

Sub Appendix

A19:B

NGN Asset Integrity Investment Methodology



R110-GD1

Sub Appendix

A19:B

Asset Integrity Investment Methodology



Asset Integrity Investment Methodology

- Overriding principle is to invest only where clear benefits are delivered.
- Focus is on Total Network Management (TNM) with asset management by our Customer Operations Area Managers (COAMs).
- This is not an aggressive Investment plan.
- However priorities are shifting due to asset condition.
- Majority of assets have been in operation for over 40 years.
- We have a robust track record of maintaining not unnecessarily replacing assets.



Asset Integrity Investment Methodology

- Risks have been evaluated and balanced across asset categories.
- Criticality has provided the ability to drive performance at local level.
- NGN has achieved a major step change in understanding asset health.
- Ahead of original timescales for gathering asset health data.
- First cut assessment now complete and moving into detailed site surveys.
- We have used Subject Matter Expert (SME) assessment balanced with detailed asset failure data.
- Data gaps do exist - however we understand where they are we are able to close out.



Asset Health Category 18 - Pressure Reduction Installations Above 7 bar. **GREEN**



Asset Health - NGN Overview

- Purpose: To give an overview of NGN's approach to Asset Health.
- Structure: three categories:
 - PRI's (deep dive - Pre-Heating) **Green**
 - Telemetry above 7 bar (deep dive - Energy Flow Measurement) **Amber**
 - Special Crossings below 7 bar (Deep dive - non N2 Sleeves) **Red**
- Out of the 47 categories (including sub categories)
 - 40% Green
 - 54% Amber
 - 6% Red

Robust data and/or confident in assumptions

Good data – improvement required, but confident in assumptions

Data unavailable or poor quality – requires more data but based on solid assumptions



Asset Health Category 18 - Pressure Reduction Installations above 7 bar

The challenge:

- PRI's have multiple independent components parts.
- Different component parts have different asset health and criticality indices.
- Different parts of the PRI may have been modified / upgraded at different moments in time.

How do you correctly define the asset health of an above 7 bar PRI taking into account the factors above?



The Master Table - Supported by the sub tables

Asset categories		Criticality Index	Asset distribution based on estimated asset health index in current reporting year					Asset Register
			Asset health index					31-Mar-11
			HI1	HI2	HI3	HI4	HI5	
18	PRI's above 7 Bar	Low	0	0	143	0	0	
		Medium	0	0	143	0	0	
		High	76	1	278	287	0	
		Very High	115	10	406	459	0	

Asset categories		Criticality Index	Asset distribution based on estimated asset health index in current reporting year					Asset Register
			Asset health index					31-Mar-11
			HI1	HI2	HI3	HI4	HI5	
18	PRI's above 7 bar	Low						
	PRI's - Filters	Medium						
		High	40		150	151		
		Very High						
18	PRI's above 7 bar	Low						
	PRI's - Pre Heating	Medium						
		High			1	2	10	
		Very High			10	9	66	
18	PRI's above 7 bar	Low						
	PRI's - regulators	Medium						
		High			36		126	126
		Very High			56		181	181
18	PRI's above 7 bar	Low						
	PRI's - slam shuts	Medium						
		High						
		Very High	14		165	165		
18	PRI's above 7 bar	Low					143	
	PRI's - Civils	Medium					143	
		High						
		Very High	45		51	47		

Sub tables populated independently against their own criteria rolling up to the master table.

Pre Heating - Deep Dive

Pre-heating represents a significant investment throughout RIIO-GD1. This investment line has been driven by the asset health assessment.

The network believes it could have a potentially significant issue with site pre-heating throughout and after RIIO-GD1 if this critical issue is not addressed.

Our above 7 bar PRI's currently have:

- 67 Water Bath Heaters (WBH); and
- 33 Boiler packages

Within RIIO-GD1 the network is forecasting to replace / upgrade :

- 16 WBH (24%)
- 20 Boiler Packages (65%)



Criticality Criteria

C1	Very High	Heating on site with an above 15 bar pressure drop. (in line with IGE/TD/13)
C2	High	Heating on site with a below 15bar pressure drop. (in line with IGE/TD/13)

Criticality for Pre-Heating has been based on the physical characteristics of the site based on the requirements outlined in IGE/TD/13.

The network considers Pre-Heating on site to be a critical activity, failure of the Pre-Heating system can cause physical damage to the surrounding area (frost heave) and could ultimately damage equipment and cause loss of gas through freezing of control pilots.



Asset Health Criteria

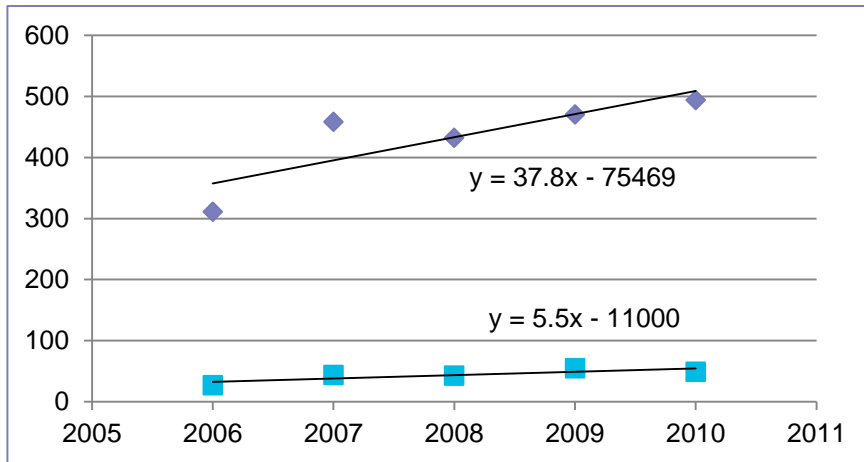
		Water Bath Heaters	Boiler packages
HI1	New or as new	WBHs under 10 years old	Boiler packages under five years old
HI2	Good or serviceable condition	WBHs 10 to 20 years old.	Boiler package/heat exchangers, five to ten years old
HI3	Deterioration, requires assessment or monitoring	WBHs 20 to 30 years old	Boiler package/heat exchangers, 10 to 15 years old.
HI4	Material deterioration, intervention requires consideration	WBHs over 30 years old	Boiler package/heat exchangers, between 15 to 20 years old
HI5	End of serviceable life, intervention required	WBHs with over fifty faults in last 5 years.	Boilers packages over 20 years old

Pre-Heating has been classified based on a combination of age, deterioration assessment data and SME assessment.



Deterioration Rates

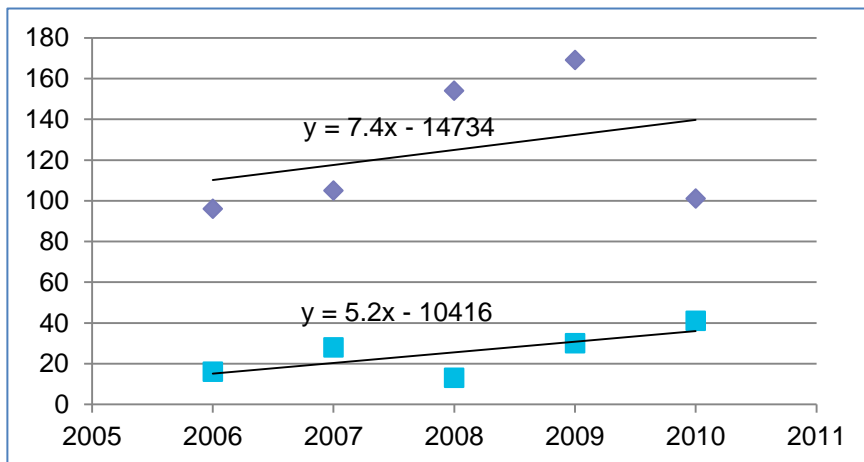
NE WBH Average Number of Faults



WBH

- Once over 40 faults in five years has been reached there is a ongoing significant deterioration in asset health.
- Below 40 faults in five years show a minimal increase in deterioration.
- NGN has based its replacement i.e. HI5 threshold on 50 faults in five years identifying the programme through constant monitoring.

NE Boilers Average Number of Faults



Boiler Packages

- Using the same 40 faults in five years criteria there is a ongoing deterioration in asset health with a consistently high number of faults.
- Below forty faults in five years show a lower increase in deterioration.
- NGN has based its replacement i.e. HI5 threshold on 50 faults in five years and we anticipate that a significant number of boilers will achieve this threshold considering historic age, fault data coupled with manufacturers guidelines and SME assessments.

The Data

LDZ	Pipeline Section	Brief Description of the purpose of the site	Installation Name	No Sites	Pre Heating	No WBH	No HE	Faults in five years	CRITICALITY
NO	Salt Cavity	50 to 19 bar PRI (Regulator)	Cowpen Bewley Regulator		WBH x4	4		644	vh
NO		50 to 19 bar (Regulator)	Seal Sands Regulator (19 bar)		WBH x2	2		314	vh
NO	South Tees	40 to 2 bar PRI	Thornaby Vale		WBH x2	2		170	vh
NO	South Tees	40 to 0.45 bar PRI	Wilton Westgate		WBh x2	2		120	vh
NO	Downrated	38 to 19 bar PRI (Regulator)	Tanfield		WBH x2	2		107	vh
NE	Central West 17 bar	17 to 2 bar PRI	Chapel Haddlesey		HE x1		1	94	h
NE	Central West 17 bar	17 to 2 bar PRI	Keighley		HE x1		1	91	h
NO		38 to 6.9 bar PRI	Hazelrigg		HE x2		2	88	vh
NO	South Tees	12 to 0.28 bar PRI	Bluebell		HE x2		2	81	h
NO		17 to 2 bar PRI	Low Thornley (Rowlands Gill)		Elec x1		1	81	h
NO		70 to 19 bar PRI (Regulator)	Hepscott Regulator 19bar		WBH x2	2		62	vh
NO		70 to 2 bar PRI	Catterick		HE x2		2	61	vh
NE	Central West 17 bar	17 to 2 bar PRI	Crossgates		HE x1		1	58	h
NO	South Tees	40 to 6.9 bar PRI	Kirkleatham		WBH x2	2		55	vh
NO		70 to 6.9 bar PRI	Scremerston		WBH x2	2		55	vh
NO	Downrated	38 to 2 bar PRI	Ushaw Moor		WBH x2	2		55	vh
NO	Salt Cavity	50 to 19 bar PRI (Regulator)	Warden Law		HE x2		2	51	vh
NE	East Coast 38 bar	38 to 17 bar PRI (Regulator)	Pickering		WBH x2	2		50	vh
NO	South Tees	19 to 10 bar PRI (Regulator)	Durham Lane		WBh x2	2		49	h
NO	South Tees	40 to 2 bar PRI	Brotton		HE x2		2	48	vh
NE	Central West 17 bar	17 to 2 bar PRI	Dewsbury		WBH x1	1		46	h
NE	East Coast 38 bar	38 to 17 bar PRI (Regulator)	Saltend		WBH x2 HE x2	2	2	45	vh
NE	Central West 38 bar	38 to 7 bar PRI	Whinny Gill		HE x2		2	45	vh
NO		70 to 2 bar PRI	Springwell Lane		HE x2		2	42	vh
NO		17 to 6.9 bar PRI	Blaydon Regulator		WBh x2	1		41	h
NE	Central West 17 bar	17 to 2 bar PRI	Low Moor		HE x1		1	40	h
NE	Central West 17 bar	17 to 2 bar PRI	Hartshead Moor		HE x1		1	35	h
NE	Central West 38 bar	38 to 17 bar PRI (Regulator)	Whitehall Road		HE x2		2	34	vh
NO	Downrated	38 to 19 bar PRI (Regulator)	West Edmonsley Regulator		HE x2		2	25	vh
NE	Central West 38 bar	38 to 2 bar PRI	Knottingley		WBH x3	3		24	
NO	NO LDZ	19 to 6.9 bar PRI	Shap		WBH x1 Elec x2	1	2	24	h
NO	South Tees	40 to 12 bar PRI (Regulator)	Newby		WBH x2	2		21	vh
NE	Central West 38 bar	38 to 2 bar PRI	Aberford		WBH x2	2		19	vh
NE	Central West 38 bar	38 to 7 bar PRI	Askham Bryan		WBH x2			19	vh
NO	Wearside	19 to 2 bar PRI	Plawsworth		HE x2		2	17	h

Cowpen Bewley is being undertaken this year.

Our above 7 bar PRI's currently have:

- 67 Water Bath Heaters
- 33 Boiler packages

Within RIIO-GD1 the network is expecting to replace/ upgrade :

- 16 WBH (24%)
- 20 Boiler Packages (65%)

Financial Overview - Unit Cost Assumptions

1. Based on our extensive prior experience replacement of a WBH costs circa c. £400K on an above 7 bar PRI. Replacement of 16 WBHs would therefore cost £6.4m.
2. Upgrades of a boiler house (boiler replacements) would cost an estimated £150k per site. Upgrading 20 sites would give a total cost of £3m.
3. Installation of new boiler packages and associated heat exchangers etc are estimated to cost circa £600k per site. Total cost for upgrade on three sites is c. £1.8m.



Financial Overview - Forecast Expenditure

PRI's above 7 bar - Pre heating									TOTAL (£000K)
Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	
New Pre heating Requirements	0	0	0	600	600	600	0	0	1,800
Boiler upgrade	300	300	300	450	300	450	600	300	3000
WBH Replacement (£000)	800	800	800	800	800	800	800	800	6400
Total Cost	1100	1100	1100	1850	1700	1850	1400	1100	11200
Total Investment PRI's Above 7 Bar Pre-Heating									£11.2m
Total Investment Offtakes Pre-Heating									£9.3m
Total Pre Heating Investment									£20.5m

Different Asset Health Category 17 – Offtakes

See RIIO-GD1 Business Plan – Figure 7.33

Asset Health Tables

Asset Health at the start of RIIO-GD1

Asset categories		Criticality Index	Asset distribution based on estimated asset health index in current reporting year					Asset Register
			Asset health index					31-Mar-11
			HI1	HI2	HI3	HI4	HI5	
18	PRI's above 7 bar	Low						
	PRI's -Pre Heating	Medium						
		High		1	2	10		
		Very High		10	9	66		

Boilers

Boilers & WBHs

Asset Health with investment

Asset categories		Criticality Index	Asset distribution based on estimated remaining useful life at 31 March 2021				
			Remaining useful life				
			Expected (50%)				
			HI1	HI2	HI3	HI4	HI5
18	PRI's above 7 bar	Low					
	PRI's -Pre Heating	Medium					
		High	7			6	
		Very High	32			53	

Asset Health without investment

Asset categories		Criticality Index	Asset distribution based on estimated remaining useful life at 31 March 2021				
			Remaining useful life				
			Expected (50%)				
			HI1	HI2	HI3	HI4	HI5
18	PRI's above 7 bar	Low					
	PRI's -Pre Heating	Medium					
		High				6	7
		Very High				56	29

3 New Boilers, 20 boiler Upgrades, 16 WBHs

**Asset Health Category 22 -
Telemetry above 7 bar **AMBER****



Asset Health Category 22 - Telemetry above 7 bar

In order to populate the 'telemetry above 7 bar' asset health table NGN broke this primary category down into 9 sub categories. These sub categories were designed to ensure NGN could evaluate all the constituent electrical and instrumentation systems.

No.	Subcategory
1	LTS Offtakes, Odorant upgrades
2	LTS Offtakes, Energy Flow Measurement
3	LTS Offtakes, Electrical Systems
4	LTS Offtakes, Instrumentation Systems
5	LTS Offtakes, Flow Metering Upgrades
6	LTS Above 7 bar Electrical Systems
7	LTS Above 7 bar, Instrumentation Systems
8	E&I Telemetry Communication
9	E&I Telemetry Outstations



The Master Table - Supported by the sub tables

Asset categories		Criticality Index	Asset distribution based on estimated asset health index in current reporting year					Asset Register
			Asset health index					31-Mar-11
			HI1	HI2	HI3	HI4	HI5	
22	Telemetry & Control	Low	0	125	86	182	0	
		Medium	0	23	78	46	65	
		High	0	0	0	23	0	
		Very High	4	23	0	43	0	

Sub tables populated independently against their own criteria rolling up to the master table.

Asset categories		Criticality Index	Asset distribution based on estimated asset health index in current reporting year					Asset Register	Asset Register	Asset Register	Asset Register	Asset Register	Asset Register
			Asset health index										
			HI1	HI2	HI3	HI4	HI5	31-Mar-11	31-Mar-11	31-Mar-11	31-Mar-11	31-Mar-11	31-Mar-11
22	Telemetry & Control	Low											
	Offtakes - Odourant Tanks	Medium											
		High											
		Very High	4				20						
		Very High											
		High					1	2	10				
		Very High					10	9	66				
		High					36		126	126			
		Very High					56		181	181			
		Very High						14		165	165		
		High											
		Very High							45		51	47	

Energy Flow Measurement - Deep Dive

Energy flow measurement equipment is critical to all networks to confirm and record the energy of the gas entering our system. Failure of this equipment would be a breach of GSMR regulations and cause significant issues for gas shippers.

Criticality

C1	Very High	Can not be replaced on fail - must operate 24/7
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Asset Health

HI4	Material deterioration, intervention requires consideration	Component equipment tending towards obsolescence
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Calorimeters and specifically the controllers on the network are now over 15 years old and are obsolete or have component parts tending towards obsolescence. Minimal spares / support is available and new improved calorimeters allow the network to ensure energy measurement accuracy and reliability using the latest IFI developed process/audit software.



Deterioration Rates

As is the case with a large amount of E&I based equipment, a significant factor affecting deterioration rates is obsolete equipment. E&I equipment and specifically the operating hardware / software is relatively fast moving, as such many of the deterioration rates have been based on SME assessment and historical trends of equipment obsolescence.

Specifically relating to energy flow measurement:

- Deterioration rates have been determined at five year intervals derived from a twenty year design life. The intervention required was based on network experience of upgrading this equipment and an estimate of asset depreciation rates linked to manufacturers guidance on design life.
- Specific to NGN our calorimeter controllers have not been manufactured for some time and minimal components are available. Skilled contractors to carry out expert work are also difficult to find. The calorimeters also have now been superseded and will become unsupported during the RIIO-GD1 period.



The Data

NGN Offtake Calorimeters			
Site	Installation Date	Manufacturer	System Control Fault Data
Burley Bank	1995/6	Daniels	Yes
Ganstead	1995/6	Daniels	Yes
Pannal	1995/6	Daniels	Yes
Paull	1995/6	Daniels	Yes
Pickering	1995/6	Daniels	Yes
Towton	1995/6	Daniels	Yes
Bishop Auckland	1995/6	Daniels	Yes
Wetheral	1995/6	Daniels	Yes
Cowpen Bewley	1995/6	Daniels	Yes
Elton	1995/6	Daniels	Yes
Little Burdon	1995/6	Daniels	Yes
Saltwick	1995/6	Daniels	Yes

Financial Overview - Unit Cost Assumptions

1. Calorimeters – The calorimeters on the network are now 15 years old and are approaching obsolescence. It is expected that before the end of RIIO-GD1 period all 12 calorimeters will need major intervention. Calorimeter replacement is estimated at £100k per calorimeter. This will be undertaken at a rate of three pa from 2017 onwards.
2. Calorimeter controllers are now obsolete and unsupported and need replacement. Controller replacement, estimated at £10k per controller replaced at a rate of three pa from 2013 onwards.
3. Omni Flow Computers are now obsolete, there are some spares available but it is expected that a total replacement will be required towards the mid point of RIIO-GD1. Replacement also allows upgrades of the orifice flow calculation to the 2003 standard. The flow computers will be replaced at a rate of three pa starting 2017 meaning just over half are replaced in RIIO-GD1.
4. UPS replacement, estimated at £7K per site will be undertaken in a two year period.



Financial Overview - Forecast Expenditure

Energy Flow Measurement									TOTAL (£000K)
Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	
Calorimeter Replacement					300	300	300	300	1200
Controller Replacement	30	30	30	30					120
Omni Flow Computer Replacement					90	120	120	120	450
UPS Replacement		56	56	49					161
Cost (£000)	30	86	86	79	390	420	420	420	1931
						Total Investment			£1.9m

Asset Health Tables

Asset Health at the start of RIIO-GD1

Asset categories		Criticality Index	Asset distribution based on estimated asset health index in current reporting year				
			Asset health index				
			HI1	HI2	HI3	HI4	HI5
22	Telemetry & Control	Low					
	Offtakes - Energy Flow Measurement	Medium					
		High					
		Very High				23	

Asset Health with investment

Asset categories		Criticality Index	Asset distribution based on estimated remaining useful life at 31 March 2021				
			Remaining useful life				
			Expected (50%)				
			HI1	HI2	HI3	HI4	HI5
22	Telemetry & Control	Low					
	Offtakes - Energy Flow Measurement	Medium					
		High					
		Very High	23				

Asset Health without investment

Asset categories		Criticality Index	Asset distribution based on estimated remaining useful life at 31 March 2021				
			Remaining useful life				
			Expected (50%)				
			HI1	HI2	HI3	HI4	HI5
22	Telemetry & Control	Low					
	Offtakes - Energy Flow Measurement	Medium					
		High					
		Very High					23

Asset Health Category 3 - Special Crossings (< 7 bar) **RED**



Asset Health Category 3 - Special Crossings (< 7 bar)

In order to populate the 'Special Crossings (< 7 bar)' asset health table NGN broke this primary category down into two sub categories. These sub categories were designed to ensure NGN could evaluate all special crossings within the asset health system methodology.

No.	Subcategory
1	Non Nitrogen (N ₂) Sleeves
2	Over crossings

NGN currently have c.1700 <7 bar overcrossings. The investment through RIIO-GD1 will allow the upgrade of 140 crossings (8%).



The Master Table - Supported by the sub tables

Asset categories		Criticality Index	Asset distribution based on estimated asset health index in current reporting year					Asset Register
			Asset health index					31-Mar-11
			HI1	HI2	HI3	HI4	HI5	
3	Overcrossings	Low	0	0	0	0	0	0
		Medium	0	0	0	0	0	0
		High	0	0	1200	500	0	1700
		Very High	0	0	0	0	0	0

Asset categories		Criticality Index	Asset distribution based on estimated asset health index in current reporting year					Asset Register
			Asset health index					31-Mar-11
			HI1	HI2	HI3	HI4	HI5	
3	Overcrossings	Low	0	0	0	0	0	0
		Medium	0	0	0	0	0	0
		High	0	0	1200	500	0	1700
		Very High	0	0	0	0	0	0

Sub tables populated independently against their own criteria rolling up to the master table.

Overcrossings - Deep Dive

According to NGN/PM/MAINT5 an above-ground crossing is defined as “an exposed pipe, or pipe within a sleeve, that crosses a particular feature or facility, above ground level”. Failure to maintain these assets would be a breach of PSR regulations.

Criticality

c1	Very High	Crossings on pipelines where the loss of supply consequences will be great. (>100 customers). All > 7 bar crossings.
c2	High	Crossings on pipelines which can be back fed and therefore loss of supply is minimised. All < 7 bar crossings.

Most <7 bar overcrossings will be part of an integrated system, as such they have all been classified as ‘High’.



Overcrossings - Deep Dive

Asset Health

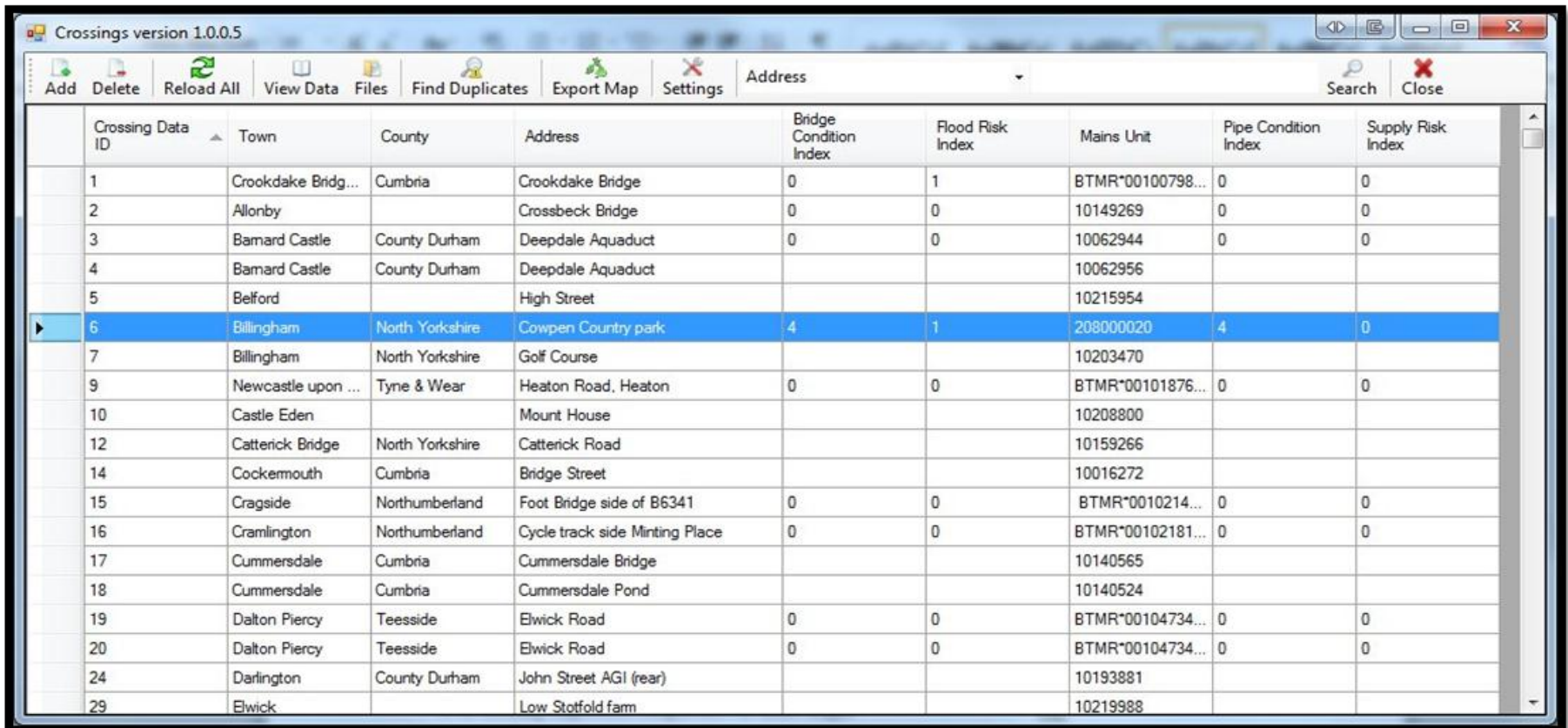
HI1	New or as new	< 20 years old
HI2	Good or serviceable condition	Recent inspection and no outstanding issues
HI3	Deterioration, requires assessment or monitoring	Remedial actions outstanding from previous surveys
HI4	Material deterioration, intervention requires consideration	Little information - Serious structural/corrosion issues
HI5	End of serviceable life, intervention required	Little information - Serious structural/corrosion Issues

It has been assumed using SME assessment and available data that many of the < 7 bar overcrossings currently fall in HI4 category or HI3 and require further assessment.



The Data

All data for overcrossings is held with the relevant experts (pipeline engineers) or within a database which is under development. Currently this database contains only a list of points where a pipe is exposed above ground.




The screenshot shows a software application window titled "Crossings version 1.0.0.5". The window contains a menu bar with options: Add, Delete, Reload All, View Data, Files, Find Duplicates, Export Map, and Settings. There is also a search bar with a "Search" button and a "Close" button. The main area displays a table with the following columns: Crossing Data ID, Town, County, Address, Bridge Condition Index, Flood Risk Index, Mains Unit, Pipe Condition Index, and Supply Risk Index. The table lists 20 entries, with the 6th entry (Crossing Data ID 6) highlighted in blue.

Crossing Data ID	Town	County	Address	Bridge Condition Index	Flood Risk Index	Mains Unit	Pipe Condition Index	Supply Risk Index
1	Crookdake Brdg...	Cumbria	Crookdake Bridge	0	1	BTMR*00100798...	0	0
2	Allonby		Crossbeck Bridge	0	0	10149269	0	0
3	Barnard Castle	County Durham	Deepdale Aquaduct	0	0	10062944	0	0
4	Barnard Castle	County Durham	Deepdale Aquaduct			10062956		
5	Belford		High Street			10215954		
6	Billingham	North Yorkshire	Cowpen Country park	4	1	208000020	4	0
7	Billingham	North Yorkshire	Golf Course			10203470		
9	Newcastle upon ...	Tyne & Wear	Heaton Road, Heaton	0	0	BTMR*00101876...	0	0
10	Castle Eden		Mount House			10208800		
12	Catterick Bridge	North Yorkshire	Catterick Road			10159266		
14	Cockermouth	Cumbria	Bridge Street			10016272		
15	Cragside	Northumberland	Foot Bridge side of B6341	0	0	BTMR*0010214...	0	0
16	Cramlington	Northumberland	Cycle track side Minting Place	0	0	BTMR*00102181...	0	0
17	Cummersdale	Cumbria	Cummersdale Bridge			10140565		
18	Cummersdale	Cumbria	Cummersdale Pond			10140524		
19	Dalton Piercy	Teesside	Elwick Road	0	0	BTMR*00104734...	0	0
20	Dalton Piercy	Teesside	Elwick Road	0	0	BTMR*00104734...	0	0
24	Darlington	County Durham	John Street AGI (rear)			10193881		
29	Elwick		Low Stotfold farm			10219988		

The Data - Next Steps

As the database development progresses, each overcrossing will have a link to a display box showing details of the crossing. This box will be comprised of data retrieved from a risk survey, allowing asset risk management to gain a better understanding of the condition of this asset class.

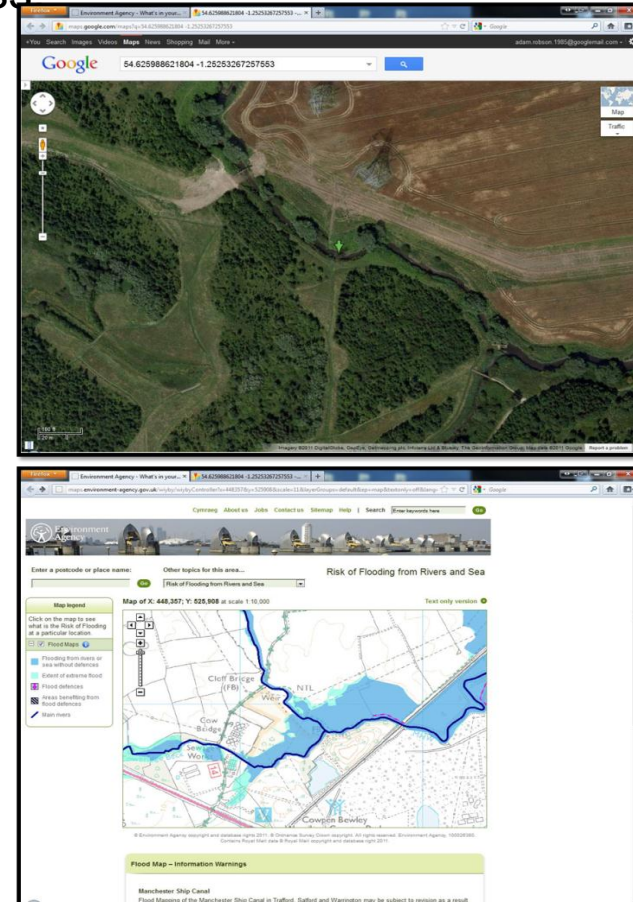


Crossing Details

Save Close Map Flood Map

Crossing Details Pipe Details

Town: Billingham
County: North Yorkshire
Address: Cowpen Country park
Grid Reference: E 448357 N 525908
Crossing Type: Watercourse
Description: Cowbridge Beck CH11
Bridge Material: brick
Supports: Poor condition - see report for details
Bridge Ownership:
Inspection Regime: No
Contact Name:
Telephone No.:
Construction Date: 23 February 2011
Last Inspection: 22 February 2011
Next Inspection: 23 February 2011
Condition Index: 4
Flood Risk Index: 1



Deterioration Rates

Overcrossings will deteriorate in time due to weather initiating corrosion as well as “one-off” natural incidents, such as flooding. Ongoing surveys and monitoring will identify upgrades required to ensure these assets are fit for purpose on a rolling program.

Deterioration rates have been determined in line with the same methodology as was determined for Asset Category 1: LTS Pipelines, whereby an assumed percentage of overcrossings are expected to deteriorate in health. This percentage is based on historic data, to project forward into RIIO-GD1.

Investment will be targeted at preventing this deterioration occurring and maintaining assets to a good working standard.



Financial Overview - Unit cost Assumptions

1. The overcrossings in the network are of various ages and condition. Overcrossings are unlikely to be replaced entirely and the majority of works will include repainting, rewinding and reinforcement to prevent deterioration or to repair damage from an environmental “one-off” such as flooding.
2. Based on previous remedial work carried out on overcrossings, a unit cost of £5K - £30K has been estimated, covering all types of remedial work to be undertaken on overcrossings.



Financial Overview - Forecast Expenditure

Expenditure (£M)	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21
Overcrossings	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

Overcrossings may require repainting, rewrapping and reinforcing to ensure they stay in a good and serviceable condition. A total of £2.4m has been allocated for overcrossings within our RIIO-GD1 plan. This is based on SME assessment and the data we have to date. It is believed this is sufficient investment to allow none of the overcrossing assets to be in H14/H15 at the end of RIIO-GD1, therefore delivering a significant removal of risk from the network.

See RIIO Business Plan – Figure 7.38



Asset Health Tables

Asset Health and Criticality - at the start of RII0-GD1

Asset categories		Criticality Index	Asset distribution based on estimated asset health index in current reporting year					Asset Register
			Asset health index					31-Mar-11
			HI1	HI2	HI3	HI4	HI5	
3	Overcrossings	Low	0	0	0	0	0	0
		Medium	0	0	0	0	0	0
		High	0	0	1200	500	0	1700
		Very High	0	0	0	0	0	0

Asset Health and Criticality - With Investment

Asset categories		Criticality Index	Asset distribution based on estimated remaining useful life at 31 March 2021				
			Remaining useful life				
			Expected (50%)				
			HI1	HI2	HI3	HI4	HI5
3	Overcrossings	Low					
		Medium					
		High		140	1200	360	
		Very High					

Asset Health and Criticality - Without Investment

Asset categories		Criticality Index	Asset distribution based on estimated remaining useful life at 31 March 2021				
			Remaining useful life				
			Expected (50%)				
			HI1	HI2	HI3	HI4	HI5
3	Overcrossings	Low					
		Medium					
		High			1200	360	140
		Very High					

Asset Health - Risk Scoring and Trade-Offs



Plant Status Register - Risk Scoring

Description				Scoring matrices							
Plant Status Reference	Plant Status Title	Initiator	Status	Safety Score	Environmental	Security of Supply	Risk of Gas release	Failure of the Safety Device will occur if no action is taken	Potential effect on addition Equipment damage	3rd party Damage to asset	SCORE
12021201	Flange Protectors East Bierley	BJ		0	0	0	5	0	1	0	6
12021202	KIOSK roof Ysite - leaking felt roof, down the wall, roof integrity looks OK	BJ		5	0	5	5	0	0	0	15
12021203	KIOSK roof Xsite - leaking GRP roof, over electrical cabinet, roof integrity looks OK	KS		20	0	5	5	0	15	0	45
12021204	Axial Inspirator Block replacement at Z-site	AMcA		5	0	5	0	10	0	0	20
12021205	Boiler Failure Chappel Haddelsey	NH		0	0	10	5	20	15	0	50
12021206	Odourant Tank Relief Valve	KS		30	5	5	0	0	1	0	41
12021207	WBH Ignition Systems at C-Site	AR		30	0	0	20	0	0	0	50
12021208	WBH Ignition Systems All sites x90 WBH's	AR		30	0	0	20	0	0	0	50
12021209	Kiosk Door at B-site sticking but secure	GP		5	0	0	0	0	0	0	5
12021210	Kiosk Door at F-site unable to secure	GP		5	0	10	10	0	5	25	55

Within the RIIO-GD1 business plan there are two investment lines for Ancillary and Auxiliary equipment. The work associated with these investment lines is predominantly made up of small operations led schemes for example, WBH cabinet upgrades, roofs, doors, site signage, intervention resulting from statutory inspections, obsolete equipment etc.

Investment ‘Trade-Off’s’

The Plant Status register will allow the identification of potential ‘problems areas’ which should be considered as bigger schemes. When these types of schemes are identified individual business cases will be developed and ‘trades offs’ may have to be made within the RIIO-GD1 business plan to identify project funding.

In essence this process will form a substantial part of the networks ability to react to changing operational issues in a clearly defined process which is both auditable and has a clear methodology for prioritising work. This will ultimately allow NGN to identify where trade offs for investment have taken place in a systematic process.



For consideration

NGN proposes to couple the asset health category risk profiling with the plant status register to drive the optimum investment solutions.

			HI1	HI2	HI3	HI4	HI5
		C4	RI5	RI5	RI4	RI3	RI2
		C3	RI5	RI5	RI3	RI2	RI2
		C2	RI5	RI4	RI2	RI2	RI1
		C1	RI4	RI3	RI2	RI1	RI1
Asset categories		Criticality Index	Asset distribution based on estimated asset health index in current reporting year				
			Asset health index				
			HI1	HI2	HI3	HI4	HI5
18	PRI's above 7 bar	Low					
	PRI's -Filters	Medium					
		High					
		Very High					
Asset categories		Criticality Index	Asset distribution based on estimated asset health index in current reporting year				
			Asset health index				
			HI1	HI2	HI3	HI4	HI5
18	PRI's above 7 bar	Low					
	PRI's -Pre Heating	Medium					
		High					
		Very High					
Asset categories		Criticality Index	Asset distribution based on estimated asset health index in current reporting year				
			Asset health index				
			HI1	HI2	HI3	HI4	HI5
18	PRI's above 7 bar	Low					
	PRI's -slam shuts	Medium					
		High					
		Very High					



Asset Health - The Evolution



Surveys

Above 2 bar Site Survey Proforma						
Site Name					Date of Audit	
PRU Pressure Rating						
Asset Health Category MECHANICAL EQUIPMENT						
	FILTERS					
PSSR drawing Item Ref No	1	2	3	4	5	6
Manufacturer						
Serial No						
Type						
Diameter						
Visual Condition						
Diameter of connecting pipework						
Flange diameter						
Flange thickness						
Flange (no. of bolts)						
Flange (PCD. of bolts)						
Class						
Date commissioned						
Design life						
Fault Data						
	METERS					
PSSR drawing Item Ref No	1	2	3	4	5	6
Manufacturer						
Serial No						
Type						
Diameter (orifice / carrier)						
Visual Condition						
Diameter of connecting pipework						
Flange diameter						
Flange thickness						
Flange (no. of bolts)						
Flange (PCD. of bolts)						
Class						
Date commissioned						
Design life						
Fault Data						

Fencing 4	Fencing 5
Building 4	Building 5
Gate 4	Gate 5

	Roadways 1	Roadways 2	Roadways 3	Roadways 4	Roadways 5
Location description (entrance to site etc)					
Visual Condition					
Location description (Roadway 1 etc)	Curbing 1	Curbing 2	Curbing 3	Curbing 4	Curbing 5
Visual Condition					
Location description (next to building 1 etc)	Ductwork 1	Ductwork 2	Ductwork 3	Ductwork 4	Ductwork 5
Visual Condition					
Location description (next to building 1 etc)	Bunds 1	Bunds 2	Bunds 3	Bunds 4	Bunds 5
Visual Condition					
	Steps/access 1	Steps/access 2	Steps/access 3	Steps/access 4	Steps/access 5

The Network is now undertaking a series of targeted surveys to consolidate its 'first cut' asset health assessment. These surveys will also help assist in coupling some of the current deterioration rate methodology with risk based monitoring.

Conclusions

- NGN believes asset health measures are a key part of robust asset management:
 - Builds on work NGN has already undertaken; and
 - Compliments NGN's existing and future asset management strategies.
- NGN has made significant progress to developing fully populated measures.
- NGN's RIIO-GD1 capex forecasts are clearly linked to these measures.
- We aim to have fully populated measures driving investment for all asset categories before 2017.

