

Secure Training Facility

Outline Proposals Mechanical and Electrical Engineering Stage 2 Report

Section 2.4



Audit Sheet

Rev.	Description	Prepared and Checked by	Reviewed by	Date
P01	Draft for Comment	RB/SC	AMT	11.10.16
P02	Ventilation amendments & floor plans updated to Rev PL5	RB/SC	AMT	08.11.16
P03	External layout & LMS survey updated	RB/SC	AMT	12.01.17
P04	Scheme updated to incorporate VE	RB/SC	AMT	11.12.17

This report has been prepared in accordance with our appointment by Gleeds / Associated British Ports and we do not admit any liability to any third party other than to the extent required by our appointment.

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1. Executive Summary

The Hoare Lea Stage 2 document outlines the building mechanical, electrical and public health systems proposals for the new secure training facility development works at Cargo Road, Cardiff Bay.

This document is the first milestone of the design audit with the primary aim of reconciling the client's aspirations with our proposed design solutions.

The report sets out our understanding of the client brief and outlines the ways in which the following are going to be dealt within the project: -

- Incoming utility supplies for the building as well as the impact on the existing site underground services, in particular upgrading and diversionary works
- An overview of the Electrical Engineering principles including security systems.
- An overview of the Mechanical Engineering principles, including the indoor climate control options
- An overview of the Vertical Transportation strategy
- An overview of Sustainable and Environmental Engineering

2. Introduction

This document has been prepared to provide a Stage 2 report to describe the scope of the Mechanical and Electrical systems to the Secure Training Facility. The new building is approx. 4000m² GFA on four levels, comprising general and specialist teaching areas, office, storage, sleeping accommodation and informal type spaces for approximately 300 occupants.

This document is presented as a consultative document which, when agreed with the client, will form the basis from which the design will be developed further.

The objectives of this document are:-

- To confirm the understanding of the brief and to explain the systems to achieve it.
- To promote comment at the earliest opportunity.
- To influence future design policy and decision-making.
- To brief the user group members within the project team on the engineering systems proposals.

The project will be procured as a design and build and the M&E criteria, standards and systems described in this report will be relayed to the contractor with Stage 3 Drawings and Specifications prepared by Hoare Lea.

The design will be underpinned by a particularly low energy and sustainable approach, through reducing the requirements for energy and good efficient design. LZC and renewable technologies will be incorporated, where necessary, to supplement this approach to meet sustainable targets. Where these technologies are included, they will be fully considered and integrated into the holistic approach

The Building (MEP Engineering) Services design philosophy embraces the following design principles:-

- Minimise energy consumption through passive design techniques
- Maximise daylight whilst minimising unwanted solar gain
- Provide a superior internal environment through the creation of visually, thermally and acoustically comfortable environments to support productivity and attainment
- High efficiency plant and distribution of services to achieve minimum carbon emissions compliant with Good Practice
- Water conservation
- Provide engineering services which are simple in operation and provide occupants with control of their environment
- Low life cycle cost (capital, energy and maintenance costs)
- Afford flexibility (both long and short term) in respect of general layout, environmental control and meeting changes to room usage
- Integration of IT/Communications (ICT) into the project for training and administrative purposes
- Safe and efficient access to plant for maintenance and replacement
- Provide internal environmental conditions that comply with the clients requirements

2.1 Scope of Mechanical and Electrical Systems

The list of below is an outline of engineering services proposed:-

- Low Temperature Hot Water (LTHW) Heating System
- Domestic Hot and Cold Water Systems
- Natural Ventilation Systems
- Mechanical Ventilation Systems
- Comfort Cooling Systems
- Building Management/Automatic Control Systems
- Natural Gas Systems
- Low Voltage Electrical Switchgear and Distribution
- Small Power Installations
- Internal Artificial Lighting
- Intelligent Lighting Control Systems
- Security Systems
- Emergency Lighting and Testing Facilities
- External Lighting
- Fire Detection and Alarm Systems
- Earthing and Bonding
- Lightning Protection Systems

- Vertical Transportation Systems
- ICT Systems, Structured Cabling & Containment
- Above Ground Foul Drainage Systems

3. Design Criteria

3.1 Design Standards

The design will be based generally on the requirements of the Employers Requirements (ER's) current British and European Standards, guidelines of the Chartered Institute of Building Services Engineers and Building Regulations.

The electrical installation shall also comply with the Defence Infrastructure Organisation Specifications. And Electricity at Work Regulations.

Design solutions will recognise the guidance from Ministry of Defence and other related standards and codes.

3.2 Operational Life

Elements of the building engineering systems will be specified to conform as a minimum to the economic life expectancy factors given in CIBSE Guide M, Maintenance Engineering and Management, 2008.

3.3 Building Regulations Part L

The development is required to comply with Approved Document L2A, 2014 Wales – New Buildings Other Than Dwellings.

3.4 BREEAM

The development will be assessed under BREEAM 2014. Hoare Lea will work with the assessor (DRAC Consulting) and the other members of the design team with a view to achieving the client's required rating of Excellent. A pre-assessment for the project has been carried out. In order to achieve an Excellent rating, 70 credits are required. The current pre-assessment predicts a score of 68. At this stage of the project it is recommended to exceed the minimum target by at least 5% to allow for changes during design development. In addition, the ER's specify that for Ene 01 Reduction of Emissions, 5 mandatory credits are to be achieved for the Excellent rating.



3.5 External fabric thermal performance

The following building envelope U-values and glazing performance properties have been advised to Chetwoods and assumed in the modelling to date:

- ▶ Exposed solid walls 0.18 W/m²K
- ▶ Opaque curtain walls 1.6 W/m²K
- ▶ Floor 0.15 W/m²K
- ▶ Roof 0.15 W/m²K
- ▶ Windows 1.6 W/m²K
 - ▶ G value 0.4
 - ▶ Light transmission 0.7
- ▶ Doors 1.6 W/m²K

3.6 Solar shading

Solar shading has not currently been considered

3.7 Air leakage rate

The following air permeability setting was used within the model: 3.0 m³/m².h @ 50Pa. We have been advised by Chetwoods that this is achievable based on the current construction methods.

3.8 Façade modelling

Façade modelling has not currently been undertaken. We are looking at resolving any Part L and overheating problems in conjunction with the architect.

3.9 Energy strategy and LZC technologies

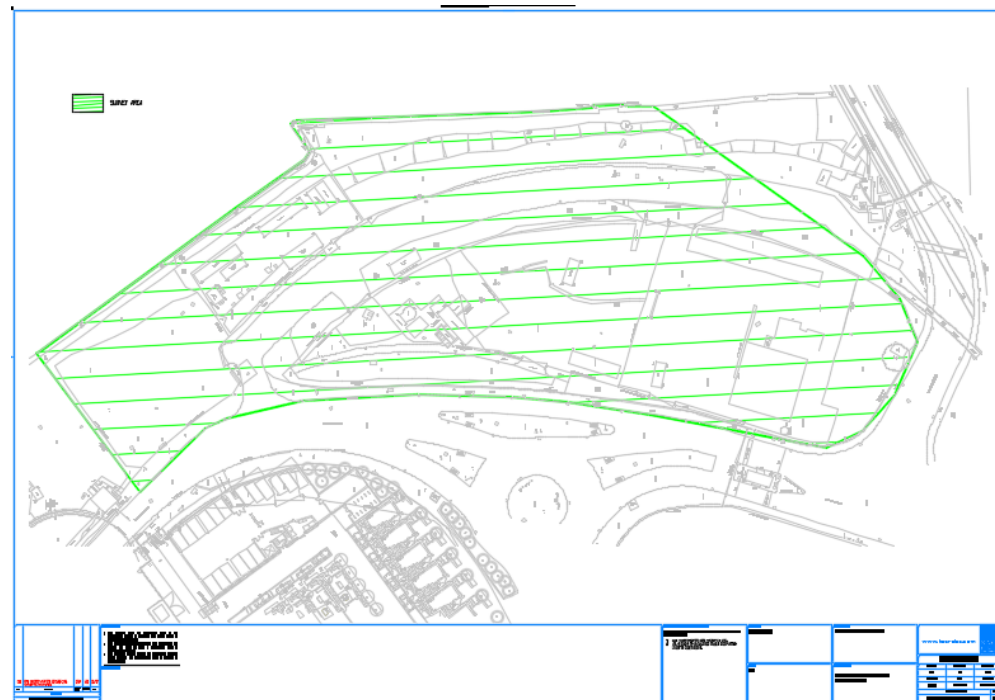
In order to pass the planning requirements for carbon emissions, the energy strategy for the building is to reduce the energy demand through high efficiency plant and to cover the renewables obligation through the solar PV panels. We have considered the use of a combined heat and power (CHP) engine due to the building hot water demand, however due to initial installation costs and ongoing maintenance requirements, the Stage 3 Part L modelling will aim to omit the CHP from the design, whilst still achieving the required BREEAM credits.

4. Statutory Supplies And Service Provision

4.1 General

The existing site has a number of industrial type buildings located within the boundary and a significant amount of underground, street lighting & overhead utility and port services which will need to be cleared / diverted prior to construction. Hoare Lea are in the process of estimating the loads for the building and will contact the utilities to discuss the new supplies as well as the removal and diversion of existing utility services as required to facilitate the new Secure Training Facility.

0901421 HL XX 00 DR U 900 9001 External Services Mapping Survey Extents refers:-



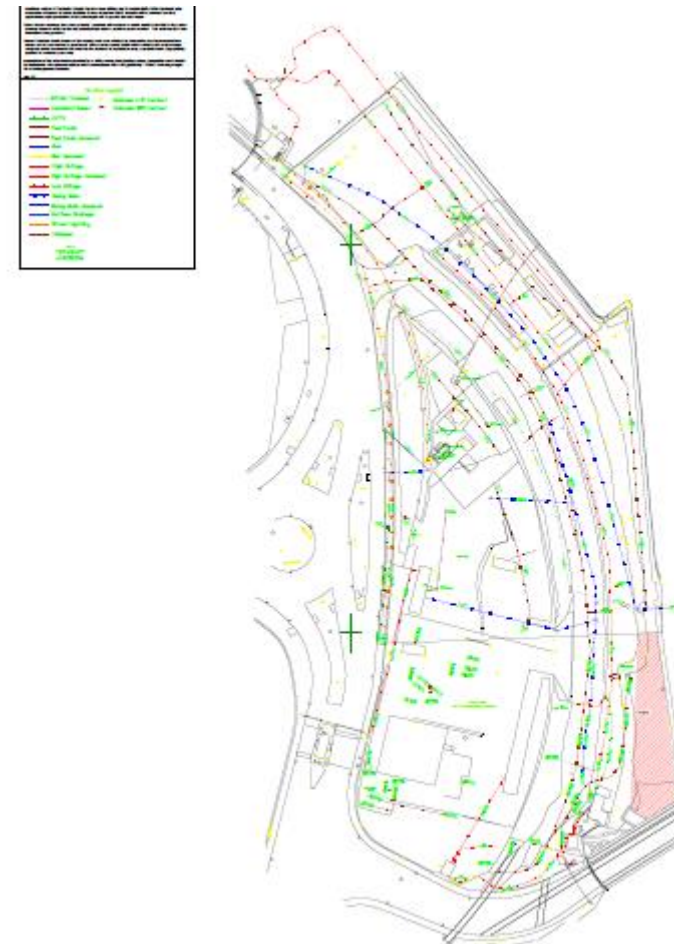
External Services Mapping Survey Extents

This site services are provided by:

Electricity	Western Power Distribution (WPD)
Water	Welsh Water
Sewerage	Welsh Water
Gas	Wales & West Utilities
Communications	BT

Some preliminary discussions have taken place with the utility companies and diversions and infrastructure upgrades are required. Details on these are detailed below.

Underground services mapping has been undertaken by Land Mark Surveys Ltd

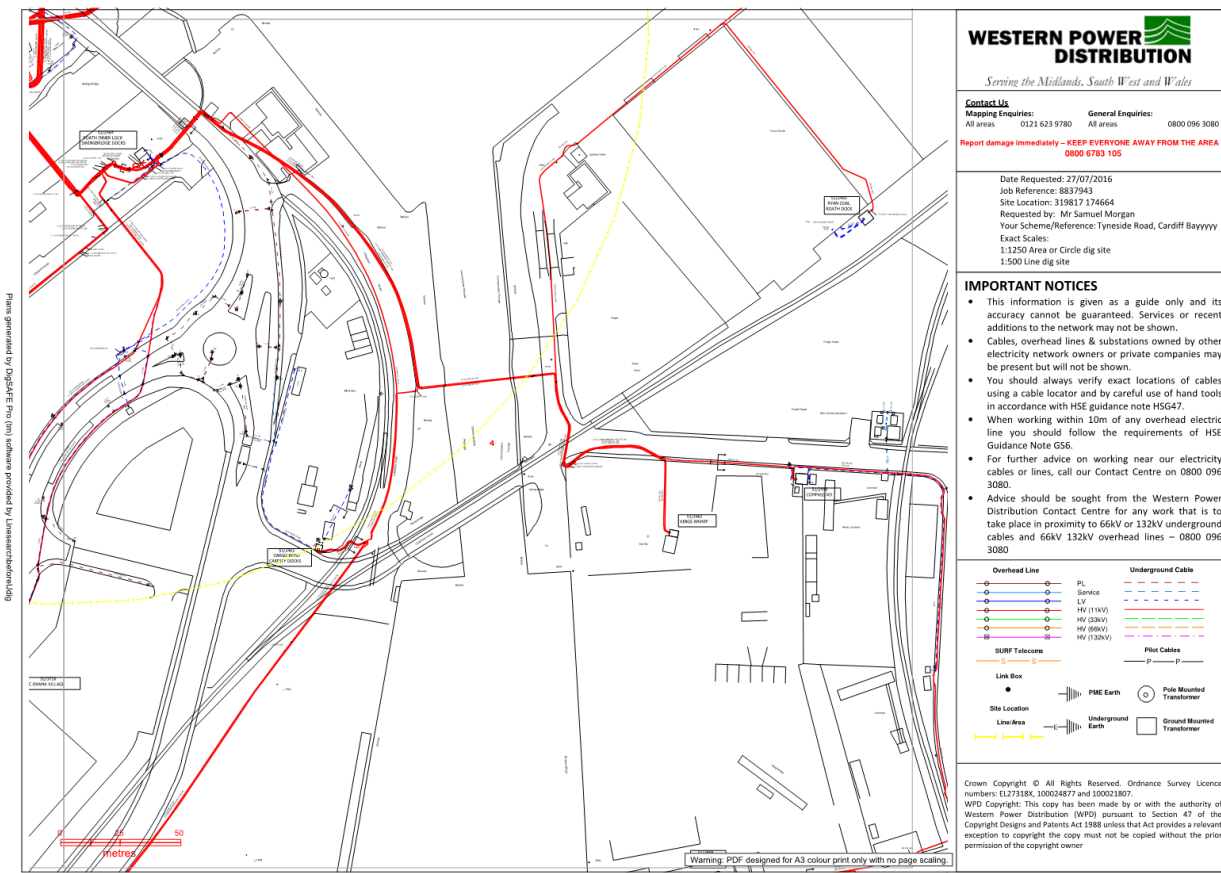


LMS Survey Cargo Rd – Ref 4666

4.2 Electricity

Records have been obtained from Western Power Distribution (WPD) which detail existing services on the site. From record information it appears the existing WPD 11kV equipment requires significant diversion works, notably from the north of the site adjacent to Tyneside Road Bridge Control Kiosk travelling south east directly across the site. The locations of the equipment should be verified by detailed scans and surveys being undertaken prior to any site works. The 11kV cables diversion works should be undertaken prior to the main construction works. It is anticipated that the extensive 11kV cabling would need to be diverted around the entire perimeter of the development in order to free up the building plot and not restrict any works activity within the site boundary.

4.2.1_WPD Existing Services



WPD LV supplies will need to be disconnected and removed to the brick building / Portakabin on the southern part of the site boundary.

It is proposed to retain the existing WPD substation to the south of the site on Compass Road as this falls outside the boundary of the Secure Training Facility site although this is denoted as "ABP Development Site".

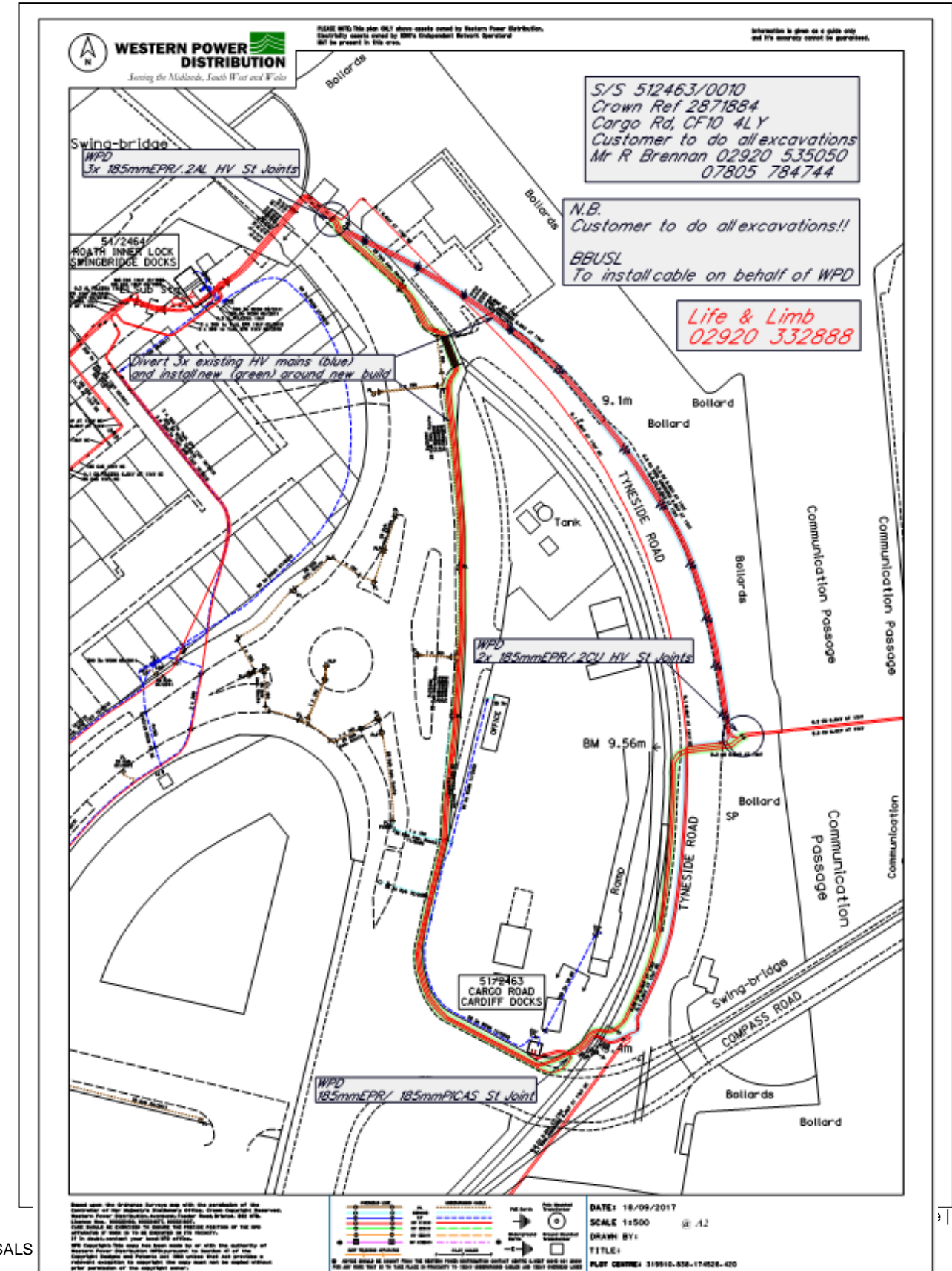
The anticipated load of the Secure Training Facility is approx. 200 kVA subject to a detailed load analysis to be undertaken during the stage 3 design stage.

The new supply will emanate from the Cargo Rd substation and run in the pavement up to the main security gates where the WPD and other Utility services will run across the car park and terminate within or adjacent to the new building.

Quotations have been obtained by WPD and these are detailed as follows:-

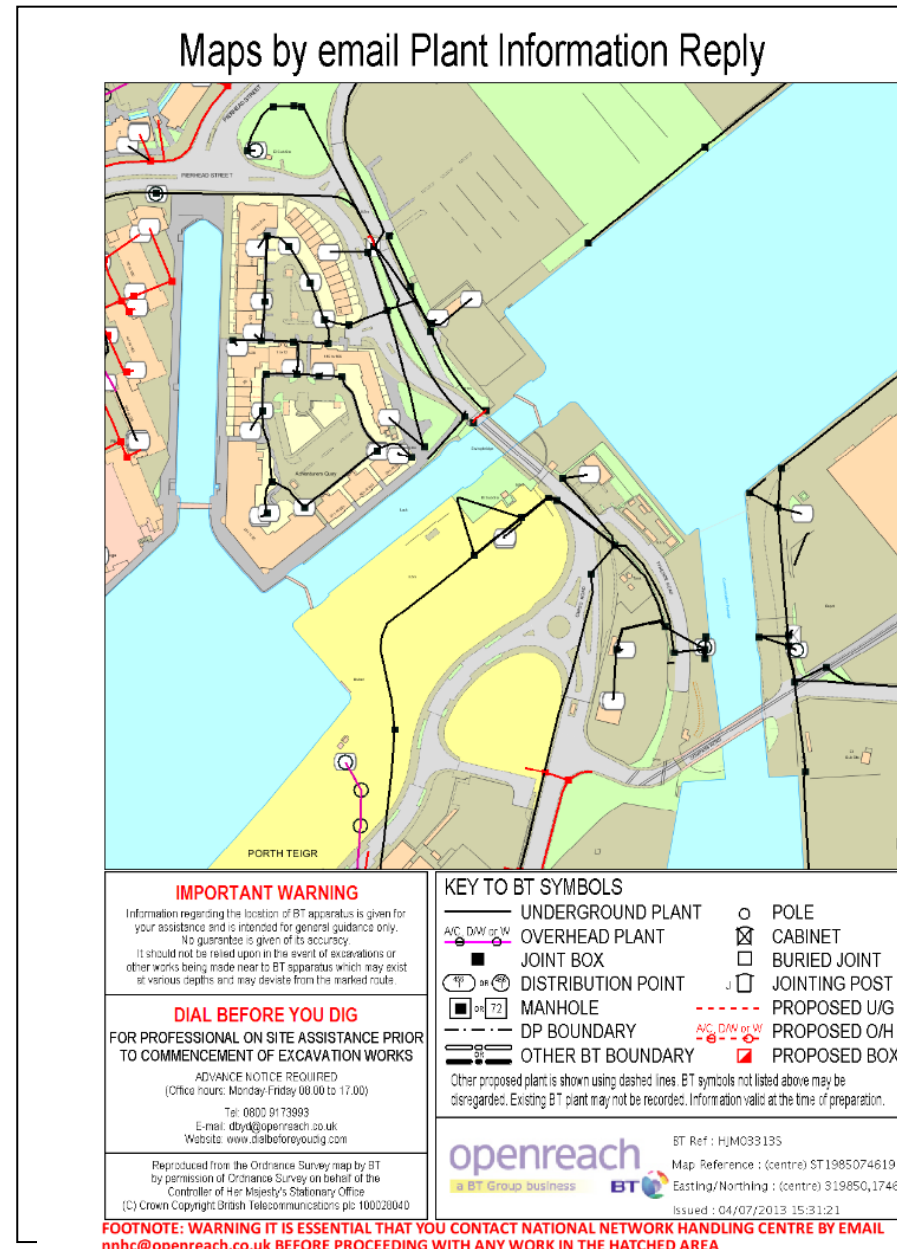
Quotation	Description	Cost (Exc VAT)
1	Disconnection of LV Supply to Portacabin	£783.73
2	HV Diversions Rev 2	£37,937.58
3	New Supply (Connection Charge Option 1)	£12,031.62
	Total	£50,752.93

4.2.2_WPD Proposed Services & Diversions



4.2.3 Telecoms

Records have been obtained from BT which details the existing services on the site.



From record information it appears the existing BT underground equipment requires significant diversion works, notably from the north of the site adjacent to Tyneside Road Bridge Control Kiosk travelling south east directly across the site. The locations of the equipment should be verified by detailed scans and surveys being undertaken prior to any site works. The BT cables diversion works should be undertaken prior to the main construction works. It is anticipated that the cabling would need to be diverted with the installation of cables along the Tyneside Road/Cargo Road pavement then follow the line of the 2.4m perimeter fence (within the ABP Development Site) leading to the underground dock crossing. These would need to be carefully laid internally and externally to the construction boundary noting the provision of other underground services, new foundations and landscaping.

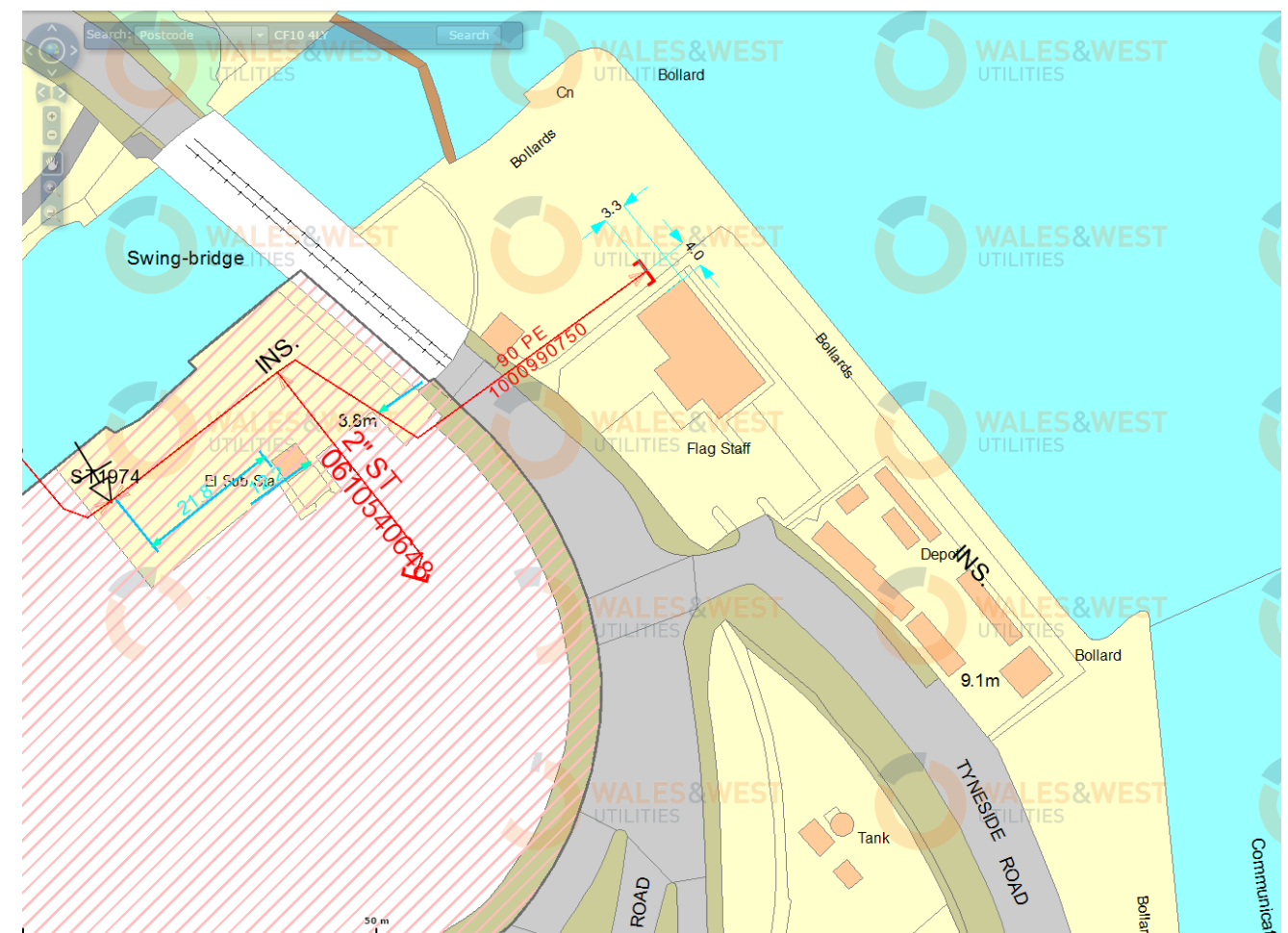
BT supplies will need to be disconnected and removed to the brick building / Portakabin on the southern part of the site boundary. The building in the ABP development site will need to be re-fed from new infrastructure laid on Cargo Road.

Following site investigations, Dwr Cymru Welsh Water have stated that BT equipment and cabling is fouling access to their equipment and this also needs to be diverted.

We have obtained budget estimate from BT Network Alterations indicating the diversions will be a time consuming and high expenses exercise costing circa £138K.

4.3 Gas

The development site is fed by a Wales and West Utilities low pressure gas main, entering the site from Cargo Road. The existing supply will be relocated to avoid the perimeter fencing around the site. The supply will rise from below ground before entering the new building through the wall of the ground floor plantroom. The supply will pass through a Wales & West Utilities gas meter to serve the building. The plantroom will allow 24 hour unobstructed emergency access for Wales & West Utilities.



We have obtained budget quotations from Wales & West and these are circa £11 K for the new supply and £1.5K for the disconnection.

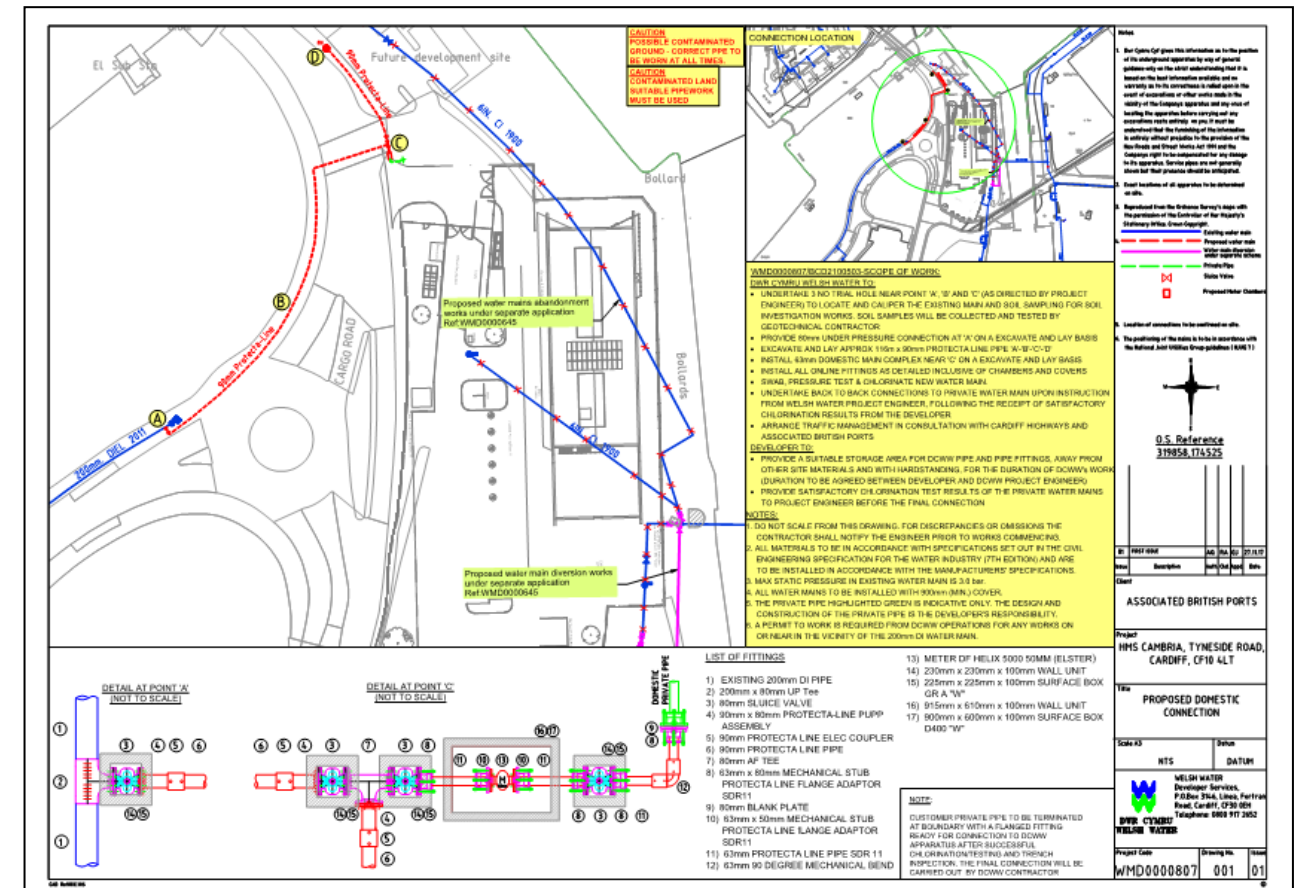
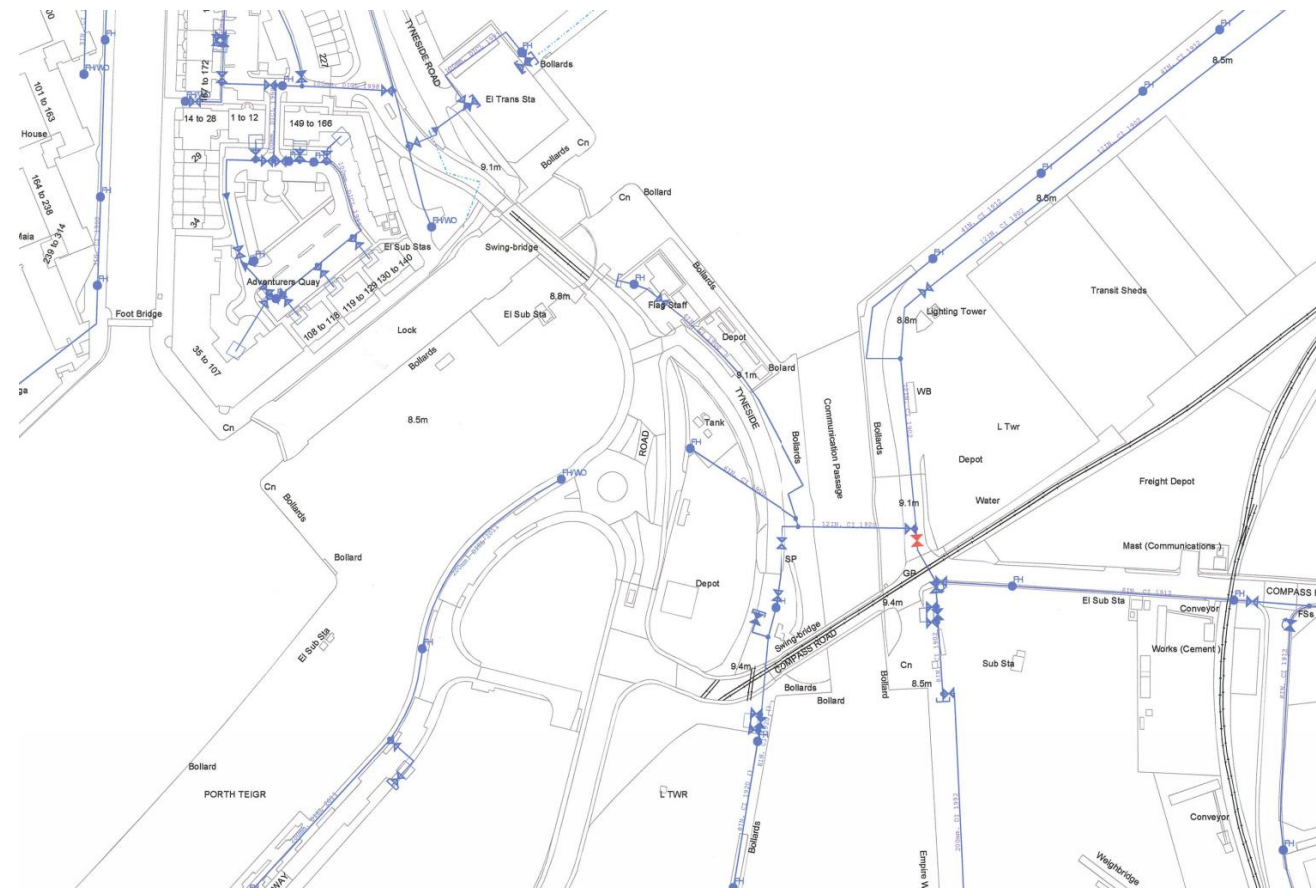
Mechanical and Electrical Engineering Stage 2 Report

4.4 Water Infrastructure

Records have been obtained from Welsh Water which detail the existing services on the site. From this information it appears the existing water main requires significant diversion works.

The location of all equipment should be verified by a detailed underground Radar survey of the site, to establish exact existing service routes, prior to any site works. The water main diversion works should be undertaken prior to the main construction works. It is anticipated that the pipework would need to be diverted along Tyneside Road/Cargo Road. These would need to be carefully laid internal and external to the construction boundary.

The mains cold water supply will be brought into the site from a connection to a new Welsh Water main in Cargo Road. The existing pipework serving this location is insufficient and therefore an increase in the pipework size and extent are required. A utility bulk meter will be located at the site boundary in the footpath. A new fire hydrant main will also be required as part of the diversion works, to be located within 18m of the main entrance doors.



We have obtained a budget estimate from Dwr Cymru Welsh Water for circa £39.5k for the extension and new connection, and circa £24k for the main diversion. A small additional cost may also be required to re-connect the adjacent site for the Sea Cadets, depending on the phasing of the diversion and new connection works.

5. Mechanical And Public Health Engineering Systems

5.1 Plant Strategy

The project consists of a new build secure training facility, comprising catering facilities, offices, teaching rooms, overnight accommodation and showering facilities. All primary plant for the LTHW Heating System and Domestic Water Systems will be located within the ground floor plantroom. Comfort Cooling and all Ventilation Systems will be located at roof level. All plant will be provided with suitable metering to monitor energy consumption.

The main heating pipework, domestic water pipework, gas pipework, ductwork, electric cabling and controls cabling will distribute via dedicated risers located at each end of the building. Services will then be distributed vertically through these risers to serve all floors.

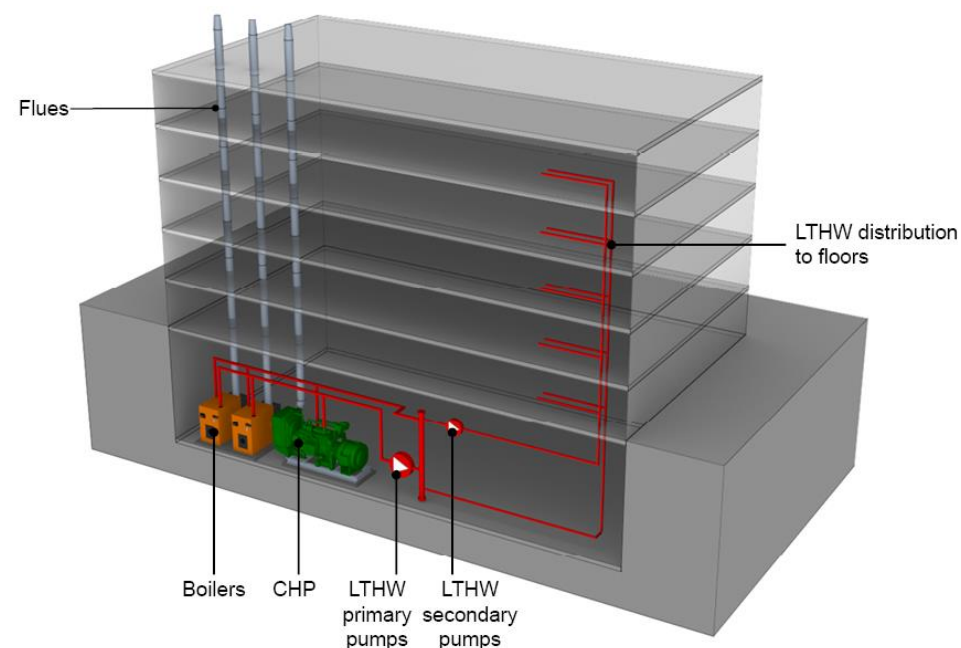
Sprinklers are not currently envisaged, therefore a dedicated sprinkler tank shall not be required.

5.2 Gas Installation

From the Wales & West Utilities supply, the gas pipework will enter the building, via a gas meter located in the plantroom, and split to serve the first floor kitchen and to feed the boilers. Within the plantroom, the gas supply will have metered branches to monitor the consumption of each boiler. The plantroom will be naturally ventilated by double louvred entrance doors and/or louvres as required to meet IGEM/G/5.

5.3 Heating Systems

Heating will be provided by low temperature hot water (LTHW), generated in the ground floor plantroom via gas-fired boilers (and a gas-fired CHP if necessary to meet Part L or BREEAM requirements). The plantroom will also contain the associated pressurisation unit, expansion vessels, primary circulating pump set and secondary circulating run/standby pump sets. The plant flues will be routed, via a dedicated fully accessible riser to the roof. The flues will extend above the roof level in accordance with the Clean Air Act.



The gas-fired boilers will be high efficiency, low NOx fully modulating condensing boilers, sized to meet the maximum LTHW demand. The installation should be sized so that if one boiler fails or requires maintenance the LTHW demand could still be met by the remaining boilers. The client is to consider the exact requirement for standby boiler plant and whether 2 No. boilers provide sufficient redundancy.

The LTHW circuit will be split to serve the building heating circuit and the hot water storage calorifiers. Dedicated pumps will serve each circuit. LTHW will distribute to each floor via a dedicated riser. Valved bypasses are required for each floor/circuit to avoid long dead-legs. The LTHW system will also serve the AHUs located on the roof.

Heating to all spaces will be provided via radiators from the LTHW system, unless stated otherwise. Each radiator will be provided with thermostatic radiator valves (TRVs) and will be located either beneath windows or on internal walls (to be fully coordinated with the internal furniture). Heating flow and return pipework will be routed within the ceiling void and partition walls to radiator locations. Each heated space will have a programmable room thermostat to provide simple and user-friendly control of the radiators. Refer to the BEMS section for details on control and metering strategies.

It has been agreed by the client that LST radiators are no longer required for the changing room areas.

As the main corridors have no external windows or external walls there will be minimal heat loss. The corridors also contain the LTHW distribution pipes, therefore we anticipate that heating will not be required.

The heating system will be capable of maintaining the minimum air temperatures as per the room data sheets.

5.4 Domestic Cold Water Services

Mains pressure potable cold water will be brought into the site from a connection to the new Welsh Water main in Cargo Road, via a Welsh Water meter. From the meter, the main will be extended into the ground floor plantroom, to feed a sectional cold water storage tank. Adjustable float valves will be installed on the inlet to the tank, such that the stored volume can be adjusted, to alter the turnover rate of the tank volume and reduce the time the water is exposed to potential heat gains. To aid in protecting the whole system from legionella, the cold water storage tank will be dosed with chlorine dioxide.

The water tank will supply a packaged booster set, providing sufficient flow and pressure. The variable speed booster pumps will be installed as 3 number in a duty/share/standby arrangement.

Cold water will be distributed throughout the building via the riser adjacent to the ground floor plantroom, with branches to serve each floor. Pipework will be insulated to help limit potential heat gains. Anti-vacuum and air release valves, plus surge protection devices will be installed at the top of the riser. Pressure regulating valves will be installed in the riser on the branch to each floor to protect fittings from excessive pressure. From the riser, pipework will be distributed through the corridor on each floor, to feed all outlets. The architect/client will select fittings with flow control devices to suit end user requirements and to provide compliance with Part G of the Building Regulations and BREEAM requirements.

5.5 Domestic Hot Water Services

Domestic hot water will be generated centrally in the plantroom by the LTHW system. Hot water will be distributed, via a plate heat exchanger linked to a storage vessel, throughout the building via a pumped return circuit. The supply will be distributed to all outlets via a pumped flow/return installation, with circulation taken to within 1m of all appliances.

The final discharge temperatures for hot water for all basins and showers will be regulated by thermostatic mixing valves (TRVs). Where domestic water is supplied at higher temperature to sinks, outlets will be labelled appropriately.

5.6 External Water Services

Domestic hot and cold water will also be required to serve the washdown/shower area. Domestic cold water will be required for an external tap within the bin store.

5.7 BREEAM Water Credits

6 water credits have been targeted to achieve BREEAM Excellent, please refer to the BREEAM pre-assessment document. A mains leak detection will be provided to reduce the risk of minor leaks, as required to achieve a BREEAM credit. Credits are also targeted for the sanitaryware and kitchen equipment: the end user is to specify equipment to minimise water consumption, including flow control devices to each sanitary area/facility.

5.8 Drinking Water

Chilled, mains fed, point of use water coolers will be provided in the Fitness Suite, Induction Area, Drill Hall and Beverage Bays, as agreed with the end user.

5.9 Above Ground Drainage

The building will be fitted with an independent foul drainage system to serve all sanitary appliances and other drainage outlets within the building.

Foul drainage will be collected from each level and transported via gravity to the below-ground drainage system which is to be designed by structural engineers. The below-ground drainage system will terminate at ground floor slab level. Where ventilating pipework is necessary, to suit either the below-ground drainage system or the sanitary plumbing system, it will terminate through the roof to meet architectural and technical requirements.

Sanitary discharge pipework will be designed to meet the requirements of BS EN 12056-2 System III. Sanitary pipework will be sized based on peak frequent use.

The drainage system will be designed and installed to ensure that:

- ▶ Appliances drain quickly, quietly and completely at all times without nuisance or risk to public health.
- ▶ Discharge is conveyed without crossflow, backfall, leakage or blockage.
- ▶ Foul air from the system does not enter the building.
- ▶ It can be adequately tested, cleaned and maintained.

The drainage system will utilise uPVC to BS 4514 and BS 5255 with solvent welded joints. Intumescent fire sleeves will be incorporated between fire compartments.

The WC cores have been better stacked as part of the VE re-design, to improve drainage verticality.

5.10 General Space Ventilation Systems

5.10.1 Standards and Strategy

The design brief is to employ natural ventilation wherever feasible as it is a sustainable and energy efficient solution. However due to the external noise levels, it will not be possible to naturally ventilate all of the building – refer to the Hoare Lea Acoustic Report for further details.

A number of ventilation solutions have been analysed. Due to the higher than anticipated external noise levels, a mixture of natural and mechanical ventilation is to be provided to achieve the required environmental criteria.

The mechanical ventilation will be achieved via central ventilation plant systems, located on the roof, rather than via MVHR, in order to minimise external penetrations to the façade.

Where natural ventilation is possible, this will be via manually operated opening windows. Generally openable windows should be located at both high and low level. This arrangement will help to induce air into the space by stack effect with both high and low level windows open in summer, and help to avoid cold draughts in winter when the high level window only will be used. The client is to consider whether CO2 monitoring and control is required for the natural ventilated spaces, in particular the offices.

A summary of the ventilation strategy is described below:

	Mechanical Ventilation	Natural Ventilation
Ground floor	WCs/showers/changing, laundry, fitness suite, presentation room	Stores, plantroom
First floor	WCs/showers/changing, bunks, drill hall	Bars/wardrooms
Second floor	WCs/showers/changing, IT room	Offices
Third floor	WCs, teaching rooms	Breakout

There will also be dedicated plant for the kitchen ventilation.

The mechanical ventilation plant will comprise a supply and extract AHU, with heat recovery via plate heat exchangers where possible.

Ventilation systems should be designed to achieve three key aspects of environmental performance:

1. Adequate outside air supply to maintain adequate levels of indoor air quality
2. Control of internal summer temperatures to avoid overheating
3. Provide a satisfactory acoustic environment

All ventilation systems must be designed and installed in accordance with Approved Document Part F (Ventilation), Approved Document Part L (Conservation of Fuel and Power) and Approved Document Part E (Resistance to Sound), and the CIBSE Codes.

5.10.2 Ventilation Strategy for WCs and Changing Rooms

Mechanical extract systems will be required for all toilet and changing room areas to remove vitiated air and water vapour.

Individual WCs will be provided with 6 air changes per hour mechanical extract, with a nominal transfer of air from surrounding spaces. Where WCs lobbies are present, 4 air changes per hour mechanical supply to these are recommended.

Larger sanitary accommodation will be provided with a minimum of 6 air changes per hour mechanical extract to the WC and shower areas with a minimum of 4 air changes per hour mechanical supply to the changing areas, with the total space maintained under negative pressure in relation to adjacent spaces. Ventilation will be PIR/humidistat activated with trickle ventilation on a timed control.

5.10.3 Kitchen Ventilation

For the kitchen, a cooker hood will be provided as part of the kitchen specialist installation, supplemented by a ducted ventilation system, served by an extract fan located at roof level. The kitchen extract system will be sized to a minimum of 40 air changes per hour for the kitchen and 10 air changes per hour for the kitchen store, or based on specific kitchen equipment in line with DW172. The fan will discharge to atmosphere via fire rated ductwork. A supply AHU will provide a minimum of 80% of the extract air flowrates. A dedicated ventilation riser, local to the kitchen, will be provided for all ductwork.

5.11 External plant

All roof mounted ventilation equipment should be treated for a coastal environment due to the project location in Cardiff Bay.

5.12 Acoustics

All rooms must meet the indoor noise levels stated in the acoustic report.

5.13 General Space Cooling Systems

5.13.1 IT rooms

Due to the high internal heat gains within the server rooms cooling will be required. Allow for 5kW (n+1) units as a minimum for each server room, or to match the IT strategy, with dedicated condensers for each.

Within the IT room, comfort cooling will be required. When possible, free cooling utilising the mechanical ventilation will be provided. However, where high heat gains mean the temperature cannot be controlled effectively using any other means, cooling will be provided to this room by ceiling mounted split cooling units. All units will be provided with local control.

All condensers are to be located on the main roof.

5.13.2 Fitness Suite and Presentation Room

Due to the potentially high occupancy levels, internal heat gains and high levels of water vapour from the room usages, comfort cooling will be required. Cooling will be via ceiling mounted VRV fan coil cassette units, connected to an externally located condenser. It is not anticipated that the unit will incorporate heat recovery.

5.14 Sprinkler Systems

It is currently anticipated that sprinklers will not be required. Please refer to the fire consultant report for details on the building fire strategy, including sprinkler systems.

5.15 Building and Energy Management System (BEMS)

An automatic building management and control system will be provided, to enable centralised control, testing and monitoring facilities for the M&E systems. The BEMS shall significantly help to improve both the performance of the building and its controllability. A front end graphic workstation will be provided to allow full control of the plant.

The BEMS will have a graphical user interface that will provide the ability to monitor inputs and outputs, adjust set-points and time schedules, monitor alarms, archive data and compile trend logs. The control and management of the building services elements will as a minimum encapsulate the following:

- Temperature control and set point adjustment
- Weather compensation
- Optimised start / stop control for space heating controls to maximise free heat periods
- Boiler sequence control (manual and automatic), including boiler operation periods
- Time scheduling including out of hours use
- Zone control
- Frost protection
- Automatic change over between duty/standby boilers and pump sets
- Plant status monitoring / logging / trending / alarms
- Provide alarm and a hard copy record of any plant failure giving rise to a high or low temperature
- Plant performance monitoring / logging / trending
- System pressures (maximum/minimum)
- Pump interlocks
- Recording of space temperatures (4 times daily)
- Domestic hot and cold water temperatures
- Heating system flow and return temperatures
- Metering of energy consumption, including electricity and gas meters and all sub meters. This facility could be utilised by the building for teaching purposes.
- Metering of water consumption
- Pump/Fan speed control (where applicable)
- Provide free cooling on ventilation systems (where applicable)
- Capability to have remote monitoring capability for offsite interrogation
- Ability to provide record and data history of monitoring regime including alarm modes
- In the event of a fire alarm condition, the fire alarm system will communicate with the BEMS system, ensuring all plant is shut down and switched to a safe operating condition. All kitchen ventilation plant will be shut down in the event of a fire.

6. ELECTRICAL ENGINEERING SYSTEMS

6.1 Incoming Electrical Services

The existing site is supplied with electricity via 11 kV/400V Western Power Distribution (WPD) substation. The substation at the southern part of the site on Cargo Road houses the utilities HV / LV switchgear and transformer. The substation must be provided with 24 hour unrestricted access and access way facilities to aid its maintenance and any future replacement or upgrade.

The locations of all site services should be verified by detailed scans and surveys being undertaken prior to any site works.

An Import/Export utility meter will be provided to facilitate export of power from renewable / green technologies during times of low building demand.

6.2 Renewables Distribution

A Photovoltaic System will be provided utilising roof mounted HIT solar panels and riser mounted inverters in conjunction with the Part L analysis. The inverters will be connected to a 4 Way TPN Distribution Board that will be mounted in the electrical riser and will be connected to the main switch panel (MSP) and the DNO network.



An interactive WebBox type data logger will be provided and connected to a display located in the entrance lobby which will depict kWh energy production and CO2 reductions. It is intended that the PV will be located on the lower roof.

6.3 Mains Distribution

6.3.1 General

An intake LV switchroom shall be provided and with a new LV main switchgear panel switchboard containing sufficient switchgear to accommodate the new training facility plus any spares.

The LV switchroom will provide the power mains cabling emanating throughout the new building.

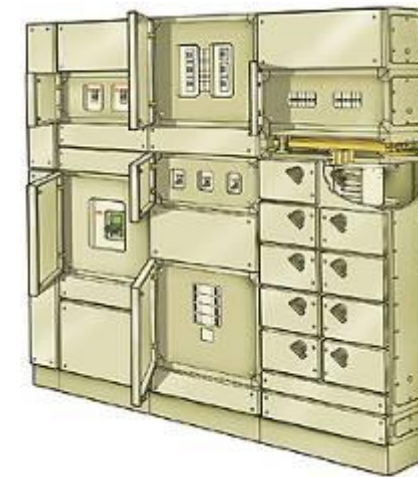
The distribution strategy for the secure training facility will be to provide sub main supplies with distribution boards located at strategic locations on each floor. The distribution boards will be either fed direct from the MSP or via upstream sub distribution panel boards as required.

6.3.2 Main Switch Panel (MSP)

The new mains LV switchgear panel (MSP) will be a form 4 type 2 freestanding switchboard with front /rear access located in the new LV switchroom. A separate WPD MCCB metering cubicle will be mounted adjacent to the customers LV panel.

The main LV distribution panel will incorporate incoming and outgoing switched moulded case circuit breakers to supply the sub-main distribution boards and control panels etc. Supplies to lift mechanical plant will also be provided where required.

The MSP will also include MCCB's to facilitate the connection of on-site electricity generating plant i.e. Photovoltaics'. This shall be synchronized with the main electrical supply via a G59 unit within the PV control panel or at main switch panel.



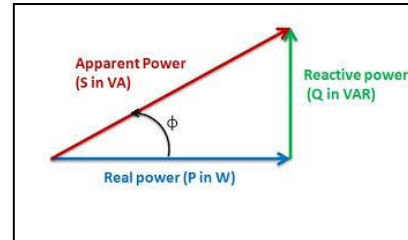
The new MSP will have 20% or four spare ways capacity, whichever is the greater and the ability to add additional sections as a future proofing measure.

The MSP will be fitted with multifunction meters in incoming and outgoing sections in accordance with the Part L & TM39 and the metering strategy, be connected on to a metering network and the BMS system. The meters will be able to read voltage, current, frequency, power energy, demand values and where required harmonic distortion. The meters will be MODBUS compatible.



Transient surge protection Type 1 equipment is to be provided as an integral part of the panel.

Power factor correction is to be provided to automatically control power factor to above 0.95.



Supplies from the incoming LV switchboard to local and sub mains type distribution boards to be by means of multicore XLPE/SWA/LSF type cables with full size neutrals.

Any Life / Fire Safety supplies from the incoming LV switchboard are to be provided by fire protected cables in accordance with BS 8519.

Any Life / Fire Safety supplies will be provided with local Automatic Transfer Switches (ATS's) to provide equipment with primary and secondary electrical sources as required by the Building Control Officer.

A standby generator may be required for Life / fire safety systems. A fire engineer should be commissioned to provide a fire engineering strategy report.

6.4 Secondary LV Distribution

MCCB sub distribution panel board will be installed where required to provide an efficient and robust LV main distribution system. The sub distribution panel's feeding final MCB distribution boards and other items of fixed equipment will be metered upstream at the main MSP with multifunction meters and outgoing sections at the panel boards, will be connected on to a building metering network and the BMS system.



MCCB panel boards will be minimum Form 3 type 2 and fitted with lockable covers.

6.5 Final LV Distribution

MCB distribution boards for small power, lighting, mechanical plant, ancillary equipment and for any specialist installations will be strategically located throughout the building. This will provide efficient use of primary distribution routes and clearly defined distribution zones, whilst enabling ease of maintenance.

The DB's will be fitted with lockable covers.



Separate lighting and power distribution boards will be provided where appropriate.

Where there is a high concentration of ICT equipment within a room i.e. communications rooms, a dedicated MCB distribution board will be provided for the space.

All distribution boards will be suitable for high integrity earthing. RCD protection will be provided to comply with the requirements of BS7671.

Generally the Lighting and Power distribution boards will be split-load boards, with an integral meters providing separate meter readings for both the lighting and power circuits, to comply with the requirements of part L2 and TM39.

Sub metering will be provided at either the primary or secondary distribution panel boards or in the case of the split-load boards, integral to the local board.

The distribution boards will be fitted with multifunction meters on incoming sections as required, be connected on to a metering network and the BMS system.

The routing of the sub-main cabling will principally be within the corridors on cable tray and concealed above a suspended bulkhead wherever possible.

6.5.1 Transient Overvoltage Protection

The ICT /server room distribution boards and any external services distribution boards shall be afforded protection by type 1 / 2 transient overvoltage protection device(s). The protective device will be installed in a readily accessible location to enable a visual inspection to be carried out.

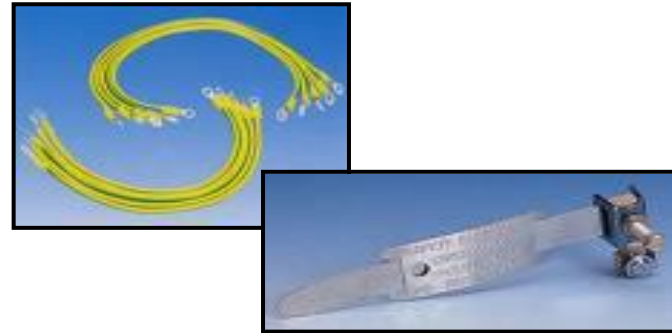
6.6 Earthing and Bonding

All earthing systems at the primary supply position will be provided to meet all statutory and regulatory requirements.

WPD will provide the earthing connection to the premises and will terminate at the main earthing terminal located in the LV switchroom.

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The earthing and bonding system shall be installed compliant with BS 7671: 2008 and BS 7430, which includes bonding to all incoming services and extraneous metalwork.



A clean earth will be provided to each IT equipment comms rooms. All clean earths will be connected back to the main earthing terminal.

All extraneous metalwork will be earthed including the following:

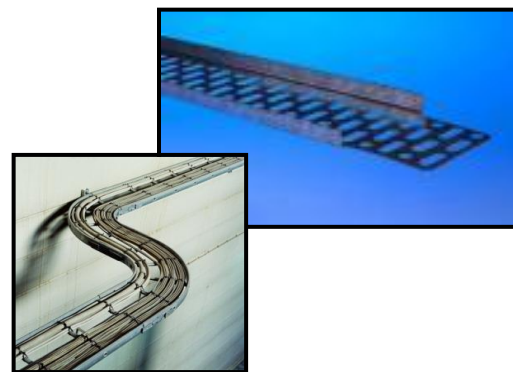
- Incoming Services
- Building Structure
- Lightning protection System
- Lift Guide Rails
- Cladding
- Mechanical Services
- Enclosures and IT Equipment

6.7 Containment

Cable containment management will be provided from the main LV switchgear, panel / distribution boards and IT equipment rooms to the points of utilisation.

The cable management will be segregated to provide individual containment for final distribution cables, sub-mains cabling, fire alarm, ELV systems (i.e. security, BMS) and data systems. The segregation of services shall comply with BS 7671 and CIBSE AM 7 for IT cable installations. A minimum reserve space of 30% of cross sectional area shall be provided in all service voids.

The main containment routes will be concealed above a suspended bulkhead within the corridors and within risers as required to distribute services around the building.



6.8 Small Power Installation

A small power installation will be provided in accordance with the requirements of the room data sheets and BS 7671:2008.

Final circuits for small power services and lighting will generally be via twin and earth 300/500V grade LSZH (Low Smoke & Zero Halogen) sheathed & insulated cable (6242B). Cables will be contained within high impact plastic conduit where buried in walls and supported on metallic cable basket within ceiling spaces.

Generally, standard 13A switched socket outlets will be provided throughout the building. Sockets will generally be protected via 30mA RCBO's at the distribution board apart from those areas and instances permitted by BS7671. All sockets throughout installation to be flush mounted apart from those within plant spaces and stores. These sockets will be surface mounted to the structure, along with galvanised steel containment fixed to the building.

To provide flexibility of power distribution outlets, a combination of the following solutions are to be provided:

- Floor boxes
- Cat 6a dado trunking installed around the perimeter of the room
- Wall Mounted Outlets
- Power Poles



The small power installation will incorporate power for the following:

Audio Visual Aids / Hard of Hearing Systems/ Amplifiers	Fire Alarms
Disabled / Refuge Alarms	Fan Coil Units
Interactive whiteboard / display systems	Water Heaters
Access Controls	Extract Fans
CCTV Cameras (PTZ)	Main Entrance Overdoor Heater
Hand / Hair driers,	Alarm Panels
General power outlets	WC Flush Valves
Equipment and plant	IT
End user equipment	Lifts
ICT Equipment / Charging Bays and Trolleys	PV System
Fire Alarm System	Roller Shutters
PA system	Window Actuators
Intruder System	Natural Vent Openers
Audio Systems	Illuminated Signage

The design and installation will provide for all general service small power supplies at 230V/SPN/50Hz and specialist power supplies at 400V/TPN/50Hz and 230V/SPN/50Hz as required for each area of the building.

Sockets will be provided for cleaning at not less than 12m intervals.

Double sockets shall be provided to every 37m² of floor space within entrance lobbies / halls and queue spaces.

Small power distribution will be provided from 230V/SPN/50Hz protective devices. All socket outlets are to be protected on standard RCDs with 30mA sensitivity.

Supplies to mechanical plant and renewables will be provided via suitable isolators, containing a lock off facility. Installation of the mechanical systems, including control panels and wiring from the isolator is to be by the mechanical contractor.



Final sub circuits where used to power computers or other equipment containing mains filters, shall be designed to limit the number of socket outlets fed, such that the RCDs are operated within the manufacturers maximum permissible standing earth leakage current.

All accessories will typically be of white / coloured plastic in front of house areas with metal finish within plant room areas etc. BS4343 (IP 65) socket outlets and isolators will be provided in wet and hazardous areas. Consideration will be given to compliance with Part M, particularly within the SEN areas.

To satisfy Part M of the Building Regulations, socket outlets (switch or back plate) will have a contrast of 30% LRF (Light Reflective Value with their background and situated at appropriate heights.

Good quality electric hand dryers, with thermal cut-out will be provided in toilets as specified in the Architects sanitaryware package. A fused connection unit supplying the hand dryers will be located at high level.



Where appropriate and in areas with high numbers of socket outlets (ICT rooms etc.) surface mounted multi-compartment dado trunking will be installed.

Ceiling mounted sockets / outlets will be provided for projectors and other AV equipment. High integrity socket outlets and high integrity earthing installations will be provided throughout the building. 32A, 30 mA RCBO's will be used for ring circuits. Radial circuits shall be protected via 16A/ 20A 30 mA RCBO's. A maximum of 7 No computers / work stations will be provided per circuit to avoid unnecessary tripping caused by leakage currents.

6.9 Specialist Small Power

6.9.1 Disabled WC & Refuge Alarm Systems

A disabled person call alarm and separate refuge alarm systems will be provided in each disabled WC/changing room area, first aid room and refuge point as required.

The system will include a 13A FCU power supply to the power transformer to be located above the disabled WC ceiling with local access. A pull cord will be mounted on the ceiling adjacent the toilet pan and local reset button will be installed within each area. An illuminated over door lamp/ tone generator will be installed externally above each door, activated by the ceiling pull cord.

A remote indicator panel will be located at the front reception (or other location to be agreed) to alert staff of assistance required.

FCU's will be provided to the disabled refugee intercom master panel, location tbc.

6.10 Lighting Installation

The lighting proposal to the teaching spaces is based upon providing 300/500 lux at the working plane. Uniformity for these rooms is to comply with CIBSE guidelines.

The lighting design to Teaching & Office spaces will be developed using standard recessed modular luminaires to be fitted within suspended ceilings. The controls, fire alarms, PA, sprinklers and any acoustic requirements will also be fitted within the suspended ceilings.

The architectural design will aim to maximise the use of natural lighting during daylight hours as the main source of internal illumination to teaching spaces. The artificial lighting will be designed to complement and supplement the use of natural daylight when required with a controls system.

The system, in addition to being designed to meet the technical requirements, will also be designed to create a positive learning atmosphere.

The light fittings will be selected to achieve lighting to minimise contrast and achieve a good average level of illuminance. Particular attention will be paid to ensuring that walls and ceilings are illuminated to enhance the building appearance. Uplighters and feature lighting will be utilised where necessary to increase the aesthetic performance of the building.

Scene setting plates will be provided in each room and will work independently and not form part of a networked lighting system.

6.10.1 Lighting Design Proposals

The following lighting criteria will be used throughout the training facility generally in accordance with BS EN 12464-1 and the Room Data Sheets:-:

Area	Illuminance (Lux)	Type
Corridors	100	Recessed LED Downlight
Server	200	Surface Mounted Linear LED
Conference Rooms	500	Modular Recessed & Recessed Downlights
Teaching Rooms	300	Recessed Modular LED
CBT (Training)	500	Recessed Modular LED
M/F/Disabled WC	200	Recessed LED Downlight IP44
Breakaway	200	Recessed LED Panel
Stairs	100	Recessed LED Downlight / Wall Mounted LED
Stores	100	Surface Mounted Linear LED
Navi Training	500	Recessed Modular LED
Office	300	Recessed Modular LED
Mezzanine	100	Recessed LED Downlight
Breakaway	200	Recessed LED Panel
Breakout	300	Recessed Modular LED
Wardroom	300	Recessed LED Downlight
Bar	300	Recessed LED Downlight
Kitchen	500	Surface Mounted Linear LED IP 44
Drill Hall	300	Recessed LED Downlights & Wall lights (Decorative)
Bunks	100	Recessed LED Downlight
Washdown	200	Surface Mounted Linear LED IP 65
Drying	300	Surface Mounted Linear LED
Laundry	300	Surface Mounted Linear LED
Induction	300	Recessed Modular LED
Fitness Suite	300	Recessed Modular LED Panel
Plant / Elec Switchrooms & DB Cupboards	200	Surface Mounted Linear LED IP 65



General lighting will be provided utilising the latest LED lighting technology.

The luminaires will be complete with low-loss control gear. All lamps will be colour corrected and will have consistent colour temperature throughout the facility of class 4000K. (Drill hall and Bars to have a warmer temperature of 3000K).



The lighting design will be such that the light fittings selected will utilise a minimum number of products to assist maintenance procedures.



6.11 Lighting Controls

The lighting control strategy principles are as follows:-

6.11.1 Teaching / Conference Rooms

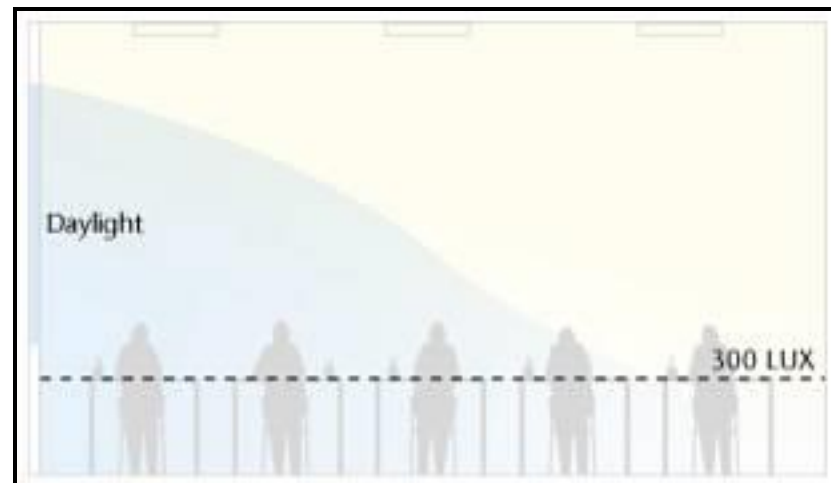
The lighting control proposal to the teaching / conference is based upon photocell and absence detection combined with manual switching to dim down or turn lighting on and off when required. The daylight control will automatically dim or shut down lighting in zones with adequate day lighting.

Absence detection works by the manual operation of the local switch to turn on the lights, with automatic sensors to switch off the lights when the room is empty for a pre-determined length of time.

The intent is to provide a user-friendly, simple control system that maximises the use of natural daylight and minimises the use of artificial light by using an intelligent facility providing dimming and level matching. The chosen level of control will provide an appropriate affordable solution to new teaching spaces throughout the facility.

The control switching of teaching type spaces will be located at the entrance doors.

The teacher will have control over all lighting with additional switching near the teacher's desk. The lighting adjacent to the interactive whiteboard will be independently switched from the remainder of the teaching space lighting.



Lighting control in other areas will be as follows:

6.11.2 Corridors and general circulation

Presence detection with integral time delay shall be provided; the detectors shall be positioned to provide maximum coverage.

6.11.3 Toilets

Presence detection with integral time delay shall be used within toilets to activate the lighting.

6.11.4 Store rooms

Presence detection with integral time delay shall be provided; the detectors shall be positioned to provide maximum coverage.

6.11.5 General Areas

Presence / absence detectors and daylight sensors will be utilised in other appropriate areas to increase energy efficiency of the buildings wherever possible.

All other areas will be provided with wall mounted local manual control switches, where appropriate manual dimming ballasts and controls will be provided.

All lighting switches / accessories will typically be white / coloured plastic, with metal finish within plant room areas etc. IP 65 rated switches will be provided in wet and hazardous areas.

The common corridors and entrances of the building lighting installation will be linked, via the BMS, to allow switching of the lighting installation by the premises staff.

Where dimmable lighting is required the DALI protocol shall be typically used but with the VE in mind dimmable luminaires and suitable will only be provided where necessary. Corridors & Stairwells to be typically switched.

Manual overrides will be provided to all areas with automatic lighting controls.

6.12 External Lighting

The external lighting will be provided in accordance with the requirements of BS 5489, CIBSE Lighting guide LG6, ILE guidance notes for the reduction of light pollution. An average value of 5-10 Lux @ 0.4 Uo will be typically provided,

The external areas of the buildings will be illuminated utilising a combination of column-mounted light fittings at a suitable height, building mounted light fittings and low-level flood luminaires to provide building effect lighting as appropriate. Cardiff County Council Street lighting will remain as existing, although some column positions may need to be relocated to suit the new site layout.



External lighting will be provided to match the aesthetic aspirations of the building and the local environment. Luminaires will be selected to withstand damage from vandalism and malicious damage.

The external lighting systems will be automatically controlled by a photocell and time-switch override and will be co-ordinated to maximise the effectiveness of the security CCTV systems employed.

The external lighting installation will utilise LED lighting technology.

LED luminaires to be fitted with 4000K LEDs.

Final Lighting proposals will be discussed and agreed with the planners.

The landscaping, planting design and the external lighting will take into account site safety and security both in terms of preventing unauthorised access, hiding spaces and personnel safety.

External lighting will be provided to aid way finding and provide secure environments for staff and visitors to travel around the building.

The functional amenity lights will be complemented where appropriate by feature landscape lighting to highlight artwork, structural and landscape features. This lighting will be designed to provide a stimulating night time environment whilst minimise energy consumption and maintenance.

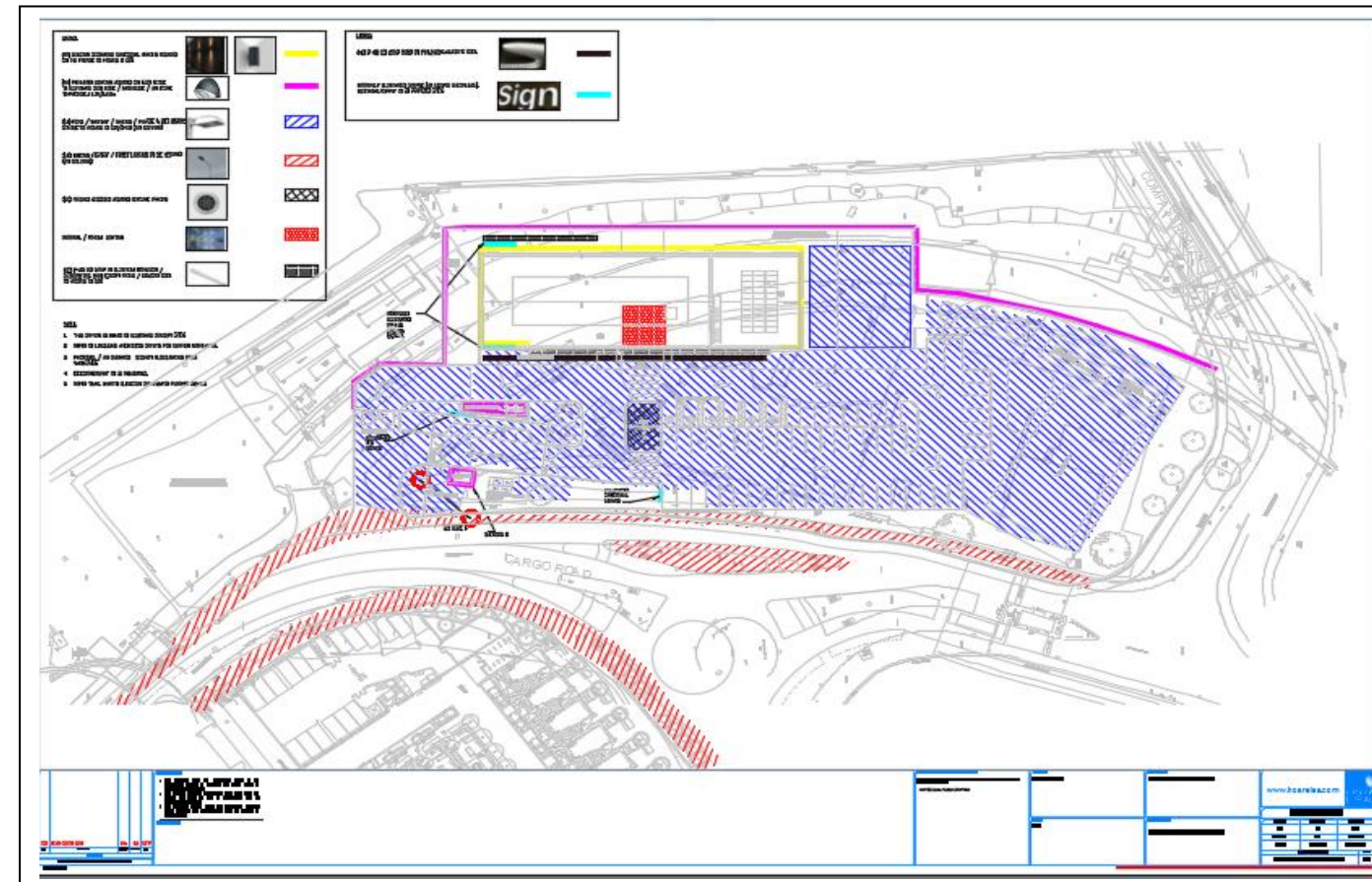
The external lighting design will employ luminaires to minimise light pollution and will be positioned to limit light trespass onto adjoining properties. Controls will facilitate set hours dimming of the luminaires to 50 % Lumen output where required.

All external cabling will distribute in a draw pit and duct system that will be routed wherever possible to avoid car parks and roadways, thus facilitating future maintenance and minimising disruption.

The main external sign will be illuminated with an energy efficient source and controlled via photo cell and time-switch override.

External security lighting will be provided to the perimeter of the building and along the main routes from the gatehouse to the main reception/entrance.

The external lighting shall take account of the requirements of the CCTV system coverage around the premises and also the proximity to the roadway. 0901421 HL XX 00 GA E 630 0001 External Lighting Strategy Refers



6.13 Emergency Lighting

The building will be provided with an emergency lighting system to meet all requirements of BS 5266, BS EN 1838, Building Bulletins and Building regulations.



The building is to comply with these standards to allow for out of hours use. Emergency lighting will be provided to all defined and undefined escape routes throughout the building specific open areas and will be subject to the approval of the building control and local fire officer.



Emergency lighting will be installed to provide a safe means of escape from the building in the event of failure of the normal local lighting systems and will be a category M3 or NM3 as appropriate throughout the building depending on usage and access to the public.

The emergency light fittings will operate on both total power failure to the building and local lighting circuit failure.

Safety emergency lighting will also be provided to risk areas.

Exit signs will be illuminated by local emergency lighting.

Maintained illuminated exit signs will be provided where required.

Emergency lighting will be provided by self-contained LED emergency luminaires category M3 or NM3 to suit the location.

A basic key switch testing facility will be provided that will require enhanced input from the building user in order to maintain the building emergency lighting system in compliance with BS 5266.

6.14 Public Address System

The PA system will cover all areas of the facility and incorporate:

- Ability to broadcast music , radio and pre-set announcement
- Ability to deliver pre-recorded announcements in English and Welsh



6.15 PA Zoning

Zone Ref	Area Served	Notes
1	Teaching Spaces	Volume Controls
2	Circulation Spaces including Toilets, Social Spaces	
3	Offices	
4	Stores	
5	External	
6	Dorms	

The Public Address system will typically consist of the following components:

A floor standing amplifier rack, standard 19" format, will be installed as a completely factory wired, assembled, tested and engineered unit. All power amplifiers will be fully electronically protected against overload and short circuit line fault conditions.

The proposed Public Address system will provide standalone public address with 1No.Paging microphone and a multi-channel CD/MPEG3 player and/or DAB tuner to broadcast music.

The system will feature 8 Zones, each having a single loudspeaker circuit. Each zone is configured so that it may be called or addressed together with or entirely separately from any other zone or combination of zones.

6.15.1 Speakers

Ceiling and wall mounted loudspeakers will be parallel connected and in phase, i.e., the same connections used throughout each circuit and each loudspeaker will be tapped for the appropriate wattage to generate the correct audibility.

6.15.2 Volume Control

Volume controls shall be provided for key spaces and provided with a wall mounted controller to fit into a standard single gang back box.

The installation of the system will comply with BS 6259 and be linked to the fire alarm.

6.16 Display Screens & Audio-visual

6.16.1 Teaching Interactive White Boards/ Projectors / TV's etc

These displays will be provided by the fit out contractor.

Power supplies data and TV signals will be available at each display.

AV accessories will be provided in Training, Teaching, Conference and Presentation Rooms as indicated on the Room Datasheets.

The AV Accessories will comprise

- Ceiling Mounted Socket Outlet
- Ceiling Mounted Data Outlet
- HDMI / VGA outlets on Wall on Ceiling
- Wall mounted Twin Socket Outlet
- Wall mounted Twin Data Outlet

6.17 Fire Alarm System

An analogue addressable fire alarm system will be provided within the building, linked to a central monitoring station. The system will include strategically located Fire Alarm Control Indicator panels and visual alarm indicators where required. The main panel will be located adjacent to the main entry point of the building.



The system will comply with BS 5839 to category L2 and will be in accordance with the agreed fire strategy for the building.



It is not anticipated that a sprinkler system will be provided.

Full consultation with local Building Control and the Fire Officer will be made in view of providing a total fire engineered solution for this building.

Visual fire alarm warning indicators are to be provided to alert occupants with sensory disabilities of an alarm situation. Visual alarm devices will be to EN 54 -23 and will be located in the following areas around the building:

- Disabled & Accessible Toilets
- Changing rooms
- Public Access
- Circulation

In addition a vibrating alert pager system will be provided to cover all areas of the building.

The fire alarm system will be provided with battery backup sized to maintain the system for a period of 48 hours.

Door hold open devices will be installed on all corridor cross doors, with key operated override facility adjacent to each door.

Wiring will use standard type fire resistant cables.

The system shall include for a link to a monitoring system and the cost of connection for a 12 month period for the monitoring of building alarms.

The fire alarm will typically consist of the following components:

6.17.1 Control Panel

A BS5839 fully compliant to facilitate a Type L2 fire detection and alarm system, consisting of a four loop analogue addressable control panel, with a scrolling LCD display for alpha numeric text identification of individual device, loop and zone.

A framed A3 geographical zonal diagram, identifying the individual detection zones, will be wall mounted adjacent to the main control panel.

6.17.2 Detection Devices

A combination of analogue / digitally addressable automatic smoke detectors, heat detectors, and manual break glass call points will be located throughout the building to detect a fire condition. Break Glass Units will be provided with plastic drop down covers. All field devices are connected to a bi-direction comms. Short circuit loop isolator's integral to the universal base used to mount field devices.

6.17.3 Warning Devices

Loop powered addressable sounders and combined sounder/LED warning strobes will be located throughout the building. Sounders to achieve a minimum of 65dB or 5dB's above the ambient background noise.

A Dual Comms GSM dual signalling device system shall be provided within the main control panel to communicate fire activation following an evacuation signal (following detector or break glass unit activation)and report loss of 230v AC mains power to the main control panel PSU.

6.17.4 Interface Modules

Input/output Interface modules will be provided to signal third party equipment upon alarm activation; Access Control; Gas Valve; Public Address; General Plant and Lifts

Plant interface modules should be capable of isolation by key switch during regular system testing. Key switch is to be installed adjacent to the main control panel.

6.18 Access Control System

Chubb Fire & Security Ltd shall be engaged to design, supply, install, connect, test and commission a proprietary ADACS+ Automated Access Control System (AACS).

The AACS shall comprise of an Internet Protocol security management system providing class 3 level of protection.

The access control system will be provided for the use of resident and visiting staff and students.

The access control system is required to control pedestrian entry into the site and building. The systems will permit controlled access in and out of the building in normal and out of hours periods. Electronic access control systems will also be provided to restrict visitor access within the site and the building.



The building will have key internal access control doors, monitored by the CCTV where required enabling safe remote activation of access controlled doors.

AACS shall be provided to the following as a minimum.

- Main Entrance Door
- Doors which access the building from the ground floor atrium
- Doors leading onto the secure quayside
- Ground Floor Access from Car Park to Stores and Specialist Parking Bay
- NER Room
- Main Gate

Doors equipped with access control systems and forming means of escape in the event of emergency or fire shall be interfaced with the fire alarm system to open in the event of an alarm and provided with override green break glass units adjacent to each door.

Each door controller shall be complete with a 3 hour battery back up and be interfaced with the fire alarm to allow them to fail safe open in the event of a fire condition. The interface shall release the door lock, thus providing free egress from the building unless select doors are secured by means of a secondary mechanical key or release bar.

Proximity readers for access controlled doors shall be provided to suit the building access and egress strategy.

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The Access control system shall be linked to the Vehicle Barrier Main Gate which will have two way intercom to Reception and remote release.

The main gate shall be provided with a turnstile / side gate arrangement to facilitate authorised access. A chip and pin function is required at this location.

All doors with intercom to reception shall be capable of being released at reception. The intercom panels shall be stainless steel flush mounted and mounted at a suitable DDA height. A telephone type handset shall be provided at reception to facilitate 2 way speech and door release function.

The main entrance doors shall incorporate automatic operation and 'fail safe to open' in the event of an emergency. The access control system will be an integrated system ensuring access and circulation is controlled to meet the needs of the building operational policy, whilst providing security and safe emergency evacuation.

The system will utilize "MIFARE" type smart cards and software database to operate a coordinated system across the Local Area Network (LAN) and Wide Area Network (WAN) as appropriate, to enable the use of a single smart card within the organisation and enable compatibility with the other facilities operating a similar system.

The control software will have the ability to monitor or record the actions of each door on the system and keep a record of a predetermined number of actions on the software database.

Sufficient quantities of smart cards will be provided, programmed and commissioned such that there is one for every member of staff, administration officer and ancillary member of staff with an allowance for additional 20% spare cards for future use.



The proximity MIFARE cards could be used as ID cards for staff and for cashless vending systems etc.

The system shall be controlled and programmed via a management PC with high level software suitable for the door controllers and system installed. The administration point will be provided at the guards lodge / control point and a suitable administration PC / Software shall be provided.



6.18.1 CCTV System

Chubb Fire & Security Ltd shall be engaged to design, supply, install, connect, test and commission a proprietary Internet Protocol (IP) CCTV system integrated with the aforementioned Chubb ADACS+ Network.

The CCTV camera system will from part of the common network system be capable of operating across the ICT network infrastructure, e.g. IP cameras, with power distributed to the internal / fixed cameras utilising the Cat 6A cabling and POE switches (Power over Ethernet) removing the need for additional power outlets at fixed cameras. ICT department to consider Network Bandwidth implications.

External / PTZ cameras will however require additional power outlets to provide the additional functionality of these devices. A duct network shall be provided to the remote CCTV cameras to facilitate power and data wiring.

A comprehensive 24 hours a day 365 days per year, colour Closed Circuit Television (CCTV) system will be provided to cover internal spaces as identified on the room data sheets and External spaces as below.

The CCTV system will be continually available at the agreed locations in order to meet specified security requirements. The CCTV system will be capable of producing high quality recordings that clearly identify persons and vehicle number plates involved in any incidents based on police advice of resolution of video required for legal action. Storage facilities shall be provided in the comms room(s) to enable 31 day storage of recorded images recorded at a minimum of 6 IPS per camera for 31 Days minimum.

CCTV cameras will be specifically provided to cover the following areas: -

- Main vehicle access and Barriers
- Main Gate
- Waterfront area
- Main entrance and secondary entrances
- External building perimeter
- Reception area
- Circulation routes
- Areas with specialist equipment
- ICT Locker areas and Laptop safes.
- Critical Stores – ie Magazine Store
- Vehicle Barrier

All CCTV footage will be recorded and saved according to procedures agreed with the end user.

CCTV systems will be installed to deter crime and vandalism around the facility.



Video motion and infra-red detection will be provided for specific areas in the facility and externally.

The CCTV system shall be linked with the intruder alarm, access control and fire detection system via volt free contacts to monitor specific areas if an alarm has been activated i.e. camera image of door whose sensors will be activated to take priority.

The local properties shall also be considered when installing the external CCTV cameras, to ensure privacy is maintained at all times.

Cameras will be vandal resistant and designed to operate in both day and night conditions.

The CCTV system will typically comprise of the following equipment:

6.18.2 Cameras

Dome and PTZ cameras shall be provided to provide an optimum design solution with no compromise of system coverage.

Provide cameras on all elevations of the building to provide a minimum a zone around the entire perimeter of the building and beyond. Provide external motion detection devices on all external cameras to facilitate the minimum zones of protection.

All cameras to be housed in domed or camera specific proprietary enclosures to suit the camera.

- A TCP/IP addressable networked CCTV system will provide a BS EN 50132-7 fully compliant system.
- Internal IP addressable mini dome PoE fixed cameras will be surface mounted.
- External IP addressable weatherproof dome cameras will be typically installed at 1st floor level to view the external elevations of the building and 6m wind down / hinged columns to view the remote areas.
- Dynamic object tracking is incorporated to be incorporated into each camera for automatic operation or manual target selection.

6.18.3 Monitoring & Control Equipment

All monitors to be 21" TFT type, will display multiplexed, single live screen and recorded images. The monitor shall be professional grade rated for 24 hour commercial use. Control of the entire system will be through a networked system that is hardware agnostic and non-proprietary such that it can easily integrate with multiple 3rd party CCTV brands and products. Live camera images, network recorded images and 360 degree thumbnail map-shot function to monitor to simplify choice of view should be viewed from this location, with PTZ control and camera selection through the software and user interface.

6.18.4 Network Video Recording

The digital streams shall be connected to rack mounted Network Video Recorder's (NVR) via Cat 6A and dual Ethernet network interface cards. Each NVR is to have applicable amounts of useable storage to meet the camera frame rate, image quality and retention period requirements. NVR's shall be provided in the primary and secondary comms room to facility a resilient CCTV operating and storage system.

6.19 Intruder Alarm System

ISD shall be engaged to design, supply, install, connect, test and commission a proprietary intruder alarm system and shall be fully integrated with the Chubb AACS and CCTV Networks for the Armoury and Magazine Store

The system shall be compliant with PD662 / BS EN 50131 for a Grade 3 typically with Grade 4 in armoury.

The system shall be Class 3 AC12.

The system shall be flexible, expandable and provided with a minimum expansion capacity provision of 20%

An Intruder Detection System will be installed with a connection via Dual Comms to a central monitoring station and the BMS. The intruder system shall provide detection to the Armoury and Magazine store.



The Intruder Detection System will be designed to be as unobtrusive as practically possible.

The Intruder detection system will typically consist of the following components:

6.19.1 Overview/Panel

An Intruder Alarm system will be installed to fully comply with PD662 and provide automatic Police response upon generating a sequential activation to an NSI approved Alarm Receiving Centre (ARC). All equipment to be fully Grade 3/4 compliant. The key pad entry panel shall be located adjacent to the main entry point of the building.

6.19.2 Detection Devices

A mixture of detection devices with provide comprehensive perimeter coverage and movement detection, Fabric Vibration Detectors, Dual Technology (PIR & Microwave) movement detectors with Anti-Masking and Dual Technology + Anti-Masking sequential activation detectors are to be used appropriately.

6.19.3 Remote Keypad

Remote Keyprox Keypads with text display to set and un-set the system will be installed as per the clients requirements for setting/un-setting zones and full set. The system shall have the capacity to install up to 16 remote keypads.

6.19.4 Warning Devices

Internal and external sounders are to provide an audible warning of all alarm activations and setting & insetting of the system.

External sounders to have integral blue strobe light and on-board battery backup. External sounder(s) will operate with the strobe light and internal sounder for a period not exceeding twenty minutes to comply with the local Police Policy and the Department of Environment Code of Practice on Noise from Intruder Alarms 1981. The sounder will then cut out to leave the internal sounder(s) and strobe light operating until the system is fully restored.

6.19.5 Dualcomms

The system will be monitored by Dualcomms GSM to an Alarm Receiving Centre (ARC). Upon the ARC receiving and alarm activation that meets the requirements of DD243 the ARC will notify the key holders for the premises and request Police response.

6.19.6 Battery Back-Up

Battery back-up in the event of the loss of mains power will be 24 hours.

The specialist installer shall be an NSI Gold approved contractor.

6.19.7 Panic Alarms

A panic alarm system shall be provided in the reception and armoury / magazine store to notify key staff and security of alarms generated by either by fixed or portable panic buttons. The system will generate calls to a central control panel, the IP phone system, a coded message to the PA system to alert key staff and security personnel.

6.19.8 AC12 Alarm – Armoury & Magazine Store

The AC12 alarm fitted will have the ability to zone the Armoury bays. If the bays are fitted, it is recommended that this function is utilised to maximise the effectiveness of the alarm.

- A manual personal attack alarm should be installed within the armoury so that the occupants can give warning and get help in the event of an attack.
- This alarm should be located near doors or with each issue hatch, sounding an audible warning as a deterrent.
- The IDS should terminate with the both the guard and the local Police in accordance with the agreed Counter Terrorism Plan (this may be included with Memorandum of Understanding).
- Fabric vibration detectors and PIRs are installed to walls, ceilings, door frames and grilles to provide an early warning of attack.

6.20 TV Aerial & Dish System

The distribution of Digital Television, FM and DAB Radio and Satellite Television will be carried out using an integrated reception system (IRS) network to carry signals around the facility.



The system shall comprise aerials, satellite dishes, head end and intermediate splitters and final distribution via cabling via termination boxes and multi-function outlet plates.

Additional data and power outlets will be provided in prominent locations around the facility, in order that TV screens can be installed and connected by others as a source of information for students and visitors to the facility. The final locations of all TV screens would be agreed in consultation with the end user.

6.21 Lightning Protection System

Lightning protection systems and earthing will be provided complying with BSEN 62305 & BS 7430.



The building construction may utilize the available steel work or may necessitate the use of separate earth tapes and arrays fixed to the free surface of the building fabric. These will be concealed behind rainwater down pipes or other discrete locations in order not to compromise the aesthetics of the facades.

6.22 ICT Distribution

The training facility will be provided with a structured cabling ICT infrastructure, using a Category 6A cabling network covering all areas of the building to meet the requirements of the room data sheets and ICT documentation.

The structured cabling network shall be installed around the building to include back boxes, outlet cover plates and the termination and testing of the cables within patch panels.



The structured cabling system and associated containment will be provided with a spare capacity of 25% to cater for the future expansion of the data outlets around the facility.

Patch panels shall be provided with 25% spare capacity to allow for future growth.

The ICT cabling system will be installed and co-ordinated in consultation with the ICT Managed Service provider.

The cabling will emanate from the comms rooms, which will contain the requisite number of cabinets for the cabling and systems being installed in and around the building.

This is typically to be as follows:

- Clients Equipment and Patch Cabinets
- ICT Service Providers Cabinets
- Third Party Systems Cabinets

Multiple comms rooms will be provided for resilience and distribution of ICT equipment. The rooms will be sized to accommodate additional capacity and cabinets to enable future expansion of the overall ICT system.

Each of the above cabinets will be typically 47U 800 x 1000mm cabinet, with mesh wardrobe doors to the front and the rear. They will be installed on a stabilising plate and will contain 2No full length 150mm cable trays, a 10 way filtered power distribution unit and earthing points. The main server room and the satellite/hub rooms will be designed to ensure that the stipulated clearances around the equipment will be achieved.

Client consideration should be given to the provision of Uninterruptable Power Supplies in the equipment cabinets to provide sufficient battery autonomy for critical equipment software shutdowns in the event of mains power loss.

Horizontal cabling is required for the following outlets forming part of the common network system:-

High level Equipment

Interactive Displays/ Displays/ TV's/ Wireless Access Points, Access Controls, CCTV

Low Level Equipment

Wall mounted & floor mounted points for data and telephones.

Other systems

Security, BMS, TV/ Video and Video Conferencing etc.

Data & Telephone outlet points are to be supplied and installed in each area as indicated on the room data sheets.

Hard wired external Telephone points will be required for Lifts, Security system and Fire Alarms.

The cabling patch cabinet will accommodate 2U - 48 way patch panels and 1U management bars for the connection and management of the structured cabling network distributing out across the building floor-plate.

The ICT service provider's cabinet will, subject to the ICT department and providers requirements, house the LAN switches, telephone PBX server, voice host panels, video distribution and data communication link equipment.

The third party systems cabinets will be provided to house equipment associated with the systems installed around the building i.e. access control, public address,, Closed Circuit Television and IP Telephony systems.

The cabinets will distribute final outlet cabling throughout the facility, floor-plates, whilst maintaining the 90 metre maximum cable distance. Satellite ICT hubs will be provided to distribute final outlet cabling throughout the building whilst maintaining the 90 metre maximum cable distance. The hubs and satellite ICT hub shall be provided with an interconnected copper and fibre optic backbone.

Each and every cabinet data outlet will be provided with a Category 6A UTP RJ45 patch cord to enable connection to the appropriate switch or device - the quantity of switches and devices required and subsequently the quantity of patch cords is to be advised by the ICT department and managed service provider.

Category 6A UTP RJ 45 fly leads shall be provided for the data outlet points.

Hardware & Other Equipment

Clients ICT specialist will specify the requirements of telephone handsets, exchange facilities, computer data processing equipment and connections to external communications networks. These will be provided in the main building contract works and included in a turnkey package.



6.22.1 Wireless Network (Wireless Access Points)

A wireless network system will be installed to provide complete coverage of the building internally and key areas externally. The wireless access units will be sized to take into consideration the coverage and total number of anticipated users within the coverage area.



Clients ICT specialist will specify wireless network access units and these shall typically operate using Power over Ethernet technology, providing the flexibility to enable, through patching, any available data outlet to be utilised for connection of wireless access units, without the need for adjacent power supply outlets. Consideration will be required as to the numbers of WAPS in teaching spaces etc with regards to available bandwidth and saturation of the devices.

6.22.2 ICT Interactive Displays & Screens

Interactive displays & screens are to be excluded from this contract, but the primary infrastructure will be provided. The final selection of screens etc will be undertaken post Tender by the Clients ICT specialist / fit out team and therefore these will be provided by client and fixed by the main contractor.



The interactive whiteboards will be installed such that they are positioned in front of any dado trunking installed to provide data and power connectivity to the whiteboard and ensure that they are located at such a height that the boards can be fully accessed.

The final location and position of the whiteboards will be co-ordinated with these and all other requirements in liaison with the client.

If required, support poles and brackets will be provided / coordinated for the projector, these poles shall be at least two metres in length, the actual length chosen to suit the location and the sight lines of the audience. The bracket and pole shall be located in consultation with the ICT department service provider, to ensure that they are installed on the mid focal point of the projectors to be provided. The interconnecting cables between the projector, whiteboard, speakers and a manufactured faceplate unit at the teacher's position will be installed as part of these works.

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6.23 Induction/Hearing Loops

Audio-frequency induction-loop systems will be provided to the areas indicated on the Room Data Sheets i.e Reception Desk in accordance with BS 7594:1993:-



Portable Audio-frequency induction-loop systems will be provided for "misc areas as required" within the building and kept at reception.

6.24 Disabled Alarms

6.24.1 Disabled Toilet Alarm

Disabled toilet alarm systems are to be installed to each disabled toilet and shower room within the building. These would signal back to the administration area within the facility when activated, as well as providing a local alarm to each room.

6.24.2 Disabled Refuge Alarm

In order to assist with the orderly and efficient evacuation of the building in the event of a fire, a two-way speech intercom system between the main entrance/reception desk (master call station) and the designated disabled refuge points will be provided.

The intercom system shall help to avoid anxiety and confusion to the disabled people in each of the refuge locations whilst awaiting evacuation from the fire fighters.

The intercom shall provide the Fire Officer with the facility to identify how many disabled people are currently awaiting evacuation, the nature of their disabilities and the location of the refuge areas at which they are located.

The Disabled Refuge system will typically consist of the following components:

Control Panel

- An analogue addressable Disabled Refuge system will provide a fire tolerant communication system for use within a building that contains Refuge Areas and is compliant with; BS5839 Part 9: 2008 and the Disability Discrimination Act.
- The main control panel is to be located adjacent to the main fire alarm panel and should be equipped with an audio handset to contact each refuge intercom or make an all call broadcast simultaneously to all intercoms. An illuminated text display will indicate the location of a refuge intercom calling for assistance, with an adjacent membrane tactile button to answer a call.
- Battery back-up in the event of the loss of mains power will be 24 hours in standby mode and 3 hours in full use.

Refuge Call Points

- Each refuge area is to be equipped with an audio intercom panel with an integral microphone, speaker and induction loop to assist the hearing impaired. The faceplate should be luminescent finish with raised text and Braille. Upon activation of the fire alarm system all refuge call points will be live, in normal state the call points are to remain dormant to avoid misuse. When a call for assistance is initiated an indicator LED and an assurance buzzer will sound locally and at the main control panel.

Cabling

- The system should be cabled throughout with Enhanced fire tolerant four core cable (PH120). Short circuit loop isolators should be incorporated into each call point to retain communication in the event of a comms loop fault.

7. Vertical Transportation Systems

7.1 Machine-room-less Passenger Lift

A machine-room-less passenger lift will be installed, accessed from the main circulation space and located in the front of house areas. This lifts will travel between the ground and the upper floors and will provide DDA compliant access to the building.

The lift shall be sized to comply with enhanced DDA requirements to facilitate one wheelchair and one assistant. The lift shall be minimum 8 person - 630kg type with a typical internal car size of 1400(D) x 1100(W) with the emergency telephone linked to a 24 hour monitoring station.

The finishes fit-out of the lift car will be provided to be robust, vandal resistant and meet the aesthetic aspirations of the client.

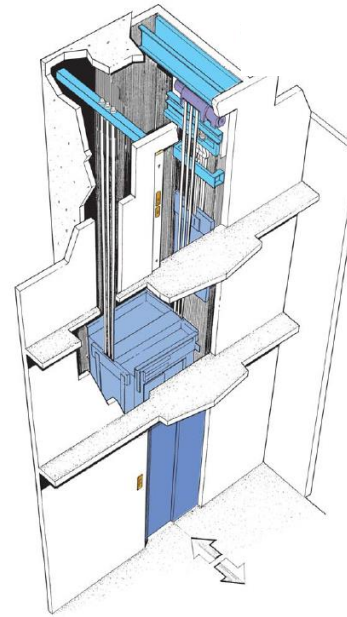
The lifts will not be suitable for operation in the event of fire and will reset to ground floor level, with doors in the closed position upon the activation of the fire alarm.

The lift shaft shall be fitted out with lighting, fire alarms, small power and a BT point shall be provided for remote communications.

The lift rated speed will 1.0m/s minimum.

The following features shall be provided with the passenger lifts:

- Full set of vandal resistant illuminating Braille floor push buttons
- Car position indicator
- Voice synthesiser to announce floor levels in Welsh and English
- Emergency telephone/intercom facility, complete with telephone line to enable external communication
- Alarm button
- Full height mirror to back of car



8. Sustainable And Environmental Engineering

The design for the new building will be underpinned with a low energy and sustainable ethos/approach to meet brief. The design of the building systems shall achieve a BREEAM "Excellent" rating.

Refer to the BREEAM report for further information.

The Building Research Establishment Environmental Assessment Method (BREEAM) is the industry standard for measuring environmental performance that represents best practice.

The assessment is carried out by addressing a series of issues, each with a defined benchmark or requirement against which the design is measured. These are divided into the following categories:

8.1 Management

- Health and Wellbeing
- Energy
- Transport
- Water
- Materials
- Waste
- Land use and ecology
- Pollution
- Innovation

The new building will be assessed under BREEAM 2014.

8.2 Water Management

Similar to the energy hierarchy, the water strategy for the new building focuses first on resource reduction, and then considers efficient use and recycling. The approach proposed is described in more detail below.

- Reduction of water demand
 - Metering of water consumption is proposed. This will highlight any abnormal usage patterns and help in the creation and tracking of targets for water use minimisation.
 - Sub metering is proposed for areas of high water consumption such as the kitchens to the catering facilities.
 - A leak detection system is also proposed which would sound an alarm when a leak occurs so that it can be rectified immediately.
- Efficiency
 - Water efficient appliances and fittings are proposed to further minimise water consumption.

Further discussions are required with the Planning Authorities to determine whether there are any specific planning requirements.

The energy hierarchy proposed for the new building is "Be Lean, Be Clean and Be Green".

8.3 Passive and Carbon Savings Measures – Be Lean

The following initial measures are being considered for the building. These will be assessed further during the design development taking into account the building shape form and operational needs.

- External shading for inclusion on all major glazed area and that are likely to be subject to high heat gain.
- Low-emissivity, solar control glass to reduce heat loss in winter and cooling loads in summer, and to minimise artificial lighting energy consumption.
- Glazing dimensions will be reviewed to maximise useful solar gains whilst still mitigating overheating risk and respecting architectural design.
- Good practice building fabric U-Values
- Internal blinds with local occupant control to minimise solar gains (as required) and glare.
- The layout of high occupancy rooms/ IT rich spaces will be optimised to reduce the cooling load where possible.
- Mechanical cooling will be primarily provided to high density IT rooms only.
- Low building air leakage to reduce the heat loss in winter due to infiltration.

8.4 Active Energy and Carbon Savings Measures – Be Lean

The following active measures will be considered:

- High efficiency boiler plant.
- Primary flow water temperature from the centralised boiler plant which can be adjusted according to the external ambient temperature for high energy efficiency.
- Variable speed pumping of heating water services to take advantage of load diversity throughout the day.
- Variable speed pumping water supply services to reduce annual energy demand and take maximum advantage of diversity of load.
- High efficiency motors incorporated into all building services.
- High efficiency LED / electronic lighting ballasts and high efficacy lamps.
- Passive infra-red and daylight responsive lighting control where possible in common areas.
- Daylight responsive external lighting.
- Power factor correction reducing electrical consumption.
- Energy meters to facilitate feedback, monitoring and control.



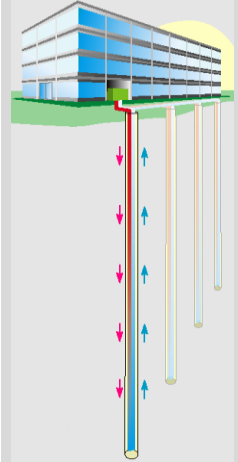
8.5 Renewable Energy Feasibility Study – Be Green


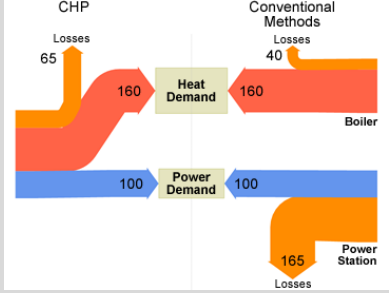

A range of renewable and (low carbon) energy technologies will be appraised for the new building. These include:

- Photovoltaic (PV) modules for electricity generation
- Solar hot water
- Ground source heat pumps
- Air source heat pumps (ASHP's)
- Combined Heat & Power (CHP)
- Wind turbines

The above renewable energy technologies will be reviewed when the building shape, form and usage pattern has developed further.

Given the site constraints and building operational requirements, the incorporation of PV's will be identified at this stage as potentially being the technology most suitable. However the following technologies will be reviewed in more detail as the scheme design develops.

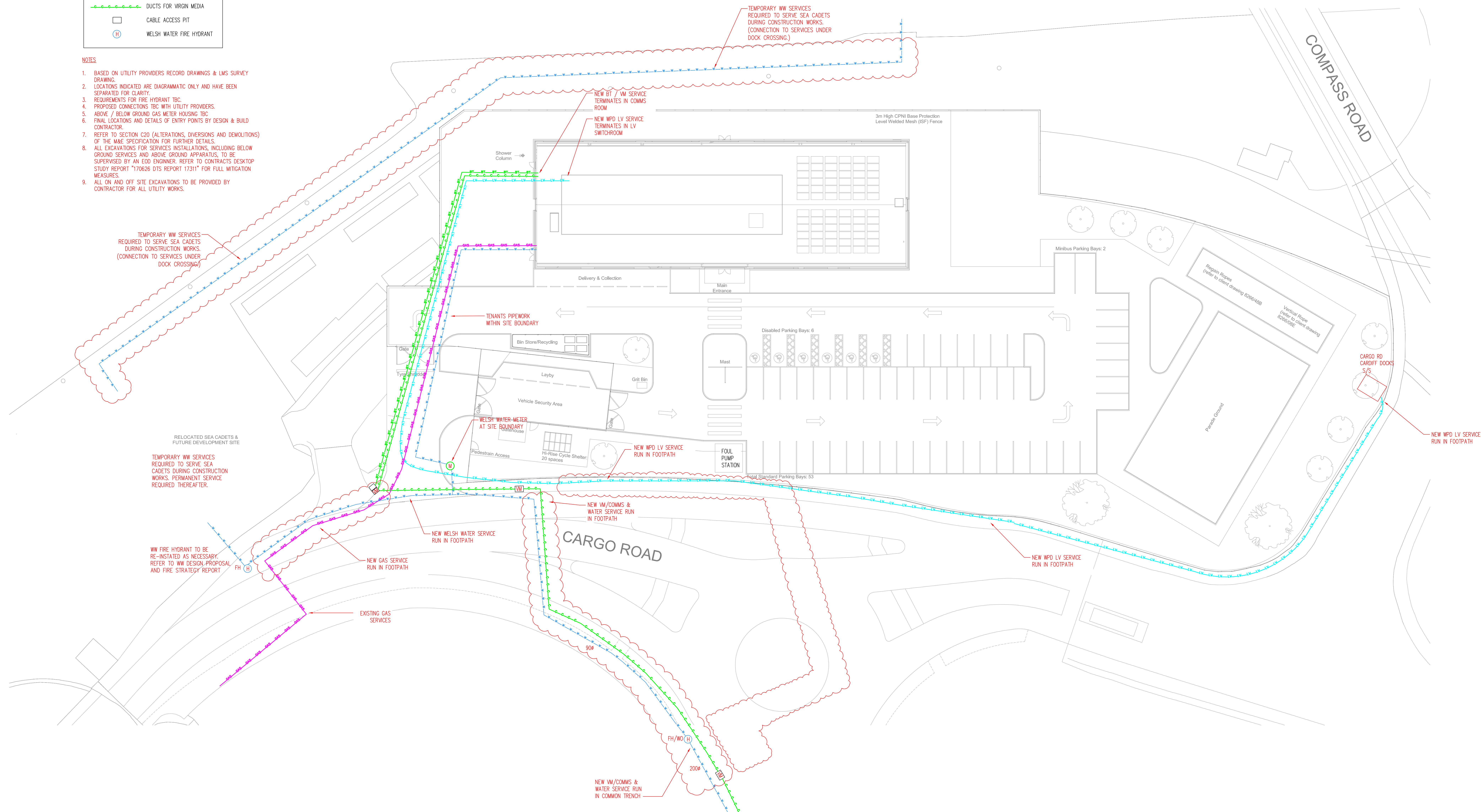
Renewable Energy Technology	Details and compatibility	Feasibility
Solar Photovoltaic 	Photovoltaics could be mounted at roof level to generate electricity. The best locations in the northern hemisphere for photovoltaic systems are on buildings with a roof or wall that faces within 45° of south, with systems elevated at 10–15°. PV arrays will also benefit from Feed In Tariffs which will provide income revenue for the building.	This is feasible due to a good quantity of roof space available, on suitable orientations. VE PV array size to be increased in conjunction with the potential CHP omission.
Solar thermal hot water 	A centralised solar hot water system with buffer vessel could be used to generate domestic hot water for this development.	We have not considered this as we have utilised the roof for a PV array.
Ground source heat pumps 	Ground source heat pumps are more efficient when operating at lower hot water temperature, i.e. between 40 to 50°C. This temperature is best suited to underfloor heating installations. The capital costs are higher than for alternative systems, mainly because of the civil engineering costs associated with the ground coil.	A ground source heat pump is not feasible as underfloor heating is not proposed, along with the high cost of installation.

Renewable Energy Technology	Details and compatibility	Feasibility
<p>Air source heat pumps</p> 	<p>Air source heat pumps operate in a similar manner as ground source heat pumps except that the thermal transfer is completed with the external air instead of the ground.</p> <p>Use of air source heat pumps is a feasible and cost effective technology for providing heating and cooling to areas with high heat gains, e.g. server rooms.</p>	<p>Due to limited external plant space, we have not considered this technology.</p>
<p>Combined Heat & Power</p> 	<p>CHP requires a high thermal base load in order to operate efficiently.</p> <p>During the summer months, the DHW load allows the CHP to continue running. Without a large base load, a limit is placed on the size of CHP that could be installed. It is unlikely that a CHP unit would run for significant periods during the warmer months and therefore CO2 emission saving is potentially limited.</p>	<p>There is a reasonable DHW load requirement due to the shower facilities. The inclusion of CHP is to be considered at this stage if required to meet Part L & BREEAM.</p> <p>VE CHP to be omitted if possible, in favour of additional PV.</p>
<p>Wind Turbines</p> 	<p>Wind power can be used to generate electricity, either in parallel with mains supplies or for stand-alone applications with battery back-up. In order to generate worthwhile quantities of electricity, average wind speeds of more than 5–6 m/s are typically required.</p> <p>Wind turbines are highly visible and aesthetically unattractive which can cause planning issues due to the proximity of residential areas. Careful positioning of turbines and good design of rotors is required to ensure that noise from turbines does not affect nearby residential areas.</p>	<p>Due to the high cost of installation and maintenance as well as nearby residential developments, we have not considered this technology.</p>

LEGEND	
	11kV-11kV WPD 11KV CABLING
	W-W-W WELSH WATER
	GAS-GAS WALES & WEST GAS
	BT-BT UNDERGROUND BT NETWORK
	LV-LV-LV WPD LV CABLING
	DUCTS FOR VIRGIN MEDIA
	CABLE ACCESS PIT
	WELSH WATER FIRE HYDRANT

NOTES

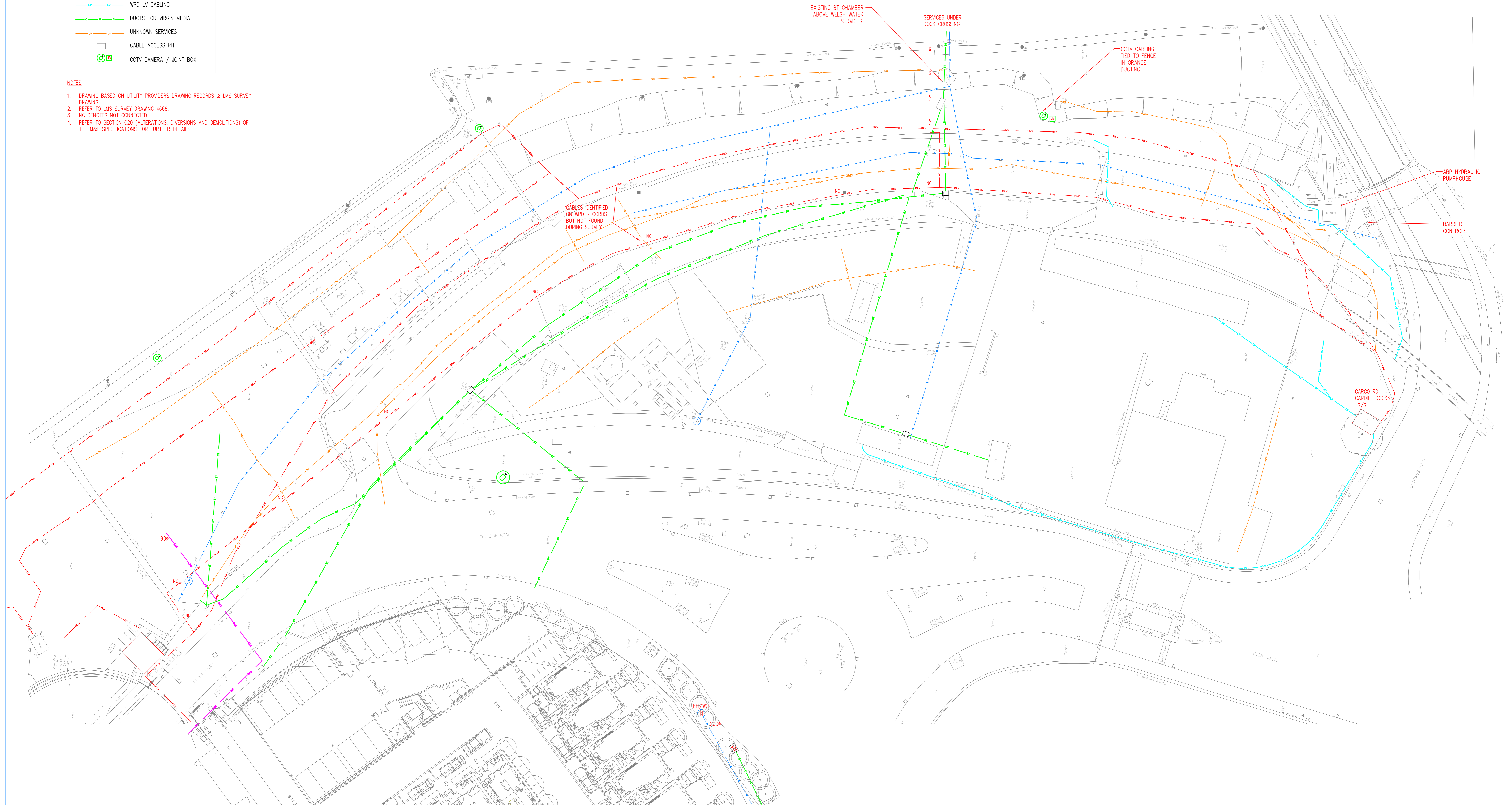
1. BASED ON UTILITY PROVIDERS RECORD DRAWINGS & LMS SURVEY DRAWING.
2. LOCATIONS INDICATED ARE DIAGRAMMATIC ONLY AND HAVE BEEN SEPARATED FOR CLARITY.
3. REQUIREMENTS FOR FIRE HYDRANT TBC.
4. PROPOSED CONNECTIONS TBC WITH UTILITY PROVIDERS.
5. ABOVE / BELOW GROUND GAS METER HOUSING TBC.
6. FINAL LOCATIONS AND DETAILS OF ENTRY POINTS BY DESIGN & BUILD CONTRACTOR.
7. REFER TO SECTION C20 (ALTERATIONS, DIVERSIONS AND DEMOLITIONS) OF THE MAE SPECIFICATION FOR FURTHER DETAILS.
8. ALL EXCAVATIONS FOR SERVICES INSTALLATIONS, INCLUDING BELOW GROUND SERVICES AND ABOVE GROUND APPARATUS, TO BE SUPERVISED BY AN EOD ENGINEER. REFER TO CONTRACTS DESKTOP STUDY REPORT "170626 DTS REPORT 17311" FOR FULL MITIGATION MEASURES.
9. ALL ON AND OFF SITE EXCAVATIONS TO BE PROVIDED BY CONTRACTOR FOR ALL UTILITY WORKS.



<p>TO2 VE RE-DESIGN ISSUE</p> <p>SO: RB 01/18</p> <p>Revisions</p> <p>CAD ORIGINAL - NOT TO BE MODIFIED BY HAND</p>	<p>General Notes:</p> <ul style="list-style-type: none"> The drawing does not necessarily show all the information needed to interpret the design intent or the construction details. The drawing contains information from more than one source and must be read in conjunction with all relevant specifications. Any apparent drafting errors and differences between other drawings and specifications shall be brought to our attention. 	<p>CDM Pre-Construction Information</p> <p>The following information is provided in accordance with Regulation 9 of the CDM Regulations 2015:</p> <ol style="list-style-type: none"> 1. LIVE UNIDENTIFIED SERVICES PRESENT ON SITE. 2. ALL SERVICES TO BE SCANNED, TRACED AND PLOTTED PRIOR TO CONSTRUCTION. 	<p>Architect: CHETWOODS</p> <p>Client: ABP</p>	<p>Project Title: SECURE TRAINING FACILITY</p> <p>Drawing Title: UTILITY & SITE SERVICES PROPOSED SERVICES & NEW CONNECTIONS</p>	<p>www.hoarelea.com</p> <p>HOARE LEA</p> <p>TENDER ISSUE</p> <table border="1"> <thead> <tr> <th>Drawn by</th> <th>Designed by</th> <th>Reviewed by</th> </tr> </thead> <tbody> <tr> <td>DR</td> <td>RB/SC</td> <td>AMT</td> </tr> <tr> <td>Project No</td> <td>Date</td> <td>Scale @ A0</td> </tr> <tr> <td>91421</td> <td>SEP 2016</td> <td>1:200 @ A0</td> </tr> <tr> <td colspan="3">DRAWING NUMBER</td> </tr> <tr> <td colspan="3">91421-HL-EX-00-GA-U-500-0003</td> </tr> <tr> <td colspan="3">Revision</td> </tr> <tr> <td colspan="3">T02</td> </tr> </tbody> </table>	Drawn by	Designed by	Reviewed by	DR	RB/SC	AMT	Project No	Date	Scale @ A0	91421	SEP 2016	1:200 @ A0	DRAWING NUMBER			91421-HL-EX-00-GA-U-500-0003			Revision			T02		
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LEGEND	
	WPD 11KV CABLING
	WELSH WATER
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	UNDERGROUND BT NETWORK
	WPD LV CABLING
	DUCTS FOR VIRGIN MEDIA
	UNKNOWN SERVICES
	CABLE ACCESS PIT
	CCTV CAMERA / JOINT BOX

- NOTES**
- DRAWING BASED ON UTILITY PROVIDERS DRAWING RECORDS & LMS SURVEY DRAWING.
 - REFER TO LMS SURVEY DRAWING 4666.
 - NC DENOTES NOT CONNECTED.
 - REFER TO SECTION C20 (ALTERATIONS, DIVERSIONS AND DEMOLITIONS) OF THE M&E SPECIFICATIONS FOR FURTHER DETAILS.

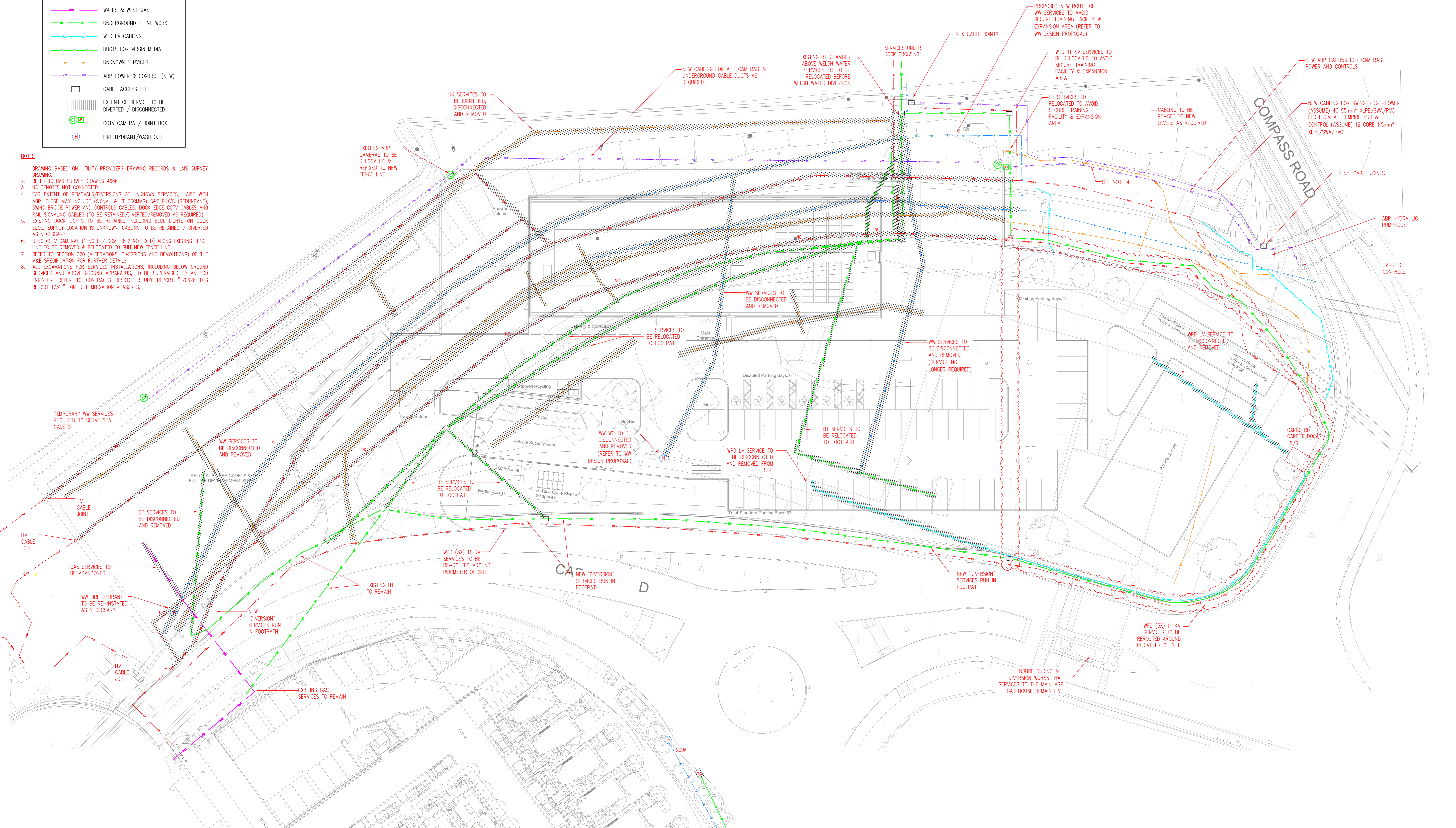


<p>T02 VE RE-DESIGN ISSUE</p> <p>Drawn by: DR Designed by: RB/SC Checked by: AMT Date: 07/18</p> <p>Revisions</p> <p>CAD ORIGINAL - NOT TO BE MODIFIED BY HAND</p>	<p>General Notes:</p> <ul style="list-style-type: none"> The drawing does not necessarily show all the information needed to interpret the design intent or the construction details. The drawing contains information from more than one source and must be read in conjunction with all relevant specifications. Any apparent drafting errors and differences between other drawings and specifications shall be brought to our attention. <p>Project Notes:</p>	<p>CDM Pre-Construction Information</p> <p>The following information is provided in accordance with Regulation 9 of the CDM Regulations 2015:</p> <ol style="list-style-type: none"> LIVE UNIDENTIFIED SERVICES PRESENT ON SITE. ALL SERVICES TO BE SCANNED, TRACED AND PLOTTED PRIOR TO CONSTRUCTION. 	<p>Architect: CHETWOODS</p> <p>Client: ABP</p>	<p>Project Title: SECURE TRAINING FACILITY</p> <p>Drawing Title: UTILITY & SITE SERVICES EXISTING</p>	<p>www.hoarelea.com</p> <p>HOARE LEA</p>																			
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91421	SEP 2016	1:200 @ A0																						
DRAWING NUMBER																								
91421-HL-EX-00-GA-U-500-0001																								
Revision																								
T02																								

LEGEND

- WPD 11KV CABLING
- WELSH WATER
- WALES & WEST GAS
- UNDERGROUND BT NETWORK
- WPD LV CABLING
- DUCTS FOR VIRGIN MEDIA
- UNKNOWN SERVICES
- ABP POWER & CONTROL (NEW)
- CABLE ACCESS PIT
- EXTENT OF SERVICE TO BE DIVERTED / DISCONNECTED
- C CCTV CAMERA / JOINT BOX
- H FIRE HYDRANT/WASH OUT

- NOTES**
1. DRAWING BASED ON UTILITY PROVIDERS DRAWING RECORDS & LMS SURVEY DRAWING.
 2. REFER TO LMS SURVEY DRAWING 4666.
 3. NC DENOTES NOT CONNECTED.
 4. FOR EXTENT OF REMOVALS/DIVERSIONS OF UNKNOWN SERVICES, LIAISE WITH ABP. THESE MAY INCLUDE (SIGNAL & TELECOMS) S&T PILCS (REDUNDANT), SWING BRIDGE POWER AND CONTROLS CABLES, DOCK EDGE CCTV CABLES AND RAIL SIGNALING CABLES (TO BE RETAINED/DIVERTED/REMOVED AS REQUIRED).
 5. EXISTING DOCK LIGHTS TO BE RETAINED INCLUDING BLUE LIGHTS ON DOCK EDGE. SUPPLY LOCATION IS UNKNOWN. CABLING TO BE RETAINED / DIVERTED AS NECESSARY.
 6. 3 NO CCTV CAMERAS (1 NO PTZ DOME & 2 NO FIXED) ALONG EXISTING FENCE LINE TO BE REMOVED & RELOCATED TO SUIT NEW FENCE LINE.
 7. REFER TO SECTION C20 (ALTERATIONS, DIVERSIONS AND DEMOLITIONS) OF THE M&E SPECIFICATION FOR FURTHER DETAILS.
 8. ALL EXCAVATIONS FOR SERVICES INSTALLATIONS, INCLUDING BELOW GROUND SERVICES AND ABOVE GROUND APPARATUS, TO BE SUPERVISED BY AN EOD ENGINEER. REFER TO CONTRACTS DESKTOP STUDY REPORT "170626 DTS REPORT 17311" FOR FULL MITIGATION MEASURES.



<p>102 VE RE-DESIGN ISSUE BT ROUTE RUN VIA PAVEMENT</p> <p>DRW: SC REV: RB DATE: 01/18</p> <p>Revisions</p> <p>CAD ORIGINAL - NOT TO BE MODIFIED BY HAND</p>	<p>General Notes</p> <ul style="list-style-type: none"> The drawing does not necessarily show all the information needed to interpret the design intent or the construction details. The drawing contains information from more than one source and must be read in conjunction with all relevant specifications. Any apparent drafting errors and differences between other drawings and specifications shall be brought to our attention. <p>Project Notes</p>	<p>CDM Pre-Construction Information</p> <p>The following information is provided in accordance with Regulation 9 of the CDM Regulations 2015:</p> <ol style="list-style-type: none"> 1. LIVE UNIDENTIFIED SERVICES PRESENT ON SITE. 2. ALL SERVICES TO BE SCANNED, TRACED AND PLOTTED PRIOR TO CONSTRUCTION. 	<p>Architect: CHETWOODS</p> <p>Client: ABP</p>	<p>Project Title: SECURE TRAINING FACILITY</p> <p>Drawing Title: UTILITY & SITE SERVICES PROPOSED DIVERSIONS</p>	<p>www.hoarelea.com</p> <p>HOARE LEA</p> <p>TENDER ISSUE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Drawn by</td> <td>Designed by</td> <td>Reviewed by</td> </tr> <tr> <td>DR</td> <td>RB/SC</td> <td>AMT</td> </tr> <tr> <td>Project No</td> <td>Date</td> <td>Scale @ A0</td> </tr> <tr> <td>91421</td> <td>SEP 2016</td> <td>1:200 @ A0</td> </tr> <tr> <td colspan="3" style="text-align: center;">DRAWING NUMBER</td> </tr> <tr> <td colspan="2">91421-HL-EX-00-GA-U-500-0002</td> <td>T02</td> </tr> </table>	Drawn by	Designed by	Reviewed by	DR	RB/SC	AMT	Project No	Date	Scale @ A0	91421	SEP 2016	1:200 @ A0	DRAWING NUMBER			91421-HL-EX-00-GA-U-500-0002		T02
Drawn by	Designed by	Reviewed by																					
DR	RB/SC	AMT																					
Project No	Date	Scale @ A0																					
91421	SEP 2016	1:200 @ A0																					
DRAWING NUMBER																							
91421-HL-EX-00-GA-U-500-0002		T02																					

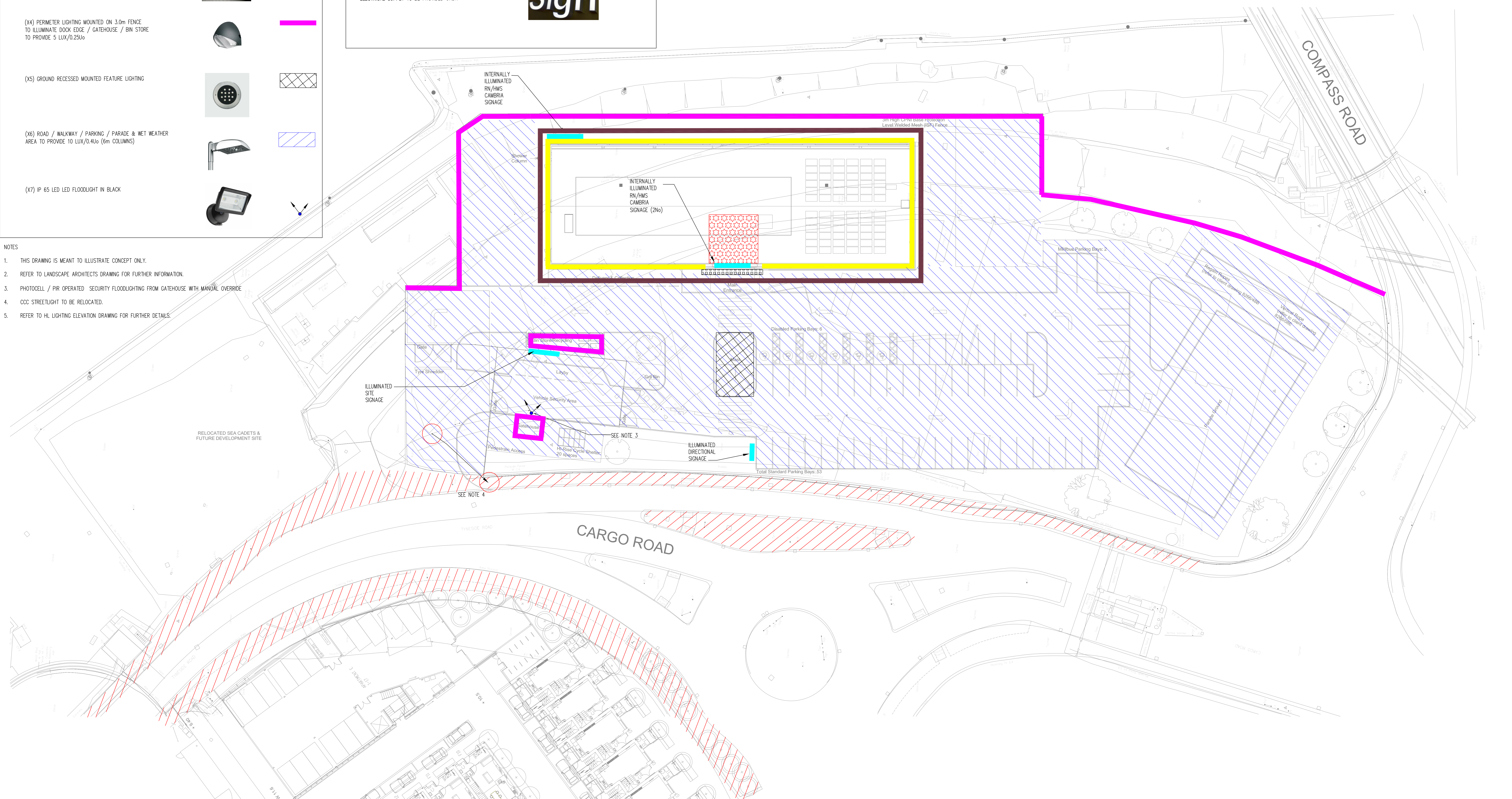
LEGEND

- (X1) BUILDING DECORATIVE FUNCTIONAL DOWN LIGHTING MOUNTED ON THE FACADE TO PROVIDE 5 LUX. (C/W EMERGENCY O/S EXITS)
- (X2) IP 65 LED STRIP IN ALUMINIUM EXTRUSION / DOWNLIGHTING FROM CANOPY FRAME
- (X3) IP 65 LED STRIP FIXED TO PROJECTING CLADDING EDGE (3 ROWS)
- (X4) PERIMETER LIGHTING MOUNTED ON 3.0m FENCE TO ILLUMINATE DOCK EDGE / GATEHOUSE / BIN STORE TO PROVIDE 5 LUX/0.250u
- (X5) GROUND RECESSED MOUNTED FEATURE LIGHTING
- (X6) ROAD / WALKWAY / PARKING / PARADE & WET WEATHER AREA TO PROVIDE TO LUX/0.40u (6m COLUMNS)
- (X7) IP 65 LED LED FLOODLIGHT IN BLACK

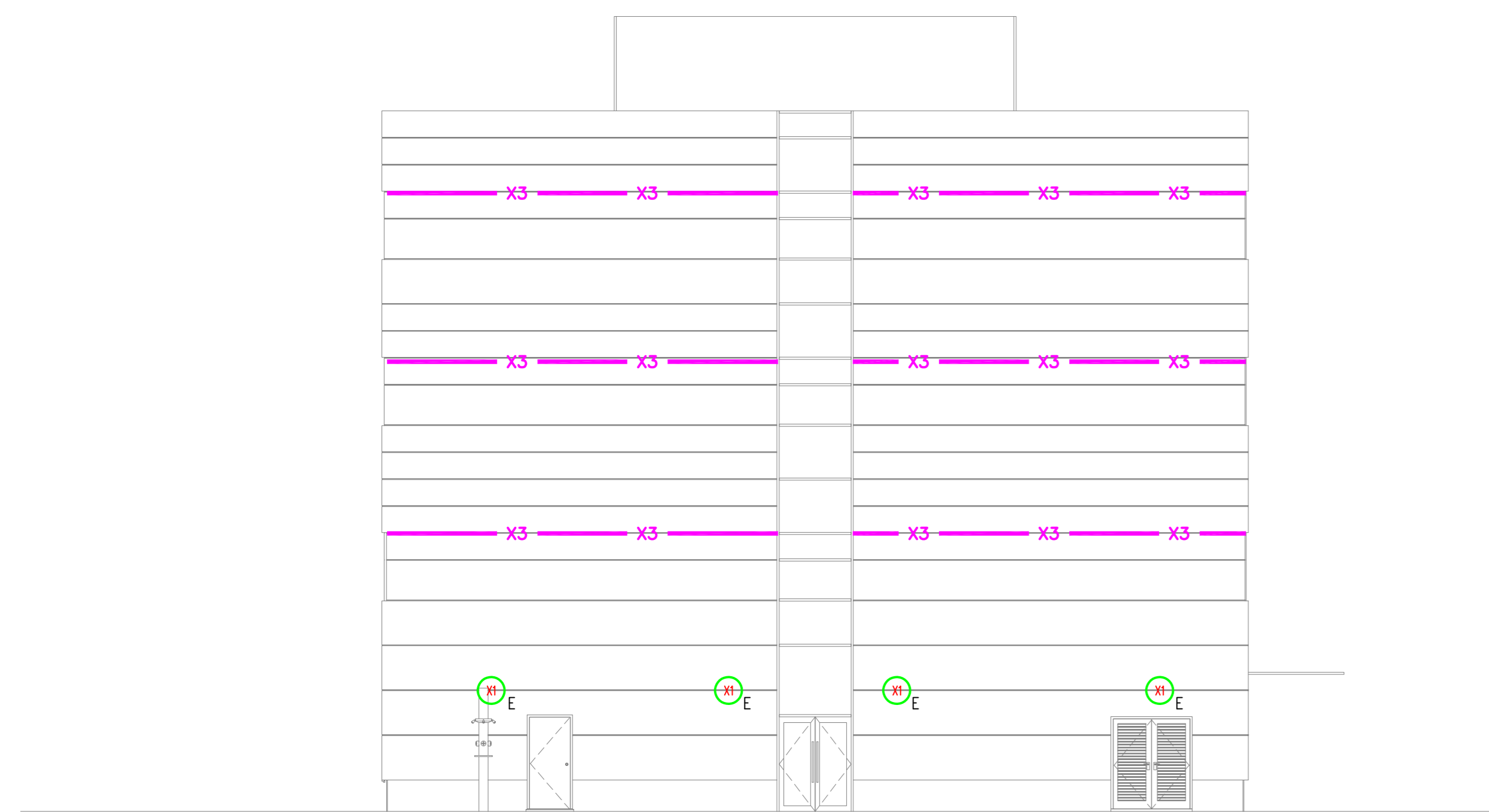
LEGEND

- INTERNAL / ATRIUM LIGHTING
- (X8) EXISTING HIGHWAY / STREET LIGHTING TO BE RETAINED (8m COLUMNS)
- INTERNALLY ILLUMINATED SIGNAGE (BY SIGNAGE SPECIALISTS). ELECTRICAL SUPPLY TO BE PROVIDED ONLY.

- NOTES**
- THIS DRAWING IS MEANT TO ILLUSTRATE CONCEPT ONLY.
 - REFER TO LANDSCAPE ARCHITECTS DRAWING FOR FURTHER INFORMATION.
 - PHOTOCELL / PIR OPERATED SECURITY FLOODLIGHTING FROM GATEHOUSE WITH MANUAL OVERRIDE
 - CCC STREETLIGHT TO BE RELOCATED.
 - REFER TO HL LIGHTING ELEVATION DRAWING FOR FURTHER DETAILS.



<p>General Notes</p> <ul style="list-style-type: none"> The drawing does not necessarily show all the information needed to interpret the design intent or the construction details. The drawing contains information from more than one source and must be read in conjunction with all relevant specifications. Any apparent drafting errors and differences between other drawings and specifications shall be brought to our attention. <p>Project Notes</p>	<p>CDM Pre-Construction Information</p> <p>The following information is provided in accordance with Regulation 9 of the CDM Regulations 2015:</p> <p>NO RESIDUAL RISKS IDENTIFIED</p>	<p>Architect</p> <p>CHETWOODS</p>	<p>Project Title</p> <p>SECURE TRAINING FACILITY</p>	<p>www.hoarelea.com</p> <p>HOARE LEA</p>																						
					<p>Client</p> <p>ABP</p>	<p>Drawing Title</p> <p>EXTERNAL LIGHTING STRATEGY</p>	<p>TENDER ISSUE</p> <table border="1"> <tr> <td>Drawn by</td> <td>Designed by</td> <td>Reviewed by</td> </tr> <tr> <td>DR</td> <td>RB</td> <td>AMT</td> </tr> <tr> <td>Project No</td> <td>Date</td> <td>Scale</td> </tr> <tr> <td>91421</td> <td>AUG 2016</td> <td>1:200 @ A0</td> </tr> <tr> <td colspan="3">DRAWING NUMBER</td> </tr> <tr> <td colspan="3">91421-HL-EX-00-GA-E-630-0001</td> </tr> <tr> <td colspan="3">Revision</td> </tr> <tr> <td colspan="3">T02</td> </tr> </table>	Drawn by	Designed by	Reviewed by	DR	RB	AMT	Project No	Date	Scale	91421	AUG 2016	1:200 @ A0	DRAWING NUMBER			91421-HL-EX-00-GA-E-630-0001			Revision
Drawn by	Designed by	Reviewed by																								
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Revision																										
T02																										
<p>Revisions</p> <table border="1"> <tr> <th>No.</th> <th>Description</th> <th>Drawn & Date</th> <th>Checked & Date</th> </tr> <tr> <td>T02</td> <td>VE RE-DESIGN ISSUE</td> <td>DR</td> <td>RB 01/18</td> </tr> </table> <p>CAD ORIGINAL - NOT TO BE MODIFIED BY HAND</p>	No.	Description	Drawn & Date	Checked & Date	T02	VE RE-DESIGN ISSUE	DR	RB 01/18	<p>© Hoare Lea LLP</p> <p>X:\Cardiff\Projects\91421 Secure Training Facility\07 BIM Avo CAD\7B CAD\7B-3 Electrical\630 - Lighting\91421-HL-EX-00-GA-E-630-0001.dwg Richard Brennan.12010218 13:36:52</p>																	
No.	Description	Drawn & Date	Checked & Date																							
T02	VE RE-DESIGN ISSUE	DR	RB 01/18																							



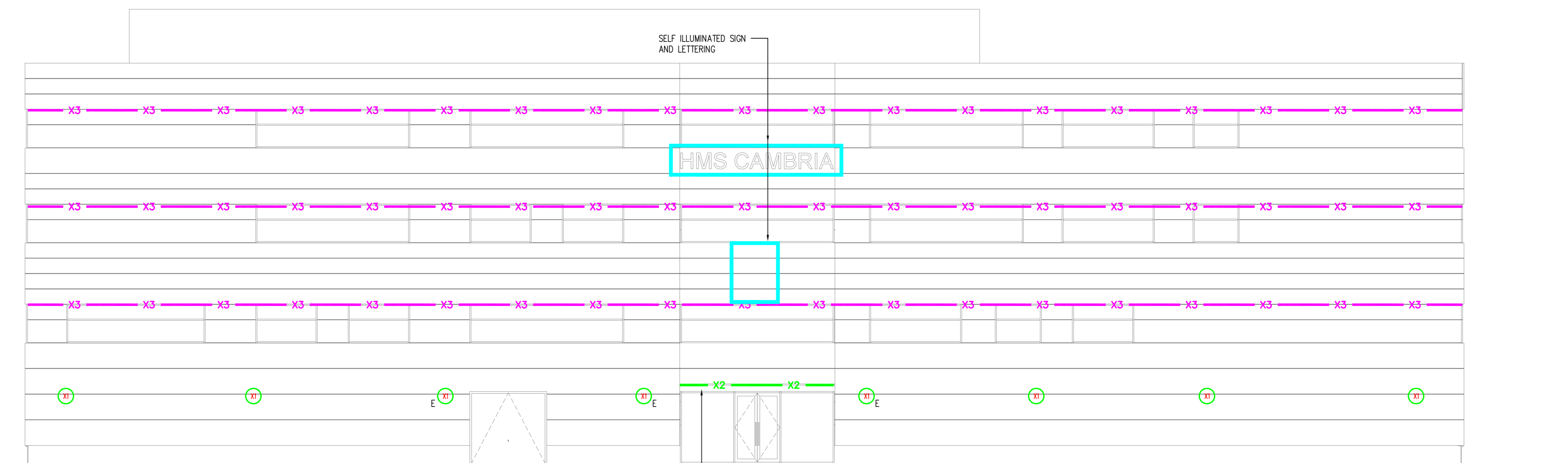
NORTH ELEVATION



EAST ELEVATION




SOUTH ELEVATION



WEST ELEVATION

LEGEND

- X2 CONTINUOUS LED LIGHT STRIP MOUNTED IN ALUMINUM EXTRUSION
- X3 CONTINUOUS LED LIGHT STRIP MOUNTED IN FLEXIBLE SUPPORT SYSTEM
-  DECORATIVE DOWNLIGHT BULKHEAD FIXED TO BUILDING
- E DENOTES EMERGENCY LIGHTING

- NOTES**
1. THIS DRAWING IS MEANT TO ILLUSTRATE CONCEPT ONLY.
 2. REFER TO EXTERNAL LIGHTING STRATEGY DRAWING FOR FURTHER INFO.
 3. ELECTRICAL SUPPLY TO SIGNAGE ONLY. SIGNAGE TO BE PROVIDED BY SPECIALIST.
 4. X'S TO BE PROVIDED WITH REMOTE EMERGENCY PACKS WHERE SITUATED ADJACENT TO FINAL EXITS.

TO2	VE RE-DESIGN	JG	ROB	01/18
Issue	Description	Drawn & Date	Revised by	Date
Revisions				
CAD ORIGINAL - NOT TO BE MODIFIED BY HAND				

General Notes

- The drawing does not necessarily show all the information needed to interpret the design intent or the construction details.
- The drawing contains information from more than one source and must be read in conjunction with all relevant specifications.
- Any apparent drafting errors and differences between other drawings and specifications shall be brought to our attention.

Project Notes:

CDM Pre-Construction Information
The following information is provided in accordance with Regulation 9 of the CDM Regulations 2015:

Architect
CHETWOODS

Client
ABP

Project Title
SECURE TRAINING FACILITY

Drawing Title
LIGHTING ELEVATION DETAIL

www.hoarelea.com **HOARE LEA**

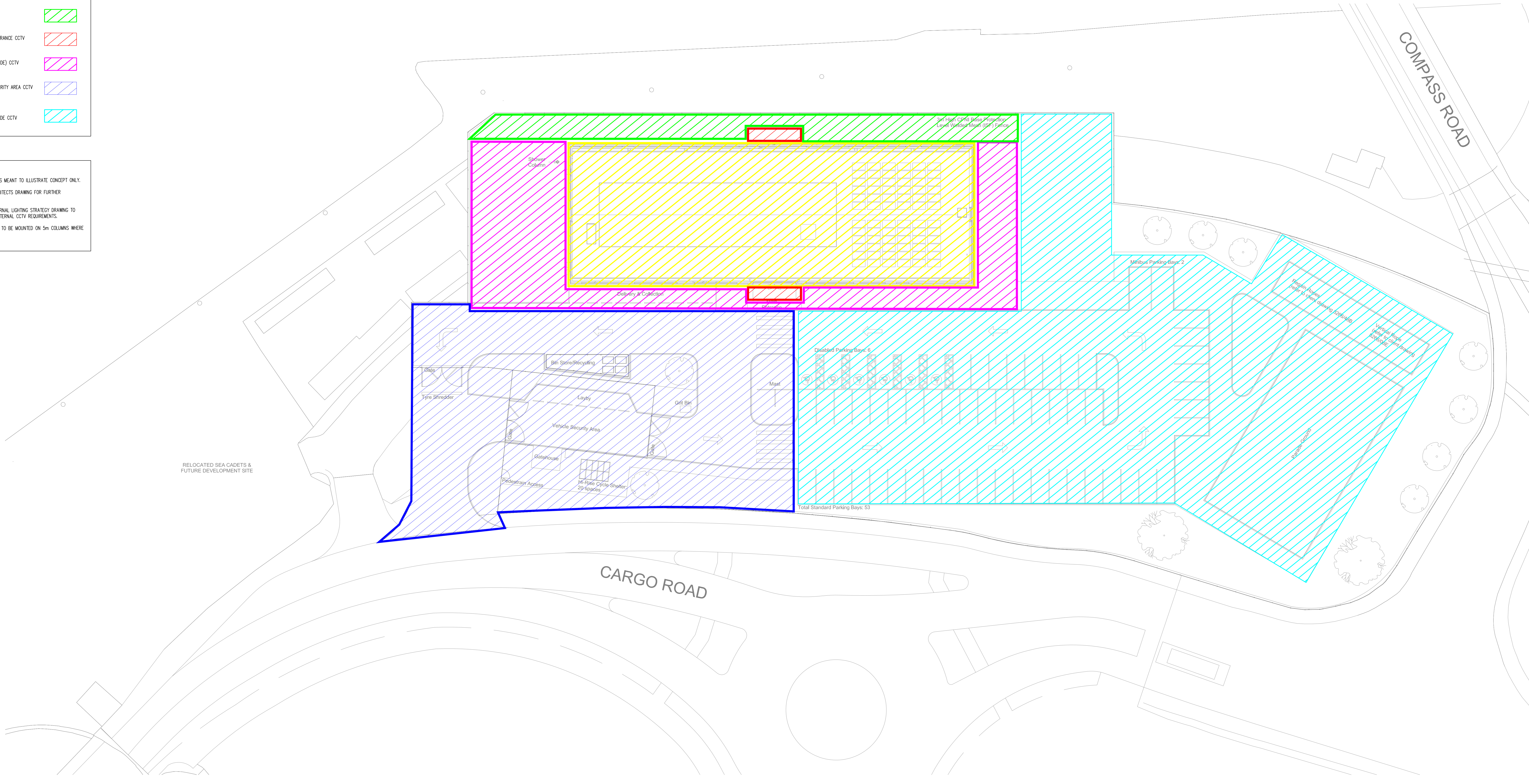
TENDER ISSUE

Drawn by	Designed by	Reviewed by
DR	JG	RDB
Project No	Date	Scale @ A0
0991421	APR 2017	1:100 @ A0
DRAWING NUMBER		
91421-HL-EX-00-DT-E-630-0001		T02

LEGEND:

INTERNAL AREAS CCTV	
WATERFRONT CCTV	
MAIN / REAR ENTRANCE CCTV	
PERIMETER (ROADSIDE) CCTV	
MAIN GATE / SECURITY AREA CCTV	
CAR PARK / PARADE CCTV	

- NOTES:**
1. THIS DRAWING IS MEANT TO ILLUSTRATE CONCEPT ONLY.
 2. REFER TO ARCHITECTS DRAWING FOR FURTHER INFORMATION.
 3. REFER TO EXTERNAL LIGHTING STRATEGY DRAWING TO COORDINATE EXTERNAL CCTV REQUIREMENTS.
 4. CCTV COLUMNS TO BE MOUNTED ON 5m COLUMNS WHERE REQUIRED.



P02	SITE PLAN UPDATED VE RE-DESIGN	SC	RB	01/18
P01	SITE PLAN UPDATED	SC	RB	01/17
Minor	Drawings	Drawn & Checked	Revised by	Date
Revisions				
CAD ORIGINAL - NOT TO BE MODIFIED BY HAND				

General Notes:

- The drawing does not necessarily show all the information needed to interpret the design intent or the construction details.
- The drawing contains information from more than one source and must be read in conjunction with all relevant specifications.
- Any separate drafting errors and differences between other drawings and specifications shall be brought to our attention.

Project Notes:

CDM Pre-Construction Information
 The following information is provided in accordance with Regulation 9 of the CDM Regulations 2015:
 NO RESIDUAL RISKS IDENTIFIED

Architect:
 CHETWOODS

Client:
 ABP

Project Title:
 SECURE TRAINING FACILITY

Drawing Title:
 EXTERNAL SECURITY/CCTV STRATEGY

PRELIMINARY ISSUE	
Drawn by DR	Designed by RB
Project No 91421	Date JAN 2017
Scale 1:200 @ A0	Reviewed by AMT
DRAWING NUMBER	
91421-HL-EX-00-GA-E-680-0001	
Revision P02	

www.hoarelea.com

Mechanical and Electrical Engineering Stage 2 Report

Appendix F Drawing Schedule - Utility And Site Services Drawings

Mechanical and Electrical Engineering Stage 2 Report

Appendix F Drawing Schedule - Utility And Site Services Drawings

Utility & Site Services Drawings

DRAWING	DESCRIPTION	SCALE
8837943	WPD Existing	NTS
HJM03313S	BT Existing	NTS
319573-17420	Welsh Water Existing	1:1500
1W8Q1XR	Wales & West Utilities (Gas) Existing	1:500
4666	LMS (External Services) Survey Drawing Cargo Rd	1:500
2866930	WPD Proposed	1:750
WMD0000807-001-01	Welsh Water Proposed New Connection	NTS
WMD0000645-002-01	Welsh Water Proposed Diversion	1/500
WMD0000645-003-01	Welsh Water Proposed Diversion Connection Details	NTS
35037343	Wales & West Utilities Proposed Connection	NTS
0991421-HL-EX-00-GA-U-500-0001	Utility & Site Services Existing	1:200
0991421-HL-EX-00-GA-U-500-0002	Utility & Site Services Proposed Diversions	1:200
0991421-HL-EX-00-GA-U-500-0003	Utility & Site Services Proposed Services & New Connections	1:200

Contact Us

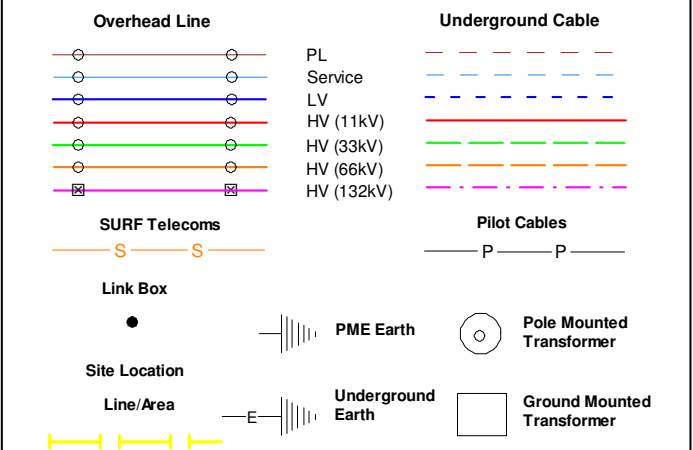
Mapping Enquiries: All areas 0121 623 9780
General Enquiries: All areas 0800 096 3080

**Report damage immediately – KEEP EVERYONE AWAY FROM THE AREA
 0800 6783 105**

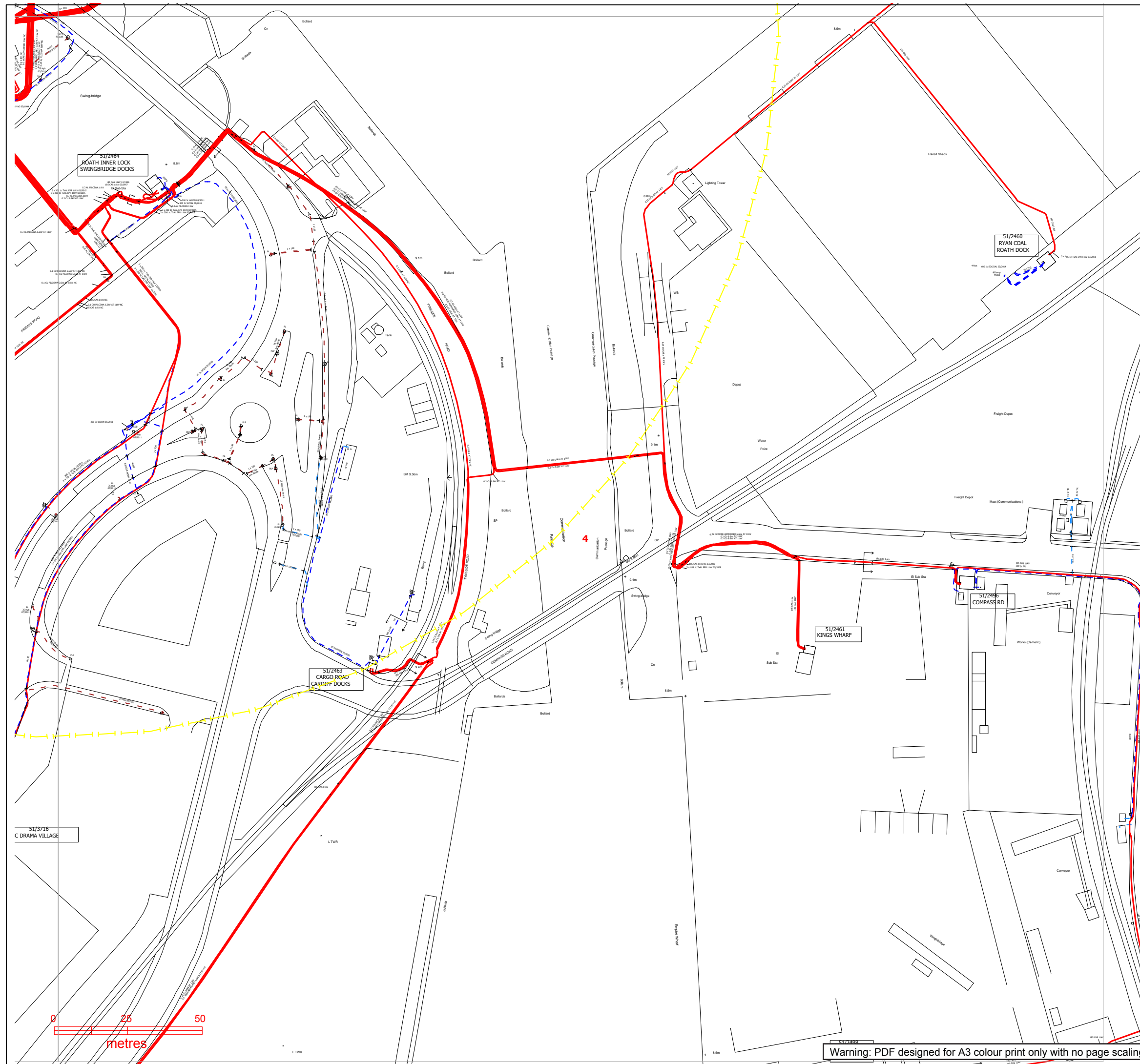
Date Requested: 27/07/2016
 Job Reference: 8837943
 Site Location: 319817 174664
 Requested by: Mr Samuel Morgan
 Your Scheme/Reference: Tyneside Road, Cardiff Bayyyyy
 Exact Scales:
 1:1250 Area or Circle dig site
 1:500 Line dig site

IMPORTANT NOTICES

- This information is given as a guide only and its accuracy cannot be guaranteed. Services or recent additions to the network may not be shown.
- Cables, overhead lines & substations owned by other electricity network owners or private companies may be present but will not be shown.
- You should always verify exact locations of cables using a cable locator and by careful use of hand tools in accordance with HSE guidance note HSG47.
- When working within 10m of any overhead electric line you should follow the requirements of HSE Guidance Note GS6.
- For further advice on working near our electricity cables or lines, call our Contact Centre on 0800 096 3080.
- Advice should be sought from the Western Power Distribution Contact Centre for any work that is to take place in proximity to 66kV or 132kV underground cables and 66kV 132kV overhead lines – 0800 096 3080



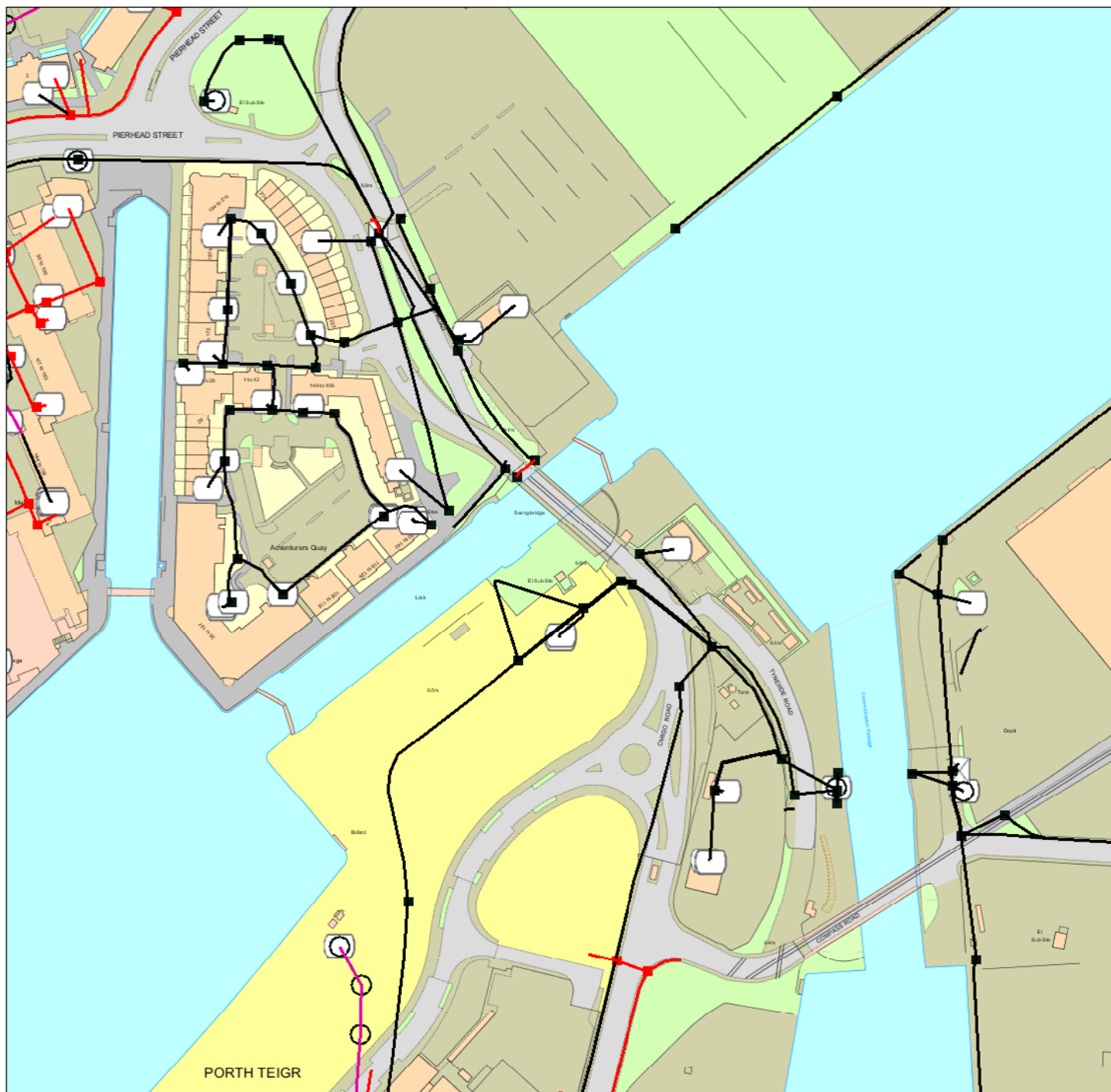
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 WPD Copyright: This copy has been made by or with the authority of Western Power Distribution (WPD) pursuant to Section 47 of the Copyright Designs and Patents Act 1988 unless that Act provides a relevant exception to copyright the copy must not be copied without the prior permission of the copyright owner



Warning: PDF designed for A3 colour print only with no page scaling.

Plans generated by DigSAFE Pro (tm) software provided by LinesearchbeforeUdig

Maps by email Plant Information Reply



IMPORTANT WARNING

Information regarding the location of BT apparatus is given for your assistance and is intended for general guidance only. No guarantee is given of its accuracy. It should not be relied upon in the event of excavations or other works being made near to BT apparatus which may exist at various depths and may deviate from the marked route.

DIAL BEFORE YOU DIG

FOR PROFESSIONAL ON SITE ASSISTANCE PRIOR TO COMMENCEMENT OF EXCAVATION WORKS

ADVANCE NOTICE REQUIRED
(Office hours: Monday-Friday 08.00 to 17.00)

Tel: 0800 9173993
E-mail: dbyd@openreach.co.uk
Website: www.dialbeforeyoudig.com

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KEY TO BT SYMBOLS

	UNDERGROUND PLANT		POLE
	OVERHEAD PLANT		CABINET
	JOINT BOX		BURIED JOINT
	DISTRIBUTION POINT		JOINTING POST
	MANHOLE		PROPOSED U/G
	DP BOUNDARY		PROPOSED O/H
	OTHER BT BOUNDARY		PROPOSED BOX

Other proposed plant is shown using dashed lines. BT symbols not listed above may be disregarded. Existing BT plant may not be recorded. Information valid at the time of preparation.

openreach
a BT Group business

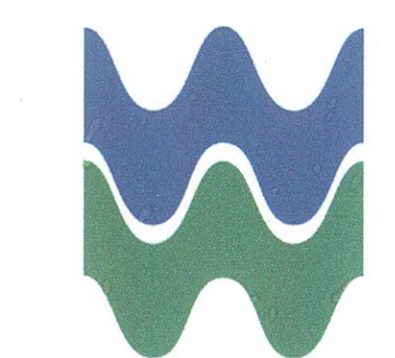
BT Ref : HJM03313S

Map Reference : (centre) ST1985074619

Easting/Northing : (centre) 319850, 174619

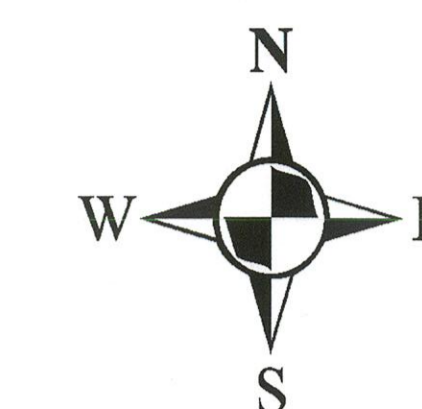
Issued : 04/07/2013 15:31:21

FOOTNOTE: WARNING IT IS ESSENTIAL THAT YOU CONTACT NATIONAL NETWORK HANDLING CENTRE BY EMAIL nnhc@openreach.co.uk BEFORE PROCEEDING WITH ANY WORK IN THE HATCHED AREA



Dŵr Cymru
Welsh Water

CARDIFF



LEGEND

- | | | |
|----------------|-------------------------|--|
| Clean network: | Sluice valve | Stop tap |
| | Pressure reducing valve | Water Treatment Works |
| | Meter | Water Pumping Station |
| | Bulk meter | Existing main |
| | Hydrant | Non-operational main |
| | Cap end | Raw Water |
| | Air valve | NS: Water main symbol colour indicates size type |
| | | LIGHT BLUE - Trunk |
| | | DARK BLUE - Distribution |
| | | YELLOW - Raw Water |

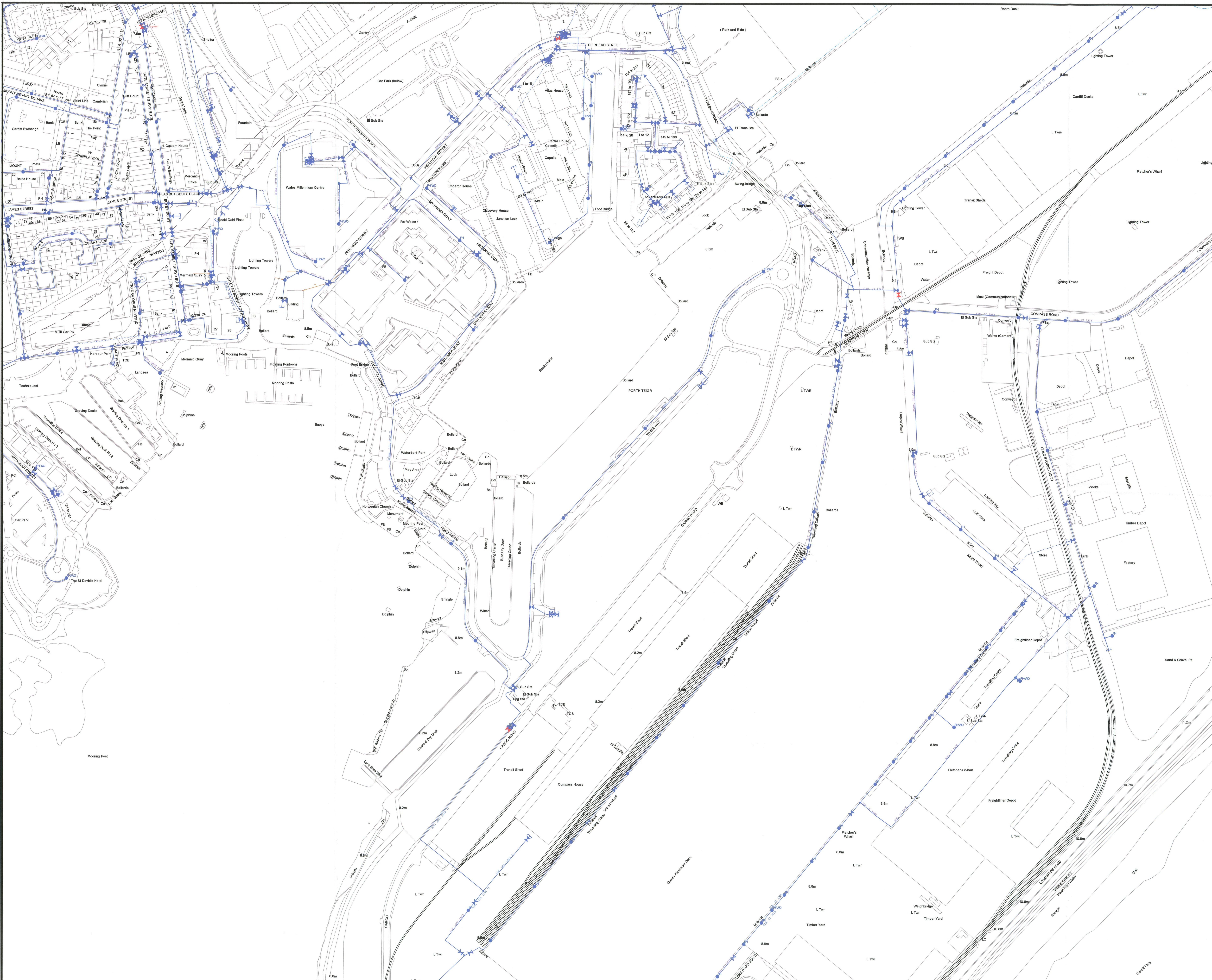
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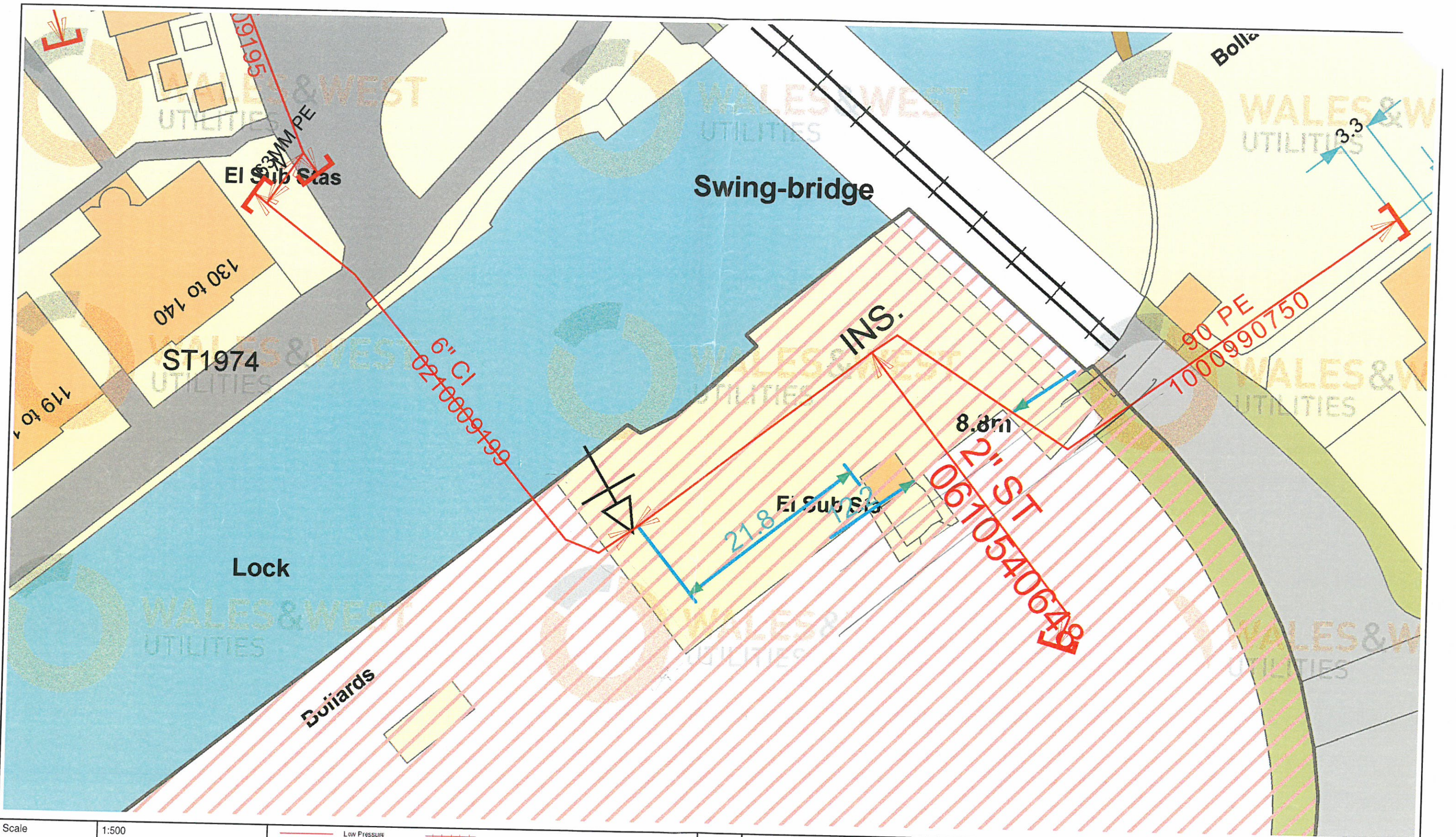
Dŵr Cymru Cŵl gives this information as to the location of the underground apparatus by way of general guidance only on the basis of information that it is based on the best information available and is not intended as a guarantee or warranty of accuracy or other works made in the vicinity of the Company's assets. The Company is not responsible for any damage or loss of any kind arising from the use of this information. It shall be considered that the location of the apparatus is a preliminary indication and the position of the New Roads and Streetworks Act 1991 and of the Company's rights are not intended to be affected by this information.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map Ref: 319573,174240
Map scale: 1:1,500
Printed by:
Printed on: 18.10.2012





Scale	1:500
User ID	wwutilities\HoareLea1w8qjxr
Date	14/05/2013
Grid Ref:	Easting 319833
	Northing 174612

<p>Low Pressure</p> <p>Medium Pressure</p> <p>Intermediate Pressure</p> <p>High Pressure</p>	<p>Design Pipes</p> <p>Abandoned</p>
--	--------------------------------------

Some examples of Plant Items:

Valve	Depth of Cover	Syphon	Diameter Change	Material Change

Title Swing Bridge

The plan shows those pipes owned by Wales & West Utilities (WU) in its role as a Licensed Gas Transporter (GT). The information shown on this plan is derived from historic information and may have involved re-scaling plans, and the accuracy of it cannot be guaranteed. Service pipes, valves, syphons, stub connections, etc. may not be shown but their presence should be anticipated. No warranties are therefore given in respect of it. WU its employees and contractors do not accept any liability for any inaccuracy or incompleteness in it.

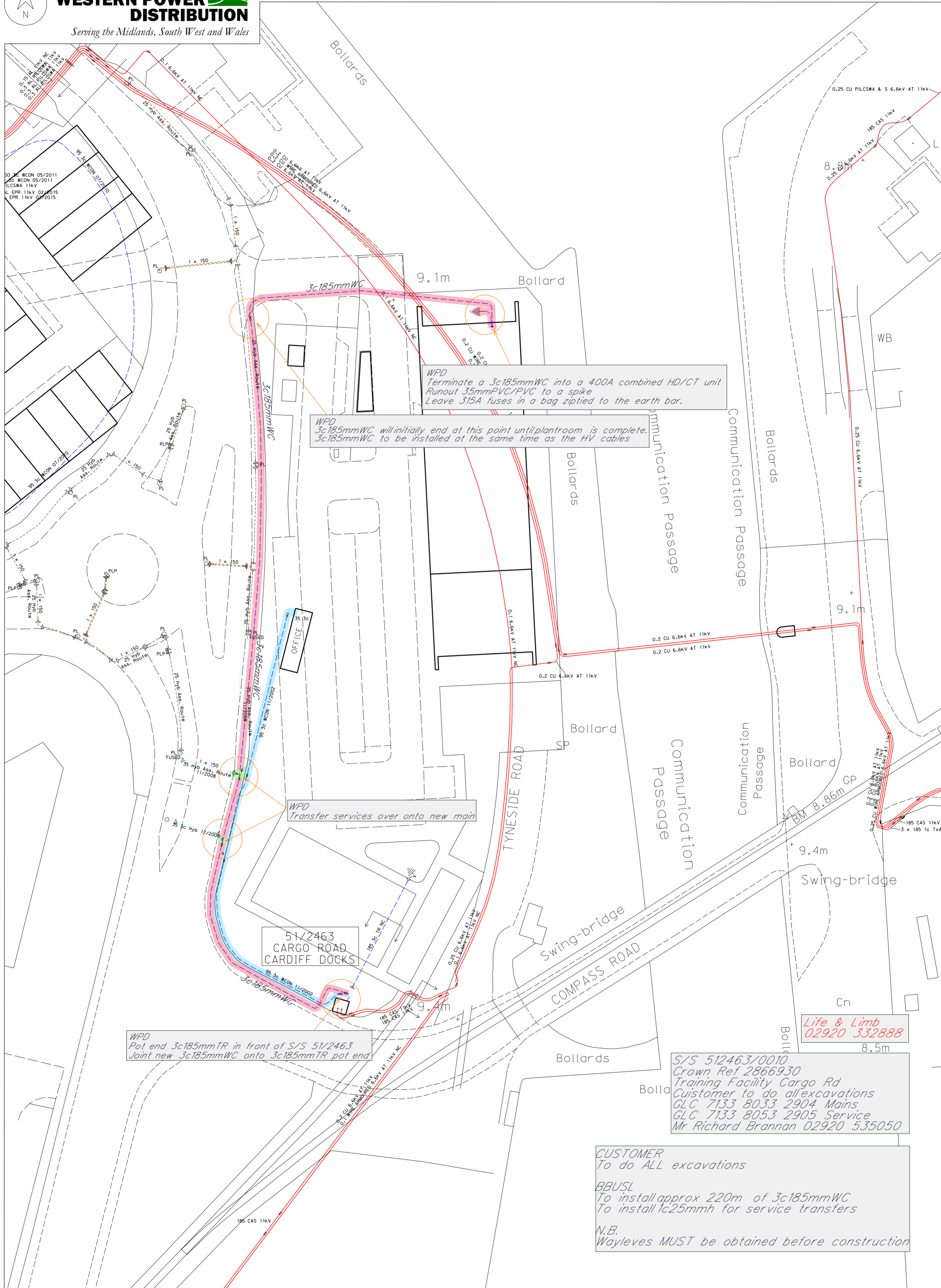
You must use safe digging practices, in accordance with HS(G)47, to establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you or near gas apparatus. The information shown on this plan should not be used beyond 28 days from the date of issue of this plan as it is subject to updating.

The plan also provides indications of gas pipes owned by other GTs, or otherwise privately owned, which may be present in this area. This information is not information of WU and WU is unable to verify this information or to confirm whether it is accurate or complete. It is supplied voluntarily to assist the user in determining whether to make contact with other GTs or others. The user must obtain such information from the other GT or person concerned. WU, its employees and contractors do not accept any liability for this information or any inaccuracy or incompleteness in it.

Wales & West Utilities

Wales & West Utilities Ltd., Wales & West House, Spooner Close, Celtic Springs, Coedkernew, Newport, NP10 8FZ.

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WPD
Terminate a 3c185mmWC into a 400A combined HD/CT unit
Runout 35mmPVC/PVC to a spike
Leave 315A fuses in a bag ziptied to the earth bar.

WPD
3c185mmWC will initially end at this point until plantroom is complete.
3c185mmWC to be installed at the same time as the HV cables

WPD
Transfer services over onto new main

51/2463
CARGO ROAD
CARDIFF DOCKS

WPD
Pot end 3c185mmTR in front of S/S 51/2463
Joint new 3c185mmWC onto 3c185mmTR pot end

Life & Limb
02920 332888

S/S 512463/0010
Crown Ref 2866930
Training Facility Cargo Rd
Customer to do all excavations
GLC 7133 8033 2904 Mains
GLC 7133 8053 2905 Service
Mr Richard Brannan 02920 535050

CUSTOMER
To do ALL excavations

BBUSL
To install approx 220m of 3c185mmWC
To install 1c25mmh for service transfers

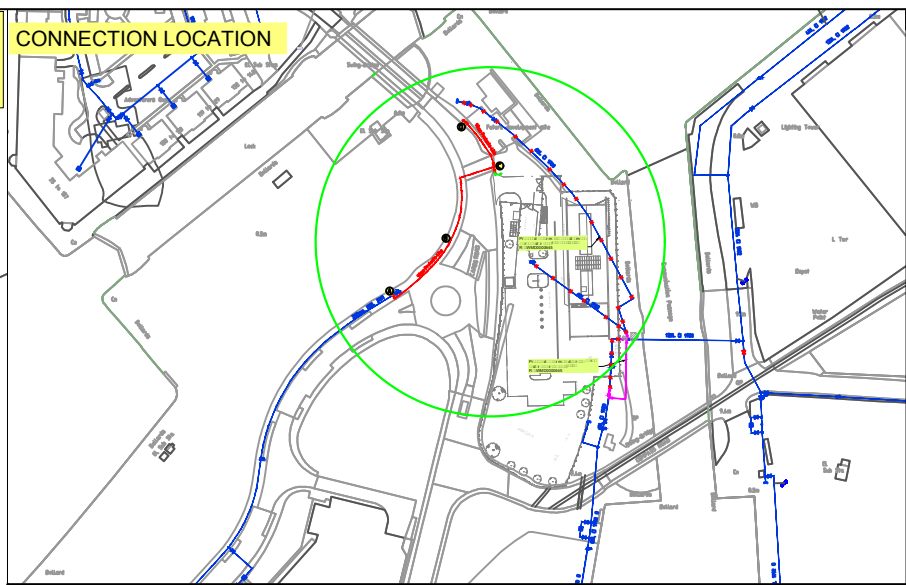
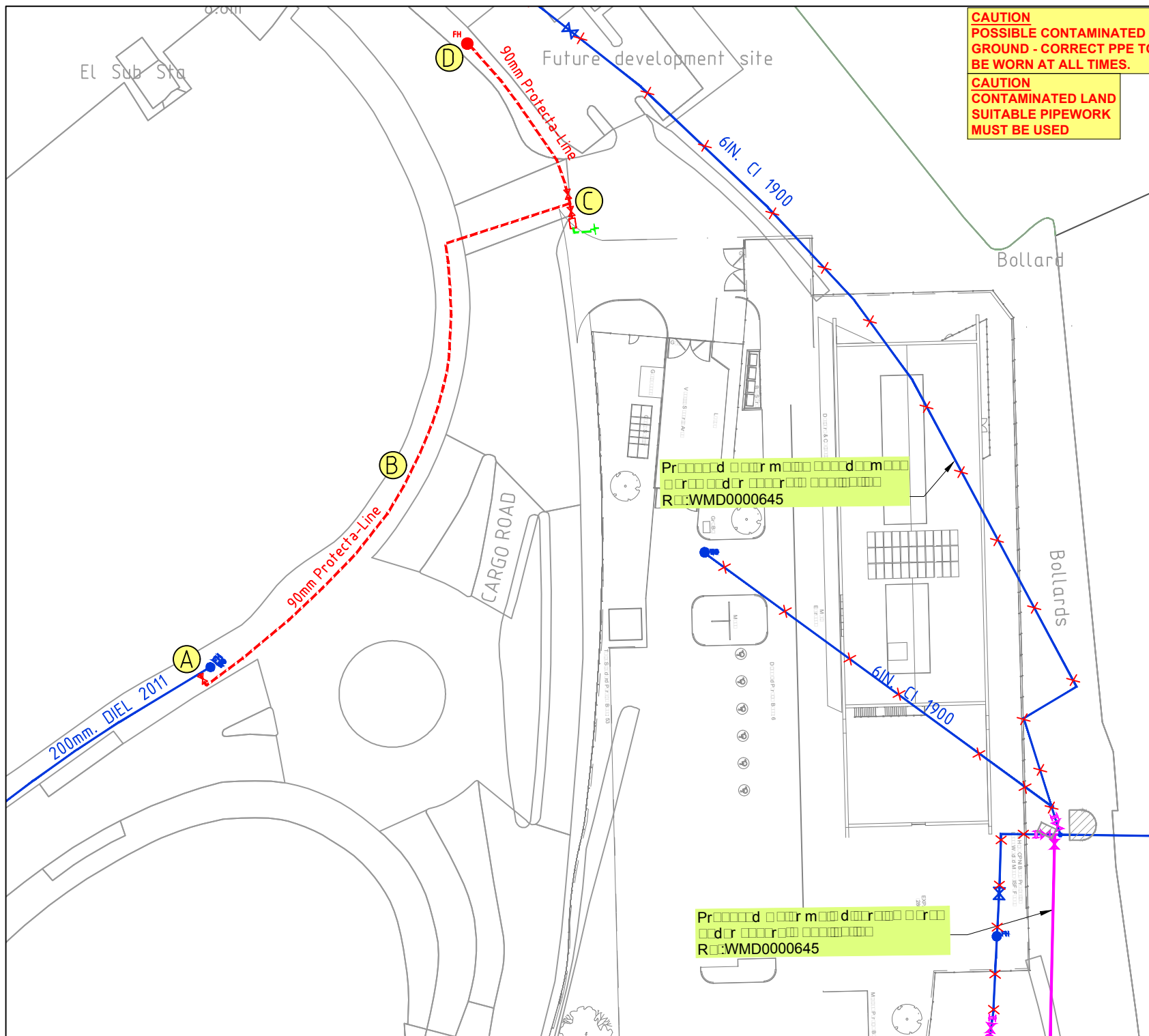
N.B.
Wayleves MUST be obtained before construction

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	OVERHEAD LINE		UNDERGROUND CABLE		Pole Mounted Transformer
	PL SERVICE		PILOT CABLES		PME Earth
	LV (11kV)				Ground Mounted Transformer
	HV (33kV)				
	HV (66kV)				
	HV (132kV)				

* ADVICE SHOULD BE SOUGHT FROM THE WESTERN POWER DISTRIBUTION CONTACT CENTRE S.WEST (0845 601 2989) FOR ANY WORK THAT IS TO TAKE PLACE IN PROXIMITY TO 132kV UNDERGROUND CABLES AND 132kV OVERHEAD LINES

DATE: 19/09/2017
SCALE 1:500 @ A2
DRAWN BY:
TITLE:
PLOT CENTRE: 319947.334,174503.394



WMD0000807 BCD2100503-SCOPE OF WORK:
DWR CYMRU WELSH WATER TO:

- UNDERTAKE 3 NO TRIAL HOLE NEAR POINT 'A', 'B' AND 'C' AS DIRECTED BY PROJECT ENGINEER TO LOCATE AND CALIPER THE EXISTING MAIN AND SOIL SAMPLING FOR SOIL INVESTIGATION WORKS. SOIL SAMPLES WILL BE COLLECTED AND TESTED BY GEOTECHNICAL CONTRACTOR
- PROVIDE 80mm UNDER PRESSURE CONNECTION AT 'A' ON AN EXCAVATE AND LAY BASIS
- EXCAVATE AND LAY APPROX 116m x 90mm PROTECTA LINE PIPE 'A'-'B'-'C'-'D'
- INSTALL 63mm DOMESTIC MAIN COMPLEX NEAR 'C' ON AN EXCAVATE AND LAY BASIS
- INSTALL ALL ONLINE FITTINGS AS DETAILED INCLUSIVE OF CHAMBERS AND COVERS
- SWAB, PRESSURE TEST & CHLORINATE NEW WATER MAIN.
- UNDERTAKE BACK TO BACK CONNECTIONS TO PRIVATE WATER MAIN UPON INSTRUCTION FROM WELSH WATER PROJECT ENGINEER, FOLLOWING THE RECEIPT OF SATISFACTORY CHLORINATION RESULTS FROM THE DEVELOPER
- ARRANGE TRAFFIC MANAGEMENT IN CONSULTATION WITH CARDIFF HIGHWAYS AND ASSOCIATED BRITISH PORTS

DEVELOPER TO:

- PROVIDE A SUITABLE STORAGE AREA FOR DCWW PIPE AND PIPE FITTINGS, AWAY FROM OTHER SITE MATERIALS AND WITH HARDSTANDING, FOR THE DURATION OF DCWW WORK
- DURATION TO BE AGREED BETWEEN DEVELOPER AND DCWW PROJECT ENGINEER
- PROVIDE SATISFACTORY CHLORINATION TEST RESULTS OF THE PRIVATE WATER MAINS TO PROJECT ENGINEER BEFORE THE FINAL CONNECTION

NOTES:

1. DO NOT SCALE FROM THIS DRAWING. FOR DISCREPANCIES OR OMISSIONS THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO WORKS COMMENCING.
2. ALL MATERIALS TO BE IN ACCORDANCE WITH SPECIFICATIONS SET OUT IN THE CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY (7TH EDITION) AND ARE TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS' SPECIFICATIONS.
3. MAX STATIC PRESSURE IN EXISTING WATER MAIN IS 3.0 bar.
4. ALL WATER MAINS TO BE INSTALLED WITH 900mm MIN. COVER.
5. THE PRIVATE PIPE HIGHLIGHTED GREEN IS INDICATIVE ONLY. THE DESIGN AND CONSTRUCTION OF THE PRIVATE PIPE IS THE DEVELOPER'S RESPONSIBILITY.
6. A PERMIT TO WORK IS REQUIRED FROM DCWW OPERATIONS FOR ANY WORKS ON OR NEAR IN THE VICINITY OF THE 200mm DI WATER MAIN.

Notes

1. Dwr Cymru Cyf gives this information as to the position of its underground apparatus by way of general guidance only on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the Companies apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you. It must be understood that the furnishing of the information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Companies right to be compensated for any damage to its apparatus. Service pipes are not generally shown but their presence should be anticipated.
2. Exact locations of all apparatus to be determined on site.
3. Reproduced from the Ordnance Survey's maps with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright.

4. Existing water main
Proposed water main
Water main diversion under separate scheme
Private Pipe
Sluice Valve
Proposed Meter Chambers

5. Location of connections to be confirmed on site.

6. The positioning of the mains is to be in accordance with the National Joint Utilities Group guidelines (NJUG 7)

N

S
E
W

O.S. Reference
319858,174525

Issue	Description	Auth.	Ckd.	Appd.	Date
01	FIRST ISSUE	AQ	RA	GJ	27.11.17

Client
ASSOCIATED BRITISH PORTS

Project
HMS CAMBRIA, TYNESIDE ROAD, CARDIFF, CF10 4LT

Title
PROPOSED DOMESTIC CONNECTION

Scale A3
NTS

Datum
DATUM

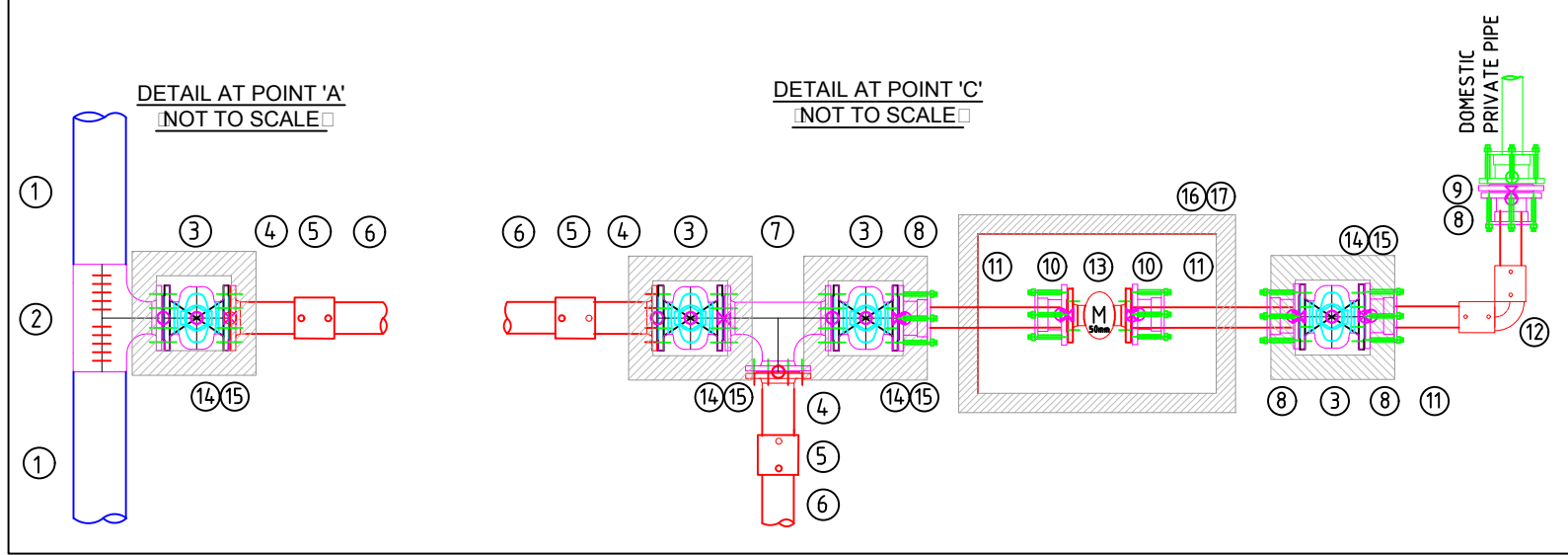
WELSH WATER Developer Services, P.O.Box 3146, Linea, Fortran Road, Cardiff, CF30 0EH Telephone: 0800 917 2652

DWR CYMRU WELSH WATER

Project Code
WMD0000807

Drawing No.
001

Issue
01



- LIST OF FITTINGS**
1. EXISTING 200mm DI PIPE
 2. 200mm x 80mm UP TEE
 3. 80mm SLUICE VALVE
 4. 90mm x 80mm PROTECTA-LINE PUPP ASSEMBLY
 5. 90mm PROTECTA LINE ELEC COUPLER
 6. 90mm PROTECTA LINE PIPE
 7. 80mm AF TEE
 8. 63mm x 80mm MECHANICAL STUB PROTECTA LINE FLANGE ADAPTOR SDR11
 9. 80mm BLANK PLATE
 10. 63mm x 50mm MECHANICAL STUB PROTECTA LINE FLANGE ADAPTOR SDR11
 11. 63mm PROTECTA LINE PIPE SDR 11
 12. 63mm 90 DEGREE MECHANICAL BEND

13. 1.5 METER DF HELIX 5000 50MM (ELSTER)

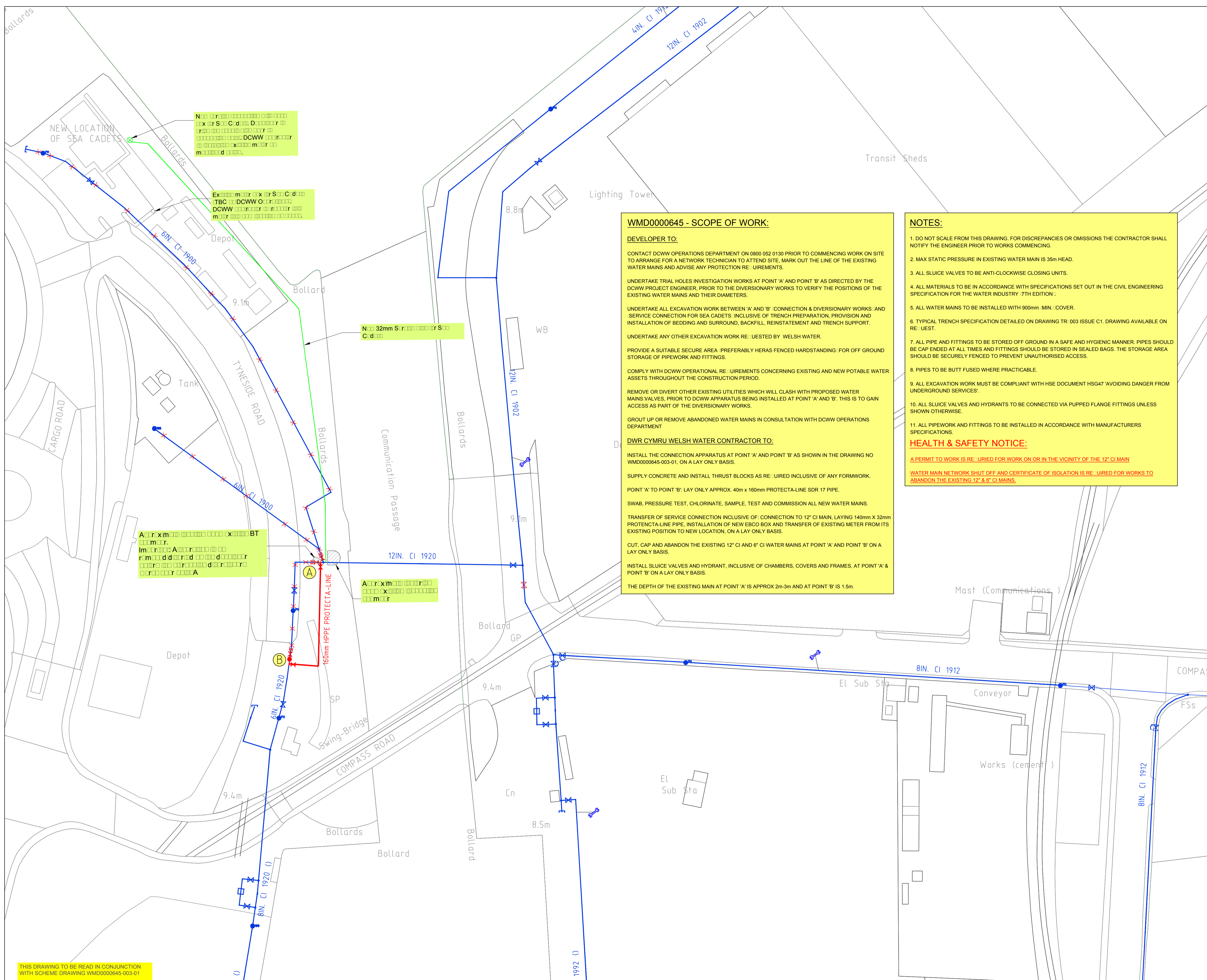
14. 230mm x 230mm x 100mm WALL UNIT

15. 225mm x 225mm x 100mm SURFACE BOX GR A "W"

16. 915mm x 610mm x 100mm WALL UNIT

17. 900mm x 600mm x 100mm SURFACE BOX D400 "W"

NOTE:
CUSTOMER PRIVATE PIPE TO BE TERMINATED AT BOUNDARY WITH A FLANGED FITTING READY FOR CONNECTION TO DCWW APPARATUS AFTER SUCCESSFUL CHLORINATION TESTING AND TRENCH INSPECTION. THE FINAL CONNECTION WILL BE CARRIED OUT BY DCWW CONTRACTOR



WMD0000645 - SCOPE OF WORK:

DEVELOPER TO:

CONTACT DCWW OPERATIONS DEPARTMENT ON 0800 052 0130 PRIOR TO COMMENCING WORK ON SITE TO ARRANGE FOR A NETWORK TECHNICIAN TO ATTEND SITE, MARK OUT THE LINE OF THE EXISTING WATER MAINS AND ADVISE ANY PROTECTION REQUIREMENTS.

UNDERTAKE TRIAL HOLES INVESTIGATION WORKS AT POINT 'A' AND POINT 'B' AS DIRECTED BY THE DCWW PROJECT ENGINEER, PRIOR TO THE DIVERSIONARY WORKS TO VERIFY THE POSITIONS OF THE EXISTING WATER MAINS AND THEIR DIAMETERS.

UNDERTAKE ALL EXCAVATION WORK BETWEEN 'A' AND 'B' CONNECTION & DIVERSIONARY WORKS AND SERVICE CONNECTION FOR SEA CADETS, INCLUSIVE OF TRENCH PREPARATION, PROVISION AND INSTALLATION OF BEDDING AND SURROUND, BACKFILL, REINSTATEMENT AND TRENCH SUPPORT.

UNDERTAKE ANY OTHER EXCAVATION WORK REQUESTED BY WELSH WATER.

PROVIDE A SUITABLE SECURE AREA (PREFERABLY HERAS FENCED HARDSTANDING, FOR OFF GROUND STORAGE OF PIPEWORK AND FITTINGS).

COMPLY WITH DCWW OPERATIONAL REQUIREMENTS CONCERNING EXISTING AND NEW POTABLE WATER ASSETS THROUGHOUT THE CONSTRUCTION PERIOD.

REMOVE OR DIVERT OTHER EXISTING UTILITIES WHICH WILL CLASH WITH PROPOSED WATER MAINS VALVES, PRIOR TO DCWW APPARATUS BEING INSTALLED AT POINT 'A' AND 'B'. THIS IS TO GAIN ACCESS AS PART OF THE DIVERSIONARY WORKS.

GROUT UP OR REMOVE ABANDONED WATER MAINS IN CONSULTATION WITH DCWW OPERATIONS DEPARTMENT

DWR CYMRU WELSH WATER CONTRACTOR TO:

INSTALL THE CONNECTION APPARATUS AT POINT 'A' AND POINT 'B' AS SHOWN IN THE DRAWING ON WMD0000645-003-01, ON A LAY ONLY BASIS.

SUPPLY CONCRETE AND INSTALL THRUST BLOCKS AS REQUIRED INCLUSIVE OF ANY FORMWORK.

POINT 'A' TO POINT 'B': LAY ONLY APPROX. 40m x 160mm PROTECTA-LINE SDR 17 PIPE.

SWAB, PRESSURE TEST, CHLORINATE, SAMPLE, TEST AND COMMISSION ALL NEW WATER MAINS.

TRANSFER OF SERVICE CONNECTION INCLUSIVE OF: CONNECTION TO 12" CI MAIN, LAYING 140mm X 32mm PROTECTA-LINE PIPE, INSTALLATION OF NEW EBCO BOX AND TRANSFER OF EXISTING METER FROM ITS EXISTING POSITION TO NEW LOCATION, ON A LAY ONLY BASIS.

CUT, CAP AND ABANDON THE EXISTING 12" CI AND 6" CI WATER MAINS AT POINT 'A' AND POINT 'B' ON A LAY ONLY BASIS.

INSTALL SLUICE VALVES AND HYDRANT, INCLUSIVE OF CHAMBERS, COVERS AND FRAMES, AT POINT 'A' & POINT 'B' ON A LAY ONLY BASIS.

THE DEPTH OF THE EXISTING MAIN AT POINT 'A' IS APPROX 2m-3m AND AT POINT 'B' IS 1.5m.

NOTES:

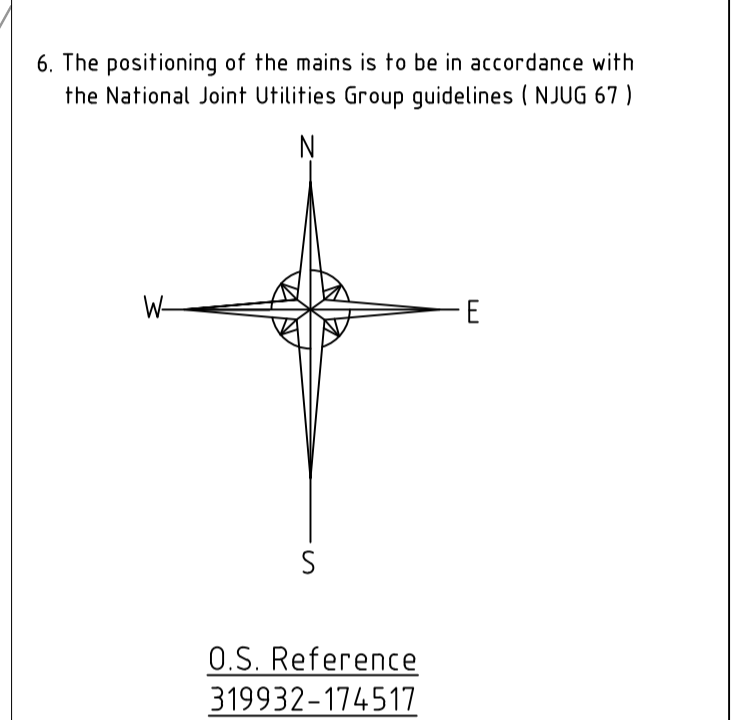
- DO NOT SCALE FROM THIS DRAWING. FOR DISCREPANCIES OR OMISSIONS THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO WORKS COMMENCING.
- MAX STATIC PRESSURE IN EXISTING WATER MAIN IS 35m HEAD.
- ALL SLUICE VALVES TO BE ANTI-CLOCKWISE CLOSING UNITS.
- ALL MATERIALS TO BE IN ACCORDANCE WITH SPECIFICATIONS SET OUT IN THE CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY 7TH EDITION.
- ALL WATER MAINS TO BE INSTALLED WITH 900mm MIN. COVER.
- TYPICAL TRENCH SPECIFICATION DETAILED ON DRAWING TR 003 ISSUE C1. DRAWING AVAILABLE ON REQUEST.
- ALL PIPE AND FITTINGS TO BE STORED OFF GROUND IN A SAFE AND HYGIENIC MANNER. PIPES SHOULD BE CAP ENDED AT ALL TIMES AND FITTINGS SHOULD BE STORED IN SEALED BAGS. THE STORAGE AREA SHOULD BE SECURELY FENCED TO PREVENT UNAUTHORISED ACCESS.
- PIPES TO BE BUTT FUSED WHERE PRACTICABLE.
- ALL EXCAVATION WORK MUST BE COMPLIANT WITH HSE DOCUMENT HSG47 'AVOIDING DANGER FROM UNDERGROUND SERVICES'.
- ALL SLUICE VALVES AND HYDRANTS TO BE CONNECTED VIA PUPPED FLANGE FITTINGS UNLESS SHOWN OTHERWISE.
- ALL PIPEWORK AND FITTINGS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.

HEALTH & SAFETY NOTICE:

A PERMIT TO WORK IS REQUIRED FOR WORK ON OR IN THE VICINITY OF THE 12" CI MAIN

WATER MAIN NETWORK SHUT OFF AND CERTIFICATE OF ISOLATION IS REQUIRED FOR WORKS TO ABANDON THE EXISTING 12" & 6" CI MAINS.

- Notes**
- Dwr Cymru Cyf gives this information as to the position of its underground apparatus by way of general guidance only on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the Company's apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you. It must be understood that the furnishing of the information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus. Service pipes are not generally shown but their presence should be anticipated.
 - Exact locations of all apparatus to be determined on site.
 - Reproduced from the Ordnance Survey's maps with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright.



01	FIRST ISSUE	AQ	RA	GJ	07.08.17
Issue	Description	Auth.	Ckd.	Appd.	Date

Client
ASSOCIATED BRITISH PORTS

Project
HMS CAMBRIA, TYNESIDE ROAD, CARDIFF, CF10 4LT

Title
WATER MAIN DIVERSION AND ABANDONMENT

Scale A1
1/500

Datum
DATUM

WELSH WATER Developer Services, P.O.Box 3146, Linea, Fortran Road, Cardiff, CF30 0EH Telephone: 0800 917 2652

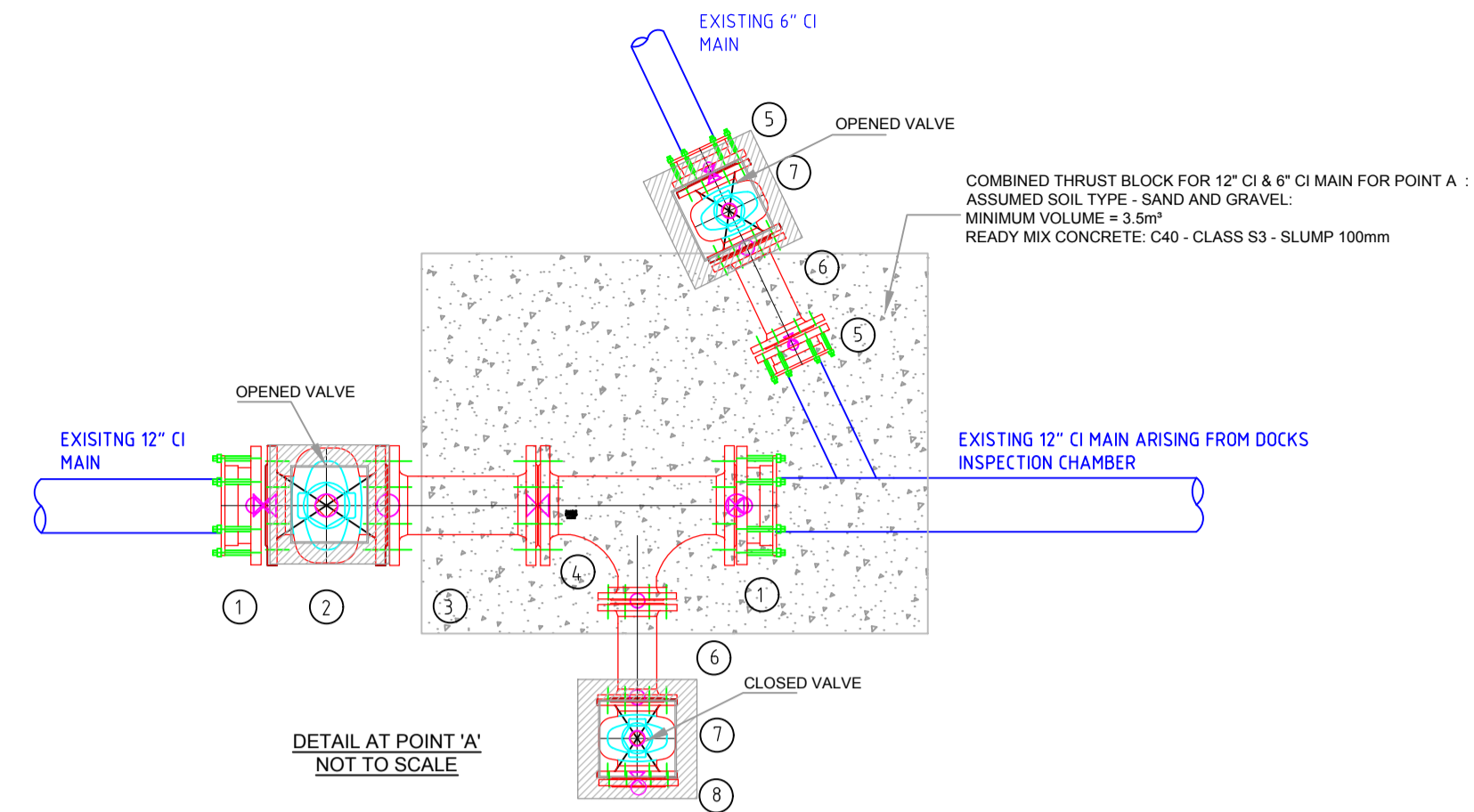
DWR CYMRU WELSH WATER

Project Code	Drawing No.	Issue
WMD0000645	002	01

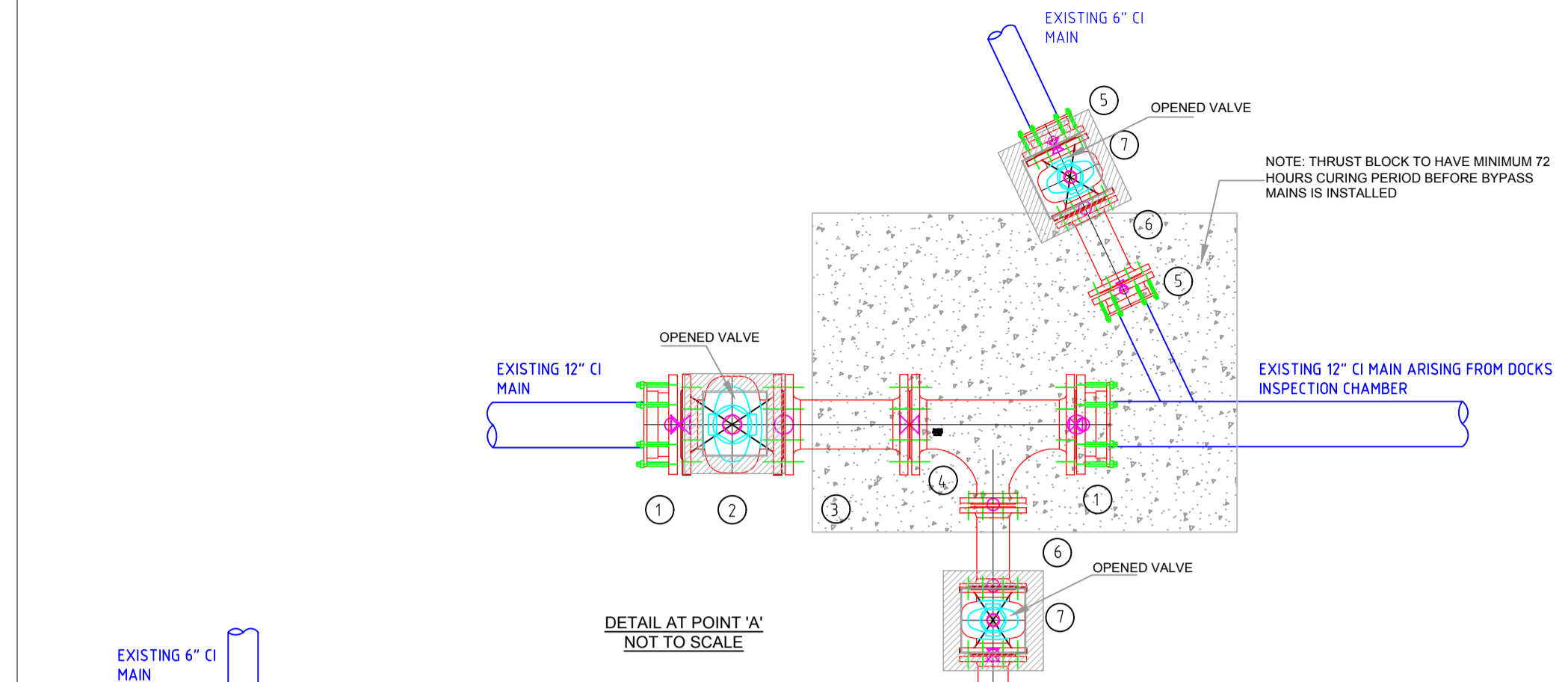
THIS DRAWING TO BE READ IN CONJUNCTION WITH SCHEME DRAWING WMD0000645-003-01

THIS DRAWING TO BE READ IN CONJUNCTION WITH SCHEME DRAWING WMD0000645-002-01

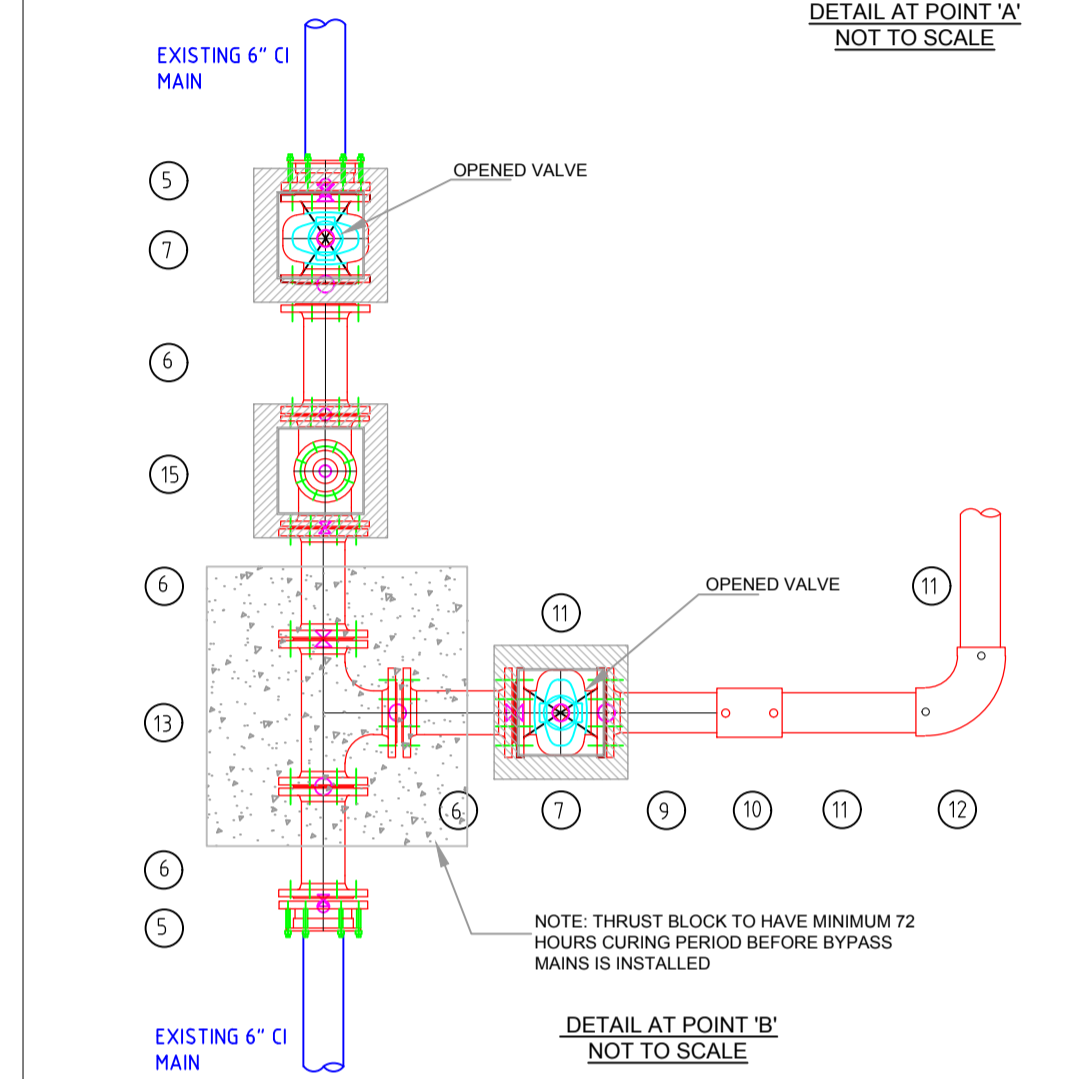
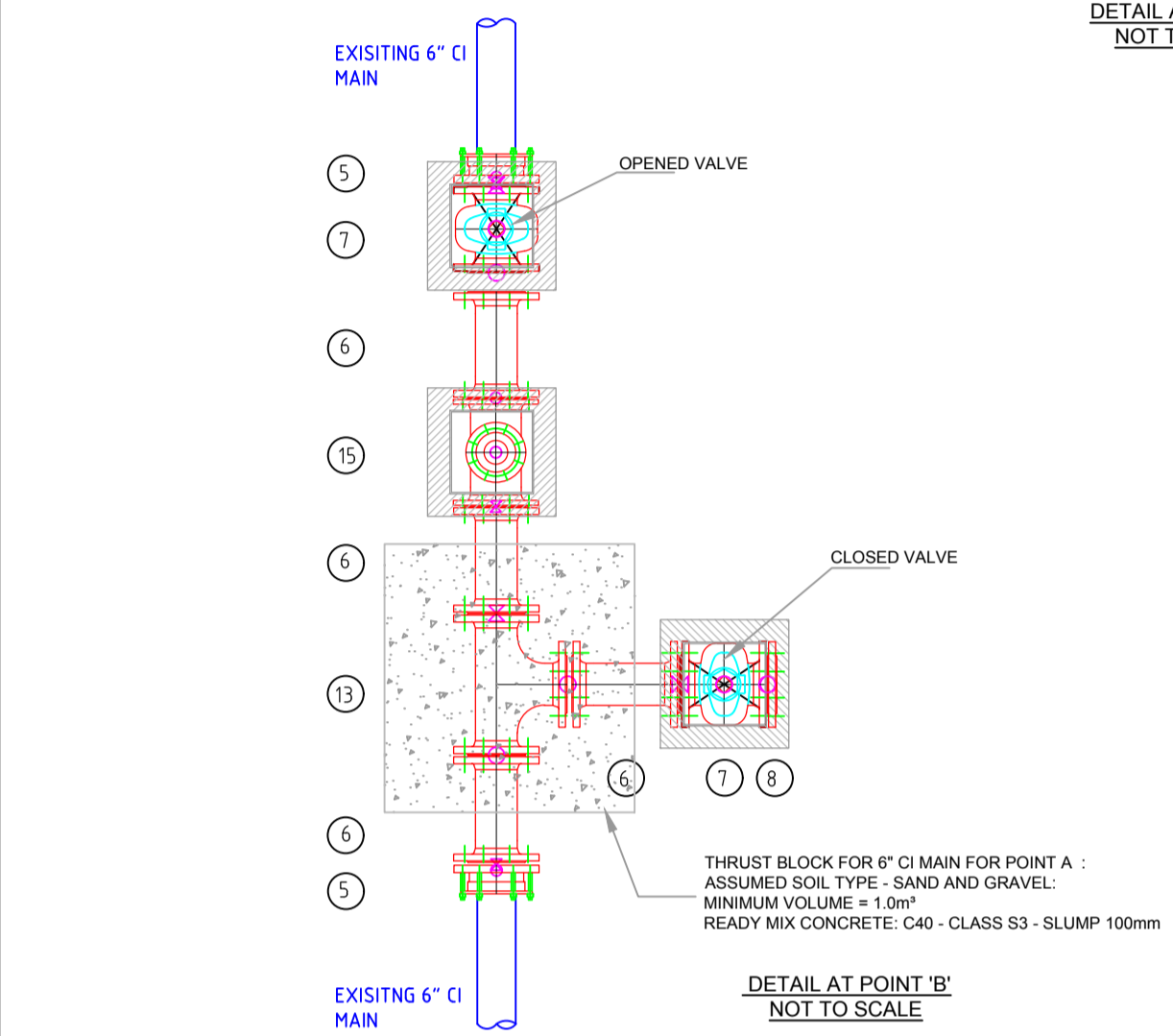
NOTE: EXACT ORIENTATION OF EXISTING BRANCH COMPLEX UNKNOWN, TO BE DETERMINED ONSITE



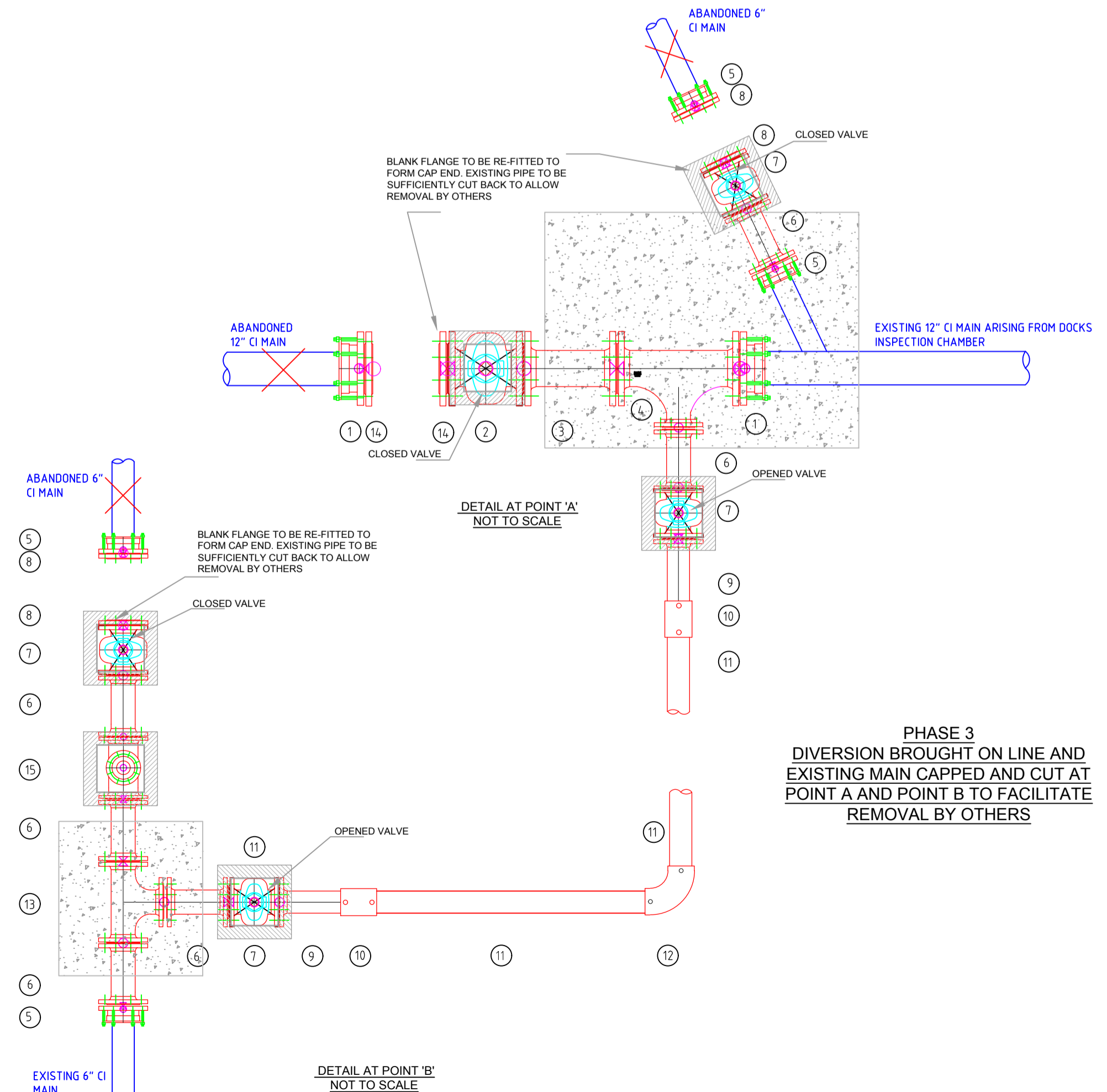
**PHASE 1
INSTALLATION OF CONNECTION POINTS
AT POINT A AND POINT B UNDER WATER
MAINS SHUT OFF**



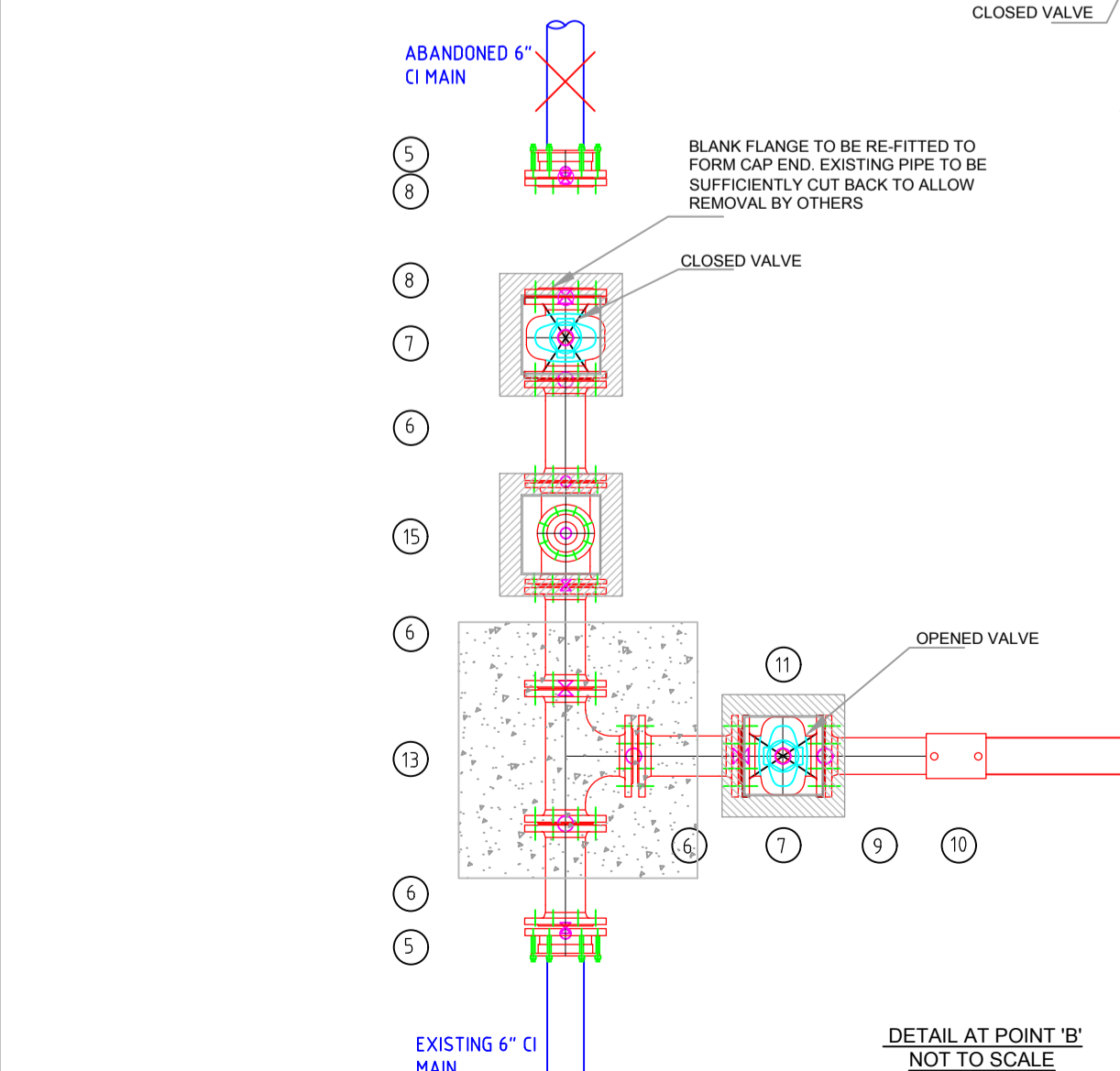
**PHASE 2
INSTALLATION AND COMMISSIONING OF
BYPASS MAIN AT POINT A AND POINT B**



- SCHEDULE OF PARTS**
- 12" FLANGE ADAPTER TO SUIT CI PIPE
 - 300mm SLUICE VALVE WITH WALL UNITS AND SURFACE BOX
 - 300mm x 300mm DI OF PIPE
 - 300mm x 150mm AF TEE
 - 6" FLANGE ADAPTER TO SUIT CI PIPE
 - 150mm x 300mm DI OF PIPE
 - 150mm SLUICE VALVE WITH WALL UNITS AND SURFACE BOX
 - 150mm BLANK PLATE
 - 150mm x 160mm PROTECTA LINE PUPP FLANGE
 - 160mm PROTECTA LINE ELECTRIFUSION CONNECTOR
 - 160mm PROTECTA PIPE
 - 160mm PROTECTA LINE 90 DEGREE BEND
 - 150mm x 150mm AF TEE
 - 300mm BLANK PLATE
 - 150mm INLINE HYDRANT WITH BASE, WALL UNITS AND SURFACE BOX



**PHASE 3
DIVERSION BROUGHT ON LINE AND
EXISTING MAIN CAPPED AND CUT AT
POINT A AND POINT B TO FACILITATE
REMOVAL BY OTHERS**

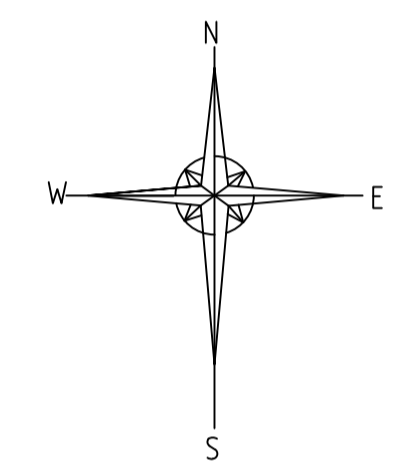


Notes

- Dwr Cymru Cyf gives this information as to the position of its underground apparatus by way of general guidance only on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the Companys apparatus and any onus of locating the apparatus before carrying out any excavations rests entirely on you. It must be understood that the furnishing of the information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Companys right to be compensated for any damage to its apparatus. Service pipes are not generally shown but their presence should be anticipated.
- Exact locations of all apparatus to be determined on site.
- Reproduced from the Ordnance Survey's maps with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright.

Existing distribution water main
 Proposed water main
 Abandoned water main

- Location of connections to be confirmed on site.
- The positioning of the mains is to be in accordance with the National Joint Utilities Group guidelines (NUJG 67)



O.S. Reference
319932-174517

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01	FIRST ISSUE	AQ	RA	GJ	07.08.17
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Issue	Description	Auth.	Ckd.	Appd.	Date
Client					
ASSOCIATED BRITISH PORTS					

Project					
HMS CAMBRIA, TYNESIDE ROAD, CARDIFF, CF10 4LT					

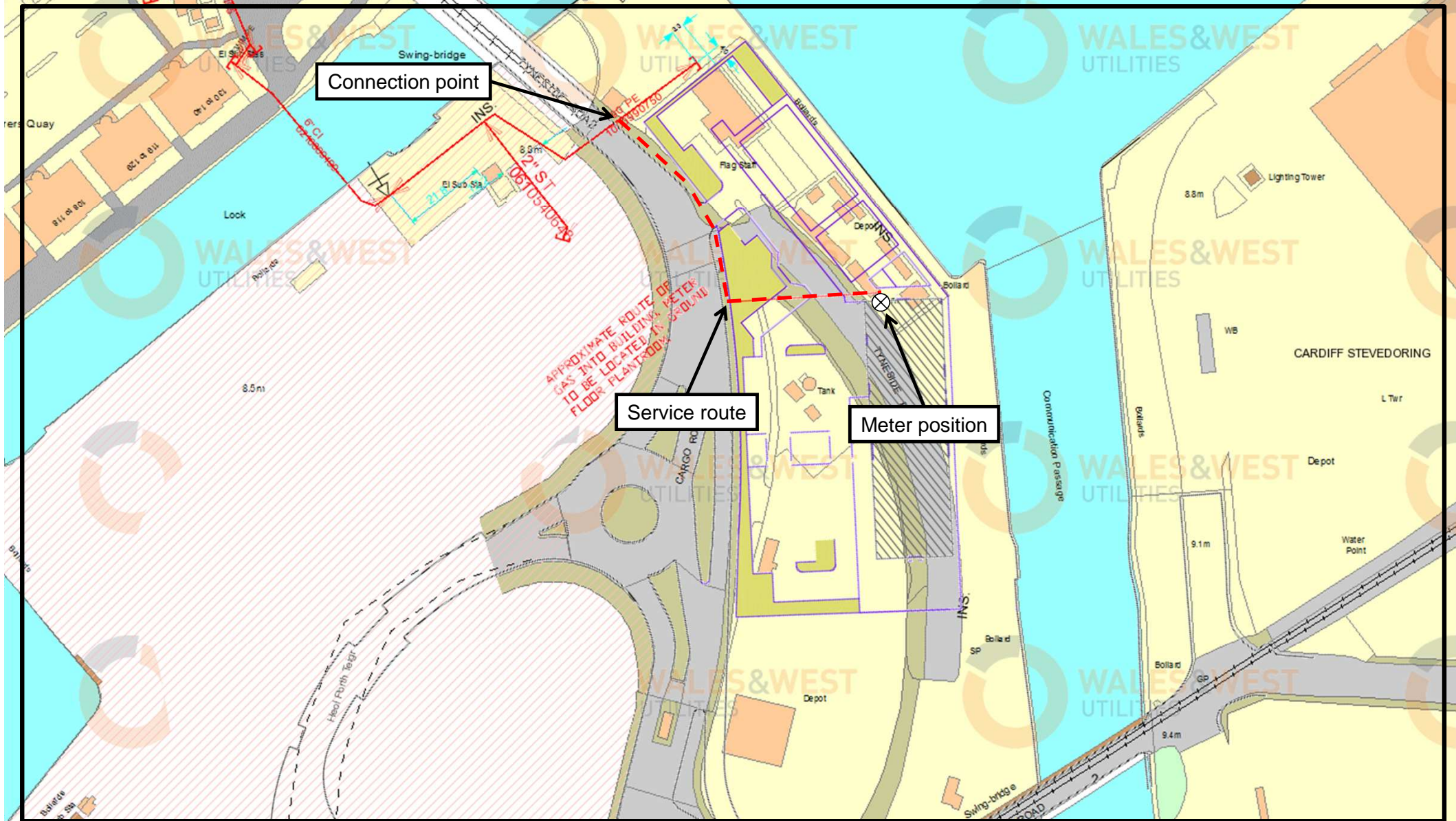
Title					
CONNECTIONS DETAILS					

Scale A1	Datum
NTS	DATUM

WELSH WATER
Developer Services,
P.O.Box 3146, Linea, Fortran
Road, Cardiff, CF30 0EH
Telephone: 0800 917 2652

**DWR CYMRU
WELSH WATER**

Project Code	Drawing No.	Issue
WMD0000645	003	01



Connection point

Service route

Meter position

APPROXIMATE ROUTE OF GAS INTO BUILDING. METER TO BE LOCATED IN 5-FLOOR PLANT-Room



ArcIMS 9.2

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- Low Pressure (LP) 21mbar – 75mbar
- - - Medium Pressure (MP) 350mbar – 2bar
- . . . Intermediate Pressure (IP) 2bar – 7bar
- - - High Pressure (HP) >7bar

- Line/Fire Valve
- Governor Station
- Change of Diameter
- End Cap

Document Version: CONN_LF_WW_233

Training Facility, Associated British Ports, Tyneside Road, Cardiff, CF10 4LY

Date: 08.11.16

Designer: James Hiller

Scale: Not to Scale

Drawing Number: One of One

Reference: 35037343

SMELL GAS?

Call 0800 111 999

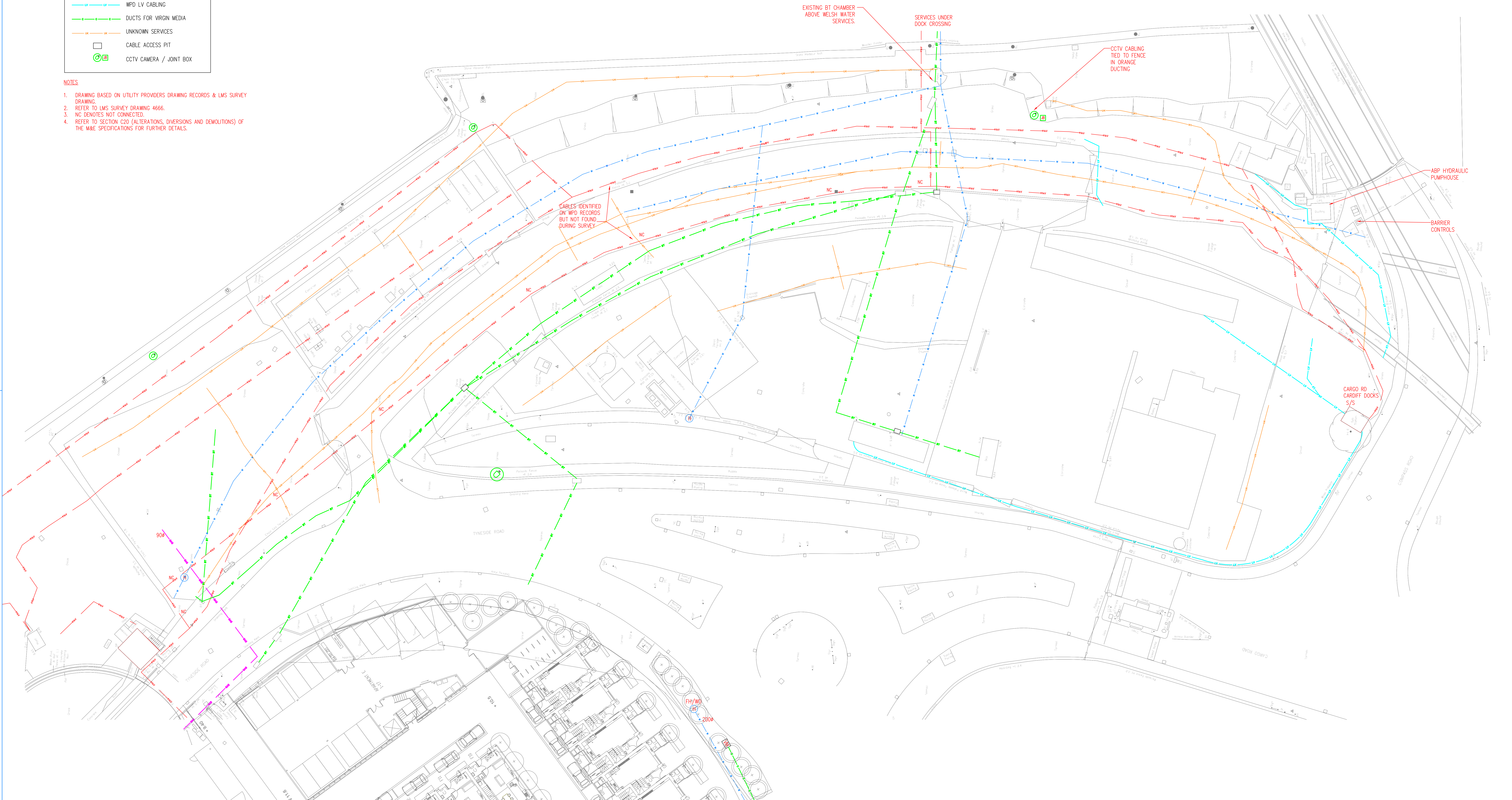
Dial Before You Dig
Plantprotectionenquiries
@www.utilities.co.uk
02920 278 912



The plan shows those pipes owned by Wales & West Utilities or the relevant Gas Distribution Network in their roles as Licenced Gas Transporters (GT). Gas Pipes owned by other GTs, or otherwise privately owned, may be present in this area. Information with regard to such pipes should be obtained from the relevant owners. The information shown on this plan is given without warranty, the accuracy thereof cannot be guaranteed. Service pipes, valves, syphons, stub connections, etc. are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Wales & West Utilities, the relevant Gas Distribution Network, or their agents, servants or contractors for any error or omission. Safe digging practices, in accordance with HS(G)47, must be used to verify and establish the actual position of mains, pipes, services and other apparatus on site and before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you or near gas apparatus. The information included on this plan should not be referred to beyond a period of 28 days from the date of issue.

LEGEND	
	WPD 11KV CABLING
	WELSH WATER
	WALES & WEST GAS
	UNDERGROUND BT NETWORK
	WPD LV CABLING
	DUCTS FOR VIRGIN MEDIA
	UNKNOWN SERVICES
	CABLE ACCESS PIT
	CCTV CAMERA / JOINT BOX

- NOTES**
- DRAWING BASED ON UTILITY PROVIDERS DRAWING RECORDS & LMS SURVEY DRAWING.
 - REFER TO LMS SURVEY DRAWING 4666.
 - NC DENOTES NOT CONNECTED.
 - REFER TO SECTION C20 (ALTERATIONS, DIVERSIONS AND DEMOLITIONS) OF THE M&E SPECIFICATIONS FOR FURTHER DETAILS.

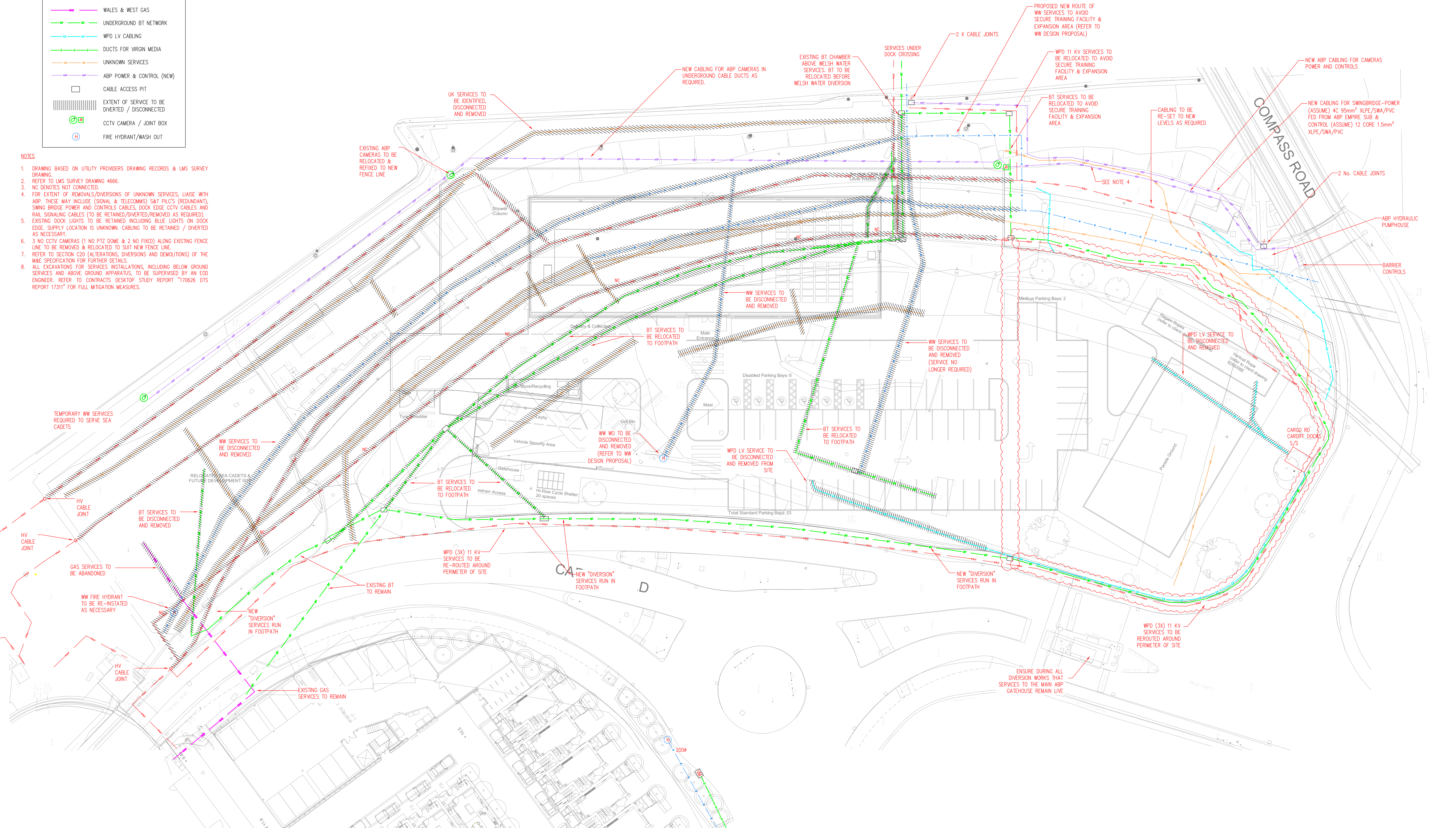


<p>T02 VE RE-DESIGN ISSUE</p> <p>SD RB 07/18</p> <p>Revisions</p> <p>CAD ORIGINAL - NOT TO BE MODIFIED BY HAND</p>	<p>General Notes:</p> <ul style="list-style-type: none"> The drawing does not necessarily show all the information needed to interpret the design intent or the construction details. The drawing contains information from more than one source and must be read in conjunction with all relevant specifications. Any apparent drafting errors and differences between other drawings and specifications shall be brought to our attention. <p>Project Notes:</p>	<p>CDM Pre-Construction Information</p> <p>The following information is provided in accordance with Regulation 9 of the CDM Regulations 2015:</p> <ol style="list-style-type: none"> LIVE UNIDENTIFIED SERVICES PRESENT ON SITE. ALL SERVICES TO BE SCANNED, TRACED AND PLOTTED PRIOR TO CONSTRUCTION. 	<p>Architect:</p> <p>CHETWOODS</p>	<p>Project Title:</p> <p>SECURE TRAINING FACILITY</p>	<p>www.hoarelea.com</p> <p>HOARE LEA</p> <p>TENDER ISSUE</p> <table border="1"> <tr> <td>Drawn by</td> <td>Designed by</td> <td>Reviewed by</td> </tr> <tr> <td>DR</td> <td>RB/SC</td> <td>AMT</td> </tr> <tr> <td>Project No</td> <td>Date</td> <td>Scale @ A0</td> </tr> <tr> <td>91421</td> <td>SEP 2016</td> <td>1:200 @ A0</td> </tr> <tr> <td colspan="3">DRAWING NUMBER</td> </tr> <tr> <td colspan="3">91421-HL-EX-00-GA-U-500-0001</td> </tr> <tr> <td colspan="3">T02</td> </tr> </table>	Drawn by	Designed by	Reviewed by	DR	RB/SC	AMT	Project No	Date	Scale @ A0	91421	SEP 2016	1:200 @ A0	DRAWING NUMBER			91421-HL-EX-00-GA-U-500-0001			T02		
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91421-HL-EX-00-GA-U-500-0001																										
T02																										
<p>Client:</p> <p>ABP</p>	<p>Drawing Title:</p> <p>UTILITY & SITE SERVICES EXISTING</p>	<p>© Hoare Lea LLP</p> <p>X:\Cardiff Projects\91421 Secure Training Facility\07 BIM And CAD\7B CAD\7B-5 Coordinates\91421-HL-EX-00-GA-U-500-0001.dwg Richard Brennan.12010218 12:30:01</p>																								

LEGEND

- WPD 11KV CABLING
- WELSH WATER
- WALES & WEST GAS
- UNDERGROUND BT NETWORK
- WPD LV CABLING
- DUCTS FOR VIRGIN MEDIA
- UNKNOWN SERVICES
- ABP POWER & CONTROL (NEW)
- CABLE ACCESS PIT
- EXTENT OF SERVICE TO BE DIVERTED / DISCONNECTED
- CCTV CAMERA / JOINT BOX
- FIRE HYDRANT/WASH OUT

- NOTES**
1. DRAWING BASED ON UTILITY PROVIDERS DRAWING RECORDS & LMS SURVEY DRAWING.
 2. REFER TO LMS SURVEY DRAWING 4666.
 3. NC DENOTES NOT CONNECTED.
 4. FOR EXTENT OF REMOVALS/DIVERSIONS OF UNKNOWN SERVICES, LIAISE WITH ABP. THESE MAY INCLUDE (SIGNAL & TELECOMS) S&T PILCS (REDUNDANT), SWING BRIDGE POWER AND CONTROLS CABLES, DOCK EDGE CCTV CABLES AND RAIL SIGNALING CABLES (TO BE RETAINED/DIVERTED/REMOVED AS REQUIRED).
 5. EXISTING DOCK LIGHTS TO BE RETAINED INCLUDING BLUE LIGHTS ON DOCK EDGE. SUPPLY LOCATION IS UNKNOWN. CABLING TO BE RETAINED / DIVERTED AS NECESSARY.
 6. 3 NO CCTV CAMERAS (1 NO PTZ DOME & 2 NO FIXED) ALONG EXISTING FENCE LINE TO BE REMOVED & RELOCATED TO SUIT NEW FENCE LINE.
 7. REFER TO SECTION C20 (ALTERATIONS, DIVERSIONS AND DEMOLITIONS) OF THE MAE SPECIFICATION FOR FURTHER DETAILS.
 8. ALL EXCAVATIONS FOR SERVICES INSTALLATIONS, INCLUDING BELOW GROUND SERVICES AND ABOVE GROUND APPARATUS, TO BE SUPERVISED BY AN EOD ENGINEER. REFER TO CONTRACTS DESKTOP STUDY REPORT "170626 DTS REPORT 17311" FOR FULL MITIGATION MEASURES.

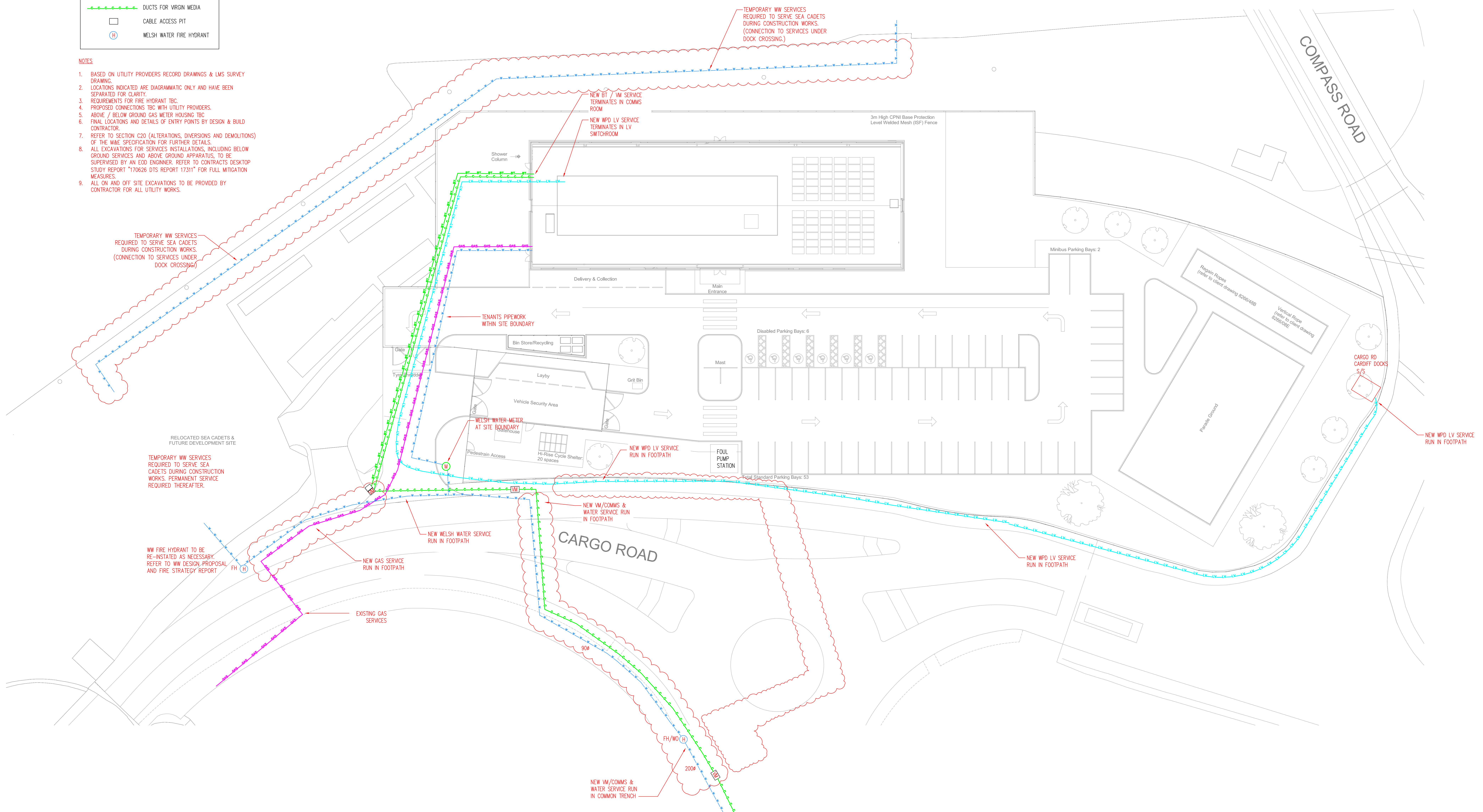


<p>102 VE RE-DESIGN ISSUE BT ROUTE RUN VIA PAVEMENT</p>	<p>SC RB 01/18</p>	<p>General Notes</p> <ul style="list-style-type: none"> The drawing does not necessarily show all the information needed to interpret the design intent or the construction details. The drawing contains information from more than one source and must be read in conjunction with all relevant specifications. Any apparent drafting errors and differences between other drawings and specifications shall be brought to our attention. <p>Project Notes</p>	<p>CDM Pre-Construction Information</p> <p>The following information is provided in accordance with Regulation 9 of the CDM Regulations 2015:</p> <ol style="list-style-type: none"> 1. LIVE UNIDENTIFIED SERVICES PRESENT ON SITE. 2. ALL SERVICES TO BE SCANNED, TRACED AND PLOTTED PRIOR TO CONSTRUCTION. 	<p>Architect CHETWOODS</p> <p>Client ABP</p>	<p>Project Title SECURE TRAINING FACILITY</p> <p>Drawing Title UTILITY & SITE SERVICES PROPOSED DIVERSIONS</p>	<p>www.hoarelea.com</p> <p>HOARE LEA</p> <p>TENDER ISSUE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Drawn by</td> <td>Designed by</td> <td>Reviewed by</td> </tr> <tr> <td>DR</td> <td>RB/SC</td> <td>AMT</td> </tr> <tr> <td>Project No</td> <td>Date</td> <td>Scale @ A0</td> </tr> <tr> <td>91421</td> <td>SEP 2016</td> <td>1:200 @ A0</td> </tr> <tr> <td colspan="3" style="text-align: center;">DRAWING NUMBER</td> </tr> <tr> <td colspan="2">91421-HL-EX-00-GA-U-500-0002</td> <td>T02</td> </tr> </table>	Drawn by	Designed by	Reviewed by	DR	RB/SC	AMT	Project No	Date	Scale @ A0	91421	SEP 2016	1:200 @ A0	DRAWING NUMBER			91421-HL-EX-00-GA-U-500-0002		T02
Drawn by	Designed by	Reviewed by																						
DR	RB/SC	AMT																						
Project No	Date	Scale @ A0																						
91421	SEP 2016	1:200 @ A0																						
DRAWING NUMBER																								
91421-HL-EX-00-GA-U-500-0002		T02																						

LEGEND	
	11kV-11kV WPD 11KV CABLING
	W-W-W WELSH WATER
	GAS-GAS WALES & WEST GAS
	BT-BT UNDERGROUND BT NETWORK
	LV-LV-LV WPD LV CABLING
	DUCTS FOR VIRGIN MEDIA
	CABLE ACCESS PIT
	WELSH WATER FIRE HYDRANT

NOTES

1. BASED ON UTILITY PROVIDERS RECORD DRAWINGS & LMS SURVEY DRAWING.
2. LOCATIONS INDICATED ARE DIAGRAMMATIC ONLY AND HAVE BEEN SEPARATED FOR CLARITY.
3. REQUIREMENTS FOR FIRE HYDRANT TBC.
4. PROPOSED CONNECTIONS TBC WITH UTILITY PROVIDERS.
5. ABOVE / BELOW GROUND GAS METER HOUSING TBC.
6. FINAL LOCATIONS AND DETAILS OF ENTRY POINTS BY DESIGN & BUILD CONTRACTOR.
7. REFER TO SECTION C20 (ALTERATIONS, DIVERSIONS AND DEMOLITIONS) OF THE MAE SPECIFICATION FOR FURTHER DETAILS.
8. ALL EXCAVATIONS FOR SERVICES INSTALLATIONS, INCLUDING BELOW GROUND SERVICES AND ABOVE GROUND APPARATUS, TO BE SUPERVISED BY AN EOD ENGINEER. REFER TO CONTRACTS DESKTOP STUDY REPORT "170626 DTS REPORT 17311" FOR FULL MITIGATION MEASURES.
9. ALL ON AND OFF SITE EXCAVATIONS TO BE PROVIDED BY CONTRACTOR FOR ALL UTILITY WORKS.



<p>General Notes:</p> <ul style="list-style-type: none"> The drawing does not necessarily show all the information needed to interpret the design intent or the construction details. The drawing contains information from more than one source and must be read in conjunction with all relevant specifications. Any apparent drafting errors and differences between other drawings and specifications shall be brought to our attention. <p>Project Notes:</p>	<p>CDM Pre-Construction Information</p> <p>The following information is provided in accordance with Regulation 9 of the CDM Regulations 2015:</p> <ol style="list-style-type: none"> 1. LIVE UNIDENTIFIED SERVICES PRESENT ON SITE. 2. ALL SERVICES TO BE SCANNED, TRACED AND PLOTTED PRIOR TO CONSTRUCTION. 	<p>Architect: CHETWOODS</p> <p>Client: ABP</p>	<p>Project Title: SECURE TRAINING FACILITY</p> <p>Drawing Title: UTILITY & SITE SERVICES PROPOSED SERVICES & NEW CONNECTIONS</p>	<p>www.hoarelea.com</p> <p>HOARE LEA</p> <p>TENDER ISSUE</p> <table border="1"> <thead> <tr> <th>Drawn by</th> <th>Designed by</th> <th>Reviewed by</th> </tr> </thead> <tbody> <tr> <td>DR</td> <td>RB/SC</td> <td>AMT</td> </tr> <tr> <td>Project No</td> <td>Date</td> <td>Scale @ A0</td> </tr> <tr> <td>91421</td> <td>SEP 2016</td> <td>1:200 @ A0</td> </tr> <tr> <td colspan="3">DRAWING NUMBER</td> </tr> <tr> <td colspan="3">91421-HL-EX-00-GA-U-500-0003</td> </tr> <tr> <td colspan="3">T02</td> </tr> </tbody> </table>	Drawn by	Designed by	Reviewed by	DR	RB/SC	AMT	Project No	Date	Scale @ A0	91421	SEP 2016	1:200 @ A0	DRAWING NUMBER			91421-HL-EX-00-GA-U-500-0003			T02		
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