

Alterations and Extensions to Unit 336 Stockley Close, West Drayton, UB7 9BL

Report for Planning Condition 7 - Low NOx Boiler Technical Note

Introduction

Planning Approval ref. no: 51458/APP/2018/2791 dated 3rd. December 2018, has been gained for the above development, which is one unit of an original three-unit development.

Planning Condition 7 requires that prior to the installation of the boiler, a technical note shall be submitted to and approved in writing by the Local Planning Authority which shall have been signed by the applicant and clearly states compliance with the following requirements:

a) the new boiler meets the London ultra-low NOx boiler emission requirements (< 40mg/kWh);

The proposed works are to an existing detached industrial unit that was completed in 2014.

The Existing Building

The existing building is currently a food processing factory with offices and ancillary accommodation in a two-storey extension to the south front elevation east side.

The existing water heating system is a gas fired calorifier BOSS BCE80-140G and this system has no capacity to cater for the new heating demand for cooking pasta, hence the need for a new boiler.

Relevant Planning Policies

The relevant planning policies have been stated in the planning Conditions:

To safeguard the amenity of the surrounding area in accordance with Policy OE1 of the Hillingdon Local Plan (November 2012) and Policy 7.15 of the London Plan (March 2016).

Current Proposed Scheme

The industrial unit is currently a food production, storage, packaging and distribution facility.

The planning approved scheme (planning approval no: 51458/APP/2018/2791 dated 3rd. December 2018), consists of the following:

- (a). internal alterations, subdividing larger rooms into smaller rooms, plus the installation of new plant and machinery principally to service a new cooked pasta production line;
- (b). A new packaged steam boiler in a new boiler room on the ground floor within the existing unit, with a new flue on the west elevation up to high level;
- (c). a new two storey extension on the south-west corner of the existing building to house a new DAF processing plant, a chemical store and an air-lock into the chilled warehouse area;

- (d). a new double height extension in the middle of the existing south elevation to form an air-lock in front of an existing loading dock to include an area for pallet storage;
- (e). an extended external plant area to provide plant and machinery in support of the new internal processes as follows:
 - (i). hot and cold-water storage tanks;
 - (ii). New condenser units and buffer tanks for the upgraded internal cooling systems;
 - (iii). A new balance tank in a concrete bunded enclosure to store waste water from the factory processes prior to treatment in the DAF process;
 - (iv). A new sludge tank in a concrete bunded enclosure to store the semi-solid material left over from the DAF process prior to its removal from site by tanker;
 - (v). a screening building where solids are removed from the factory process waste water prior to DAF treatment;
 - (vi). A new High Voltage transformer Enclosure and a new Electrical Switch-Gear Enclosure;
 - (vii). A new Gas Meter Enclosure.
- (f). an enlarged service yard to facilitate easier access for a Sludge Tanker to reverse into a position close to the Sludge Tank.

The new proposed food processes place more demands on energy and water use and the proposals are designed to deal with this extra demand.

The DAF process, 'dissolved air floatation' is a water treatment process that clarifies waste water by removing suspended matter such as oil and solids and making the waste water fit to be discharged into the normal public foul sewer system.

Proposed Steam Boiler

The planning conditions require that the new boiler meets the London ultra-low NO_x boiler emission requirements (< 40mg/kWh).

The figure of <40mg/kWh stems from requirements imposed on emissions from the City Square Mile.

The Applicant is having difficulty complying with the emission requirements as the limits quoted are in the order of magnitude for domestic type boilers. The proposed is a completely different type of process. The limit of 40mg/kWh is not achievable on an industrial steam raising boiler, which operates at significantly higher temperatures than a domestic boiler or hot water heater.

In reaching a specification for the boiler that would be acceptable to the Local Authority the Applicant Company's Group Environmental Manager James Cherry has been in correspondence with Dr Ana Grossinho, Director of Air Quality Experts Global Ltd, acting as the Council's EPU (Air Quality) Officer.

The following is extracts of correspondence exchanged between James Cherry and Dr Ana Grossinho:

JC - 01/08/18

A quick update for you – we anticipate that even if we are unable to obtain an increase in the gas supply to the Heathrow site, we will be able to meet the steam demand with the proposed low NOx boiler supplied from Cochran. If the limited gas is available, we would limit the burner to a maximum of around 75% output (which would also further reduce the NOx emissions).

We will be including an economiser in the boiler which further improves the energy efficiency by 3-4%, and have decided to include the flue gas recirculation system from day 1 to minimise the NOx emissions. Cochran have quoted 50-60mg/m³ of NOx with the flue gas recirculation installed.

Dr AG - 01/08/18

Thank you so much for the update - that is excellent news!!

Looking forward to seeing the final specifications via Hillingdon planning system!

JC - 12/12/18

As previously discussed, we have done everything that we can do to minimise the emissions – MCPD compliant boiler (low NOx design), low NOx burner, flue gas recirculation system, and an economiser for improved efficiency.

Despite doing everything, the boiler is only likely to be able to deliver a minimum NOx emissions level of 50-60mg/m³, which equates to 42.85-51.42mg/kWh, based on the calculation and guidance below.

We have ordered the boiler and all other equipment based on the discussions earlier in the year and an apparent acceptance of 50-60mg/m³.

Dr AG - 03/01/19

Thank you for your note and update in terms of the boiler specifications achieved. It should be acceptable in terms of the NOx emissions produced for the category under application.

I am available early next week for a chat but I can confirm the boiler emissions are acceptable for operation.

The report has attached the following in the Appendix:

- 1). Cochran Stream Boiler Model No. ST28 Datasheet:
- 2). ST28 Low NOx Packaged Steam Boiler Technical Specification;
- 3). Input data Template for the Cochran ST28;
- 4). Stack Location and Building Height Data.

Conclusion

Whilst the chosen boiler does not quite meet the maximum emission requirement <40mg/kWh, it has been acknowledged by the Council's EPU (Air Quality) Officer that this type of boiler cannot be assessed properly on this criterion.

The proposed type of boiler and associated flue gas recirculation system will produce output results that are acceptable to the Council's EPU (Air Quality) Officer and therefore should satisfy the Planning Condition 7.

Report prepared by

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First Issue - 15/01/2019



**Three Pass Wet back
ST28
Low NOx
Packaged Steam Boiler**

Technical Specification

COCHRAN ST28 Low Nox PACKAGE STEAM BOILER SPECIFICATION

Styled on the world renowned and popular Wee Chieftain boiler, the **COCHRAN ST28 Low Nox PACKAGE STEAM BOILER** is of horizontal three pass wet back design and constructed in accordance with BS EN 12953 providing unrivalled efficiency and reliability. The boiler is designed to meet the latest European environmental legislation, the Medium Combustion Plant Directive (**MCPD**) when fitted with Cochran (or equivalent) combustion equipment. It complies with the requirements of the Factories Act (1961) and Guidance on Safe Operation of Boilers Ref: BG01 developed by the Safety Assessment Federation (**SAFED**) and the Combustion Engineering Association (CEA), the latter being the acceptance criteria for compliance with HSE and UK Inspection Authority requirements. Additionally, the Boiler is CE Marked to meet the requirements of the Pressure Equipment Directive (**PED**), Low Voltage; Electro-Magnetic Compliance & Machinery Safety Directives.

The Cochran ST28 steam boiler has the following **key features and upgrades available**:

- **Emissions fully compliant with MCPD**
- **Output range of 1000 kg/hr to 6000 kg/hr F&A 100°C**
- **Nett Efficiency upto 95% in accordance with EN12953**
- **Fully matched Cochran combustion equipment**
- **Turndown of upto 6:1**
- **Eclipse Touchscreen HMI with Modbus interface and remote access capability**
- **Variable speed drives for FD Fan and Feed water pump motors**
- **Low noise levels**
- **Enhanced insulation for lower touch temperature**

Throughout the manufacturing process, the **BOILER** is subject to inspection by a leading Independent Insurance Company. In addition, **COCHRAN** apply their own quality procedures that comply with the requirements of ISO 9001:2015.

The attached schedules detail the specification of the Boiler proposed in the tender enclosed.

Schedule Number	Description	Page Number
1	Boiler - Pressure Parts	3
2	Boiler Mounted Fabrications	5
3	Steam and Water Mountings	6
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Schedule 1: Boiler Pressure Part

GENERAL

All plate used in the construction of the boiler is cut and profiled by computer controlled equipment. The shell, furnace and reversal chamber plates are then rolled, assembled, machine welded and subjected to NDT (either radiographic or ultrasonic) to ensure compliance with the latest construction standard requirements.

Tube plates are drilled by computer controlled equipment to ensure the correct ligament is maintained and a satisfactory tube hole finish is achieved.

Design

All boilers in the range are of fully wet-back design. The furnace tube is designed to allow adequate expansion and is located between the front tube plate and the totally submerged reversal chamber. The rear reversal chamber plate is stayed to the Boiler rear tube plate with the required number of stay bars.

Tube plates are drilled by computer controlled equipment to ensure the correct ligaments are maintained and a satisfactory tube hole finish is achieved. Weld preparation for welded tubes and bars are also undertaken by computer controlled equipment to strict tolerances.

Two separate passes of convection tubes are fitted. All plain tubes are expanded into position with stay tubes and stay bars fitted to ensure that stressing of tube plates and tube nests are within construction code limits.

All stay tubes are lightly expanded before being welded in the main boiler tube plates and reversal chamber. Stay bars are welded into tube plates.

Access and Inspection

For inspection purposes, openings are provided to gain access to the steam/water side of the boiler. One 420 x 320mm elliptical manway opening is provided on the top of the boiler. One 320 x 220mm elliptical headhole opening is provided in the lower quadrants toward the rear of the boiler. Two 125 x 90mm elliptical handhole openings are provided, one in each of the main boiler tubeplates.

To permit observation and access into boiler furnace tube, a rear access door complete with a flame viewing sight port is provided.

Schedule 1: Boiler Pressure Part (continued)

Seatings

Mountings and controls are fitted to pads, standpipes and bosses welded to boiler shell.

Materials Specification Shell and Shell Attachments

Shell, Furnace, Reversal Chamber and Tube Plates:	BS EN 10025-2 P265 GH
Furnace Access Tube:	ASTM A106 GR B
Stay Bars:	BS EN 10273 P235 GH
Plain and Stay Tubes:	BS EN 10216-1-TR2 BS EN 10216-2 BS EN 10217-1-TR2 BS EN 10217-2
Mandoor Head Holes Muddoor Lifting Lug:	BS EN 10025-2 P265 GH
Pads (Valves):	BS EN 10025-2 P265 GH
Standpipes:	ASTM A106 GR B

Schedule 2: Boiler Mounted fabrications – Casings; Insulation & Supports

Front and Rear Casings

The front casing incorporates a hinged, insulation lined door, which carries the combustion equipment and provides access to the boiler furnace and convection tubes.

Rear casing can be insulated externally and provided with a flanged outlet for chimney connection (vertical gas flow), and lift off doors for access to boiler tubeplates and tubes to facilitate tube cleaning and inspection.

The front and rear casings are provided with screen plates on the front and rear to further minimise heat losses.

Insulation and Sheeting

The boiler shell is insulated with 100mm thick insulation to reduce radiation loss then clad in 0.9mm thick self coloured Aluzinc sheeting. Pads and standpipe penetrations are also finished with Aluzinc collars.

To reduce touch temperature, the boiler rear casing can be insulated and clad.

To aid access for inspection purposes, inspection doors and valves are not provided with insulation, this is available on request as an added option. Pipework is provided uninsulated as the client may find it easier to insulate on site with other connecting pipework between the package and the system.

Supports

The boiler supports are an integral part of the front and rear casings and are provided with outriggers for feed pump and also incorporate jacking points. The front and rear supports are connected together using tie sections to provide rigidity and assist in installation.

Jacking points are provided on the support structure to assist in offloading, positioning and manoeuvring the boiler.

Schedule 3: Steam & Water Mountings

General

As standard, the valves and gauges we offer comply with BS EN 12953 and are fitted to the boiler standpipes with suitable joints and flanges drilled to BS EN 1092. Flange fixing is by metric studs and nuts or bolts. Standard valves and fitting are tabulated below:

Quantity	Description	Manufacturer	Material
1	Steam Stop Valve, Angle pattern type	Ari Armaturen	Cast steel
1	Single Spring High Lift Safety Valve sized to provide 100% discharge capacity	Ari Armaturen	SG Iron
1	Feed water isolation, Angle pattern type	Ari Armaturen	Cast steel
1	Feed water, wafer pattern non-return	Gestra Flowserve	Stainless steel
1	Multi stage, fixed speed, centrifugal feed pump	Grundfos	Stainless steel
1	Water strainer, Y Type (supplied loose)	ISIS Fluid Control	Cast Iron
1	Manual Blowdown Valve, ball type	RTK Control	Carbon steel
2	Reflex type water gauge assembly with steam & water cocks fitted to a plate type column	Klinger	Carbon steel
1	Standard integrity on/off Probe type controls.	Flowserve	-
1	Bourdon type, rear entry Pressure Gauge	Stewart Buchanan	Aluminium
1	DN25 Blanked connection for TDS Control or Chemical injection	-	-

Drain pipework from the water gauge drain cocks and safety valve drain are extended in suitably sized pipework terminating individually at boiler centre line.

NOTES

- Valve materials are provided for the rating, pressure and temperature requirements.
- For multi-boiler installations an additional steam non-return valve will be required to comply with the requirements of Guidance Notes BG01. Cochran can provide this additional valve on request if not being supplied by your Installation Contractor.
- Please refer to quotation for any additional valves or mountings offered.

Schedule 4: Feed Pumps & Water Level Controls

WATER LEVEL CONTROLS – DIRECT MOUNTED PROBE TYPE

Utilising the tried and proven Direct Mounted Probe Type water level controls that are located on the top centreline of the boiler shell.

All boilers within the range are supplied with standard integrity level controls with the following available functions:

- Pump control
- 1st Low Water Level Alarm and System Lockout requiring manual reset
- 2nd Low Water Level Alarm and System Lockout requiring manual reset
- High Water Alarm

FEED WATER PUMP

Manufactured by Grundfos who are recognised as one of the leading pump manufacturers worldwide, the boiler feed pump is a multistage type sized to suit the boiler working pressure and rating.

The pump can incorporate a variable speed drive (VSD) to improve and is fitted to the boiler and connected with suitably sized mild steel pipework.

A feed water inlet strainer is supplied loose.

Schedule 5: Combustion Equipment/Control Panel/Wiring & Testing

COMBUSTION EQUIPMENT

Each boiler is fitted with Cochran combustion equipment to achieve Nox levels to meet the MCP Directive.

Our Simplex Burner (Modulating control on gas firing; high/low control on oil firing) is fitted on boilers rated upto and including 3000 kg/hr and our Triplex Burner (Modulating control on gas firing; three stage control on oil firing) is fitted on boilers rated from 4000 kg/hr and 5000 kg/hr. The 6000 kg/hr unit is fitted our Equinox burner (Modulating control on gas / oil firing).

All burners are fully automatic pressure jet type and have been designed specifically for gas and/or oil applications. Primarily designed for use when firing natural gas, our burners can be adapted to suit gases such Towns gas and liquefied petroleum gas.

The Simplex and Triplex burners are an undershot type configuration comprising of a combustion head assembly, electronically operated air damper, forced draught fan, electric ignition and flame monitoring equipment pre-wired to a junction box. Our Equinox burner has all of the same features but with a side slung windbox arrangement.

The burner is controlled by the Siemens LMV electronic controller that employs a linkageless burner management system. Compliance with BG01 Arrangement 3 is available by upgrading the LMV controller.

CONTROL PANEL

A control panel is fitted to the Boiler supports and includes the necessary control equipment, starters, water level alarms, controls for feed pump and mains isolation.

Every panel has our own specially designed Eclipse HMI supplied as standard.

ELECTRICAL WIRING

Heat resistant cabling is used for wiring between water level controls and the control panel, all other wiring is in PVC covered wiring carried in flexible conduit. Colour Coding to BS EN 60204-1:2006.

FUNCTIONAL TESTING

An electrical functional test of the boiler safety and control system is carried out and witnessed by the Cochran Q.A. Department Inspectors.

Schedule 6: Painting

Surfaces are degreased prior to painting and one coat of primer, one coat of undercoat and one finishing coat is applied.

Standard Colours are as follows:-

Baseframe, all Valves, Platform and Ladder (<i>when fitted</i>)	Black
Front and Rear Casings	Black
Screen Plates	Blue
Sheeting	Self coloured Aluzinc
Burner	Poppy Red
Control Panel	Manufacturer's Standard
Feed Pump	Manufacturer's Standard

Schedule 7: Terminal Points

Flanges to BS EN 1092 except where otherwise stated.

Screwed connections BSP except where otherwise stated.

DESCRIPTION

Stop Valve (Outlet)	Flanged
Safety Valve (Outlet)	Flanged
Blowdown Valve (Outlet)	Flanged
Feed Water (Inlet)	Flanged
Flue Gas (Outlet)	Vertical Flanged
Drain Pipework (Outlets)	Screwed
Oil Flow (Connection)	Screwed
Oil Return (Connection)	Screwed
Gas (Inlet)	Screwed
Pilot Gas (Inlet) <i>when applicable</i>	Screwed

Schedule 8: Tools/Documents

TOOLS

Tube cleaning brushes and rod handle are provided.

DOCUMENTS

Boiler General Arrangement Drawing and Electrical Wiring Diagrams are provided.

Certificate of Compliance is provided, certified by independent Inspection Authority.

Operation and Maintenance Manual is provided.

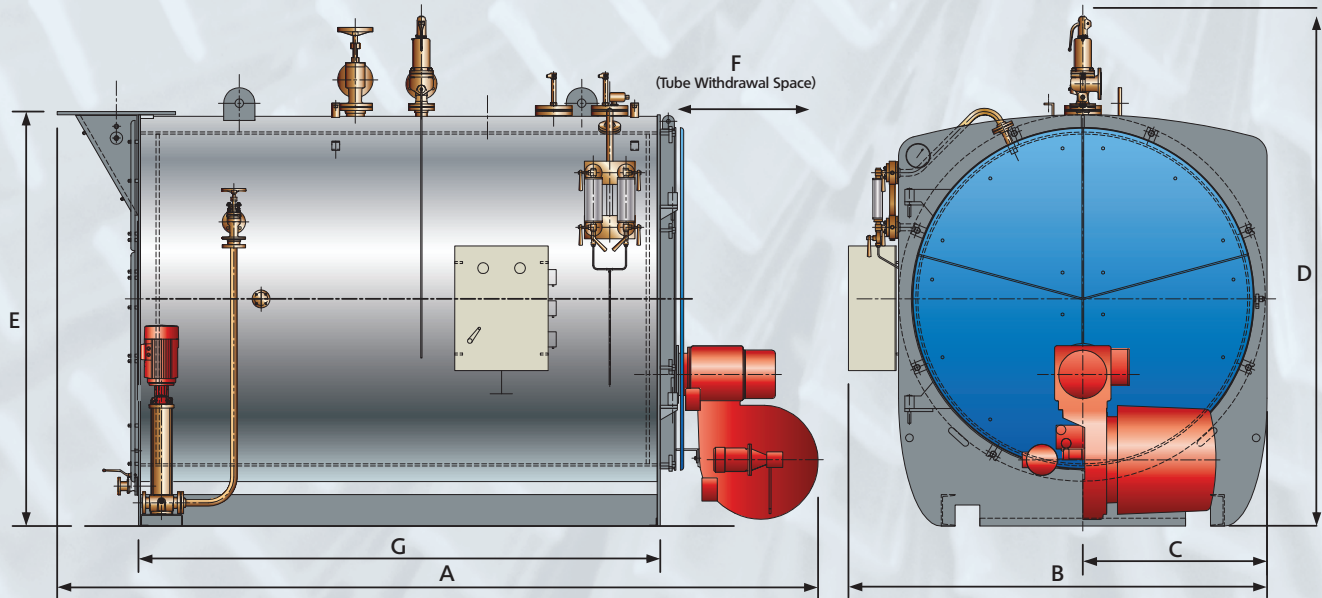
NOTE:

In order to take advantage of Technical Developments, we reserve the right to amend or alter this Specification during the tender validity period or the manufacturing stage of any subsequent order to comply with any alteration or amendment to applicable Standards, Safety Codes, Guidance Notes or Revisions in Manufacturing Techniques.

Cochran Steam Boiler

ST28 Low NOx

Cochran's ST28 Low NOx Package Steam Boiler is of horizontal three pass wet back design and constructed in accordance with BS EN 12953. This CE marked boiler is designed to meet the latest European environmental legislation and anticipated Medium Combustion Plant Directive (MCPD) requirements. Suitable for any application, the design features Cochran's low NOx, low noise burners as standard, and are available with a comprehensive range of control options.



Output (F&A 100°C): 1000 kg/hr to 6000 kg/hr.

ST28 Boiler Model			ST28-1	ST28-2	ST28-3	ST28-4	ST28-5	ST28-6
Rating F&A @100°C	kg/hr		1000	2000	3000	4000	5000	6000
Dimensions	A	mm	3606	4680	5485	6317	6867	6805
	B	mm	1914	2650	2720	2854	2854	3823
	C	mm	781	1149	1184	1251	1251	1347
	D	mm	2180	2976	3223	3394	3394	3490
	E	mm	1769	2502	2664	2780	2780	2876
	F	mm	2040	2860	3580	4180	4730	4650
	G	mm	2313	3133	3853	4453	5003	4923
MinTransport Width	mm		1607	2343	2413	2547	2547	2739
Min Transport Height	mm		1863	2655	2818	2911	2911	3040
Rec Chimney Dia	mm		215	300	355	420	454	510
Stop Valve Dia	mm		50	65	80	100	100	125
Safety Valve Size	mm		25	32	40	50	50	50
Safety Valve Outlet Dia	mm		40	50	65	80	80	80
Blowdown Valve Dia	mm		25	25	25	25	25	25
Feed Pump Inlet Dia	mm		32	32	32	32	32	40
Weight Empty	Tonnes		4.7	8.3	12.1	15.8	16.9	19.6
Weight to NWL	Tonnes		6.4	14.9	19.7	25.7	27.9	32.0
Weight Full	Tonnes		6.8	16.2	21.5	28.1	30.6	35.1

Note:

All Dimensions and weights are approximate only and are based on a boiler working pressure of 10.34 Barg, other design pressures available.

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Cochran Ltd Newbie Works, Annan, Dumfries & Galloway, UK DG12 5QU. ©2018 Cochran Ltd. Version 1 03/2018



Parameter	Unit	Condition	Value
X (stack Location)	m		07675
Y (Stack Location)	m		79771
Stack Diameter	m	Internal Diameter	0.3
Stack Height (above ground)	m		14
Temperature of release	C		256
Velocity of release	m/s	Actual conditions	11.6
Volume release rate	m ³ /s	Actual conditions	0.91
Release Rate	g/s		582.2
Moisture content of stack gas	%		10.75
Oxygen content of stack gas	%		3
Actual Volumetric Release (wet)	m ³ /s	Actual conditions	0.7206
Normalised Volumetric Release (dry, x% O ₂)	Nm ³ /s	Reference conditions =3% O ₂ Dry	0.47
Density of Gas at Discharge Temperature	Kg/m ³		0.6415
N of units			1
FOR BIOMASS BOILERS			
Pollutant Concentration	mg/Nm ³		
NO _x			
PM ₁₀			
CO			
SO ₂			
Pollutant Discharge Rate	g/s		
NO _x			
PM ₁₀			
CO			
SO ₂			
Mass Flux (Exhaust Gas Flow)	kg/s		
NO _x			
PM ₁₀			
CO			
SO ₂			

OS Grid Reference for stack TQ 07675 79771

2,594m³/hr

Greencore Food to Go Ltd

366 Stockley Close, West Drayton, UB7 9BL

Building Height: ~12m

Boiler stack height: 14m

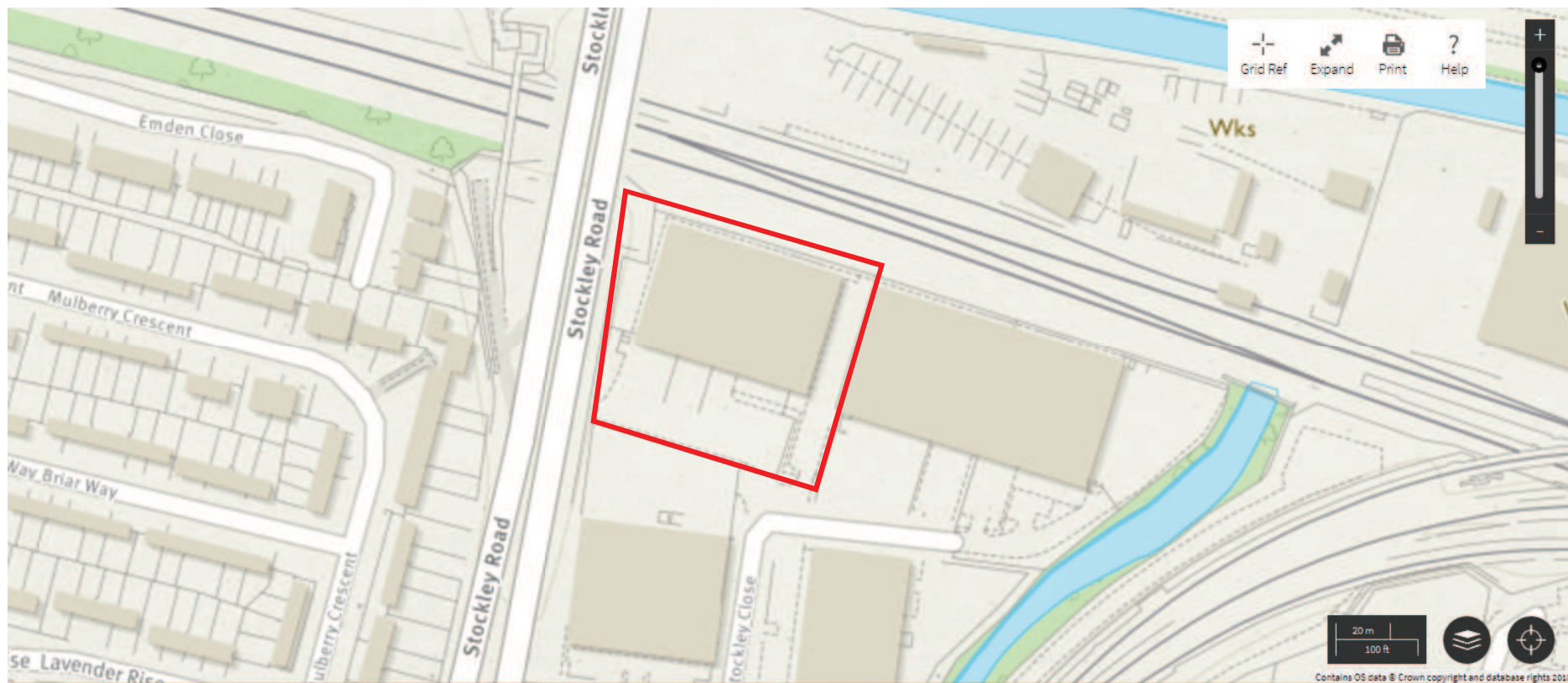
Stack location

Building height ~12m



Building height ~9m

Building height ~9m



Stack location from OS Mapping

Grid Reference TQ 07675 79771

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