BURO HAPPOLD

SIM - Sitewide Capital Works

Drainage Strategy

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18 April 2024

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1 Executive Summary

This drainage strategy has been prepared in support of the planning application and to set the principles for the drainage design to serve the proposed development at the Science and Industry Museum .

The site ownership area is circa 2.21 hectares in area and located in central Manchester, within the Castlefield Conservation Area. The site is bounded by Lower Byrom Street to the east, Liverpool Street to the south, Water Street to the west and commercial developments directly north of the site.

The proposed development comprises of the phased refurbishment of the Upper Yard and Station Approach public realm areas, temporary landscaping in the Heart Space, and repairs and making good to the plant room deck and the former vehicle ramp area.

The aspiration for all new developments is to reduce surface water runoff rates to the equivalent greenfield rate (Qbar) which can equate to a reduction of over 95%. In order to achieve this reduction in discharge rate it is typically necessary to provide stormwater storage in the form of an attenuation basin, buried tank or similar.

Guidance issued by Manchester City Council, in their capacity as the Lead Local Flood Authority (LLFA), acknowledges that such significant reductions in discharge rate may not be achievable on previously developed sites where the necessary attenuation volumes cannot be accommodated. In such cases the guidance recommends pre-application discussions are held with the LLFA to agree an alternative approach.

Through consultation with the LLFA, it was acknowledged that the historic nature of the site poses significant constraints to development mainly relating to the site's unique location being partially situated atop an existing viaduct. It was therefore agreed with the LLFA that, due to the site constraints, the proposed drainage strategy will retain the existing drainage regime and points of connection with a like-for-like proposal.

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2 Introduction

2.1 Appointment and Brief

This drainage strategy has been prepared in support of the full planning application relating to the proposed development at the Science and Industry Museum (herein referred to as the proposed development). This report specifically relates to the full planning application for the phased refurbishment of the Upper Yard and Station Approach public realm areas, temporary landscaping in the Heart Space, and repairs and making good to the plant room deck and the former vehicle ramp area.

2.2 Limitations

This report is based on the interpretation and assessment of data provided by third parties. It should be noted that the detailed design of the drainage and associated Sustainable Drainage Systems (SuDS) features for the site has not been finalised and the assumptions and information presented here is therefore subject to design development. Operation and maintenance of all SuDS (including proprietary systems) will need to be considered once the proposed development has been finalised with all specific information presented to those responsible for the maintenance of this site. Buro Happold cannot be held responsible for the accuracy of third-party data or the conclusions that come from this information or as a result of changes arising from the developing design. The conclusions and findings of this report may change if the proposed development is amended or updated after the date of publishing.

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3 Site Description

3.1 Existing Site

The site ownership area is circa 2.21 hectares in area and located in central Manchester, within the Castlefield Conservation Area. The post code and grid reference of the site are M3 4JP and SJ 83150 97851 respectively. The site is bounded by Lower Byrom Street to the east, Liverpool Street to the south, Water Street to the west and commercial developments directly north of the site.

The planning application boundary encompasses two primary areas within the wider ownership boundary: the Upper Yard and the Station Approach. The Upper Yard is an area of external landscaping situated to the east of the site, in-between the New Warehouse and Power Hall. The Station Approach is a section of a historic railway viaduct and station platform located between the 1830s Warehouse to the north and the Station Building and Station Master's house to the south. Figure 3—1 presents the site boundary and its relative location.

Based on the Flood Map for Planning the site is located in Flood Zone 1 which is classified as having a less than 0.1% (1 in 1000) annual probability of river (fluvial) or sea (tidal) flooding. The Manchester City, Salford City and Trafford Strategic Flood Risk Assessment (SFRA) identifies the site as being located within the Conurbation Core Critical Drainage Area. For further details of the flood risk at the site from all sources, please refer to the Flood Risk Assessment (FRA) which accompanies this application.

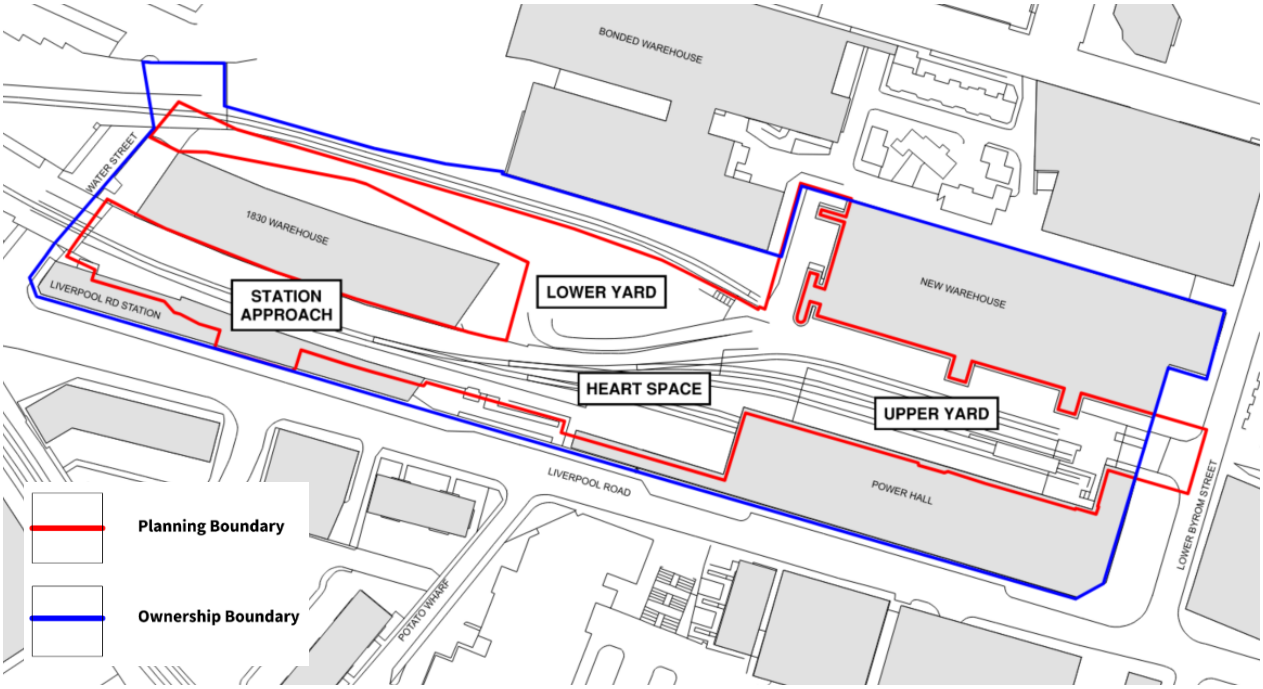

Figure 3—1 Science and Industry Site Plan

3.2 Existing Topography

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The external hard landscaped area within the Upper Yard, to the south of the New Warehouse, falls in a westerly direction, away from the main entrance gates on Lower Byrom Street, however, the majority of the Upper Yard is relatively level. Existing surface levels undulate across the yard, mainly as a result of the poor condition of the existing hardstanding. Levels fall from a high point of circa 33.17m AOD at the eastern entrance to a level of circa 31.90m AOD in the yard. A level of circa 31.9m AOD continues across the viaduct towards the Station Approach.

The Upper Yard and Viaduct are elevated above the Lower Yard by approximately 4.5m. The Lower Yard, situated to the west of the site and north of the 1830s Warehouse, falls in a westerly direction towards Water Street from a level of 27.40m AOD to circa 26.20m AOD.

Refer to Appendix A for the topographical survey.

3.3 Existing Waterbodies and Watercourses

There are no known watercourses or waterbodies within the boundary of the site. The nearest charted watercourse to the site is The River Irwell, a Main River managed by the Environment Agency, located 60m north-west of the site.

In addition, a data screening was undertaken for the Science and Industry Museum by the LLFA to identify any culvert conduits that could be located within the site and not registered on the public sewer records. No culverts were identified within or in close proximity to the site boundary. A copy of the LLFA data screening response is provided in Appendix B.

Further from the site, the Bridgewater Canal is located 60m south of the site and the River Medlock, a main river managed by the Environment Agency, is located 140m south of the site.

3.4 Existing Drainage

The existing drainage details presented in this section is based on information extracted from United Utilities Asset Records (2023), a GPR survey (2023), a CCTV drainage survey (2023) and a topographical survey (2023) of the site and surrounding area. A plan of the existing drainage is provided in Appendix E.

3.4.1 Public Drainage

United Utilities sewer records (2023), see Figure 3—2, show that the site is surrounded by an extensive network of combined sewers. Within Water Street to the west of the site, a 390x510mm combined sewer runs south before connecting into a 620x920mm sewer in Liverpool Road. At the junction of Water Street and Liverpool Road, the asset records indicate a combined sewer overflow which flows into the River Irwell. To the east of the site a 300mm brick sewer originates adjacent to the main entrance of the museum before connecting into the 620x920mm sewer in Liverpool Road.

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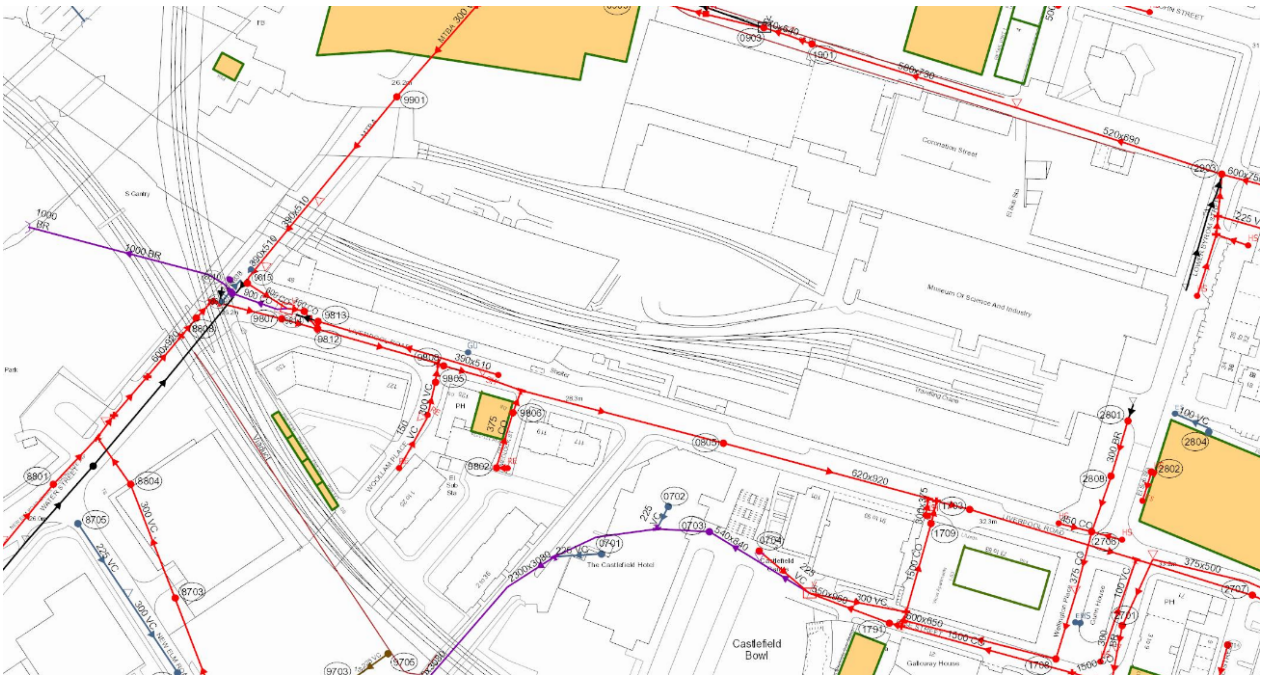

Figure 3—2 United Utilities Asset Records

3.4.2 Private Drainage

As much of the existing site is atop an existing viaduct structure, the way in which the site drains varies. The existing surface water drainage regime can therefore be described as distinct catchments, specifically:

- **Upper Yard:** Located in the east of the site, the Upper Yard is mostly ground-bearing and utilises a traditional below-ground surface water drainage network (gullies and pipework) which outfalls to the Lower Yard via a single downpipe. This network discharges to a combined drain within the Lower Yard which outfalls to the public combined sewer on Water Street.
- **Lower Yard:** Located in the north-west of the site, but beyond the application boundary, the Lower Yard is ground-bearing and drains via a traditional below ground drainage network that also conveys the surface water drainage from the Upper Yard to the public sewer in Water Street. There are two combined systems and one surface water culvert within the Lower Yard.
- **Heart Space (Eastern Viaduct):** The existing drainage regime atop the viaduct is similar to that of a conventional roof which drains independently to the Upper and Lower yards. The eastern section of the viaduct drains via a series of hoppers and downpipes which are visible within the viaduct undercroft. This section of the viaduct outfalls into the below ground drainage network within the Lower Yard.
- **Station Approach (Western Viaduct):** The western section of the viaduct drains via a series of large drainage troughs which convey surface water along the viaduct and outfall to ground level via a single downpipe to ground level.

Refer to Appendix D for existing drainage plans and Figure 3—3 for an indicative drainage layout.

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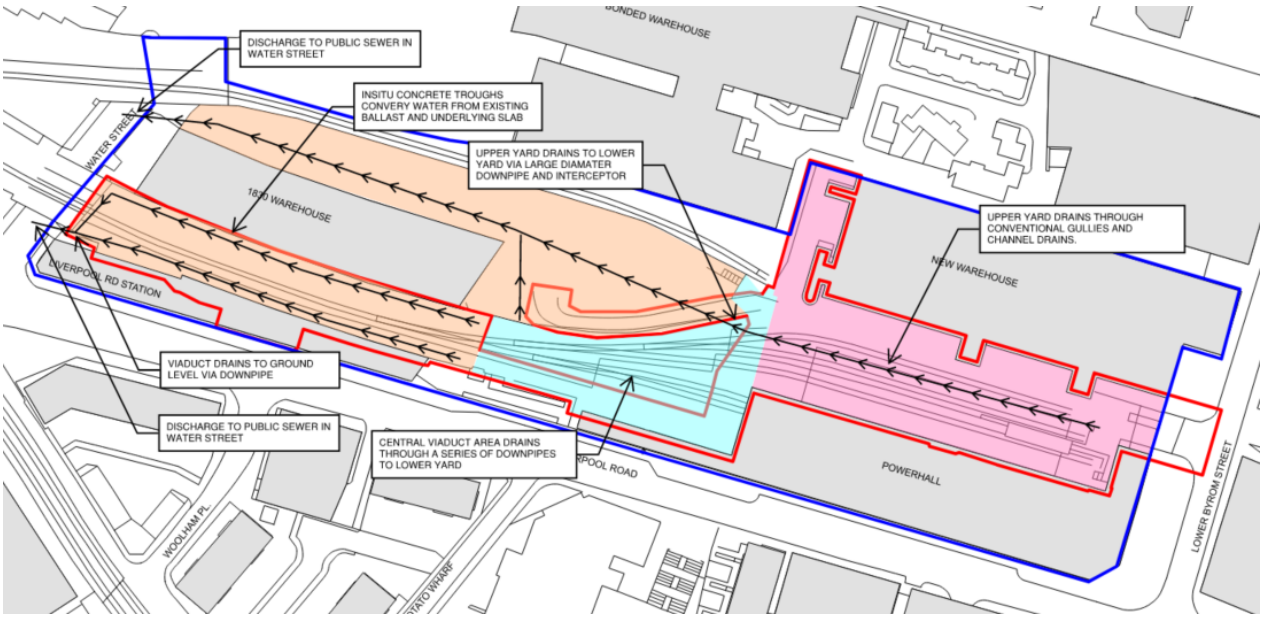

Figure 3—3 Indicative Existing Surface Water Drainage Layout

Further details relating to the existing drainage systems are detailed below.

Upper Yard (within application boundary)

Based on CCTV surveys and site inspections, the Upper Yard drains via a series of existing gullies and linear channels into a below ground surface water network. A 225mm surface water pipe runs through the Upper Yard in a westerly direction towards the Lower Yard where it discharges into the Lower Yard via an existing downpipe. The large diameter downpipe is connected to an existing bypass separator shown in Figure 3—4. The 225mm surface water pipe within the Upper Yard also collects nine rainwater pipes draining the southern elevation of the New Warehouse

Figure 3—4 Surface water downpipe connecting Upper Yard to Lower Yard

After draining into the Lower Yard, the surface water pipe connects into a combined system which runs the length of the Lower Yard in a westerly direction before connecting into the public combined sewer in Water Street.

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Lower Yard

There are two combined systems and one surface water system within the Lower Yard. The northern combined drain conveys water from the Upper Yard and New Warehouse. The southern combined drain collects foul water from the 1830s Warehouse in addition to surface water drainage collected from the eastern end of the viaduct. The two combined drainage runs combine prior to discharging into the existing public combined sewer in Water Street.

A surface water culvert approx. 900x900mm is also located within the Lower Yard. The culvert is understood to drain several gullies within the Lower Yard in addition to historical drainage assets originating from the land to the north of the site. The culvert is not identified on historical mapping and surveys have been undertaken to understand its connectivity. A CCTV survey established that the culvert extends west through the site and connects into another culvert within Water Street. No accesses into the culvert have been identified outside of the site boundary therefore its connectivity beyond Water Street is unknown.

Station Approach (within application boundary)

The existing drainage regime on the Station Approach acts similar to a permeable paving system. Surface water on the viaduct infiltrates through the existing railway ballast to the underlying structural slab. From here, the slab is laid to camber to shed water towards existing drainage troughs on the north and south side of the viaduct and which run parallel with the station platform.

The southern trough runs in a westerly direction from the pedestrian ramp at the east of the platform and terminates at the western end of the platform. The majority of the trough is covered by visible timber planks which can be lifted in some areas, see Figure 3—5. Several rainwater pipes draining the northern elevation of the station building outfall into the southern side of the trough.

Figure 3—5 Southern Trough

The northern trough, located north of the railway, runs in a westerly direction parallel to the 1830s Warehouse. Several rainwater pipes draining the southern elevation of the 1830s Warehouse outfall directly into the top of the trough. See Figure 3—6. To the western end of the viaduct, the trough drains south to connect to the southern trough adjacent to the platform.

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Figure 3—6 Northern trough

The drainage troughs convey water towards the south-west corner of the viaduct where they drain to ground level via the existing downpipe fixed to the bridge abutment, see Figure **3**—**7**. From ground level, surface water is discharged to the existing public combined sewer in Water Street.

Figure 3—7 **Downpipe from station viaduct**

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4 Proposed Development

The proposed development comprises of the phased refurbishment of the Upper Yard and Station Approach public realm areas, temporary landscaping in the Heart Space, and repairs and making good to the plant room deck and the former vehicle ramp area. As defined on the phasing plan 2913-PLA-XX-XX-DR-L-0024, Phase 1 includes works to Upper Yard areas including: new accessible routes; new planters; new fixed furniture; re-surfacing including with new materials; repair and relaying of existing cobbles; works to underground services to accommodate the scheme, building repairs and associated works. Phase 2 includes works to Station Approach areas including: new accessible routes; new planting areas; new fixed furniture; re-surfacing including with new materials; works to underground services to accommodate the scheme, building repairs and associated works. Phase 3 includes temporary re-surfacing works in the Heart space. Phase 4 includes repairs and making good works to the hard landscaping beneath and the viaduct façade adjacent to the location of the former vehicle ramp. The phases of the development are severable.

.Figure 4—1 illustrates the proposed development forming this planning application.

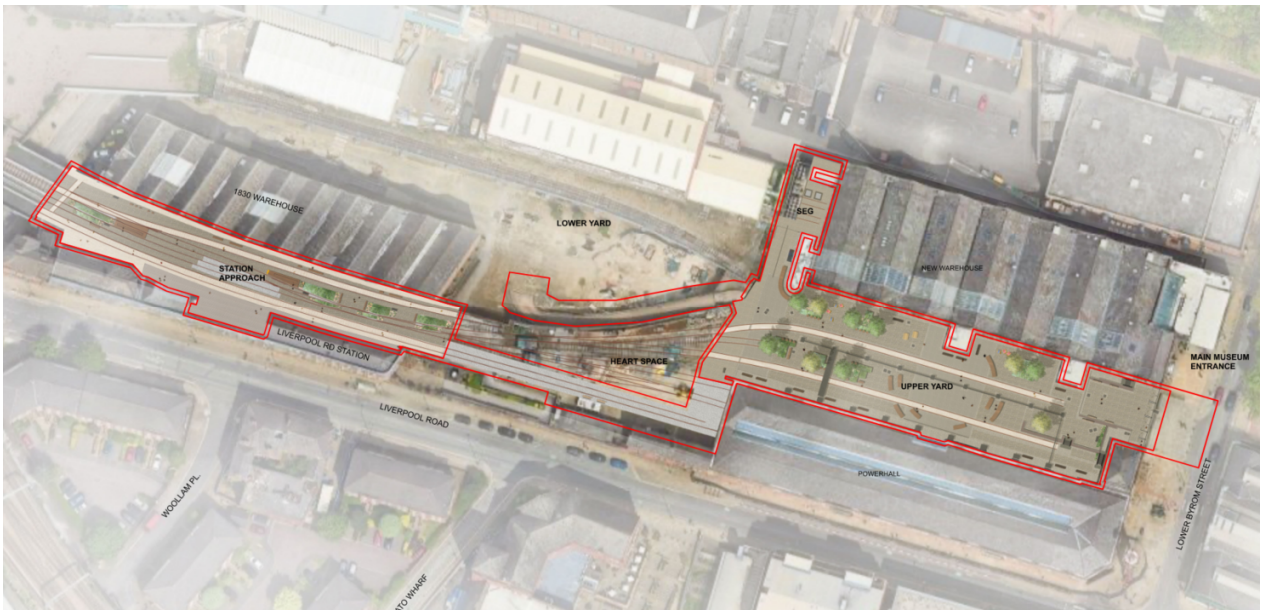

Figure 4—1 Proposed Illustrative Plan

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5 Proposed Surface Water Strategy

5.1 General

New developments are required to cater for all surface water that will be generated within the site, so as not to cause flooding, damage or inconvenience to on-site or off-site areas. In accordance with associated legislation, local policy and general best practice, this will typically require the introduction of a dedicated surface water drainage network that intercepts, treats and stores surface water prior to it being discharged from site.

A surface water drainage system will be provided to collect surface water runoff from hardstanding areas. Primary runoff will be from hard impermeable surfaces such as roofs and any exposed areas of hardstanding. Allowance will be made to include green areas that may fall towards the buildings, particularly where infiltration is not viable in the proposed development.

The aspiration for all new developments is to reduce surface water runoff rates to the equivalent greenfield rate (Qbar) which can equate to a reduction of over 95%. In order to achieve this reduction in discharge it is typically necessary to provide stormwater storage in the form of an attenuation basins, buried tanks or similar.

Guidance issued by Manchester City Council, in their capacity as the Lead Local Flood Authority (LLFA), acknowledges that such significant reductions in discharge rate may not be achievable on previously developed sites where the necessary attenuation volumes cannot be accommodated. In such cases the guidance recommends pre-application discussions are held with the LLFA to agree an alternative approach.

5.2 Consultation

5.2.1 Manchester City Council (Lead Local Flood Authority)

A meeting with a Drainage Officer from Manchester City Council (MCC), in its capacity as the LLFA, was held on 16 May 2023. A summary of the discussions with the LLFA is provided below. Refer to Appendix C for full correspondence.

The LLFA acknowledged that the historic nature of the site poses significant constraints to development, including the location being partially situated atop an existing viaduct or otherwise within a heavily industrialised site. It was agreed that the proposed drainage strategy should retain the existing drainage regime and points of connection with a like-for-like proposal. It was noted that more stringent policy requirements will need to be met if the proposed drainage design requires alterations to the existing strategy.

It was agreed with the LLFA that, within the proposed drainage strategy, evidence of the existing drainage connectivity and suitability for the proposed development will be provided. In addition, evidence should also be provided to show that the drainage catchment area will not increase as a result of the proposed development. Finally, in cases where it is feasible, the proposals will aim to incorporate any improvements in accordance with the drainage hierarchy, such as SuDS or rainwater harvesting.

5.3 Drainage Hierarchy

Best practice for the management of surface water, based on Building Regulations 2010 Part H (2015 edition) and in line with LLFA guidance, states that runoff from a site should discharge in accordance with the drainage hierarchy. Surface water runoff should therefore discharge to one of the following in order of priority:

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- Discharge to the ground via a soakaway or other adequate infiltration system;
- Discharge to a watercourse;
- Connection to a surface water drain; or,
- Connection to a combined drain.

Soakaway / Infiltration

As much of the proposed development is located atop an existing viaduct, or in close proximity to the existing buildings and surrounding developments, it not deemed practical to discharge surface water to ground.

Watercourse

The River Irwell is located approximately 60m west of the site, however, an existing surface water connection from the site has not been identified. Due to the third-party land between the site and River Irwell, any new direct connection to the watercourses is not considered viable.

Surface Water Drain

No public surface water sewers have been identified in close proximity to the site. A surface water culvert has been identified within the Lower Yard which connects to a another culvert in Water Street. As the this culvert has not been identified on record drawings and surveys have not been able to prove its connectivity beyond Water Street, it cannot be relied upon as a suitable discharge option for the site.

Combined Drain

Based on existing drainage surveys the Upper Yard and Station Viaduct currently discharges surface water to the public combined sewer network in Water Street to the west of the site. As agreed with the LLFA, it is proposed to retain the existing outfall connections from the site to ensure no detriment to flood risk and the established drainage regime.

5.4 Proposed Strategy

As agreed with the LLFA, the proposed surface water drainage strategy retains the existing drainage regime and the existing outfalls to the public sewer network. All existing sitewide drainage outside of the proposed development within the Upper Yard and Station Approach is to be retained as existing. The proposed surface water drainage plans are provided in Appendix E.

5.4.1 Upper Yard

In order to drain surface water from the newly landscaped area, a series of linear channel drains and gullies have been proposed which will integrate into the new finished levels. The discharge from these drains will be directed to the existing surface water outfall, at the western end of the Upper Yard, in order to retain the existing drainage strategy as agreed with the LLFA. Whilst retaining the existing drainage strategy and outfall it is proposed to replace the majority of the below ground surface water network in the Upper Yard, in order to rationalise and remediate the existing below ground drainage.

The existing surface water outfall to the west of the Upper Yard will continue to drain to the Lower Yard via a downpipe. Surface water will continue to drain in a westerly direction through the Lower Yard before ultimately discharging to the public sewer in Water Street via the existing connection. It is proposed to retain the existing drainage infrastructure within the Lower Yard.

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The Upper Yard is deemed to have low pollution risks from the contributing roof and pedestrian areas, and a medium pollution risk from the delivery area. As SuDS components are not deemed practical for this area due to the viaduct structure and below ground constraints, it is proposed to mitigate all pollution hazards to acceptable levels by retaining the proprietary interceptor at the point of outfall from the Upper Yard to the Lower Yard. As part of the proposed works, the existing bypass interceptor is to be remediated to ensure it is fully functional. If this is not possible, it is proposed to replace the existing interceptor with a new propriety system with adequate hazard mitigation.

5.4.2 Station Approach

Atop the existing viaduct it is proposed to retain the existing drainage regime which relies on the infiltration of surface water through the existing ballast to the underlying structural slab. From here, the slab is laid to camber to shed water towards existing drainage troughs that run parallel to the north and south of the viaduct. In order to retain this approach, the surfacing and associated subgrade will be permeable to promote the infiltration of rainwater and replicate the permeable nature of the ballast. The drainage troughs will continue to convey water towards the south-west corner of the viaduct where the existing outfall and downpipe arrangement will be retained to discharge all surface water to the public sewer in Water Street.

Whilst retaining the existing drainage strategy and outfall, it is proposed to remediate the existing drainage infrastructure where necessary. It is proposed to waterproof the existing viaduct slab and drainage troughs to ensure all water is drained to the network and reduce the risk of water ingress in the structures below.

5.5 Pollution Control

It is widely recognised that diffuse pollution from urban surface water runoff is a significant factor which compromises receiving waterbodies including watercourses and groundwater. As such there is a requirement to identify and mitigate the impact of poor water quality originating from new developments.

The SuDS Manual (CIRIA C753) provides various methodologies for identifying potential sources of pollution within developments and a means of determining the treatment potential the various SuDS techniques can offer. The Simple Index Approach allocates pollution hazard indices against the proposed land use, along with pollution mitigation indices for each SuDS component. To ensure adequate treatment is being provided, the selected SuDS components must have a total pollution mitigation index equal to or greater than the pollution hazard index associated with the land use of the contributing drainage area.

The pollution hazard indices for the proposed land use within the development are as follows, based on Table 26.2 of the SuDS Manual.

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Commercial roofs	Low	0.3	0.2	0.05
Pedestrianised areas and low trafficked roads	Low	0.5	0.4	0.4
Commercial yard and delivery areas	Medium	0.7	0.6	0.7

Table 5—1 Pollution Hazard Indices (based on Table 26.2 of the SuDS Manual)

Following a screening exercise the following table presents the mitigation indices for a range of SuDS components proposed for the proposed development,

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SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable pavement	0.7	0.6	0.7
Proprietary treatment system (SPEL Stormceptor)	0.8	0.6	0.9

Table 5—2 Indicative SuDS Mitigation Indices (based on Table 26.3 of the SuDS Manual)

The proposed site is deemed to have low pollution risks from its roof and pedestrian areas, and a medium pollution risk from its delivery areas. Permeable paving is proposed within the Station Approach whilst a SPEL Stormceptor, or similar product, is proposed in order to mitigate all pollution hazards to acceptable levels within the Upper Yard. Since the mitigation index exceeds the pollution hazard index, this method of hazard mitigation is deemed sufficient.

5.6 Site Wide Strategy

The proposed drainage strategy takes into account the long-term sitewide ambition at the Science and Industry Museum and is designed to be unaffected by all planned and envisaged works across the museum site. As discussed in section 3.4.2, the existing surface water drainage regime can be described as distinct catchments which are retained by the proposed strategy.

The application boundary encompasses the Upper Yard and Station Approach which represent the upstream areas of the site and are elevated from the Lower Yard. Given this, the Lower Yard can be developed without the need to increase the drainage capacity within the application boundary.

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6 Conclusions

This drainage strategy has been prepared in support of the full planning application relating to the proposed development at the Science and Industry Museum. This report specifically relates to the full planning application for the phased refurbishment of the Upper Yard and Station Approach public realm areas, temporary landscaping in the Heart Space, and repairs and making good to the plant room deck and the former vehicle ramp area.

Through consultation, the LLFA has acknowledged that the historic nature of the site poses significant constraints to development. It has therefore been agreed with the LLFA that, due to the site constraints, the proposed drainage strategy will retain the existing drainage regime and points of connection with a like-for-like proposal. Whilst retaining the existing strategy, the existing surface water drainage network is to be rationalised and remediated where necessary to adequately drain the site.

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Appendix A Topographical Survey

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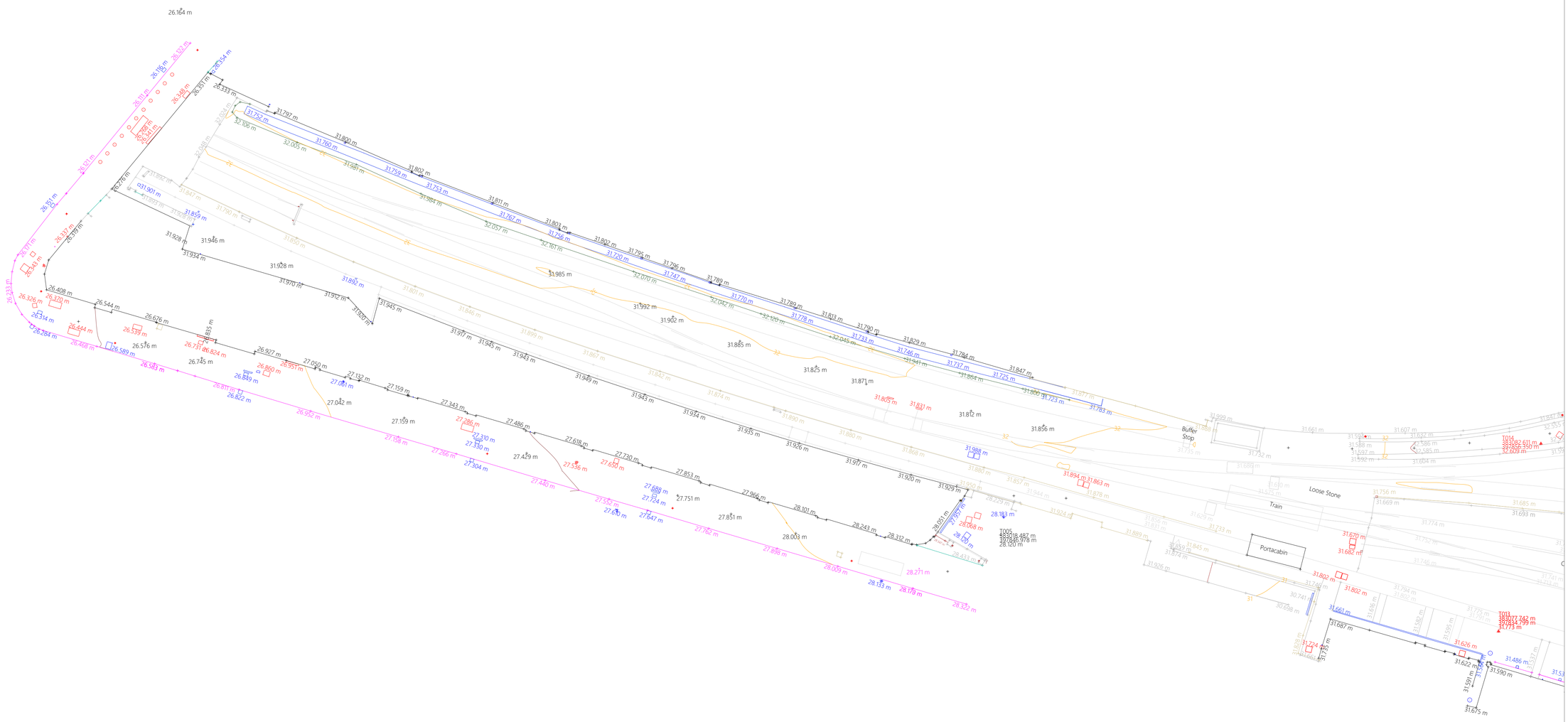

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KEY:

Topographical Survey Legend

Bol	Bollard	PT	Post
Bin	Litter bin	PM	Parking meter
BS	Bus stop	PP	Power point
BT	British telecom	RE	Rodding eye
BB	Bottom of bank	RIDGE	Roof/ridge level
Cam	Security camera	RS	Road sign
CATV	Cable television	RWP	Rain water pipe
CL	Cover level	SL	Soffit level
DR	Drain	SH	Shrub
DK	Dropped kerb	SLAB	Slab level
Elec	Electrical c	STAY	Cable stay
EP	Electrical pole	STEP	Step level
ER	Earth rod	SV	Stop valve
FP	Flag pole	SVP	Soil pipe
FL	Floodlight	TL	Stop tap
FH	Fire hydrant	TL	Traffic light
FL	Floor level	TOB	Top of building
T	Floodlight	TB	Top of bank
FG	Gully	TOW	Top of wall
GP	Gate post	TP	Telegraph pole
GV	Gas valve	TS	Traffic signal
HYD	Hydrant	TAC	Tactile area
IC	Inspection cover	TR	Tree
IL	Invert level	VP	Vent pipe
LP	Lamp post	WL	Water level
MH	Manhole	WM	Water meter
MP	Mile post	WO	Water outlet
MKR	Utility marker	UTL	Unable to lift

Fence

Gate

Hedge

Limit of foliage & tree canopy

50.00 Spot level

Survey station

Tree

Meters

5 0 5 10

1:250

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Museum of Science and Industry

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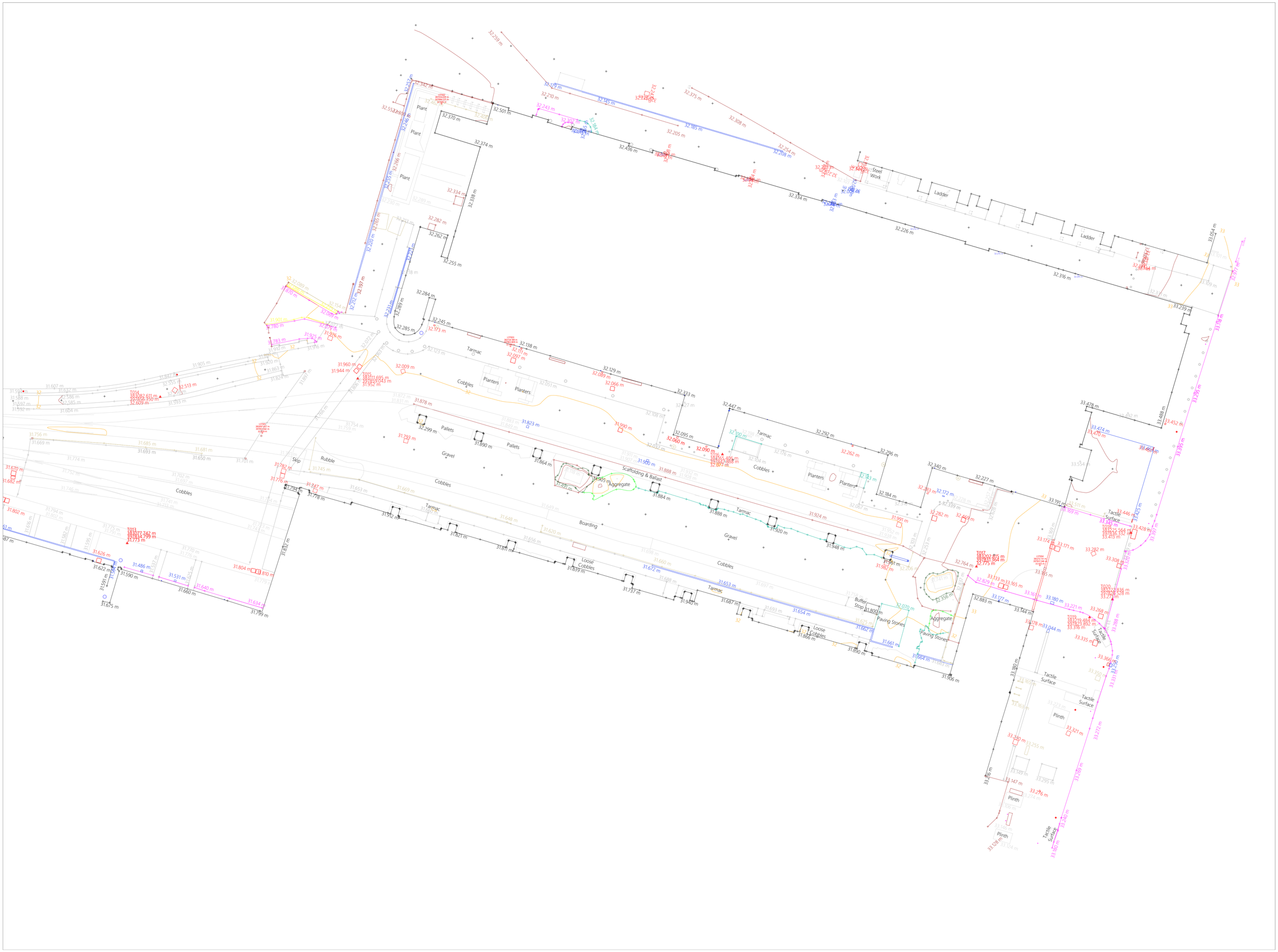

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This drawing to be read in conjunction with all other relevant information whether produced by Christians Environmental Ltd or by others. Any inconsistencies to be notified to the company immediately.

DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE

KEY:

Topographical Survey Legend

Bol	Bollard	PT	Post
Bin	Litter bin	PM	Parking meter
BS	Bus stop	PP	Power point
BT	British telecom	RE	Rodding eye
BB	Bottom of bank	RIDGE	Roof/ridge level
Cam	Security camera	RS	Road sign
CATV	Cable television	RWP	Rain water pipe
CL	Cover level	SL	Soffit level
DR	Drain	SH	Shrub
DK	Dropped kerb	SLAB	Slab level
Elec	Electrical c	STAY	Cable stay
EP	Electrical pole	STEP	Step level
ER	Earth rod	SV	Stop valve
FP	Flag pole	SVP	Soil pipe
FL	Floodlight	T1	Strip tap
FH	Fire hydrant	TL	Traffic light
FL	Floor level	TOB	Top of building
T	Floodlight	TB	Top of bank
FG	Gully	TOW	Top of wall
GP	Gate post	TP	Telegraph pole
GV	Gas valve	TS	Traffic signal
HYD	Hydrant	TAC	Tactile area
IC	Inspection cover	TR	Tree
IL	Invert level	VP	Vent pipe
LP	Lamp post	WL	Water level
MH	Manhole	WM	Water meter
MP	Mile post	WO	Water outlet
MKR	Utility marker	UTL	Unable to lift

Fence

Gate

Hedge

Limit of foliage & tree canopy

50.00 Spot level

Survey station

Tree

Meters

5 0 5 10

1:250

CHRISTIANS
SURVEY & INSPECTION SOLUTIONS

Christians Ltd (Lancashire)
37-39 Manor Court | Salesbury Hall Road | Ribchester | Preston | PR3 3XR
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E: info@christiansltd.com
W: www.christiansltd.com

Christians Ltd (Cumbria)
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T: +44 (0) 1254 790810
E: info@christiansltd.com
W: www.christiansltd.com

Client
Site Owner

Project
Museum of Science and Industry

Drawing Title
Topographical Plan

Scale
1:250 @ A1

Date
May 2023

Drawing Number
MOSI-TOPO-002

Drawn By
CEL-SKM

Revision
A

Appendix B LLFA Data Screening

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MANCHESTER
CITY COUNCIL

Lead Local Flood Authority
Highways Service
Growth and Neighbourhoods Directorate
Manchester City Council
PO Box 532
Town Hall
Manchester
M60 2LA
Email: floodriskmanagement@manchester.gov.uk

DATE 15/05/2023

Dear Sir or Madam,

RE: Our Ref: MCC015/05/2023

We acknowledge with thanks your payment received on 12/05/2023 for our LLFA data screen service.

Please find enclosed plan showing the results of the data screen. The position of features shown on this plan is approximate only and is given in accordance with the best information currently available.

The enclosed plan cannot be used to substitute a competent site investigation.

The enclosed plan is being provided to you subject to Manchester City Council's terms and conditions which are shown attached.

I trust the above meets your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter, please do not hesitate to contact us.

Yours Faithfully,

Laura Peacock, Flood Risk Engineer, Lead Local Flood Authority

MANCHESTER
CITY COUNCIL

TERMS AND CONDITIONS – LLFA DATA SCREEN

These provisions apply to LLFA data supplied by Manchester City Council ("MCC").

TERMS AND CONDITIONS:

- This data Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- MCC has taken all reasonable care to compile this data Map. This data Map and any information supplied with it is provided for general guidance only and MCC makes no representation, undertaking or warranty of any kind as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position of any culverted assets shown on the data Map are approximate only. MCC strongly recommends that a comprehensive site investigation is undertaken in addition to reviewing this data Map to determine and ensure the precise location of any assets. The exact location, positions and depths should be obtained by an appropriate survey which may include but shall not be limited to GPR and CCTV.
- The data screened may be modified over time without notice and therefore this data Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the data Map have been made subsequent to issue and prior to any works being carried out.
- This data Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) or for the purpose of determining the suitability of a point of connection to discharge.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising from damages of any kind caused to assets by reason of the actual position and/or existence of assets being different from those shown on the data Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent MCC from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

MANCHESTER
CITY COUNCIL

DATA SCREEN SYMBOLOGY

Bridge

- Good
- Fair
- Poor
- Very Poor
- Unknown

Trash Screen

- Good
- Fair
- Poor
- Very Poor
- Unknown

Culvert Orifice

- Very Good
- Good
- Fair
- Poor
- Very Poor
- Unknown

Culvert Conduit

- CCTV surveyed
- Not CCTV surveyed
- Ordinary Watercourse Conduit
- MCC SuDS
- MCC Flood Incident Points
- MCC Section 19 Report
- MCC Flood Incident Polygons
- MCC Local Authority Boundary

Supplementary Information where available:

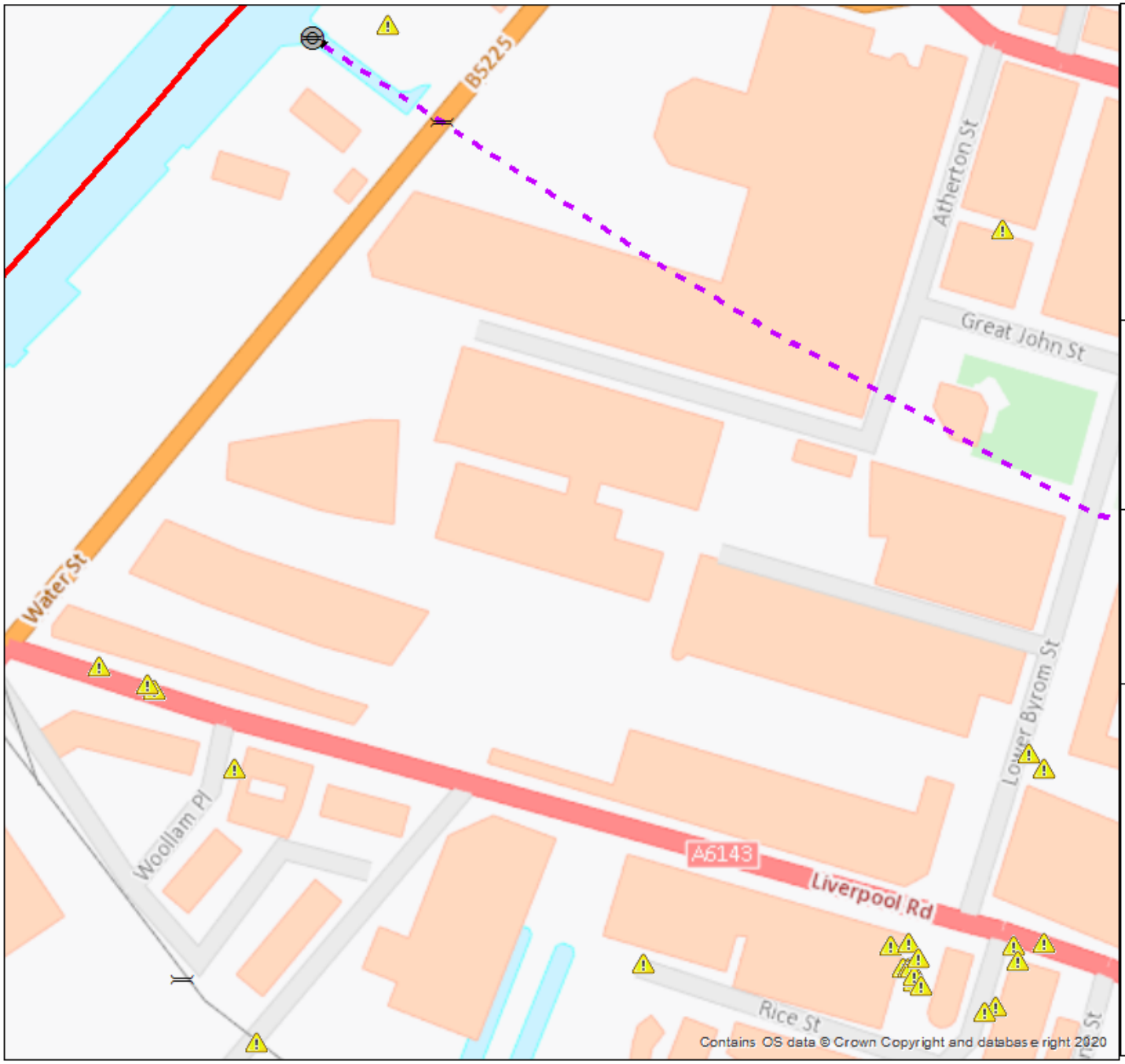
Critical Drainage Area – The Site is within the Conurbation Core CDA.

Flood Incidents - The nearest flood/drainage incident on record is approximately 10m east of the Site, dated 23/12/2021, described as “Blocked gully or drain”.

Culvert Conduits – There are no known ordinary watercourse culverts within the Site boundary. The LLFA asset register highlights an indicative canal tunnel in proximity to the Site: “Canal Tunnel (River Irwell)” approximately 50m north of the Site boundary.

Survey and Design Archive – The 1984 drainage survey of major assets (enclosed) does not highlight any culvert assets onsite.

Any other information identified by LLFA officer during screening – None.



MANCHESTER CITY COUNCIL

LLFA DATA SCREEN

Address/Site Ref:

Science and Industry Museum

Our Ref: **MCC015/05/2023**

Author: Manchester City Council LLFA
Date: 15/05/2023
Scale: 1:1,735

The position of features shown on this plan is approximate only and is given in accordance with the best information currently available. Manchester City Council will not accept liability for any loss or damage caused by the actual position being different from those shown.

0 12.5 25 50 Meters

N

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MANCHESTER CITY COUNCIL

LLFA DATA SCREEN

Address/Site Ref:

Science and Industry Museum

Our Ref: **MCC015/05/2023**

Author: Manchester City Council LLFA
Date: 15/05/2023
Scale: 1:1,735

The position of features shown on this plan is approximate only and is given in accordance with the best information currently available. Manchester City Council will not accept liability for any loss or damage caused by the actual position being different from those shown.

0 12.5 25 50 Meters

N

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LEGEND

COMBINED & FOUL SEWERS (MAN ENTRY) (eg WORK 873 1050 mm DIA)

SURFACE WATER & STORM SEWAGE OVERFLOW (eg S.S.O. 1200mm DIA)
(S.S.O MAN ENTRY)

S.S.O. CHAMBER
PENSTOCK CHAMBER
PUMPING STATION
} ONLY HIGHLIGHTED ON MAN ENTRY SIZE SEWERS

MAIN RIVER (OPEN) (eg RIVER MERSEY)

MAIN RIVER (CULVERTED MAN ENTRY) (eg PLATT BROOK 3600 x 1950 mm)

NON-MAIN RIVER (OPEN) (eg CORN BROOK)

NON-MAIN RIVER (CULVERTED MAN ENTRY) (eg CORNBROOK 3600 x 1500 mm)

OUTFALL INTO (MAIN) RIVER (eg RIVER MEDLOCK)

(eg 300mm DIA)

NON MAN ENTRY SEWERS AND CULVERTS (eg U SEWER 750mm DIA)
(SEE NOTE 5)

CITY OF MANCHESTER BOUNDARY

Appendix C LLFA Correspondence

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Daniel Carroll

From: Laura Peacock <Laura.Peacock@manchester.gov.uk>
Sent: 18 May 2023 17:30
To: Daniel Carroll
Cc: Jennifer Atkinson; Andrew Durber; Bird, Eleanor
Subject: RE: Science and Industry Museum

****External Email. This email originated from outside Buro Happold.****

Hi Dan,

Thank you for providing the summary and hosting the meeting.

I agree that your points below reflect our discussions.

If you require further discussions please let us know.

Kind Regards,
Laura

Laura Peacock
Flood Risk Engineer – LLFA

Highways Service
Neighbourhoods Directorate
Manchester City Council
PO Box 532
Town Hall
Manchester
M60 2LA
Web: http://www.manchester.gov.uk
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From: Daniel Carroll <Daniel.Carroll@BuroHappold.com>
Sent: 18 May 2023 17:08
To: Laura Peacock <Laura.Peacock@manchester.gov.uk>
Cc: Jennifer Atkinson <jennifer.atkinson@manchester.gov.uk>; Andrew Durber <Andrew.Durber@BuroHappold.com>; Bird, Eleanor <efbird@deloitte.co.uk>
Subject: RE: Science and Industry Museum

Hi Laura,

Thank you for taking the time to meet with us earlier this week. I've provided a summary below of the points discussed in the meeting:

- It was noted that the site is unusual with a significant portion situated on top of an existing viaduct.
- The site was recognised as being constrained and that ground conditions are likely to be contaminated, presenting challenges for development.
- It was agreed that the proposed drainage strategy will retain the existing drainage regime and points of connection with a like-for-like proposal. It was noted that more stringent policy requirements will need to be met if the drainage strategy requires additional / alterations to the existing strategy.
- It was noted that within the proposed drainage strategy, we will provide evidence of the existing drainage networks connectivity and suitability for the proposed development.
- We will provide evidence to show that the drainage catchment area will not increase as a result of the proposed development.
- In cases where it is feasible, we will strive to incorporate any improvements in accordance with the drainage hierarchy, such as SuDS or rainwater harvesting.

Please let me know if you have any comments on the above or anything further to add.

Kind regards,
Dan

Daniel Carroll
Infrastructure Engineer
Buro Happold | Cities - Infrastructure
T: +44 (0)161 819 3426

From: Laura Peacock <Laura.Peacock@manchester.gov.uk>
Sent: 11 May 2023 14:48
To: Daniel Carroll <Daniel.Carroll@BuroHappold.com>
Cc: Andrew Durber <Andrew.Durber@BuroHappold.com>; Jennifer Atkinson <jennifer.atkinson@manchester.gov.uk>
Subject: RE: Science and Industry Museum

****External Email. This email originated from outside Buro Happold.****

Good Afternoon,

Thank you for your enquiry.

Pre-app discussion - Please could you send a Teams invite at your convenience in any of the below slots:

Monday 15th 1pm-5pm
Tuesday 16th 9am-11am, or 2pm-5pm

Culvert data screen – this can be purchased at the following link. I attach a pre-payment letter detailing the service.

Please send through any proposed plans (where available) prior to the call.

Kind Regards,
Laura

Laura Peacock
Flood Risk Engineer – LLFA

Highways Service
Neighbourhoods Directorate

Manchester City Council
PO Box 532
Town Hall
Manchester
M60 2LA
Web: http://www.manchester.gov.uk
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From: Daniel Carroll <Daniel.Carroll@BuroHappold.com>
Sent: 03 May 2023 10:17
To: Laura Peacock <Laura.Peacock@manchester.gov.uk>; Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Cc: Andrew Durber <Andrew.Durber@BuroHappold.com>
Subject: RE: Science and Industry Museum

> Some people who received this message don't often get email from daniel.carroll@burohappold.com. Learn why this is important

Hi Laura,

Please could you reply to the below? Given the complex nature of the site we believe a pre-app meeting with the LLFA is required.

Kind regards,
Dan

Daniel Carroll
Infrastructure Engineer
Buro Happold | Cities - Infrastructure
T: +44 (0)161 819 3426

From: Daniel Carroll
Sent: 26 April 2023 16:51
To: laura.peacock@manchester.gov.uk
Cc: floodriskmanagement@manchester.gov.uk; Andrew Durber <Andrew.Durber@BuroHappold.com>
Subject: Science and Industry Museum

Hi Laura,

We've been provided your contact details by the Planning Officer at MCC for the proposed works at the Science and Industry Museum (SIM). The works involve landscaping improvements to some external areas and will therefore require planning permission.

The site is heavily constrained, and a large portion of the works are taking place atop an existing viaduct. Providing a betterment to existing discharge rates is therefore going to be challenging and we would appreciate a meeting with the LLFA to discuss the site. Please could you let me know your availability for a meeting next week?

If you have any questions or require any further information, please do not hesitate to contact me. I have also attached a recent email to the LLFA requesting a culvert screening.

Kind regards,
Dan

Daniel Carroll
Infrastructure Engineer
Buro Happold | Cities - Infrastructure
T: +44 (0)161 819 3426
www.burohappold.com | Twitter | Instagram

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Appendix D Existing Drainage

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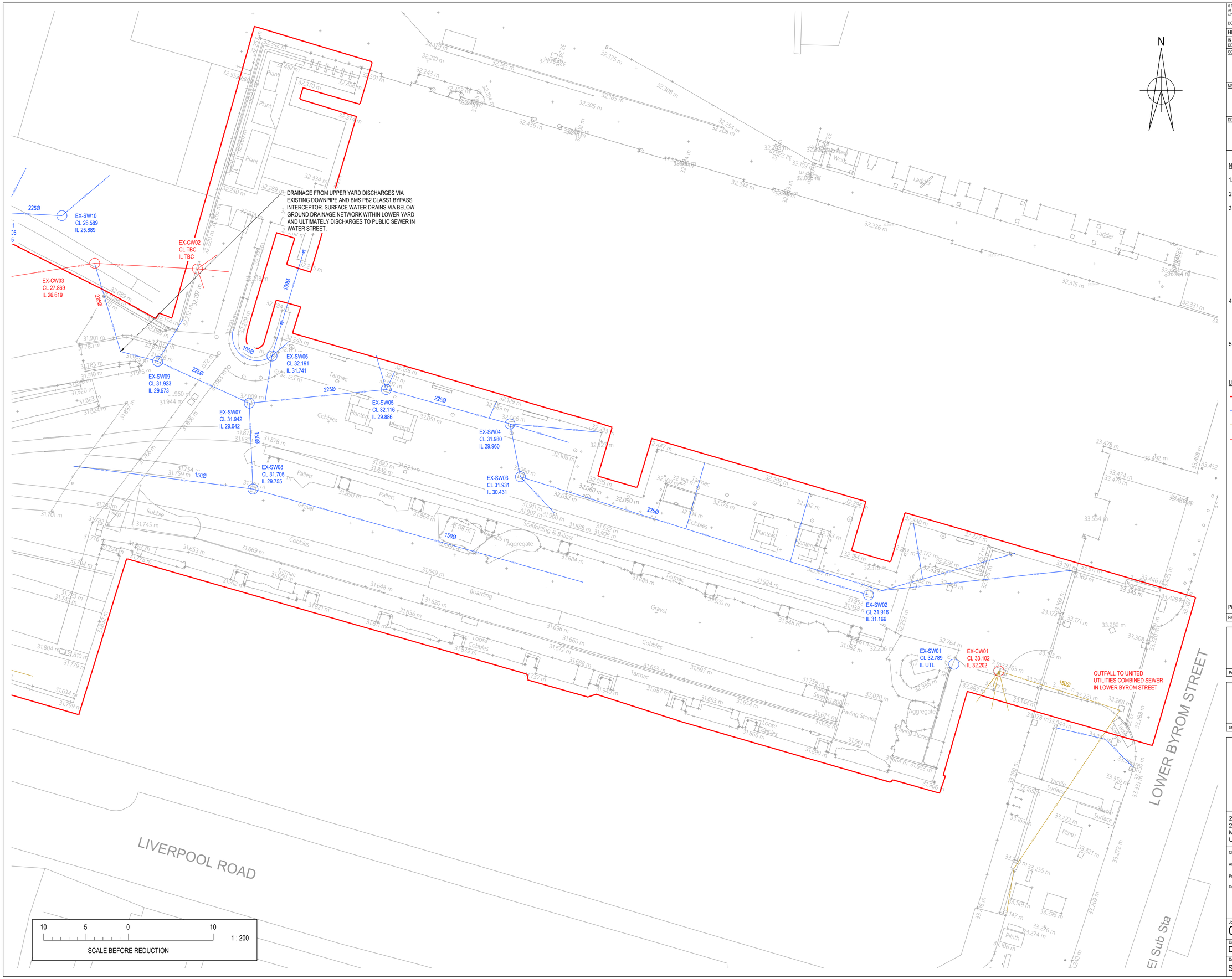

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- WORKS WITHIN POTENTIAL CONFINED SPACE CONDITIONS
- WORKS IN PROXIMITY TO LIVE SERVICES
- POSSIBLE PRESENCE OF CONTAMINATION FROM HISTORIC INDUSTRIAL USE
- PRESENCE OF CULVERTS & VOIDS FROM HISTORIC INDUSTRIAL USE
- UNKNOWN CONDITION & STRUCTURAL CAPACITY OF SLAB ATOP STATION VIADUCT

MAINTENANCE/CLEANING/OPERATION.

- WORKS WITHIN POTENTIAL CONFINED SPACE CONDITIONS
- WORKS IN PROXIMITY TO LIVE SERVICES
- WORKS INTERFACE WITH THE PUBLIC

DECOMMISSIONING/DEMOLITION.

- WORKS WITHIN POTENTIAL CONFINED SPACE CONDITIONS
- WORKS IN PROXIMITY TO LIVE SERVICES
- WORKS INTERFACE WITH THE PUBLIC

NOTES:

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3. THIS DESIGN IS BASED ON THE FOLLOWING DRAWINGS AND INFORMATION:
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   - LANDSCAPE ARCHITECT PLAN 2913-PLA-XX-XX-DR-L-3002 (STATION APPROACH) RECEIVED FROM PLANIT ON 07/03/2024
   - TOPOGRAPHICAL SURVEY MOSI-TOPO PRODUCED BY CHRISTIANS DATED MAY 2023
   - UTILITY MAPPING SURVEY 5412 PRODUCED BY SEDDON SURVEYS DATED JULY 2023
   - CCTV DRAINAGE SURVEY 675853 PRODUCED BY METRO ROD DATED MAY 2023
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5. THE CONTRACTOR SHALL ALLOW FOR THE PROTECTION, TEMPORARY AND PERMANENT SUPPORT AND DIVERSION WORKS AS NECESSARY TO ALL EXISTING SERVICES TO THE SATISFACTION OF THE PROJECT MANAGER.

LEGEND

- PLANNING BOUNDARY
- EXISTING SURFACE WATER DRAINAGE
- EXISTING FOUL WATER DRAINAGE
- EXISTING COMBINED WATER DRAINAGE

Rev	Description	Date	Iss'd	Rev'd	App'd
P01	ISSUED FOR INFORMATION	02.04.2024	DC	AD	AD

PLANNING

Project Stage

INFORMATION

Status of Drawing

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Web: www.burohappold.com

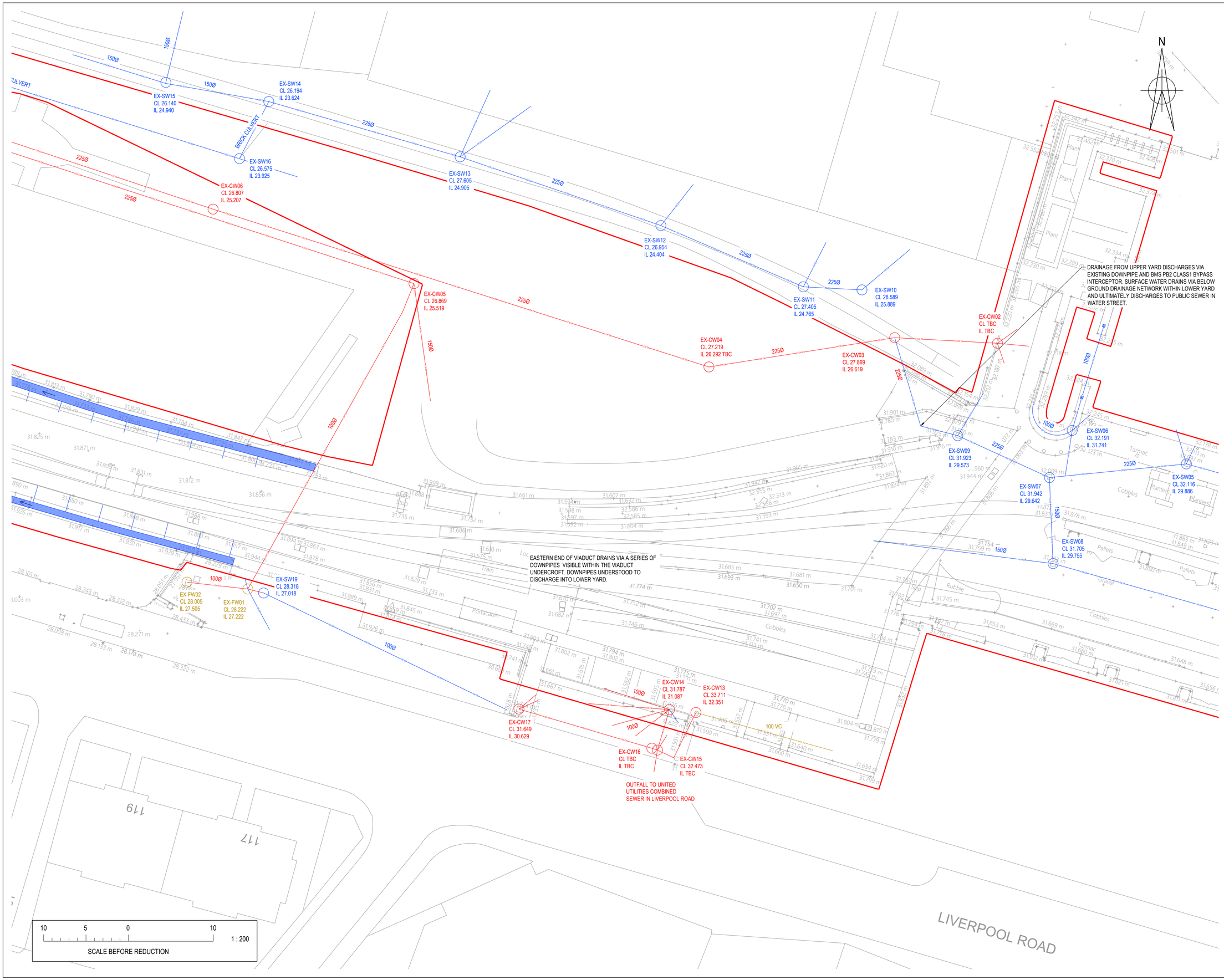
Client	SMG
Architect	PLANIT-IE
Project	SIM SITEWIDE CAPITAL WORKS
Drg Title	EXISTING DRAINAGE LAYOUT UPPER YARD

Job No.	Scale@A1
0054704	1:200

Drawn/Designed By.	Checked By.	Approved By.
DC	AD	AD

Drawing No.	Revision
SIM-BHE-XX-XX-DR-C-3050	P01

Dated Created P:\0054704 SIM Sitewide Estate Capital Works\208 Cities - Infra\01 - Shared\SIM-BHE-XX-XX-DR-C-3050_Existing Drainage.dwg



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DECOMMISSIONING/DEMOLITION.

- WORKS WITHIN POTENTIAL CONFINED SPACE CONDITIONS
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LEGEND

- PLANNING BOUNDARY
- EXISTING SURFACE WATER DRAINAGE
- EXISTING FOUL WATER DRAINAGE
- EXISTING COMBINED WATER DRAINAGE

Rev	Description	Date	Iss'd	Rev'd	App'd
P01	ISSUED FOR INFORMATION	02.04.2024	DC	AD	AD

PLANNING

Project Stage

INFORMATION

Status of Drawing

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Web: www.burohappold.com

Client: *SMG*

Architect: *PLANIT-IE*

Project: **SIM SITEWIDE CAPITAL WORKS**

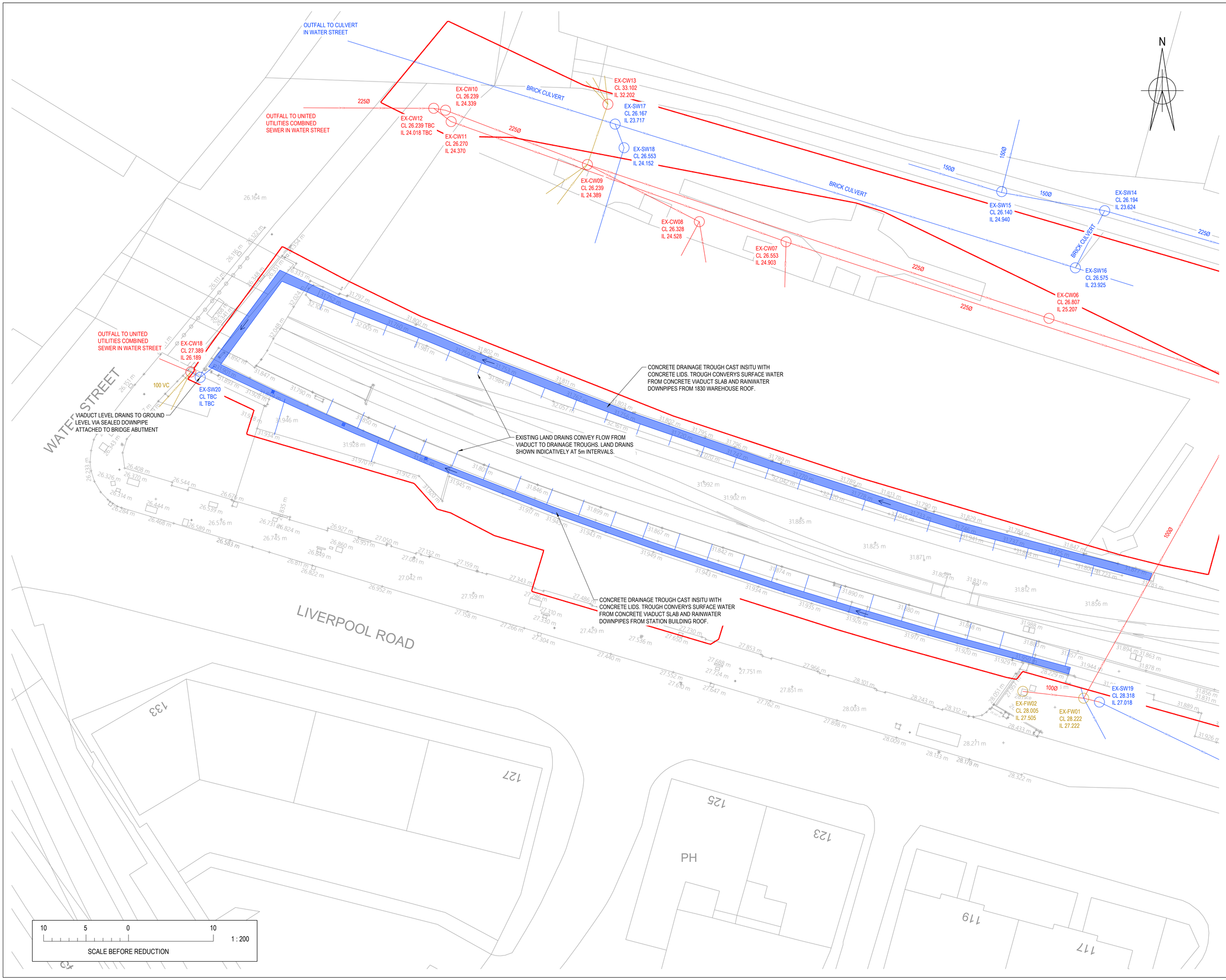
Drg Title: EXISTING DRAINAGE LAYOUT HEART SPACE

Job No.	Scale@A1
0054704	1:200

Drawn/Designed By.	Checked By.	Approved By.
DC	AD	AD

Drawing No.	Revision
SIM-BHE-XX-XX-DR-C-3051	P01

Date Created P:\0054704 SIM Sitewide Estate Capital Works\206 Cities - Infra\21_Sheet\SIM-BHE-XX-XX-DR-C-3051_Existing Drainage.dwg



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   - UTILITY MAPPING SURVEY 5412 PRODUCED BY SEDDON SURVEYS DATED JULY 2023
   - CCTV DRAINAGE SURVEY 675853 PRODUCED BY METRO ROD DATED MAY 2023
4. PRIOR TO THE COMMENCEMENT OF WORK THE LOCATION, SIZE AND DEPTH OF ALL EXISTING DRAINAGE AND SERVICES SHALL BE ESTABLISHED BY THE CONTRACTOR. ANY DISCREPANCIES FROM THE INFORMATION SHOWN ON THESE DRAWINGS SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER.
5. THE CONTRACTOR SHALL ALLOW FOR THE PROTECTION, TEMPORARY AND PERMANENT SUPPORT AND DIVERSION WORKS AS NECESSARY TO ALL EXISTING SERVICES TO THE SATISFACTION OF THE PROJECT MANAGER.

LEGEND

- PLANNING BOUNDARY
- EXISTING SURFACE WATER DRAINAGE
- EXISTING FOUL WATER DRAINAGE
- EXISTING COMBINED WATER DRAINAGE

Rev	Description	Date	Iss'd	Rev'd	App'd
P01	ISSUED FOR INFORMATION	02.04.2024	DC	AD	AD

PLANNING

Project Stage

INFORMATION

Status of Drawing

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Client: SMG

Architect: PLANIT-IE

Project: **SIM SITEWIDE CAPITAL WORKS**

Drg Title: EXISTING DRAINAGE LAYOUT STATION APPROACH

Job No.	Scale@A1
0054704	1:200

Drawn/Designed By.	Checked By.	Approved By.
DC	AD	AD

Drawing No.	Revision
SIM-BHE-XX-XX-DR-C-3052	P01

Darrell Carroll P:\0054704 SIM Sitewide Estate Capital Works 2026 Ongo - Intra\01 Sheets\SIM-BHE-XX-XX-DR-C-3052_Existing Drainage.dwg

Appendix E Proposed Drainage Strategy

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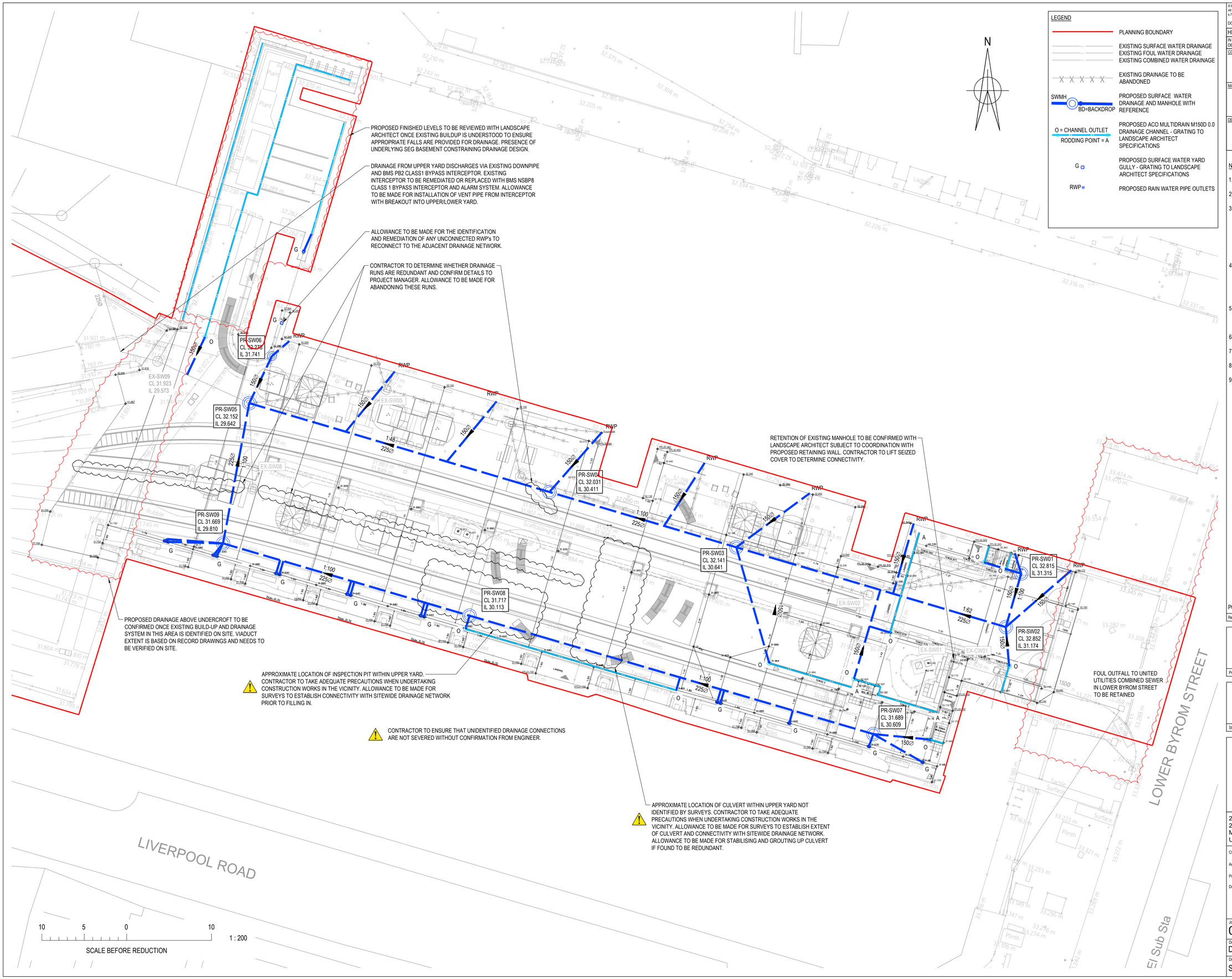

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LEGEND

	PLANNING BOUNDARY
	EXISTING SURFACE WATER DRAINAGE EXISTING FOUL WATER DRAINAGE EXISTING COMBINED WATER DRAINAGE
	EXISTING DRAINAGE TO BE ABANDONED
SWMH BD=BACKDROP	PROPOSED SURFACE WATER DRAINAGE AND MANHOLE WITH REFERENCE
O = CHANNEL OUTLET RODDING POINT = A	PROPOSED ACO MULTIDRAIN M150D 0.0 DRAINAGE CHANNEL - GRATING TO LANDSCAPE ARCHITECT SPECIFICATIONS
G	PROPOSED SURFACE WATER YARD GULLY - GRATING TO LANDSCAPE ARCHITECT SPECIFICATIONS
RWP	PROPOSED RAIN WATER PIPE OUTLETS

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- WORKS WITHIN POTENTIAL CONFINED SPACE CONDITIONS
- WORKS IN PROXIMITY TO LIVE SERVICES
- POSSIBLE PRESENCE OF CONTAMINATION FROM HISTORIC INDUSTRIAL USE
- PRESENCE OF CULVERTS & VOIDS FROM HISTORIC INDUSTRIAL USE
- UNKNOWN CONDITION & STRUCTURAL CAPACITY OF SLAB ATOP STATION VIADUCT

MAINTENANCE/CLEANING/OPERATION.

- WORKS WITHIN POTENTIAL CONFINED SPACE CONDITIONS
- WORKS IN PROXIMITY TO LIVE SERVICES
- WORKS INTERFACE WITH THE PUBLIC

DECOMMISSIONING/DEMOLITION.

- WORKS WITHIN POTENTIAL CONFINED SPACE CONDITIONS
- WORKS IN PROXIMITY TO LIVE SERVICES
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1. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS, DETAILS AND SPECIFICATIONS.
3. THIS DESIGN IS BASED ON THE FOLLOWING DRAWINGS AND INFORMATION:
   - LANDSCAPE ARCHITECT PLAN 2913-PLA-XX-XX-DR-L-3000 (UPPER YARD) RECEIVED FROM PLANIT ON 07/03/2024
   - LANDSCAPE ARCHITECT PLAN 2913-PLA-XX-XX-DR-L-3002 (STATION APPROACH) RECEIVED FROM PLANIT ON 07/03/2024
   - TOPOGRAPHICAL SURVEY MOSI-TOPO PRODUCED BY CHRISTIANS DATED MAY 2023
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6. ANY DRAINAGE TO BE ABANDONED SHALL BE DONE SO IN ACCORDANCE WITH MCHW SERIES 500 CLAUSE 506.3.
7. REFER TO DRAWING SIM-BHE-XX-XX-DR-C-3800 FOR MANHOLE SCHEDULES.
8. REFER TO ARCHITECTURAL SPECIFICATION FOR ALL WATERPROOFING WORKS.
9. REFER TO LANDSCAPE AND STRUCTURAL SPECIFICATIONS FOR DETAILS OF THE PROPOSED REMOVABLE COVER SLABS OVER EXISTING DRAINAGE TROUGHS.

ALLOWANCE TO BE MADE FOR REMEDIATION OF RETAINED DRAINAGE (E.G. JETTING AND LOCALISED STRUCTURAL LINER PATCH REPAIRS)

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Architect: PLANIT-IE
Project: **SIM SITEWIDE CAPITAL WORKS**
Drg Title: PROPOSED DRAINAGE STRATEGY UPPER YARD

Job No.	Scale@A1	
0054704	1:200	
Drawn/Designed By. DC	Checked By. AD	Approved By. AD
Drawing No. SIM-BHE-XX-XX-DR-C-3300		Revision P01

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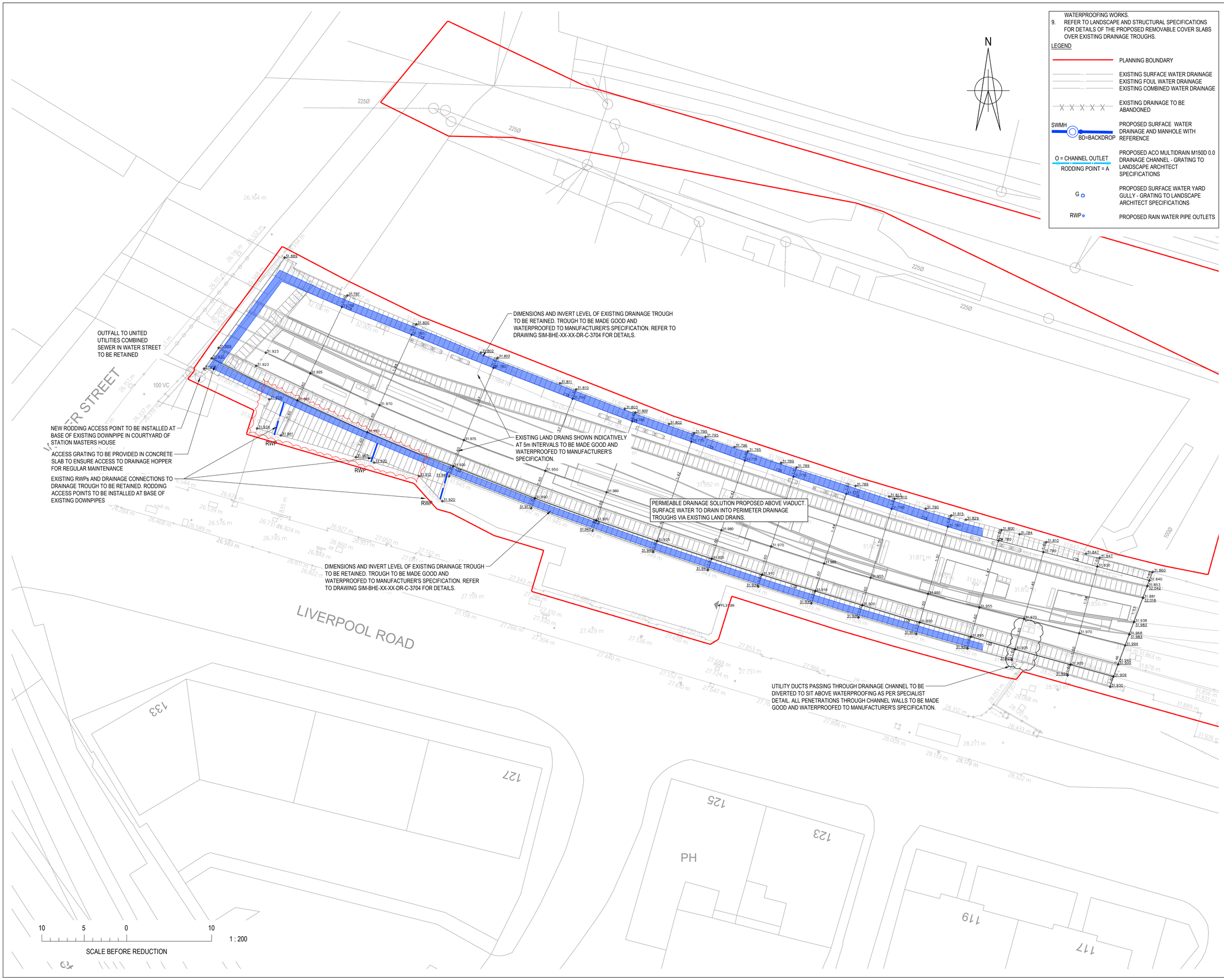

WATERPROOFING WORKS.

9. REFER TO LANDSCAPE AND STRUCTURAL SPECIFICATIONS FOR DETAILS OF THE PROPOSED REMOVABLE COVER SLABS OVER EXISTING DRAINAGE TROUGHS.

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SIM-BHE-XX-XX-DR-C-3302	P01

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