGATION INDEX: INDUSTRIAL ROOFS (CIRIA C753).....	29
TABLE 7.3 PROPOSED MITIGATION INDEX: SERVICE YARD/ROADS (CIRIA C753).....	29
TABLE 7.4 PROPOSED MITIGATION INDEX: CAR PARKS (CIRIA C753).....	30
TABLE 8.1 EA RIVACRE BROOK 2007 DATA (ENVIRONMENT AGENCY).....	31
TABLE 8.2 EA MSC 2010 DATA (ENVIRONMENT AGENCY).....	32
TABLE 9.1 SUDS MAINTENANCE MANAGEMENT.....	35

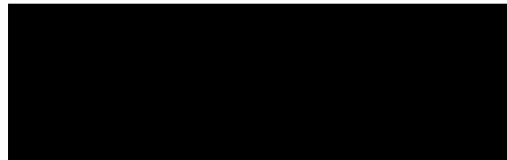
LIST OF FIGURES

FIGURE 1.1 SITE LOCATION (GOOGLE MAPS).....	8
FIGURE 1.2 ILLUSTRATIVE MASTERPLAN (AEW ARCHITECTS).....	9
FIGURE 2.1 FLOOD MAP FOR PLANNING (GOV.UK).....	10
FIGURE 2.2 SFRA FLUVIAL/TIDAL FLOOD MAP (SFRA).....	11
FIGURE 2.3 FLOOD MAP (ENVIRONMENT AGENCY).....	12
FIGURE 2.4 OS MAP OVERLAY (NATIONAL LIBRARY OF SCOTLAND).....	13
FIGURE 2.5 GROUNDWATER FLOOD MAP (MAGIC).....	14
FIGURE 2.6 RESERVOIR FLOOD [REDACTED].....	15
FIGURE 2.7 PLUVIAL FLOOD R [REDACTED].....	16
FIGURE 5.1 SEWER RECORDS ([REDACTED]).....	21
FIGURE 5.1 AS BUILT DRAINAGE [REDACTED].....	22
FIGURE 7.1 TYPE C NON INFILTRATION PAVEMENT CONSTRUCTION.....	30
FIGURE 8.1 ENVIRONMENT AGENCY NODE POINTS.....	32



LIST OF APPENDICIES

APPENDIX A	TOPOGRAPHICAL SURVEY
APPENDIX B	ARCHITECT PROPOSALS
APPENDIX C	UNITED UTILITIES RECORDS
APPENDIX D	AS BUILT DRAINAGE
APPENDIX E	PRELIMINARY SW DRAINAGE LAYOUT
APPENDIX F	ENVIRONMENT AGENCY DATA



SECTION I SITE INVESTIGATION

INTRODUCTION

- I.1. Shepherd Gilmour Infrastructure Ltd (SGi) has been engaged by Ma6nitude Land LLP to prepare a Flood Risk Assessment and Drainage Statement in support of a planning application for a site known as Link Logistics Park in Ellesmere Port.
- I.2. The Flood Risk Assessment has been prepared in accordance with the Flood Risk and Coastal Change Planning Practice Guidance (PPG) and the National Planning Policy Framework (NPPF). It contains information from sources such as the Environment Agency (EA), Local Sewerage Undertaker, District Council and Site Owner.
- I.3. The Drainage Statement has been prepared in line with the Non-Statutory Technical Standards for Sustainable Drainage (NSTSSD) and CIRIA Report C753. It also defines the outline proposal for the disposal of surface runoff and foul effluent from the site.

EXISTING SITE DESCRIPTION

- I.4. The proposed development site (PDS) is centred on National Grid reference SJ 338914, 378594 and spans approximate area of 17.35 hectares. The PDS is located 2km to the north west of Ellesmere Port town centre between the M53 and the Manchester Ship Canal with the Mersey Estuary beyond.
- I.5. Access to the site [REDACTED] 53 via Netherpool Road and North Road which [REDACTED] site. North Road also provides access to the industrial premises to the south east.
- I.6. The site was formerly occupied by the Bridgewater Mill which closed in February 2012 with the buildings having since been demolished. The only remaining structures on site are the former office building, built in the mid 1990's, and the mill water tower located adjacent to North Road.
- I.7. The site has been levelled and remains covered in hardstanding and crushed concrete with occasional scrubby vegetation over much of the area. Ground conditions become overgrown towards the north west boundary and extend into the Rivacre Brook valley.
- I.8. A copy of the latest topographical survey has been included within **Appendix A**.



Figure I.1 Site Location (Google Maps)

PROPOSED SITE LAYOUT

- I.9. The client’s proposals are for three new industrial units which vary in size. Each of the units will also have their own associated service yards, car parking and landscaping.
- I.10. A copy of the architect’s current masterplan has been included within **Appendix B**.

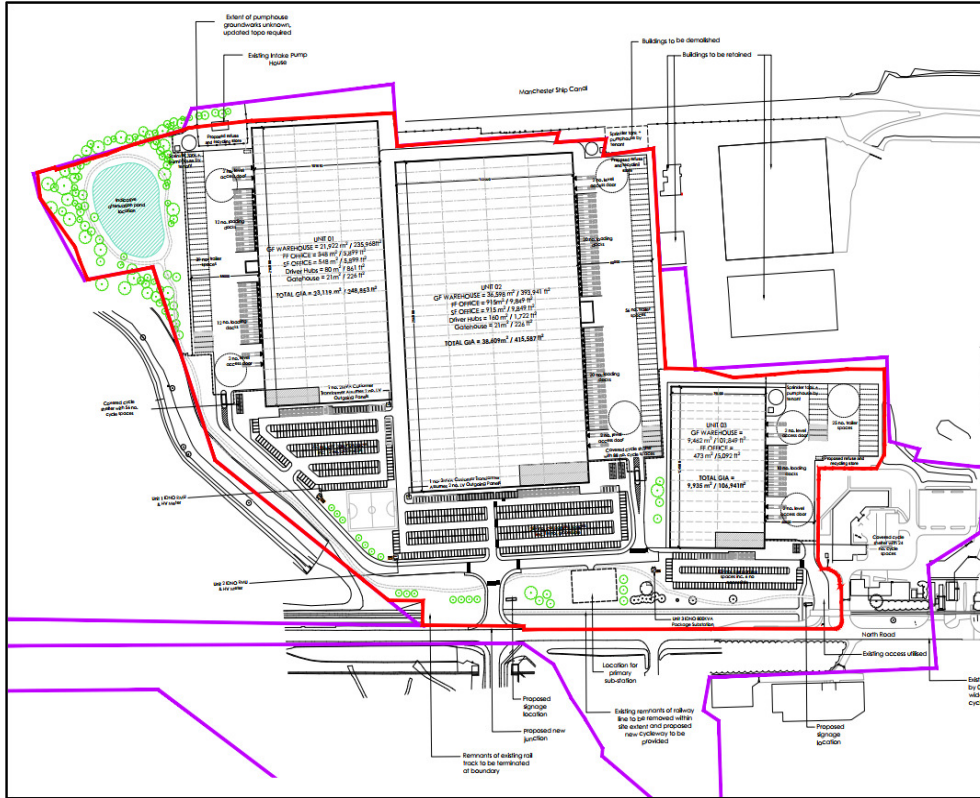
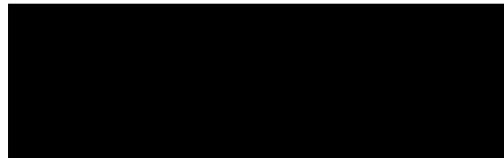


Figure 1.2 Illustrative Masterplan (AEW Architects)



SECTION 2 POTENTIAL SOURCES OF FLOODING

2.1. There are several sources of flooding which could impact a site. The risk of flooding from these potential sources onto the Proposed Development Site (PDS) has been explored in this section;

- Fluvial/Tidal,
- Ground Water,
- Artificial Waterbodies (canals, reservoirs etc) and,
- Pluvial.

2.2. The sources of flooding which could potentially impact the PDS are discussed in detail within **Section 3 & 4** along with their associated mitigation measures.

FLUVIAL/TIDAL FLOOD RISK

Gov.UK Website

2.3. The Gov.UK website provides a flood risk service which allows for a PDS to be quickly checked against an online fluvial/tidal flood map. This map indicates that the site is at low risk and an abstract has been shown below in **Figure 2.1**.

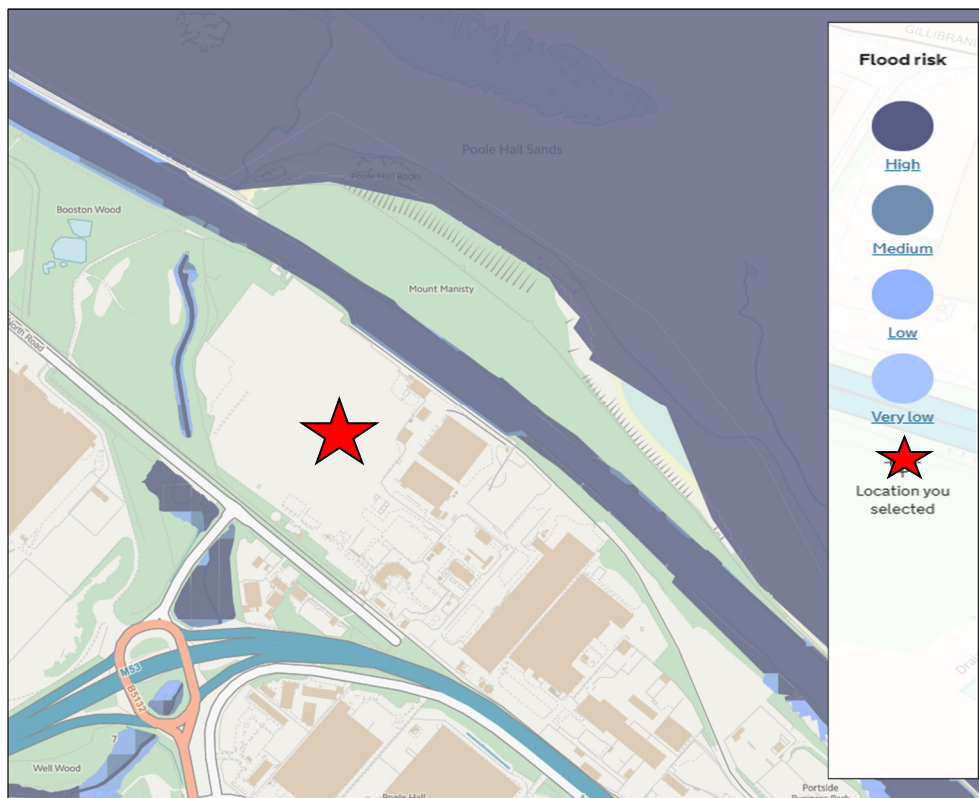


Figure 2.1 Flood Map for Planning (Gov.UK)

Strategic Flood Risk Assessment

- 2.4. The NPPF requires Local Planning Authorities to produce Strategic Flood Risk Assessments in support of their Local Plan. These form the basis for preparing appropriate policies for flood risk management within the area and provide the framework for assessing areas of developable land.
- 2.5. The PDS is within the SFRA for Ellesmere Port and Neston and was produced by Faber Maunsell in June 2008. The SFRA maps indicates that the PDS is in Flood Zone 1.

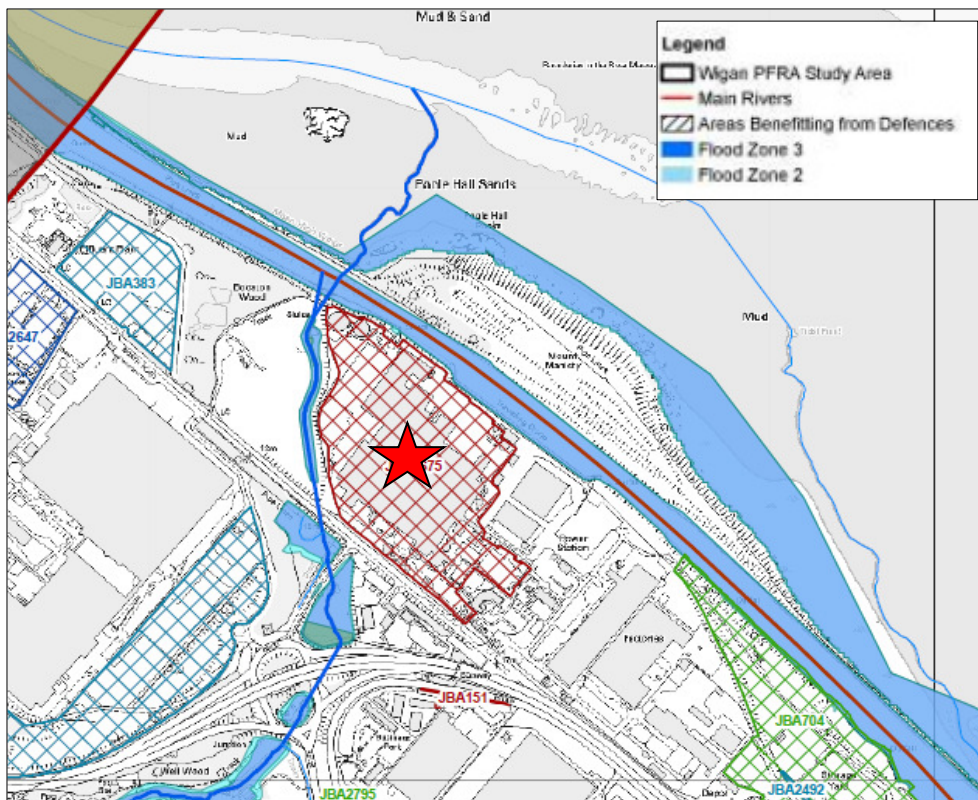


Figure 2.2 SFRA Fluvial/Tidal Flood Map (SFRA)

Environment Agency

- 2.6. According to the Environment Agency (EA) flood search the PDS is located within Flood Zones 1. An abstract of this EA Flood Map has been shown below in **Figure 2.3**.

- *Flood Zone 1 – Low Probability*

Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)

- *Flood Zone 2 – Medium Probability*

Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)

- **Flood Zone 3 – High Probability**

Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)

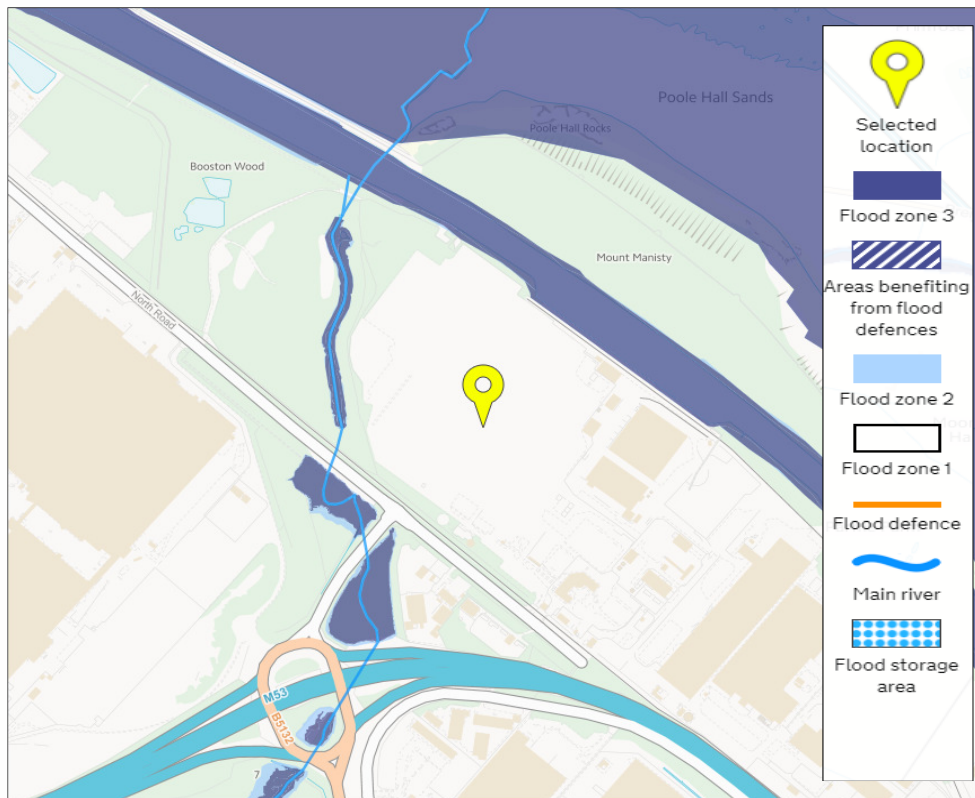


Figure 2.3 Flood Map (Environment Agency)

Ordinary Watercourse

2.7. Ordinary watercourses do not form part of a 'main river' and can consist of rivers, ditches, swales, drains etc. These watercourses are the responsibility of the riparian owner who must ensure that:

- *Flows can pass freely without obstruction, pollution or diversion (affecting the rights of others).*
- *The banks and bed of the watercourse are maintained (including vegetation).*
- *Any approved onsite watercourse structures are maintained.*

2.8. There is no data available (historic/present) to suggest that there are any ordinary watercourses onsite.



Figure 2.4 OS Map Overlay (National Library of Scotland)

CANAL FLOOD RISK

- 2.9. Most of the canals in England and Wales are owned, maintained, and operated by the Canal & River [REDACTED] within the canal is usually maintained/regulate [REDACTED] a breach or overtopping is unlikely, the potent [REDACTED]
- 2.10. The closest canal to the PDS is the Manchester Ship Canal (MSC). This canal forms the north eastern boundary of the site and is owned/maintained by Peel Ports. The topographical survey indicates that the canal on average is around 6.0m AOD which is 8m lower than the PDS.
- 2.11. The risk to the PDS from a potential breach therefore would be considered very low.

GROUNDWATER FLOOD RISK

- 2.12. Unlike flooding from rivers and the sea, groundwater does not pose a significant risk to life. It is more associated with damage to the building, due to the flooding persisting over several weeks.
- 2.13. The Department for Environment, Food, and rural Affairs MAGIC map (**Figure 2.5**). Indicates that the PDS is at medium to low risk of groundwater flooding.

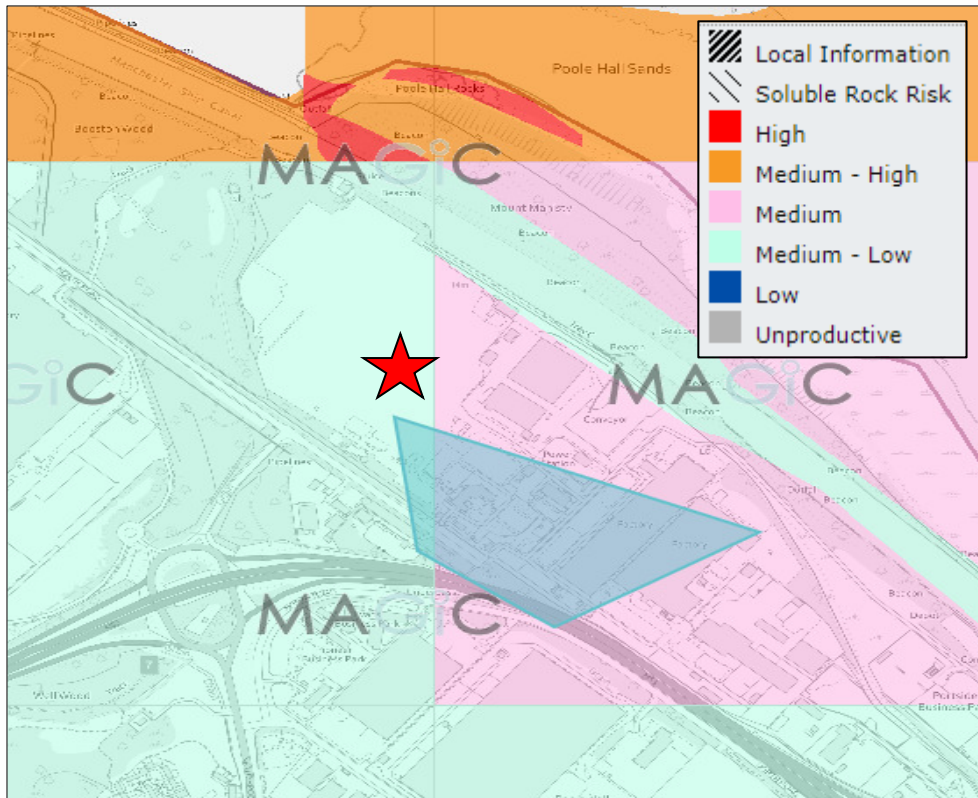


Figure 2.5 Groundwater Flood Map (MAGIC)

ARTIFICIAL WATERBODIES

- 2.14. The reservoirs in the area are owned and operated by Yorkshire Water and are covered by the Reservoirs [REDACTED] of a catastrophic dam failure occurring is relatively [REDACTED] event are severe.
- 2.15. Reservoir flood plans are still required and are prepared by their owners. These documents are considered sensitive due to national security and only indicative plans are made available by the Environment Agency/Gov.UK.
- 2.16. The indicative reservoir flood plan (**Figure 2.6**) indicates that the PDS is outside of associated flood risk during a possible breach.

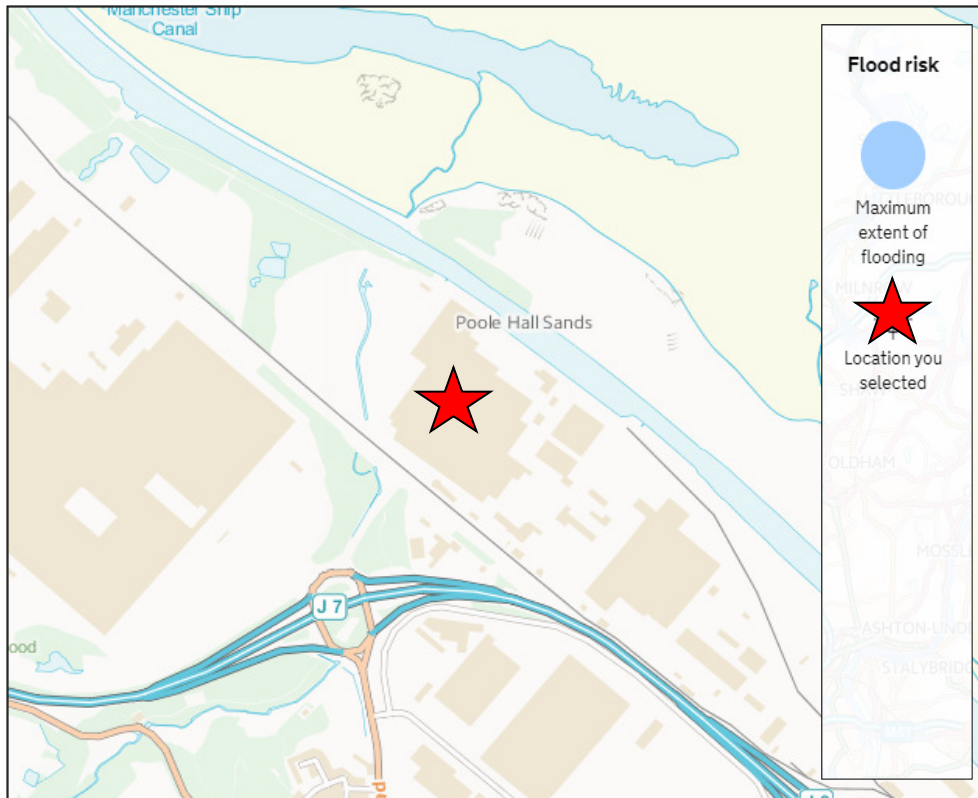


Figure 2.6 Reservoir Flood Risk Map (Gov.UK)

PLUVIAL RUNOFF

- 2.17. Pluvial flooding is defined as ‘flooding from rainfall generated overland flow before the runoff enters any [REDACTED] associated with high-intensity rainfall events but [REDACTED] events when the ground is saturated/frozen or [REDACTED]’
- 2.18. The maps provided within the SFRA and Gov.UK (**Figure 2.7**) indicates that most of the site is at very low risk. But there are some small, isolated areas of medium-high risk onsite.

CRITICAL DRAINAGE AREA

- 2.19. Critical Drainage Areas (CDA) are areas that are particularly sensitive to an increase in surface water runoff, either as direct overland flow or from the existing sewer network.
- 2.20. There is no information available to confirm if the PDS lies within a CDA.

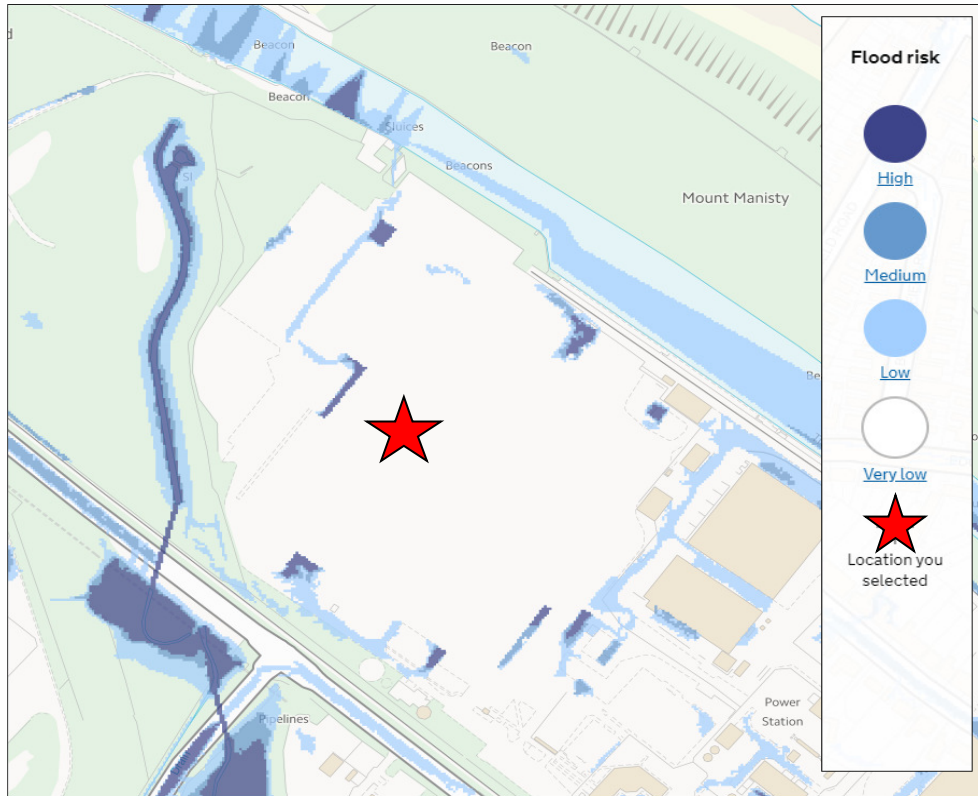


Figure 2.7 Pluvial Flood Risk Map (Gov UK)

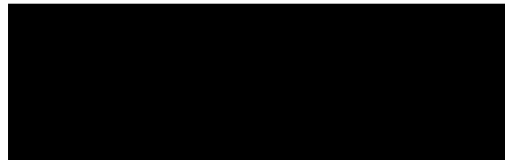
FLOOD RISK OVERVIEW

2.21. The potential sources of flooding which could be experienced have been summarised in **Table 2.1**. Those [redacted] the site have been investigated further in **Section** [redacted] measures.

Source of Flooding	Potential Flood Risk					Site Description
	High	Medium	Low	Very Low or Negligible	Information Not Available	
Fluvial/Tidal			X	X		The Environment Agency maps indicate that the onsite risk varies between Zone 1.
Canal				X		A potential breach would be unlikely to affect the PDS due to the topography.
Ground Water		X	X			The SFRA considers the area to be low to medium risk.

Artificial Waterbodies				X		In the event of a breach, the PDS is located outside of any flood risk area.
Pluvial Runoff	X	X	X			The Gov.UK Maps identifies that the site is at low to high risk of surface flooding.
Critical Drainage Areas					X	No information available.

Table 2.1 Potential Sources of Flooding Overview



SECTION 3 FLOOD RISK ANALYSIS

GROUNDWATER FLOODING

- 3.1. The Defra MAGIC maps in **Section 2** indicated that the PDS was at low to medium risk of ground water flooding. These maps provide a good insight into what could be encountered but are not detailed enough to form any conclusions.
- 3.2. The risk of groundwater flooding to the PDS is expected to be low after the site has been reprofiled (externals fall away from the buildings etc). The risk, however, will be confirmed once the intrusive site investigation has been carried out.

Groundwater Flood Risk = To be confirmed

PLUVIAL FLOODING

- 3.3. The Gov.UK Maps in **Section 2** indicates that the PDS was at risk of pluvial flooding. These maps, however, are based solely on LIDAR data and purely highlight low spots and/or depressions where runoff may gather.
- 3.4. A review of the topographical survey confirms that the areas identified at risk are low spots/holding tanks and will be removed by the development proposals.

Mitigation Measures 1

- 3.5. The proposed Finished Floor Level (FFL) should be raised by a minimum of 150mm above the surrounding ground level. If raising the FFL is not possible, then the following measures should be implemented at the detailed design stage.
 - External levels plan to indicate how surface water runoff is directed away from sensitive areas or intercepted by runoff-capturing devices.
 - A detailed surface water drainage design that shows all necessary storm periods can be adequately catered for below ground.

Mitigation Measures 2

- 3.6. The surface water drainage for the PDS must be designed to cater for all storm events up to and including the 100-year plus climate change event. This will reduce the risk of pluvial flooding onsite/offsite.

Pluvial Flood Risk = Low risk after redevelopment

SECTION 4 FLOOD ZONE REQUIREMENTS

4.1. Based on the information currently available the PDS is in Flood Zone 1.

- *Flood Zone 1 Low Probability - Land having a less than 1 in 1,000 annual probability of river or sea flooding.*

Proposed Development Type

4.2. In accordance with the National Planning Policy Framework Practice Guidance on flooding, less vulnerable types of development are permitted within Flood Zones 1.

Flood Zone	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1	✓	✓	✓	✓	✓
2	✓	Exception Test Required	✓	✓	✓
3a	Exception Test Required	x	Exception Test Required	✓	✓
3b	Exception Test Required	x	x	x	✓

Key: ✓ Development is appropriate x Development should not be permitted

Table 4.1 Flood Risk Classification (NPPF)

Sequential Test

4.3. Not applicable in Flood Zone 1.

Exception Test

4.4. Not applicable in Flood Zone 1.

Local Authority Policy Aims

4.5. In this zone developers and Local Authorities should still seek opportunities to reduce the overall level of flood risk in the area through the layout design and form of development and the appropriate application of sustainable drainage techniques.

4.6. The proposed sustainable drainage techniques along with an outline drainage strategy are discussed in detail in **Section 6 & 7**.

Finished Floor Level Restrictions

4.7. Not applicable in Flood Zone 1.

Flood Compensation

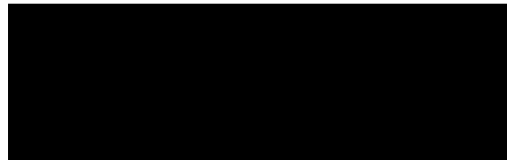
4.8. Not applicable in Flood Zone 1.

Flood Resilient Construction

4.9. Not applicable in Flood Zone I.

Safe Access and Egress

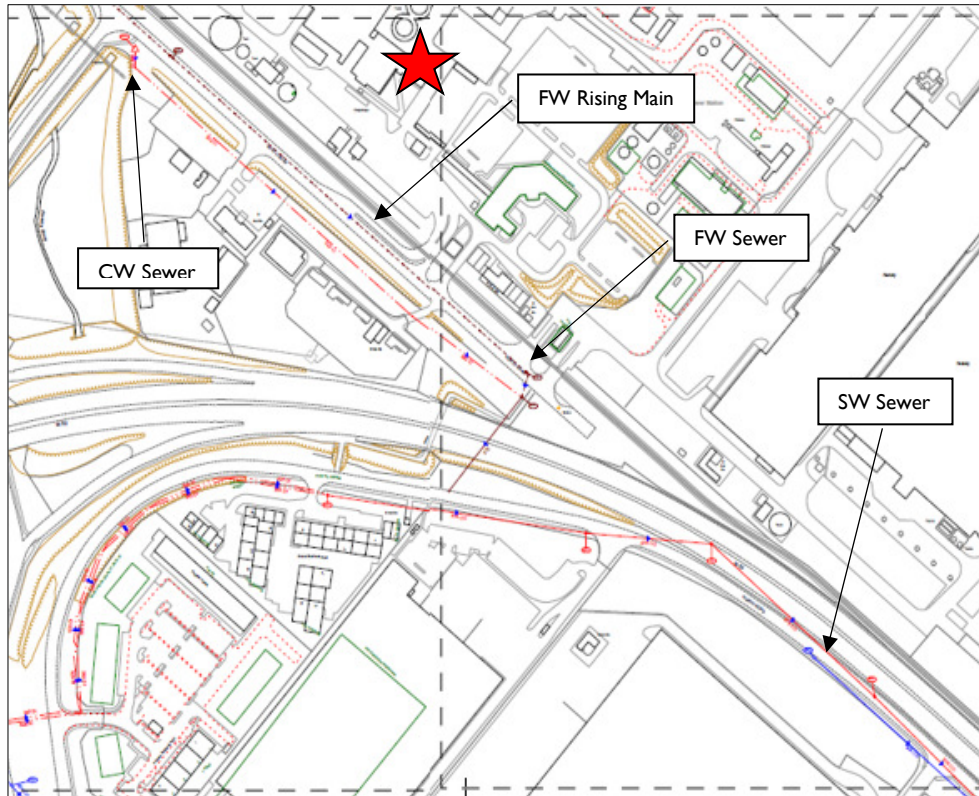
4.10. Not applicable in Flood Zone I.



SECTION 5 EXISTING DRAINAGE INFORMATION

PUBLIC SEWERS

- 5.1. The public sewers in the area are owned and maintained by United Utilities (UU). A copy of their sewer records has been included within **Appendix C**.



es)

Surface Water Sewers

- 5.2. The nearest surface water sewer to the PDS is 300m to the southeast.

Foul Water Sewers

- 5.3. The nearest foul water sewer to the PDS is 150m to the southeast. There is also a rising main within North road, but this is a sealed system and not accessible.

Combined Water Sewers

- 5.4. The nearest combined water sewer is 60m to the southeast and connections to a pumping station.

Sewer Diversions

- 5.5. None required. There are no public sewers identified on the site.

PRIVATE DRAINAGE

As Built Plans

- 5.6. The previous owner of the site has provided as built drainage plans for the Bridgewater Mill. These plans showed that the existing site was served by three surface water outfalls and one foul water outfall.
- 5.7. The as built records also confirmed that 6.5ha of the site discharged to the MSC (approx 43%) where as 8.5ha discharged to Rivacre Brook (57%). The condition of the existing drainage outfalls post demolition is unknown and will require further investigation during the detailed design stage.
- 5.8. A copy of the as built records has been included within **Appendix D**.

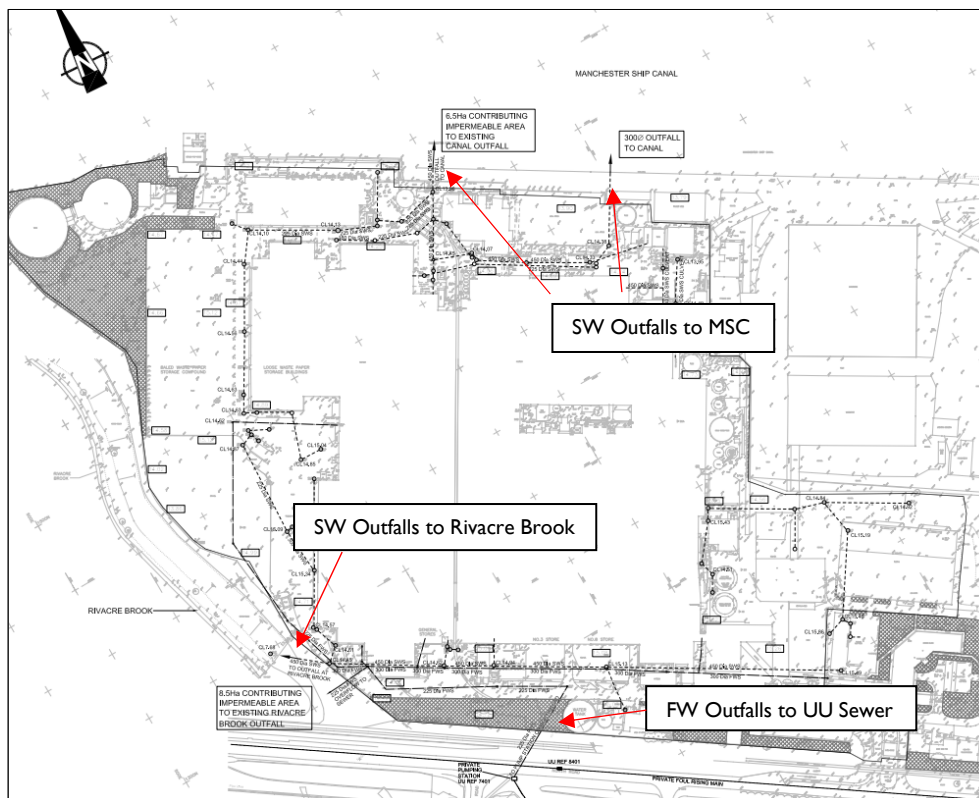


Figure 5.1 As Built Drainage Records (Lees Roxburgh)

PREDEVELOPMENT ENQUIRY

- 5.9. A predevelopment enquiry has been submitted to UU and a copy of their response is included within **Appendix C**. The response in summary confirms;
- *The foul water effluent can connect to the UU's pump station via the existing 225mm stub,*
 - *The surface water runoff cannot discharge to UU's network,*
 - *The surface water runoff must utilise either infiltration and/or discharge to a waterbody.*

SECTION 6 SUSTAINABLE DRAINAGE STRATEGY

6.1. The general requirement set out by the NSSDS 2011 and NSTSSD 2015 technical documents is that ‘the development must not increase the risk of flooding elsewhere.’ In practical terms this means that the proposed runoff must provide an overall betterment or be equal to the calculated greenfield rate.

Existing Brownfield Runoff Rate

6.2. The Modified Rational Method has been used to calculate the existing runoff rate from the previous development. This method requires the existing impermeable area, an approximate time of concentration and the variables from the Wallingford Procedure.

	m ²	ha
Current Red Line Boundary	173500	17.350
Previous Development Size	15 ha	
Impermeable Ratio	90%	
Impermeable Area	135000	13.5

Table 6.1 Existing Site Analysis

Volume Wallingford Variables	Value
M5-60 minute rainfall depth	90mm
Ratio of M5-60 to M5-2 day rainfalls	0.38
Average Annual Rainfall (SAAR)	122mm
Winter Rain Acceptance Potential (SOIL)	Soil Type 4 (0.45)
Urban Catchment Wetness Index (UCWI)	80
Time of Concentration	5

Table 6.2 Wallingford Procedure Volume 3 Variables

Return Period (Years)	1	2	5	30	100
Rainfall Intensity (l/s)	46.87	59.72	77.11	109.47	135.32

Table 6.3 Return Period Rainfall Intensity

6.3. The peak flow rate as calculated by the Modified Rational Method is as follows:

$$Q_{\text{Brownfield}} \text{ (l/s)} = 2.78 \times C_v \times C_r \times R_i \times \text{Area}$$

Where; $PIMP = \text{Percentage of impermeable area} = 90\%$

$$P_r = 0.829 PIMP + 25 SOIL + 0.078 UCWI - 20.7 = 71.4$$

$$C_v = \text{Volumetric runoff coefficient} = \frac{Pr}{PIMP} = 0.793$$

$$C_r = \text{Routing coefficient (Urban Areas)} = 1.3$$

$$R_i = \text{Rainfall Intensity 1 Year} = 46.87$$

$$\text{Area} = \text{Impermeable Area} = 13.50$$

$$Q_{\text{Brownfield (l/s)}} = 2.78 \times 0.793 \times 1.3 \times 46.87 \times 13.50 = 19.00$$

Return Period (Years)	1	2	5	30	100
Peak Runoff Rate (l/s)	1813	2310	2983	4235	5235

Table 6.4 Existing Peak Runoff Rates

Proposed Runoff Rate

6.4. Redevelopments should aim for a 50% reduction (minimum) in surface water runoff for Brownfield sites. This reduction has therefore been applied to the existing peak runoff rate (**Table 6.5**) to confirm the permissible discharge rates for the PDS.

Return Period (Years)	1	2	5	30	100
Peak Runoff Rate (l/s)	1813	2310	2983	4235	5235
Proposed Betterment	-50%				
Permissible Peak Runoff Rate (l/s)	906.5	1155	1491.5	2117.5	2617.5

PROPOSED RUNOFF DESTINATION

Surface Water Hierarchy

6.5. Paragraph 080 of the Flood Risk and Coastal Change Guidance within the Planning Practice Guidance sets out the following hierarchy of surface water runoff destinations:

- i. Discharge into the ground (infiltration),
- ii. Discharge to a surface waterbody,
- iii. Discharge to a surface water sewer,
- iv. Discharge to a combined sewer.

Discharge into the ground

6.6. There are five bands of soil classes in England which roughly describe the infiltration potential of an area. It is derived from factors such as, soil permeability, topography, and the likelihood of impermeable layers.

6.7. The soil classification for the PDS is Type 4. This implies that the use of infiltration techniques to dispose of surface runoff is unlikely to be practical.

Soil	WRAP	Runoff	Soil Value	Soil Characteristics
1	Very High	Very Low	0.15	Sandy, well drained
2	High	Low	0.30	Intermediate soils (sandy)
3	Moderate	Moderate	0.40	Intermediate soils (silty)
4	Low	High	0.45	Clayey, poorly drained
5	Very Low	Very High	0.50	Steep, rocky areas

Table 6.6 Soil Classification

6.8. The use of infiltration onsite will also be prohibited by the previous site uses and the likelihood of contamination. This surface water destination has therefore been discounted.

Discharge to a surface water body

6.9. The surface water runoff from the previous site discharged to both the MSC and Riveacre Brook. These waterbodies then connected to the adjacent River Mersey estuary which is immediately downstream.

6.10. The PDS should consider [redacted] destinations but must be limited to the rates shown [redacted]

Discharge to a surface water sewer

6.11. Not applicable for this site.

Discharge to a combined sewer

6.12. Not applicable for this site.

SUSTAINABLE DRAINAGE TECHNIQUES

6.13. There are several SuDS techniques that are suitable for high and low-density developments. One or more of the techniques shown in **Table 6.6** could be included at the detailed design stage to provide the required reduction/betterment in flow rates.

6.14. Some of these techniques also provide some or all the required water quality treatment by removing, capturing or breaking down contaminants such as hydrocarbons, sediment and heavy metals

SuDS Technique		Proposed Development Suitability
Porous pavements	Description	Pavements constructed with porous paving can provide runoff storage within the sub-base and runoff treatment.
	Suitability	Potentially suitable for car parking areas with light-duty traffic. Suitability is subject to detailed drainage design, topography and infiltration rates.
Filter drains	Description	Granular filled linear trenches with a perforated pipe installed at the base.
	Suitability	Filter drains can be used along embankments/boundaries to prevent overland runoff from leaving the site.
Swales	Description	Relatively shallow naturally landscaped channels that convey and/or infiltrate the surface water runoff.
	Suitability	Could be used within the perimeter landscaped area. Suitability is subject to detailed design, topography and infiltration rates (if permitted).
Retention Ponds	Description	Partially filled permanent water bodies that have been designed to provide temporary surface water storage during critical events.
	Suitability	Suitable. But subject to detailed design.
Detention Basin	Description	Naturally vegetated depression. Designed to store surface water runoff on a temporary basis during critical events.
	Suitability	Suitable. But subject to detailed design.
Soakaways	Description	Drainage structures designed to store and infiltrate runoff into the
	Suitability	[REDACTED] in this development.
Green Roofs	Description	[REDACTED] runoff and increase times of concentration.
	Suitability	Not suitable for this type of development
Underground Storage	Description	Attenuation structures installed below ground to provide surface water storage.
	Suitability	Can be located under the car park/service yard areas. The type of structure would be confirmed during detailed design stage.

Table 6.6 SuDS Techniques

CLIMATE CHANGE ALLOWANCE

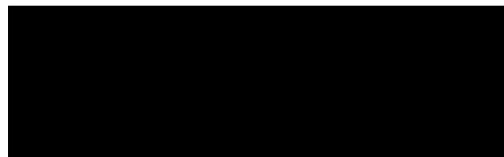
- 6.15. An allowance for climate change should be included at the detailed design stage to help minimize vulnerability and provide resilience to flooding. According to the Flood Risk Assessments: Climate Change Allowances **both** the 'Upper End' and 'Central' allowances should be assessed.

- 6.16. The ‘Central’ allowance should be applied to the underground surface water drainage network/design to assess its ability to contain critical events. Whilst the ‘Upper End’ allowance should be applied to evaluate the potential implications and to ensure that the flooding is wholly contained onsite.
- 6.17. The following climate change allowances should be applied to the proposed rainfall intensities during the detailed design stage.

- *Less Vulnerable Commercial Development +20% to +40% Allowance.*

Applies across all of England	Potential Change anticipated for the 2020's	Potential Change anticipated for the 2050's	Potential Change anticipated for the 2080's
Upper End	+10%	+20%	+40%
Central	+5%	+10%	+20%

Table 6.7 Recommend Climate Change Guidance (EA)



SECTION 7 SURFACE WATER TREATMENT

CIRIA REPORT C753

7.1. CIRIA Report C753 (The SuDS Manual) outlines the simple index approach which is a best practice design standard for managing the water quality of runoff. The pollution hazard index for different land uses/sources and has been reproduced below.

No.	Proposed Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro carbons
1	Residential roofs	Very Low	0.2	0.2	0.05
2	Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 – 0.8	0.05
3	Individual property driveways, residential car parks, low traffic roads (e.g. cul de sac, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. <300 traffic movements per day	Low	0.5	0.4	0.4
4	Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7

Table 7.1 (CIRIA Report C753)

7.2. Based on the development, the following SuDS components are applicable. The surface water runoff will therefore require at least one SuDS components, to sufficiently treat the runoff before it can be discharged offsite.

7.3. Where more than one SuDS component/technique is implemented there will be a reduced “performance factor” and the following formula must be applied.

$$\text{Total SuDS mitigation index} = \text{Mitigation component index} + 0.5 \times \text{Mitigation index of second component}$$

PRELIMINARY RUNOFF TREATMENT

7.4. The required runoff treatment will be confirmed during the detailed design stage. But based on the current masterplan there are four distinct runoff areas.

- Industrial Roof
- Service Yard
- Car Park

- Access Road

Industrial Roofs

7.5. We would suggest that runoff from the buildings is directed to a filter drain before discharging to the wider drainage network.

	TSS	Metals	Hydrocarbons
Pollution Hazard: No.2 Industrial Roof (See Table 7.1)	-0.3	-0.4*	-0.05
Proposed Mitigation 1: Filter Drain	+0.4	+0.4	+0.4
Total Pollution Mitigation	+0.1 (Adequate)	+0.0 (Adequate)	+0.35 (Adequate)

Table 7.2 Proposed Mitigation Index: Industrial Roofs (CIRIA C753)

*Assumed Figure - The potential for metal to leach from the roof should be assessed at the detailed design stage.

Service Yard & Access Roads

7.6. We would suggest that the runoff from the service yard areas is directed to a filter drain or treatment channels such as Hydro Filter Drain. The runoff can then discharge to the wider drainage network

	TSS	Metals	Hydrocarbons
Pollution Hazard: No.4 Service Yard (See Table 7.1)	-0.7	-0.6	-0.7
Proposed Mitigation 1: Filter Drain	+0.4	+0.4	+0.4
Total Pollution Mitigation I	-0.3 (Inadequate)	-0.2 (Inadequate)	-0.3 (Inadequate)
Proposed Mitigation 2: Hydro Internal Downstream Defender	(+0.5) +0.25	(+0.4) +0.2	(+0.8) +0.4
Total Pollution Mitigation I	-0.05 (Adequate)	+0.0 (Adequate)	+0.1 (Adequate)

Table 7.3 Proposed Mitigation Index: Service Yard/Roads (CIRIA C753)

7.7. Where possible the main access roads should aim to discharge to a swale rather than a filter drain. This will provide a betterment/further cleansing of the runoff before discharging to the watercourse (TSS 0.5, Metals 0.6, Hydrocarbons 0.6).

Car Parks

7.8. We would suggest that all the light duty car parks are formed with a permeable surface. The overall construction would need to be a Type-C System due to the ground conditions (non-infiltrating) and the runoff from the sub-base would discharge to drains.

	TSS	Metals	Hydrocarbons
Pollution Hazard: No.3 Non-Residential Car Parking (See Table 7.1)	-0.7	-0.6	-0.7
Proposed Mitigation I: Permeable Pavement	+0.7	+0.6	+0.7
Total Pollution Mitigation I	+0.0 (Adequate)	+0.0 (Adequate)	+0.0 (Adequate)

Table 7.4 Proposed Mitigation Index: Car Parks (CIRIA C753)

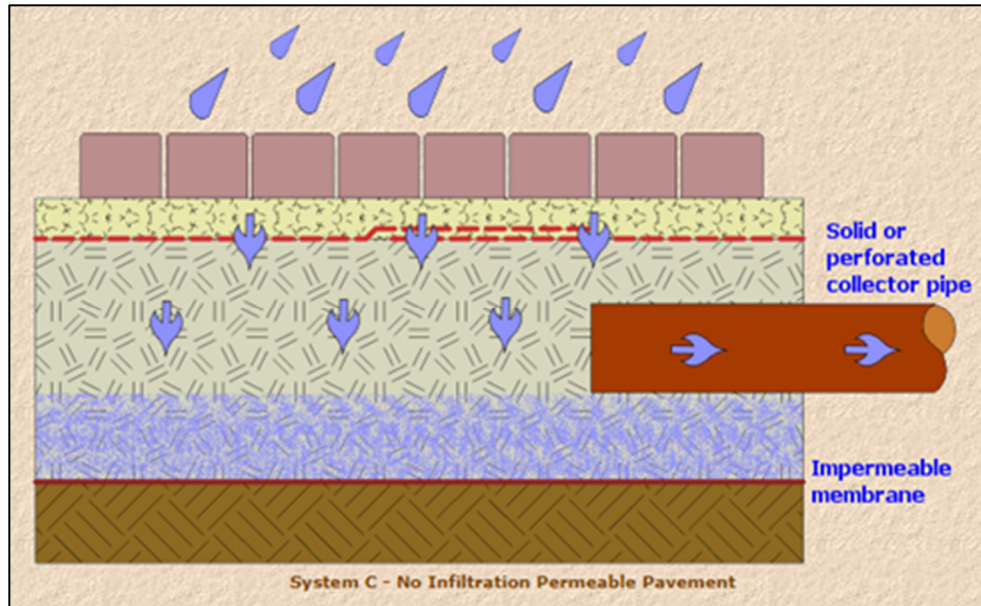


Figure 7.1 Type C Non Infiltration Pavement Construction

SECTION 8 PRELIMINARY DRAINAGE STRATEGY

- 8.1. A preliminary drainage strategy has been produced to identify any major issues that may affect the foul and surface water drainage for the proposed development. All recommendations are preliminary at this stage and should be developed/investigated further during the detailed design stage.
- 8.2. A preliminary drainage layout demonstrating the below strategy, utilising SuDS where possible, is included in **Appendix E**.

SURFACE WATER STRATEGY

- 8.3. A new underground drainage network will collect and convey the proposed development runoff towards the new/existing outfalls. Only clean/treated runoff will be permitted to discharge into the adjacent waterbodies, so an effective SuDS treatment is required (**Section 7**).
- 8.4. The discharge rate from the new PDS will be restricted to the rates shown in **Table 6.5** and will require excess runoff to be attenuated. The attenuation will likely be in the form of a new attenuation basin/pond in the northwest corner.
- 8.5. Based on the development proposal, we estimate that between 4000m³ and 6500m³ of storage will be required for a 100 year return period climate change event.

Outfall Velocity

- 8.6. The surface water [REDACTED] must be controlled to prevent downstream scouring or damage. The maximum velocity will be confirmed/approved by both the LLFA (Riveacre Brook) and Peel Ports (MSC) during the detailed design stage.

Submerged Outfall

- 8.7. During an extreme storm, the surface water outfalls could become submerged and cause flooding onsite. The following EA data provides estimated flood levels in which the proposed drainage network can be tested against.
- 8.8. The EA Data has been included within **Appendix F**.

Node/Event	Node 1	Node 2	Node 3
Undefended 100 Year	6.63	5.70	5.28
Undefended 1000 Year	7.46	5.96	5.35

Table 8.1 EA Rivacre Brook 2007 data (Environment Agency)

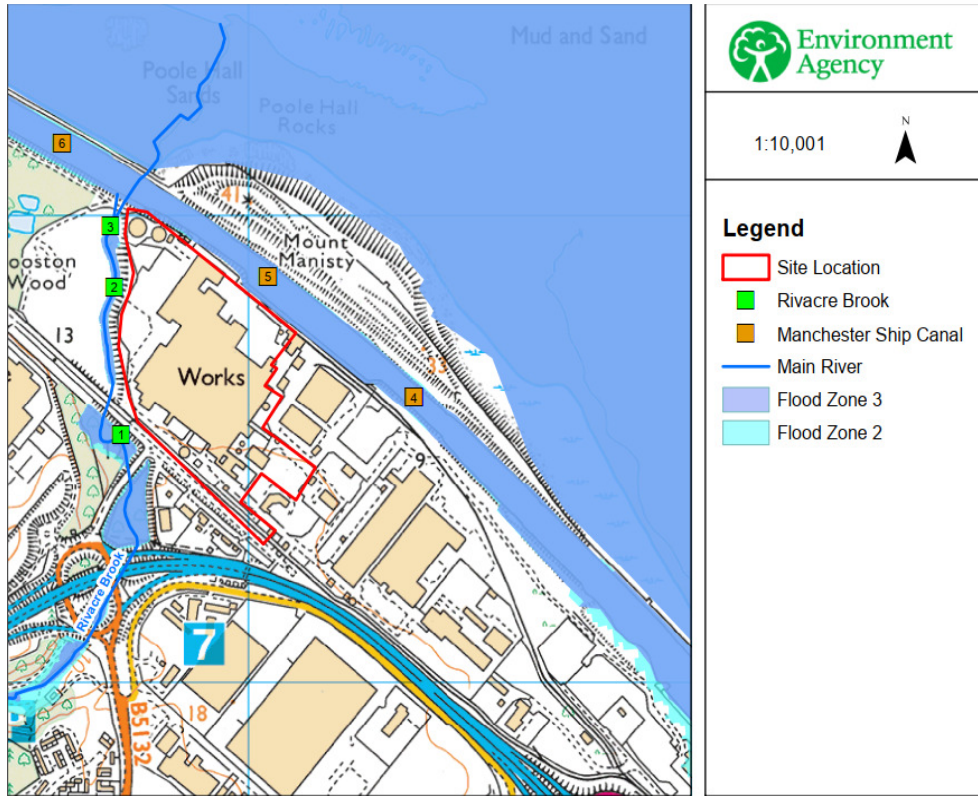


Figure 8.1 Environment Agency Node Points

Node/Event	Node 4	Node 5	Node 6
Defended 100 Year	4.62	4.63	4.61
Defended 1000 Year			6.79

Table (Agency)

FOUL WATER STRATEGY

Foul Water Drainage

8.9. A new underground drainage network(s) will collect and convey the foul effluent from the proposed units to the existing 225mm stub on North Road.

8.10. Depending upon the existing foul water invert level. There could be a need for a new onsite pumping station.

Foul Water Flows

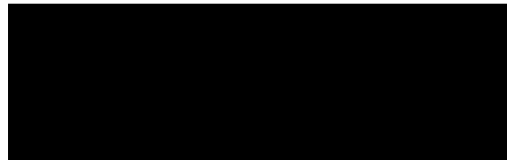
8.11. Sewers for Adoption 7th Edition recommends that drainage designs for Commercial developments should be based on 0.6 litres per second per hectare of developable land.

$$Q \text{ Foul Water (litres)} = 0.6 \text{ litres per second per hectare}$$

$$\text{Redline Boundary} = 17.4 \text{ ha}$$

$$Q \text{ Foul Water (l/s)} = 17.4 \times 0.6 = 10.44 \text{ l/s}$$

- 8.12. The proposed flow rate and any connection point must be agreed with United Utilities during the detailed design stage. Any proposed drainage should also be designed in accordance with Building Regulations Document H1 and Sewers for Adoption 7th Edition.



SECTION 9 FUTURE DRAINAGE MAINTENANCE

General Drainage Maintenance

9.1. The end-users will be provided with as-built plans to ensure that the private development drainage within their responsibility undergoes a regular maintenance regime (either as required or every 2-5 years). This includes, jetting, vacuumation and a visual/CCTV survey to check the structural condition of pipes and manholes.

SuDS Maintenance

9.2. The maintenance for the onsite SuDS elements will be split into the following sections and will be undertaken by an appointed Maintenance Company once the scheme/plot has been completed.

- *Regular (weeding/inspections/sweeping/litter removal/grass cutting),*
- *Occasional (sediment removal/vacuum brushing) and*
- *Remedial maintenance (repair and replacement).*

9.3. The Maintenance Company will be employed by the end user of the site and will be provided an Operation and Maintenance manual. This manual will outline the location(s) of any drainage infrastructure and detail the maintenance that is required. It will also include the associated maintenance that should be carried out.

9.4. Records must be maintained by the Maintenance Company and the end user for any maintenance works undertaken and must be available for inspection when requested.

Site Specific SuDS elements

9.5. The design of the onsite surface water drainage networks will be carried out during the detailed design stage. But we envisage that the design will include the following SuDS elements.

- *Ponds / Detention Basins,*
- *Filter Drains,*
- *Cellular Storage,*
- *Porous Paving,*
- *Swales and*
- *Proprietary System; Petrol Interceptors, Downstream Defenders*

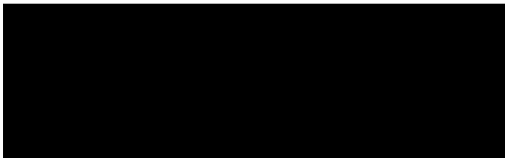
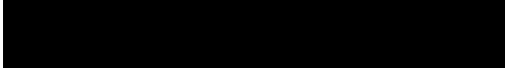
9.6. The maintenance required for each of the SuDS elements is shown below in **Table 9.1**

Operation and Maintenance Activity	Suds Component												
	Pond	Wetland	Detention Basin	Infiltration Basin	Soakaway	Infiltration Trench	Filter Drain	Cellular Storage	Permeable Pavement	Swales	Filter Strip	Green Roof	Proprietary Systems
Regular Maintenance – Monthly Basis													
Inspection	●	●	●	●	●	●	●	●	●	●	●	●	●
Litter and debris removal	●	●	●	●	○	●	●	○	●	●	●		○
Grass cutting	●	●	●	●	○	●	●	○	○	●	●		
Weed and invasive plant control	○	○	○	○		○	○		○		○	●	
Shrub management	○	○	○	○					○	○	○		
Shoreline vegetation management	●	●	○										
Aquatic vegetation management	[REDACTED]												
Occasional Maintenance – Annually or as required													
Sediment management	[REDACTED]												
Vegetation replacement	○	○	○	○						○	○	●	
Vacuum sweeping and brushing									●				
Remedial Maintenance – As required													
Structure rehabilitation/repair	○	○	○	○	○	○	○	○	○	○	○	○	
Infiltration surface reconditioning				○	○	○	○		○	○	○		

● Will be required ○ May be required

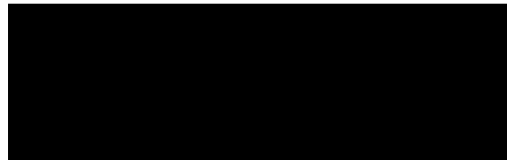
Table 9.1 SuDS Maintenance Management

SECTION 10 CONCLUSION

- 10.1. A Flood Risk Assessment is required to satisfy all requirements of the National Planning Policy Framework (NPPF) and the Flood Risk and Coastal Change Planning Practice Guidance (PPG).
- 10.2. This FRA as far as reasonably practical; determines the potential flood risk associated with the site and has concluded the following:
- a) The proposed development site is located within Flood Zone 1 (low risk)
 - b) The line and level of the existing drainage connection/outfalls (surface & foul) should be confirmed during the detailed design stage via a CCTV survey and/or topographical survey.
 - c) The peak surface water runoff from the proposed developments must be restricted to the rates shown in **Section 6**. The proposed network should also be modelled against a surcharged outfall to ensure that the PDS is protected (**Section 8**).
 - d) Only clean/treated surface water runoff will be allowed to discharge to the adjacent waterbodies. Surface water runoff must be treated in accordance with CIRIA C753 (**Section 7**).
 - e) The maximum  (s) must be confirmed by the LLFA and Peel 
 - f) Surface water storage will be needed onsite to store excess flows during extreme events. The estimated attenuation is noted within **Section 8** and the exact type/volume will be confirmed during the detailed design stage.
 - g) The allowable foul water discharge rate must be approved by United Utilities via a S106 & S104 application.
 - h) The proposed onsite drainage system must not contribute to any offsite flood risk or overland flow risk. Any residual risk must be effectively managed onsite with the use of appropriate drainage and/or topographical level consideration.
 - i) The proposed development of the site should not commence until a detailed scheme for surface and foul water drainage has been submitted to and approved by the Local Planning Authority.

- j) The proposed surface water network for the proposed developments must include the “Central” climate change allowance of 20%. The proposed network must also be checked against the “Upper” climate change allowance of 40% to ensure any surface flooding remains wholly within the development.

10.3. SGi recommends that the Local Planning Authority accept this Flood Risk Assessment and Drainage Strategy in support of the Planning Application.





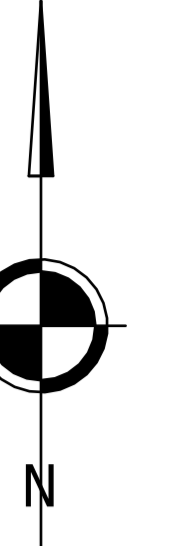
Shepherd Gilmour
Consulting Engineers

Colchester House, 40 Peter Street, Manchester M2 5GP

(44)0161 837 1500

www.shepherd-gilmour.co.uk

APPENDIX A1

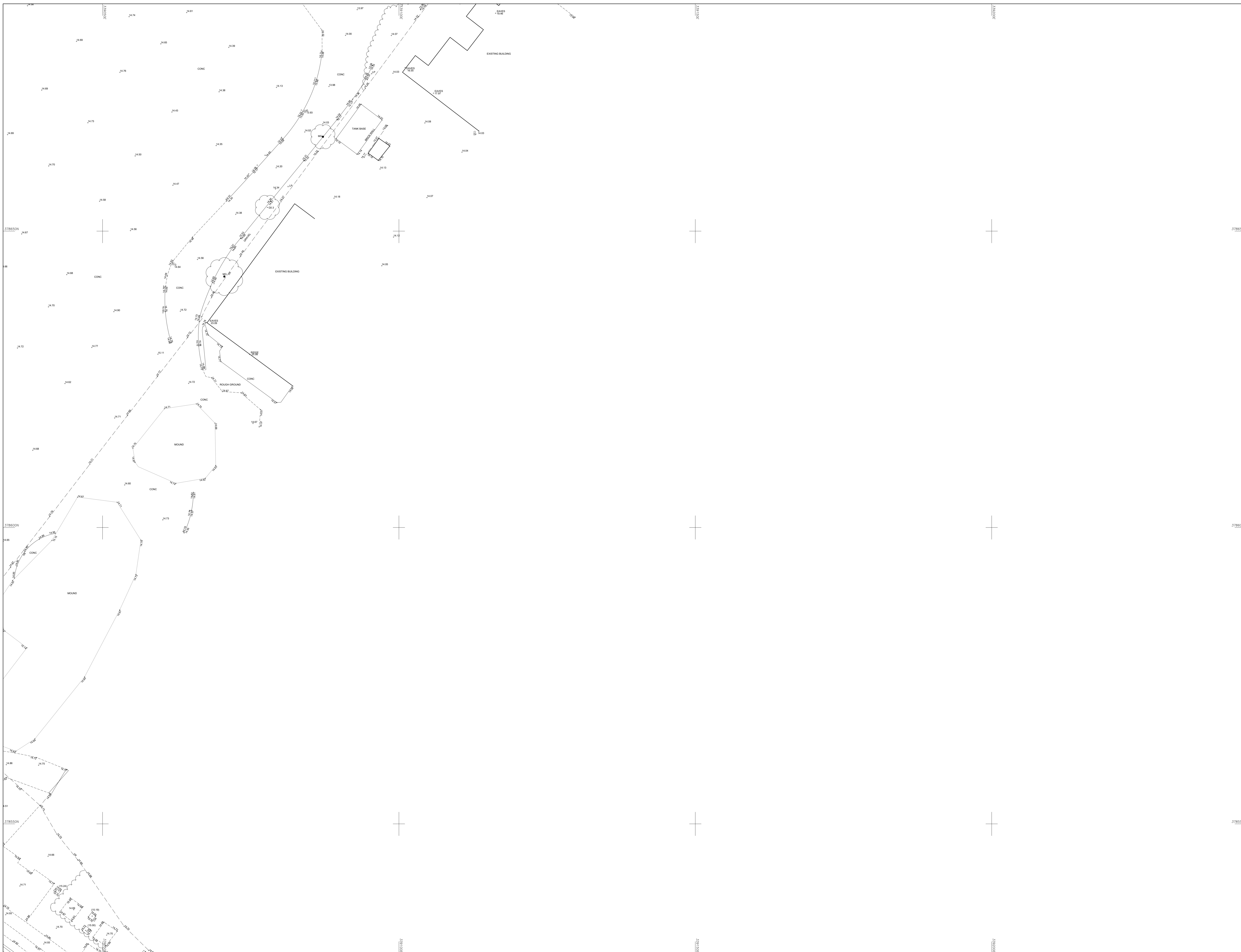


Note:
 The survey is plotted on a plane local
 Grid. Orientation to National Grid.
 All levels relate to Ordnance Datum,
 achieved using the
 OS National GPS Network.
 Survey Control Markers established for
 Mapping purposes only and should not be
 used for Construction without the written
 approval of Survey Operations Ltd.

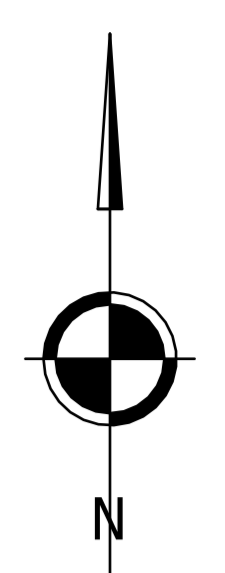
Point	Easting	Northing	Height
S01	138646.93	278207.68	10.03
S02	138699.43	278206.00	2.02
S03	138864.18	278423.71	15.27
S04	138864.18	278423.71	15.27
S05	139011.23	278271.57	15.46
S06	139011.23	278423.50	15.45
S08	139000.04	278515.28	15.33
W01	139002.05	278205.33	15.64
W02	139000.04	278515.28	15.33
W03	139100.17	278430.80	15.43
W04	139002.05	278205.33	15.36
W05	139014.00	278600.08	14.81
W06	139002.05	278102.24	14.63
W07	139000.04	278702.08	14.37
W08	138999.08	278600.08	14.25
W09	138854.63	278901.44	14.74
W10	138854.63	278901.44	14.74
W11	138812.62	278942.37	14.58
W12	138712.62	278900.08	14.55
W14	138742.25	278900.08	15.19
W15	138712.62	278900.08	14.55
W16	138740.31	278877.30	14.82

STANDARD REFERENCE & ABBREVIATIONS

AB	Abundant Bush	SL	Short Level
AD	Asp. Drain	SP	Short Pipe
AF	Asp. Fence	SR	Short Run
AK	Asphalt	ST	Street
AL	Asphalt	TA	Terrace
AM	Asphalt	TC	Terrace
AN	Asphalt	TD	Terrace
AO	Asphalt	TE	Terrace
AP	Asphalt	TF	Terrace
AQ	Asphalt	TH	Thatch
AR	Asphalt	TI	Terrace
AS	Asphalt	TJ	Terrace
AT	Asphalt	TK	Terrace
AV	Asphalt	TL	Terrace
AW	Asphalt	TM	Terrace
AX	Asphalt	TO	Terrace
AY	Asphalt	TP	Terrace
AZ	Asphalt	TQ	Terrace
BA	Asphalt	TR	Terrace
BB	Asphalt	TS	Terrace
BC	Asphalt	TT	Terrace
BD	Asphalt	TU	Terrace
BE	Asphalt	TV	Terrace
BF	Asphalt	TW	Terrace
BG	Asphalt	TX	Terrace
BH	Asphalt	TY	Terrace
BI	Asphalt	TZ	Terrace
BJ	Asphalt	UA	Terrace
BK	Asphalt	UB	Terrace
BL	Asphalt	UC	Terrace
BM	Asphalt	UD	Terrace
BN	Asphalt	UE	Terrace
BO	Asphalt	UF	Terrace
BP	Asphalt	UG	Terrace
BQ	Asphalt	UH	Terrace
BR	Asphalt	UI	Terrace
BS	Asphalt	UJ	Terrace
BT	Asphalt	UK	Terrace
BU	Asphalt	UL	Terrace
BV	Asphalt	UM	Terrace
BW	Asphalt	UN	Terrace
BX	Asphalt	UO	Terrace
BY	Asphalt	UP	Terrace
BZ	Asphalt	UQ	Terrace
CA	Asphalt	UR	Terrace
CB	Asphalt	US	Terrace
CC	Asphalt	UT	Terrace
CD	Asphalt	UU	Terrace
CE	Asphalt	UV	Terrace
CF	Asphalt	UW	Terrace
CG	Asphalt	UX	Terrace
CH	Asphalt	UY	Terrace
CI	Asphalt	UZ	Terrace
CJ	Asphalt	VA	Terrace
CK	Asphalt	VB	Terrace
CL	Asphalt	VC	Terrace
CM	Asphalt	VD	Terrace
CN	Asphalt	VE	Terrace
CO	Asphalt	VF	Terrace
CP	Asphalt	VG	Terrace
CQ	Asphalt	VH	Terrace
CR	Asphalt	VI	Terrace
CS	Asphalt	VJ	Terrace
CT	Asphalt	VK	Terrace
CU	Asphalt	VL	Terrace
CV	Asphalt	VM	Terrace
CW	Asphalt	VN	Terrace
CX	Asphalt	VO	Terrace
CY	Asphalt	VP	Terrace
CZ	Asphalt	VQ	Terrace
DA	Asphalt	VR	Terrace
DB	Asphalt	VS	Terrace
DC	Asphalt	VT	Terrace
DD	Asphalt	VU	Terrace
DE	Asphalt	VV	Terrace
DF	Asphalt	VW	Terrace
DG	Asphalt	VX	Terrace
DH	Asphalt	VY	Terrace
DI	Asphalt	VZ	Terrace
DJ	Asphalt	WA	Terrace
DK	Asphalt	WB	Terrace
DL	Asphalt	WC	Terrace
DM	Asphalt	WD	Terrace
DN	Asphalt	WE	Terrace
DO	Asphalt	WF	Terrace
DP	Asphalt	WG	Terrace
DQ	Asphalt	WH	Terrace
DR	Asphalt	WI	Terrace
DS	Asphalt	WJ	Terrace
DT	Asphalt	WK	Terrace
DU	Asphalt	WL	Terrace
DV	Asphalt	WM	Terrace
DW	Asphalt	WN	Terrace
DX	Asphalt	WO	Terrace
DY	Asphalt	WP	Terrace
DZ	Asphalt	WQ	Terrace
EA	Asphalt	WR	Terrace
EB	Asphalt	WS	Terrace
EC	Asphalt	WT	Terrace
ED	Asphalt	WU	Terrace
EE	Asphalt	WV	Terrace
EF	Asphalt	WW	Terrace
EG	Asphalt	WX	Terrace
EH	Asphalt	WY	Terrace
EI	Asphalt	WZ	Terrace
EJ	Asphalt	XA	Terrace
EK	Asphalt	XB	Terrace
EL	Asphalt	XC	Terrace
EM	Asphalt	XD	Terrace
EN	Asphalt	XE	Terrace
EO	Asphalt	XF	Terrace
EP	Asphalt	XG	Terrace
EQ	Asphalt	XH	Terrace
ER	Asphalt	XI	Terrace
ES	Asphalt	XJ	Terrace
ET	Asphalt	XK	Terrace
EU	Asphalt	XL	Terrace
EV	Asphalt	XM	Terrace
EW	Asphalt	XN	Terrace
EX	Asphalt	XO	Terrace
EY	Asphalt	XP	Terrace
EZ	Asphalt	XQ	Terrace
FA	Asphalt	XR	Terrace
FB	Asphalt	XS	Terrace
FC	Asphalt	XT	Terrace
FD	Asphalt	XU	Terrace
FE	Asphalt	XV	Terrace
FF	Asphalt	XW	Terrace
FG	Asphalt	XX	Terrace
FH	Asphalt	XY	Terrace
FI	Asphalt	XZ	Terrace
FJ	Asphalt	YA	Terrace
FK	Asphalt	YB	Terrace
FL	Asphalt	YC	Terrace
FM	Asphalt	YD	Terrace
FN	Asphalt	YE	Terrace
FO	Asphalt	YF	Terrace
FP	Asphalt	YG	Terrace
FQ	Asphalt	YH	Terrace
FR	Asphalt	YI	Terrace
FS	Asphalt	YJ	Terrace
FT	Asphalt	YK	Terrace
FU	Asphalt	YL	Terrace
FV	Asphalt	YM	Terrace
FW	Asphalt	YN	Terrace
FX	Asphalt	YO	Terrace
FY	Asphalt	YP	Terrace
FZ	Asphalt	YQ	Terrace
GA	Asphalt	YR	Terrace
GB	Asphalt	YS	Terrace
GC	Asphalt	YT	Terrace
GD	Asphalt	YU	Terrace
GE	Asphalt	YV	Terrace
GF	Asphalt	YW	Terrace
GG	Asphalt	YX	Terrace
GH	Asphalt	YY	Terrace
GI	Asphalt	YZ	Terrace
GJ	Asphalt	ZA	Terrace
GK	Asphalt	ZB	Terrace
GL	Asphalt	ZC	Terrace
GM	Asphalt	ZD	Terrace
GN	Asphalt	ZE	Terrace
GO	Asphalt	ZF	Terrace
GP	Asphalt	ZG	Terrace
GQ	Asphalt	ZH	Terrace
GR	Asphalt	ZI	Terrace
GS	Asphalt	ZJ	Terrace
GT	Asphalt	ZK	Terrace
GU	Asphalt	ZL	Terrace
GV	Asphalt	ZM	Terrace
GW	Asphalt	ZN	Terrace
GX	Asphalt	ZO	Terrace
GY	Asphalt	ZA	Terrace
GZ	Asphalt	ZB	Terrace
HA	Asphalt	ZC	Terrace
HB	Asphalt	ZD	Terrace
HC	Asphalt	ZE	Terrace
HD	Asphalt	ZF	Terrace
HE	Asphalt	ZG	Terrace
HF	Asphalt	ZH	Terrace
HG	Asphalt	ZI	Terrace
HH	Asphalt	ZJ	Terrace
HI	Asphalt	ZK	Terrace
HJ	Asphalt	ZL	Terrace
HK	Asphalt	ZM	Terrace
HL	Asphalt	ZN	Terrace
HM	Asphalt	ZO	Terrace
HN	Asphalt	ZA	Terrace
HO	Asphalt	ZB	Terrace
HP	Asphalt	ZC	Terrace
HQ	Asphalt	ZD	Terrace
HR	Asphalt	ZE	Terrace
HS	Asphalt	ZF	Terrace
HT	Asphalt	ZG	Terrace
HU	Asphalt	ZH	Terrace
HV	Asphalt	ZI	Terrace
HW	Asphalt	ZJ	Terrace
HX	Asphalt	ZK	Terrace
HY	Asphalt	ZL	Terrace
HZ	Asphalt	ZM	Terrace
IA	Asphalt	ZN	Terrace
IB	Asphalt	ZO	Terrace
IC	Asphalt	ZA	Terrace
ID	Asphalt	ZB	Terrace
IE	Asphalt	ZC	Terrace
IF	Asphalt	ZD	Terrace
IG	Asphalt	ZE	Terrace
IH	Asphalt	ZF	Terrace
II	Asphalt	ZG	Terrace
IJ	Asphalt	ZH	Terrace
IK	Asphalt	ZI	Terrace
IL	Asphalt	ZJ	Terrace
IM	Asphalt	ZK	Terrace
IN	Asphalt	ZL	Terrace
IO	Asphalt	ZN	Terrace
IP	Asphalt	ZO	Terrace
IQ	Asphalt	ZA	Terrace
IR	Asphalt	ZB	Terrace
IS	Asphalt	ZC	Terrace
IT	Asphalt	ZD	Terrace
IU	Asphalt	ZE	Terrace
IV	Asphalt	ZF	Terrace
IV	Asphalt	ZG	Terrace
IV	Asphalt	ZH	Terrace
IV	Asphalt	ZI	Terrace
IV	Asphalt	ZJ	Terrace
IV	Asphalt	ZK	Terrace
IV	Asphalt	ZL	Terrace
IV	Asphalt	ZN	Terrace
IV	Asphalt	ZO	Terrace
IV	Asphalt	ZA	Terrace
IV	Asphalt	ZB	Terrace
IV	Asphalt	ZC	Terrace
IV	Asphalt	ZD	Terrace
IV	Asphalt	ZE	Terrace
IV	Asphalt	ZF	Terrace
IV	Asphalt	ZG	Terrace
IV	Asphalt	ZH	Terrace
IV	Asphalt	ZI	Terrace
IV	Asphalt	ZJ	Terrace
IV	Asphalt	ZK	Terrace
IV	Asphalt	ZL	Terrace
IV	Asphalt	ZN	Terrace
IV	Asphalt	ZO	Terrace
IV	Asphalt	ZA	Terrace
IV	Asphalt	ZB	Terrace
IV	Asphalt	ZC	Terrace
IV	Asphalt	ZD	Terrace
IV	Asphalt	ZE	Terrace
IV	Asphalt	ZF	Terrace
IV	Asphalt	ZG	Terrace
IV	Asphalt	ZH	Terrace
IV	Asphalt	ZI	Terrace
IV	Asphalt	ZJ	Terrace
IV	Asphalt	ZK	Terrace
IV	Asphalt	ZL	Terrace
IV	Asphalt	ZN	Terrace
IV	Asphalt	ZO	Terrace
IV	Asphalt	ZA	Terrace
IV	Asphalt	ZB	Terrace
IV	Asphalt	ZC	Terrace
IV	Asphalt	ZD	Terrace
IV	Asphalt	ZE	Terrace
IV	Asphalt	ZF	Terrace
IV	Asphalt	ZG	Terrace
IV	Asphalt	ZH	Terrace
IV	Asphalt	ZI	Terrace
IV	Asphalt	ZJ	Terrace
IV	Asphalt	ZK	Terrace
IV	Asphalt	ZL	Terrace
IV	Asphalt	ZN	Terrace
IV	Asphalt	ZO	Terrace
IV	Asphalt	ZA	Terrace
IV	Asphalt	ZB	Terrace
IV	Asphalt	ZC	Terrace
IV	Asphalt	ZD	Terrace
IV	Asphalt	ZE	Terrace
IV	Asphalt	ZF	Terrace
IV	Asphalt	ZG	Terrace
IV	Asphalt	ZH	Terrace
IV	Asphalt	ZI	Terrace
IV	Asphalt	ZJ	Terrace
IV	Asphalt	ZK	Terrace
IV	Asphalt	ZL	Terrace
IV	Asphalt	ZN	Terrace
IV	Asphalt	ZO	Terrace
IV	Asphalt	ZA	Terrace
IV	Asphalt	ZB	Terrace
IV	Asphalt	ZC	Terrace
IV	Asphalt	ZD	Terrace
IV	Asphalt	ZE	Terrace
IV	Asphalt	ZF	Terrace
IV	Asphalt	ZG	Terrace
IV	Asphalt	ZH	Terrace
IV	Asphalt	ZI	Terrace
IV	Asphalt	ZJ	Terrace
IV	Asphalt	ZK	Terrace
IV	Asphalt	ZL	Terrace
IV	Asphalt	ZN	Terrace
IV	Asphalt	ZO	Terrace
IV	Asphalt	ZA	Terrace
IV	Asphalt	ZB	Terrace
IV	Asphalt	ZC	Terrace
IV	Asphalt	ZD	Terrace
IV	Asphalt	ZE	Terrace
IV	Asphalt	ZF	Terrace
IV	Asphalt	ZG	Terrace
IV	Asphalt	ZH	Terrace
IV	Asphalt	ZI	



© Survey Operations Limited 2021
 Reproduction in whole or in part by any means is prohibited without the prior permission of Survey Operations Limited.

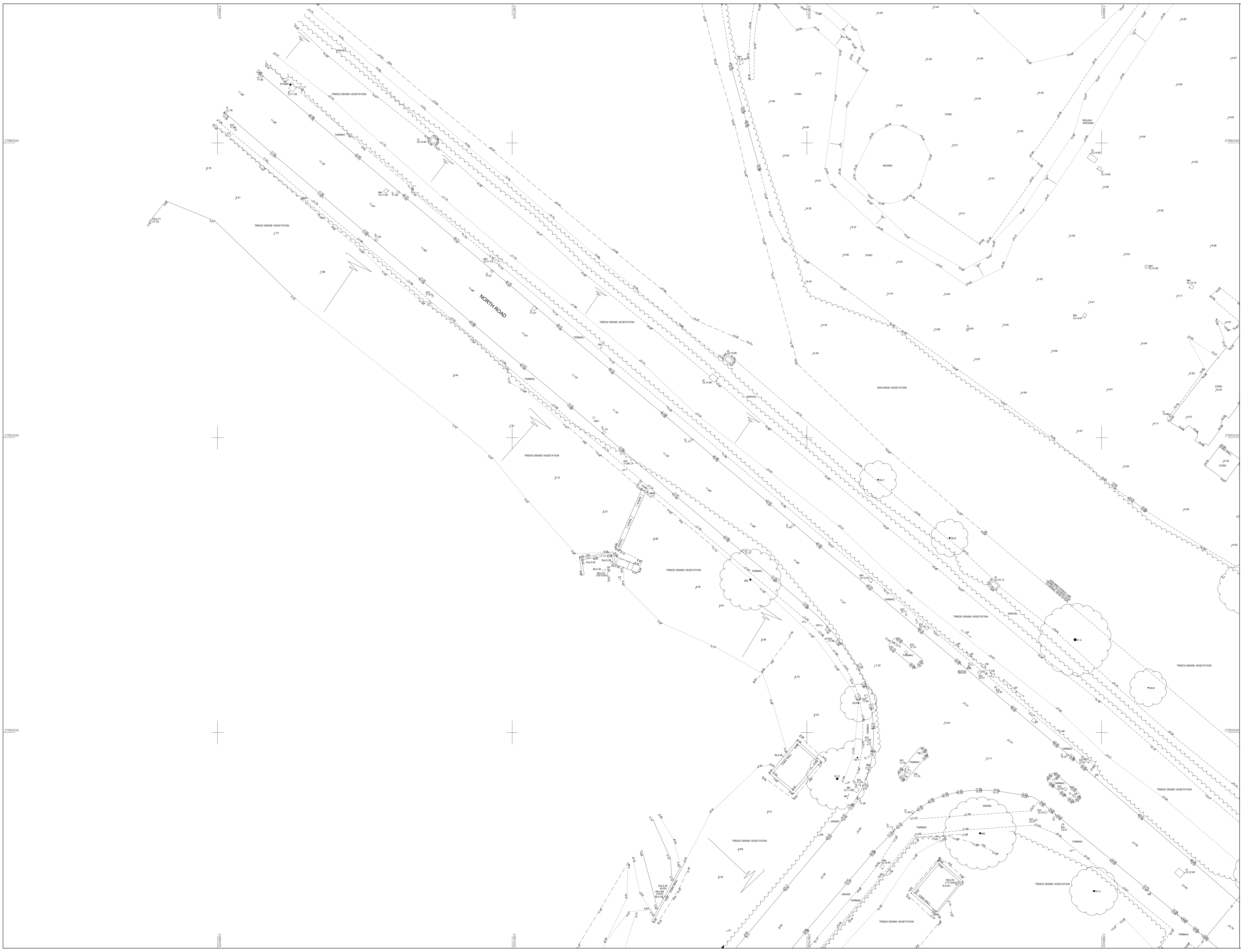


Note:
 The survey is plotted on a plane local Grid. Orientation to National Grid.
 All levels relate to Ordnance Datum, achieved using the OS National GPS Network.
 Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

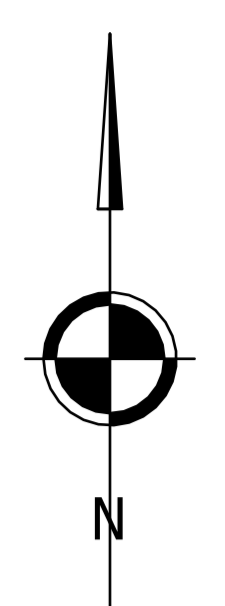
Point	Easting	Northing	Height
S01	338646.93	278207.68	10.03
S02	338699.63	278206.00	9.20
S03	338664.18	278223.71	15.27
S04	338664.18	278223.71	15.27
S05	339011.23	278211.57	15.46
S06	339011.23	278211.57	15.46
S07	339043.52	278243.00	15.45
S08	339000.04	278215.28	15.33
W01	339022.85	278216.35	15.64
W02	339000.04	278215.28	15.33
W03	339100.17	278230.80	15.43
W04	339099.87	278231.10	15.36
W05	339144.00	278200.08	14.81
W06	339022.85	278216.35	15.64
W07	339000.04	278215.28	15.33
W08	339000.04	278215.28	15.33
W09	338999.28	278200.00	14.25
W10	338854.63	278201.44	14.74
W11	338859.28	278201.44	14.37
W12	338812.62	278242.37	14.58
W13	338782.62	278201.44	14.55
W14	338742.25	278200.08	15.19
W15	338751.62	278202.20	14.20
W16	338740.31	278207.30	14.82

STANDARD REFERENCE & ABBREVIATIONS

AB	Abundant Bush	SL	Short Level
AD	Asp Drain	SP	Short Pipe
AL	Asp Line	SB	Short Bush
AN	Asp Nook	CP	Center Point
AS	Asp Stone	UP	Upper Pipe
BA	Bank Area	UL	Upper Level
BB	Bank Bush	ML	Medium Level
BC	Bank Bush	ML	Medium Level
BD	Bank Drain	ML	Medium Level
BE	Bank Edge	ML	Medium Level
BF	Bank Fence	ML	Medium Level
BH	Bank Hole	ML	Medium Level
BI	Bank Inlet	ML	Medium Level
BJ	Bank Junction	ML	Medium Level
BK	Bank Kiosk	ML	Medium Level
BL	Bank Line	ML	Medium Level
BM	Bank Mound	ML	Medium Level
BN	Bank Nook	ML	Medium Level
BO	Bank Outcrop	ML	Medium Level
BP	Bank Point	ML	Medium Level
BQ	Bank Quarter	ML	Medium Level
BR	Bank Ridge	ML	Medium Level
BS	Bank Slope	ML	Medium Level
BT	Bank Terrace	ML	Medium Level
BU	Bank Underpass	ML	Medium Level
BV	Bank Valley	ML	Medium Level
BW	Bank Wall	ML	Medium Level
BX	Bank Wall	ML	Medium Level
BY	Bank Wall	ML	Medium Level
BZ	Bank Wall	ML	Medium Level
CA	Concrete Area	ML	Medium Level
CB	Concrete Bush	ML	Medium Level
CC	Concrete Channel	ML	Medium Level
CD	Concrete Drain	ML	Medium Level
CE	Concrete Edge	ML	Medium Level
CF	Concrete Fence	ML	Medium Level
CG	Concrete Ground	ML	Medium Level
CH	Concrete Hole	ML	Medium Level
CI	Concrete Inlet	ML	Medium Level
CJ	Concrete Junction	ML	Medium Level
CK	Concrete Kiosk	ML	Medium Level
CL	Concrete Line	ML	Medium Level
CM	Concrete Mound	ML	Medium Level
CN	Concrete Nook	ML	Medium Level
CO	Concrete Outcrop	ML	Medium Level
CP	Concrete Point	ML	Medium Level
CQ	Concrete Quarter	ML	Medium Level
CR	Concrete Ridge	ML	Medium Level
CS	Concrete Slope	ML	Medium Level
CT	Concrete Terrace	ML	Medium Level
CU	Concrete Underpass	ML	Medium Level
CV	Concrete Valley	ML	Medium Level
CW	Concrete Wall	ML	Medium Level
CX	Concrete Wall	ML	Medium Level
CY	Concrete Wall	ML	Medium Level
CZ	Concrete Wall	ML	Medium Level
DA	Dam Area	ML	Medium Level
DB	Dam Bush	ML	Medium Level
DC	Dam Channel	ML	Medium Level
DD	Dam Drain	ML	Medium Level
DE	Dam Edge	ML	Medium Level
DF	Dam Fence	ML	Medium Level
DG	Dam Ground	ML	Medium Level
DH	Dam Hole	ML	Medium Level
DI	Dam Inlet	ML	Medium Level
DJ	Dam Junction	ML	Medium Level
DK	Dam Kiosk	ML	Medium Level
DL	Dam Line	ML	Medium Level
DM	Dam Mound	ML	Medium Level
DN	Dam Nook	ML	Medium Level
DO	Dam Outcrop	ML	Medium Level
DP	Dam Point	ML	Medium Level
DQ	Dam Quarter	ML	Medium Level
DR	Dam Ridge	ML	Medium Level
DS	Dam Slope	ML	Medium Level
DT	Dam Terrace	ML	Medium Level
DU	Dam Underpass	ML	Medium Level
DV	Dam Valley	ML	Medium Level
DW	Dam Wall	ML	Medium Level
DX	Dam Wall	ML	Medium Level
DY	Dam Wall	ML	Medium Level
DZ	Dam Wall	ML	Medium Level
EA	Earth Area	ML	Medium Level
EB	Earth Bush	ML	Medium Level
EC	Earth Channel	ML	Medium Level
ED	Earth Drain	ML	Medium Level
EE	Earth Edge	ML	Medium Level
EF	Earth Fence	ML	Medium Level
EG	Earth Ground	ML	Medium Level
EH	Earth Hole	ML	Medium Level
EI	Earth Inlet	ML	Medium Level
EJ	Earth Junction	ML	Medium Level
EK	Earth Kiosk	ML	Medium Level
EL	Earth Line	ML	Medium Level
EM	Earth Mound	ML	Medium Level
EN	Earth Nook	ML	Medium Level
EO	Earth Outcrop	ML	Medium Level
EP	Earth Point	ML	Medium Level
EQ	Earth Quarter	ML	Medium Level
ER	Earth Ridge	ML	Medium Level
ES	Earth Slope	ML	Medium Level
ET	Earth Terrace	ML	Medium Level
EU	Earth Underpass	ML	Medium Level
EV	Earth Valley	ML	Medium Level
EW	Earth Wall	ML	Medium Level
EX	Earth Wall	ML	Medium Level
EY	Earth Wall	ML	Medium Level
EZ	Earth Wall	ML	Medium Level
FA	Fence Area	ML	Medium Level
FB	Fence Bush	ML	Medium Level
FC	Fence Channel	ML	Medium Level
FD	Fence Drain	ML	Medium Level
FE	Fence Edge	ML	Medium Level
FF	Fence Fence	ML	Medium Level
FG	Fence Ground	ML	Medium Level
FH	Fence Hole	ML	Medium Level
FI	Fence Inlet	ML	Medium Level
FJ	Fence Junction	ML	Medium Level
FK	Fence Kiosk	ML	Medium Level
FL	Fence Line	ML	Medium Level
FM	Fence Mound	ML	Medium Level
FN	Fence Nook	ML	Medium Level
FO	Fence Outcrop	ML	Medium Level
FP	Fence Point	ML	Medium Level
FQ	Fence Quarter	ML	Medium Level
FR	Fence Ridge	ML	Medium Level
FS	Fence Slope	ML	Medium Level
FT	Fence Terrace	ML	Medium Level
FU	Fence Underpass	ML	Medium Level
FV	Fence Valley	ML	Medium Level
FW	Fence Wall	ML	Medium Level
FX	Fence Wall	ML	Medium Level
FY	Fence Wall	ML	Medium Level
FZ	Fence Wall	ML	Medium Level
GA	Grass Area	ML	Medium Level
GB	Grass Bush	ML	Medium Level
GC	Grass Channel	ML	Medium Level
GD	Grass Drain	ML	Medium Level
GE	Grass Edge	ML	Medium Level
GF	Grass Fence	ML	Medium Level
GG	Grass Ground	ML	Medium Level
GH	Grass Hole	ML	Medium Level
GI	Grass Inlet	ML	Medium Level
GJ	Grass Junction	ML	Medium Level
GK	Grass Kiosk	ML	Medium Level
GL	Grass Line	ML	Medium Level
GM	Grass Mound	ML	Medium Level
GN	Grass Nook	ML	Medium Level
GO	Grass Outcrop	ML	Medium Level
GP	Grass Point	ML	Medium Level
GQ	Grass Quarter	ML	Medium Level
GR	Grass Ridge	ML	Medium Level
GS	Grass Slope	ML	Medium Level
GT	Grass Terrace	ML	Medium Level
GU	Grass Underpass	ML	Medium Level
GV	Grass Valley	ML	Medium Level
GW	Grass Wall	ML	Medium Level
GX	Grass Wall	ML	Medium Level
GY	Grass Wall	ML	Medium Level
GZ	Grass Wall	ML	Medium Level
HA	Hard Area	ML	Medium Level
HB	Hard Bush	ML	Medium Level
HC	Hard Channel	ML	Medium Level
HD	Hard Drain	ML	Medium Level
HE	Hard Edge	ML	Medium Level
HF	Hard Fence	ML	Medium Level
HG	Hard Ground	ML	Medium Level
HH	Hard Hole	ML	Medium Level
HI	Hard Inlet	ML	Medium Level
HJ	Hard Junction	ML	Medium Level
HK	Hard Kiosk	ML	Medium Level
HL	Hard Line	ML	Medium Level
HM	Hard Mound	ML	Medium Level
HN	Hard Nook	ML	Medium Level
HO	Hard Outcrop	ML	Medium Level
HP	Hard Point	ML	Medium Level
HQ	Hard Quarter	ML	Medium Level
HR	Hard Ridge	ML	Medium Level
HS	Hard Slope	ML	Medium Level
HT	Hard Terrace	ML	Medium Level
HU	Hard Underpass	ML	Medium Level
HV	Hard Valley	ML	Medium Level
HW	Hard Wall	ML	Medium Level
HX	Hard Wall	ML	Medium Level
HY	Hard Wall	ML	Medium Level
HZ	Hard Wall	ML	Medium Level
IA	Iron Area	ML	Medium Level
IB	Iron Bush	ML	Medium Level
IC	Iron Channel	ML	Medium Level
ID	Iron Drain	ML	Medium Level
IE	Iron Edge	ML	Medium Level
IF	Iron Fence	ML	Medium Level
IG	Iron Ground	ML	Medium Level
IH	Iron Hole	ML	Medium Level
II	Iron Inlet	ML	Medium Level
IJ	Iron Junction	ML	Medium Level
IK	Iron Kiosk	ML	Medium Level
IL	Iron Line	ML	Medium Level
IM	Iron Mound	ML	Medium Level
IN	Iron Nook	ML	Medium Level
IO	Iron Outcrop	ML	Medium Level
IP	Iron Point	ML	Medium Level
IQ	Iron Quarter	ML	Medium Level
IR	Iron Ridge	ML	Medium Level
IS	Iron Slope	ML	Medium Level
IT	Iron Terrace	ML	Medium Level
IU	Iron Underpass	ML	Medium Level
IV	Iron Valley	ML	Medium Level
IW	Iron Wall	ML	Medium Level
IX	Iron Wall	ML	Medium Level
IY	Iron Wall	ML	Medium Level
IZ	Iron Wall	ML	Medium Level
JA	Jack Area	ML	Medium Level
JB	Jack Bush	ML	Medium Level
JC	Jack Channel	ML	Medium Level
JD	Jack Drain	ML	Medium Level
JE	Jack Edge	ML	Medium Level
JF	Jack Fence	ML	Medium Level
JG	Jack Ground	ML	Medium Level
JH	Jack Hole	ML	Medium Level
JI	Jack Inlet	ML	Medium Level
JJ	Jack Junction	ML	Medium Level
JK	Jack Kiosk	ML	Medium Level
JL	Jack Line	ML	Medium Level
JM	Jack Mound	ML	Medium Level
JN	Jack Nook	ML	Medium Level
JO	Jack Outcrop	ML	Medium Level
JP	Jack Point	ML	Medium Level
JQ	Jack Quarter	ML	Medium Level
JR	Jack Ridge	ML	Medium Level
JS	Jack Slope	ML	Medium Level
JT	Jack Terrace	ML	Medium Level
JU	Jack Underpass	ML	Medium Level
JV	Jack Valley	ML	Medium Level
JW	Jack Wall	ML	Medium Level
JX	Jack Wall	ML	Medium Level
JY	Jack Wall	ML	Medium Level
JZ	Jack Wall	ML	Medium Level
KA	Kiosk Area	ML	Medium Level
KB	Kiosk Bush	ML	Medium Level
KC	Kiosk Channel	ML	Medium Level
KD	Kiosk Drain	ML	Medium Level
KE	Kiosk Edge	ML	Medium Level
KF	Kiosk Fence	ML	Medium Level
KG	Kiosk Ground	ML	Medium Level
KH	Kiosk Hole	ML	Medium Level
KI	Kiosk Inlet	ML	Medium Level
KJ	Kiosk Junction	ML	Medium Level
KK	Kiosk Kiosk	ML	Medium Level
KL	Kiosk Line	ML	Medium Level
KM	Kiosk Mound	ML	Medium Level
KN	Kiosk Nook	ML	Medium Level
KO	Kiosk Outcrop	ML	Medium Level
KP	Kiosk Point	ML	Medium Level
KQ	Kiosk Quarter	ML	Medium Level
KR	Kiosk Ridge	ML	Medium Level
KS	Kiosk Slope	ML	Medium Level
KT	Kiosk Terrace	ML	Medium Level
KU	Kiosk Underpass	ML	Medium Level
KV	Kiosk Valley	ML	Medium Level
KW	Kiosk Wall	ML	Medium Level
KX	Kiosk Wall	ML	Medium Level
KY	Kiosk Wall	ML	Medium Level
KZ	Kiosk Wall	ML	Medium Level
LA	Lamp Area	ML	Medium Level
LB	Lamp Bush	ML	Medium Level
LC	Lamp Channel	ML	Medium Level
LD	Lamp Drain	ML	Medium Level
LE	Lamp Edge	ML	Medium Level
LF	Lamp Fence	ML	Medium Level
LG	Lamp Ground	ML	Medium Level
LH	Lamp Hole	ML	Medium Level
LI	Lamp Inlet	ML	Medium Level
LJ	Lamp Junction	ML	Medium Level
LK	Lamp Kiosk	ML	Medium Level
LL	Lamp Line	ML	Medium Level
LM	Lamp Mound	ML	Medium Level
LN	Lamp Nook	ML	Medium Level
LO	Lamp Outcrop	ML	Medium Level
LP	Lamp Point	ML	Medium Level
LQ	Lamp Quarter	ML	Medium Level
LR	Lamp Ridge	ML	Medium Level
LS	Lamp Slope	ML	Medium Level
LT	Lamp Terrace	ML	Medium Level
LU	Lamp Underpass	ML	Medium Level
LV	Lamp Valley	ML	Medium Level
LW	Lamp Wall	ML	Medium Level
LX	Lamp Wall	ML	Medium Level
LY	Lamp Wall	ML	Medium Level
LZ	Lamp Wall	ML	Medium Level
MA	Man Area	ML	Medium Level
MB	Man Bush	ML	Medium Level
MC	Man Channel	ML	Medium Level
MD	Man Drain	ML	Medium Level
ME	Man Edge	ML	Medium Level
MF	Man Fence	ML	Medium Level
MG	Man Ground	ML	Medium Level
MH	Man Hole	ML	Medium Level
MI	Man Inlet	ML	Medium Level
MJ	Man Junction	ML	Medium Level
MK	Man Kiosk	ML	Medium Level
ML	Man Line	ML	Medium Level
MM	Man Mound	ML	Medium Level
MN	Man Nook	ML	Medium Level
MO	Man Outcrop	ML	Medium Level
MP	Man Point	ML	Medium Level
MQ	Man Quarter	ML	Medium Level
MR	Man Ridge	ML	Medium Level
MS	Man Slope	ML	Medium Level
MT	Man Terrace	ML	Medium Level
MU	Man Underpass	ML	Medium Level
MV	Man Valley	ML	Medium Level
MW	Man Wall	ML	Medium Level
MX	Man Wall	ML	Medium Level
MY	Man Wall	ML	Medium Level
MZ	Man Wall	ML	Medium Level
NA	Nail Area	ML	Medium Level
NB	Nail Bush	ML	Medium Level
NC	Nail Channel	ML	Medium Level
ND	Nail Drain	ML	Medium Level
NE	Nail Edge	ML	Medium Level
NF	Nail Fence	ML	Medium Level
NG	Nail Ground	ML	Medium Level
NH	Nail Hole	ML	Medium Level
NI	Nail Inlet	ML	Medium Level
NJ	Nail Junction	ML	Medium Level
NK	Nail Kiosk	ML	Medium Level
NL	Nail Line	ML	Medium Level
NM	Nail Mound	ML	Medium Level
NN	Nail Nook	ML	Medium Level
NO	Nail Outcrop	ML	Medium Level
NP	Nail Point	ML	Medium Level
NQ	Nail Quarter	ML	Medium Level
NR	Nail Ridge	ML	Medium Level
NS	Nail Slope	ML	Medium Level
NT	Nail Terrace	ML	Medium Level
NU	Nail Underpass	ML	Medium Level
NV	Nail Valley	ML	Medium Level
NW	Nail Wall	ML	Medium Level
NX	Nail Wall	ML	Medium Level
NY	Nail Wall	ML	Medium Level



© Survey Operations Limited 2021
 Reproduction in whole or in part by any means is prohibited without the prior permission of Survey Operations Limited.



Note:
 The survey is plotted on a plane local Grid. Orientation to National Grid.
 All levels relate to Ordnance Datum, achieved using the OS National GPS Network.
 Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

Point	Easting	Northing	Height
S01	338646.93	278207.69	10.03
S02	338699.63	278206.00	9.22
S03	338664.18	278223.71	15.27
S04	338664.18	278223.71	15.28
S05	339011.23	278211.57	15.46
S06	339011.23	278211.57	15.45
S08	339000.04	278215.28	15.33
M01	339022.85	278210.33	15.64
M02	339100.17	278430.80	15.43
M03	339022.85	278210.33	15.36
M04	339014.00	278600.08	14.81
M05	339022.85	278210.33	14.63
M07	339000.18	278210.28	14.37
M08	338954.63	278200.00	14.22
M10	338954.63	278200.00	14.24
M11	338954.63	278200.00	14.21
M12	338812.62	278942.37	14.58
M13	338742.25	278920.58	15.19
M14	338742.25	278920.58	15.19
M15	338742.25	278920.58	14.22
M16	338740.31	278927.30	14.82

STANDARD REFERENCE & ABBREVIATIONS

AD	Asphalt Drive	SL	Short Level
AL	Asphalt Lane	SP	Short Pipe
AR	Asphalt Road	SR	Short Run
AS	Asphalt Surface	SS	Short Street
AW	Asphalt Wall	ST	Short Street
AX	Asphalt X	TA	Tarmac
AY	Asphalt Y	TB	Tarmac Block
BA	Brick	TC	Tarmac Concrete
BB	Brick	TD	Tarmac Driveway
BC	Brick	TE	Tarmac Edge
BD	Brick	TF	Tarmac Finish
BE	Brick	TG	Tarmac Gravel
BF	Brick	TH	Tarmac Holes
BG	Brick	TI	Tarmac Inlets
BH	Brick	TJ	Tarmac Joints
BI	Brick	TK	Tarmac Kerbs
BJ	Brick	TL	Tarmac Lanes
BK	Brick	TM	Tarmac Mats
BL	Brick	TN	Tarmac Networks
BM	Brick	TO	Tarmac Obstacles
BN	Brick	TP	Tarmac Paving
BO	Brick	TR	Tarmac Ramps
BP	Brick	TS	Tarmac Signs
BQ	Brick	TU	Tarmac Surfaces
BR	Brick	TV	Tarmac Trenches
BS	Brick	TW	Tarmac Walls
BT	Brick	TX	Tarmac Works
BU	Brick	TY	Tarmac Yards
BV	Brick	TZ	Tarmac Zones
BW	Brick	UA	Unfinished
BX	Brick	UB	Unfinished
BY	Brick	UC	Unfinished
BZ	Brick	UD	Unfinished
CA	Concrete	UE	Unfinished
CB	Concrete	UF	Unfinished
CC	Concrete	UG	Unfinished
CD	Concrete	UH	Unfinished
CE	Concrete	UI	Unfinished
CF	Concrete	UJ	Unfinished
CG	Concrete	UK	Unfinished
CH	Concrete	UL	Unfinished
CI	Concrete	UM	Unfinished
CJ	Concrete	UN	Unfinished
CK	Concrete	UO	Unfinished
CL	Concrete	UP	Unfinished
CM	Concrete	UQ	Unfinished
CN	Concrete	UR	Unfinished
CO	Concrete	US	Unfinished
CP	Concrete	UT	Unfinished
CQ	Concrete	UU	Unfinished
CR	Concrete	UV	Unfinished
CS	Concrete	UW	Unfinished
CT	Concrete	UX	Unfinished
CU	Concrete	UY	Unfinished
CV	Concrete	UZ	Unfinished
CW	Concrete	VA	Unfinished
CX	Concrete	VB	Unfinished
CY	Concrete	VC	Unfinished
CZ	Concrete	VD	Unfinished
DA	Concrete	VE	Unfinished
DB	Concrete	VF	Unfinished
DC	Concrete	VG	Unfinished
DD	Concrete	VH	Unfinished
DE	Concrete	VI	Unfinished
DF	Concrete	VJ	Unfinished
DF	Concrete	VK	Unfinished
DF	Concrete	VL	Unfinished
DF	Concrete	VM	Unfinished
DF	Concrete	VN	Unfinished
DF	Concrete	VO	Unfinished
DF	Concrete	VP	Unfinished
DF	Concrete	VQ	Unfinished
DF	Concrete	VR	Unfinished
DF	Concrete	VS	Unfinished
DF	Concrete	VT	Unfinished
DF	Concrete	VU	Unfinished
DF	Concrete	VV	Unfinished
DF	Concrete	UV	Unfinished
DF	Concrete	VW	Unfinished
DF	Concrete	VX	Unfinished
DF	Concrete	VY	Unfinished
DF	Concrete	VZ	Unfinished
DF	Concrete	WA	Unfinished
DF	Concrete	WB	Unfinished
DF	Concrete	WC	Unfinished
DF	Concrete	WD	Unfinished
DF	Concrete	WE	Unfinished
DF	Concrete	WF	Unfinished
DF	Concrete	WG	Unfinished
DF	Concrete	WH	Unfinished
DF	Concrete	WI	Unfinished
DF	Concrete	WJ	Unfinished
DF	Concrete	WK	Unfinished
DF	Concrete	WL	Unfinished
DF	Concrete	WM	Unfinished
DF	Concrete	WN	Unfinished
DF	Concrete	WO	Unfinished
DF	Concrete	WP	Unfinished
DF	Concrete	WQ	Unfinished
DF	Concrete	WR	Unfinished
DF	Concrete	WS	Unfinished
DF	Concrete	WT	Unfinished
DF	Concrete	WU	Unfinished
DF	Concrete	WV	Unfinished
DF	Concrete	WW	Unfinished
DF	Concrete	WX	Unfinished
DF	Concrete	WY	Unfinished
DF	Concrete	WZ	Unfinished
DF	Concrete	XA	Unfinished
DF	Concrete	XB	Unfinished
DF	Concrete	XC	Unfinished
DF	Concrete	XD	Unfinished
DF	Concrete	XE	Unfinished
DF	Concrete	XF	Unfinished
DF	Concrete	XG	Unfinished
DF	Concrete	XH	Unfinished
DF	Concrete	XI	Unfinished
DF	Concrete	XJ	Unfinished
DF	Concrete	XK	Unfinished
DF	Concrete	XL	Unfinished
DF	Concrete	XM	Unfinished
DF	Concrete	XN	Unfinished
DF	Concrete	XO	Unfinished
DF	Concrete	XP	Unfinished
DF	Concrete	XQ	Unfinished
DF	Concrete	XR	Unfinished
DF	Concrete	XS	Unfinished
DF	Concrete	XT	Unfinished
DF	Concrete	XU	Unfinished
DF	Concrete	XV	Unfinished
DF	Concrete	XW	Unfinished
DF	Concrete	XZ	Unfinished
DF	Concrete	YA	Unfinished
DF	Concrete	YB	Unfinished
DF	Concrete	YC	Unfinished
DF	Concrete	YD	Unfinished
DF	Concrete	YE	Unfinished
DF	Concrete	YF	Unfinished
DF	Concrete	YG	Unfinished
DF	Concrete	YH	Unfinished
DF	Concrete	YI	Unfinished
DF	Concrete	YJ	Unfinished
DF	Concrete	YK	Unfinished
DF	Concrete	YL	Unfinished
DF	Concrete	YM	Unfinished
DF	Concrete	YN	Unfinished
DF	Concrete	YO	Unfinished
DF	Concrete	YP	Unfinished
DF	Concrete	YQ	Unfinished
DF	Concrete	YR	Unfinished
DF	Concrete	YS	Unfinished
DF	Concrete	YT	Unfinished
DF	Concrete	YU	Unfinished
DF	Concrete	YV	Unfinished
DF	Concrete	YW	Unfinished
DF	Concrete	YZ	Unfinished
DF	Concrete	ZA	Unfinished
DF	Concrete	ZB	Unfinished
DF	Concrete	ZC	Unfinished
DF	Concrete	ZD	Unfinished
DF	Concrete	ZE	Unfinished
DF	Concrete	ZF	Unfinished
DF	Concrete	ZG	Unfinished
DF	Concrete	ZH	Unfinished
DF	Concrete	ZI	Unfinished
DF	Concrete	ZJ	Unfinished
DF	Concrete	ZK	Unfinished
DF	Concrete	ZL	Unfinished
DF	Concrete	ZM	Unfinished
DF	Concrete	ZN	Unfinished
DF	Concrete	ZO	Unfinished
DF	Concrete	ZP	Unfinished
DF	Concrete	ZQ	Unfinished
DF	Concrete	ZR	Unfinished
DF	Concrete	ZS	Unfinished
DF	Concrete	ZT	Unfinished
DF	Concrete	ZU	Unfinished
DF	Concrete	ZV	Unfinished
DF	Concrete	ZW	Unfinished
DF	Concrete	ZX	Unfinished
DF	Concrete	ZY	Unfinished
DF	Concrete	ZZ	Unfinished

1
2 3
5 6 4
8 9 7
11 12 10

Survey OPERATIONS
 Smith Street, Skelmersdale, Lancs. WN8 8LN
 Tel: 01695 725662 Fax: 01695 51816
 Email: mail@survops.co.uk - www.survops.co.uk

Client
 Shepherd Gilmour

Drawing Title
 Topographical Survey of Land at:
 Port Cheshire
 Ellesmere Port
 Sheet 8 of 12

Scale(s)
 1:200

Date
 Jan 21

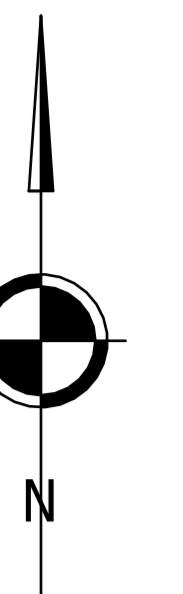
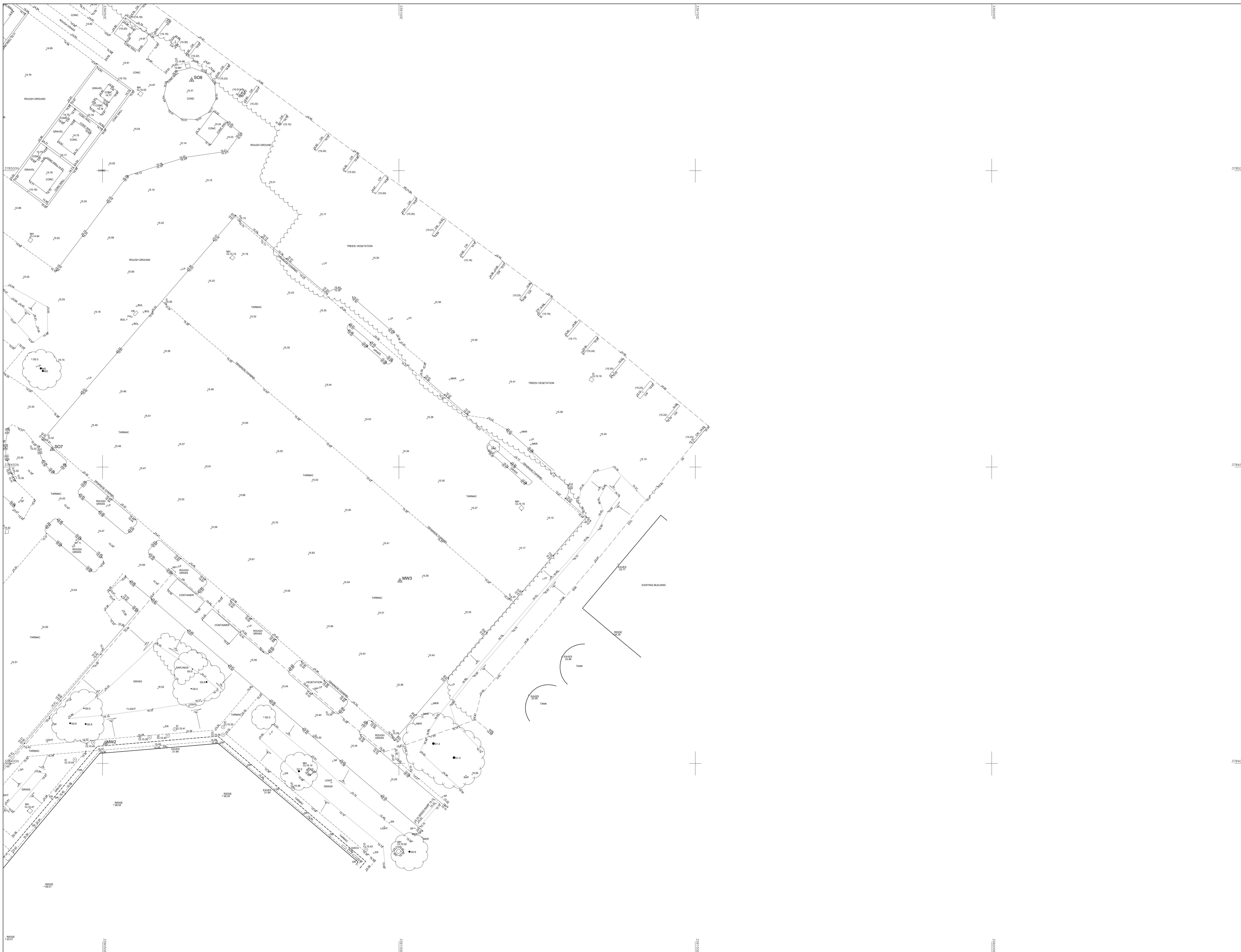
Job Number
 20K288

Surveyor
 CA/MW

Dram
 DIF

Checked
 SO

Sheet Size & Drg Number & Revision
 A0 20K288/008

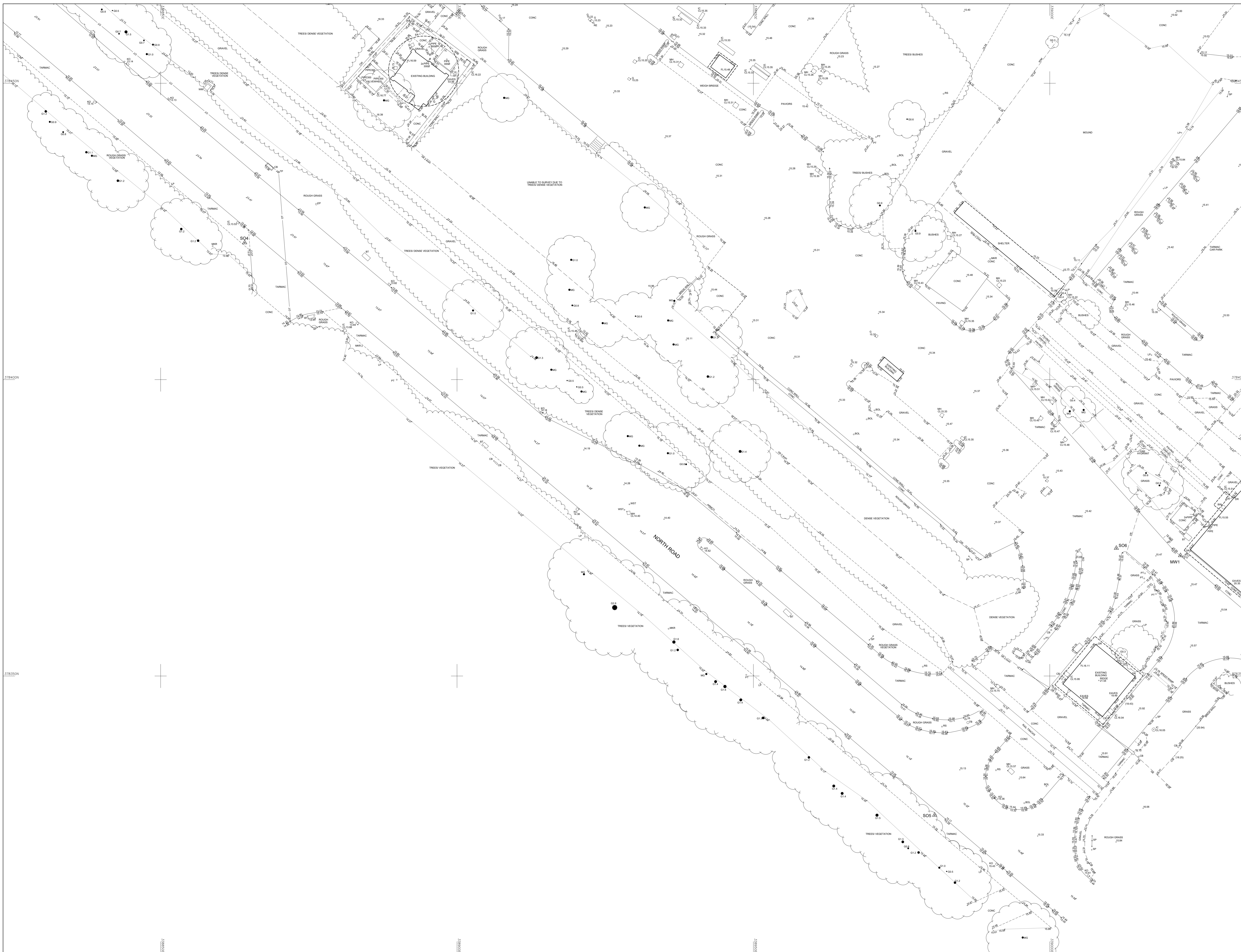


Note:
 The survey is plotted on a plane local Grid. Orientation to National Grid. All levels relate to Ordnance Datum, achieved using the OS National GPS Network. Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

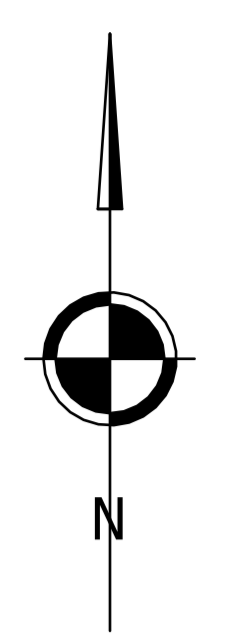
Point	Easting	Northing	Height
S01	338646.93	278207.68	10.03
S02	338699.63	278206.00	9.20
S03	338646.18	278223.71	15.27
S04	338646.18	278223.71	15.27
S05	339011.23	278211.57	15.46
S06	339011.23	278211.57	15.46
S07	339011.23	278211.57	15.46
S08	339000.04	278215.28	15.32
M01	339022.05	278216.35	15.64
M02	339000.04	278215.28	15.32
M03	339000.04	278215.28	15.32
M04	339000.04	278215.28	15.32
M05	339000.04	278215.28	15.32
M06	339000.04	278215.28	15.32
M07	339000.04	278215.28	15.32
M08	339000.04	278215.28	15.32
M09	339000.04	278215.28	15.32
M10	338854.63	278207.68	14.23
M11	338854.63	278207.68	14.23
M12	338854.63	278207.68	14.23
M13	338854.63	278207.68	14.23
M14	338854.63	278207.68	14.23
M15	338742.25	278207.68	15.19
M16	338742.25	278207.68	15.19
M17	338742.25	278207.68	15.19
M18	338742.25	278207.68	15.19
M19	338742.25	278207.68	15.19
M20	338742.25	278207.68	15.19
M21	338742.25	278207.68	15.19
M22	338742.25	278207.68	15.19
M23	338742.25	278207.68	15.19
M24	338742.25	278207.68	15.19
M25	338742.25	278207.68	15.19
M26	338742.25	278207.68	15.19
M27	338742.25	278207.68	15.19
M28	338742.25	278207.68	15.19
M29	338742.25	278207.68	15.19
M30	338742.25	278207.68	15.19
M31	338742.25	278207.68	15.19
M32	338742.25	278207.68	15.19
M33	338742.25	278207.68	15.19
M34	338742.25	278207.68	15.19
M35	338742.25	278207.68	15.19
M36	338742.25	278207.68	15.19
M37	338742.25	278207.68	15.19
M38	338742.25	278207.68	15.19
M39	338742.25	278207.68	15.19
M40	338742.25	278207.68	15.19
M41	338742.25	278207.68	15.19
M42	338742.25	278207.68	15.19
M43	338742.25	278207.68	15.19
M44	338742.25	278207.68	15.19
M45	338742.25	278207.68	15.19
M46	338742.25	278207.68	15.19
M47	338742.25	278207.68	15.19
M48	338742.25	278207.68	15.19
M49	338742.25	278207.68	15.19
M50	338742.25	278207.68	15.19
M51	338742.25	278207.68	15.19
M52	338742.25	278207.68	15.19
M53	338742.25	278207.68	15.19
M54	338742.25	278207.68	15.19
M55	338742.25	278207.68	15.19
M56	338742.25	278207.68	15.19
M57	338742.25	278207.68	15.19
M58	338742.25	278207.68	15.19
M59	338742.25	278207.68	15.19
M60	338742.25	278207.68	15.19
M61	338742.25	278207.68	15.19
M62	338742.25	278207.68	15.19
M63	338742.25	278207.68	15.19
M64	338742.25	278207.68	15.19
M65	338742.25	278207.68	15.19
M66	338742.25	278207.68	15.19
M67	338742.25	278207.68	15.19
M68	338742.25	278207.68	15.19
M69	338742.25	278207.68	15.19
M70	338742.25	278207.68	15.19
M71	338742.25	278207.68	15.19
M72	338742.25	278207.68	15.19
M73	338742.25	278207.68	15.19
M74	338742.25	278207.68	15.19
M75	338742.25	278207.68	15.19
M76	338742.25	278207.68	15.19
M77	338742.25	278207.68	15.19
M78	338742.25	278207.68	15.19
M79	338742.25	278207.68	15.19
M80	338742.25	278207.68	15.19
M81	338742.25	278207.68	15.19
M82	338742.25	278207.68	15.19
M83	338742.25	278207.68	15.19
M84	338742.25	278207.68	15.19
M85	338742.25	278207.68	15.19
M86	338742.25	278207.68	15.19
M87	338742.25	278207.68	15.19
M88	338742.25	278207.68	15.19
M89	338742.25	278207.68	15.19
M90	338742.25	278207.68	15.19
M91	338742.25	278207.68	15.19
M92	338742.25	278207.68	15.19
M93	338742.25	278207.68	15.19
M94	338742.25	278207.68	15.19
M95	338742.25	278207.68	15.19
M96	338742.25	278207.68	15.19
M97	338742.25	278207.68	15.19
M98	338742.25	278207.68	15.19
M99	338742.25	278207.68	15.19
M100	338742.25	278207.68	15.19

STANDARD REFERENCE & ABBREVIATIONS

AB	Abundant Bush	SL	Street Level
AD	Asphalt Drive	SP	Spot Height
AE	Asphalt Edge	SR	Survey Range
AF	Asphalt Foot	SS	Street Sign
AG	Asphalt Gate	ST	Street
AH	Asphalt Head	SV	Street View
AI	Asphalt Inlet	SW	Street Wall
AJ	Asphalt Junction	SY	Street Yards
AK	Asphalt Kerb	SZ	Street Zebra
AL	Asphalt Lane	T1	Tank
AM	Asphalt Main	T2	Tank
AN	Asphalt Nook	T3	Tank
AO	Asphalt Oval	T4	Tank
AP	Asphalt Path	T5	Tank
AQ	Asphalt Quay	T6	Tank
AR	Asphalt Ramp	T7	Tank
AS	Asphalt Road	T8	Tank
AT	Asphalt Tarmac	T9	Tank
AU	Asphalt Turn	T10	Tank
AV	Asphalt Van	T11	Tank
AW	Asphalt Wall	T12	Tank
AX	Asphalt Way	T13	Tank
AY	Asphalt Yard	T14	Tank
AZ	Asphalt Zone	T15	Tank
BA	Back	T16	Tank
BB	Back	T17	Tank
BC	Back	T18	Tank
BD	Back	T19	Tank
BE	Back	T20	Tank
BF	Back	T21	Tank
BG	Back	T22	Tank
BH	Back	T23	Tank
BI	Back	T24	Tank
BJ	Back	T25	Tank
BK	Back	T26	Tank
BL	Back	T27	Tank
BM	Back	T28	Tank
BN	Back	T29	Tank
BO	Back	T30	Tank
BP	Back	T31	Tank
BQ	Back	T32	Tank
BR	Back	T33	Tank
BS	Back	T34	Tank
BT	Back	T35	Tank
BV	Back	T36	Tank
BW	Back	T37	Tank
BX	Back	T38	Tank
BY	Back	T39	Tank
BZ	Back	T40	Tank
CA	Can	T41	Tank
CB	Can	T42	Tank
CC	Can	T43	Tank
CD	Can	T44	Tank
CE	Can	T45	Tank
CF	Can	T46	Tank
CG	Can	T47	Tank
CH	Can	T48	Tank
CI	Can	T49	Tank
CJ	Can	T50	Tank
CK	Can	T51	Tank
CL	Can	T52	Tank
CM	Can	T53	Tank
CN	Can	T54	Tank
CO	Can	T55	Tank
CP	Can	T56	Tank
CQ	Can	T57	Tank
CR	Can	T58	Tank
CS	Can	T59	Tank
CT	Can	T60	Tank
CU	Can	T61	Tank
CV	Can	T62	Tank
CW	Can	T63	Tank
CX	Can	T64	Tank
CY	Can	T65	Tank
CZ	Can	T66	Tank
DA	Can	T67	Tank
DB	Can	T68	Tank
DC	Can	T69	Tank
DD	Can	T70	Tank
DE	Can	T71	Tank
DF	Can	T72	Tank
DG	Can	T73	Tank
DH	Can	T74	Tank
DI	Can	T75	Tank
DJ	Can	T76	Tank
DK	Can	T77	Tank
DL	Can	T78	Tank
DM	Can	T79	Tank
DN	Can	T80	Tank
DO	Can	T81	Tank
DP	Can	T82	Tank
DQ	Can	T83	Tank
DR	Can	T84	Tank
DS	Can	T85	Tank
DT	Can	T86	Tank
DU	Can	T87	Tank
DV	Can	T88	Tank
DW	Can	T89	Tank
DX	Can	T90	Tank
DY	Can	T91	Tank
DZ	Can	T92	Tank
EA	Can	T93	Tank
EB	Can	T94	Tank
EC	Can	T95	Tank
ED	Can	T96	Tank
EE	Can	T97	Tank
EF	Can	T98	Tank
EG	Can	T99	Tank
EH	Can	T100	Tank
EI	Can	T101	Tank
EJ	Can	T102	Tank
EK	Can	T103	Tank
EL	Can	T104	Tank
EM	Can	T105	Tank
EN	Can	T106	Tank
EO	Can	T107	Tank
EP	Can	T108	Tank
EQ	Can	T109	Tank
ER	Can	T110	Tank
ES	Can	T111	Tank
ET	Can	T112	Tank
EU	Can	T113	Tank
EV	Can	T114	Tank
EW	Can	T115	Tank
EX	Can	T116	Tank
EY	Can	T117	Tank
EZ	Can	T118	Tank
FA	Can	T119	Tank
FB	Can	T120	Tank
FC	Can	T121	Tank
FD	Can	T122	Tank
FE	Can	T123	Tank
FF	Can	T124	Tank
FG	Can	T125	Tank
FH	Can	T126	Tank
FI	Can	T127	Tank
FJ	Can	T128	Tank
FK	Can	T129	Tank
FL	Can	T130	Tank
FM	Can	T131	Tank
FN	Can	T132	Tank
FO	Can	T133	Tank
FP	Can	T134	Tank
FQ	Can	T135	Tank
FR	Can	T136	Tank
FS	Can	T137	Tank
FT	Can	T138	Tank
FU	Can	T139	Tank
FV	Can	T140	Tank
FW	Can	T141	Tank
FX	Can	T142	Tank
FY	Can	T143	Tank
FZ	Can	T144	Tank
GA	Can	T145	Tank
GB	Can	T146	Tank
GC	Can	T147	Tank
GD	Can	T148	Tank
GE	Can	T149	Tank
GF	Can	T150	Tank
GG	Can	T151	Tank
GH	Can	T152	Tank
GI	Can	T153	Tank
GJ	Can	T154	Tank
GK	Can	T155	Tank
GL	Can	T156	Tank
GM	Can	T157	Tank
GN	Can	T158	Tank
GO	Can	T159	Tank
GP	Can	T160	Tank
GQ	Can	T161	Tank
GR	Can	T162	Tank
GS	Can	T163	Tank
GT	Can	T164	Tank
GU	Can	T165	Tank
GV	Can	T166	Tank
GW	Can	T167	Tank
GX	Can	T168	Tank
GY	Can	T169	Tank
GZ	Can	T170	Tank
HA	Can	T171	Tank
HB	Can	T172	Tank
HC	Can	T173	Tank
HD	Can	T174	Tank
HE	Can	T175	Tank
HF	Can	T176	Tank
HG	Can	T177	Tank
HH	Can	T178	Tank
HI	Can	T179	Tank
HJ	Can	T180	Tank
HK	Can	T181	Tank
HL	Can	T182	Tank
HM	Can	T183	Tank
HN	Can	T184	Tank
HO	Can	T185	Tank
HP	Can	T186	Tank
HQ	Can	T187	Tank
HR	Can	T188	Tank
HS	Can	T189	Tank
HT	Can	T190	Tank
HU	Can	T191	Tank
HV	Can	T192	Tank
HW	Can	T193	Tank
HX	Can	T194	Tank
HY	Can	T195	Tank
HZ	Can	T196	Tank
IA	Can	T197	Tank
IB	Can	T198	Tank
IC	Can	T199	Tank
ID	Can	T200	Tank
IE	Can	T201	Tank
IF	Can	T202	Tank



© Survey Operations Limited 2021
 Reproduction in whole or in part by any means is prohibited without the prior permission of Survey Operations Limited.



Note:
 The survey is plotted on a plane local to the site. Orientation to National Grid. All levels relate to Ordnance Datum, achieved using the OS National GPS Network. Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

Point	Easting	Northing	Height
S01	338646.93	278207.69	10.03
S02	338649.63	278206.00	9.22
S03	338646.18	278223.71	15.27
S04	338646.18	278223.71	15.27
S05	338646.18	278223.71	15.27
S06	338646.18	278223.71	15.27
S07	338646.18	278223.71	15.27
S08	338646.18	278223.71	15.27
S09	338646.18	278223.71	15.27
S10	338646.18	278223.71	15.27
S11	338646.18	278223.71	15.27
S12	338646.18	278223.71	15.27
S13	338646.18	278223.71	15.27
S14	338646.18	278223.71	15.27
S15	338646.18	278223.71	15.27
S16	338646.18	278223.71	15.27
S17	338646.18	278223.71	15.27
S18	338646.18	278223.71	15.27
S19	338646.18	278223.71	15.27
S20	338646.18	278223.71	15.27
S21	338646.18	278223.71	15.27
S22	338646.18	278223.71	15.27
S23	338646.18	278223.71	15.27
S24	338646.18	278223.71	15.27
S25	338646.18	278223.71	15.27
S26	338646.18	278223.71	15.27
S27	338646.18	278223.71	15.27
S28	338646.18	278223.71	15.27
S29	338646.18	278223.71	15.27
S30	338646.18	278223.71	15.27
S31	338646.18	278223.71	15.27
S32	338646.18	278223.71	15.27
S33	338646.18	278223.71	15.27
S34	338646.18	278223.71	15.27
S35	338646.18	278223.71	15.27
S36	338646.18	278223.71	15.27
S37	338646.18	278223.71	15.27
S38	338646.18	278223.71	15.27
S39	338646.18	278223.71	15.27
S40	338646.18	278223.71	15.27
S41	338646.18	278223.71	15.27
S42	338646.18	278223.71	15.27
S43	338646.18	278223.71	15.27
S44	338646.18	278223.71	15.27
S45	338646.18	278223.71	15.27
S46	338646.18	278223.71	15.27
S47	338646.18	278223.71	15.27
S48	338646.18	278223.71	15.27
S49	338646.18	278223.71	15.27
S50	338646.18	278223.71	15.27
S51	338646.18	278223.71	15.27
S52	338646.18	278223.71	15.27
S53	338646.18	278223.71	15.27
S54	338646.18	278223.71	15.27
S55	338646.18	278223.71	15.27
S56	338646.18	278223.71	15.27
S57	338646.18	278223.71	15.27
S58	338646.18	278223.71	15.27
S59	338646.18	278223.71	15.27
S60	338646.18	278223.71	15.27
S61	338646.18	278223.71	15.27
S62	338646.18	278223.71	15.27
S63	338646.18	278223.71	15.27
S64	338646.18	278223.71	15.27
S65	338646.18	278223.71	15.27
S66	338646.18	278223.71	15.27
S67	338646.18	278223.71	15.27
S68	338646.18	278223.71	15.27
S69	338646.18	278223.71	15.27
S70	338646.18	278223.71	15.27
S71	338646.18	278223.71	15.27
S72	338646.18	278223.71	15.27
S73	338646.18	278223.71	15.27
S74	338646.18	278223.71	15.27
S75	338646.18	278223.71	15.27
S76	338646.18	278223.71	15.27
S77	338646.18	278223.71	15.27
S78	338646.18	278223.71	15.27
S79	338646.18	278223.71	15.27
S80	338646.18	278223.71	15.27
S81	338646.18	278223.71	15.27
S82	338646.18	278223.71	15.27
S83	338646.18	278223.71	15.27
S84	338646.18	278223.71	15.27
S85	338646.18	278223.71	15.27
S86	338646.18	278223.71	15.27
S87	338646.18	278223.71	15.27
S88	338646.18	278223.71	15.27
S89	338646.18	278223.71	15.27
S90	338646.18	278223.71	15.27
S91	338646.18	278223.71	15.27
S92	338646.18	278223.71	15.27
S93	338646.18	278223.71	15.27
S94	338646.18	278223.71	15.27
S95	338646.18	278223.71	15.27
S96	338646.18	278223.71	15.27
S97	338646.18	278223.71	15.27
S98	338646.18	278223.71	15.27
S99	338646.18	278223.71	15.27
S00	338646.18	278223.71	15.27

STANDARD REFERENCE & ABBREVIATIONS

AD	Asphalt Drive	SL	Street Level
AL	Asphalt Lane	SP	Spot Height
AR	Asphalt Road	SR	Survey Reference
AW	Asphalt Way	ST	Street
BA	Brick Arch	TA	Tarmac
BB	Brick Arch	TB	Tarmac
BC	Brick Arch	TC	Tarmac
BD	Brick Arch	TD	Tarmac
BE	Brick Arch	TE	Tarmac
BF	Brick Arch	TF	Tarmac
BG	Brick Arch	TG	Tarmac
BH	Brick Arch	TH	Tarmac
BI	Brick Arch	TI	Tarmac
BJ	Brick Arch	TJ	Tarmac
BK	Brick Arch	TK	Tarmac
BL	Brick Arch	TL	Tarmac
BM	Brick Arch	TM	Tarmac
BN	Brick Arch	TN	Tarmac
BO	Brick Arch	TO	Tarmac
BP	Brick Arch	TP	Tarmac
BQ	Brick Arch	TQ	Tarmac
BR	Brick Arch	TR	Tarmac
BS	Brick Arch	TS	Tarmac
BT	Brick Arch	TT	Tarmac
BU	Brick Arch	TU	Tarmac
BV	Brick Arch	TV	Tarmac
BW	Brick Arch	TW	Tarmac
BX	Brick Arch	TX	Tarmac
BY	Brick Arch	TY	Tarmac
BZ	Brick Arch	TY	Tarmac
CA	Concrete Arch	UA	Unsurveyed Area
CB	Concrete Arch	UB	Unsurveyed Area
CC	Concrete Arch	UC	Unsurveyed Area
CD	Concrete Arch	UD	Unsurveyed Area
CE	Concrete Arch	UE	Unsurveyed Area
CF	Concrete Arch	UF	Unsurveyed Area
CG	Concrete Arch	UG	Unsurveyed Area
CH	Concrete Arch	UH	Unsurveyed Area
CI	Concrete Arch	UI	Unsurveyed Area
CJ	Concrete Arch	UJ	Unsurveyed Area
CK	Concrete Arch	UK	Unsurveyed Area
CL	Concrete Arch	UL	Unsurveyed Area
CM	Concrete Arch	UM	Unsurveyed Area
CN	Concrete Arch	UN	Unsurveyed Area
CO	Concrete Arch	UO	Unsurveyed Area
CP	Concrete Arch	UP	Unsurveyed Area
CQ	Concrete Arch	UQ	Unsurveyed Area
CR	Concrete Arch	UR	Unsurveyed Area
CS	Concrete Arch	US	Unsurveyed Area
CT	Concrete Arch	UT	Unsurveyed Area
CU	Concrete Arch	UU	Unsurveyed Area
CV	Concrete Arch	UV	Unsurveyed Area
CW	Concrete Arch	UW	Unsurveyed Area
CX	Concrete Arch	UX	Unsurveyed Area
CY	Concrete Arch	UY	Unsurveyed Area
CA	Concrete Arch	UZ	Unsurveyed Area
CB	Concrete Arch	VA	Unsurveyed Area
CC	Concrete Arch	VB	Unsurveyed Area
CD	Concrete Arch	VC	Unsurveyed Area
CE	Concrete Arch	VD	Unsurveyed Area
CF	Concrete Arch	VE	Unsurveyed Area
CG	Concrete Arch	VF	Unsurveyed Area
CH	Concrete Arch	VG	Unsurveyed Area
CI	Concrete Arch	VH	Unsurveyed Area
CJ	Concrete Arch	VI	Unsurveyed Area
CK	Concrete Arch	VJ	Unsurveyed Area
CL	Concrete Arch	VK	Unsurveyed Area
CM	Concrete Arch	VL	Unsurveyed Area
CN	Concrete Arch	VM	Unsurveyed Area
CO	Concrete Arch	VN	Unsurveyed Area
CP	Concrete Arch	VO	Unsurveyed Area
CQ	Concrete Arch	VP	Unsurveyed Area
CR	Concrete Arch	VQ	Unsurveyed Area
CS	Concrete Arch	VR	Unsurveyed Area
CT	Concrete Arch	VS	Unsurveyed Area
CU	Concrete Arch	VT	Unsurveyed Area
CV	Concrete Arch	VU	Unsurveyed Area
CW	Concrete Arch	VV	Unsurveyed Area
CX	Concrete Arch	VV	Unsurveyed Area
CY	Concrete Arch	VW	Unsurveyed Area
CA	Concrete Arch	VX	Unsurveyed Area
CB	Concrete Arch	VY	Unsurveyed Area
CC	Concrete Arch	VZ	Unsurveyed Area
CD	Concrete Arch	WA	Unsurveyed Area
CE	Concrete Arch	WB	Unsurveyed Area
CF	Concrete Arch	WC	Unsurveyed Area
CG	Concrete Arch	WD	Unsurveyed Area
CH	Concrete Arch	WE	Unsurveyed Area
CI	Concrete Arch	WF	Unsurveyed Area
CJ	Concrete Arch	WG	Unsurveyed Area
CK	Concrete Arch	WH	Unsurveyed Area
CL	Concrete Arch	WI	Unsurveyed Area
CM	Concrete Arch	WJ	Unsurveyed Area
CN	Concrete Arch	WK	Unsurveyed Area
CO	Concrete Arch	WL	Unsurveyed Area
CP	Concrete Arch	WM	Unsurveyed Area
CQ	Concrete Arch	WN	Unsurveyed Area
CR	Concrete Arch	WO	Unsurveyed Area
CS	Concrete Arch	WP	Unsurveyed Area
CT	Concrete Arch	WQ	Unsurveyed Area
CU	Concrete Arch	WR	Unsurveyed Area
CV	Concrete Arch	WS	Unsurveyed Area
CW	Concrete Arch	WT	Unsurveyed Area
CX	Concrete Arch	WU	Unsurveyed Area
CY	Concrete Arch	WV	Unsurveyed Area
CA	Concrete Arch	WW	Unsurveyed Area
CB	Concrete Arch	WX	Unsurveyed Area
CC	Concrete Arch	WY	Unsurveyed Area
CD	Concrete Arch	WZ	Unsurveyed Area
CE	Concrete Arch	XA	Unsurveyed Area
CF	Concrete Arch	XB	Unsurveyed Area
CG	Concrete Arch	XC	Unsurveyed Area
CH	Concrete Arch	XD	Unsurveyed Area
CI	Concrete Arch	XE	Unsurveyed Area
CJ	Concrete Arch	XF	Unsurveyed Area
CK	Concrete Arch	XG	Unsurveyed Area
CL	Concrete Arch	XH	Unsurveyed Area
CM	Concrete Arch	XI	Unsurveyed Area
CN	Concrete Arch	XJ	Unsurveyed Area
CO	Concrete Arch	XK	Unsurveyed Area
CP	Concrete Arch	XL	Unsurveyed Area
CQ	Concrete Arch	XM	Unsurveyed Area
CR	Concrete Arch	XN	Unsurveyed Area
CS	Concrete Arch	XO	Unsurveyed Area
CT	Concrete Arch	XP	Unsurveyed Area
CU	Concrete Arch	XQ	Unsurveyed Area
CV	Concrete Arch	XR	Unsurveyed Area
CW	Concrete Arch	XS	Unsurveyed Area
CX	Concrete Arch	XT	Unsurveyed Area
CY	Concrete Arch	XU	Unsurveyed Area
CA	Concrete Arch	XV	Unsurveyed Area
CB	Concrete Arch	XW	Unsurveyed Area
CC	Concrete Arch	XX	Unsurveyed Area
CD	Concrete Arch	XY	Unsurveyed Area
CE	Concrete Arch	XZ	Unsurveyed Area
CF	Concrete Arch	YA	Unsurveyed Area
CG	Concrete Arch	YB	Unsurveyed Area
CH	Concrete Arch	YC	Unsurveyed Area
CI	Concrete Arch	YD	Unsurveyed Area
CJ	Concrete Arch	YE	Unsurveyed Area
CK	Concrete Arch	YF	Unsurveyed Area
CL	Concrete Arch	YG	Unsurveyed Area
CM	Concrete Arch	YH	Unsurveyed Area
CN	Concrete Arch	YI	Unsurveyed Area
CO	Concrete Arch	YJ	Unsurveyed Area
CP	Concrete Arch	YK	Unsurveyed Area
CQ	Concrete Arch	YL	Unsurveyed Area
CR	Concrete Arch	YM	Unsurveyed Area
CS	Concrete Arch	YN	Unsurveyed Area
CT	Concrete Arch	YO	Unsurveyed Area
CU	Concrete Arch	YP	Unsurveyed Area
CV	Concrete Arch	YQ	Unsurveyed Area
CW	Concrete Arch	YR	Unsurveyed Area
CX	Concrete Arch	YS	Unsurveyed Area
CY	Concrete Arch	YT	Unsurveyed Area
CA	Concrete Arch	YU	Unsurveyed Area
CB	Concrete Arch	YV	Unsurveyed Area
CC	Concrete Arch	YW	Unsurveyed Area
CD	Concrete Arch	YX	Unsurveyed Area
CE	Concrete Arch	YY	Unsurveyed Area
CF	Concrete Arch	YZ	Unsurveyed Area
CG	Concrete Arch	ZA	Unsurveyed Area
CH	Concrete Arch	ZB	Unsurveyed Area
CI	Concrete Arch	ZC	Unsurveyed Area
CJ	Concrete Arch	ZD	Unsurveyed Area
CK	Concrete Arch	ZE	Unsurveyed Area
CL	Concrete Arch	ZF	Unsurveyed Area
CM	Concrete Arch	ZG	Unsurveyed Area
CN	Concrete Arch	ZH	Unsurveyed Area
CO	Concrete Arch	ZI	Unsurveyed Area
CP	Concrete Arch	ZJ	Unsurveyed Area
CQ	Concrete Arch	ZK	Unsurveyed Area
CR	Concrete Arch	ZL	Unsurveyed Area
CS	Concrete Arch	ZM	Unsurveyed Area
CT	Concrete Arch	ZN	Unsurveyed Area
CU	Concrete Arch	ZO	Unsurveyed Area
CV	Concrete Arch	ZP	Unsurveyed Area
CW	Concrete Arch	ZQ	Unsurveyed Area
CX	Concrete Arch	ZR	Unsurveyed Area
CY	Concrete Arch	ZS	Unsurveyed Area
CA	Concrete Arch	ZT	Unsurveyed Area
CB	Concrete Arch	ZU	Unsurveyed Area
CC	Concrete Arch	ZV	Unsurveyed Area
CD	Concrete Arch	ZW	Unsurveyed Area
CE	Concrete Arch	ZX	Unsurveyed Area
CF	Concrete Arch	ZY	Unsurveyed Area
CG	Concrete Arch	ZZ	Unsurveyed Area

1
2 3 4
5 6 7
8 9 10
11 12

Survey OPERATIONS
 Smith Street, Skelmersdale, Lancs. WN8 8LN
 Tel: 01695 725662 Fax: 01695 51816
 Email: mail@surveys.co.uk www.surveys.co.uk

Client: **Shepherd Gilmour**

Drawing Title: **Topographical Survey of Land at: Port Cheshire Ellesmere Port**

Sheet 12 of 12

Scales: 1:200 Surveyor: CA/MW
 Date: Jan 21 Drawn: DIF
 Job Number: 20K288 Checked: SO

Sheet Size & Drg Number & Revision: **A0 20K288/012**



Shepherd Gilmour
Consulting Engineers

Colchester House, 40 Peter Street, Manchester M2 5GP

(44)0161 837 1500

www.shepherd-gilmour.co.uk

APPENDIX B1



Shepherd Gilmour
Consulting Engineers

Colchester House, 40 Peter Street, Manchester M2 5GP

(44)0161 837 1500

www.shepherd-gilmour.co.uk

APPENDIX C1

Filing

From: Filing
Sent: 02 March 2021 09:43
To: Paul Quirk
Subject: FW: Port Cheshire, North Road Industrial Estate, Ellesmere Port , CH65 1AB – UU Ref 4200036841

From: Perry, Graham <Graham.Perry@uuplc.co.uk>
Sent: 11 February 2021 10:13
To: Jason Jones <jjones@sgiconsulting.co.uk>
Cc: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: RE: Port Cheshire, North Road Industrial Estate, Ellesmere Port , CH65 1AB – UU Ref 4200036841

Caution: Email originated from outside the SGI Network.

Hello Jason

I can confirm that you can make an indirect connection to the North Rd pumping station via the existing private 225mm foul sewer shown on your plan. I assume your client owns the pipe and as such will grant permission. If not you will have to obtain permission from the owner of the pipe.

Thanks

Graham Perry



Graham Perry
Development Engineer
Developer Services
M: 07557 577548
T: 01925 679405
unitedutilities.com

If you have received a great service today why not tell us?
Visit: unitedutilities.com/wow

From: Wastewater Developer Services
Sent: 11 February 2021 09:03
To: Perry, Graham <Graham.Perry@uuplc.co.uk>
Subject: FW: Port Cheshire, North Road Industrial Estate, Ellesmere Port , CH65 1AB – UU Ref 4200036841

Many thanks

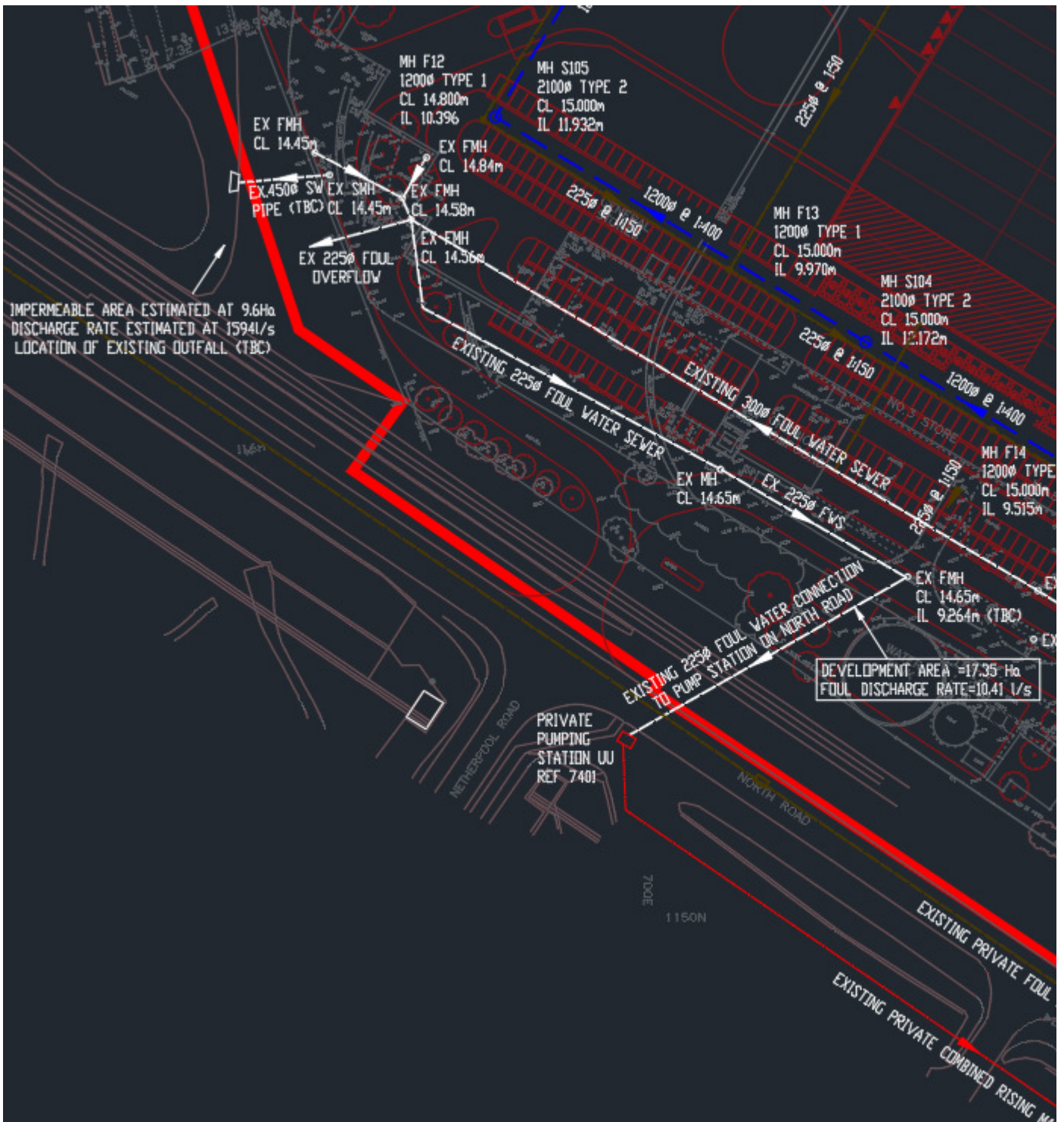
Sharon

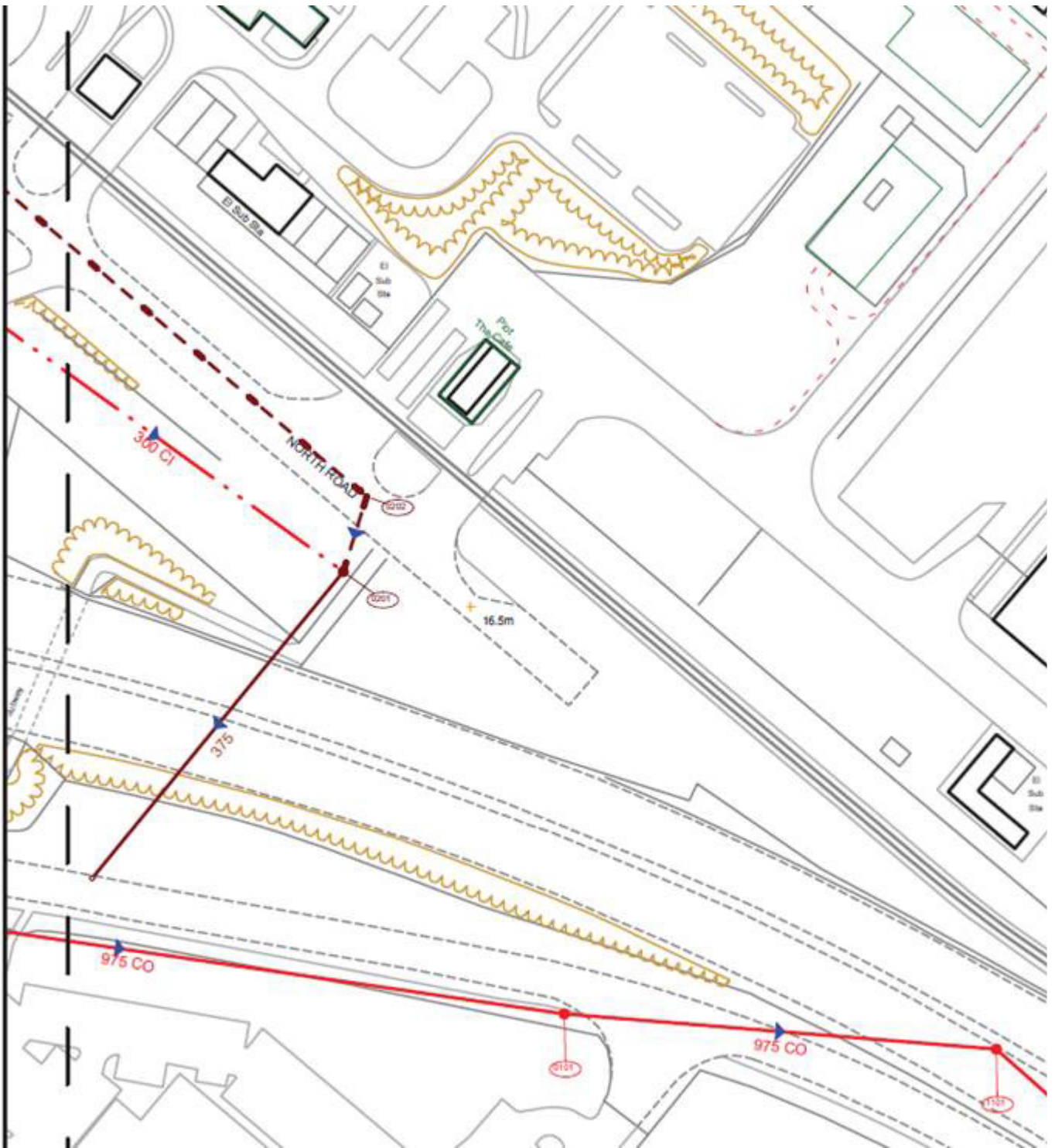
From: Jason Jones [<mailto:jjones@sgiconsulting.co.uk>]
Sent: 10 February 2021 21:53
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>; Perry, Graham <Graham.Perry@uuplc.co.uk>
Subject: Port Cheshire, North Road Industrial Estate, Ellesmere Port , CH65 1AB – UU Ref 4200036841

Hi Graham,

Thanks for getting back to me so quickly.

According to our records there is an established 225 diameter connection from the site into the pumping station and we would like to reuse this connection (therefore no cost for the rebuild of the wet well). The connection of the foul drainage into the 975 dia combined sewer would be a significant cost due to the distance and 3rd party ownership agreements.





Kind Regards,

Jason Jones

Associate Infrastructure Engineer

T: (44) 0161 837 1500

DDI: (44) 0161 837 1517



From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Sent: 10 February 2021 21:34

To: Jason Jones <jjones@sgiconsulting.co.uk>

Cc: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Subject: Pre Development Enquiry for : Port Cheshire, North Road Industrial Estate, Ellesmere Port , CH65 1AB – UU Ref 4200036841

Caution: Email originated from outside the SGI Network.

Dear Sirs,

Pre Development Enquiry for: Port Cheshire, North Road Industrial Estate, Ellesmere Port , CH65 1AB – UU Ref 4200036841

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 3723223 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 975mm diameter public combined sewer within North Rd located to the south east of your proposed development at an unrestricted rate.

I can confirm that the waste water pumping station you refer to in your enquiry does belong to United Utilities.

I have noted that you were looking to drain foul directly into the wastewater pumping station but we have no upstream network to connect your outfall to and it would be near impossible to make a new direct connection into the wet well of the station without a rebuild. I have asked our network team to investigate this further but to date I have not had a response.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

This is outlined as follows, in order of priority:

1. **into the ground (infiltration);**
2. **to a surface waterbody;**
3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

For guidance, The North West SuDS Pro-Forma provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

<https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs>

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

<https://www.gov.uk/government/publications/groundwater-protection-position-statements>

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Waterbody

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the open ordinary watercourse located to the west of the site.

We would encourage you to identify and engage with any third party landowner and riparian owner to agree access and discharge rights to the water body if this is not in your ownership.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address:

DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-connections/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,



Graham Perry
Development Engineer
Developer Services
M: 07557 577548
T: 01925 679405
unitedutilities.com

If you have received a great service today why not tell us?
Visit: unitedutilities.com/wow

EMGateway3.uuplc.co.uk made the following annotations

The information contained in this e-mail is intended only for the individual to whom it is addressed. It may contain legally privileged or confidential information or otherwise be exempt from disclosure. If you have received this Message in error or there are any problems, please notify the sender immediately and delete the message from your computer. You must not use, disclose, copy or alter this message for any unauthorised purpose. Neither United Utilities Group PLC nor any of its subsidiaries will be liable for any direct, special, indirect or consequential damages as a result of any virus being passed on, or arising from the alteration of the contents of this message by a third party.

United Utilities Group PLC, Haweswater House, Lingley Mere
Business Park, Lingley Green Avenue, Great Sankey,
Warrington, WA5 3LP
Registered in England and Wales. Registered No 6559020

www.unitedutilities.com
www.unitedutilities.com/subsidiaries



Shepherd Gilmour
Consulting Engineers

Colchester House, 40 Peter Street, Manchester M2 5GP

(44)0161 837 1500

www.shepherd-gilmour.co.uk

APPENDIX D1



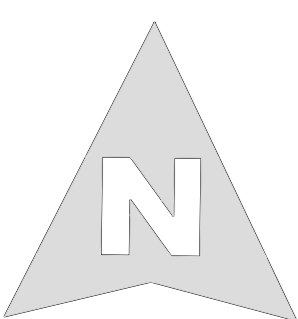
Shepherd Gilmour
Consulting Engineers

Colchester House, 40 Peter Street, Manchester M2 5GP

(44)0161 837 1500

www.shepherd-gilmour.co.uk

APPENDIX E1



Pond Invert Level - 10.698m
 Pond Base Area - 3,400m²
 Pond Depth - 1.500m
 Storage Volume - 5,829m³

S17 HYDROBRAKE
 24000 DIA
 SHE-0664-5000-4613-5000
 DESIGN HEAD: 4.613
 CL 15.150m
 IL 10.568m
 SUMP 10.068m

- LEGEND**
- SITE BOUNDARY
 - - - PROPOSED FOUL SEWER
 - - - PROPOSED SURFACE WATER SEWER
 - - - PROPOSED OUTFALL TO MANCHESTER SHIP CANAL
 - - - PROPOSED OUTFALL TO ATTENUATION POND
 - - - EXISTING SEWER
 - - - EXISTING OUTFALL TO MANCHESTER SHIP CANAL
 - - - EXISTING OUTFALL TO RIVACRE BROOK
 - - - EXISTING DRAINS TO BE REMOVED

- Drainage notes**
1. This drainage drawing is to be read in conjunction with all relevant Architect, Engineer drawings and specifications.
 2. Do not scale this drawing. Any ambiguities, omissions and errors on the drawings shall be brought to the Engineer's attention immediately. All dimensions must be checked and verified on-site before construction commences.
 3. All external underground drainage works are to be constructed in accordance with the Civil Engineering Specification for the Water Industry 7th Edition (CEWI), Sewers for Adoption 3rd Edition (SFA) and any site-specific details provided on the contract drawings.
 4. All internal underground drainage works are to be constructed in accordance with the Building Regulations Approved Document H 2015 Edition and any site-specific details provided on the contract drawings.
 5. The contractor must survey any retained drainage on-site and report the line, level and condition of the existing drainage to the engineer. We would recommend that the existing drainage is cleaned before any surveying and that these works are undertaken before the contractor commences on-site.
 6. Any redundant manholes are to be broken out to at least 600mm below formation level and backfilled with an approved compacted granular material.
 7. Any redundant pipes up to and including 300mm diameter are to be filled with a 10:1 PFA cement mix or broken out and backfilled with an approved compacted granular material. Any redundant pipes over 300mm diameter are to be broken out and backfilled with an approved compacted granular material.
 8. Adoptable Drainage Pipes - All foul and surface water pipes up to and including 300mm diameter are to be Verified Clay in accordance with BS EN 295-1. All pipes greater than 300mm diameter are to be Concrete Class 120 in accordance with BS EN 1916:2002.
 9. Private Drainage Pipes - All foul and surface water pipes up to and including 100mm diameter are to be Verified Clay in accordance with BS EN 295-1 or Solid Walled PVC-U in accordance with BS EN 1401. All foul and surface water pipes greater than 100mm diameter are to be Verified Clay in accordance with BS EN 295-1, Concrete Class 120 in accordance with BS EN 1916:2002 or Structural Walled PVC-U in accordance with BS EN 438-1 and BS EN 13476.
 10. All concrete manholes are to be in accordance with BS EN 1917. All plastic inspection chambers are to be in accordance with BS EN 13595.
 11. All pipes laid within vehicle trafficked areas with less than 900mm of cover shall be surrounded in Class Z bedding. All pipes less than 300mm below the underside of a ground floor slab shall be surrounded in Class Z bedding. Where Class Z bedding is used as a surround a compressible material must be placed at every pipe joint to provide flexibility. All other pipes are to be laid in a Class S bedding.
 12. All underground drainage must be protected during the construction phase where intermediate cover is less than 900mm.
 13. Where foul and surface drains and/or sewers cross within 120mm of each other then concrete protection (Class Z bedding) may be required to prevent any potential cross-contamination.
 14. All cover levels shown are approximate only. All manhole covers are to be set at the proposed finished pavement or floor level provided by the Architect.
 15. All foul and surface water connections to be 100mm diameter unless stated. All external gully connections and channel drain sumpgully connections to be 150mm diameter unless otherwise stated. All gully and channel drain outlets to be trapped and roddable. All internal gullies and channel drains to be specified by others.
 16. Channel drains to have a 200mm minimum concrete bed and haunch and be fitted with a heel guard cast iron grating. Gratings to be load Class D400 specification unless otherwise agreed.
 17. All foul water stacks and RWPs to have low level roofing access plates unless an alternative means of access or maintenance is agreed. The access plate size must be in accordance with Document H and sited above any connected ground floor appliance soil level.
 18. All drainage connections passing through foundation bases and/or edge beams to be located within sealed sleeves. With the approval of the Engineer, drainage connections may be cast in with flexible joints either side. Flexible joints to be no greater than 150mm from face of the concrete.
 19. All manhole covers located within the road and car parking areas shall be Class D400. Covers within hard and soft landscaped areas with pedestrian traffic only shall be Class B125. Covers located within blockpaved areas are to be recessed to suit the proposed paving and of the appropriate grade. All internal covers are to be recessed, double sealed bolt down type such as howe green 5000 series or similar approved.
 20. Channels within Type 1 & 2 manholes must use pre-formed using clayware sections for pipes up to and including 300mm diameter. All manhole channels to be set at the appropriate level for the incoming and outgoing pipe gradients.
 21. All manholes connections to be formed at soffit to soffit unless otherwise stated. All internal branch connections to be made with swept bends in the direction of flow in the main pipe.
 22. All internal drainage connections are to be provided to the penetration positions shown on and coordinated by the Architect.

ALL DRAINAGE SHOWN INDICATIVELY AND IS SUBJECT TO CHANGE IN DETAILED DESIGN.

Foul Flow Calculation
 As per SFA7 B5.1 2(a)

FOUL NETWORK 1
 Total Developable Area = 18.07Ha
 18.07 x 0.6 = 10.84l/s

P3	Drainage revised to suit new layout	WC	09.03.21
P2	Drainage revised to suit new layout	WC	25.02.21
P1	Preliminary Issue	WC	15.02.21
Rev.	Description	Rev. by	Date

SGI Shepherd Gilmour
 Consulting Engineers
 Colchester House, 40 Peter Street
 Manchester, M2 5GP
 t: 0161 837 1500 w: www.shepherd-gilmour.co.uk

Client
FIRETHORN DEVELOPMENTS LTD.

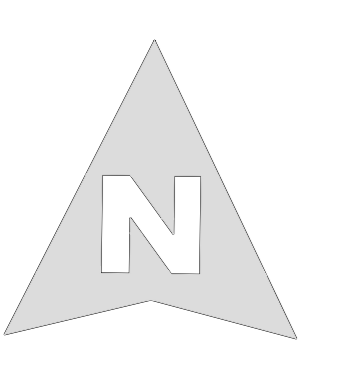
Architect
AEW ARCHITECTS

Project
LINK LOGISTICS PARK

Title
PRELIMINARY DRAINAGE SHEET 1 OF 2

Date	09.11.2020	Drawn By	WC
Size	A0	Checked By	EAJ
Scale	1:500	Approved By	EAJ

Dwg No. **C1442-102.1** Rev **P3**



CUT LINE - PLEASE SEE C1442-102.1

- Drainage notes**
- The drainage drawing is to be read in conjunction with all relevant Architects, Engineers drawings and specifications.
 - Do not scale this drawing. Any ambiguities, omissions and errors on the drawings shall be brought to the Engineer's attention immediately. All dimensions must be checked and verified on-site before construction commences.
 - All external underground drainage works are to be constructed in accordance with the Civil Engineering Specification for the Water Industry 7th Edition (ICESWI). Sewers for Adoption 3rd Edition (SFA) and any site-specific details provided on the contract drawings.
 - All internal underground drainage works are to be constructed in accordance with the Building Regulations Approved Document H (2015 Edition) and any site-specific details provided on the contract drawings.
 - The contractor must survey any retained drainage on-site and report the line, level and condition of the existing drainage to the engineer. We would recommend that the existing drainage is cleaned before any surveying and that these works are undertaken before the contractor commences on-site.
 - Any redundant manholes are to be broken out to at least 600mm below formation level and backfilled with an approved compacted granular material.
 - Any redundant pipes up to and including 300mm diameter are to be filled with a 10:1 PFA cement mix or broken out and backfilled with an approved compacted granular material. Any redundant pipes over 300mm diameter are to be broken out and backfilled with an approved compacted granular material.
 - Adoptable Drainage Pipes - All foul and surface water pipes up to and including 300mm diameter are to be Verified Clay in accordance with BS EN 252-1. All pipes greater than 300mm diameter are to be Concrete Class 120 in accordance with BS EN 1916:2002.
 - Private Drainage Pipes - All foul and surface water pipes up to and including 100mm diameter are to be Verified Clay in accordance with BS EN 252-1 or Solid Walled PVC-U in accordance with BS EN 1401. All foul and surface water pipes greater than 100mm diameter are to be Verified Clay in accordance with BS EN 252-1. Concrete Class 120 in accordance with BS EN 1916:2002 or Structural Walled PVC-U in accordance with BS 4351 and BS EN 13476.
 - All concrete manholes are to be in accordance with BS EN 1917. All plastic inspection chambers are to be in accordance with BS EN 13595.
 - All pipes laid within vehicle trafficked areas with less than 900mm of cover shall be surrounded in Class Z bedding. All pipes less than 300mm below the underside of a ground floor slab shall be surrounded in Class Z bedding. Where Class Z bedding is used as a surround a compressible material must be placed at every pipe joint to provide flexibility. All other pipes are to be laid in a Class S bedding.
 - All underground drainage must be protected during the construction phase where intermediate cover is less than 900mm.
 - Where foul and surface drains and/or sewers cross within 100mm of each other then concrete protection (Class Z bedding) may be required to prevent any potential cross-contamination.
 - All cover levels shown are approximate only. All manhole covers are to be set at the proposed finished pavement or floor level provided by the Architect.
 - All foul and surface water connections to be 100mm diameter unless stated. All external gully connections and channel drain sumpully connectors to be 150mm diameter unless otherwise stated. All gully and channel drain outlets to be trapped and roddable. All internal gullies and channel drains to be specified by others.
 - Channel drains to have a 200mm minimum concrete bed and haunch and be fitted with a heel guard cast iron grating. Gratings to be to load Class D400 specification unless otherwise agreed.
 - All foul water stacks and RWPs to have low level roofing access plates unless an alternative means of access or maintenance is agreed. The access plate size must be in accordance with Document H and sited above any connected ground floor appliance soil level.
 - All drainage connections passing through foundation bases and/or edge beams to be located within sealed sleeves. With the approval of the Engineer, drainage connections may be cast with flexible joints either side. Flexible joints to be no greater than 150mm from face of the concrete.
 - All manhole covers located within the road and car parking areas shall be Class D400. Covers within hard and soft landscaped areas with pedestrian traffic only shall be Class B125. Covers located within block-paved areas are to be recessed to suit the proposed paving and of the appropriate grade. All internal covers are to be recessed, double sealed both down type such as howe green 5000 series or similar approved.
 - Chambers within Type 1 & 2 manholes must use pre-formed using clayware sections for pipes up to and including 300mm diameter. All manhole chambers to be set at the appropriate level for the incoming and outgoing pipe gradients.
 - All internal branch connections to be formed at soffit to soffit unless otherwise stated. All internal branch connections to be made with swept bends in the direction of flow in the main pipe.
 - All internal drainage connections are to be provided to the penetration positions shown on and coordinated by the Architect.

ALL DRAINAGE SHOWN INDICATIVELY AND IS SUBJECT TO CHANGE IN DETAILED DESIGN.

Foul Flow Calculation
As per SFA7 B5.1 2(a)

FOUL NETWORK 1
Total Developable Area = 18.07Ha
18.07 x 0.6 = 10.84/s

- LEGEND**
- SITE BOUNDARY
 - PROPOSED FOUL SEWER
 - PROPOSED SURFACE WATER SEWER
 - PROPOSED OUTFALL TO MANCHESTER SHIP CANAL
 - PROPOSED OUTFALL TO ATTENUATION POND
 - EXISTING SEWER
 - EXISTING OUTFALL TO MANCHESTER SHIP CANAL
 - EXISTING OUTFALL TO RIVACRE BROOK
 - EXISTING DRAINS TO BE REMOVED

P3	Drainage revised to suit new layout	WC	09.03.21
P2	Drainage revised to suit new layout	WC	25.02.21
P1	Preliminary Issue	WC	15.02.21
Rev.	Description	Rev. by	Date

Shepherd Gilmour
Consulting Engineers
Colchester House, 40 Peter Street
Manchester, M2 5GP
t: 0161 837 1500 w: www.shepherd-gilmour.co.uk

Client
FIRETHORN DEVELOPMENTS LTD.

Architect
AEW ARCHITECTS

Project
LINK LOGISTICS PARK

Title
PRELIMINARY DRAINAGE SHEET 2 OF 2

Date	09.11.2020	Drawn By	WC
Size	A0	Checked By	EAJ
Scale	1:500	Approved By	EAJ
Dwg No.	C1442-102.2	Rev	P3



Shepherd Gilmour
Consulting Engineers

Colchester House, 40 Peter Street, Manchester M2 5GP

(44)0161 837 1500

www.shepherd-gilmour.co.uk

APPENDIX F1



Detailed Flood Map centred on North Road, Ellesmere Port, CH65 1AB. Created on 05/01/2021 [GMMC199223AB]



1:10,001



Legend

-  Site Location
-  Rivacre Brook
-  Manchester Ship Canal
-  Main River
-  Flood Zone 3
-  Flood Zone 2

Map Reference	Model Node Reference	Existing	Nothing	Data	Undersized (Present)													Undersized (Future)					
					50 % AEP (1 in 2 year)	25 % AEP (1 in 5 year)	10 % AEP (1 in 10 year)	5 % AEP (1 in 20 year)	4 % AEP (1 in 25 year)	2 % AEP (1 in 50 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 30% increase in flow	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.5 % AEP (1 in 200 year)	0.5 % AEP (1 in 200 year) + 30% increase in flow	0.1 % AEP (1 in 1000 year)	0.1 % AEP (1 in 1000 year) + 30% increase in flow	0.5 % AEP (1 in 200 year)	0.5 % AEP (1 in 200 year) + 30% increase in flow	0.1 % AEP (1 in 1000 year)	
1	ea013_0246_RACR01_0462	338711	378832	Modelled Water Level (m aodN)	5.55	5.78	5.98	6.17	6.22	6.45	6.56	6.63	7.19	7.22	7.40	6.86	7.33	7.46	7.67	7.10	7.80	7.30	
				Modelled Flow (cumecs)	5.02	6.81	6.35	5.81	10.01	11.58	12.38	12.85	13.73	14.02	15.01	14.45	15.25	16.02	17.70	11.64	8.30	8.30	8.30
				Modelled Water Level (m aodN)	5.25	5.40	5.47	5.54	5.58	5.64	5.68	5.70	6.03	6.06	6.40	6.18	6.86	6.89	7.06	6.89	7.16	6.89	7.16
2	ea013_0246_RACR01_0145H	338693	378863	Modelled Water Level (m aodN)	5.10	5.32	5.41	5.70	10.11	11.69	12.48	12.94	13.26	15.00	17.15	14.48	16.50	11.75	13.40	10.64	14.92	7.25	
				Modelled Flow (cumecs)	5.21	5.23	5.24	5.25	5.25	5.27	5.28	5.28	6.81	6.81	6.83	5.30	6.82	5.30	6.85	5.30	6.85	5.30	6.85
				Modelled Water Level (m aodN)	5.29	7.10	6.58	6.86	10.27	11.84	12.62	13.07	16.09	16.32	17.07	11.62	16.38	16.04	20.22	16.04	20.22	16.04	20.22

Model data taken from Rivera Brook 2017 Study

AEP - Annual Exceedance Probability

m aodN - metres above ordnance datum Northey

cumecs - cubic metres per second

Note: *Climate Change Scenario - 30%, 35% and 70% increases in flow calculated for the 2050s (2070 - 2150). Please see <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> for more information regarding the new climate change guidance. The location of the site and the type (vulnerability) of development determine the climate change allowances to consider in any flood risk assessment.

Map Reference	Model Node Reference	Existing	Nothing	Data	Model run in representative of a single gate failure on every set of abutment structures. Maximum gate opening height is set to 2.4m.										Model run in representative of present conditions and all gates are operational as per the agreed automated process. Maximum gate opening height is set to 2.4m. This run is the same as used in the flood map products.									
					50 % AEP (1 in 2 year)	25 % AEP (1 in 5 year)	4 % AEP (1 in 25 year)	2 % AEP (1 in 50 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + Climate Change*	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)	50 % AEP (1 in 2 year)	20 % AEP (1 in 5 year)	4 % AEP (1 in 25 year)	2 % AEP (1 in 50 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + Climate Change*	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)		
4	ea013_Moah_MSC001_417	330375	378609	Modelled Water Level (m aodN)	4.62	4.62	4.62	4.62	4.62	4.62	4.86	4.62	4.62	4.62	4.62	4.62	4.62	4.62	4.62	4.62	4.62			
				Modelled Flow (cumecs)	75.80	72.17	73.87	69.20	66.46	101.98	112.20	260.38	191.98	72.20	68.30	67.64	67.64	67.64	67.64	67.64	67.64	67.64	67.64	
5	ea013_Moah_MSC001_421	330645	378609	Modelled Water Level (m aodN)	4.63	4.63	4.63	4.63	4.63	4.63	4.85	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63			
				Modelled Flow (cumecs)	72.34	68.74	69.33	64.65	62.97	102.59	106.61	155.81	265.61	75.80	69.72	64.90	64.92	64.92	64.92	64.92	64.92	64.92	64.92	
6	ea013_Moah_MSC001_424	330680	378154	Modelled Water Level (m aodN)	4.61	4.61	4.61	4.61	4.61	4.61	4.86	4.61	4.61	4.61	4.61	4.61	4.61	4.61	4.61	4.61	4.61			
				Modelled Flow (cumecs)	64.20	60.53	61.95	57.70	56.93	100.26	103.07	146.88	260.38	69.76	64.06	58.66	57.38	57.38	57.38	57.38	57.38	57.38	57.38	

Model data taken from Manchester Ship Canal 2010 Study

AEP - Annual Exceedance Probability

m aodN - metres above ordnance datum Northey

cumecs - cubic metres per second

Note: *Climate Change Scenario - We only hold climate change measurements based on the previous climate change guidance (20% increase in flow). The new climate change guidance is available at <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>. The location of the site and the type (vulnerability) of development determine the climate change allowances to consider in any flood risk assessment.

For the Manchester Ship Canal Models, we provide the following two scenarios:

1. Model run in representative of present conditions and all gates are operational as per the agreed automated process. Maximum gate opening height is set to 2.4m. This run is the same as used in the flood map products.
2. Model run in representative of a single gate failure on every set of abutment structures. Maximum gate opening height is set to 2.4m.