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**Subject** Cardiff Arena and Hotel - Utilities Strategy

**Date** 26 August 2021

**Job No/Ref** 281124

## Cardiff Arena and Hotel – Utilities Strategy

### 1 Existing Utilities

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The locations of existing utilities within the site boundary have been taken from plans provided by the statutory authorities, additional information from Cardiff Council and a geophysical survey carried out by Gwalia. The main utilities and easements are shown on Figure 1, full details of existing utilities are shown in Drawing No CAH-ARP-AX-XX-DR-C-92-2500 in Appendix A, a summary of the existing utilities and drainage is contained within the following sections.

#### 1.1 Hemingway Road

There is an existing surface water sewer in Hemingway Road, which Dŵr Cymru Welsh Water (DCWW) records indicate to be 450mm diameter in the east, increasing to 600mm diameter in the west.

DCWW maps show a rising main in Hemingway Road which falls from east to west. DCWW have confirmed that the rising main pipe diameter is 130mm.

Additional utilities in Hemingway Road include high voltage (11kV) electricity cables, low pressure and medium pressure gas, and telecoms (Openreach, Virgin Media and Vodafone).

#### 1.2 Schooner Way

There is an existing, large surface water sewer in Schooner Way, flowing from north to south. The diameter of this sewer is 1125mm and is some 7m deep.

Additional existing utilities in Schooner Way include high voltage (11kV) electricity, low pressure gas, telecoms (Openreach, Vodafone and Virgin Media), potable water, highway drainage and possible traffic signal cables. DCWW have indicated that the 300mm water main running along the west side of Schooner Way.

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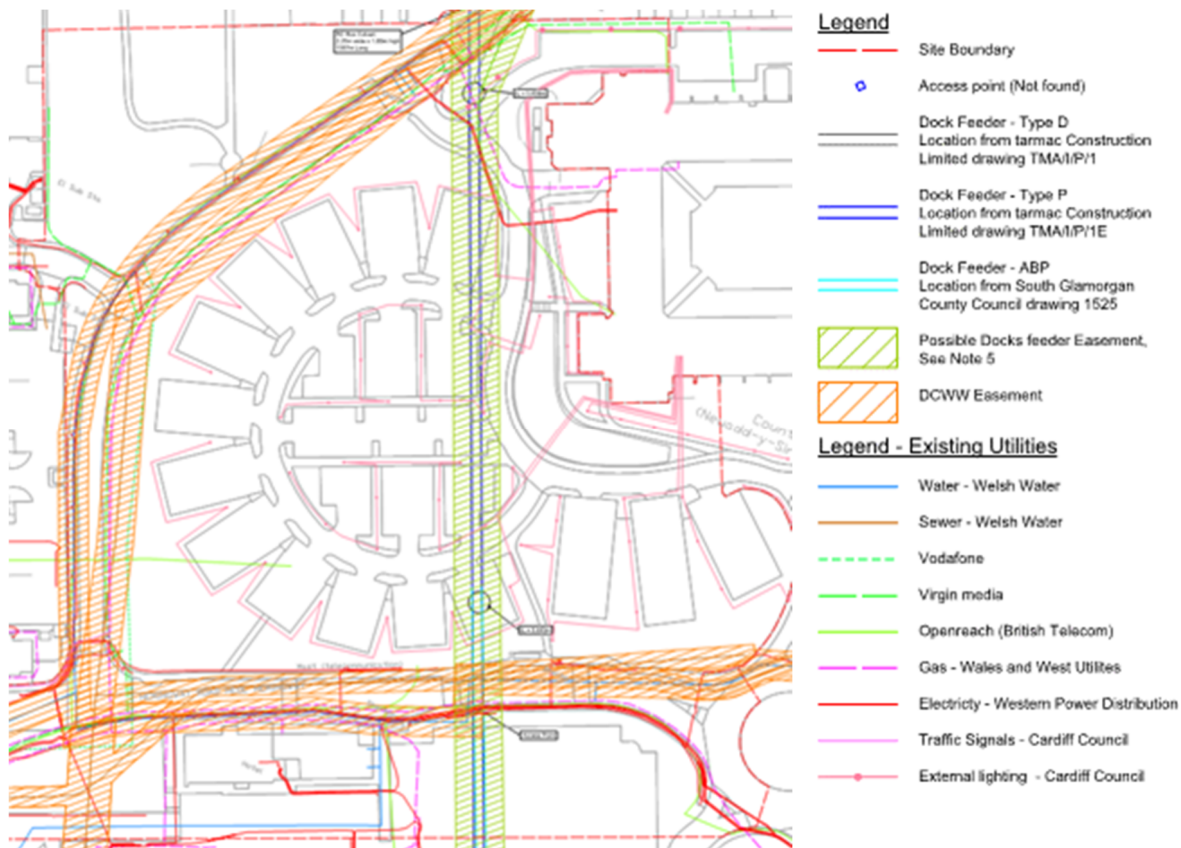


Figure 1 – Existing Utilities and Easements

### 1.3 Dock Feeder Culvert

Record drawings and the geophysical survey show a Dock Feeder Culvert flowing from north to south through the proposed site. Plans received from Associated British Ports (ABP) show that the Dock Feeder is a reinforced concrete box culvert, 2.25m wide and 1.80m high, with a typical depth to invert of 4.5-5.1m below the existing ground level.

### 1.4 Car Park

Street light cable information has been received from Cardiff Council, these are shown on Figure 1. The Gwalia survey also surface water drainage within the car park, outfalling into the deep surface water sewer along Schooner Way, these are shown on Drawing No CAH-ARP-AX-XX-DR-C-92-2500 in in Appendix A.

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## 2 Proposals

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### 2.1 Site Layout

In developing the site layout, the constraints discussed in the above section are being taken into account. The Dock Feeder Culvert forms a major constraint in the east and the Arena has been sited to avoid building over this culvert. It is also proposed that Hemingway Road in the south is stopped off and Schooner way will be partially diverted and partially stopped off.

### 2.2 Development Site Levels

A proposed finished floor level of the Arena is 10.6mAOD and the Hotel is 10.8mAOD, these are generally higher than the existing level, thus providing additional cover over existing utilities. The levels of the external areas will generally vary between 9.5m and 10.7m to tie in to existing levels around the site and enable drainage falls across large areas of external works hardstandings.

### 2.3 Utility and Drainage Diversions

To enable the Arena and hotel to be developed, much of the utilities and drainage along Schooner Way will need to be diverted, this includes the deep surface water sewer, the water main, gas main, high and low voltage electrical cables and Openreach, Virgin, Vodafone and Cardiff Council comms. The deep surface water sewer forms a significant constraint and potential a very wide (14m) easement, discussions have been held with DCWW to see if the easement width could be relaxed and where other utilities can be placed in immediate proximity. DCWW have indicated that they may be prepared to relax the easement requirement, provided that parallel utilities are kept outside of the trench width of the pipe, advised by DCWW to be 3.4m wide. Plans and sections showing the proposed utility diversion corridors have been prepared, these are presented in Appendix A.

It is currently proposed not to divert the utilities along Hemingway Road, this will need to be reviewed as public realm proposals in this area develops. There may also be a need to divert utilities leading into County Hall in the north-west, pending further consultation with statutory authorities.

There are also two mobile phone masts present within the site, these are operated by Vodafone and Openreach, these are to be removed and relocated off site.

### 2.4 Utility Capacities and Connections

#### 2.4.1 Water Mains

Enquiries have been made with DCWW regarding water supply for the development, they have indicated that capacity is currently not available in their network and hydraulic modelling is required to assess what improvements are required to their network. This modelling work is currently being undertaken by DCWW.

The water demand has been reduced by the provision of water storage system within the arena building. This is a proven solution for buildings with high peak demands that cannot be provided from mains water network.

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The DCWW utility plans identify a 300mm combined potable and fire main distributing along Schooner Way which would be the preferred connection location. This main will require diversion, the proposed route of the pipe follows the utility corridor and is also shown on Drawing CAH-ARP-AX-XX-DR-C-96-2520 in Appendix A. This proposed layout and sections have been sent to DCWW to proceed with their design.

## 2.4.2 Fire Water / Fire Hydrants

The arena will need appropriate hydrant cover, taking into consideration fire tender access to the external plaza and the service yard access. The intention is the hydrant supply will be taken from the public utility infrastructure. Each hydrant should be capable of delivering 1500 l/min/ WWU will need to confirm the availability of the flow required.

Fire Hydrants will be provided within 90m of dry mains inlets (where provided) or within 90m of an entry point to the building and not more than 90m apart.

It is proposed that the diverted water main provides hydrant supply to the west and north of the site. An existing water main is present along Hemingway Road, and this provides hydrant supply to the south. It is proposed to place a new water supply pipe along the eastern boundary of the site, as shown on Drawing CAH-ARP-AX-XX-DR-C-96-2520. The proposed location has been sent to DCWW to proceed with their design.

## 2.4.3 Natural Gas

The maximum and annual gas demand for the Arena has been estimated from the requirements of the proposed buildings and are shown in Table \*\*.

Table 1 Estimated Maximum and Annual Gas Demands for Arena building and Hotel

<b>Building</b>	<b>Maximum Demand (kW/hr)</b>	<b>Annual Demand (kWh)</b>
Arena	4,359	7,862,088
Hotel	400	723,117

WWU have confirmed that there is a 250mm diameter main located along Schooner Way that is available to supply the buildings based on the estimated demands. It is proposed to divert this gas pipe as part of the works and a new connection can be formed as part of the diversion.

## 2.4.4 Electrical Utility Supply

Discussions with the local distribution network operator (WPD) have indicated that a new 11kV ring connection is available from Bute Place to the front of the Wales Millennium Centre.

The new circuit will supply a WPD owned and operated 11kV intake within the development footprint with metering being at the 11kV point of connection. The new circuit is subject to design development but at this stage it is proposed that a single metered 11kV supply will be provided to the facility.

The WPD ring circuit arrangement with suitable separation between each supply leg provides an increase in the availability of the supply and therefore provides a degree of resilience.



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The requirements for two separate 11kV cables have been identified, one leg running to the west and another leg running to the east of the Arena. The cables are included on the service corridor plan and sections shown in Appendix A.

### **2.4.5 Telecoms**

New incoming fibre optic connections will be provided to the facility. The capacity of the incoming fibre connection will be determined but there is an allowance for two separate intake positions for resilience.

A number of copper lines for auto-diallers, Redcare and telephone connections will likely be required. The extent of these provisions will be determined during the design.

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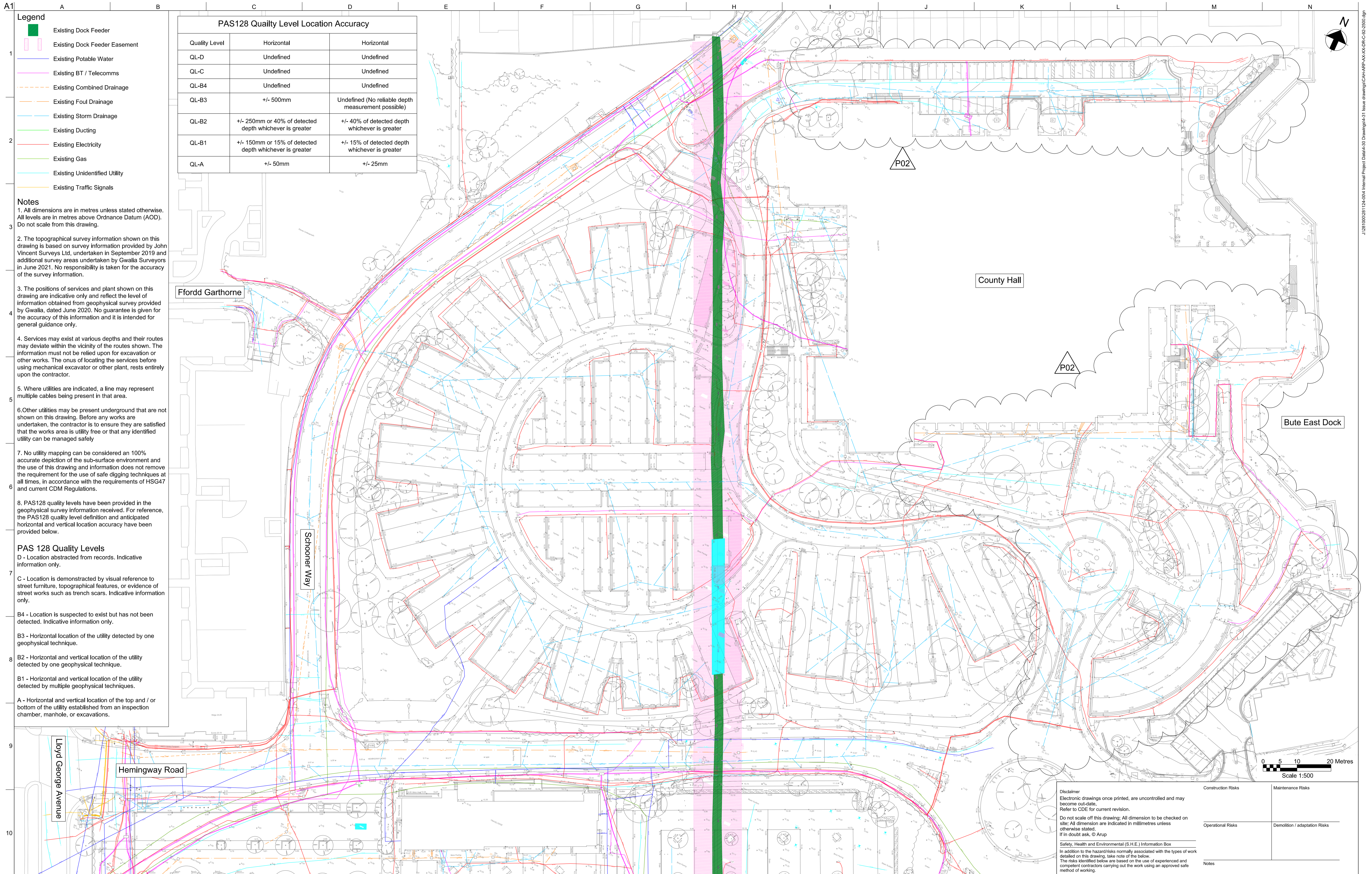
**Date** 26 August 2021

**Job No/Ref** 281124

# Appendix A – Utilities Drawings

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**Legend**

- Existing Dock Feeder
- Existing Dock Feeder Easement
- Existing Potable Water
- Existing BT / Telecomms
- Existing Combined Drainage
- Existing Foul Drainage
- Existing Storm Drainage
- Existing Ducting
- Existing Electricity
- Existing Gas
- Existing Unidentified Utility
- Existing Traffic Signals

**PAS128 Quality Level Location Accuracy**

Quality Level	Horizontal	Horizontal
QL-D	Undefined	Undefined
QL-C	Undefined	Undefined
QL-B4	Undefined	Undefined
QL-B3	+/- 500mm	Undefined (No reliable depth measurement possible)
QL-B2	+/- 250mm or 40% of detected depth whichever is greater	+/- 40% of detected depth whichever is greater
QL-B1	+/- 150mm or 15% of detected depth whichever is greater	+/- 15% of detected depth whichever is greater
QL-A	+/- 50mm	+/- 25mm

**Notes**

1. All dimensions are in metres unless stated otherwise. All levels are in metres above Ordnance Datum (AOD). Do not scale from this drawing.

2. The topographical survey information shown on this drawing is based on survey information provided by John Vincent Surveys Ltd, undertaken in September 2019 and additional survey areas undertaken by Gwalla Surveyors in June 2021. No responsibility is taken for the accuracy of the survey information.

3. The positions of services and plant shown on this drawing are indicative only and reflect the level of information obtained from geophysical survey provided by Gwalla, dated June 2020. No guarantee is given for the accuracy of this information and it is intended for general guidance only.

4. Services may exist at various depths and their routes may deviate within the vicinity of the routes shown. The information must not be relied upon for excavation or other works. The onus of locating the services before using mechanical excavator or other plant, rests entirely upon the contractor.

5. Where utilities are indicated, a line may represent multiple cables being present in that area.

6. Other utilities may be present underground that are not shown on this drawing. Before any works are undertaken, the contractor is to ensure they are satisfied that the works area is utility free or that any identified utility can be managed safely.

7. No utility mapping can be considered an 100% accurate depiction of the sub-surface environment and the use of this drawing and information does not remove the requirement for the use of safe digging techniques at all times, in accordance with the requirements of HSG47 and current CDM Regulations.

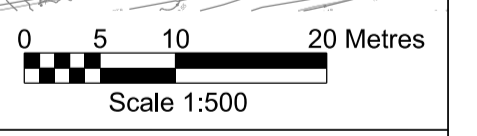
8. PAS128 quality levels have been provided in the geophysical survey information received. For reference, the PAS128 quality level definition and anticipated horizontal and vertical location accuracy have been provided below.

- PAS 128 Quality Levels**
- D - Location abstracted from records. Indicative information only.
  - C - Location is demonstrated by visual reference to street furniture, topographical features, or evidence of street works such as trench scars. Indicative information only.
  - B4 - Location is suspected to exist but has not been detected. Indicative information only.
  - B3 - Horizontal location of the utility detected by one geophysical technique.
  - B2 - Horizontal and vertical location of the utility detected by one geophysical technique.
  - B1 - Horizontal and vertical location of the utility detected by multiple geophysical techniques.
  - A - Horizontal and vertical location of the top and / or bottom of the utility established from an inspection chamber, manhole, or excavations.

**Disclaimer**  
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Do not scale off this drawing: All dimension to be checked on site: All dimension are indicated in millimetres unless otherwise stated. If in doubt ask. © Arup

**Safety, Health and Environmental (S.H.E.) Information Box**  
In addition to the hazards normally associated with the types of work detailed on this drawing, take note of the below.  
The risks identified below are based on the use of experienced and competent contractors carrying out the work using an approved safe method of working.

Construction Risks	Maintenance Risks
Operational Risks	Demolition / adaptation Risks
Notes	



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Issue	Date	Revision Description
P02	24/08/21	Additional utility information added
P01	23/07/21	Information

Record of Revisions

Client

Operators

Lead Designer

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Project Title

**Cardiff Arena & Hotel**

Key Plan

Drawing Title

**Existing Drainage and Utilities**

Scale at A1: 1:500

Role: **Civils**

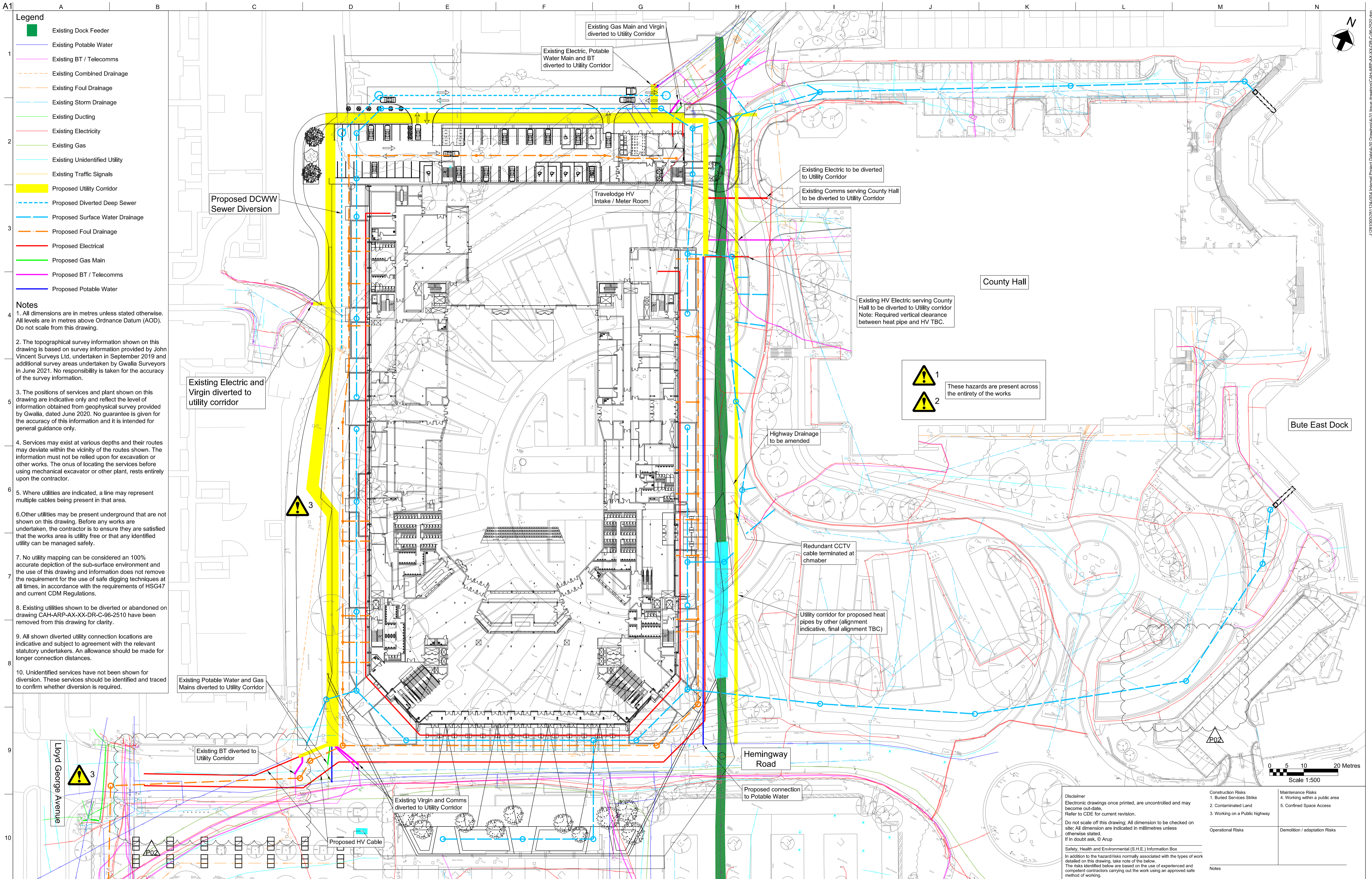
Drawn By: CB | Checked By: RV | Approved By: JS

Purpose of Issue: Information

Project No: **281124** | Rev: **P02**

ID: **CAH-ARP-AX-XX-DR-C-92-2500**





- Legend**
- Existing Dock Feeder
  - Existing Potable Water
  - Existing BT / Telecomms
  - Existing Combined Drainage
  - Existing Foul Drainage
  - Existing Storm Drainage
  - Existing Ducting
  - Existing Electricity
  - Existing Gas
  - Existing Unidentified Utility
  - Existing Traffic Signals
  - Proposed Utility Corridor
  - Proposed Diverted Deep Sewer
  - Proposed Surface Water Drainage
  - Proposed Foul Drainage
  - Proposed Electrical
  - Proposed Gas Main
  - Proposed BT / Telecomms
  - Proposed Potable Water

- Notes**
1. All dimensions are in metres unless stated otherwise. All levels are in metres above Ordnance Datum (AOD). Do not scale from this drawing.
  2. The topographical survey information shown on this drawing is based on survey information provided by John Vincent Surveys Ltd, undertaken in September 2019 and additional survey areas undertaken by Gwalla Surveyors in June 2021. No responsibility is taken for the accuracy of the survey information.
  3. The positions of services and plant shown on this drawing are indicative only and reflect the level of information obtained from geophysical survey provided by Gwalla, dated June 2020. No guarantee is given for the accuracy of this information and it is intended for general guidance only.
  4. Services may exist at various depths and their routes may deviate within the vicinity of the routes shown. The information must not be relied upon for excavation or other works. The onus of locating the services before using mechanical excavator or other plant, rests entirely upon the contractor.
  5. Where utilities are indicated, a line may represent multiple cables being present in that area.
  6. Other utilities may be present underground that are not shown on this drawing. Before any works are undertaken, the contractor is to ensure they are satisfied that the works area is utility free or that any identified utility can be managed safely.
  7. No utility mapping can be considered a 100% accurate depiction of the sub-surface environment and the use of this drawing and information does not remove the requirement for the use of safe digging techniques at all times, in accordance with the requirements of HSG47 and current CDM Regulations.
  8. Existing utilities shown to be diverted or abandoned on drawing CAH-ARP-AX-XX-DR-C-96-2510 have been removed from this drawing for clarity.
  9. All shown diverted utility connection locations are indicative and subject to agreement with the relevant statutory undertakers. An allowance should be made for longer connection distances.
  10. Unidentified services have not been shown for diversion. These services should be identified and traced to confirm whether diversion is required.

⚠ 1  
⚠ 2  
These hazards are present across the entirety of the works

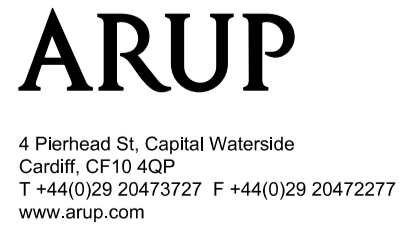
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Scale 1:500

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In addition to the hazards/risks normally associated with the types of work detailed on this drawing, take note of the below.  
The risks identified below are based on the use of experienced and competent contractors carrying out the work using an approved safe method of working.

Construction Risks 1. Buried Services Strike 2. Contaminated Land 3. Working on a Public Highway	Maintenance Risks 4. Working within a public area 5. Confined Space Access
Operational Risks	Demolition / adaptation Risks

Notes



Issue	Date	Revision Description
P02	27/08/21	Revised in south-west and south-east
P01	23/07/21	Information

Record of Revisions



Project Title  
**Cardiff Arena & Hotel**

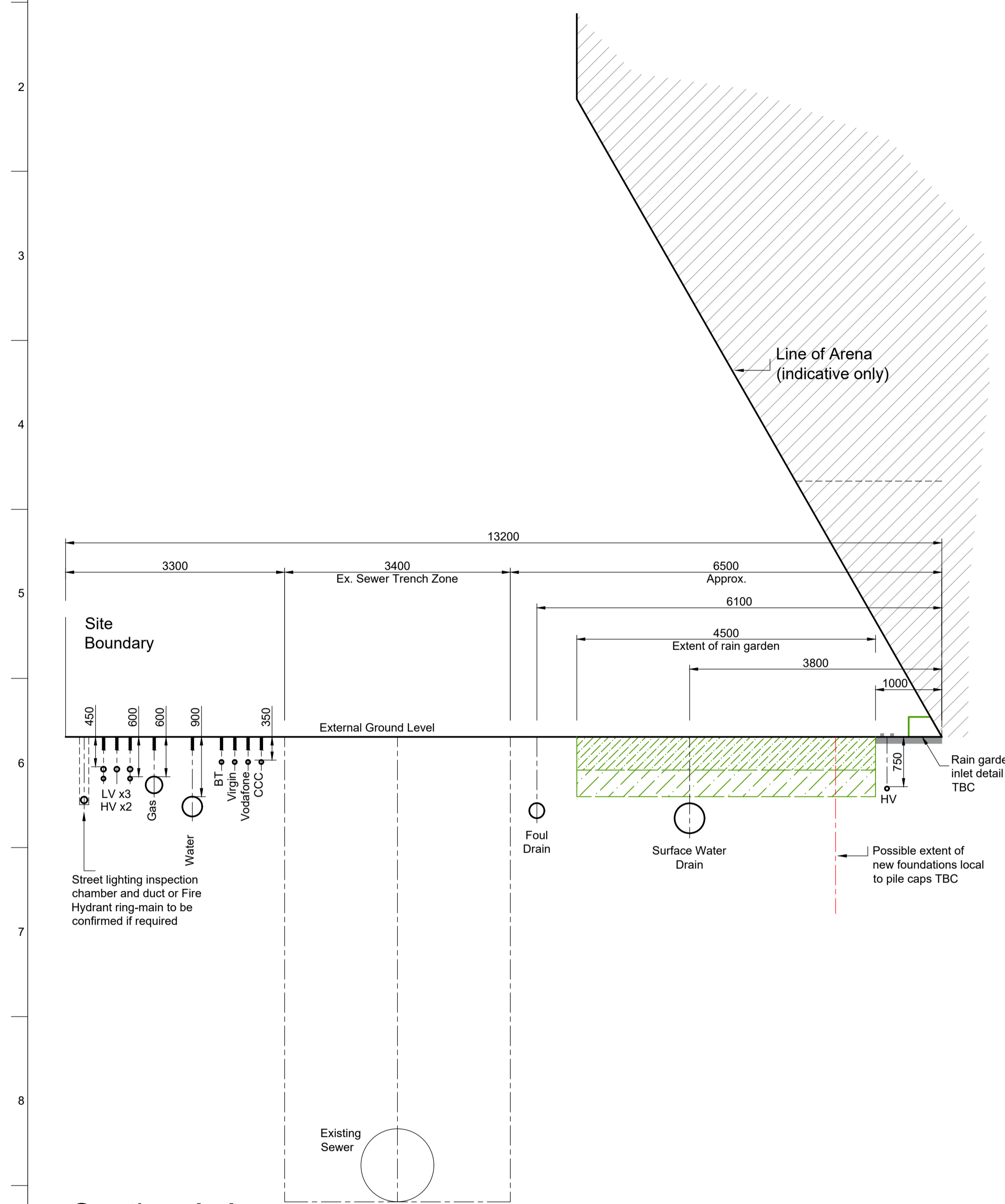
Key Plan

Drawing Title  
**Proposed Utilities Layout**

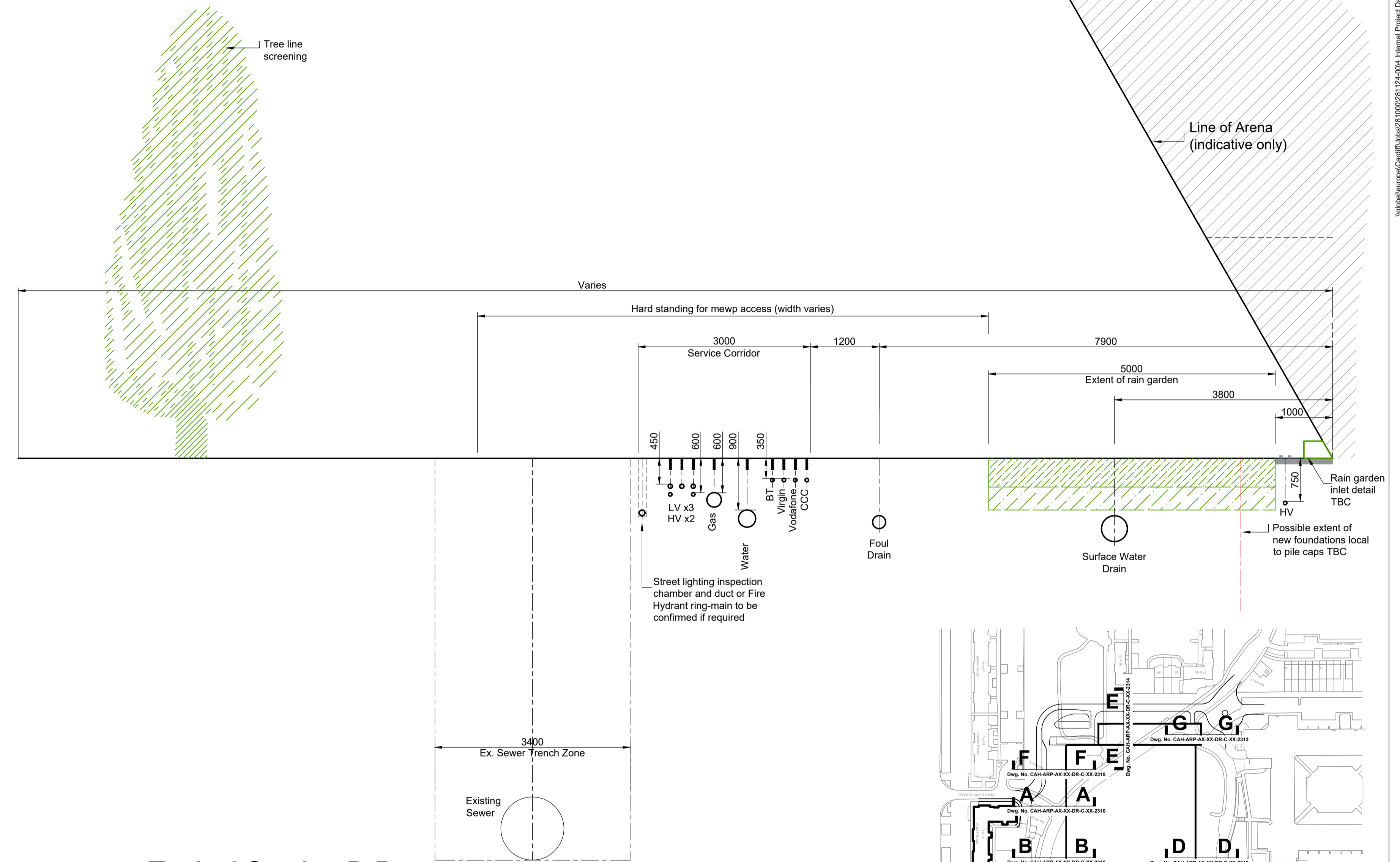
Scale at A1	1:500
Role	Civils
Drawn By	CB
Checked By	RV
Approved By	JS
Purpose of Issue	Information
Project No	281124
Rev	P02
ID	CAH-ARP-AX-XX-DR-C-96-2520



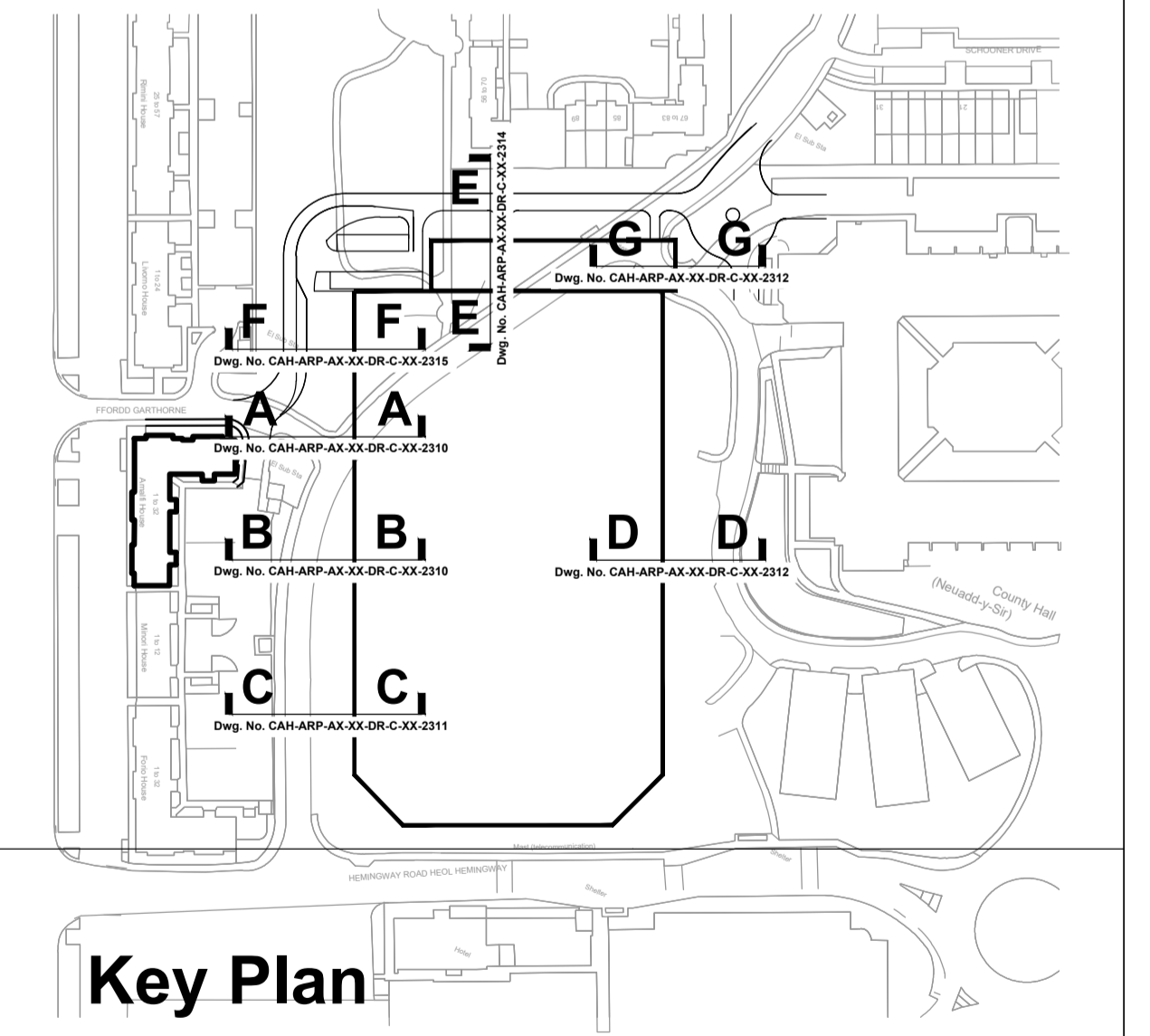
- General Notes:**
1. Position of buildings and roads taken from recent drawings provided by HOK and WSP
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  3. Utilities position and depth to be reviewed and checked on site before any excavation commences
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**Section A-A**  
Garthorne Road Pinch Point



**Typical Section B-B**  
to West of Arena



**Key Plan**  
**Buried Services**

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	<p><b>Operational Risks</b></p>	<p><b>Demolition / adaptation Risks</b></p>
<p><b>Notes</b></p>		

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Issue	Date	Revision Description
P01	17/05/21	Preliminary
P02	28/05/21	Minor annotation updates
P03	17/06/21	HV run added, section adjusted
P04	23/07/21	Updated to new building location

Client  
**ROBERTSON**

Operators  
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**OVG OAK VIEW GROUP**

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Project Title  
**Cardiff Arena**

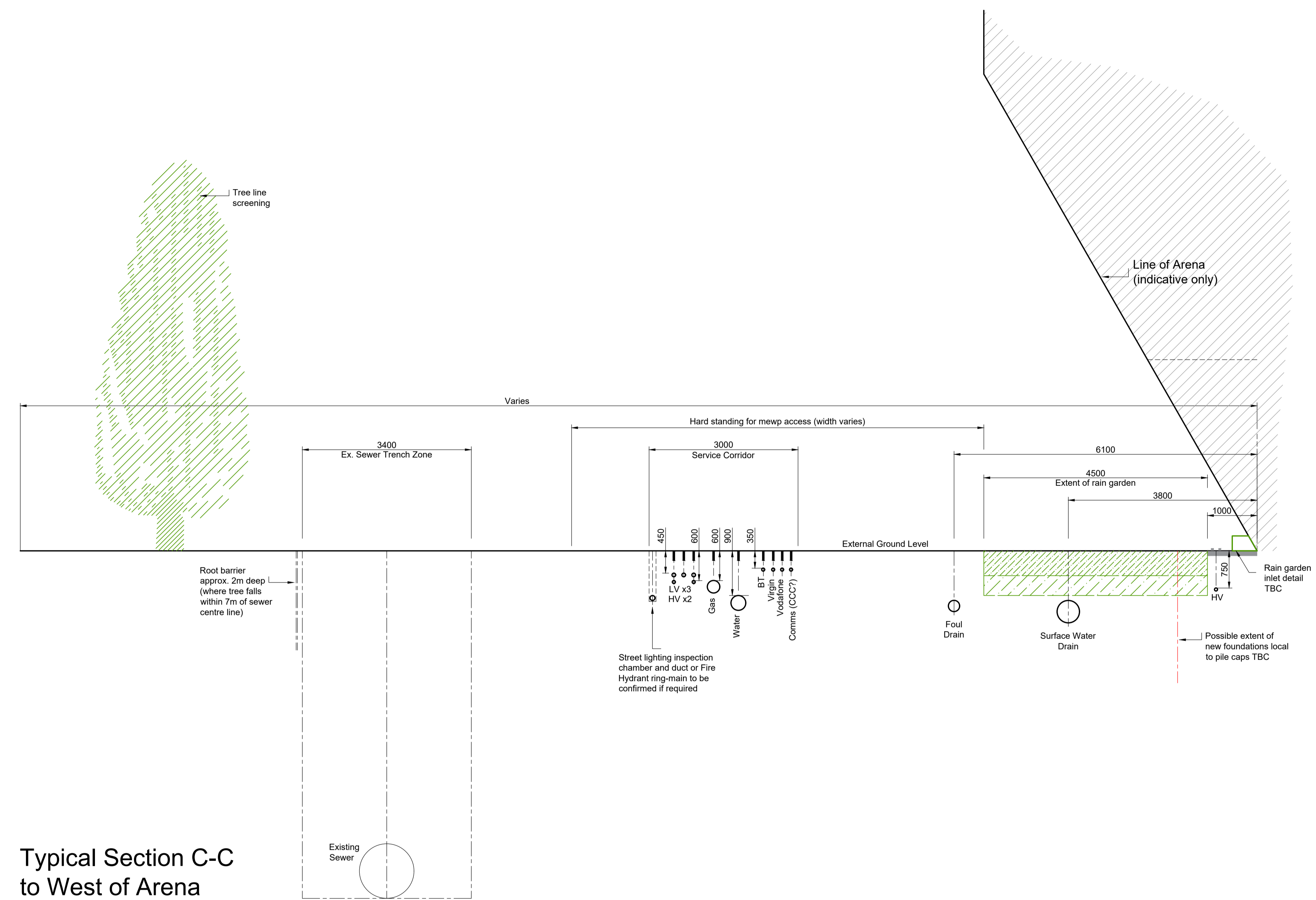
Key Plan

Drawing Title  
**Indicative Utilities and Drainage  
Typical Sections West  
Sheet 1**

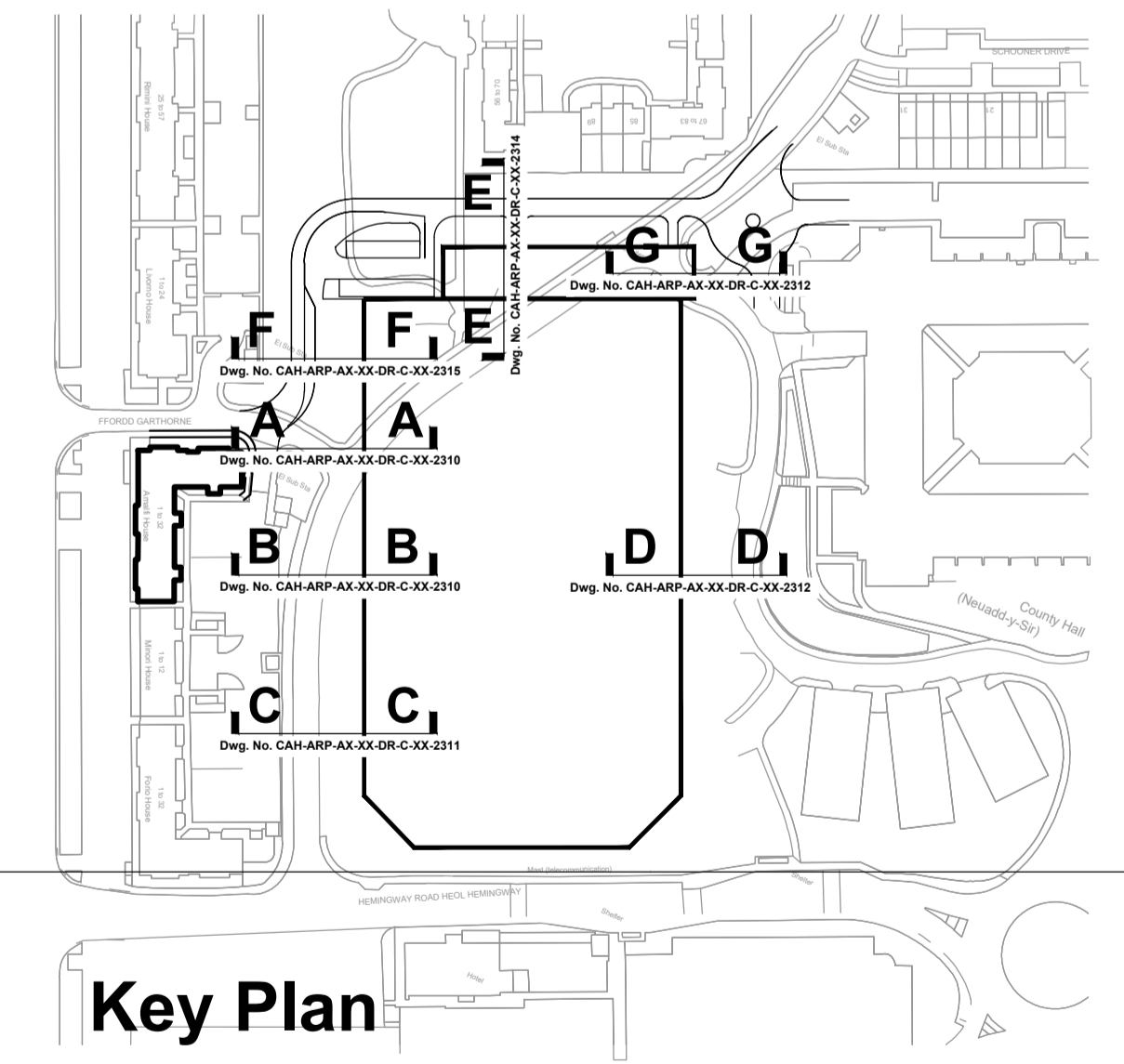
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Role Civil	Checked By JS	Approved By JS
Drawn By PB		
Purpose of Issue Information		
Project No <b>281124</b>	Rev <b>P04</b>	
ID <b>CAH-ARP-AX-XX-DR-C-XX-2310</b>		

- General Notes:**
1. Position of buildings and roads taken from recent drawings provided by HOK and WSP
  2. Existing utilities information taken from statutory authority plan and survey information supplied by client, no responsibility can be taken for the accuracy of this information
  3. Utilities position and depth to be reviewed and checked on site before any excavation commences
  4. The details shown on this drawing are based on concept level input and will need to be reviewed and revised as details developed
  5. Details subject to further consultation and agreement with statutory authorities regarding utility spacing and easements



Typical Section C-C to West of Arena



Key Plan  
**Buried Services**

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<b>Construction Risks</b> 1. Buried services strike 2. Contaminated land	<b>Maintenance Risks</b>
<b>Operational Risks</b>	<b>Demolition / adaptation Risks</b>
<b>Notes</b>	



P01	17/05/21	Preliminary
P02	28/05/21	Minor annotation updates
P03	17/06/21	HV run added, section adjusted
P04	23/07/21	Updated to new building location
Issue	Date	Revision Description
Record of Revisions		



Project Title  
Cardiff Arena

Key Plan

Drawing Title  
Indicative Utilities and Drainage  
Typical Sections West  
Sheet 2

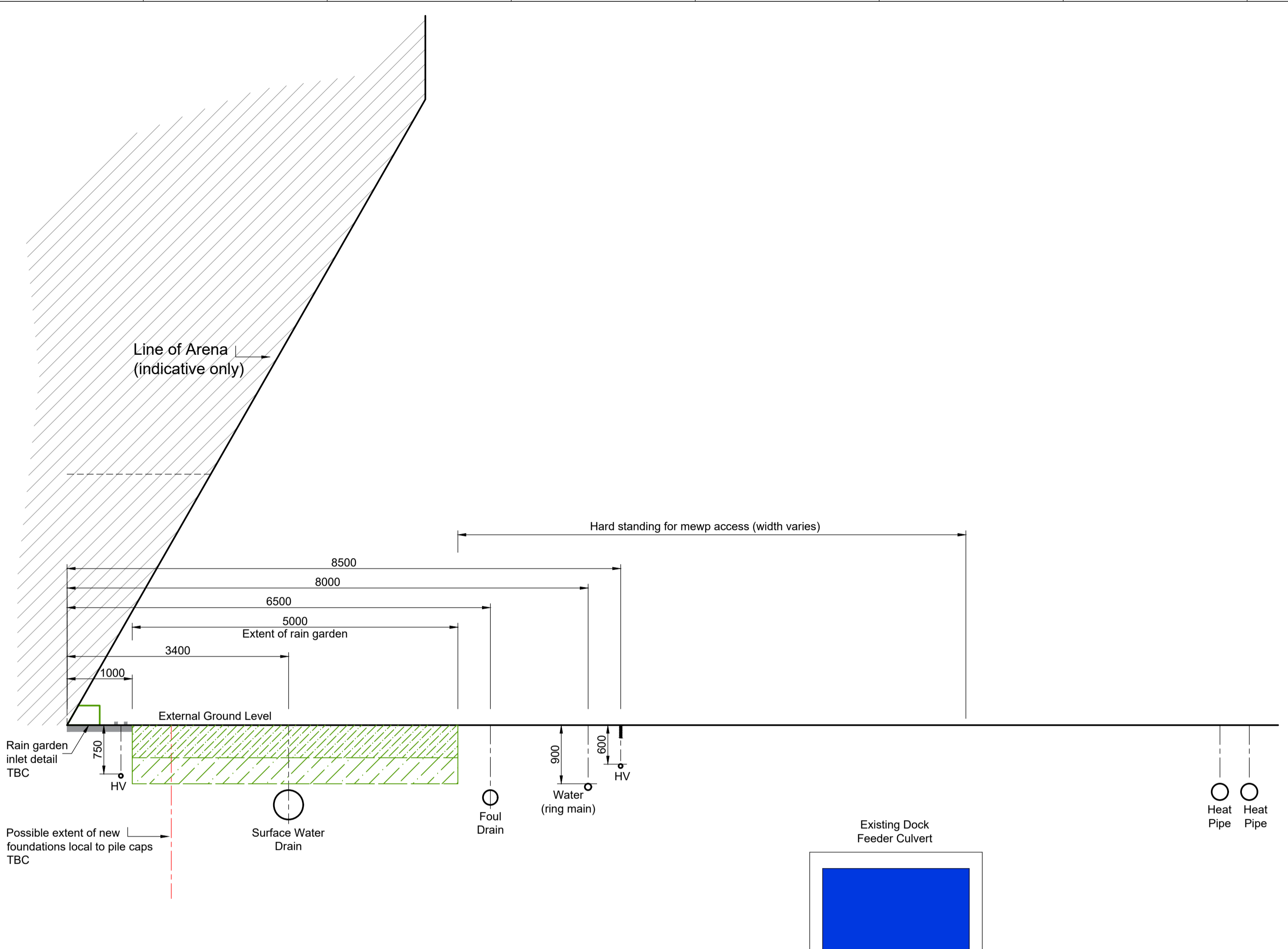
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Role Civil	Checked By JS	Approved By JS
Drawn By PB	Rev P04	
Purpose of Issue Information	ID CAH-ARP-AX-XX-DR-C-XX-2311	
Project No 281124		

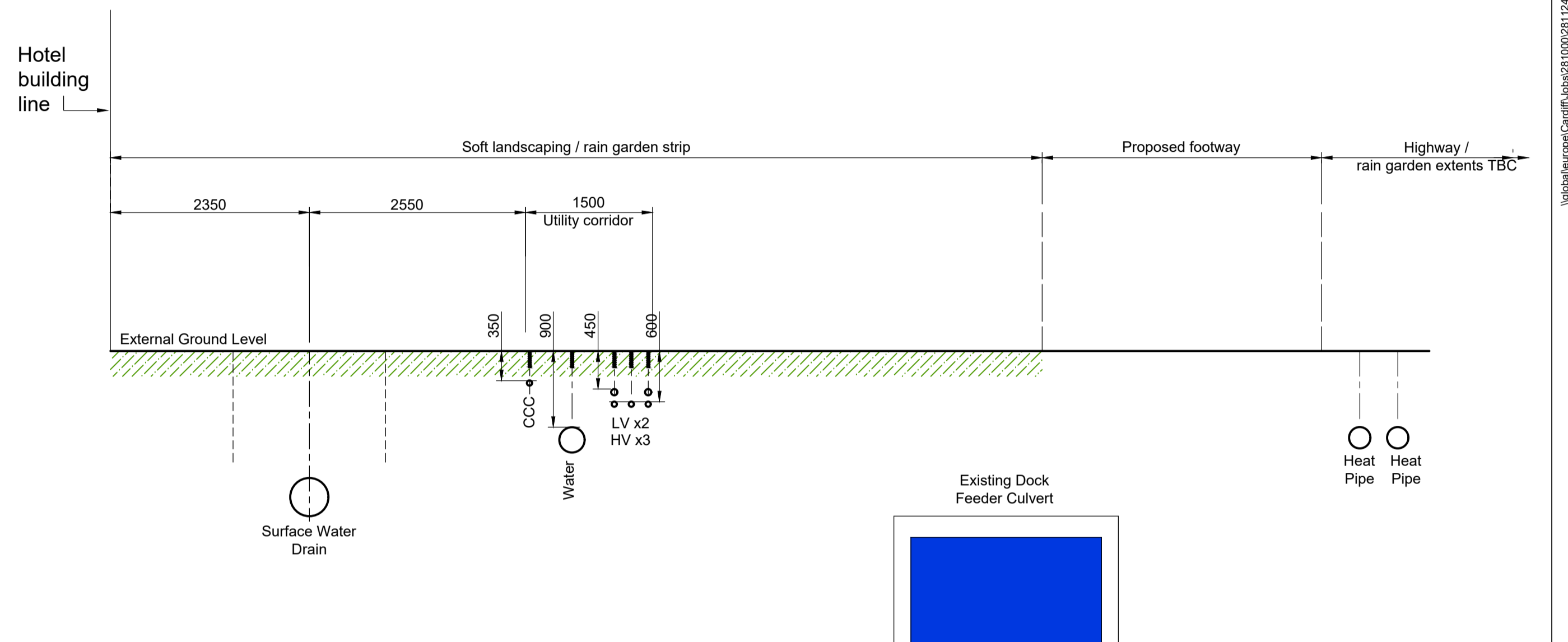


A1  
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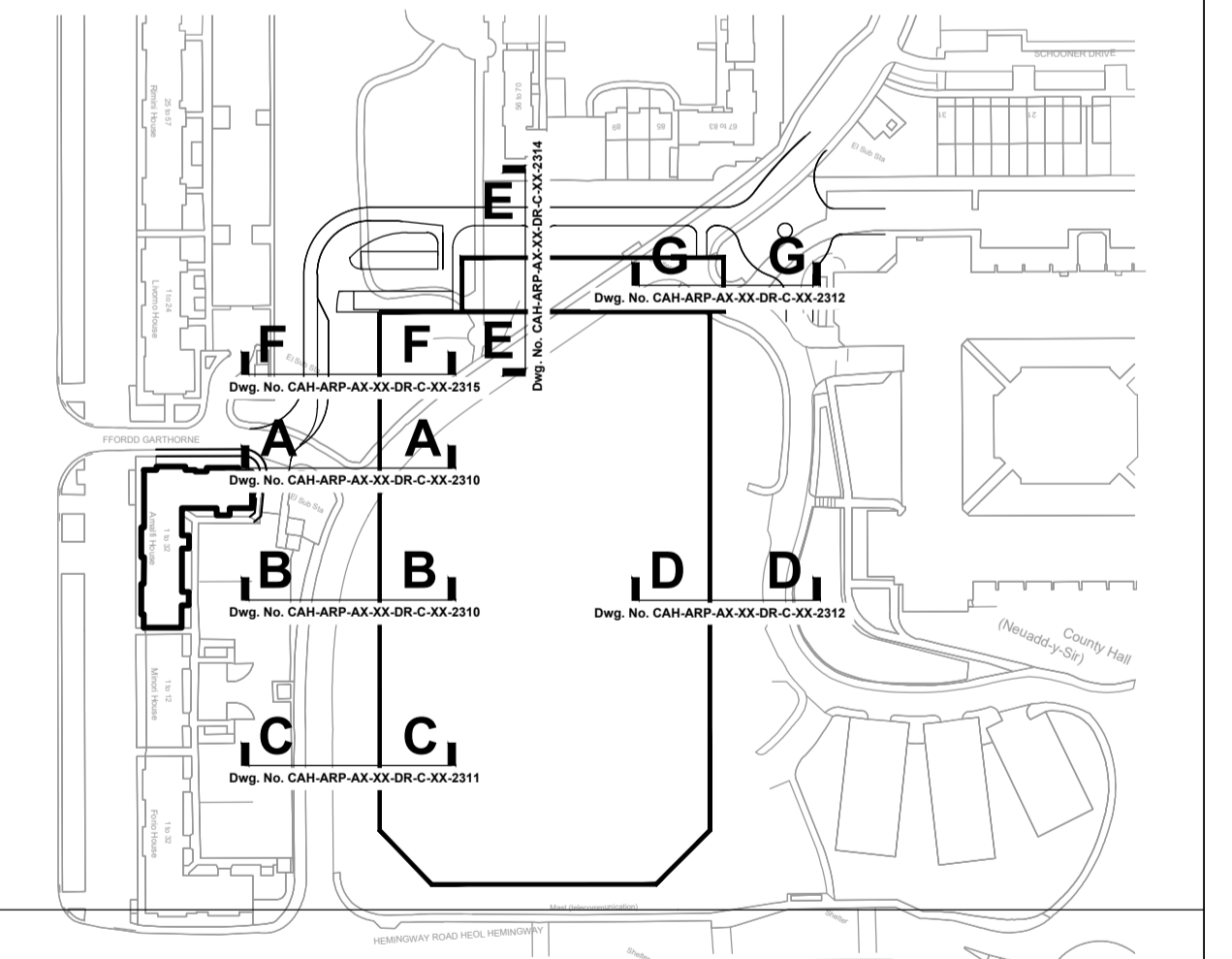
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Typical Section D-D to East of Arena



Typical Section G-G to East of Hotel



Key Plan  
**Buried Services**

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<b>Safety, Health and Environmental (S.H.E.) Information Box</b> In addition to the hazard risks normally associated with the types of work detailed on this drawing, take note of the below. The risks identified below are based on the use of experienced and competent contractors carrying out the work using an approved safe method of working.		<b>Operational Risks</b>	<b>Demolition / adaptation Risks</b>
<b>Notes</b>			



Issue	Date	Revision Description
P01	17/05/21	Preliminary
P02	28/05/21	Minor annotation updates
P03	17/06/21	HV run added, section adjusted
P04	23/07/21	Updated to new building location



Project Title  
**Cardiff Arena**

Key Plan

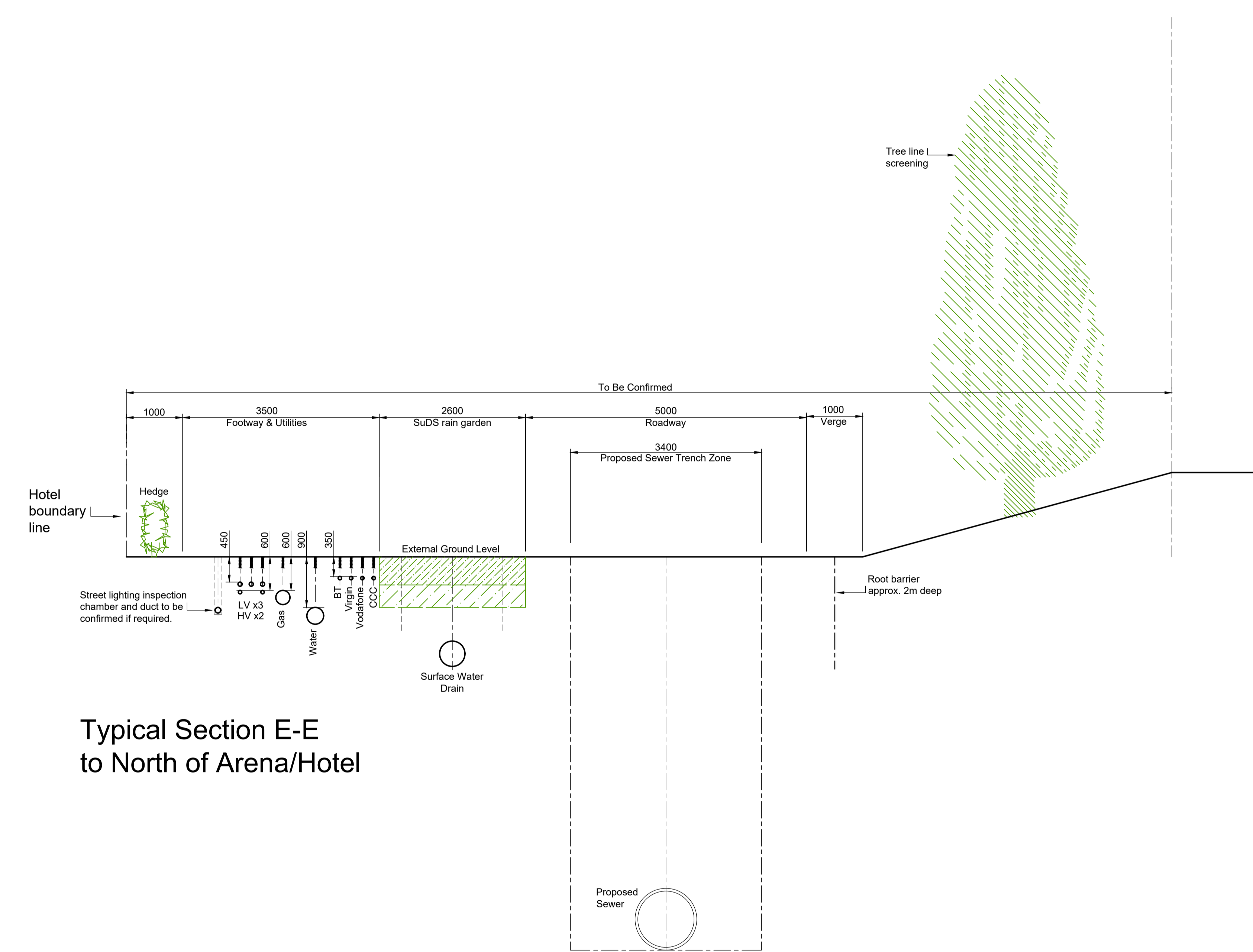
Drawing Title  
**Indicative Utilities and Drainage  
Typical Sections East  
Sheet 1**

Scale at A1 1:50	Role Civil
Drawn By PB	Checked By JS
Approved By JS	
Purpose of Issue Information	Rev P04
Project No <b>281124</b>	
ID <b>CAH-ARP-AX-XX-DR-C-XX-2312</b>	

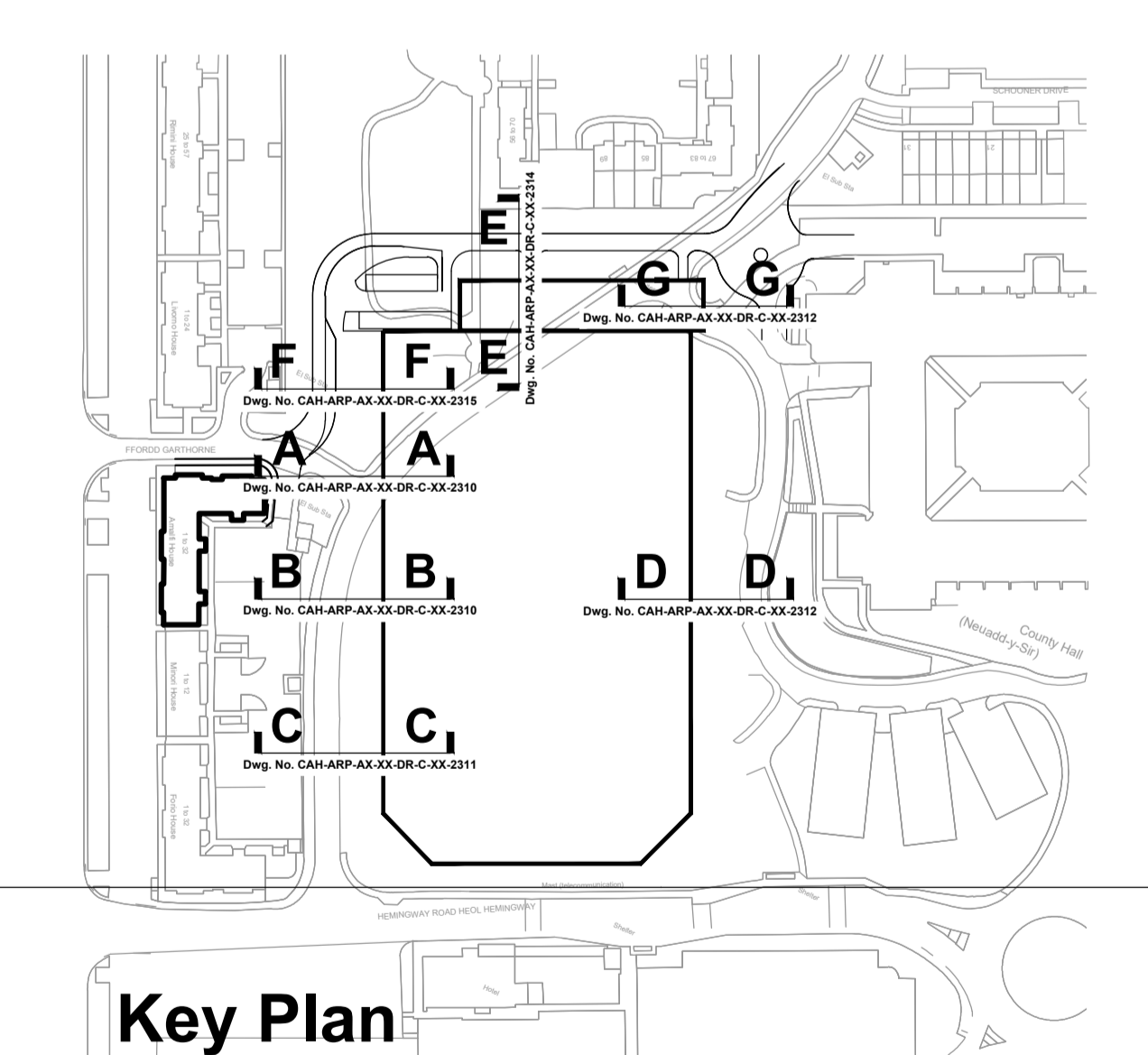




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Typical Section E-E  
to North of Arena/Hotel



Key Plan  
Buried Services

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	<p><b>Operational Risks</b></p>	<p><b>Demolition / adaptation Risks</b></p>
<p>Notes</p>		

<p><b>ARUP</b> 13 Fitzroy Street London W1T 4BQ Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924 www.arup.com</p>	<p>P01 28/05/21 Preliminary</p>	<p>Client <b>ROBERTSON</b></p>						
	<p>P02 17/06/21 Section adjusted</p>							
	<p>P03 23/07/21 Updated to new building location</p>							
<p>Record of Revisions</p> <table border="1"> <thead> <tr> <th>Issue</th> <th>Date</th> <th>Revision Description</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		Issue	Date	Revision Description				<p>Operators <b>LIVE NATION ENTERTAINMENT</b> <b>OVG OAK VIEW GROUP</b></p>
Issue	Date	Revision Description						



Project Title  
**Cardiff Arena**

Key Plan

Drawing Title  
Indicative Utilities and Drainage  
Typical Sections North  
Sheet 1

Scale at A1	1:50
Role	Civil
Drawn By	PB
Checked By	JS
Approved By	JS
Purpose of Issue Information	
Project No	281124
Rev	P03
ID	CAH-ARP-AX-XX-DR-C-XX-2315

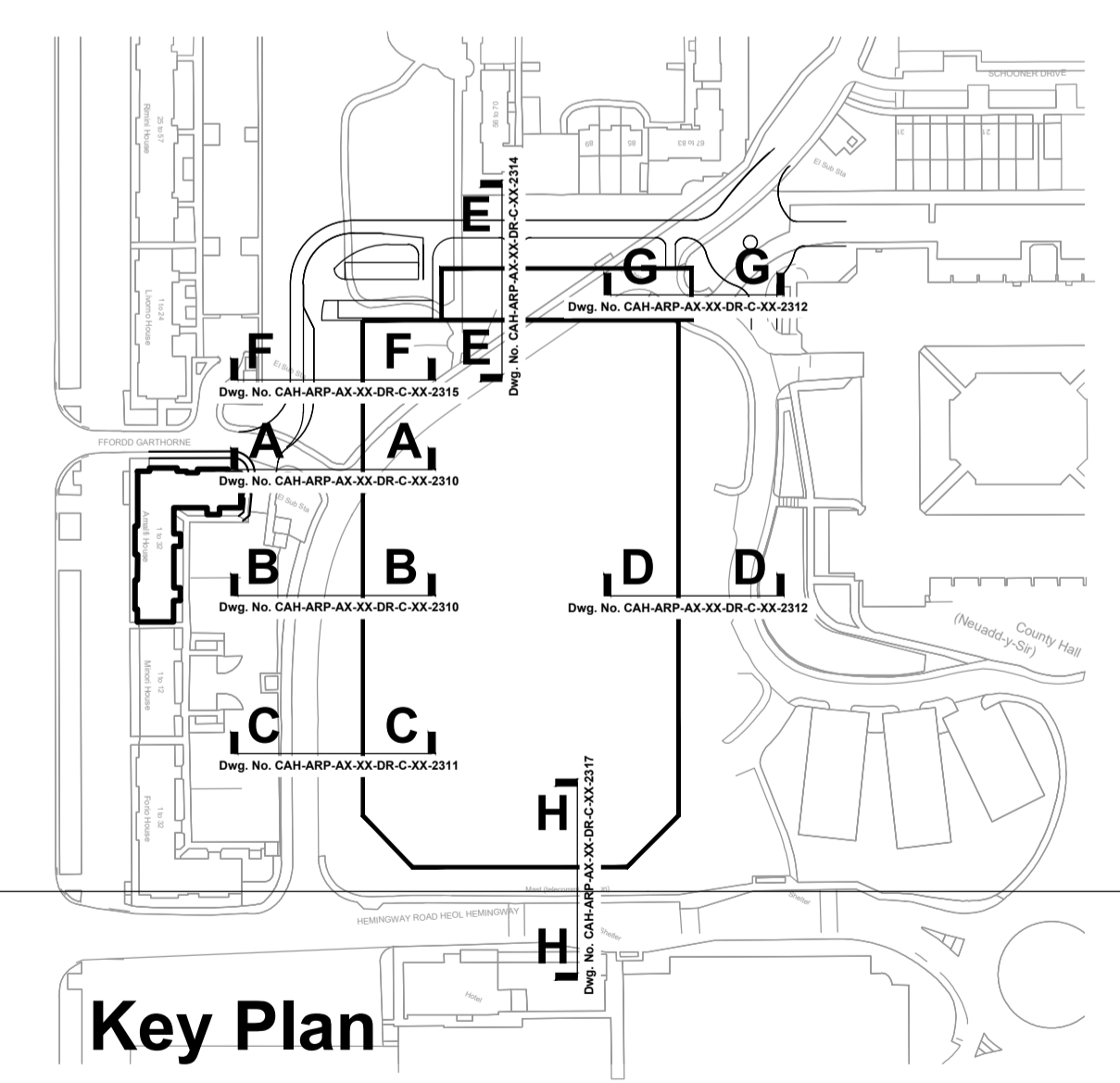
- General Notes:**
1. Position of buildings and roads taken from recent drawings provided by HOK and WSP
  2. Existing utilities information taken from statutory authority plan and survey information supplied by client, no responsibility can be taken for the accuracy of this information
  3. Utilities position and depth to be reviewed and checked on site before any excavation commences
  4. The details shown on this drawing are based on concept level input and will need to be reviewed and revised as details developed
  5. Details subject to further consultation and agreement with statutory authorities regarding utility spacing and easements



**Note:**  
Setting out dimensions are taken approx. 12m from South East corner of Arena perpendicular to entrance door facade

**Section H-H to South of Arena**

- Notes:**
- \* Denotes design standard depth of existing service actual depth not known and to be verified on site during construction operations
  - \*\* Denotes existing services depth not known and to be verified on site during construction operations



**Key Plan Buried Services**

<p><b>Disclaimer</b> Electronic drawings once printed, are uncontrolled and may become out-of-date. Refer to CDE for current revision.</p> <p>Do not scale off this drawing; All dimension to be checked on site; All dimension are indicated in millimetres unless otherwise stated. If in doubt ask. © Arup</p> <p><b>Safety, Health and Environmental (S.H.E.) Information Box</b> In addition to the hazard risks normally associated with the types of work detailed on this drawing, take note of the below. The risks identified below are based on the use of experienced and competent contractors carrying out the work using an approved safe method of working.</p>	<p><b>Construction Risks</b> 1. Buried services strike 2. Contaminated land</p>	<p><b>Maintenance Risks</b></p>
	<p><b>Operational Risks</b></p>	<p><b>Demolition / adaptation Risks</b></p>
<p>Notes</p>		

<b>ARUP</b> 13 Fitzroy Street London W1T 4BQ Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924 www.arup.com	<table border="1"> <tr> <td>P01</td> <td>18/08/21</td> <td>Preliminary</td> </tr> </table>	P01	18/08/21	Preliminary	<p>Client</p>	<p>Operators</p>	<p>Lead Designer</p>	<p>Project Title</p> <p>Cardiff Arena</p>	<p>Key Plan</p>	<p>Drawing Title</p> <p>Indicative Utilities and Drainage Typical Sections South Sheet 1</p>	<p>Scale at A1: 1:50</p> <table border="1"> <tr> <td>Role</td> <td>Civil</td> </tr> <tr> <td>Drawn By</td> <td>PB</td> </tr> <tr> <td>Checked By</td> <td>JS</td> </tr> <tr> <td>Approved By</td> <td>JS</td> </tr> <tr> <td>Purpose of Issue</td> <td>Information</td> </tr> <tr> <td>Project No</td> <td>281124</td> </tr> <tr> <td>Rev</td> <td>P01</td> </tr> <tr> <td>ID</td> <td>CAH-ARP-AX-XX-DR-C-XX-2317</td> </tr> </table>	Role	Civil	Drawn By	PB	Checked By	JS	Approved By	JS	Purpose of Issue	Information	Project No	281124	Rev	P01	ID	CAH-ARP-AX-XX-DR-C-XX-2317
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