

BRB (Residuary) Ltd

Major Works Programme 2009 - 2012

VAR9/3299 ASSESSMENT PROGRAMME

BE4 ASSESSMENT AND INSPECTION REPORT

**Ratho Station Road, Ratho
Edinburgh**

BRIDGE REF: QDS/1



October 2011

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Contents

1	General Description and Structural Details	1-1
1.1	Introduction	1-1
1.2	Location and General Description	1-1
1.3	Construction type	1-1
2	Existing Information Search	2-1
2.1	Services Search	2-1
2.2	SI Results	2-1
2.3	Existing Drawings	2-1
3	Structure Condition	3-1
3.1	General	3-1
3.2	Structure condition	3-1
3.2.1	Arch Barrel	3-1
3.2.2	Abutments	3-1
3.2.3	Spandrels	3-1
3.2.4	Box Wingwalls	3-2
3.2.5	Parapets	3-2
3.2.6	Formation	3-2
3.2.7	Road surface	3-2
4	Assessment to BE4	4-1
4.1	Methodology	4-1
4.2	Results	4-1
4.2.1	MEXE analysis	4-1
5	Conclusions and Recommendations	4-1
Appendix A	Photographs	
Appendix B	Services Search	
Appendix C	Trial Pit Log	
Appendix D	Form AA	
Appendix E	Form BA	
Appendix F	Calculations	

1**General Description and Structural Details****1.1 Introduction**

Jacobs was appointed by BRB(R) to conduct the site survey at QDS/1 in sufficient detail to provide data for BE4 assessment work.

Structural Soils Ltd excavated a trial pit in the east verge adjacent to the face of the parapet and exposed the top of the crown of the arch.

1.2 Location and General Description

Bridge QDS/1 carries Station Road (unclassified) over the track bed of the former South Queensferry Branch in Ratho. The line ran between Ratho and Dalmeny before closing in 1967.

The formation to the west of the bridge has been infilled and the ground level raised by approximately 5m with the land used to form part of a private garden (Photograph 4).

The road is a single carriageway 5.75m wide at the centre of the span. There is a footpath on the east side that is 1.25m wide and a verge on the west side which is approximately 0.64m wide. Refer to the plan at road level in Appendix F for the carriageway dimensions. Overall width between parapets is 7.64m.

The road is quiet with occasional HGV use.

The OS grid reference is NT132723.

The railway was opened in 1866 and the bridge probably dates from this time.

1.3 Construction type

The structure is a square single span arch overbridge. The clear square span is 8.55m (28').

The arch barrel is segmental constructed from a single ring of ashlar sandstone blocks.

The arch barrel rise is approximately 1.6m (5' – 3") at midspan. The thickness of the arch barrel was measured as a minimum of 383mm at the crown by level survey.

The arch is supported upon gravity type abutments constructed from large stone blocks. The spandrel walls and box wingwalls are constructed from the same type of stone, albeit using smaller sized blocks.

Sketches of the plan at road level and the elevation are included in Appendix F.

2 Existing Information Search

2.1 Services Search

Service search documentation obtained by Structural Soils Ltd is included in Appendix B.

2.2 SI Results

Structural Soils Ltd excavated a trial pit in the east verge, adjacent to the east parapet exposing the top of the crown of the arch (Photograph 9).

Data on the trial pit and a description of the investigation is included in Appendix C.

2.3 Existing Drawings

The structure's bridge file contains no existing drawings.

3 Structure Condition

3.1 General

The level survey and inspection for BE4 assessment were undertaken on Friday 2nd September 2011. Weather conditions on the day of the inspection were fine with a temperature of 16°C.

Parking was available on the east side of the carriageway, approximately 10m to the north of the bridge.

Access to the formation was gained via the embankment to the north east of the bridge.

3.2 Structure condition

3.2.1 Arch Barrel

The arch barrel is generally in a good condition with no cracking or distortion of the arch profile. The bridge is constructed from a single ashlar sandstone arch ring (Photograph 3). A Ring factor (Fr) of 1.4 is applicable for this material (table 3 of BE4). Minor water seepage and dripping was evident (open joints have previously been reported but were not evident on the day of inspection).

The trial pit indicated a well compacted un-cemented fill material over the arch (Photograph 9). A fill factor (Ff) of 0.7 (see Table 4 of BE4) is considered appropriate for this material.

The visible joints appear to be in good condition and sufficiently filled, a Depth factor (Fd) 1.0 is applicable for joints in this condition (Table 6 of BE4). A Mortar factor (Fmo) of 0.9 (Table 7 of BE4) is recommended as a conservative estimate to account for the possible softening of joints due to the ingress of water. Joints are up to 6mm wide, giving a Width factor (Fw) of 1.0 (Table 5 of BE4).

No signs of spandrel separation, cracking or distortion of the arch profile were observed. A general Condition factor (Fcm) 0.9 is considered appropriate to account for minor deterioration.

3.2.2 Abutments

Both abutments appear to be in good condition, the western halves of the abutment faces are concealed by the embankment slope of the infilled western formation. The remaining exposed areas of the abutment faces were noted to be very wet with graffiti observed throughout (Photographs 5 and 6).

3.2.3 Spandrels

The west spandrel is completely concealed by the in filled western formation.

The east spandrel wall is in good condition, with localised areas of minor mortar loss.

3.2.4 Wingwalls

The north west and south west wingwalls are completely concealed by the infilled western formation.

The wingwalls on the east side are generally in good condition with localised areas of minor mortar loss observed. The areas in front of the return walls are heavily vegetated with a number of large trees growing close to the base of the walls, no associated defects or signs of movement were noted during the inspection (Photographs 7 and 8).

3.2.5 Parapets

Both the east and west parapets are in fair condition. Minor moss growth was noted to the lower parapet courses. Minor intermittent vegetation growth was noted to the base of the east parapet, no associated defects or signs of movement were noted during the inspection (Photograph 2). The outer face of the west parapet was not inspected as the adjacent private garden restricted access.

3.2.6 Formation

The formation to the west of the bridge has been infilled and the ground level raised by approximately 5m with the land used to form part of a private garden. The infill on the west side slopes steeply down under the bridge (Photograph 4). The formation to the east has become largely overgrown, with tree growth throughout. There is some old fly-tipping on the embankment slope and east side formation.

3.2.7 Road surface

The road surface is in poor condition with potholes and patch repairs evident (Photograph 2).

4.1 Methodology

The following table summarises the condition/modifying factors that were applied in the MEXE analysis in accordance with BE4: Part III. The factors represent the general condition of the elements of the structure.

Description	Modifying Factor
Ring Factor, F_r	1.4
Fill Factor, F_f	0.7
Width of Joint factor, F_w	1.0
Depth Factor, F_d	1.0
Mortar Factor, F_m	0.9
General condition factor of bridge, F_{cm}	0.9

Table 1: Factors used for MEXE analysis

4.2 Results

4.2.1 MEXE analysis

Element: Arch barrel (MEXE assessment)

Arch span	Modified axle load	BE4 assessment result
Square span 8.55m	21 Tons	Pass

The minimum modified axle load obtained from the MEXE analysis was 21 tons. A rating of more than 9 tons means that the bridge has a sufficient capacity to carry a tandem 9 ton axle load and is therefore unrestricted for all vehicles complying with Construction and Use Reg. (1967).

Element: Substructure

By qualitative assessment, the substructure appears to be satisfactory for Full C&U loading.

5**Conclusions and Recommendations**

The arch of this structure has sufficient capacity for full BE4 loading as determined by this MEXE assessment. A rating well in excess of the required tandem 9 tons axles is indicated.

Assignment of a general condition factor for the assessment is somewhat subjective and has a large influence on the result. The excess capacity indicated by the assessment suggests that even the most conservative of general condition factors would show the bridge to have sufficient loading capacity for BE4 C&U loading.

In general the substructure does not give cause for concern and has sufficient capacity for BE4 loading by qualitative assessment. Little maintenance is required other than minor vegetation removal works, however these works are considered desirable rather than essential as the existing vegetation was not seen to cause any distress to the structure. The condition of the bridge is to be monitored through future inspection works.

Appendix A

Photographs



Photo 1 – East elevation



Photo 2 – View over bridge looking north



Photo 3 – Arch barrel



Photo 4 – Fill materials to the west side of the structure



Photo 5 – North abutment



Photo 6 – South abutment



Photo 7 – South east box wingwall



Photo 8 –North east box wingwall



Photo 9 – Trial Pit

Certificate Of Registered Enquiry					
Certificate Number	EQ/AJMDA642		Service	Retriever	
Client Reference	P0531967				
Location of Enquiry	Disused Railway Bridge Ratho Station Rd, Ratho Station, Newbridge, Midlothian, EH28 8PT				
Issued to	Structural Soils				
Address	<div> <div>The Potteries</div> <div>Pottery Street</div> <div>Castleford</div> <div>West Yorkshire</div> </div>		Contact	[REDACTED]	
25/07/2011 10:59:46			Telephone	[REDACTED]	
Copyright 2007 National One Call All Rights Reserved			Fax		
			Email	[REDACTED]@soils.co.uk	
Enquiry Date	07/07/2011	Responses Requested by	22/07/2011	Working Days Notice	11
Contacts and Responses					
Organisation	Document	Contacted	Affected	Received	Status
BSkyB Telecommunications Services Ltd	Telecoms. Plan	Yes	No	Yes	Closed
BT Openreach	Telecoms. Plan	Yes	Yes	Yes	Closed
Cable & Wireless	Telecoms. Plan	Yes	No	Yes	Closed
E S Pipelines Ltd	Multi-utility Plan	Yes	No	Yes	Closed
Energetics	Multi-utility Plan	Yes	No	Yes	Closed
Fibrespan Ltd	Telecoms. Plan	Yes	No	Yes	Closed
Fulcrum Pipelines Ltd	Gas Plan	Yes	No	Yes	Closed
Gamma Telecom	Telecoms. Plan	Yes	No	Yes	Closed
Gas Transportation Co & Electric Network Co	Gas Plan	Yes	No	Yes	Closed
Independent Pipelines & Power Networks	Gas Plan	Yes	No	Yes	Closed
Instalcom	Telecoms. Plan	Yes	No	Yes	Closed
Interoute	Telecoms. Plan	Yes	No	Yes	Closed
Linesearch (Pipeline search service)	Group Members Search	Yes	No	Yes	Closed
Mobile Phone Base Stations	Group Members Search	Yes	Yes	Yes	Closed
National Grid Transmission (Gas)	Gas Plan	Yes	No	Yes	Closed
Orange pcs	Telecoms. Plan	Yes	No	Yes	Closed
Scotland Gas Networks (Distribution)	Gas Plan	Yes	Yes	Yes	Closed
Scottish & Southern Energy	Electricity Plan	Yes	No	Not Expected	Closed
Scottish Power	Electricity Plan	Yes	Yes	Yes	Closed
Scottish Water Plant Protection	Water / Drainage Plan	Yes	Yes	Yes	Closed
Spectrum Interactive plc	Telecoms. Plan	Yes	No	Yes	Closed
Verizon Business	Telecoms. Plan	Yes	No	Yes	Closed
Virgin Media	Telecoms. Plan	Yes	No	Yes	Closed
Vtesse Networks Ltd	Telecoms. Plan	Yes	No	Yes	Closed
Validity of Certificate: This Certificate is issued by National One Call as an accurate record of the Enquiry as detailed above and warrants that the information contained is a true and accurate record of the PlanToDig Enquiry details as entered and a schedule of actions against					

that Enquiry.

This certificate in no way constitutes any permission, licence, permit, agreement, acknowledgement or other form of active or passive consent by any party to the Enquirer or their Agent undertaking any works or any other subsequent actions.

All and any information in whatever format that was provided in response to this Enquiry remains the intellectual property of the provider and is contextual solely to the details of this Enquiry. The purposes that the information provided in response to this Enquiry shall be restricted entirely to the stated intentions of the Enquirer and shall not be made available in any format or summary for other purposes without permission of the owner of the IPR.

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National One Call

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Response Summary

enquiries@national-one-call.co.uk
Tel: 0844 800 9957 Fax: 0845 280
2040

Enquiry Number	EQ/AJMDA642	Service	Retriever
Location of Enquiry	Disused Railway Bridge Ratho Station Rd, Ratho Station, Newbridge, Midlothian, EH28 8PT		
Status: Not Affected			
Organisation	Response		
BSkyB Telecommunications Services Ltd	RE: Disused Railway Bridge Ratho Station Rd, Ratho Station, Newbridge, Midlothian, EH28 8PT Thank you for your enquiry. Please be advised that Easynet Telecom will not be affected by these works. Regards NRSWA Department Network Infrastructure and Planning		
Cable & Wireless	Dear Sirs, Please accept this email as confirmation that Cable&Wireless Worldwide does not have apparatus within the boundary of your proposed works detailed in the reference/location above. Many Thanks, The Plant Enquiry Team ATKINS (working on behalf of Cable&Wireless Worldwide) PLEASE NOTE: The information given is indicative only. No warranty is made as to its accuracy. This information must not be solely relied upon in the event of excavation or other works carried out in the vicinity of Cable & Wireless Worldwide Ltd UK, plant. No liability of any kind whatsoever is accepted by C&W, its servants, or agents, for any error or omission in respect of information contained on this information. The actual position of underground services must be verified and established on site before any mechanical plant is used. Authorities and contractors will be held liable for the full cost of repairs to C&W's apparatus and all claims made against them by Third parties as a result of any interference or damage.		
E S Pipelines Ltd	7 July 2011 Reference: EQ/AJMDA642 Dear Sir/Madam, Thank you for your recent plant enquiry at: Ratho Station Rd,Ratho Station,Newbridge,Midlothian I can confirm that ESP Gas Group Ltd has no gas or electricity apparatus in the vicinity of this site address and will not be affected by your proposed works. ESP are continually laying new gas and electricity networks and this notification is valid for 90 days from the date of this letter. If your proposed works start after this period of time, please re-submit your enquiry. Important Notice Please be advised that any enquiries for ESP Connections Ltd, formerly known as British Gas Connections Ltd, Yours faithfully, Alan Slee Operations Manager		
Energetics	Energetics does not have any plant within the area that you have sent in to us.		
Fibrespan Ltd	With regard to your enquiry below, I can confirm that FibreSpan Ltd. does NOT have any plant affected by your proposed works from the info supplied.		
Fulcrum Pipelines Ltd	We can confirm that Fulcrum Pipelines Limited do not currently have any existing pipes or equipment on or around the above site address. Please note that other Gas Transporters may have plant in this locality which could be affected by your proposed works. Fulcrum Pipelines will not be held responsible for any incident or accident arising from the use of the information associated with this search. The details provided are given in good faith, but no liability whatsoever can be accepted in respect thereof. If you have any future requests for information about our plant, please email these to us at FPLplantprotection@fulcrum.co.uk. Graham Penlington can be contacted on 01709 845375 if you require any further assistance or information.		
Gamma Telecom	Having examined my records, I can confirm that Gamma Telecom has no owned apparatus within the search area of your enquiry below:- Regards Ray Gamma Telecom		
Gas Transportation	Site Ref: EQ/AJMDA642 Date: 07 July 2011 Dear Sir/Madam Re: Disused Railway Bridge Ratho Station Rd, Ratho Station, Newbridge, Midlothian Thank you for your enquiry concerning apparatus in the vicinity of your proposed work. GTC/ENC can		

<i>Co & Electric Network Co</i>	confirm that we have no apparatus in the vicinity but please note that other Gas Transporters/Electricity Distributors may have and that you should ensure that all transporters/ distributors have been consulted. All future plant enquiries must contain accurate Easting and Northing references to enable us to process your enquiry efficiently. Yours sincerely Tom Anderson Engineering Support Officer GTC
<i>Independent Pipelines & Power Networks</i>	Independent Pipelines have no plant in the vicinity of the proposed works
<i>Instalcom</i>	Your Ref: EQ/AJMDA642 Our Ref: E07/11-0500 With reference to your enquiry regarding the above noted location, I can confirm that GLOBAL CROSSING (UK) LTD, GLOBAL CROSSING PEC and FIBERNET UK LTD networks DO NOT have any apparatus within the immediate proximity of your proposed works. We do however have equipment on the railway / underground line that runs adjacent to / through your works location. If you need any information about the location of this equipment could you please contact Mr Dave Bond of Global Crossing (dave.bond@globalcrossing.com) for further details. If you require any further information, please do not hesitate to contact me. Plant Protection Administrator
<i>Interoute</i>	Thank you for your enquiry regarding the above proposals at the above location We would advise that we are unaware of any Interoute plant or services in this Location as indicated in your enquiry. We bring to your attention the fact that whilst we try to ensure the information we provide is accurate, the information is provided Without Prejudice and Interoute and its Agents accept no liability for claims arising from any inaccuracy, omissions or errors contained in this response. Yours faithfully PLANCAST Plant Enquiry Department
<i>Orange pcs</i>	Your reference: DA642 Ratho Station Rd Location: X = 313228 Y = 672244 With reference to your enquiry regarding the above noted location, please be advised that you have confirmed our records show that we do not currently hold any ORANGE PCS assets within your stated area of interest. Please note, whilst we endeavour to provide accurate information, the information is intended as a general guide only and must not be relied upon in the event of any excavations or other work in the vicinity. Also, the responsibility is on you, the client, to determine the area of works is clear. May Gurney will accept no liability for claims arising from any inaccuracy, omissions or errors contained herein. If you require any further information then please do not hesitate to contact us. Kind Regards
<i>Spectrum Interactive plc</i>	No Kiosks in the vicinity of the proposed works
<i>Verizon Business</i>	Verizon Business is a licensed Statutory Undertaker. We have reviewed your plans and have determined that Verizon Business (Formally known as MCI WorldCom, MFS) has no apparatus in the areas concerned. If you have any further queries please do not hesitate to call. Yours faithfully Chris Pile
<i>Virgin Media</i>	The Plant Enquiries Team has now completed your search, and the results are attached below. Please note that we try to provide maps where ever available. On occasions where our records show the area is not affected, you may receive a map showing apparatus in the close proximity. However where a plan is not attached, we have no record of apparatus being close by and therefore a map is not available.
<i>Vtesse Networks Ltd</i>	Our Ref 0711/547 I confirm that Vtesse Networks do not have any plant within a 250metre radius of your enquiry. Plant Enquiry Team Vtesse Networks
Copyright National One Call 2008 all rights reserved	

Our Ref: Refer to Plan
Your Ref: **EQ/AJMDA642**

07/07/2011

National Notice Handling Centre
PP 3EW45, Telecom House,
Trinity Street,
Hanley,
Stoke-on-Trent,
ST1 5ND.

Freephone: 0800 800865

Dear Customer,

**NR & SW ACT 1991 – PROPOSED WORKS AT: Disused Railway Bridge Ratho Station Rd,
Ratho Station, Newbridge, Midlothian, EH28 8PT**

Prior to commencement of work: for free onsite guidance and accurate up to date location of BT plant please contact our Plant Protection Service by the following methods

Tele 0800 9173993

Fax 01332 578650

Email Dial before you dig DBYD@openreach.co.uk

Visit the website www.dialbeforeyoudig.com

Thank you for your request of **EQ/AJMDA642** describing the above proposals.

Enclosed are copies of our drawing marked up to show the approximate locations of BT apparatus which is present in the immediate vicinity of your works. It 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 made near to British Telecommunications plc apparatus which may exist at various depths and may deviate from the marked route.

To avoid damage it is recommended that mechanical excavators or borers are not used within 600mm of British Telecommunications plc plant. If scaffolding is erected, please ensure that our equipment is not enclosed, blocked, covered or otherwise obstructed by the scaffolding.

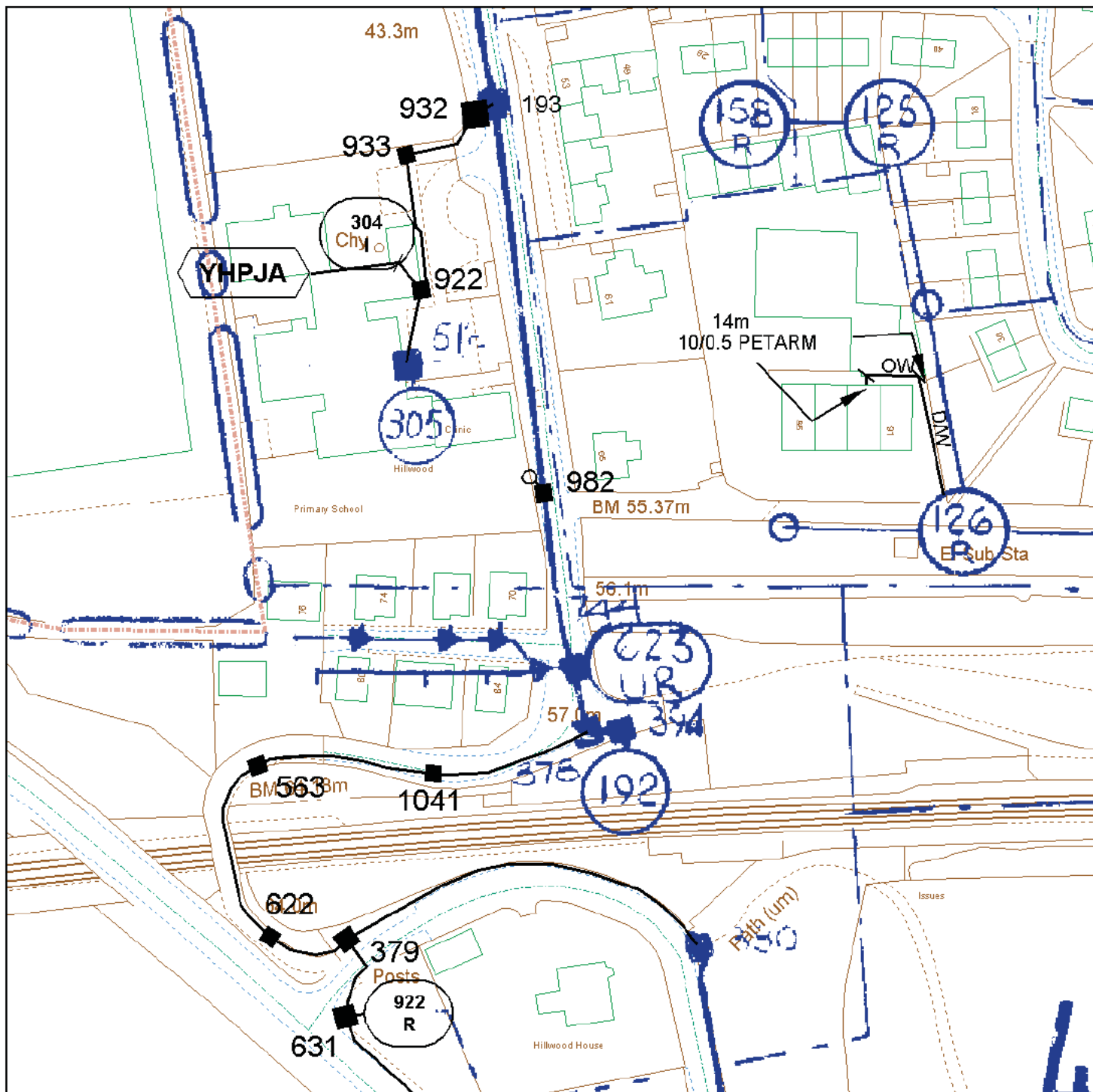
In the event of BT apparatus being in the area of works we recommend that your plant/vehicle crossing is either resited, or apply for a budget estimate by submitting detailed plans to the above address, these will be forwarded to the appropriate department for their comments.

Please ensure you quote our reference on any future correspondence.

Yours faithfully,

BT Openreach

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: NIN14130P

Map reference (centre): NT1322872244

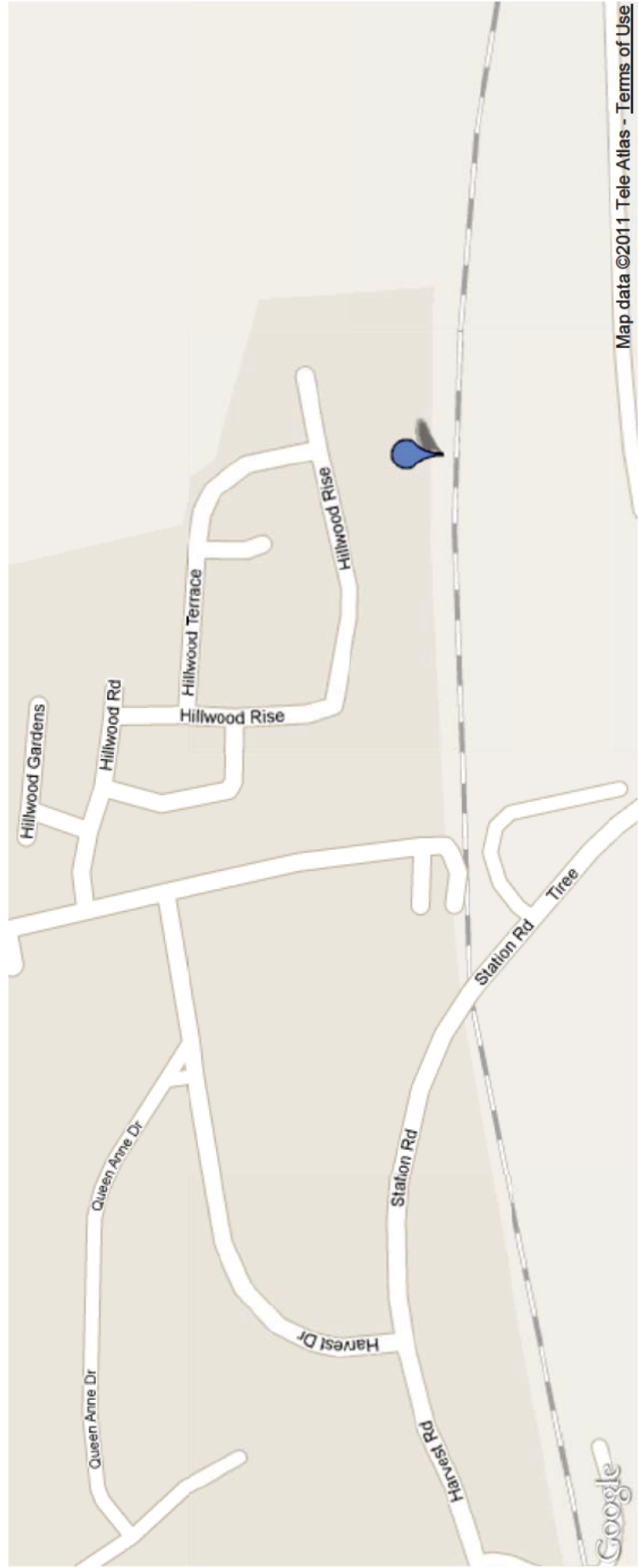
Issued: 07/07/11 14:24:44

Enter the location that you wish to search for (eg Postcode, Town or Street)

eh28 8pt

Search

Ratho Station, Newbridge, Midlothian EH28 8PT, UK ▾



Click on a station to see the details.	Single Operator GSM technology	Single Operator UMTS technology	Single Operator TETRA technology	Base stations with more than one operator or more than one technology
	1	0	0	0

Our Ref: SC/08.07.11/LP54998/107309

Your Ref: EQ/AJMDA642

Date: 08 July 2011

Fax:

Email:

National One Call

1 Mill Place

Mill Road Industrial Estate

Linlithgow Bridge

West Lothian, EH49 7TL.

**24 hour gas escape
number 0800 111 999**

Calls will be recorded and
may be monitored.

Dear Sir / Madam,

Re: Proposed Works Enquiry at: Disused Railway Bridge Ratho Station R5d, Ratho Station, Newbridge.

Scotland Gas Networks acknowledges receipt of your notice of your intention to carry out work at the above location.

Scotland Gas Networks will contact you prior to your intended start date indicated in your correspondence.

We enclose an extract from our mains records in the location of the area covered by your proposals together with a comprehensive list of precautions for your guidance. This plan shows only those pipes owned by Scotland Gas Networks in its role as a Licensed Gas Transporter (GT). Gas pipes owned by other GT's and also privately owned may be present in this area. Information with regard to such pipes should be obtained from the owners. The information shown on this plan is given without obligation, or warranty, the accuracy thereof cannot be guaranteed. Service pipes, valves, siphons, stub connections, etc., are not shown but their presence should be anticipated. Your attention is drawn to the information and disclaimer on these plans. The information included on the enclosed plan should not be referred to beyond a period of 28 days from the date of issue.

You will note the presence of our Low/Medium/Intermediate Pressure gas main in the proximity to your site. NO mechanical excavations are to take place above or within 0.5 m of the Low pressure system, 2m of the medium pressure system and 3metres of the intermediate pressure system. You should where required CONFIRM THE POSITION of mains using HAND DUG TRIAL HOLES.

A colour copy of these plans and the gas safety advice card should be passed to the senior person on site in order to prevent damage to Scotland Gas Networks plant and potential direct or consequential costs to your organisation.

Safe digging practices, in accordance with HSE publication HSG47 "Avoiding Danger from Underground Services", must be used to verify and 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 on or near gas apparatus. In addition please follow the advice given on the gas safety card.


It must be stressed that both direct and consequential damage to gas plant can be dangerous both for your employees and the general public, repairs to any such damage will incur a charge. Your works should be carried out in such a manner that we are able to gain access to our apparatus throughout the duration of your operations.

Should you require any further assistance before starting any works please contact the number below.

Yours faithfully,

Admin Assistant

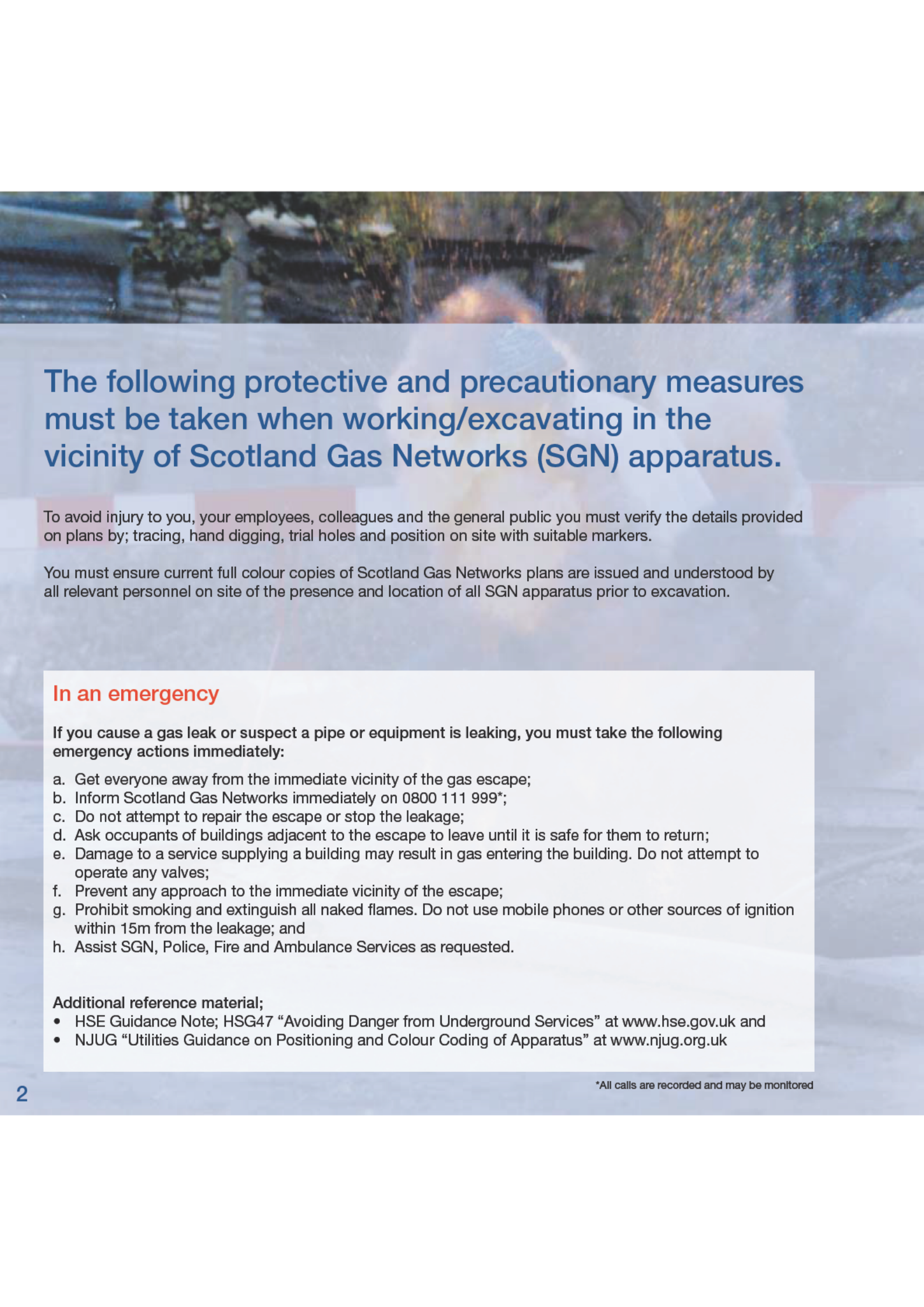
Scotland Gas Networks Limited
Registered in Scotland No SC264065
Registered Office: Axis House
5 Lonehead Drive, Newbridge, Edinburgh
EH28 8TG



General safety measures to avoid injury and damage to gas apparatus



**Scotland
Gas Networks**
A Scotia Gas Networks Company



The following protective and precautionary measures must be taken when working/excavating in the vicinity of Scotland Gas Networks (SGN) apparatus.

To avoid injury to you, your employees, colleagues and the general public you must verify the details provided on plans by; tracing, hand digging, trial holes and position on site with suitable markers.

You must ensure current full colour copies of Scotland Gas Networks plans are issued and understood by all relevant personnel on site of the presence and location of all SGN apparatus prior to excavation.

In an emergency

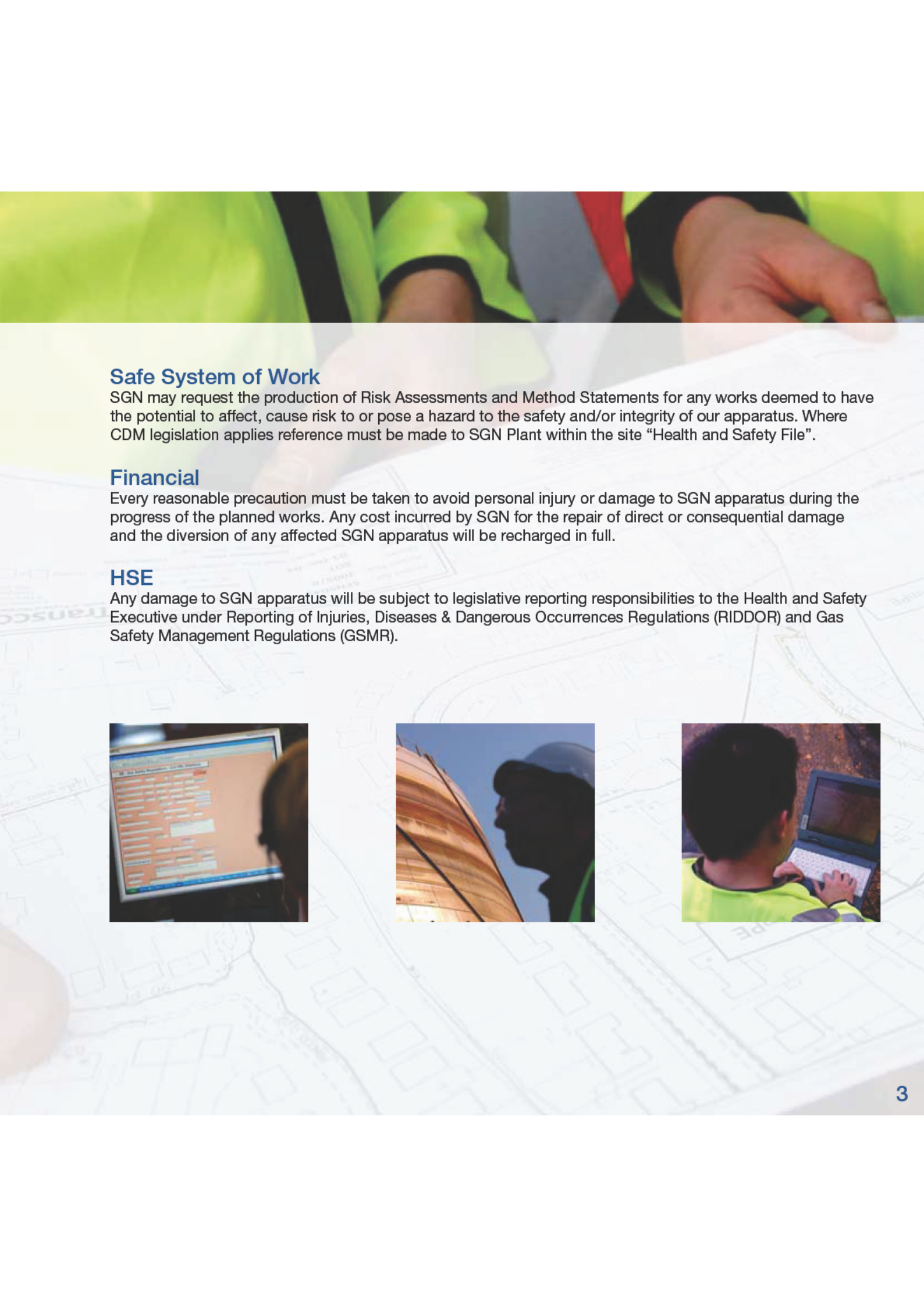
If you cause a gas leak or suspect a pipe or equipment is leaking, you must take the following emergency actions immediately:

- a. Get everyone away from the immediate vicinity of the gas escape;
- b. Inform Scotland Gas Networks immediately on 0800 111 999*;
- c. Do not attempt to repair the escape or stop the leakage;
- d. Ask occupants of buildings adjacent to the escape to leave until it is safe for them to return;
- e. Damage to a service supplying a building may result in gas entering the building. Do not attempt to operate any valves;
- f. Prevent any approach to the immediate vicinity of the escape;
- g. Prohibit smoking and extinguish all naked flames. Do not use mobile phones or other sources of ignition within 15m from the leakage; and
- h. Assist SGN, Police, Fire and Ambulance Services as requested.

Additional reference material;

- HSE Guidance Note; HSG47 “Avoiding Danger from Underground Services” at www.hse.gov.uk and
- NJUG “Utilities Guidance on Positioning and Colour Coding of Apparatus” at www.njug.org.uk

*All calls are recorded and may be monitored



Safe System of Work

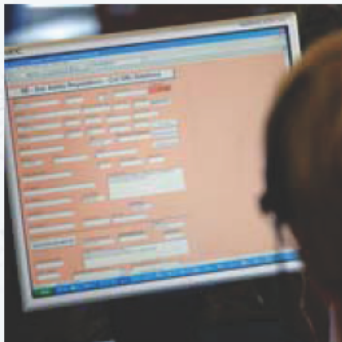
SGN may request the production of Risk Assessments and Method Statements for any works deemed to have the potential to affect, cause risk to or pose a hazard to the safety and/or integrity of our apparatus. Where CDM legislation applies reference must be made to SGN Plant within the site "Health and Safety File".

Financial

Every reasonable precaution must be taken to avoid personal injury or damage to SGN apparatus during the progress of the planned works. Any cost incurred by SGN for the repair of direct or consequential damage and the diversion of any affected SGN apparatus will be recharged in full.

HSE

Any damage to SGN apparatus will be subject to legislative reporting responsibilities to the Health and Safety Executive under Reporting of Injuries, Diseases & Dangerous Occurrences Regulations (RIDDOR) and Gas Safety Management Regulations (GSMR).





Minimum Safe Working Distances

If you are carrying out explosions, piling, splitting, boring and deep excavations, please contact SGN for further guidance. Trial holes must be dug by hand to determine the exact location of mains and service pipes in advance of mechanical excavation or thrust boring. Be aware of the potential for the presence of protruding objects from gas apparatus in the form of standpipes, test points and valve bodies.

Mechanical Excavation

Mechanical excavators (including breaker attachments) MUST NOT be used within the following distances from the confirmed location of SGN gas mains and services (as depicted on SGN GAS MAPS), without prior agreement:

Type of Mains and Services	GAS MAP Identification	Hand Excavation required inside
Low Pressure (LP)	0 – 75mbar	0.5 metres
Medium Pressure (MP)	75mbar to 2 bar	0.5 metres
Intermediate Pressure (IP)	2 – 7 bar	3.0 metres
High Pressure (HP)	Above 7 bar	3.0 metres

Note: SGN MUST be consulted prior to any planned excavation works within 10m of Pressure Reduction Equipment and may consider issuing a Permit to Work type document, if appropriate.

High Pressures

In addition to receiving a copy of SGN's 'Safe working in the vicinity of Scotland Gas Networks high pressure pipelines and associated installations', if any activities proposed are closer than the minimum distances listed below you must discuss with SGN to agree your site specific requirements.

Power Excavators in Easements	>3 metres	Demolition	>150 metres
Power Excavators in Highway	>3 metres	Blasting	>250 metres
Pressure Testing	>8 metres	No- Dig Techniques	Method Statement Req.
Piling	>15 metres	Crossing Servitude with Plant	Written Consent Req.



Tree planting

If trees or shrubs are to be planted adjacent to our apparatus, the selection of the type of tree or shrub and its planting must be considered so that root damage to buried mains or services will be avoided and that damage to trees or shrubs will not be caused by any subsequent excavations for repair and maintenance. Planting schemes should be submitted to SGN for approval. We reserve the right to remove any tree/bush at any time in the future.

Surface Boxes/ Manholes

Do not bury or move SGN surface boxes. Access must be maintained both during and after your works. No manhole cover or other structure is to be built over, around or under a gas pipe and no work is to be carried out which results in a reduction or increase in cover or protection without prior written agreement.

Clearance Requirements

No apparatus is to be laid over and along the line of a gas pipe irrespective of clearance. To allow the future repair and maintenance of gas apparatus, a minimum clearance of 250mm for low and medium pressure pipelines and 600mm for intermediate and high pressure pipelines, or 1.5 times the external diameter of the gas pipe, whichever is the greater, should be maintained between the gas apparatus and any new plant. Where this minimum clearance cannot be achieved, site discussions should be held with SGN to agree a suitable clearance. Explosives shall not be used within 30m of SGN Plant (400m for Pressure Reduction Equipment) without prior agreement. No piling or boring shall be carried out within 15m of SGN Plant without prior consultation and agreement.

Deep Excavations

Where excavations adjacent to any SGN apparatus potentially affects its security and integrity, adequate protection (approved by SGN) must be applied to such plant. Ground movement around gas apparatus must be prevented. If a sewer trench or any other water authority apparatus is to be constructed at greater than 1.5 metres deep near to a buried gas main or service pipe, SGN must be contacted. SGN should be provided with detailed drawings showing the line and width of the proposed sewer or other apparatus trench, together with the soil group classifications of the area concerned.

Backfilling

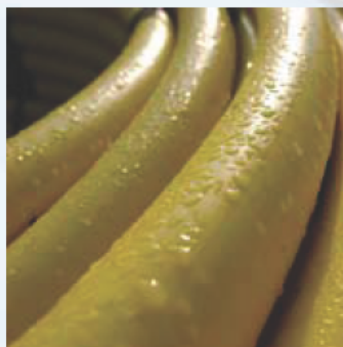
Concrete backfill should not be placed closer than 300mm to apparatus. No concrete or hard material should be placed under or adjacent to any apparatus. Shuttering must be constructed so as to prevent fresh concrete encasing SGN apparatus and to maintain the stated clearances. Material used for the surround backfill of SGN plant must conform to the following requirements:

- If sand, it must be well-graded in accordance with BS EN 12620: 2002;
- It must not contain any sharp particles; stones, bricks, lumps or corrosive materials;
- Foamed concrete should not be used; and
- It must be laid to a minimum depth of 250mm above the crown of the apparatus.

Note: Power ramming should not take place until a 300mm hand rammed layer has been completed over the crown of the pipe.

Access

Access to sites and to SGN apparatus must be provided at all times. This includes temporary structures and spoil heaps over SGN pipes.



Start:
Date Recorded: 12/12/05 Time Recorded:
STAGE DATES: Interim: Permanent:
Interim Due: 13/12/05 Permanent Due:

SITE DETAILS: L.A. Ref: 00021391
Region 820 Site 00685 GRAENE ROAD
Result

Crossing SGN plant

The placing of heavy construction plant, equipment, materials or the passage of heavy vehicles over SGN apparatus is prohibited unless specially agreed protective measures (i.e. the construction of reinforced crossing points) have been carried out. This is particularly important where reductions in side support or ground cover are planned.

Working in Servitude strips should not be undertaken without prior written consent of SGN.

Exposed Plant

Where excavations adjacent to gas apparatus affect its support, the apparatus must be adequately supported and protected in consultation with and to the satisfaction of SGN. It must be protected from impact and restraints, thrust blocks and supports must not be removed without SGN agreement.

Hot Works

The potential exits for heat damage to plastic pipelines/coatings. Where welding or other hot works involving naked flames is to be carried out in proximity to SGN plant, a SGN representative should be present.



Scotland Gas Networks provides a free plant protection enquiry service during office hours.

Contact:

Tel: 0141 418 4093

Fax: 0141 429 6432

Email: plantlocation@scotiagasnetworks.co.uk

**Scotland Gas Networks, Plant Protection Team,
Tradeston, 95 Kilbirnie Street, Glasgow, G5 8JD.**

www.scotiagasnetworks.co.uk

Only limited information can be supplied by telephone. In general requests MUST be made in writing.
For all enquires the following information is required:

- 1) Whether the enquiry is for speculative or actual works;
- 2) The full postal address of the works site and of the main company promoting the works;
- 3) A specific contact name and telephone number at each of these locations;
- 4) The full details of the nature of the works (proposed or actual);
- 5) The expected start date of the works and if known the duration of the works; and
- 6) For written enquires a suitable scale map or drawing showing the works location and any site boundaries must be provided.

National One Call
Unit 1 Mill Place
Mill Road Industrial Estate
Linlithgow Bridge
West Lothian
EH49 7TL

Your Ref
Our Ref
DM/ 6308
Date
19 July 2011

Contact
[REDACTED]

Dear Sir/Madam

NEW ROADS AND STREET WORKS ACT 1991

Re: Location of ScottishPower Equipment at Ratho Station, Road, Newbridge

Thank you for your enquiry of 07 July 2011 regarding your proposed works at the above location. Please find enclosed a copy of our relevant records showing approximate position of all known ScottishPower apparatus in the area specified.

As much information as possible has been given, however, it must be understood that locations of cables and pipes shown on the plans are indicative only as original depths and lines may have been changed by persons unknown.

I would draw your attention to the advice given in the Health and Safety Executive booklet HS (G) 47 - "Avoiding Danger from Underground Services", and their guidance note GS6 - "Avoidance of Danger from Overhead Lines". Please ensure all site operators have this information and if you discover or cause any damage to ScottishPower cables, then please call our Power Emergencies Line - 0845 2727 999 - immediately - giving all relevant information.

Should you require any further information, please do not hesitate to contact me at the address below.

Yours faithfully,

[REDACTED]
For [REDACTED]
Data Management

On behalf of SP Distribution plc and SP Transmission plc

Dear Sirs,

Location of Services at:- Ratho Station Rd,Ratho
Station,Newbridge,Midlothian,EH28 8PT
Reference: - SWPP/11/35524

Further to your enquiry regarding the location of Scottish Water infrastructure at the above site / property. I attach herewith copy coloured plans which indicate the approximate position of Scottish Water's existing public infrastructure and will arrange to have an invoice sent in due course.

Other plant such as water service / supply pipes and sewer tails to properties may also be present, but no official records of these are kept.

Should you have any further technical queries on new domestic connections; Strategic Asset Capacity etc. please contact:

Customer Connections Helpline: 0141 355 5511.

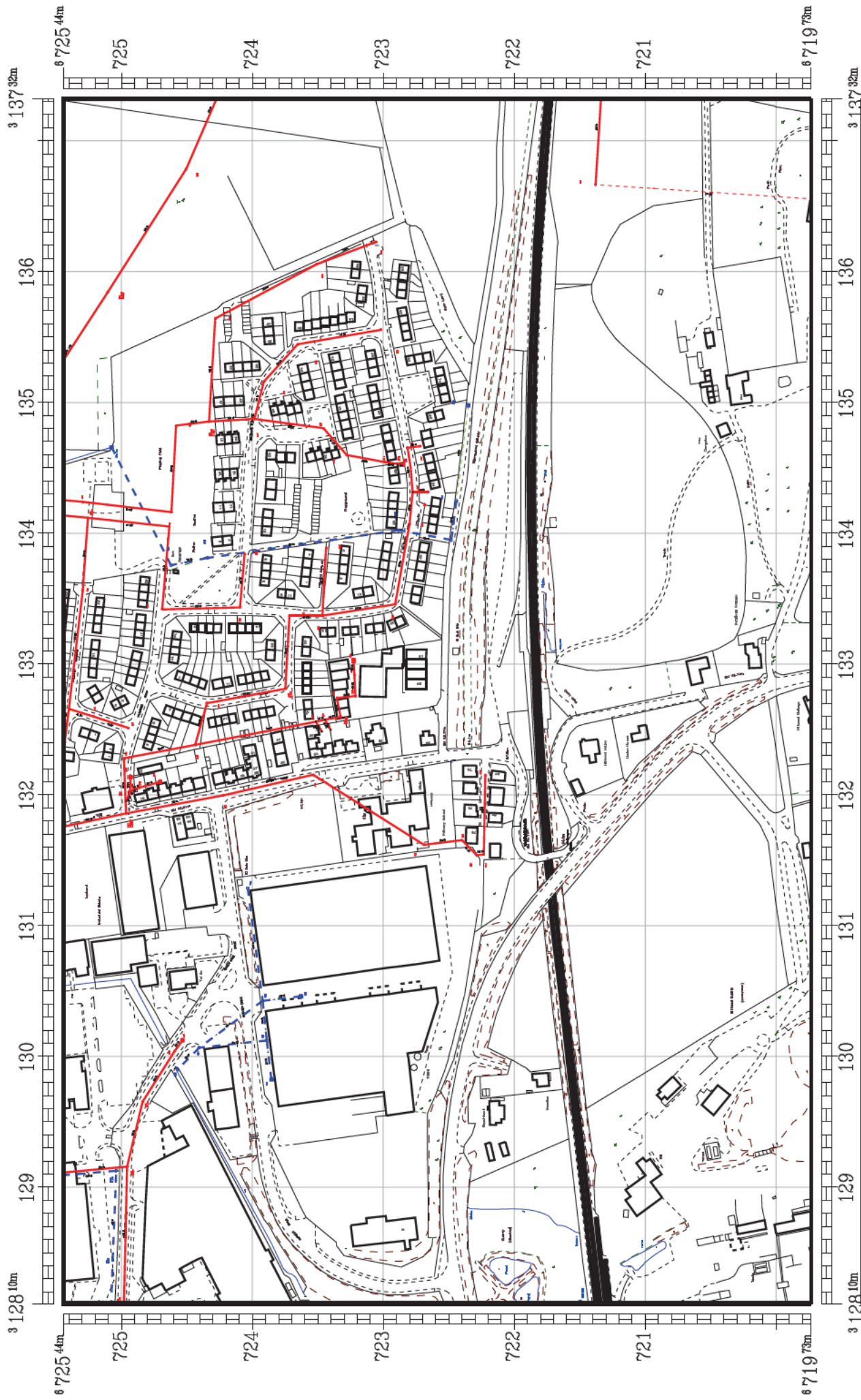
Email: Customer.ConnectionsSupport@scottishwater.co.uk

General reference can also be made under the "Getting connected" title at www.scottishwater.co.uk.

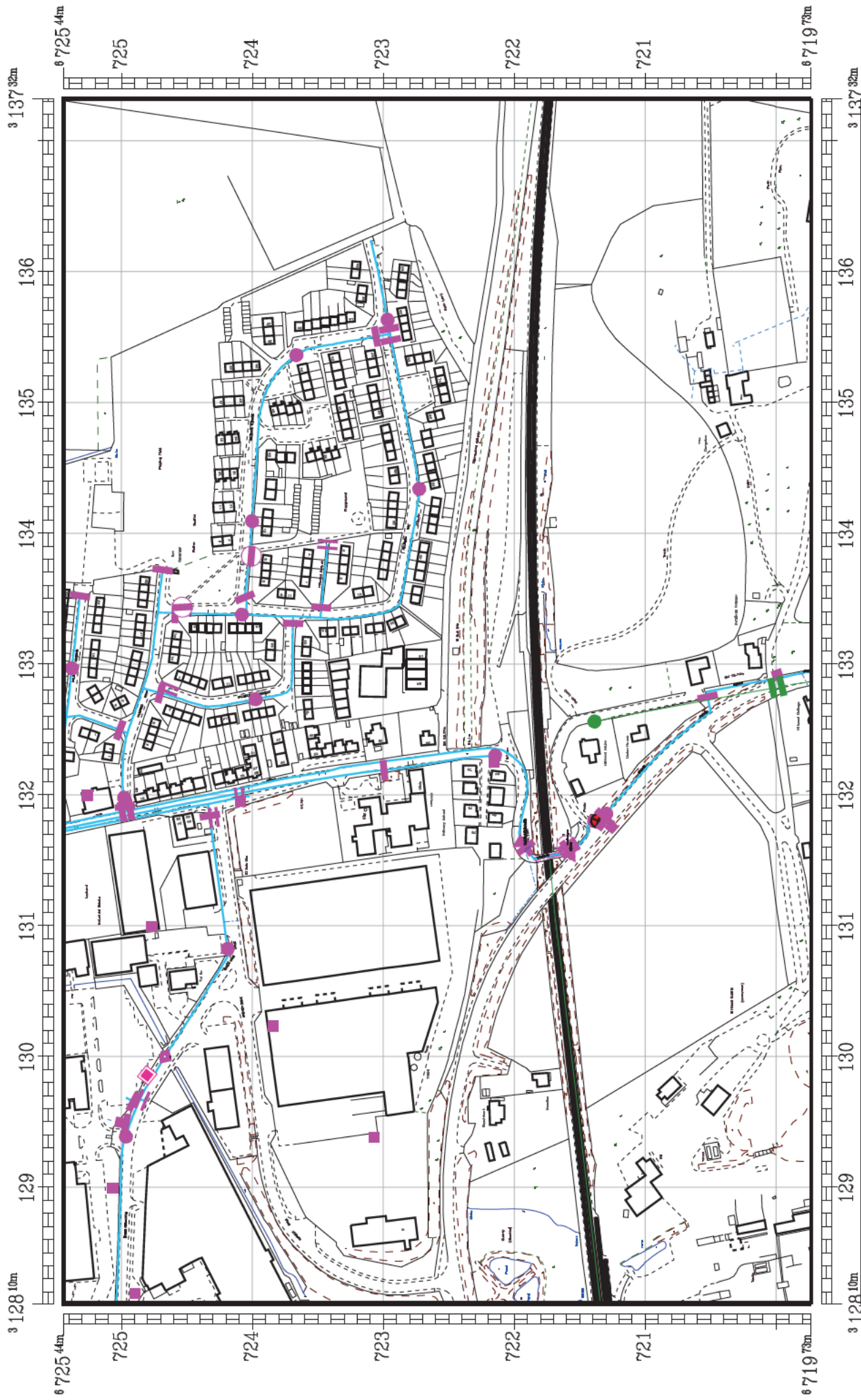
Please note: If you are a Business Customer looking to make a non domestic connection to Scottish Water infrastructure and have any further queries please contact your Licensed Provider.

Yours faithfully,

Property Searches Analyst



	<p>The representation of physical assets and the boundaries of areas in which Scottish Water and others have an interest does not necessarily imply their true positions. For further details contact the appropriate District Office.</p> <p>Date Plotted: 18/07/2011</p>	<p>SWPP/11/33524 PLANS WASTE</p>	<p>Reproduced by permission of Ordnance Survey on behalf of HMSO. Crown copyright and database right 2009. All rights reserved. Ordnance Survey Licence Number 600313560017</p>	<p>CHEF EXECUTIVE: RICHARD F. ADRIANO Castle House, 6 Castle Drive, Dumfries, KY11 6BB</p>
		Plotted by: BARPAJ		
		SCALE: 1:3938		















 <p>Always working Scotland CHIEF ENGINEER: RICHARD J. ADRIANO Castle House, 6 Castle Drive, Dumfries, KY11 6BB</p>	<p>Reproduced by permission of Ordnance Survey on behalf of HMSO. Crown copyright and database right 2009. All rights reserved. Ordnance Survey Licence Number 600313560017</p>	<p>SWPP/11/33524 PLANS WATER</p>	<p>The representation of physical assets and the boundaries of areas in which Scottish Water and others have an interest does not necessarily imply their true positions. For further details contact the appropriate District Office.</p> <p>Date Plotted: 18/07/2011</p>
<p>Plotted by: BARRAJ</p>		<p>SCALE: 1:39.38</p>	

SMALL WORLD GIS WATER LEGEND

<p>Trunk Main (in use)</p> <p>Distribution Main</p> <p>Raw Water Main</p> <p>Mains (abandoned)</p> <p>Mains (proposed)</p> <p>Mains (isolated)</p> <p>Communication Pipe</p> <p>Supply Pipe</p> <p>Tunnel</p> <p>Open Course</p> <p>Aqueduct</p> <p>Logical Service Link</p> <p>Duct</p> <p>Air Valve Double</p> <p>Air Valve Single</p> <p>Anode</p> <p>Hydrant : Terminal</p> <p>Hydrant : Fire</p> <p>Dialysis Patient</p>	<p>Tapping</p> <p>Field trough</p> <p>Other fitting</p> <p>Orifice Plate</p> <p>Meter Point</p> <p>Cleansing Cock</p> <p>Coupling</p> <p>Flow Restrictor</p> <p>Taper</p> <p>Change Collar</p> <p>End Cap</p> <p>Stopcock</p> <p>Sample Point</p> <p>Service Point</p> <p>Hatchbox</p> <p>Chemical Dosing Point</p> <p>Break Pressure Tank</p>	<p>Bulk Meter</p> <p>Revenue Meter</p> <p>Meter Cable</p> <p>Meter Display Unit</p> <p>Pumping Station</p> <p>Booster Station</p> <p>Pump Symbol</p> <p>River Intake</p> <p>Spring Intake</p> <p>Borehole Intake</p> <p>Other Company Intake</p> <p>Clear Water Tank</p> <p>Service Reservoir</p> <p>Impounding Reservoir</p> <p>Pumped Storage Reservoir</p> <p>Storage Tank</p> <p>Storage - Other</p> <p>Balancing Tank - Current</p>	<p>Water Treatment Works</p> <p>Pressure Reducing Valve</p> <p>Pressure Sustaining Valve</p> <p>Reflux (Non-Return) Valve</p> <p>Washout (Scour) Valve</p> <p>Control Valve</p> <p>Pressure Relief Valve</p> <p>Altitude Valve</p> <p>Level Control Valve</p> <p>Valve - Other</p> <p>BC WSZ Valve</p> <p>BC DMA Valve</p> <p>BC WOA Valve</p> <p>BC PRA Valve</p> <p>BC PCC Valve</p> <p>BC PSA Valve</p> <p>Pipebridge</p>
---	--	--	--

SMALLWORLD GIS – WASTEWATER LEGEND

Pipework

	Combined (red)
	Foul (brown)
	Surface Water (blue)
	Natural Water (light blue)
	CSO (dark blue)
	Trade Effluent (brown)
	Treated Effluent (black)
	Abandoned (grey)
	Water Course (dark green)
	PFI sewer (bright green)
	Rising Main (red)
	Proposed sewers (foul, combined and surface water)

Syphon



Chamber (same colour as pipework)



Dual Chamber (same colour as pipework)



Surface Water Chamber



Collapse/Choke (not visible by default)



Combined Storm Overflow



Connection (not visible)



Duct



Ghost Node (not visible by default)



Hatchbox



Hydraulic Control Chamber



Lamphole



Change of Attributes



Outfall



Inlet



Pumping Station



Wash Out



Bifurcation Chamber



Balancing Pond



Rodding Eye



Septic Tank



Sewer Junction



Sewer Structure



Sewerage Air Valve



Sewerage Pipe Bridge



Sluice Valve



Storm Tank



Unknown End



Treatment Plant



Vent Column



Buchan Trap



Capped End (same colour as pipework)





**National One Call
1 Mill Place
Mill Road Industrial Estate
Linlithgow Bridge
EH49 7TL**

Virgin Media
National Plant Enquiries Team
Scimitar Park
Courtauld Road
Basildon
Essex
SS13 1ND

Tel: 0870 888 3116 Opt 2
Fax: 01268 468557

Plant Enquiry Ref: VM/CIP/62679
Your Letter Date: 07/07/2011
Your Ref: EQ/AJMDA642
Date: 22/07/2011

Enquiry Location: **DISUSED RAILWAY BRIDGE RATHO STATION RD, EH28 8PT**

Thank you for your enquiry regarding work at the above location.

Virgin Media and Viatel plant should not be affected by your proposed work and no strategic additions to our existing network are envisaged in the immediate future.

Should your request be in relation to a New Development and you require an estimate to be prepared for Virgin Media to service your proposed development, please submit this request for costs along with site drawings (scale 1:500) to:

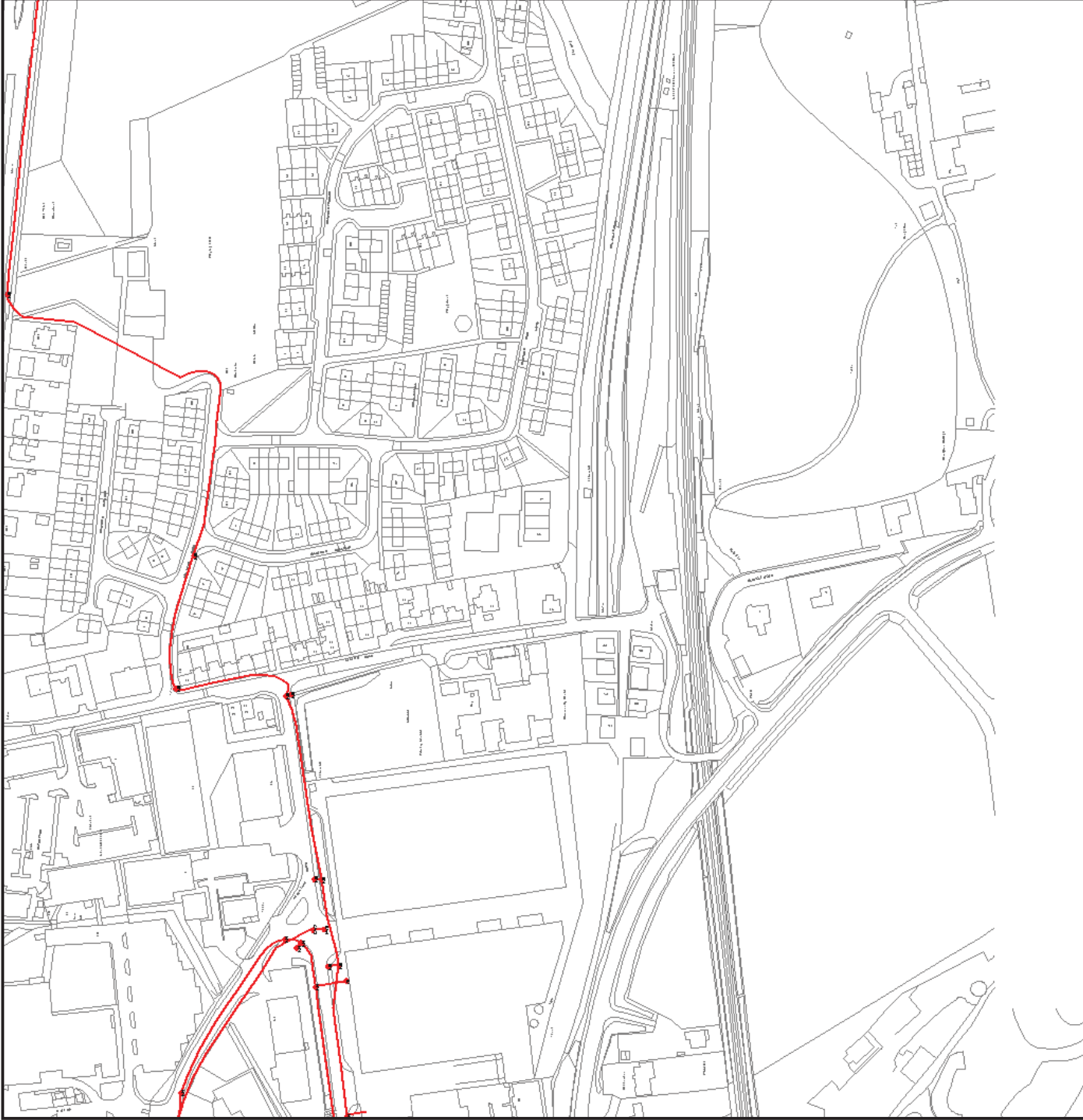
Virgin Media
New Build
Virgin Media
1 Dove Wynd
Strathclyde Business Park
Bellshill
ML4 3AL

This information is only valid on the date of issue. If your start date is 3 months or more from the date of this letter, please re-apply for updated information.

Yours faithfully,

National Plant Enquiries Team

Please note: National Plant Enquiries Team (Basildon) cover and respond to plant enquiries for all ex ntl:Telewest franchise areas.



Title:
VM.62679

Legend:

Duct, Trench
Chamber
Cabinet



Important Information - please read

The purpose of this plan is to identify Virgin Media apparatus. We have tried to make it as accurate as possible but we cannot warrant its accuracy. In addition, we caution that within Virgin Media apparatus there may be instances where mains voltage power cables have been placed inside green, rather than black ducting. Further details can be found using the 'Affected Postcodes.pdf', which can be downloaded from this website.

Therefore, you must not rely solely on this plan if you are carrying out any excavation or other works in the vicinity of Virgin Media apparatus. The actual position of any underground service must be verified by cable detection equipment, etc. and established on site before any mechanical plant is used. Accordingly, unless it is due to the negligence of Virgin Media, its employees or agents, Virgin Media will not have any liability for any omissions or inaccuracies in the plan or for any loss or damage caused or arising from the use of and/or any reliance on this plan.

This plan is produced by Virgin Media Limited from Ordnance Survey © Crown Copyright 100019209

Map Centre:

313271, 672259

Date:
22 Jul 2011

Scale:
1 : 2500

Trial Pit Log



Contract: BE4 BD21 Bridges			Client: Jacobs Engineering		Trialpit: QDS/1 TP01
Contract Ref: 761999	Date: 02.09.11	Ground Level: ---	Co-ordinates: ---		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						MADE GROUND: Tarmac.	0.12	
						MADE GROUND: Red brown to brown fine to coarse SAND and GRAVEL of sandstone.	0.28	
						MADE GROUND: Sandstone COBBLES.	(0.29)	
							0.57	
						Trial pit terminated at 0.57m depth on sandstone arch crown.		

<div>Plan (Not to Scale)</div> <div></div>		General Remarks			
		<div>1. Trial hole carried out in pavement.</div> <div>2. Service plans checked and position CAT scanned prior to excavation.</div> <div>3. No groundwater encountered during excavation.</div> <div>4. Trial hole backfilled and reinstated to local authority specification.</div>			
		All dimensions in metres		Scale: 1:25	
Method Used: Hand dug	Plant Used: Hand tools	Logged By: [REDACTED]	Checked By: [REDACTED]		

Appendix D

Form AA



FORM 'AA' (BRIDGES)**GC/TP0356**

ELR/ Bridge No QDS/1

Appendix: 4

Issue: 1

Revision: B (Nov 2000)

APPROVAL IN PRINCIPLE FOR ASSESSMENT**Bridge/Line Name: Ratho Station Road/Ratho to Dalmeny line****ELR/Bridge No. QDS/1****Brief Description of Existing Bridge:****(a) Span Arrangement**

The structure is a square single span arch overbridge. The clear square span is 8.55m (28').

(b) Superstructure Type

The arch barrel is segmental constructed from ashlar sandstone blocks.

The arch barrel rise is approximately 1.6m (5' – 3") at midspan. The thickness of the arch barrel was measured as a minimum of 383mm at the crown by level survey.

(c) Substructure Type

The arch is supported upon gravity type abutments constructed from large stone blocks. The spandrel walls and box wingwalls are constructed from the same type of stone, albeit using smaller sized blocks.

(d) Planned highway works/modifications at this site

None

(e) Road designation class and whether classed as a heavy load route

Bridge QDS/1 carries Station Road (unclassified) over the track bed of the former Ratho to Dalmeny line in Ratho. The road is a single carriageway 5.75m wide at the centre of the span. There is a footpath on the east side that is 1.25m wide and a verge on the west side which is approximately 0.64m wide. Overall width between parapets is 7.64m.

The road is quiet with occasional HGV use. It is unlikely to be a heavy load route.

(f) Any other requirements

None

FORM 'AA' (BRIDGES)**GC/TP0356**

ELR/ Bridge No QDS/1

Appendix: 4

Issue: 1

Revision: B (Nov 2000)

APPROVAL IN PRINCIPLE FOR ASSESSMENT**Assessment Criteria****(a) Loadings and Speed**

Dimensions and condition factors are obtained from site measurements and inspection. (See Jacobs report "VAR9-3299 Assessment Programme – Assessment and Inspection Report – Bridge Ref.: QDS/1" – October 2011). The final allowable axle load obtained by calculation will be compared to the 9 ton axle load permitted by BE4.

(b) Codes to be used

BE4 - "The Assessment of Highway Bridges for Construction and Use Vehicles" Ministry of Transport, 1967 (with amendments to 1969).

(c) Proposed Method of Structural Analysis

It is proposed to use the modified MEXE method of assessment as outlined in Part III of BE4.

The following factors are proposed indicating the condition of the arch for the MEXE assessment:

Ring factor	F_r	1.4
Fill Factor	F_f	0.7
(Joint) width factor	F_w	1.0
(Joint) depth factor	F_d	1.0
Mortar factor	F_m	0.9
Condition factor	F_{cm}	0.9

The substructure will be assessed qualitatively.

FORM 'AA' (BRIDGES)**GC/TP0356**

ELR/ Bridge No QDS/1

Appendix: 4

Issue: 1

Revision: B (Nov 2000)

APPROVAL IN PRINCIPLE FOR ASSESSMENT**Senior Civil Engineer's Comments**

None

Proposed Category for Independent Check1.....

Superstructure1.....

Substructure1.....

Name of Checker suggested if Cat 2 or 3Not Applicable.....

Category 1

The above assessment, with amendments shown, is approved in principle:

Signed [Redacted]

Title [Redacted]

[Redacted] [Redacted]

Category 2 and 3

The above assessment, with amendments shown, is approved in principle:

Signed [Redacted]

Title [Redacted]

Date [Redacted]

Signed [Redacted]

Title [Redacted]

Date [Redacted]

Appendix E

Form BA

FORM 'BA' (BRIDGES)**GC/TP0356**

ELR/ Bridge No QDS/1

Appendix: 4

Issue: 1

Revision: A (Dec 2005)

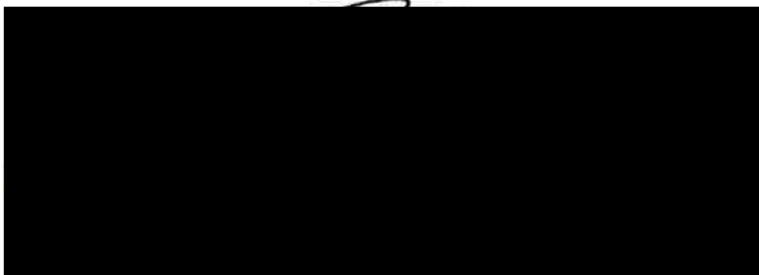
CERTIFICATION FOR ASSESSMENT CHECK**Assessment Group:** Jacobs Engineering UK Ltd**Bridge/Line Name:** Ratho Station Road/Ratho to Dalmeny**Category of Check:** 1**ELR/ Bridge No:** QDS/1

We certify that reasonable professional skill and care have been used in the assessment of the above structure with a view to securing that:

- (1) It has been assessed in accordance with the principles recorded in the accompanying Form AA.
- (2) It has been checked for compliance with the following principal British Standards, Codes of Practice, BRB (Residuary) Limited technical notes and Assessment standards:
 - BE4 - "The Assessment of Highway Bridges for Construction and Use Vehicles" Ministry of Transport, 1967 (with amendments to 1969).

List any departures from the above and additional methods or criteria adopted, with reference and justification for their acceptance.

None

Category 1NameSignatureDate

Assessor

Assessment Checker

Authorised signatory of the
firm of Consulting
Engineers to whom
Assessor/Checker is
responsible.

FORM 'BA' (BRIDGES)**GC/TP0356**

ELR/ Bridge No QDS/1

Appendix: 4

Issue: 1

Revision: A (Dec 2005)

CERTIFICATION FOR ASSESSMENT CHECKCategory 2 and 3 (Note: Category 1 check must also be signed)**(a) Assessment**NameSignatureDate

Assessor

Assessment Checker

Authorised signatory of the
firm of Consulting
Engineers to whom
Assessor/Checker is
responsible.

(b) CheckNameSignatureDate

Assessor

Assessment Checker

Authorised signatory of the
firm of Consulting
Engineers to whom
Assessor/Checker is
responsible.

This Certificate is accepted by.....

FORM 'BAA' (BRIDGES)

GC/TP0356

ELR/ Bridge No QDS/1

Appendix: 4

Issue: 1

Revision: A (Dec 2005)

CERTIFICATION FOR ASSESSMENT CHECK**Notification of Assessment Check**

Assessment Group	Jacobs Engineering UK Ltd
Bridge Name/Road No.	Ratho Station Road/Unclassified Road
Line Name	Ratho to Dalmeny
ELR Code/Structure No.	QDS/1

The above bridge has been assessed and checked in accordance with Standards which are listed on the appended Form BA. A summary of the results of the assessment in terms of capacity and restrictions is as follows:-

STATEMENT OF CAPACITY


Masonry arch (MEXE)	Full C&U vehicle loading to BE4 – tandem 9 ton axles.
Substructure:	Full C&U loading by qualitative assessment.

Recommended Loading Restrictions

None

Description of Structural Deficiencies and Recommended Strengthening

The bridge is in good condition and requires little maintenance other than keeping vegetation under control.

<u>Name</u>	<u>Signature</u>	<u>Date</u>	
		23/11/11	Assessor
		23/11/11	Assessment Checker
		30/11/11	Authorised signatory of the firm of Consulting Engineers to whom Assessor/Checker is responsible.

This Certificate is accepted by...





CALCULATION COVER SHEET

Jacobs
York

Project Title: BRB (Residuary) Ltd - Major Works 2009/2012		Calc. No.: 0447821
Job No: B12360BN		File: VAR9/3299
Project Manager	[REDACTED]	Subject: QDS/1 Ratho Station Road, Ratho BE4 Assessment
Assessor		
Project Group 31200		

	Total Sheets	Made by	Date	Checked by	Date	Reviewed by	Date		
Original	3	[REDACTED]	Oct-11	[REDACTED]	Nov-11				
Rev									
Rev									
Rev									
Rev									
Rev									

Superseded by Calculation No.

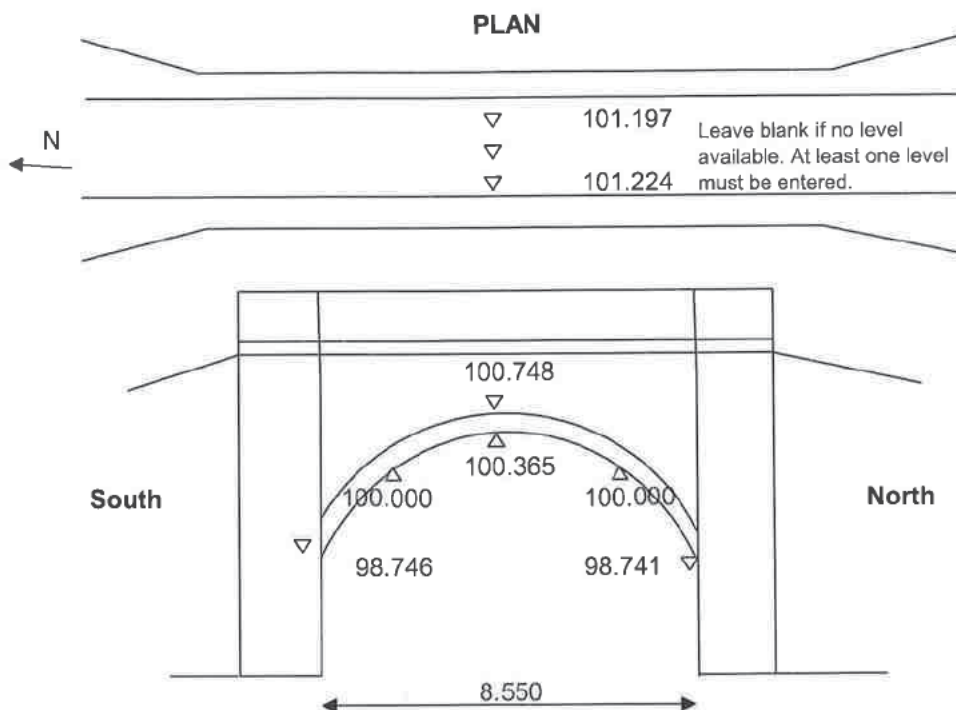
Date

For assessment criteria, refer to Approval in Principle (Form AA) document

CALCULATION SHEET

JACOBS

Project Title : BRB (Residuary) Ltd - 2010/11 assessment programme			Sheet No :	1			
Subject : QDS/1			Calc No :	0447821			
Job No : B12360BN			File :	VAR9/3299			
Made by :		Date :	20/10/2011	Revised by :		Date :	
Checked by :		Date :		Checked by :		Date :	



Dimensions taken from site measurements / Desk study

Span	L =	8.55 m
Rise of arch barrel at crown	rc =	1.622 m
Rise of arch barrel at 1/4 pts	rq =	1.257 m
Thickness of arch barrel adjacent to keystone	d =	0.383 m
Av depth of fill bet. road surface & arch barrel at crown	h =	0.462 m

Notes: East face of bridge
Arch is segmental, rise at quarter point is calculated based on circular profile

The factors represent the general condition of the soffit of the arch.

Note:-All measurements are in metres.

Structure Ref QDS/1

Assessment of Masonry Arch by the Modified MESE Method

Span L (m) 8.550
 Rise of arch barrel at crown r_c (m) 1.622
 Rise of arch barrel at 1/4 pts r_q (m) 1.257
 Thickness of arch barrel adjacent to keystone d (m) 0.383
 Av depth of fill between road surface & arch barrel at crown h (m) 0.462

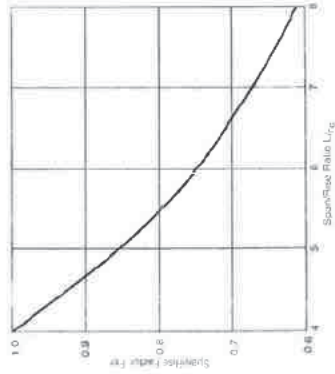


Fig 7

(max = 70)
 (formula = $(740[d+ht]^2)/L^{1.3}$)

(4 or less = span/rise factor = 1)

(Max = 1)
 (formula = $2.3[(r_c - r_q)/r_c]^{0.6}$)

(table 3 BE4)

(table 4 BE4)

(formula = $[(r_c \cdot d) + (f \cdot h)] / (d + h)$)

(table 5 BE4)

(table 6 BE4)

(table 7 BE4)

(formula = $F_w \cdot F_d \cdot F_m$)

(0= poor, 1 = good condition)

Span factor due to pier flexibility

MODIFIED AXLE LOAD
 (formula = $F_g \cdot F_p \cdot F_m \cdot F_j \cdot F_{cm} \cdot PAL$)
 20.68
 21 tons
 > than 9 tons therefore ok for BE4
 (Round up or down to nearest ton)

According to Part III (Assessment of masonry and brick arch bridges-clause 2) a rating of >9 Tons means that the bridge is capable carrying vehicles with tandem 9 ton axles, and since a such bridge is also capable of carrying vehicles with a single 11 ton axle, it follows that the arch bridge with final assessment of >9 Tons is unrestricted for all vehicles complying with Construction and Use Regulations (1967) issue.

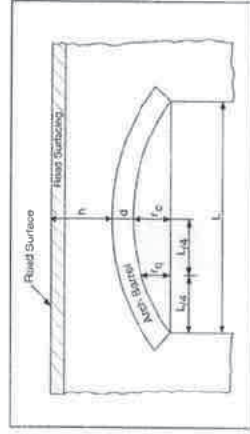


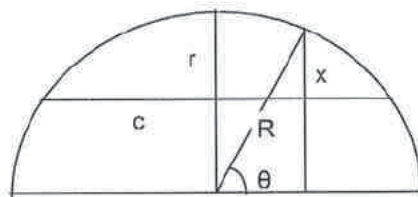
Figure 32 Arch Dimensions

Table 3	Granite, whinstone and built-in-course masonry, with large shaped voussoirs	Fr	1.5
	Concrete or engineering bricks		1.2
	Limestone, good random masonry and building bricks in good condition		1.0
	Masonry of (any kind) or brickwork in poor condition (many voussoirs flaking or badly		0.7
Table 4	Concrete slab or saddle	Ff	1.0
	Grouted materials (other than those with clay content)		0.9
	Well compacted materials		0.7
	Weak materials evidenced by tracking of the carriageway surface		0.5
Table 5	Joint with width up to 6mm	Fw	1.0
	Joints with widths between 6mm and 12.5mm		0.9
	Joints with widths over 12.5mm		0.8
Table 6	Pointed joints in good condition	Fd	1.0
	Unpointed joints, pointing in poor condition and joints with up to 0.5in from edge insufficiently		0.9
	Joints with from 0.5in to 1 tenth of the thickness of the ring insufficiently filled		0.8
	Joints insufficiently		At Engineer's
Table 7	Mortar in good condition	Fm	1.0
	Loose or friable mortar		0.9
	Span factor (from RT/CE/C015 Section 5.2.5.9)		
	Arch supported on one abutment and one pier		0.9
	Arch supported on two piers		0.8
	Arch supported on abutments or two massive type piers		1.0

CALCULATION SHEET

JACOBS

Project Title BRB (Residuary) Ltd - 2010/11 assessment programme		Sheet No :	3
Subject : QDS/1		Calc No :	447802
Job No : B12360BN		File :	VAR9/3299
Made by :		Date : 20/10/2011	Revised by :
Checked by :		Date :	Checked by :



Rise at crown, $r =$ 1.6215 m
 Span = 8.550 m
 Half span, $c =$ 4.275 m

$$\text{Radius } R = (c^2 + r^2) / 2r$$

Radius $R =$ 6.446157 m

$$\text{Angle subtended, } \theta = \cos^{-1} ((\text{span}/4) / R) = 70.63451 \text{ deg}$$

$$\text{Quarter. pt. rise, } x = R \sin \theta - (R - r) = 1.257 \text{ m}$$