# RIIO GD2 Business Plan Appendix

## Repair Service

## December 2019


SGN
Your gas. Our network

www.sgn.co.uk

## Contents

# 1 Overview

**Scope**

Repair activities are about safeguarding life and property, managing potentially unsafe situations by reducing the risk on our network. This appendix sets out the resource and cost requirements to deliver the repair service during GD2. Operational repair includes repairing gas mains and services, responding to third-party damage and associated reinstatement costs.

Our repair activities support delivery of our core responsibility of a safe network to be delivered, and as such contribute to all customer priorities identified through our stakeholder engagement and discussed in our Enhanced Engagement appendix (022).

For example, by promptly and effectively undertaking repair activities, and continuously focussing on reducing the duration of unplanned interruptions we ensure the safety of the network and its continued operation, therefore impacting 'acting safely' and 'keeping the gas flowing'. By efficiently managing and prioritising our repair workloads we are 'keeping costs down' while 'providing excellent customer service' by addressing those repairs which represent the highest risk to the network.

**Impact**

The repair service operates on a continuous basis throughout the year, managing our repair risk and undertaking permanent repairs as required. Along with our Emergency, Replacement, and Connections activities, our Repair activities are the most likely point of contact between SGN and our customers and stakeholders.

Our customer feedback has shown that 'keeping the gas flowing' and 'acting safely' are key priorities. Repair activities help ensure the safety of our network while improving its reliability and securing the availability of supply to our customers. Further detail of our customer and stakeholder feedback is shown in section 4 of this appendix and our Enhanced Engagement appendix (022).

Repair activities affect the other customer priorities in the following way:

- Supporting communities. Along with our emergency service, our repair service is at the forefront of our interaction with our local communities. We recruit our operatives from our local footprint, training and retaining employees to provide diverse employment opportunities. We have trained our operatives and provided them with the tools required to identify vulnerable customers and refer them for further support where required. Further information on this can be found in our Customer and Vulnerability Plan (023).

- Providing excellent service. As with all GDNs our customer service is measured via a postal survey provided by a third party. Throughout GD1 the Emergency and Repair category has constantly been ranked above 9/10 and shown year-on-year improvements in Scotland with similar results in Southern (Figure 10:). All our operatives strive to deliver a 10/10 service, and this is embedded within our depot structures.

- Minimising environmental impact. The Global Warming Potential (GWP) is an index recommended for use by Ofgem, which was developed to allow comparisons of the global warming impacts of different gases. It measures how much energy the emissions of a unit mass of a gas will absorb over a given period of time, relative to the emissions of a unit mass of carbon dioxide. The GWP for methane is 25 over 100 years. This means that methane is 25 times more potent than carbon dioxide over a period of 100 years. Our repair service acts quickly, safely, and efficiently to repair our assets which are causing the leakage of methane to our environment. Our Scotland and Southern networks have the highest levels of performance across all GDNs in preventing the leakage of gas within 12 hours. This is achieved against a backdrop of the most challenging price control targets in this area. Ergo, the efficiency of our service in preventing minimising

the time gas is escaping is having a direct impact on our environmental emissions.

We are also proud of our 0% spoil to landfill (as a percentage of total excavated spoil) that we have achieved over the 2015/16 to 2017/18 reporting years. We also hold ISO 14001 environmental management accreditation which covers our operational sites, further information of which can be found in our Environmental Action Plan (EAP).

- Future energy solutions. Although our repair service does not directly contribute to the development of future energy solutions, the work our repair service performs in conserving the integrity of our assets contributes to the longevity of our network and its suitability to deliver benefit to our customers into the future, supporting future energy solutions.

- Keeping costs down. This is a key priority for us. We endeavour to minimise the costs of our repairs through innovative managerial and engineering activities. Innovation is a key part of this and we have developed a number of innovative tools and techniques within our repair service, benefiting both our customers and key stakeholders. Further information on innovation can be found in the main body of this appendix and our Innovation appendix (008). We also utilise managerial, procurement, and business process improvements to further reduce costs in our repair service. Further information can be found below in the main body of this appendix. In GD1 repair activities accounted for approximately 5% of our total expenditure (totex).

**Approach to GD2**

In our approach to GD2, we will be maintaining a safe and reliable network that has customer service at its core.

This strategy builds on the successes that we delivered over the course of GD1. Our achievements in repair throughout GD1 include:

- Management of repairs (repair risk). Throughout every year of the GD1 period to-date both our Scotland and Southern networks have surpassed their targets for this primary output measure and significantly reduced the residual repair risk on our network, as a cumulative annual total, versus the Ofgem target. Southern has delivered the greatest overall mean average risk reduction, relative to target, of any GDN through the GD1 period to the end of 2017/18.
- Safety deliverable – GS(M)R 12-hour escape repair. Both Scotland and Southern have exceeded their targets for gas escapes prevented within 12 hours, against the backdrop of the most challenging annual targets of all GDNs. This requirement is not only a RIIO measure but also part of UK legislation to prevent reported gas escapes within 12 hours.

Although we are not expecting the management of repair risk and 12-hour gas escape prevention to form part of the GD2 framework, we will continue to use these measures as performance metrics, continuing to deliver the standards we have delivered in GD1 through into GD2 to ensure that our repair service is safe and efficient, delivering value for money for our customers. This is supported by our customer priorities of acting safely, keeping the gas flowing, and keeping the costs down.

- Customer satisfaction. Throughout every year of the GD1 period Scotland and Southern have delivered a level of customer service in the repair work stream rated as more than 9/10 in the Ofgem customer satisfaction survey. With six-year average scores of 9.40 and 9.28 for our Scotland and Southern networks respectively, within very challenging demographical and geographical areas.
- Reduced complaints. Ofgem also set targets to reduce the number of customer complaints throughout the GD1 period. This metric covers all a GDNs work; however, both of our networks have been successful in reducing their Ofgem complaints metric score year on year throughout the GD1 period. We have delivered complaints metric reductions in our combined emergency and repair functions of 60% in

Scotland and 63% in Southern from 2013 to 2019.

Throughout GD1 we have embedded a customer service culture within our repair service with challenging in-house targets of complaint reduction and resolution, always endeavouring to deliver a 10/10 service. This customer service momentum will be maintained in GD2 as we continue to uphold our 10/10 strategy and complaint reduction and resolution targets.

Based on these assumptions and the forecasts set out in the appendix we have defined our expected expenditure profile for the GD2 period. Notable in this forecast is the continued reduction in mains repairs expenditure. This is due to the continued roll out of the repex programme and the assumptions made regarding seasonal weather norms, discussed later in this document.

References to the Business Plan Data Templates (BPDTs) can be found in section 6.11.

## Forecast investment

### Table 1: GD2 forecast expenditure profile

| SGN (£m) | 13/14 | 14/15 | 15/16 | 16/17 | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mains Repairs | 23.4 | 21.3 | 19.9 | 20.2 | 20.8 | 21.0 | 20.9 | 20.3 | 19.6 | 18.6 | 17.6 | 16.7 | 15.9 |
| Service Repairs | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 |
| Mains Damages (Net) | -3.4 | -0.6 | -1.1 | -0.1 | -0.4 | -0.3 | -0.2 | -0.2 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| Service Damages (Net) | -0.9 | -1.0 | -0.8 | -0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| Repair Other | 3.4 | 4.5 | 1.9 | 2.1 | 1.9 | 2.2 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 |
| Transport and Plant | 7.2 | 4.7 | 4.1 | 3.8 | 3.7 | 4.0 | 3.5 | 3.5 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 |
| Employee Related Overheads | 3.0 | 2.7 | 0.7 | 1.3 | 2.0 | 1.6 | 1.2 | 1.1 | 1.6 | 1.8 | 1.8 | 1.9 | 2.1 |
| **Total** | **33.8** | **32.5** | **25.7** | **27.6** | **28.3** | **29.4** | **28.3** | **27.6** | **27.1** | **26.2** | **25.2** | **24.3** | **23.7** |

| Scotland (£m) | 13/14 | 14/15 | 15/16 | 16/17 | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mains Repairs | 4.8 | 4.1 | 4.1 | 4.4 | 5.0 | 4.8 | 4.8 | 4.6 | 4.6 | 4.5 | 4.4 | 4.3 | 4.1 |
| Service Repairs | 0.5 | 0.4 | 0.4 | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| Mains Damages (Net) | -2.4 | -0.2 | -0.1 | -0.1 | -0.0 | -0.0 | -0.1 | -0.1 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 |
| Service Damages (Net) | -0.2 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 |
| Repair Other | 0.3 | 0.3 | 0.4 | 0.2 | 0.2 | 0.1 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Transport and Plant | 3.6 | 1.3 | 1.0 | 1.2 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Employee Related Overheads | 1.3 | 0.7 | 0.4 | 0.4 | 0.6 | 0.5 | 0.3 | 0.3 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 |
| **Total** | **7.9** | **6.5** | **6.0** | **6.4** | **7.3** | **6.7** | **6.9** | **6.7** | **6.9** | **6.8** | **6.7** | **6.6** | **6.5** |

| Southern (£m) | 13/14 | 14/15 | 15/16 | 16/17 | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mains Repairs | 18.7 | 17.1 | 15.9 | 15.9 | 15.8 | 16.2 | 16.1 | 15.7 | 15.0 | 14.1 | 13.2 | 12.5 | 11.7 |
| Service Repairs | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 |
| Mains Damages (Net) | -1.0 | -0.4 | -1.1 | -0.2 | -0.4 | -0.3 | -0.1 | -0.1 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| Service Damages (Net) | -0.7 | -0.8 | -0.6 | -0.5 | -0.5 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |
| Repair Other | 3.1 | 4.2 | 1.5 | 1.9 | 1.7 | 2.2 | 1.7 | 1.7 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 |
| Transport and Plant | 3.6 | 3.3 | 3.1 | 2.6 | 2.3 | 2.8 | 2.3 | 2.3 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| Employee Related Overheads | 1.8 | 2.0 | 0.4 | 0.9 | 1.4 | 1.1 | 0.8 | 0.8 | 1.1 | 1.2 | 1.3 | 1.3 | 1.5 |
| **Total** | **26.0** | **26.0** | **19.7** | **21.2** | **21.0** | **22.7** | **21.4** | **20.9** | **20.2** | **19.4** | **18.5** | **17.7** | **17.2** |

# 2 Repair within the business plan

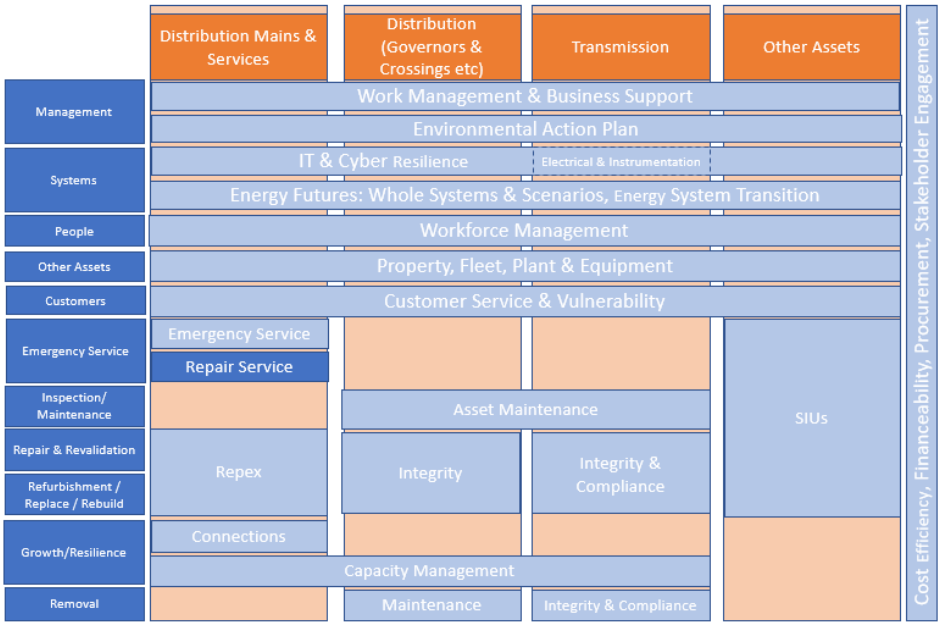
This appendix provides an explanation of the service that we maintain to all our customers to respond and implement a full repair once an escape has been identified.

The repair workload is distinguishable from the emergency service workload as the emergency service priority is to make a situation safe; if they can implement a repair then the emergency responder will do so; however, in many instances this repair will require specialist teams and ensure supplies are maintained.

Approximately 9% (Scotland) and 14% (Southern) of reported gas escapes attended by the emergency service function result in a mains or service repair report that will be attended by a team from the repair function.

The repair work in this appendix is directly related to public reported escapes and as such differs from repair work that is set out in the integrity appendices for transmission and distribution that follows from an in inspection or maintenance regime.

**Figure 1: Appendix structure**




Over the course of GD1 the provision of our repair service accounted for approximately 5% of total expenditure.

# 3 GD1 Performance and learnings

## 3.1 Overview

Throughout the GD1 period to the end of the 2018/19 reporting year, our combined networks have completed over 60,000 mains repair reports, 80,000 service repair reports (including over 7,000 iron fracture or corrosion events), while achieving gas escape prevention rates of greater than 60% every year and reducing our residual repair risk on our networks.

### Repair

If a gas escape is found to emanate from our distribution network mains or services, upstream of a customer Emergency Control Valve (ECV), the Public Reported Escape (PRE) is passed to our First Call Operative (FCO).

Where the FCO's risk assessment identifies Immediate Action Criteria (IAC), then an immediate request is made for a repair team to attend to prevent the gas escape.

IAC is defined by six scenarios:

**Figure 2: Gas escape risk assessment matrix**

| | | | | Distance - Gas Reading to nearest Building Line | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | GAS READING | 0 - 0.5m | 0.6 - 2.5m | 2.6 - 5.0m | 5.1 - 10.0m | 10.1 - 20.0m | 20.1 - 30.0m | 30.1m upwards |
| CELLARS | LP | 2m OR LESS OPEN GROUND | 75.1% - 100% GIA | 3491 | 3082 | 2462 | 1694 | 802 | 296 | 66 |
| | | | 50.1% - 75% GIA | 2424 | 2140 | 1710 | 1177 | 557 | 206 | 46 |
| | | | 25.1% - 50% GIA | 1454 | 1284 | 1026 | 706 | 334 | 123 | 28 |
| | | | 5.1% - 25% GIA | 582 | 514 | 410 | 282 | 134 | 49 | 11 |
| | | | 0 - 5% GIA (100% LEL) | 339 | 86 | 68 | 47 | 22 | 8 | 2 |
| | | 2.1m OR MORE OPEN GROUND | 75.1% - 100% GIA | 2888 | 2550 | 2037 | 1402 | 664 | 245 | 55 |
| | | | 50.1% - 75% GIA | 2006 | 1771 | 1415 | 974 | 461 | 170 | 38 |
| | | | 25.1% - 50% GIA | 1203 | 1062 | 849 | 584 | 277 | 102 | 23 |
| | | | 5.1% - 25% GIA | 481 | 425 | 340 | 234 | 111 | 41 | 9 |
| | | | 0 - 5% GIA (100% LEL) | 339 | 71 | 57 | 39 | 18 | 7 | 2 |
| | MP/IP | OPEN OR CLOSED GROUND | 75.1% - 100% GIA | 5009 | 4422 | 3534 | 2431 | 1151 | 425 | 95 |
| | | | 50.1% - 75% GIA | 3479 | 3071 | 2454 | 1688 | 799 | 295 | 66 |
| | | | 25.1% - 50% GIA | 2087 | 1843 | 1472 | 1013 | 480 | 177 | 40 |
| | | | 5.1% - 25% GIA | 835 | 737 | 589 | 405 | 192 | 71 | 16 |
| | | | 0 - 5% GIA (100% LEL) | 339 | 123 | 98 | 68 | 32 | 12 | 3 |
| NO CELLARS | LP | 2m OR LESS OPEN GROUND | 75.1% - 100% GIA | 1906 | 1682 | 1344 | 925 | 438 | 162 | 36 |
| | | | 50.1% - 75% GIA | 1323 | 1168 | 934 | 642 | 304 | 112 | 25 |
| | | | 25.1% - 50% GIA | 794 | 701 | 560 | 385 | 182 | 67 | 15 |
| | | | 5.1% - 25% GIA | 339 | 280 | 224 | 154 | 73 | 27 | 6 |
| | | | 0 - 5% GIA (100% LEL) | 339 | 47 | 37 | 26 | 12 | 4 | 1 |
| | | 2.1m OR MORE OPEN GROUND | 75.1% - 100% GIA | 1577 | 1392 | 1112 | 765 | 362 | 134 | 30 |
| | | | 50.1% - 75% GIA | 1095 | 967 | 772 | 531 | 252 | 93 | 21 |
| | | | 25.1% - 50% GIA | 657 | 580 | 463 | 319 | 151 | 56 | 12 |
| | | | 5.1% - 25% GIA | 339 | 232 | 185 | 128 | 60 | 22 | 5 |
| | | | 0 - 5% GIA (100% LEL) | 339 | 39 | 31 | 21 | 10 | 4 | 1 |
| | MP/IP | OPEN OR CLOSED GROUND | 75.1% - 100% GIA | 2735 | 2414 | 1929 | 1327 | 628 | 232 | 52 |
| | | | 50.1% - 75% GIA | 1899 | 1676 | 1340 | 922 | 436 | 161 | 36 |
| | | | 25.1% - 50% GIA | 1139 | 1006 | 804 | 553 | 262 | 97 | 22 |
| | | | 5.1% - 25% GIA | 456 | 402 | 322 | 221 | 105 | 39 | 9 |
| | | | 0 - 5% GIA (100% LEL) | 339 | 67 | 54 | 37 | 17 | 6 | 1 |

Note: Reference to 0 [zero] gas reading in the Gas Reading column means any gas reading greater than 0 [zero].
Do not calculate risk prioritisation scores for gas reading locations where 0 [zero] has been recorded

1. A blowing gas escape (hear, feel, see)
2. Gas is present in or under a building
3. Gas is present within 500mm of a building
4. A main or service within 5m of a building operating at a pressure greater than 75mbar(g), from which the gas escape could be emanating
5. Gas is present in ducts
6. Gas escape is categorised as 'red' as per the gas escape risk assessment matrix (Figure 2:).

The risk assessment matrix shown in Figure 2: compares gas concentration, the type of ground cover, the pressure of nearby gas apparatus, the distance to the nearest building and the presence of cellars in which gas could accumulate.

Alternatively, if the FCO's risk assessment does not identify an IAC, and there are constraints which obstruct the immediate prevention of the gas escape, then the repair can be completed within an extended time-frame. There are three constraint categories which can justify this extended time-frame:

1. Physical characteristics – for example where deep excavation work or specialist equipment is required
2. Social and environmental – for example work during the early hours of the morning in a residential area, or work in a Site of Specific Scientific Interest (SSSI)
3. Resource – where the volume of ongoing gas escapes exceeds the capacity of the repair teams and work needs to be prioritised according to the risk score of the incident

Within our procedures there are three repair classifications: temporary, interim, or permanent. We will always endeavour to action a permanent repair in the first instance. However, there may be instances where it is safer and more cost effective to affect a temporary repair, to remove the risk for a short duration, or an interim

repair for a longer duration, before a suitable permanent repair can be actioned.

An example where a temporary repair could be used would be where a gas escape was found on a metallic distribution main which is in a location that could cause significant customer impact. In this instance a temporary repair could reduce the risk until a permanent repair can be actioned at a time that has less impact on our customers and stakeholders.

In certain instances, the repair may take longer than 12 hours to complete. This could be due to difficulties in identifying an accurate location of the precise source of the gas escape, complexities due to underground plant such as cables, ducts or other underground plant, or the requirement to fabricate and install specialist equipment.

## Workforce

Our repair teams are highly trained, competent persons compliant with the industry's Safe Control of Operations (SCO) procedures, network construction, machine operation, and most importantly how to safely and efficiently work in and around hazardous gaseous atmospheres to successfully locate and repair faults.

A team typically consists of a team leader and one gas distribution assistant, however where high volume gas escapes, or other significantly hazardous situations are found, the repair team numbers can vary. In certain situations, such as multiple occupancy buildings, additional support from FCOs is provided.

The following table demonstrates our expected workloads for the remainder of GD1 and looking ahead into GD2:

**Table 2: Repair workload profiles**

| Scotland | GD1 | | | | | | | | GD2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 13/14 | 14/15 | 15/16 | 16/17 | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 |
| Mains Condition Reports | 2873 | 2729 | 2556 | 2579 | 2588 | 2394 | 2211 | 2097 | 2025 | 1947 | 1869 | 1791 | 1713 |
| Service Condition Reports | 3661 | 2396 | 3064 | 3235 | 3094 | 3387 | 3101 | 3097 | 3101 | 3106 | 3110 | 3115 | 3121 |
| **Total Condition Reports** | 6534 | 5125 | 5620 | 5814 | 5682 | 5781 | 5312 | 5194 | 5126 | 5053 | 4979 | 4906 | 4834 |

| Southern | GD1 | | | | | | | | GD2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 13/14 | 14/15 | 15/16 | 16/17 | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 |
| Mains Condition Reports | 9237 | 8016 | 7103 | 7130 | 6985 | 6756 | 6429 | 6161 | 5896 | 5533 | 5199 | 4877 | 4567 |
| Service Condition Reports | 12755 | 7712 | 10509 | 11072 | 10319 | 11058 | 9828 | 9664 | 9517 | 9372 | 9228 | 9085 | 8943 |
| **Total Condition Reports** | 21992 | 15728 | 17612 | 18202 | 17304 | 17814 | 16257 | 15825 | 15413 | 14905 | 14427 | 13962 | 13510 |

In both networks we expect a decline in mains and service condition reports, as the repex programme continues to remove older assets which are more prone to failure.

## Repair resource

When performing repair activities on our distribution network there are five main factors that influence the costs of repair:

1. **Labour costs.** The highest proportion of costs, for direct salaries, overtime and associated employee overheads. Premium time rates are paid for work after set times such as nights and weekends, so where possible avoiding work in these periods helps to reduce costs.
2. **Reinstatement costs.** Reinstatement is the cost associated with making good our excavations and returning the site back to its original condition. It is the highest cost category after labour. Reinstatement costs are determined by the extent of excavations (number, area, depth), the surface of the site (specialist surfaces are most expensive, followed by carriageway and then footpaths), the geography and contractor rates.

3. **Contractor costs.** Costs relating to contractors required to perform specialist repair techniques or flow stopping operations for which our own employees are not qualified, licensed, or do not have the appropriate equipment to undertake. This kind of activity is prevalent on large diameter and medium pressure (>75 mbar(g), < 2bar(g)) repairs. This includes excavations over 2.5m deep which require specialist design and protection measures. From a strategic perspective it can be more cost effective to use contractors for such activities rather than maintain the capability in-house.
4. **Materials.** Such as repair clamps, sealants, pipe and fittings.
5. **Traffic management costs.** Traffic management is subject to different legislative requirements in Scotland and Southern. In Scotland, decisions are taken by the Scottish Government and the Scottish Roadworks Commissioner; in Southern, these decisions are taken, and can vary, by local authority. The Traffic Management Act 2004 (TMA) allows for the establishment of permit schemes as an alternative to the notification system (established under the New Roads and Street Work Act 1991 (NRSWA)) to support the ability of local authorities to minimise disruption of street works. Under the notification system companies undertaking works in the highway inform an authority about their intention to carry out works in the area. Under permit schemes, works promoters apply for a permit to work in the area, whereby the local authority could impose restrictions. Lane rental was introduced as a pilot to ascertain the effect of imposing daily charges of £2,500 a day on the most traffic sensitive areas of London (TfL) and Kent to reduce disruption to road users due to Street works.

## 3.2 Legislative background

The legislative requirements that mandate our repair activities which are currently in place in GD1 are assumed to remain unchanged into GD2, including, but not exclusively:

- The Gas Act 1986
- Gas Safety (Management) Regulations 1996 (GS(M)R)
- The Gas Safety (Installation and Use) Regulations 1998 (GS(I&U)R)
- The Gas Safety (Rights of Entry) Regulations 1996
- The Pipelines Safety Regulations 1996 (PSR)
- The Pressure Systems Safety Regulations (2000) (PSSR)
- The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR)
- The Construction (Design and Management) Regulations 2007 (CDM)
- Health and Safety at Work etc. Act 1974 (HASAWA)
- New Roads and Street Works Act (1991)
- Traffic Management Act (2004)
- Transport (Scotland) Act 2005

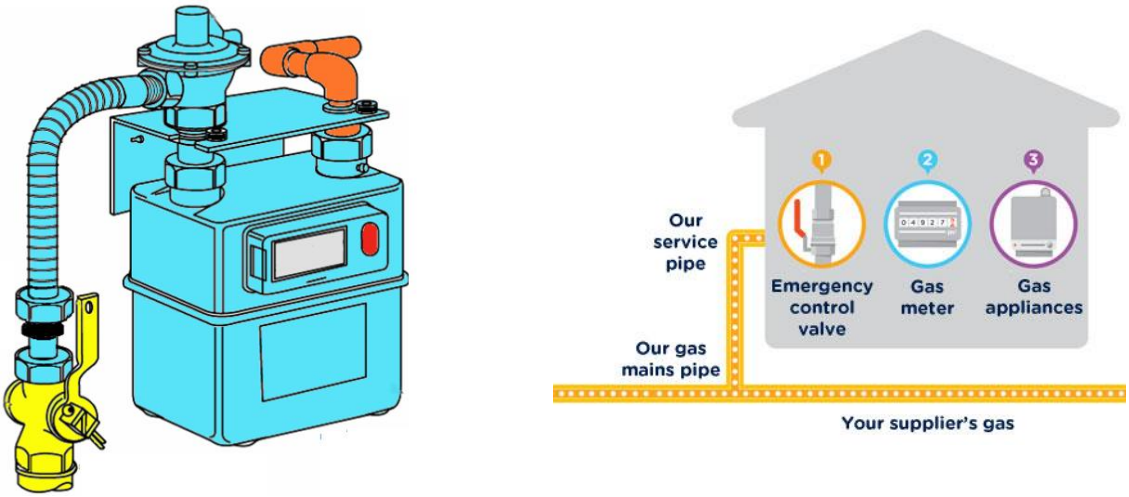
## 3.3 GD1 output delivery

In GD1 we have successfully delivered against the highest 12-hour gas prevention standard held by any network consistently throughout GD1. Furthermore, our Southern network delivered, on average, a reduction in residual repair risk, relative to target, greater than any other GDN. This exceptional repair performance in risk reduction and gas escape prevention links closely to our customers priorities of:

- Keeping the gas flowing – by ensuring the high standard of 12-hour gas prevention
- Acting safely – by safely repairing our assets, reducing the residual repair risk, and preventing within 12 hours
- Minimising environmental impact – by ensuring the high standard of 12-hour gas prevention (reducing

our methane emissions to atmosphere)

**Figure 3: Domestic supply and meter responsibility**




*SGN's responsibilities for repair[1]. Yellow items show SGN's assets and responsibilities. Gas suppliers own the gas transported through our pipes and are responsible for the maintenance of gas meters. Property owners are responsible for maintaining internal pipes and appliances. [Meter Image from ENA Gas Engineering Recommendation GER1 Issue 5.1 – 2018].*

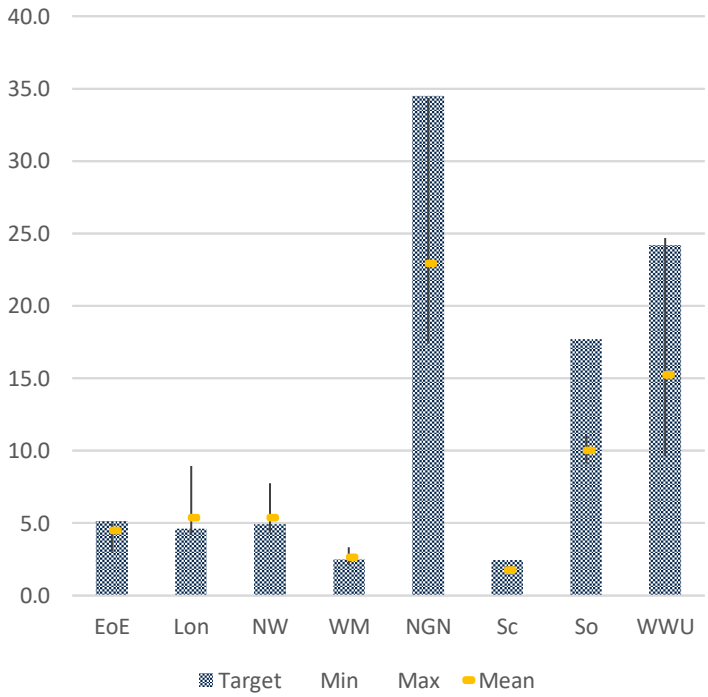
Our GD1 outputs govern most of the repair process. These are:

**Annual repair risk performance**

We are measured by Ofgem on our annual repair risk performance and targets are set for GDNs to not exceed the level of annual repair risk experienced in the year prior to GD1. Annual repair risk is the total risk score associated with all pipes which require a repair, this is recorded daily and totalled over the year. The risk score is based on a range of criteria to prioritise our repair workloads. The risk score of an individual gas escape is measured by the following coefficients:

- the concentration of gas detected using portable gas detection equipment
- the proximity of gas readings to buildings
- the amount of open or closed ground (taking into consideration any frozen conditions)
- whether or not buildings have cellars where gas may accumulate
- the pressure tier of the surrounding

**Figure 4: Residual repair risk against target**




[1] http://www.energynetworks.org/assets/files/GER1%20Version%205.1%20February%202018.pdf

distribution network

As the workload is considerably higher in our Southern network than in Scotland (11,298 mains repairs in Southern in 2018/19, compared to 3,241 in Scotland), in line with the mains population and customer base, we would reasonably expect there to be greater daily residual repair risk in Southern, and hence a greater annual repair risk output measure. It should be noted that while the annual repair risk output is consistent with network population for SGN, the outputs applied to other GDNs are not necessarily scaled in this manner.

### Gas Safety (Management) Regulations – 12-hour gas prevention

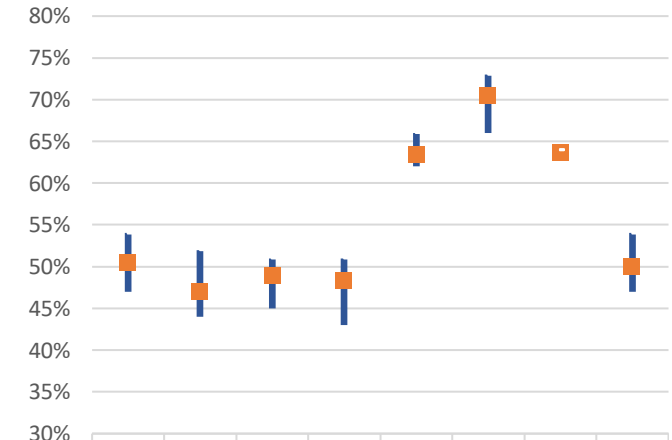
Under the Gas Safety (Management) Regulations (GS(M)R), in the event of a PRE, we are required to prevent the release of gas within 12 hours or as soon as reasonably practicable. In GD1 both of our networks were set the target by Ofgem of preventing the release of gas within 12 hours in 60% of instances. This is legislation and is written within our Safety Case.

While a PRE will always be immediately attended and assessed as part of our licence obligation, any activity to remediate a PRE traced to our distribution network will be a repair activity and as such this metric is a repair-based measurement. If the gas escape is not prevented, then the risk score associated with this will form part of the network's residual risk.

It is our duty to risk assess all PREs in line with the gas escape risk matrix discussed above, and to prioritise higher risk escapes. This prioritisation combined with constraints, and other factors such as time and location does mean that not all gas escapes are prevented within 12 hours.

At 60% we have a more challenging target than the other networks (except for one GDN who was set a phased target throughout GD1, starting lower than SGN and surpassing SGN by 1% in 2018/19) but we have still successfully over-achieved throughout GD1 to date. Both of our networks are frontier performers in this area.

**Figure 5: Delivery of the 12 hours standard over GD1 (min-max range and average)**




| | Cadent EoE | Cadent Lon | Cadent NW | Cadent WM | NGN | SGN Sc | SGN So | WWU |
|---|---|---|---|---|---|---|---|---|
| Min | 47% | 44% | 45% | 43% | 62% | 66% | 63% | 47% |
| Average | 50% | 47% | 49% | 48% | 63% | 70% | 64% | 50% |
| Max | 54% | 52% | 51% | 51% | 66% | 73% | 64% | 54% |

#### Interruptions

The GD1 price control has defined targets for the number, and the total duration, of both planned and unplanned interruptions to supply. Ensuring that interruptions are minimised is important to us as our customers have identified 'keeping the gas flowing' as one of their key priorities.

Unplanned interruptions fall into the repair category of outputs, while planned interruptions fall into the repex category. The number of unplanned interruptions is proportionate (although not on a 1:1 basis) to the amount of public reported escapes, or 'no gas' situations (loss of supply or insufficient pressure).

Our influence over the occurrence of unplanned interruptions is, therefore, primarily driven through our replacement strategy, which gradually diminishes the number of unplanned interruptions which are due to an ageing asset.

In Figure 6: and Figure 7:, we separate out the causes of unplanned interruptions; and of these 37% of interruptions in Southern and 36% in Scotland are due to leaking services, 39% of interruptions in Southern and 25% in Scotland are due to other asset failures, while 24% of interruptions in Southern and 39% in Scotland are due to third parties.

**Figure 6: Southern cause of unplanned interruptions**

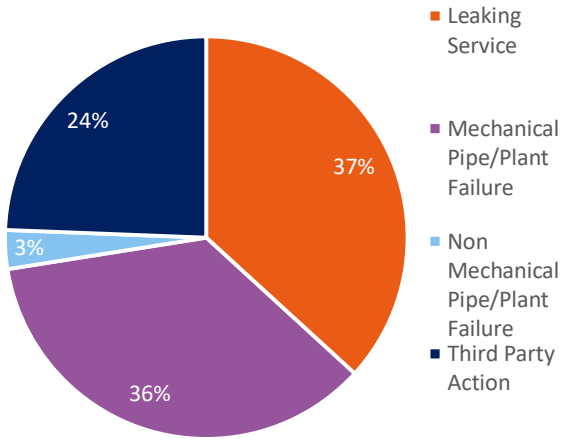
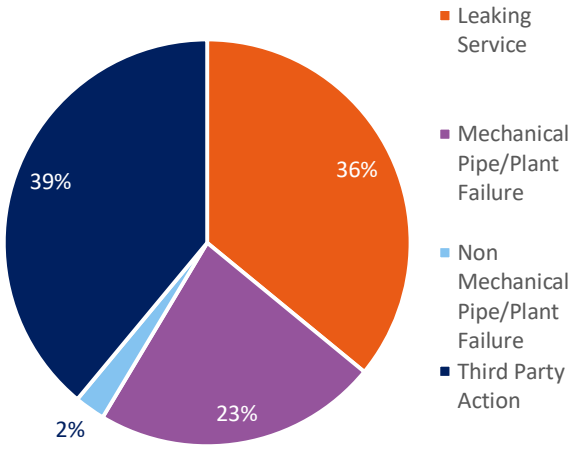



**Figure 7: Scotland cause of unplanned interruptions**



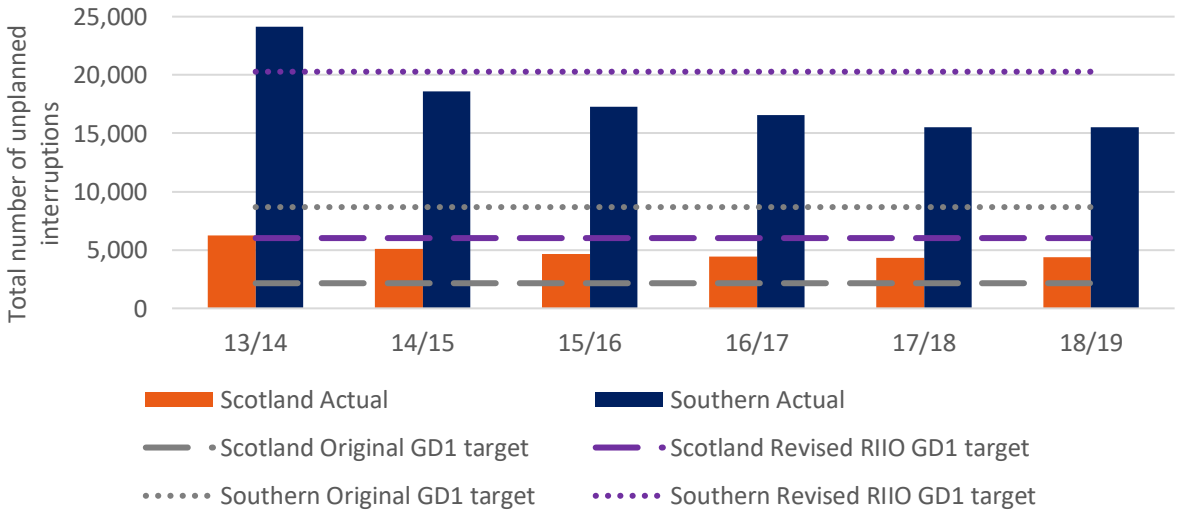

To a certain degree we are more able to influence the duration (rather than the occurrence) of unplanned interruptions. However, there are circumstances that are outside of our control regarding the duration of unplanned interruptions, for example:

- Where specialist equipment is required, such as scaffolding for riser repairs, interruption time increases.
- Where local authorities use powers under the NRSWA and TMA to enforce restrictions on our works in the highway to only working at night time on the strategic road network to minimise disruption.

As far as possible we look to resolve these issues by performing proactive assessments and refurbishment, particularly for risers in multi-occupancy buildings.

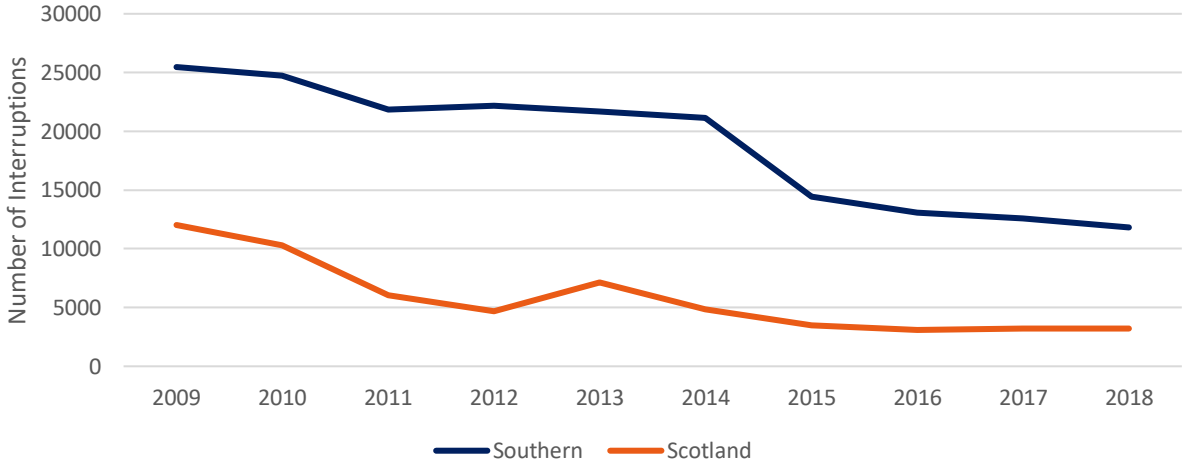
Figure 8: shows the variance to target for unplanned interruptions and shows that both Scotland and Southern have achieved the target continuously since 2014/15 and in 2017/18 both networks incurred more than 20% fewer interruption occurrences than target. It is pertinent to note that during GD1 Ofgem identified defects in some of the GDN's loss of supply targets and decided to amend the targets for the number and duration of planned and unplanned interruptions

**Figure 8: Number of unplanned interruptions variance to target**



Considering the number of interruptions, while excluding those caused by third-party actions, we can see that there has been a 55% decrease in interruptions from 2012 to 2018/19 in Scotland, and 45% in Southern.

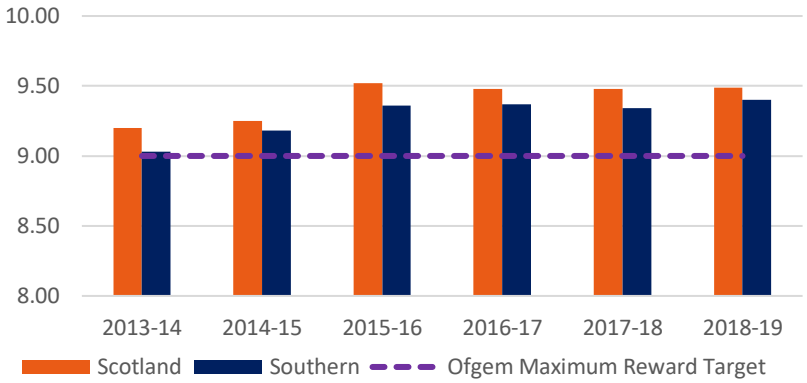
**Figure 9: Number of interruptions, excluding third party damages**




## 3.4 GD1 customer experience

In line with our customer priority of providing an excellent service, the delivery of frontier customer service has been a primary objective throughout GD1 and our efforts are reflected in our customer satisfaction scores which are shown below. The Ofgem customer satisfaction survey is segregated into three categories: emergency and repair, replacement, and connections. The data shown in Figure 10: is for emergency and repair.

**Figure 10: Emergency and repair customer satisfaction results**




To deliver a sector leading customer experience, our teams involved in operational delivery have participated in extensive training delivered by our dedicated customer experience team. This training has taken the form of face-to-face classroom-based learning utilising real-life customer experiences, role play scenarios and onsite support from the customer experience team.


**Figure 11: SGN mobile command unit**

In addition, this training his been supported by investment in technology to help measure the impact our employees are having while working in the communities we serve. Our award winning 10/10 app was developed to allow collection of real-time customer feedback enabling us to know what our customers think about our work before our engineers have left their homes. This feedback can quickly be acted upon to either praise colleagues for providing excellent service or address any concerns the customer has raised. To enhance our service offering, we included a button on the app to allow our most vulnerable customers to quickly and easily opt into the Priority Services Register (PSR).

Our customers tell us that the safety and security of their gas supply is very important to them. This is never more apparent than when we face interruptions to large numbers of customers during a gas supply incident. These incidents can be caused by a range of factors including damage to our network by third parties. Regardless of the reason for the interruption, our primary focus is on ensuring the safety of our customers and getting their gas back on as quickly as possible. The development of our mobile command unit aids our response to such incidents and helps us support our most vulnerable customers when they need us most.

All repairs to our network are completed by balancing the continuity of supply to our customers with the safety of our customers and our people. Wherever possible we endeavour to maintain supplies and minimise interruptions. We do this by utilising technology that allows us to keep the gas flowing while repairs are completed. One such technology being developed via the Network Innovation Allowance (NIA) is the stent bag which addresses the challenge of working on high volume gas escapes without needing to isolate the pipeline.

Ofgem agreed Guaranteed Standards of Performance (GSoP) underpin our customer commitments; however, we always endeavour to exceed this level of service. We have always aimed to provide a customer experience that is beyond the minimum expected from us. Our disaggregated depot structure ensures our engineers and local management teams are empowered to make decisions that deliver the best outcomes for every one of our customers, using local knowledge and experience which would not necessarily be available with a more centralised organisational structure. Every hour of every day, our local teams make decisions that are aligned with providing the best outcomes for our customers.

## 3.5 GD1 allowances and expenditure

This section of the report discusses our annual expenditure versus the allowances for repair workloads that were set by Ofgem for GD1. These allowances are tapered, declining year on year from a total for both networks of £33.8m for 2013/14 to £27.1m in 2020/21. We have embraced innovation and managerial improvement to deliver network leading safety with expenditure below these allowances, as discussed in section 5.

**Table 3: Repair expenditure versus allowances**

| £m's (18/19 Prices) | | 13/14 | 14/15 | 15/16 | 16/17 | 17/18 | 18/19 | 19/20 | 20/21 | GD1 |
|---|---|---|---|---|---|---|---|---|---|---|
| SGN | Expenditure | 33.8 | 32.5 | 25.8 | 27.6 | 28.3 | 29.4 | 28.3 | 27.6 | 233.3 |
| | Allowance | 36.6 | 36.2 | 35.6 | 35.0 | 34.3 | 33.5 | 32.6 | 31.6 | 275.4 |
| | **Variance** | 2.8 | 3.7 | 9.8 | 7.4 | 6.0 | 4.1 | 4.4 | 4.0 | 42.1 |
| Scotland | Expenditure | 7.9 | 6.5 | 6.0 | 6.4 | 7.3 | 6.7 | 6.9 | 6.7 | 54.4 |
| | Allowance | 9.3 | 9.2 | 9.2 | 9.1 | 8.9 | 8.8 | 8.6 | 8.4 | 71.5 |
| | **Variance** | 1.4 | 2.8 | 3.1 | 2.7 | 1.6 | 2.1 | 1.7 | 1.7 | 17.0 |
| Southern | Expenditure | 26.0 | 26.0 | 19.7 | 21.2 | 21.0 | 22.7 | 21.4 | 20.9 | 178.8 |
| | Allowance | 27.4 | 27.0 | 26.4 | 25.9 | 25.3 | 24.7 | 24.0 | 23.2 | 204.0 |
| | **Variance** | 1.4 | 1.0 | 6.7 | 4.7 | 4.3 | 2.0 | 2.6 | 2.3 | 25.2 |

Table 3: illustrates the repair operating expenditure and allowances for both of our networks throughout the GD1 period, including forecasts to the end of GD1. Over the GD1 period our expenditure is below allowances on average by 16%. Our strategic approach to managing residual repair risk has resulted in a saving versus allowance. However, in the later years of GD1 it is anticipated that the differential between costs and allowances will reduce due to growing cost pressures associated with a growing number of repairs on larger diameter (tiers 2 and 3) and above 75mbar(g) distribution pipes.

**Figure 12: Mains repair unit cost average (2016/17 to 2018/19) per diameter band per network**

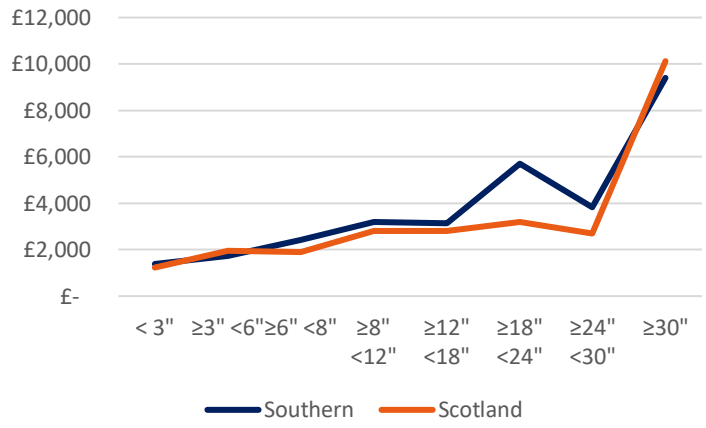



Figure 12 illustrates the historical data showing the trend in increase in expenditure in line with an increase in diameter. The effect of the increased cost of larger diameter and higher pressure tier repairs in GD2 is discussed in section 6.

**Figure 13: Scotland network percentage trend in medium pressure PREs**

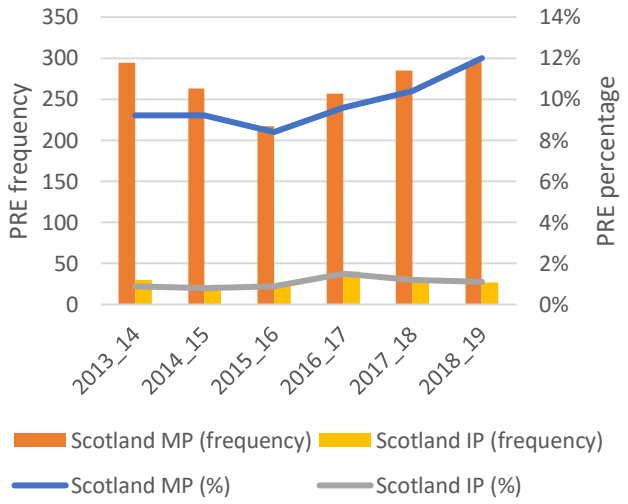
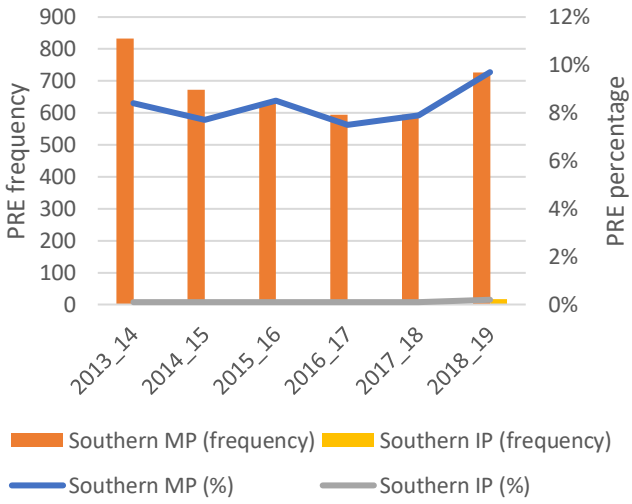



**Figure 14: Southern network percentage trend in medium pressure PREs**




Our operations strategy and procedures are focussed upon safeguarding life and property through minimising risk in the most cost-effective way. The risk is managed daily by maximising the number of gas escapes that are completed on the first visit. This is driven from a local depot level which has resulted in the exceptional performance of our residual repair risk and 12-hour standards shown throughout GD1.

Due to this core safety focus upon risk minimisation, which is engrained within the operations management structure, residual repair risk performance has improved significantly from the 2012/13 baseline to date, with minor fluctuations due to some significant peaks in winter workload.

Reducing residual repair risk leads to reduced costs and this continual drive to reduce risk yields consequent cost savings in several ways:

- **Reducing site monitoring rechecks**. Reducing the number of days by which a gas escape is not remediated reduces the number of site monitoring rechecks (SMRs) required. Each SMR adds cost hence reducing the number of days to remediate reduces number of SMRs required, which keeps costs down.
- **<12-hour gas prevention**. The repair of a PRE, in less than 12 hours in 60% of cases, requires efficient and effective resource allocation to workload, alongside reducing excavation and minimising reinstatement, resulting in a reduction in labour and reinstatement costs which are the greatest contribution to repair costs.
- **Operational productivity.** The productivity drive from depot management to ensure that residual risk is minimised also drives operational efficiency by reducing the amount of time spent on site per repair, hence reducing operational time and labour costs.
- **Depot targets.** There are consistent targets set across repair depots, regardless of volumes of workload and geography. This drives safety conscious competition within our operations structure.
- **Innovative repair techniques**. New techniques such as the SGN pioneered Core and Vac technique, along with considerate planning with local stakeholders has also yielded cost reductions through reinstatement and labour reductions.
- **Flexible resourcing**. Loose geographical boundaries between operations depots enable us to utilise our resource flexibly. During periods of high workload in one area, we move resource across a significantly large geographical footprint.
- **Organisational structures.** Management structures in both networks are designed to maximise productivity and performance in the network to which they apply. In Southern, the management structure is process aligned, with a Head of Operations and a Head of Replacement due to the size and

volume of work. In Scotland, management structures reflect a geographic focus, facilitating the use and application of local knowledge and local accountability.

- **Repex programme**. During the early part of GD1, the repex replacement mix was focussed on tier 1, as this was where the greatest risk was. Consequentially, the risk associated with these lower diameter assets was removed, delivering maximum customer benefit from a predictive risk perspective. However, average repair costs are increasing, as a repair to a larger dimeter main (tier 2 or 3, greater than 8"), is typically more expensive than a lower diameter main. More detail on the replacement programmes strategy can be found in the repex appendix.

Table 4: shows the efficiency rankings regression analysis as per the Ofgem methodology using total external condition reports.

The repair opex efficiency rankings for all GDNs in the GD1 period to 2017/18 shows that Scotland ranks on average 7th over this period and Southern 8th. However, Southern has made an improvement from early GD1, at 8th in 2013/14 to 4th in 2017/18, and Scotland has maintained an efficiency of around 6th place each year.

**Table 4: Regression analysis**

| | Efficiency rankings | | | | |
|---|---|---|---|---|---|
| | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 |
| EoE | 4 | 3 | 4 | 8 | 7 |
| Lon | 6 | 4 | 5 | 7 | 8 |
| NW | 3 | 6 | 3 | 3 | 3 |
| WM | 2 | 1 | 1 | 2 | 2 |
| NGN | 5 | 5 | 7 | 6 | 5 |
| SC | 7 | 7 | 8 | 5 | 6 |
| SO | 8 | 8 | 6 | 4 | 4 |
| WWU | 1 | 2 | 2 | 1 | 1 |

Although these are not frontier performance figures in terms of cost-based efficiency, this must be taken in close context alongside the other key outputs that are delivered within the repair opex workstream, primarily reducing residual repair risk and improving on our 12-hour gas prevention standard. It is notable that we typically achieve the greatest 12-hour standard while performing less positively in the regression analysis.

Both of our networks have seen improved efficiency scores against a backdrop of stretching targets, compared to other GDNs, and the challenges of urbanity in Southern and sparsity in Scotland.

## 3.6 GD1 lessons learned

**Accumulated repair residual risk**

The introduction of accumulated repair residual risk targets in GD1, as explained in section 3.3 above, has resulted in meeting our customer priorities of keeping costs down which in turn impacts customer bills. Further discussion of our cost efficiency can be found in our Cost Efficiency appendix (005).

Additionally, managing repair activities using such an approach means we are keeping the gas flowing and acting safely, which are two of our seven customer priorities. Although repair residual risk is not expected to be a mandatory output in GD2, we recognise the benefit of such an approach and will continue to use it as a management tool to drive productivity and safety during GD2.

**Working to improve customer experience**

We recognise that despite delivering sector leading customer service during GD1, there is still more that we can do. Analysis of the emergency and repair customer satisfaction scores shows that we have an improvement opportunity regarding our communication with customers. This analysis has been performed collaboratively between both our customer service and operations teams and has highlighted that customers place high value on communication throughout their repair and emergency service experience. This analysis also shows that we score highly with regards to communication in our emergency service, whereas this is an improvement opportunity in our repair service.

**Embracing innovation**

There has been much focus on developing innovative solutions to difficult engineering problems encountered every day by our field-based engineers. The Network Innovation Allowance (NIA) funding has allowed several projects to be developed that are delivering tangible benefits to our customers and employees every day, such as the anaerobic pressure guns, micro stop, and portable 'gas in ducts', more information on these innovations can be found in our Innovation appendix. These benefits help drive cost reductions for our customers, impacting their bills. Further discussion of our cost efficiency can be found in our Cost Efficiency appendix (005).

Minimising disruption to our customers either through interruptions or the duration of our works has meant solutions such as Core and Vac and camera systems have been implemented easily into our operations as the benefits are immediate and significantly reduce the impact of our work on customers. We will continue to develop and implement innovative solutions that provide benefits to our customers and road users, with a particular focus on vulnerable customers, during GD2. Further details of our innovation strategy can be found in our Innovation appendix (008).

**Workforce resilience**

We recognise that our successes during GD1 have been delivered by our excellent, competent workforce and that this employment, training and development yields greater societal benefits in our footprint. Furthermore, we have found that recruiting the right people in the right place can be challenging and because the training periods of our industrial workforce are protracted due to the safety critical roles we are aware that high levels of employee turnover pose a significant risk.

To ensure that we minimise our risk by maximising employee retention we have worked alongside the trade unions to jointly agree new employee terms and conditions which are more flexible. Further details can be found in our Workforce Management appendix (009).

We have also been working with charities located within our footprint to support those in the community who need it most to find employment. An example of this being our partnership with a charity in the Southampton area where we are collaboratively supporting people who are vulnerable or in need of support, the opportunity to build a brighter future by offering avenues into employment within our business.

We are also the proud holder of the gold award for the Defence Employer Recognition Scheme as we proactively demonstrate our forces-friendly credentials as part of our recruiting and selection processes. We recognise the benefits of employing ex-service personnel and reservists in our organisation and are proud of our connections with this scheme.

Throughout the GD2 period, we will continue to collaboratively work with stakeholder groups in our community to support the training and development of local people to support the local economies and deliver wider societal benefits.

**Managing disruption**

Throughout the GD1 period we have increased our awareness of the impact our repair activities have upon our customers and stakeholders, particularly regarding disruption in the highway.

Where possible, we will always seek to action a repair with minimised disruption to customers and stakeholders. As part of our innovation implementation strategy, we have successfully developed and embedded the use of the Core and Vac machine which significantly minimises the time in the highway, hence reducing disruption. This technology has received very positive feedback from highways authorities (HAs) and is frequently requested as the preferred means of repair when engaging with our stakeholders such as HAs.

To build on the success of this technology during GD1, we are preparing for GD2 by developing a 'Mark 2' version of the Core and Vac to improve the frequency of Core and Vac repairs while simultaneously reducing costs. Core and Vac is further described in section 5.2 of this appendix and our Innovation appendix (008).

# 4 Stakeholder insight

We have undertaken a comprehensive programme of engagement and research during the development of our GD2 business plan, helping us to understand our customers' and stakeholders' priorities. This is described in more detail in chapter 4 of our business plan and the Enhanced Engagement appendix (022).

As detailed below, our repair service impacts upon all three commitments at the heart of our business plan; making a positive impact, building a shared future and delivering a safe and efficient service.

The customer priorities identified through our programme of research and engagement are directly impacted by the delivery of our repair activities. For example:

- By continuing to deliver outstanding levels of performance on our accumulated residual repair risk (primary) and 12-hour gas escape (secondary) outputs we are *acting safely* and able to *keep the gas flowing*.
- Delivering this excellent performance reduces methane leakage and eliminating excavated spoil to landfill helps us to *minimise our environmental impact* (further information can be found in our Environmental Action Plan (EAP) appendix (003)).
- Developing and utilising the latest innovative repair techniques helps us reduce the cost of undertaking repair activities, meaning we *keep costs down*.
- By continually assessing the changing demands of our customers we are able to *provide excellent service*. Prioritising our most vulnerable customers ensures we are *supporting those vulnerable in our communities*.

## 4.1 Positive impact

Our customers would like us to keep our costs down, maintain excellent levels of service and support those vulnerable in our communities[2,3].

We have engaged with our stakeholders to develop a consistent approach to identifying vulnerability,[4,5] and we also continue to take practical steps to protecting vulnerable customers, for example by fitting a locking cooker valve in the homes of eligible consumers, free of charge. We intend to maintain our first-place customer service into GD2 by further engaging with customers and stakeholders to deliver and develop our package of support. Further details can be found in the Customer and Vulnerability Plan appendix (023).

Additionally, our model of having local depots close to the point of service delivery supports local employment in the communities that we serve. Stakeholders are supportive of us providing science, technology, engineering and mathematics (STEM) career opportunities for current and future employees.[6] Our first wave of wiliness to pay research showed that 79% of customers would support paying an additional 30p per year to invest in staff training[7], and our second wave showed that domestic customers would be willing to pay an additional £1.78 per year for us to increase work opportunities for disadvantaged groups in society.[8] Our people reflect the community they serve and have extensive knowledge of their local area and the challenges

[2] Explorative Qualitative Workshops and interviews (Exploratory Phase) (Ref: 002)

[3] SGN Business Plan Acceptability Testing Phase 1 (Ref 078)

[4] Specialist panel Scotland - Supporting our communities Meeting 1 and 2 (Ref 018, 019)

[5] Specialist Panel Southern - Supporting those at risk Meeting 1 and 2 (Ref 020, 021)

[6] Moving Forward Together workshops London & Edinburgh Nov 2018 (Ref 013,014)

[7] Conjoint & WtP Summary report (Valuation Phase) (Ref 005)

[8] Valuation Phase (Conjoint & WtP) Summary report (Ref 094)

or opportunities that exist to help us better respond to the needs of our customers. Further information is provided in our Workforce Management appendix (009).

## 4.2 Shared future

Customers consistently rate future energy solutions as a high priority for further investment,[9,10] and stakeholders expect us to further develop and understand our role in a future decarbonised energy system[11,12]. For repair activities this means continuing to provide a safe and reliable network for both current and future gas customers.

Furthermore, we will continue to support additional research and development into decarbonisation as we have done recently with our operations teams collecting qualitative and quantitative data on gas leak conditions to support third-party consultants working on the BEIS Hy4Heat programme of works in line with our customer priority of delivering energy solutions for the future.

Our customer research has revealed that customers place a high degree of importance on reducing our environmental impact (a sentiment that has been echoed by our Customer Engagement Group (CEG)). During our initial qualitative research workshops, customers identified 'minimising environmental impact' as an area they would like us to consider as a priority in GD2. This was further reinforced during the prioritisation phase of the research, where customers chose the attribute of 'setting and achieving ambitious environmental targets' as one of the more important considerations.

Our willingness to pay research has consistently revealed that this is an area both domestic and small and medium enterprise (SME) business customers would be willing to pay comparatively more for to achieve better performance. For example, our first wave of willingness to pay showed that domestic customers would be willing to pay up to £5.21 to achieve a 20% reduction in our operational carbon footprint. Environmental improvements in our second wave of willingness to pay were also given high values from customers.

We hold ISO 14001 accreditation for our Environmental Management System (EMS) and we maintain two key measurements of our environmental impact in relation to repair activities. These relate to excavations, both of which seek to ensure that we maximise the amount of recycled materials and minimise the amount of waste to landfill. We are especially proud of our waste to landfill (excluding spoil) performance, which was zero for both Southern and Scotland for 2018/19. We hosted expert round-tables on sustainability in January 2019, where subject matter experts provided recommendations as to where we should prioritise efforts to reduce our environmental impact. The group recommended that we continue to set targets in relation to reducing the impact of our excavations and extended these to look at our environmental impact in a circular economy. They also supported the use of innovation to promote non-intrusive repairs of the network. We will continue our commitment in this area into GD2, as discussed in more detail in the Environmental Action Plan appendix (003).

This customer and stakeholder feedback of the shared future priority reinforces our management focus around minimising residual repair risk and maximising our 12-hour gas prevention performance as both lead to reduced repair times, reduced methane leakage and reduced impact on our environment.

Our repair service has a further impact on the environment through the $CO_2$, oxides of nitrogen (NOx), and particulate matter emissions from our fleet. Feedback from our Customer Engagement Group (CEG) has

[9] Explorative Qualitative Workshops and interviews (Exploratory Phase) (Ref: 002)

10 Conjoint & WtP Summary report (Valuation Phase) (Ref: 005)

[11] Future of Heat specialist panel Aug 2018 (Ref 023)

[12] Collaborative future of gas networks workshop (Ref 070)

reflected an appetite to decarbonise our fleet, an ambition that we share. However, there are currently challenges with vehicle manufacturers around providing a suitable decarbonised repair service vehicle with the required payload and power take off facilities. Further details on our fleet decarbonisation strategy and associated challenges can be found in our Environmental Action Plan appendix (003).

We have engaged customers through research to gauge their appetite for reducing the duration of roadworks. This has the benefits of both reducing disruption on the road network and reducing our environmental impact. This can have a particular impact in urban areas, such as London, and we continue to work with stakeholders and customers to establish their requirements in this area.

To minimise the duration of our works throughout GD1 we have embraced innovative tools and techniques such as use of the SGN-pioneered Core and Vac machine and camera technology (see Innovation appendix (008) for further information). In line with our focus on continuous improvement and customer priorities we are further developing the Core and Vac machine to a new iteration to further minimise the duration of our works while reducing our costs. The importance of reducing disruption was underlined by the results of our willingness to pay customer research, which specifically looked at reducing the duration of planned roadworks. Domestic customers would be willing to pay an additional £1.91 per year on their gas bills to reduce the duration of a 6-week project on the public highway to 4 weeks[13].

At our Moving Forward Together workshops in January and February 2019, we asked stakeholders to consider the criteria they would apply when making investment decisions in our network. They were then asked, of those criteria, which were most and least important. Stakeholders viewed minimising disruption as the most important consideration in London, and the related attribute of 'synergy with local plans' as the most important in Scotland. Very few stakeholders thought minimising disruption was one of the two least important considerations. Further information is detailed in our Repex appendix (019) which covers the majority of our planned works.

## 4.3 Safe and efficient

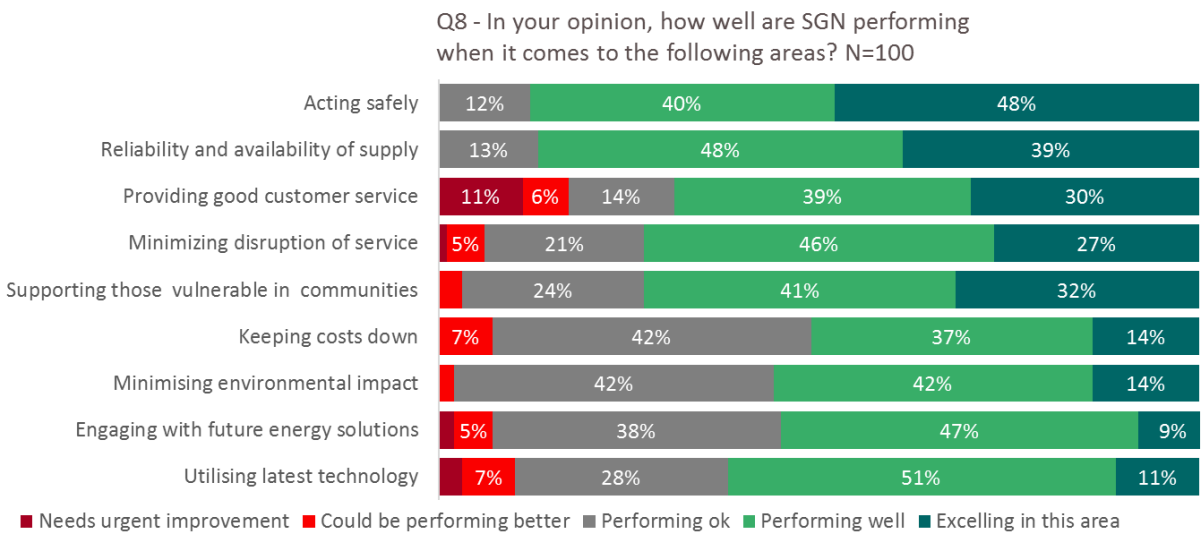
Safety is critical to our business, and we intend to maintain our existing outstanding performance in our repair activities. Our customers and stakeholders have consistently told us that safety and reliability of gas supplies is very important, and that we are performing well in these areas.[14]

This has been demonstrated by our stakeholder satisfaction surveys, where 97% of stakeholders responding to the survey rated 'acting safely' and 'reliability and availability of supply' as fairly or very important. Over 87% of stakeholders felt we were performing well or excelling in relation to acting safely and reliability and availability of supply. None felt we could be performing better or needed to urgently improve.[15]

[13] Stage 3: Conjoint & WtP Summary report (Valuation Phase) (Ref 005)

[14] Stage 2: Max Diff Prioritisation Phase Report (Ref 003,004)

[15] SGN Stakeholder Satisfaction Wave 1 and Wave 3 (Ref 071, 073)




In our programme of customer research, customers were specifically asked to rank attributes relating to different topics. Our customers strongly rated ensuring gas supplies are reliable as the most important priority. There was broad and high agreement that SGN need to maintain consistent supply. This priority was ranked highest by customers when we looked at this on a regional basis across Scotland, London and in the South East[16].

Our research has revealed that customers are happy with the current services they receive and very few have experienced issues, as indicated by the high acceptability scores received from both 'informed' and 'uninformed' customers in our quantitative acceptability testing (uninformed domestic customers in Southern and Scotland gave acceptability scores for our business plan of 85% and 88% respectively)[17]. They believe we should be ensuring that maintenance of the gas infrastructure continues[18]. For hard to reach groups, reliability of supply was seen as essential, and the need for consistent supply that enabled heating, meant that this can outweigh 'keeping costs down' for this group.

Through our programme of customer research, we asked customers what initiatives and improvements they would be willing to pay for. In our first wave of our willingness to pay research, customers expressed a moderate appetite for paying more to restore gas supplies under 24 hours. Domestic customers would be willing to pay £1.29 per year on their gas bills to restore gas supplies following an interruption to 18 hours. Customers asked to review the acceptability of our proposals consistently rated reducing the time of gas supply outages as important and was seen as the most important factor for hard to reach customers.

Our stakeholders have emphasised the importance of applying innovative techniques to make our network safer and speed up gas escape repairs, which our customers also support[19,20,21]. Examples are provided in section 5.2, and in more detail in the Innovation appendix (008). Our customers want us to keep our costs down, which is assisted by investing in innovation.

[16] Max diff Prioritisation Phase (ref 003, 004)

[17] Business Plan Acceptability Testing Phase 2 (ref 079)

[18] SGN Business Plan Acceptability Testing Phase 1 (ref 078)

[19] MFT Workshop March 2017 London, Portsmouth, Edinburgh (ref 008,009,010)

[20] Stage 2: Max Diff Prioritisation Phase Report (ref 003)

[21] Shaping the Business Plan Qualitative workshops - Sharing Financial Risk. Innovation investment (ref 083)

Safety is at the core of everything we do in SGN and is of particular focus in the high-risk activities associated with repairing our assets. Throughout the latter years of GD1 we have rolled out a new safety cultural programme supported by third-party experts and we are focussed on empowering our front-line employees with the skills and tools required to embrace a positive safety culture.

The embracing of a positive safety culture is not only with our industrial workforce at the front line but also traverses job role and company position with our Directors and CEO routinely performing site safety visits to promote this. Furthermore, our Operations Director and Managing Director (Scotland) are at the forefront of driving this in their respective areas and are commonly found on site leading from the front during large scale incidents and co-ordinating with core stakeholders such as emergency services and local MPs.

Safety is at our core and will continue to be in GD2 while always considering what is reasonably practicable with regards to keeping the gas flowing and keeping our costs down.

# 5 GD2 cross sector issues

## 5.1 Decarbonisation and whole systems

Emergency and repair work are focused on making the network safe again. By doing so we are also reducing the emissions of harmful greenhouse gases through leakage. By focusing on efficient and rapid emergency and repair approaches we can reduce the emissions associated with our network.

We have plans to support the reduction of emissions from our repair fleet to support decarbonisation and this is described in more detail in our Environmental Action Plan and our Fleet appendix (025).

## 5.2 Innovation

Improving our efficiency and reducing the overall impact of street works are key objectives in our innovation strategy. Works duration, size, disruption (traffic management) and interruption are key criteria which we are looking to reduce through innovation. Some examples of innovative tools and techniques that we have utilised within our repair workstream are described below. These are set out in more detail in the Innovation appendix (008).

**On-site plant detection**

Initial on-site detection is critical in providing a quicker delivery of the overall repair. We have innovated in this area to providing front end improvements and efficiencies to the overall process. Our aim is to pin point correct location first time where possible, while avoiding any potential third-party plant in an often-congested road or footpath.

**Magnetometers**

These enable joint location. The magnetometer can detect the magnetic fields of all ferromagnetic objects including manholes, valve boxes, cast iron pipes, 'bell' joints and service connections.

The magnetometer helps pinpoint the exact location of where to dig. This technology has now been deployed within our repair teams, improving delivery of works in the carriageway, resulting in quicker plant detection and smaller excavation sizes by only digging where we need to dig.

**Gas Tracker – PE service locator**

Gas Tracker is a system for identifying and tracking gas pipes made of polyethylene (PE) or other plastics. Using this equipment, we can now follow up to 300m from the transmitter and pipes can normally be accurately located within the width of a spade.

The system will also identify a gas pipe of any material if the detector can be placed directly in contact with the gas pipe.

This technology removes any additional excavation costs (for example slip trenches) when trying to locate gas pipes.

### Core and Vac

Smarter working using Core and Vac has dramatically reduced the size of the excavation and meant that the excavation removed is plugged back in reducing the reinstatement required. This means that in our repair works we can leave the highway sooner than a conventional repair.

We pioneered the use of Core and Vac technology in the gas distribution industry in Great Britain, with benefits shown across both our networks. The technology allows a small area of the carriageway to be drilled to remove the tarmac and access the gas main. There is minimal reinstatement because the excavation removed is replaced like a plug back on to the hole.

In addition to the reinstatement costs saved using Core and Vac, there have been a significant savings in lane rental costs. Using this technology has allowed us to be out of the carriageway usually within 24 hours after undertaking critical repairs. Traditional methods have significantly longer lead times as a direct result of the reinstatement processes and reliance on contractors.

TfL and the local authorities, including the highway authorities, have welcomed the use of the technique as all work including the reinstatement is completed within four to six hours and the carriageway is subsequently left clear without the need to return for reinstatement and collection of barriers.

Following engagement with the relevant parties, we are often requested to undertake the work out of hours on high priority roads such as the A3 in SW London. Work typically commences at 22:00 and we are off the road by 04:00 meaning that the road is clear for the 'rush hour'.

### Long-handled tooling

To aid the Core and Vac process and allow us to work on gas mains from the surface, long-handled tooling was developed for a range of jobs to be carried out through core hole. This less obtrusive Core and Vac type of excavation removes the need to enter the excavation to carry out the work.

The development of the long-handled tooling has enabled the delivery of work in carriageway with significant time and disruption savings.

### Serviflex (dead insertion-internal position)

Serviflex is a corrugated dual wall liner that when used with specialist installation equipment can negotiate tight radius bends without compromise to the design life of the material. This delivers benefits in remediating a leaking service with minimal excavation and minimising customer interruption.

### Stent bag

The stent process will soon give us the ability to seal a damaged or leaking gas main from inside the pipe while maintaining the flow of gas without interrupting customers' gas supplies. This project has real potential to be a 'game changer' in how we safely manage high volume gas escapes in the future.

**Self-amalgamating tape**

This simple innovation project allows a repair on small joint leaks on our riser network. It provides a quick and simpler method than traditional repair equipment that tends to be rather bulky. Time is reduced compared to conventual repair techniques and reduces the requirement for cutting off/disconnecting risers that leads to customer interruption and loss of supply.

## 5.3 Resilience

They most important factor related to ensuring we are resilient and can deliver upon all of our licence and price control obligations is ensuring that we are workforce resilient. Our Workforce Management appendix (009) gives further detail upon our workforce resilience strategy however, a summary is given here.

As an emergency and repair service we are required to be fully resourced to deliver our obligations to safeguard life and property while ensuring we uphold our customer priorities. We periodically assess our workforce levels against short and long-term weather and workload forecasts and retirement profiles as well as other data. We ensure that any potential resource deficit is appropriately filled, whether through direct recruitment of new employees, upskilling current employees, or flexing resources between complementary departments (where the correct skills and competencies are available).

Additionally, we recognise that there are evolving societal and employee attitudes which may dictate new ways of working and we believe that improving work-life balance is a key factor in improving the overall employee experience, ensuring we retain key workers and therefore maintaining workforce resilience.

We aim to retain our skilled competent employees whom we have invested in, retaining valuable skills, experience, and flexibility maintaining and potentially increasing our resilience, particularly during periods of high workload, such as a gas supply incident or extreme weather conditions.

Throughout the repair workstream we have been delivering resilience by delivering a higher 12-hour standard than any other network. We are working to ensure that our customers are safer, and that the environmental emissions are lowered thereby improving our customers' experience and the 'here-and-now' resilience of the network.

By doing this and spending less time in the highway through the deployment of innovation we are also reducing the impact of our works and improving the resilience of other networks.

# 6 GD2 activity breakdown

## 6.1 Approach to GD2

Our approach to repair activities in GD2 will remain similar to our GD1 approach in that we will focus upon the following priorities:

### Acting safely

The safeguarding of life and property is the primary focus of our emergency and repair workstreams, including our employees, customers and stakeholders. This is embedded within our policy, procedure and safety culture. This will continue to be our main priority in GD2.

### Keeping the gas flowing

Maintaining our exceptional performance levels of our 12-hour gas prevention, endeavouring to reduce our residual repair risk, and utilising innovative tools and techniques to reduce our unplanned interruption times to ensure that our customers' priority of keeping the gas flowing is met.

### Keeping costs down

We will continue to embrace the innovation culture that has been embedded within our business throughout GD1 to continue to utilise cost saving techniques while supporting the development and implementation of emerging and future tools and techniques which yield cost saving and safety benefits to our customers, stakeholders, and employees.

### Minimising environmental impact

We care about our environment now and in the future. Our ISO14001 environmental management accreditation is something we are proud of and we will continue to adhere to these principles on all of our operational repair sites, including our repair and emergency stores and depots where we will continue to focus upon minimising spoil to landfill, recycling materials and providing environmental protection against any contaminants that may be introduced by our works, such as oils and greases.

Our consideration for the environment does not cease with our direct contribution, and we take careful note of the environmental credentials of potential contractors during our procurement events. This includes ensuring that our reinstatement contractors meet and exceed our environmental ambition, including having an environmental management system in place.

We will also be seeking to make improvements to the environmental impact of our operational depots, more detail of which can be found in our Environmental Action Plan (EAP).

### Providing excellent service

In the emergency and repair category our customer satisfaction scores that we have received throughout GD1 have consistently exceeded 9/10 for both of our networks.

Our emergency and repair customer satisfaction scores have trended upwards throughout the GD1 periods and this has been down to a concerted effort to develop the skills required by our emergency and repair workforce through formal training and on the job coaching. This strategy will be continued into GD1 to ensure that we continually improve.

Although our customer satisfaction scores from an emergency and repair perspective are consistently above 9/10 we recognise that there is a lot more we can do for our customers within their customer journey through our repair workstream.

### Supporting those in the community who need it most

The social obligations we hold are very important, particularly when it comes to supporting those most vulnerable in society. That is why we have collaborated with other network operators to support the Priority Service Register (PSR) and embraced innovation and technology with our 10/10 customer feedback app to garner real-time customer feedback along with the opportunity to register on the priority service register. This inter-network collaboration will continue as well as collaboration with other third parties to ensure that when we have contact with those in the community who need support we can refer to the relevant bodies.

As mentioned above, we will continue to support partner charities and not for profit organisations to ensure that we are supporting the communities we live and operate in.

### Policy

As mentioned above, the legislative requirements that mandate our repair activities that are currently in place in GD1 are assumed to remain unchanged into GD2, including, but not exclusively:

- The Gas Act 1986
- Gas Safety (Management) Regulations 1996 (GS(M)R)
- The Gas Safety (Installation and Use) Regulations 1998 (GS(I&U)R)
- The Gas Safety (Rights of Entry) Regulations 1996
- The Pipelines Safety Regulations 1996 (PSR)
- The Pressure Systems Safety Regulations (2000) (PSSR)
- The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR)
- The Construction (Design and Management) Regulations 2007 (CDM)
- Health and Safety at Work etc. Act 1974 (HASAWA)
- New Roads and Street Works Act (1991)
- Traffic Management Act (2004)

Where we aware of potential changes in policy such as street works or environmental policy, we have explored this further in section 6.8 of this appendix (managing uncertainty).

### Scenarios and sensitivities

The core driver for expenditure in the repair service workstream is the repair workload. The workload has been forecast based upon the accelerated replacement programme as described in our repex appendix. Based upon the repex programme, we can forecast the length of each diameter main for each material in our networks for each year of GD2. Using historic data for the number of repairs per material type per diameter band we have then forecast the number of repairs we expect per year of GD2.

As our workload is driven by the replacement programme, the scenarios we have considered are derivations based on the baseline and accelerated repex programmes. As we have had strong stakeholder feedback for the delivery of an accelerated repex programme it is the accelerated repex derived repair numbers we have proposed in this appendix.

## 6.2 GD2 outputs and price control deliverables

GD2 outputs specifically impacted by the repair function are:

| Output name | Output type | Company driven target |
|---|---|---|
| **Guaranteed Standards of Performance (GSOPs)** | Licence obligation | No |
| **Consumer vulnerability minimum standards** | Licence obligation | No |
| **Consumer vulnerability and carbon monoxide safety use-it-or-lose-it allowance** | Price control deliverable | Yes |
| **Average restoration time for total unplanned interruptions** | Output Delivery Incentive (Financial) | Yes |
| **Customer satisfaction survey** | Output Delivery Incentive (Financial) | No |
| **Complaints metric** | Output Delivery Incentive (Financial) | No |

We believe that these outputs are appropriate to allow us to meet our customer and licence obligations regarding our Repair function. Our customer satisfaction scores throughout GD1 have shown that similar outputs have helped deliver a frontier customer experience.

During GD1, we have strived to deliver on all of our output targets where possible and now that this is embedded within our culture, we expect this to continue into GD2. The following examples demonstrate our approach to outputs:

- Delivery of the current secondary output for gas escapes prevented within 12 hours, despite SGN having the most stretching target of all GDNs, is consistently better than the GD1 target as shown in Figure 5:.
- Our Ofgem target for customer satisfaction in emergency response is 9/10 yet internally we follow the principle of delivering 10/10 service to all customers. This culture is reflected in our performance shown in Figure 10:.

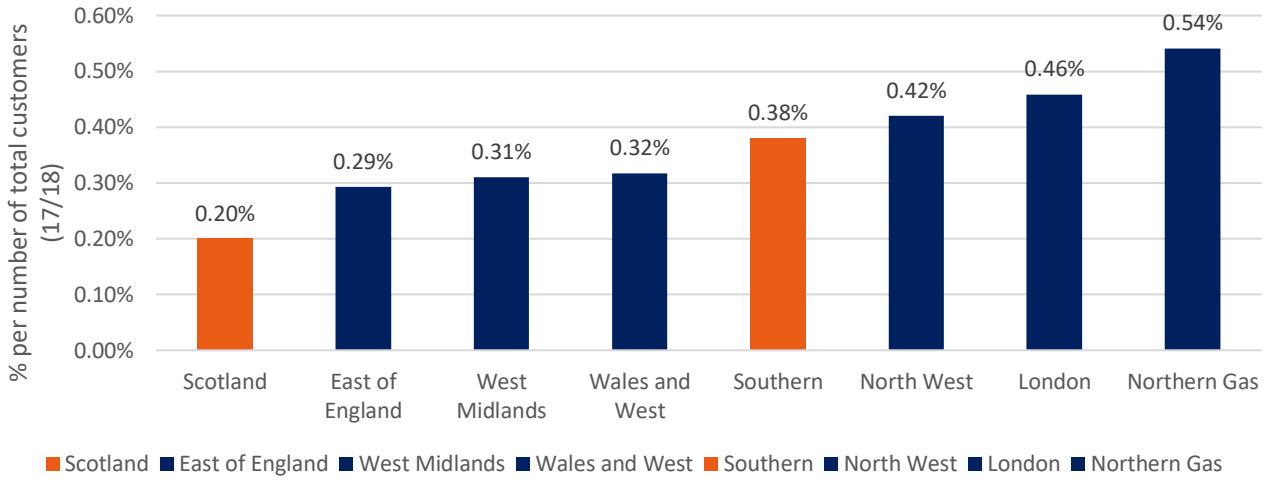
This behaviour is already realised within our performance and our costs and we foresee no reason to pass additional costs onto customers to deliver the above outputs.

We engaged with our stakeholders, customers and CEG to develop targets for a new penalty only financial incentive for average restoration time for unplanned interruptions. This was done via our deliberative workshops and positive impact round table events. Figure 6:6 and Figure 7:7 show the causes of unplanned interruptions in both of our networks.

We have more influence over the duration of unplanned interruptions than their frequency. However, there are multiple factors outside of our control which can extend the duration. These could include the requirement for specialised equipment or the imposition of working restrictions when we are excavating on the strategic road network. As far as possible we avoid these issues by performing proactive assessments and refurbishment which has been particularly effective with our approach to risers in multi-occupancy buildings. We also aim to reconnect customers at a time convenient to them, for example postponing night time works until the morning to avoid noise and disruption.

The diagram below shows that as a percentage of our customer base, our customers experience among the lowest number of unplanned interruptions of any GDN:

**Figure 15: Unplanned interruptions performance 2017/18**




We held two in-depth workshops for customers and two for stakeholders where we provided information on our past performance and trends, other networks' performance and the appetite of our customers for change as measured by a quantitative willingness to pay study.

**Past performance and trends**. Average unplanned interruption time in Scotland (an average of 13.8 hours over the last three years and 12.7 hours over GD1) is lower than in the South (an average of 23.7 hours over the last three years and 19.3 hours since the start of GD1).

**Comparisons with other networks**. The difference between our two service areas and the other gas networks was highlighted to customers and stakeholders and explained largely by the predominance of gas risers serving customers in high rise multi-occupancy buildings in London. These often present complex planning consent and engineering challenges.

**Customer appetite for change**. A willingness to pay study demonstrated investment in improving the unplanned interruption time was the lowest of seven possible alternative investment priorities for customers, although customers were prepared to pay a small amount (56p) for a three-hour reduction.

The proposal we made to stakeholders and customers was to set the target at the average of the last three years' performance for each network.

At the customer workshops there was a mixed response to whether we should try to reduce our restoration times. Some customers wanted to see improvement, others wanted to see no deterioration in the average times. Customers in Scotland were more likely to be satisfied; customers in Southern understood that restoration times would be longer than in Scotland.

At stakeholder workshops in Southern, after discussion, the overall consensus was the target to maintain the average restoration time achieved over the last three years "was about right". In Scotland, stakeholders would have preferred a continuous improvement in targets, however stakeholders at both events emphasised the experience during an interruption may be more important than the duration.

The majority of the CEG accepted our proposal to maintain targets at the average of the last three years' performance. We clarified the correlation between a lower number of shorter duration jobs in recent years and the increase in average performance time between the last three years and the full GD1 period.

Taking into account the range of feedback from customers, stakeholders and our CEG, we are proposing our target average restoration times should be the average of our performance over the last three years.

We highlighted in our October draft business plan that our engagement with customers and stakeholders focused on average restoration times excluding large incidents, while discussions with Ofgem were continuing

about the methodology for the inclusion of interruptions from large incidents into the measures and targets.

Large incidents (defined as impacting more than 250 customers) occur infrequently but can have a significant impact on restoration times in any one year. Large incidents may be caused by failure of our own network but incidents with the biggest impact on our customers are often the result of third-party damage, particularly those that result in water ingress. Water travels quickly along our pipes and one entry point can impact many hundreds of customers in different locations. Locating and pumping out the water takes focused effort working round the clock over several days.

This output is an annual penalty-only ODI with a maximum potential penalty for SGN of up to £6m a year. Ofgem's templated approach includes an allowance for the impact of large incidents which we believe to be appropriate because of the uncertainty around likelihood and precise timing of a large incident in any particular year of GD2.

The methodology we have applied to define the impact of large incidents within the ODI target is to assess the average annual impact of the largest incident caused by third party damage over the previous ten-year period. Over the five years of GD2, there is a 50% probability that this scale of incident will happen again as a result of third-party damage, but it is not possible to predict in which year. The likelihood of this risk will increase as the volume of metallic pipes are replaced with polyethylene ones.

The table below shows a breakdown of the target for average restoration times without the inclusion of large incidents to provide comparability with GD1 output measures and in line with our stakeholder discussions. It also shows the additional impact of large incidents included in Ofgem's BPDT requirements.

**Table 5: GD2 forecast unplanned interruptions restoration times (minutes)**

| | 2021/22 | 2022/23 | 2023/24 | 2324/25 | 2025/26 | GD2 average |
|---|---|---|---|---|---|---|
| **South Unplanned Average** | 1379 | 1379 | 1379 | 1379 | 1379 | |
| **Major Incident Impact** | 196 | 199 | 202 | 205 | 208 | |
| **Total Unplanned** | 1575 | 1578 | 1581 | 1584 | 1587 | 1581 |
| | | | | | | |
| **Scotland Unplanned Average** | 739 | 739 | 739 | 739 | 739 | |
| **Major Incident Impact** | 558 | 565 | 573 | 580 | 588 | |
| **Total Unplanned** | 1297 | 1304 | 1312 | 1319 | 1327 | 1312 |

## 6.3 Bespoke outputs

We do not anticipate any bespoke outputs for our repair workstream in GD2.

## 6.4 Investment in existing assets – CBAs/NARMs

The opex defined under repair does not propose any investment in existing assets, therefore there are no cost benefit analyses (CBAs) or Network Asset Risks Metrics (NARMs) appropriate to this appendix.

## 6.5 Engineering Justification Papers

Our repair operating expenditure is not supported by any engineering justification papers.

## 6.6 Investment in new assets

Our repair opex does not propose investment in any new assets, this is covered under our capex and repex strategies.

## 6.7 Cost efficiency

### Workload forecasts

Our financial forecasts for repair activities in the GD2 period are largely driven by the forecasted workload. This section seeks to describe the factors contributing to the repair workload forecasts for the GD2 period.

Our workload profiles discussed below have been subject to independent assessment by Arup. Arup has reviewed our workload model and critically challenged our base assumptions. Its assessment included:

- Discussion of the assumptions and how they feed into the relevant models
- Consideration of whether the assumptions are clearly explained and justified throughout business plan appendices, engineering justification papers and CBAs
- Consideration of whether the assumptions seem responsible and robust, based on industry knowledge and SGN's approach in deciding how to apply them

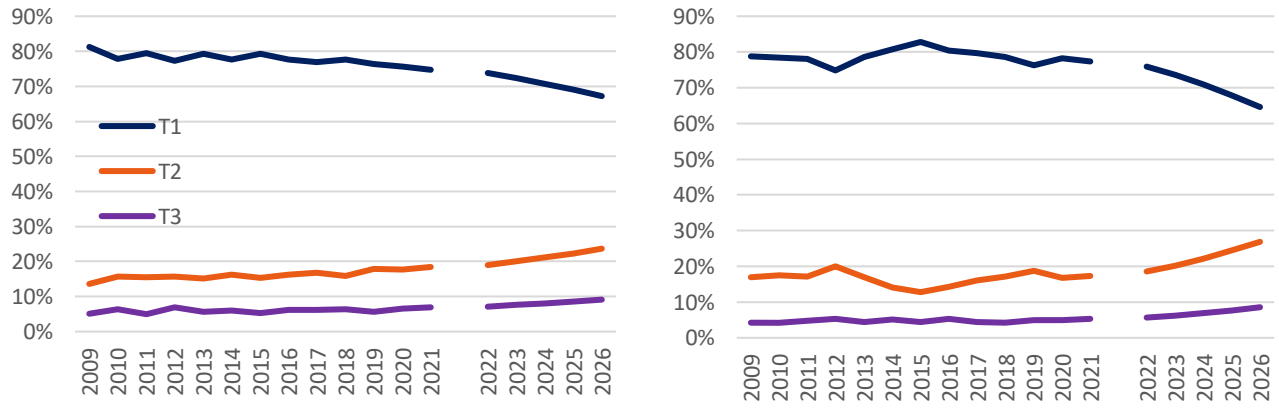
As a result of its analysis, Arup provided a red-amber-green assessment of our assumptions, with suggestions as to how these could be further justified and demonstrated. In its report, Arup did not raise any concerns with our workload model or the consequent forecasts.

Repair workloads are strongly correlated with the repex programme. Details of the proposed scenarios for our repex programme can be found within our Repex appendix (019).

Based on historic data for the number of repairs found per kilometre of main of each diameter band and material we have forecasted the total number of repairs we expect to see throughout GD2, based upon the forecasted mains diameter and material population dictated by the repex programme.

The trends shown in Figure 16: are the result of the risk prioritisation and environmental considerations of the repex programme. There are greater benefits associated with tier 1 mains replacement (including risk and environmental benefits explained in our repex appendix(019)). Therefore, our repex programme focuses delivery upon tier 1. Consequentially we see an increase in the percentage of repairs in tiers 2 and 3 over the GD2 period.

**Figure 16: Forecasted and historical mains PREs (Southern left, Scotland right)**




As seen previously (Figure 6:6 and Figure 7:) third-party damages are a major cause of unplanned interruptions on our networks. In GD2 we assume that the workload from third-party damages to our assets will remain constant throughout the period. We will continue to work with our stakeholders to avoid damage to

underground apparatus in line with the guidance issued by the Health and Safety Executive (HSE)[22]. This dictates that it is the responsibility of the property owner or company carrying out the work to make sure they have complied with the relevant legislation guidance. In practice this means that whoever is carrying out the work must obtain gas mains location information and/or maps showing the indicative position of the gas network before any work takes place.

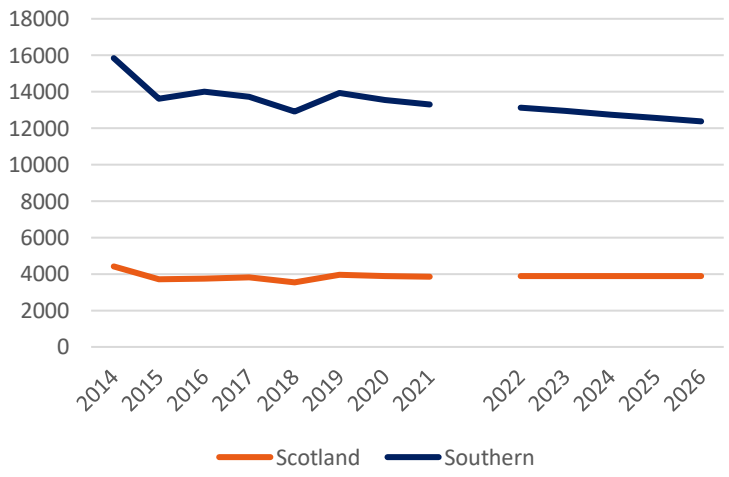
Our operations and stakeholder teams will continue to actively engage in liaising with third parties, including construction and agricultural learning establishments, to increase awareness of the dangers of excavating and promoting safe digging practices. We will continue to ensure that our assets are available via the 'LinesearchbeforeUdig'[23] website for access to anyone performing excavation works. We also have nominated plant protection officers who provide a service which results in high levels of engagement with construction organisations to promote safe digging practices.

Our services workload is also driven by our mains replacement programme. Our replacement programme drives an increase in the number of polyethylene services and a corresponding decrease in the number of metallic services. Based upon historic data of the number of repairs per service and the associated forecasted service population, we find our forecasted service repair workload. This is expected to show a small decrease in services workload in our Southern network, and a relatively flat trend in our Scotland network.

**Unit costs**

Our mains repair unit costs are made up of several components: labour, reinstatement, invoices and materials. The largest contributing factors to a repair unit cost are the labour and reinstatement costs, followed by invoice costs which include brought in services, for example: traffic management, flow stopping services, and specialist repair techniques. Of the labour costs, these are a combination of core hours (normal labour) and out of hours (premium labour).

**Figure 17: Historical and forecasted services workload**




*Labour*

The time that a gas escape is reported is highly variable. As such the time, the diameter of the pipe, the pressure under which it operates, and the associated repair technique required of a PRE, are uncontrollable. We have seen an increase in the amount of repair workload coming out of core hours (premium time) over the first few of years of GD1, which has then held broadly constant over the last three years. For our GD2 forecasts we assume that this mix will be constant with the last three years of GD1.

*Transport*

The costs allocated to repair operating expenditure from the transport account lines and employee related overheads (EROs) is the same percentage as 2017/18, as we anticipate that they were remain at similar levels.

[22] HSE Guidance Document 47 (HS(G)47)– Avoiding Danger from underground service http://www.hse.gov.uk/pUbns/priced/hsg47.pdf
[23] https://www.linesearchbeforeudig.co.uk/

The transport costs are allocated across the various activities based on the direct labour costs incurred, these costs include maintenance, fuel and leasing/hire costs associated with our transport and plant.

Our Environmental Action Plan (EAP) sets out emission reduction strategies for our fleet. However, it must be noted, that at present, there are currently no suitable alternative fuel vehicles on the market which meet the requirements of our repair fleet, particularly the requirement for on board power for ancillary equipment. Further information can be found in our EAP.

*Employee related overheads*

The costs allocated to repair operating expenditure from our EROs is the same percentage as 2017/18, as we anticipate that they were remain at similar levels. The ERO costs includes people development and Personal Protective Equipment (PPE) costs and are apportioned across the activities based on the direct labour utilisation.

The people development costs associated with EROs form part of our company talent pipeline and succession planning. We offer the opportunity to our ambitious industrial employees to develop their skills and knowledge by acting as deputies for managers when appropriate.

*Contractors*

We use contractors in our repair workstream to provide specialist services. Due to the forecasted increase in tier 2 and tier 3 repair workloads, we expect to see a resultant increase in the requirement for specialist services in our repair opex. Similarly, tier 2 and tier 3 repairs, due to the increased diameter, require larger excavation sizes than tier 1 repairs, hence we expect to see a relative increase in reinstatement costs.

All of our contracts, for specialist services and reinstatement, are subject to a procurement which ensures that the rates we pay are competitive within the industry and geographies.

*Work type*

Figure 12: illustrates the proportional relationship between mains diameter band and cost of mains repair. We have seen that our mains repair forecasts are increasing in the larger dimeter band tiers of tier 2 and 3, with a decrease in tier 1. The combination of these two factors gives insight into the trend of increasing unit costs shown in figure 19 throughout GD2.

The following case studies below show illustrate the associated costs of larger diameter and larger pressure repairs:

**Case study: Intermediate Pressure (IP) gas escape – Newmills Road district governor, Balerno, Edinburgh**

A gas escape was identified on a 150mm intermediate pressure steel main on the inlet to a district governor.

The gas escape was not considered to be high volume or a catastrophic failure of the asset (the operating pressure of the pipe meant that precision of the repair was an important factor). This is because medium and intermediate pressure gas leaks apply significant forces to the repair technique and can easily fail if not secured appropriately.

Given the proximity of the gas leak to the district governor, it was impossible to replace the section of leaking pipe without considerable expense and disruption to local gas supplies. The decision was taken to request the support of a specialist external contractor to design and build a bespoke shell to encapsulate the section of leaking pipe. Due to the natural imperfections in metallic pipework, this method requires the laser scanning of the pipe to gather accurate dimensions in order that the shell can be fabricated to the exacting requirements of repairs on such a pressure tier. The repair shell is then fabricated off-site in factory conditions before being delivered to site for installation.

The example used for this case study is not uncommon and would be regarded as a less complex leak albeit on a more complex asset. The pressure within this intermediate pressure main is approximately 200 times greater than that of a low pressure main, adding to the complexity and cost of the repair solution.

The cost of repairing this section of leaking intermediate pressure pipe was made up from the following:

- SGN labour Comme
- Reinstatement Comm
- Bespoke repair shell Comme
- Total £39,000

Had this leak been discovered on a typical small to medium diameter (2" to 12") low pressure main, the cost of the repair would have been costed at an order of magnitude less, with a typical 6" low pressure steel main costing approximately £1,800 and would have been completed using standard repair clamps held in stock by one of our own repair teams on the first visit.

**Case study: Tier 2 Medium Pressure (MP) gas escape – Hadden Hill, Oxford.**

In August 2019, a gas escape was identified upon a 12" medium pressure spun iron main operating at 1.8 bar(g). This gas escape had caused the road surface to be lifted and the gas escape was classified as being high volume and immediate action criteria.

The risk associated with this escape and the required repair technique dictated the requirement for a road closure. Due to the depth of the main, a deep excavation was required, dictating a wider excavation to ensure it was stepped down to minimise risk. Furthermore, a flow stopping technique was required to ensure the repair technique could be actioned in a safe, efficient, and effective manner. Contractors were required to be brought in to perform this specialist flow stopping technique which can be seen in the images below.

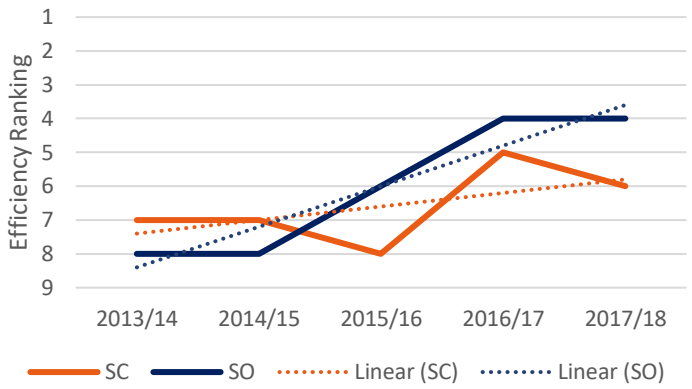
- SGN labour Comme
- Reinstatement Comme
- Contractor costs Comm
- Total £44,724

Had this repair been required on a low pressure 12" main it would have cost in the region of £3,000, in comparison to a low pressure tier 1 repair of circa £1,800.

**Benchmarking**

The regression analysis derived efficiency rankings shown in table 4 and figure 18 show that the repair efficiency of both our networks increasing over the GD1 period, with Southern ranked fourth and Scotland sixth for 2017/18. Although not frontier performers on this metric our networks are showing improvements while delivering consistent frontier performance in terms of 12-hour gas prevention and performance against our primary output measure of repair risk reduction.

**Figure 18: Repair efficiency rankings across GD1**




Throughout the remainder of GD1 and GD2 we will be continuing to drive performance through innovation and managerial process to ensure that we deliver the levels of risk reduction and gas prevention while aiming to improve our efficiency rankings. Thus, enabling fulfilment of the customer priorities of 'acting safely', 'keeping the gas flowing' and 'minimising environmental impact'.

**Productivity**

Figure 19 shows the forecast unit costs for mains repairs for both of our networks over the GD2 period. The increase in this trend is driven by the real price effects explained in section 6.10 of this appendix.

However, through ongoing productivity driven by managerial, process and innovative tools and techniques we are mitigating the magnitude of these upwards cost pressures. When forecasting our repair activities, we have built in an ambitious productivity target across repair opex. Further information can be found in our Cost Efficiency appendix (005).

This productivity factor is a combination of innovation in the field and management driven productivity. An example of field innovation driving productivity are items such as the stent bag which is explained further in section 5.2 of this report and our Innovation appendix.

Management productivity is driven by internal metrics such as unit costs for our repair activities. We use the disaggregated depot structure in both of our networks to allow us to utilise metrics such as unit costs to internally benchmark and drive competition and efficiency between depots in our repair workstream.

Our management structures also utilise our stretching 12-hour gas prevention target to drive efficiency within the depot structures. We have among the highest 12-hour gas prevention repair standard of any of the GDNs and this is reflected within our unit costs. While a more stretching 12-hour standard drives improved safety and customer experience, it should be recognised that this can lead to increased costs. Our frontier performance against the 12-hour gas prevention standard upholds our customer priorities of 'acting safely', 'keeping the gas flowing', and 'minimising environmental impact'.

Throughout GD2 we will continue to achieve similar levels of performance with regards to our 12-hour gas prevention standard, as this aligns with our customer priorities and is dictated by secondary legislation. We have delivered this frontier 12-hour performance against a back-drop of the sparsity and urbanity factors detailed in the Cost Efficiency appendix, and for these reasons we have historically had average repair unit costs greater than other networks with much lower targets and, or, less challenging geography in terms of urbanity and/or sparsity.

**Figure 19: Historical and forecasted unit costs**


As shown previously in figure 12 the unit cost is correlated with the diameter band of the main being repaired. Combining this fact with these workload trends we can see that the overall unit costs will increase over the GD2 period. This is due to the relative increase in unit cost as the diameter band increases. However, the trend illustrated in figure 16 shows that overall mains PREs are decreasing, therefore we expect the overall mains repair expenditure to decrease from GD1 into GD2.

The unit costs per mains repair will increase as shown in Figure 19:, however, this increase will be counteracted by a decrease in workload, reducing overall cost. This is illustrated in the tables below.

The combination of driving competition between our depots and embracing innovation will continue to ensure that we maintain our trend upwards in the efficiency benchmarking to deliver value to our customers through the GD2 period. Further description of repair unit costs and the associated cost drivers can be found in section 6.10 of this appendix.

**Regional factors**

There are regional variations in cost that exist and are driven by external factors outside of our control. These factors have been recognised by regulators throughout previous price controls. There are three specific areas driving costs that are specific to certain regions of our footprint: London-specific costs (urbanity), sparsity (Scotland), and the Isle of Wight. These factors are explored in more detail in our Cost Efficiency appendix (005). However, in summary:

- London specific costs include:

Factors which related to the physical make-up of the network surroundings (such as more expensive footpath materials which drive reinstatement costs) London may have a higher proportion of 'high use' road types than other regions, making street works more complex and costly. For instance, utility assets may be located deeper underground, and there may be a greater prevalence of concrete surfaces and 'road-on-road' construction. Utility assets may be more likely to be located under carriageways rather than the footway or verge due to the prevalence of coal cellars.

Road surfaces are more likely to require specialised colouring, greater 'anti-skid' properties, and have more raised road crossings with printed concrete. This reflects the specific Highway Authority requirements in London. Similarly, the prevalence of specialised footway surfaces (e.g. York stone, resin bound tiles) is greater in London. These surfaces are more expensive and increase the complexity of reinstatement works.

Utility works in London are more likely to be disrupted by special engineering conditions and/or archaeology, and the sub-surface may be more congested due to the effects of utility congestion and buried tram lines.

The prevalence of multi-occupancy buildings may create additional costs related to gas risers and lateral mains.

Wages are relatively high in London compared to other parts of the country, which can affect utilities costs

through the compensation paid to their employees, contractor rates and in some cases fleet costs and payments for commuting time.

The value of economic output in central London is also exceptionally high, which may result in commercial customers placing higher demands on utilities.

- Sparsity in Scotland:

Sparsity is the combination of low customer density (workload) and maximum area of cover (driven by time bound standards).

We provide a safe and secure network to all our gas users. To achieve this, we must ensure we have sufficient resources to respond to and repair gas escapes where ever they occur within our network.

As a country, Scotland contains areas of very low population density and an average significantly below the remainder of the UK mainland.

Development of the gas network over the past 50 years has resulted in a number of isolated, geographically distant customers. Our performance is significantly impacted in areas where:

- Travel from sparse area to next nearest populated area is not possible within time restriction
- Available workload is significantly lower than average

By the very nature of the sparse area the effective productivity of our two key services, emergency response and repair, is significantly reduced. We are unable to achieve the productivity levels of a normal network which will have a mix of urban and rural. The areas which we consider sparse display characteristics which differentiate them from the remainder of our GDN and most of the UK gas network.

External research has evaluated the extent of this effect across our network and to consider a reasonable cost impact on our ongoing operations. Further information can be found in our Cost Efficiency appendix (005).

The conclusions reached are that there are six defined areas of sparsity within our network. The sub depot locations from which these areas are supported are as follows:

- Inverness
- Elgin
- Galashiels
- Dumfries
- Rothesay (Isle of Bute)
- Dunoon
- Isle of Wight

Our Southern distribution area includes the Isle of Wight (IoW). Operating a gas distribution network on the IoW comes with several challenges that are not seen in other parts of mainland network operation. These factors are not due to sparsity as seen in our Scotland network but are a consequence of the island being geographically disconnected from the mainland. These factors include reduced competition between suppliers in tender events, a minimum resource requirement to be sustained on the island to ensure a 24-hour service and an additional cost associated with transportation via ferry or hovercraft.

## 6.8 Managing uncertainty: use-it-or-lose-it, volume drivers and reopeners

**Smart metering**

We have forecast the smart meter roll-out on the basis that the smart metering programme continues to 2024. Given the learnings from GD1 and the risk of change in this programme, we consider it appropriate to

have a re-opener for smart meters. This is discussed in the Emergency Service appendix (013) where it has the greatest direct impact.

## Managing uncertainty – street works

At the start of GDPCR1, Ofgem acknowledged that the enhancements to The New Roads and Street Works Act 1991 (NRSWA) brought about by the Traffic Management Act 2004 (TMA) could lead to a material increase in expenditure for network operators. The Traffic Management Act 2004 tightened the regulatory framework giving Highway/Permit Authorities (HAs) more power, through implementing and charging for conditional permit schemes, to co-ordinate and direct works in the highway with the aim of minimising disruption to the road user from essential street works.

In 2011, as a part of GDPCR1, our Southern network made a submission to Ofgem in relation to a claim for additional costs incurred as a result of the introduction of the enhanced street works legislation in 11 out of 38 HAs. In addition to the costs and associated administration relating to the permits and their specific conditions, there had also been a loss of productivity which was incurred through the direct impact of permit authorities enforcing restrictions on timing and duration, work methodology and access to the highway or carriageway. In Ofgem's decision letter, dated 20 December 2011, Ofgem acknowledged the principles of the claim and an income adjustment of £22.6m was made (2010/11 prices). These 11 HAs formed the basis for ex-ante allowances in GD1.

Recognising that the street works legislation would be enforced in a wider geographic area with a consequential increase in incremental costs beyond those allowed for in December 2011, Ofgem put in place an uncertainty mechanism in the GD1 price control to cover:

- Street works costs associated with new HA going live in GD1
- Lane rental schemes

As part of the GD1 price control, gas network transporters had the opportunity to apply for specified street works costs both ex post and ex ante. The additional costs could be recovered through changes to allowed revenue.

The TMA established a permit scheme as an alternative to the notification system which existed under the NRSWA, designed to help local authorities minimise the disruption caused by street works. The notification system was used by companies to inform an authority about their intention to carry out works on the local highway. Under the permit scheme, companies must apply for a permit to work in the area, which would include any restrictions imposed by the local authority.

Lane rental has been rolled out on the most traffic sensitive areas of London (TfL) and Kent, to monitor the impact of a £2,500 daily charge on disruption to road users caused by street works. Several local authorities in Southern have already indicated their intent to apply the charges, but it is unclear how they will be applied, when they will be introduced and what the charge will be. Furthermore, in GD2 we are expecting local authorities and HAs to expand the implementation of permit and lane rental schemes, with certain authorities expressing their intent to do so without clarification of the extent of the road network these charges will apply to, nor the magnitude of any charges.

The Transport (Scotland) Bill was passed on 10 October 2019. The bill addresses roadworks and low emission zones, two areas that will have implications for how we plan and undertake necessary planned or unplanned work on network assets in Scotland. The bill is relevant in several ways, including:

- Creation of Low Emission Zones
- An inspection function for the Scottish Road Works Commissioner with associated enforcement powers and new offences including for obstruction
- Increased qualifications for operatives
- Longer reinstatement guarantee periods

- A requirement for reinstatement quality plans (to establish that organisation have the necessary processes and competence to execute road works to the required standards):
  - a specific reinstatement quality plan, specific to particular road works
  - a general reinstatement quality plan, covering the approach to reinstatement for certain categories of road works
- Requirements to notify actual starts and works closed within specified timescales to improve the accuracy of information relating to road works on the Scottish Road Works Register.

Rather than address the specifics of enforcement and penalties, the bill allows Scottish Ministers the powers to make regulations specifying emissions standards, exempt vehicles, the amount of any penalty charge and other detailed aspects of schemes in operation.

There is an additional emerging issue impacting our southern network, this is the proposed changes to the guarantee period for reinstatement. This has arisen through a consultation on the Specification for the Reinstatement of Openings in Highways (SROH) code of practice issued by the Department for Transport. The consultation document proposes to increase the guarantee period for all reinstatement of excavations to five-years. The current requirements dictate a guarantee period of typically two years with an extended period of three years based upon certain additional circumstances.

Although the SROH only applies to England there is a similar code of practice, the Specification for the Reinstatement of Openings in Roads (SROR). This is a Transport Scotland document that is issued by the Scottish Government. As yet the Scottish Government has not given any clear indication when it will increase the guarantee period though it is considered that an extension similar to that proposed in the SROH consultation will follow.

We are confident in the quality of reinstatement provided by our contractors and our direct labour. However, we cannot be certain of the financial impact of the increased guarantee period upon our contracts. This uncertainty is based upon the fact that there is currently no evidence base to understand if excavation reinstatements are failing beyond the current guarantee period. Furthermore, we are uncertain of the uncontrollable factors of weather, traffic flows, and other works upon the integrity of excavation reinstatements over an extended period. We believe that the increase in this guarantee period will place additional cost pressures upon our reinstatement contracts and activities undertaken by contractors which include a requirement for reinstatement such as repex and connections. Therefore, we propose that this forms part of our street works uncertainty mechanism. The risk of the uncertainty in both of our networks is found throughout the utilities industries in these footprints, with the impact of lane rental predominantly in major cities, however this is spreading beyond the London and Kent TfL areas, the roll out of permit schemes is becoming more widespread throughout the Southern SGN footprint. There is a greater deal of uncertainty in Scotland with the passing of the Transport (Scotland) Bill.

Given the uncertainty around how our costs and operations may be impacted, we are proposing a reopener structure through which an updated position can be assessed midway through the GD2 price control.

The ownership of risk currently lies with SGN. Due to the uncertainty of these costs they have not been accounted for in our baseline submission. Where costs can be accounted for, for example in the TfL and Kent areas where lane rental is already in place, we have included these costs in our street works BPDT. By developing a reopener mechanism, the level of risk will be appropriately balance between the consumer and the company. This risk will be balanced as we will propose a threshold of expenditure based on GD1 costs. Should any additional HAs implement new schemes (West Sussex currently out for consultation on a lane rental scheme) then for additional allowances to cover these costs.

In our Southern network our 2018/19 expenditure on lane rental was £Com covering the TfL and Kent schemes.

For GD2 we are forecasting this to be £Com for these two-lane rental schemes. Should lane rental be adopted more broadly across the Southern network and begin to be implemented in Scotland we can expect these

costs to increase an order of magnitude.

Due to the uncertainty of where, when and how the extension of these measures will be implemented detailed estimates of the expenditure are not possible.

The probability of the extension of permit and lane rental schemes throughout the GD2 period is highly likely, with certain authorities already expressing their intent to roll out these schemes. However, the frequency of the expenditure in these areas is less certain. The frequency will be dictated by the replacement and operations workload and the location of this workload. The location of operations workload is unpredictable, when this unpredictability is combined with the uncertainty of the street works costs yields a high degree of uncertainty.

The workload of replacement activities is more predictable, and we can forecast with more certainty where we will undertake this work. However, as with operations workload the high degree of uncertainty of where permit and lane rental schemes will be rolled out, along with the expected costs remains highly uncertain.

Our connections programme is more predictable than our repair workload, yet less predictable than our replacement workload as it is customer driven and subject to external political and economic drivers. As with repair and replacement there is a high degree of uncertainty of where permit and lane rental schemes will be rolled out, along with the expected costs remains highly uncertain.

The reopener mechanism in GD1 was available, provided the GDN could demonstrate efficiently incurred incremental costs beyond a specified threshold value, it is our intention to assess our position throughout the GD2 period and, where appropriate, apply for funding of all additional street work costs (both ex ante and ex post) in a reopener window for the incremental cost of street works.

Due to the uncertainty of the magnitude and scale of the street works costs we believe the appropriate uncertainty mechanism remains a reopener window, as in previous price controls. Further information on uncertainty mechanisms can be found in section 12 of the main business plan.

**Figure 20: GD1 local authority boundaries – Southern Network 2019/20**


## Managing uncertainty – waste management

At the time of writing our business plan and associated appendices, there is an Environment Agency Regulatory Position Statement (RPS 211) in place. This regulatory position statement (RPS) applies to businesses who deal with excavated waste from unplanned utilities installation and repair works, and applies to businesses, such as ours, who produce excavated waste. The RPS allows excavated waste which has not been assessed and classified in line with the hazardous waste technical guidance[24] to be classified as non-hazardous waste.

The Environment Agency has expressed its intention to withdraw RPS 211 in 2020. The original withdrawal date was intended to be April 2019; however, this was changed due to the industry wide uncertainty surrounding the practical requirements needed to address this issue.

There is currently a pilot assessment in place within the utilities industry with the aim of gaining a greater understanding of the baseline and how waste can be practicably assessed and classified in unplanned operations. With guidance from the Environment Agency a uniform strategy was developed for the study to which there has been circa 600 sample results to date. The sampling trial is now in the second phase with an increased emphasis on comparing the relationship between the make-up of the and ground hazardous classification.

[24] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/719394/Waste-classification-technical-guidance-WM3.pdf

A collaborative review of the trial data will take place in November 2019 allowing the industry to discuss the findings. Conclusions from the research will support the development of the waste classification protocol and provide a justification for an assessment of risk associated with utilities excavation arisings.

The Environment Agency has agreed that the scope of the protocol will apply to all excavation wastes borne from construction activities on below ground utilities assets.

Current discussions across the industry suggest that a documented, risk assessment approach for classification would be the basis of the protocol. The level of detail required for the risk assessment would be scaled on the type of utilities activity and provide strict definitions as to when chemical analysis would be required.

As there is currently no drafted protocol and the full details of the trials and associated data is not available for analysis, the industry is uncertain of the costs associated with this new protocol. Therefore, as part of this business plan submission we are proposing to introduce a reopener mechanism to adjust our prescribed allowances, should the amount of hazardous waste found on our networks exceed 1%.

A draft protocol will be available for review mid-December 2019 and in late January 2020 will be presented to a table of industry peers for discussion and agreement. The submission deadline for the draft protocol to the regulators is the February 2020.

Further information on the uncertainty of managing waste can be found in our Environmental Action Plan, section 12 of our main business plan, and our Repex appendix (019).

## 6.9 Competition

There is currently no competition within the marketplace for completing repair activities on our network. The skillset required is not broadly held outside of the GDN community and competent repair teams are developed within the GDNs. Beyond the common repair work we encounter on a daily basis, there are occasions where specialist repair techniques are required for large diameter or upper pressure tier assets, this is discussed further under specialist contractors below.

The reinstatement contracts we currently have in place will remain broadly similar, notwithstanding any significant changes to required outputs or customer related guaranteed standards of performance that may influence this.

- **Scotland reinstatement contracts.** Reinstatement activities are completed by a mix of direct and contract labour. The direct labour resources provide an element of flexibility in responding promptly to customer or stakeholder requests. Most of the work is completed by five contracting companies following a competitive tendering event in 2018.
- **Southern reinstatement contracts**. We have three separate reinstatement contractors, one who covers our South local distribution zone, one who covers the south east local distribution zone, and another based on the Isle of Wight. The contract is split between the three areas to find geographical efficiency in the delivery and allow for benchmarking as they were awarded following a competitive tendering event.
- **Specialist contractors.** Similar contracts for specialist services such as flow stopping, bespoke repair techniques, deep excavations and traffic management will remain in place through the GD2 period, although through our continuous improvement and procurement activities we will, where possible, reduce these costs.

## 6.10 Real price effects

Our GD2 repair forecasts do not include any anticipated real price effects.

Ofgem has determined that the GD2 price control will use CPIH as the measure of inflation through which allowances should be adjusted year on year. While we consider CPIH to be a reasonable indicator of overall prices, our labour costs typically tend to exceed this index. As such, we have experienced real price effects in excess of those which would be applied through CPIH. We discuss this further, and propose alternative indices,

in our Cost Efficiency appendix (005).

Costs in this appendix are shown in 2018/19 prices, with cost pressures and funding rationale as follows:

## Upwards cost pressures

Across both our networks we are seeing a percentage increase in the amount of gas escapes on our medium pressure (75mbar(g) to 2bar(g)) network as a proportion of our overall repair numbers. Medium and intermediate pressure gas escape repairs come with an increased cost due to the increased risks and hazards associated with complex repair techniques as demonstrated in the above case studies.

In GD2 our repex programme will be more focussed on the delivery of tier 1 (≤8" diameter), leading to an increase in tier 2 and tier 3 repairs being required. The impact of larger diameter and higher-pressure repairs is to increase the cost of the average repair, due to:

- Increase in number of personnel on site giving rise to labour cost pressure
- Increase in frequency of specialist flow stopping techniques putting greater pressure on the contractor cost
- Increase in number and size of excavations leading to pressure on reinstatement contractor costs
- Increase in area of exclusion zones leading to greater traffic management cost pressures

Certain regional factors have an upward cost pressure on our repair costs. The impact of sparsity and urbanity have particular impact on our Scotland and Southern networks respectively. Urbanity and sparsity are further detailed in the Cost Efficiency appendix (005). The analysis shows that both GDNs are detrimentally affected by regional factors which influences the cost of operational delivery of outputs.

Since the October business plan submission there has been one change of note to the repair and emergency opex financial submission. As we operate a 24/7 service every day of the year we need our teams available to respond quickly, safely, and efficiently to any gas emergency. Historically we have operated a resourcing model placing operatives on standby during evenings and weekends to provide this resilience.

Following industry wide consultation with the key stakeholders on our resourcing model through the lens of personal and public safety, we have identified the risk of fatigue. To mitigate the risk of fatigue we have, in collaboration with third-party global experts and trade union representatives, proposed a new resourcing model using staggered working hours. This new model is designed to mitigate fatigue risk while practicably balancing costs. The proposed new resourcing model will be implemented from mid-November 2019 and will be continuously reviewed to ensure it is fit for purpose. This new resourcing model has had the per annum cost impact identified in the table below.

| Network | Emergency | Repair |
|---|---|---|
| **Scotland** | Commer | Commer |
| **Southern** | Commer | Commer |

## Downwards cost pressures

***Mains replacement programme.*** As the length of metallic mains in the ground decreases, so does the frequency of gas escapes on our network; hence an associated reduction in repair workload is seen. This will continue through GD2 where repair workload is forecast to decrease in line with the increase in the percentage of PE in our network.

***Service replacement.*** Along with the mains replacement programme is the replacement of metallic services. There is a direct correlation between the replacement of metallic mains and services. With the progression of the replacement programme the number of metallic services decreases, as does the leakage and repairs

associated with metallic services, hence we will also see a reduction in service repairs.

***Innovation***. As described above, we have embraced innovation within the repair workstream and this has enabled us to reduce our operating expenditure in this workstream. Further information can be found in our Innovation appendix (008).

***Weather***. Based on seasonal norms, we would expect that winters may return closer to historical average temperatures, and we may also see an increase in extraordinary winter weather events, both of which would increase workloads and drive up costs. Continuation of the exceptionally hot summer periods which we have recently experienced may also increase our workloads and similarly impact our costs. However, at present we have not made an accommodation within our forecast for these weather trends and have instead based our expected costs on the warmer winters observed through GD1 and the expected seasonal normal summers. Similarly, we have not factored in any additional costs in relation to an exceptional event, and therefore this represents a cost which we are currently proposing to absorb. This creates a risk for us should the actual weather deviate from our projections, however it also has the benefit of reducing the expected costs of our repair activities. Therefore, we are currently working to better understand the potential cost pressures of prolonged or extreme weather events.

***Wage costs.*** As set out in the Workforce Management appendix (009) there are several factors affecting our wage costs. A recent pay deal was negotiated with our employees on our SGN C terms and conditions, as opposed to our employees on legacy contracts agreed prior to the formation of SGN.

At the start of GD1 the proportion of legacy to SGN C employees was around 50:50, but by the end of GD1 we forecast that the split will be 20:80. By the end of GD2 we forecast the split will be 90:10, and that the legacy employees will have mostly retired by the late 2030s. This will have a downwards cost pressure on our wage costs.

The impact of these factors on wage costs for the remainder of GD1 and into GD2 has been included within the forecasts. Further information can be found in our Workforce Management appendix (009).

## 6.11 Financial summary

### Funding rationale

For the purposes of the Business Plan submission on 9 December 2019, we have made our current forecast on the following basis:

- The workload forecasts used throughout this paper are reflective of the replacement programme.
- The timing of gas escapes is not controllable, and we have no reason to expect a deviation from historical trends, so we have assumed that the amount of repair workload at premium time is constant with the last three years of GD1.
- Commercial confidentiality
- Third-party damage to our assets will remain constant with GD1 averages through GD2.
- Weather is expected to be broadly similar to that experienced in GD1.

Based on these assumptions and the forecasts set out above we have defined our expected expenditure profile for the GD2 period. Notable in this forecast is the continued reduction in mains repairs expenditure. This is due to the continued role out of the repex programme and the assumptions made regarding seasonal average temperatures.

**Table 6: GD2 forecast expenditure profile**

| SGN (£m) | 13/14 | 14/15 | 15/16 | 16/17 | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mains Repairs | 23.4 | 21.3 | 19.9 | 20.2 | 20.8 | 21.0 | 20.9 | 20.3 | 19.6 | 18.6 | 17.6 | 16.7 | 15.9 |
| Service Repairs | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 |
| Mains Damages (Net) | -3.4 | -0.6 | -1.1 | -0.1 | -0.4 | -0.3 | -0.2 | -0.2 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| Service Damages (Net) | -0.9 | -1.0 | -0.8 | -0.6 | -0.6 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| Repair Other | 3.4 | 4.5 | 1.9 | 2.1 | 1.9 | 2.2 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 |
| Transport and Plant | 7.2 | 4.7 | 4.1 | 3.8 | 3.7 | 4.0 | 3.5 | 3.5 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 |
| Employee Related Overheads | 3.0 | 2.7 | 0.7 | 1.3 | 2.0 | 1.6 | 1.2 | 1.1 | 1.6 | 1.8 | 1.8 | 1.9 | 2.1 |
| **Total** | **33.8** | **32.5** | **25.7** | **27.6** | **28.3** | **29.4** | **28.3** | **27.6** | **27.1** | **26.2** | **25.2** | **24.3** | **23.7** |

| Scotland (£m) | 13/14 | 14/15 | 15/16 | 16/17 | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mains Repairs | 4.8 | 4.1 | 4.1 | 4.4 | 5.0 | 4.8 | 4.8 | 4.6 | 4.6 | 4.5 | 4.4 | 4.3 | 4.1 |
| Service Repairs | 0.5 | 0.4 | 0.4 | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| Mains Damages (Net) | -2.4 | -0.2 | -0.1 | -0.1 | -0.0 | -0.0 | -0.1 | -0.1 | -0.0 | -0.0 | -0.0 | -0.0 | -0.0 |
| Service Damages (Net) | -0.2 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 |
| Repair Other | 0.3 | 0.3 | 0.4 | 0.2 | 0.2 | 0.1 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Transport and Plant | 3.6 | 1.3 | 1.0 | 1.2 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| Employee Related Overheads | 1.3 | 0.7 | 0.4 | 0.4 | 0.6 | 0.5 | 0.3 | 0.3 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 |
| **Total** | **7.9** | **6.5** | **6.0** | **6.4** | **7.3** | **6.7** | **6.9** | **6.7** | **6.9** | **6.8** | **6.7** | **6.6** | **6.5** |

| Southern (£m) | 13/14 | 14/15 | 15/16 | 16/17 | 17/18 | 18/19 | 19/20 | 20/21 | 21/22 | 22/23 | 23/24 | 24/25 | 25/26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mains Repairs | 18.7 | 17.1 | 15.9 | 15.9 | 15.8 | 16.2 | 16.1 | 15.7 | 15.0 | 14.1 | 13.2 | 12.5 | 11.7 |
| Service Repairs | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 |
| Mains Damages (Net) | -1.0 | -0.4 | -1.1 | -0.2 | -0.4 | -0.3 | -0.1 | -0.1 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| Service Damages (Net) | -0.7 | -0.8 | -0.6 | -0.5 | -0.5 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 |
| Repair Other | 3.1 | 4.2 | 1.5 | 1.9 | 1.7 | 2.2 | 1.7 | 1.7 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 |
| Transport and Plant | 3.6 | 3.3 | 3.1 | 2.6 | 2.3 | 2.8 | 2.3 | 2.3 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| Employee Related Overheads | 1.8 | 2.0 | 0.4 | 0.9 | 1.4 | 1.1 | 0.8 | 0.8 | 1.1 | 1.2 | 1.3 | 1.3 | 1.5 |
| **Total** | **26.0** | **26.0** | **19.7** | **21.2** | **21.0** | **22.7** | **21.4** | **20.9** | **20.2** | **19.4** | **18.5** | **17.7** | **17.2** |

### Business Plan data templates

Below we have included direction to the relevant section of the BPDTs on a summary and activity-specific basis. We have included references to overall repair costs as well as the workloads. We have also included reference to the rows in which total values can be found.

Cost influences and trends are discussed in section 6.10.

| Category | Summary | Activity-specific |
|---|---|---|
| **Total Repair** | 2.01 | 2.01<br>Row 141 |
| **Workloads** | 5.07 | 5.07<br>Row 44 (Reports)<br>Row 68 (Repairs) |

## 6.12 Assurance

Our business plan, including appendices, has been subject to a rigorous assurance process which is detailed in chapter 3 of the plan and the Board Assurance Statement.

Our Director of Southern Operations and Managing Director Scotland were appointed as the Sponsors for the Repair appendix (014) and the associated Business Plan Data Templates (BPDTs), which have been through the following levels of review and assurance:

**First Line**

This was undertaken at project level by the team producing the document, as a regular self-check or peer review.

**Second Line**

This was undertaken independently within the organisation to review and feedback on product development, including a peer review by general managers. Internal audit reviewed the third line assurance work conducted by Ove Arup and Partners against scope.

Both senior manager and Director sign-off was obtained and our GD2 Executive Committee: (1) considered the appropriateness of assurance activity for the Appendix and (2) provided assurance to SGN's Board that the Business Plan meets Ofgem's assurance requirements.

**Third Line**

This was undertaken by external advisors and groups providing critical challenge during the development of products within the Business Plan. In addition to the feedback and challenge provided by the Customer Engagement Group (CEG) and Customer Challenge Group (CCG) this appendix was developed after consultation with and advice from:

| Advisor / Group | Contribution |
|---|---|
| **Ove Arup and Partners** | Consultancy support to enable development of an evidence based high quality business plan draft by acting as an expert challenge group through independent peer reviews against Ofgem business plan guidance. |

**Fourth Line**

This was undertaken by independent and impartial external providers, who provided a detailed and comprehensive report to both the Executive Committee and Board of Directors:

| Advisor / Group | Contribution |
|---|---|
| **Ove Arup and Partners ('Clean' Team)** | Review of appendix against Ofgem's assurance requirements. |
| **PwC** | Business Plan Data Template review: Opex Cost Matrix: Controllable Activity Costs; PRE, Reports & Repairs and Streetworks |

# 7 Glossary

All acronyms and associated descriptions can be found within the Glossary appendix.

# 8 Annex

# 1. Permits and lane rental schemes

**Permit schemes**

Permit schemes differ from existing noticing systems in several key respects:

- Rather than informing the authority of the promoters' intentions as done prior to permit schemes, promoters are now required to book occupation of the street for specified periods and for a specified purpose; local authorities can also control how frequently the same roads are dug up and there is also a potential for collaborative working if a permit has already been granted to another utility company for the same area.
- Local authorities are able to enforce conditions on the work promoter for granting the permit, which impose constraints on the dates and times of activities and the way that work is carried out can also be stipulated.
- The authority's control over variations to the permit conditions, particularly time extensions, gives a greater incentive to complete activities on time.

A permit must be applied for unless otherwise specified, for street works in HA areas where permit schemes are enforced

A permit, if granted, will have an option to enforce conditions and if a variation is required by the works promoter to the duration or conditions, it will need to be raised with the HA for further authorisation.

**Lane rental schemes**

Lane rental charges are daily charges which apply to works promoters carrying out works in the highway. It is aimed at the works undertaken in the busiest roads at the busiest times. Section 74; Lane Rental of NRSWA came into effect June 2012, for Transport for London (TfL) Strategic Road Network and Kent county council from June 2013. It was a trial aimed at monitoring the reduction in disruption to road users caused by works; charging up to £2,500 a day to reflect the cost of disruption.

In summary the scheme:

- reduces the length of time that sites are unoccupied, reducing the time taken to complete the work
- improves planning, co-ordination and working methods to maximise efficiency
- means more work is completed outside of peak periods
- enables work to be completed as quickly as possible
- completes work to the required standard the first time

To minimise daily charges, utilities are encouraged to:

- work outside of traffic-sensitive times
- work outside of term or seasonal times
- work at weekends and bank holidays during term-times
- avoid the reduction of lanes available to traffic
- work with other HAs to share a collective charge