



**ROADS AUTHORITIES & UTILITIES COMMITTEE
(SCOTLAND)**

**NATIONAL CORING REPORT
2019/2020 PROGRAMME**

June 2020

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NATIONAL CORING REPORT 2019/2020

1. INTRODUCTION

This report presents the findings of the National Coring Programme 2019/2020.

2. PROGRAMME IMPLEMENTATION

- 2.1 The National Coring Programme was developed and implemented at Area RAUC level including Transport Scotland. This is the first national coring programme to include results from Transport Scotland and Comhairle nan Eilean Siar. Built on the lessons learned in the previous programmes. RAUC(S) had set a timetable for the exercise across the five Areas and as laid out within Advice Note 3 v10. It is important to note that the National Coring Programme investigates the compliance of the asphalt layers only and not the unbound/cementitious layers below.
- 2.2 Elements of the programme were delivered within timescales, however, there were significant issues encountered in agreeing and verifying sample selection and results. These issues had an impact on the delivery of the overall programme which resulted in a delay in producing the final report.
- 2.3 The methodology and specification for the coring programme is detailed within Advice Note 3 v10 and was approved by RAUC(S), which formed the basis for all five Area programmes. Lead Authorities were identified in each of these five areas and would coordinate the Coring Programmes for the individual Roads Authority areas as well as administering the contract for each UKAS accredited testing laboratory for their area.
- 2.4 As agreed in previous programmes, the reasonable costs of the Lead Authority would be recovered from the local Road Works Authorities on a pro-rata basis from the Coring results. The costs of any failed Cores are borne by the appropriate Statutory Undertaker that carried out the reinstatement tested.

3. RESULTS

3.1 The overall National Coring Programme results for 2019/20 are detailed in the table below. The Appendices at rear of this document will provide more detail on the individual Utility, RAUC Areas, Local Authority areas and failure types for the 2019/20 programme. All national coring inspection results have been logged onto the Scottish Road Works Register (SRWR).

Year	2001/2	2003/4	2005/6	2008/9	2010/11	2012/13	2015/16	2019/20
No. Cores	1909	1861	1340	1566	1349	1534	1535	1666
Pass	44%	59%	60%	64%	74%	83%	82%	88%
Fail	56%*	41%*	40%*	36%*	26%	17%	18%	12%

* Denotes years in which failures were classified as either "Fail Monitor" or "Fail Replace". From 2011 onwards, it was agreed at RAUC(S) to remove the "Fail Monitor" category as an option.

3.2 The details of the individual and Area RAUC's results should be discussed and reviewed at those levels. These are held within this report for reference.

3.3 The results show that the 2019/20 programme shows improvement compared to all the previous programmes. The following aspects are of note and to be considered:

- The overall result shows an improvement of 6% from previous programme.
- The sample size overall is larger to that of 2012/13 & 2015/16.
- The number of Utility Companies that achieved the 90%, or near, pass rate threshold increased from 5 to 7

3.4 Within the Sample Period for the reinstatements (1st April 2018 to 31st March 2019). The sample size, 1666, is nominally 2% of all works carried out during this period.

3.5 From the table below the following are worthy of note.

Reason for Failure	2019/20 programme					2015/16 Programme		
	Failed Cores	Fail rate as % of total cores (1666)	Change from previous	Fail Rate as % of Failed cores (201)	Change from previous	Failed Cores	Fail rate as % of total cores (1535)	Fail Rate as % of Failed cores (276)
Layers	143	8.6%	0.0%	71%	23%	132	8.6%	48%
Voids	25	1.5%	-4.1%	12%	-19%	86	5.6%	31%
Materials	54	3.2%	-1.3%	27%	2%	69	4.5%	25%
Bonding / Other	35	2.1%	-0.6%	17%	2%	41	2.7%	15%

- The main mode of failure was insufficient Asphalt layer thicknesses at 8.6% of total number of cores, the same ratio as the previous coring programme. However, at 143no., it accounts for a rate of 71% of all failed cores.
- The greatest decrease was in Air Void content, falling from 5.6% to 1.5% against total 25no cores or by 19% of failures.

- Materials failures reduced by 1.3% of total cores, there being 54no. which is a 2% increase of rate against the number of all failures.
- “Other” type which mainly includes De-Bonding had 35no. which is 2.1% of all cores or 17% of all failures. A reduction of 0.6% of all cores and a 2% increase of all failures from last programme.

Please Note: The total number of failures adds up to more than 100% of failed cores i.e. there are 257 failures from 201 failed cores. This is because some cores had more than 1 failure each and records need to be taken for all to make worthwhile analysis of the issues.

3.6 All of the results contained within this document can be found on the Scottish Road Works Commissioner’s website at <https://roadworks.scot>

4. CONCLUSIONS

- 4.1 Whilst there is an overall improvement on previous coring programmes with a pass rate of 88% there is a major issue that remains throughout the RAUC(S) community given the overall pass rate continues to be below the 90% threshold.
- 4.2 Based upon the results of this programme, there is a requirement for continued testing to ensure compliance with the SROR.
- 4.3 From the data used to produce the information held within the Appendices, Layer Depth remains the predominate failure.
- 4.4 The failures recorded across the five area RAUCs within the programme are consistent across four, but show around a 10% variance in one. This would be worthy of further investigation.
- 4.5 Of the results recorded across the five utility sectors, three consistently exceed the 90% target, but the remaining two are significantly below. This would be worthy of further investigation by those affected, and appropriate measures taken to improve.
- 4.6 Analysis of the failure results identified the following issues, indicating poor quality control and or supervision: -
 - Correct layer depth is relatively easy to achieve, the information being readily available and easily measured at time of installation. Therefore it is concerning that layer depth forms such a high failure rate at 71% of all failed cores, when this is easily avoided with due diligence.
 - Air Void content is one of the more difficult features to accurately assess by visual means. At a failure rate of 12% of all failed cores, a reduction in voiding failures can easily be achieved by correct temperature control and compaction.
 - Material failures at a failure rate of 27% of all failed cores this could be reduced by correct identification and ordering prior to application.
 - A reduction in bonding failures from 17% of all failed cores can be achieved by thorough cleaning of surfaces and application of an appropriate tack coat or bond coat, correctly applied to bound substrates.
- 4.7 Advice Note 3 v10 had clear programme dates and detailed what was required by all involved to deliver. As with previous coring programmes, commitment and availability of experienced resources would appear to be the primary reason why the programme overran some milestones set out in the advice note. Poor communication between all parties was also a factor for the delay in confirming the agreed results.

- 4.8 There is anecdotal evidence that some failures had been agreed as passes following agreement based on location of reinstatement and probable performance, however, the original core assessment had indicated a failure to meet the specification. Unfortunately, due to the current layout and method of recording cores on the appendix A this information cannot be extracted quickly to analyse and verify if these concerns are accurate. Consideration should be given to recording additional information on the appendix A so analysis can be carried out.

5. RECOMMENDATIONS

It is recommended that;

- 5.1 A further National Coring Programme be carried out to encourage continuous improvement by monitoring results and validating measures put in place to drive and maintain high standards of reinstatement.
- 5.2 All roads authorities are required to fully participate in future coring programmes.
- 5.3 Due to the high failure rate identified within this programme, there is a requirement by all undertakers to review their processes and responsibilities when carrying out road works. Such as quality control and supervision of the works to ensure improvement. A review should be carried out to identify good practice from within the RAUC(S) community to promote continued improvement.
- 5.4 A review of Advice Note 3 v10 to ensure coring programmes fully reflect the standards of materials being used and workmanship issues. That the initial result from the accredited Laboratory is reported against the final agreed result on Appendix A. This will give both a performance indicator of the Laboratory and measure of what adjustment was used to reach an agreement.
- 5.5 Where an undertaker's internal Coring Programme results are used, substitution of undertaker results should be reported and recorded in Appendix A and the SRWR in the same way as the other cores taken during the programme.
- 5.6 Whilst the lead authorities used a single contract style which helped reduce inconsistencies encountered previously, it is recommended that a single contract be issued for the whole of Scotland going forward. This would require one lead organisation.
- 5.7 A "Coring Awareness" session, or sessions, (as previously advised within the 15/16 report) be organised prior to any future programmes to assist those involved to acquire the required skills and knowledge to carry out a successful Coring Programme. This would be for both roads authorities and undertakers.
- 5.8 RAUC(S) co-chairs to release a press statement on behalf of the community.

APPENDIX NC1 NUMBERS OF PASS/FAIL BY AUTHORITY

	No. Cores	Pass	Fail	Pass %
NoS RAUC	251	226	25	90%
TayForth RAUC	301	276	25	92%
WoS RAUC	347	311	36	90%
SE RAUC	354	281	73	79%
SW RAUC	413	371	42	90%
Total	1666	1465	201	88%

Table NC1a – Numbers of Pass/Fail by RAUC Area and Overall

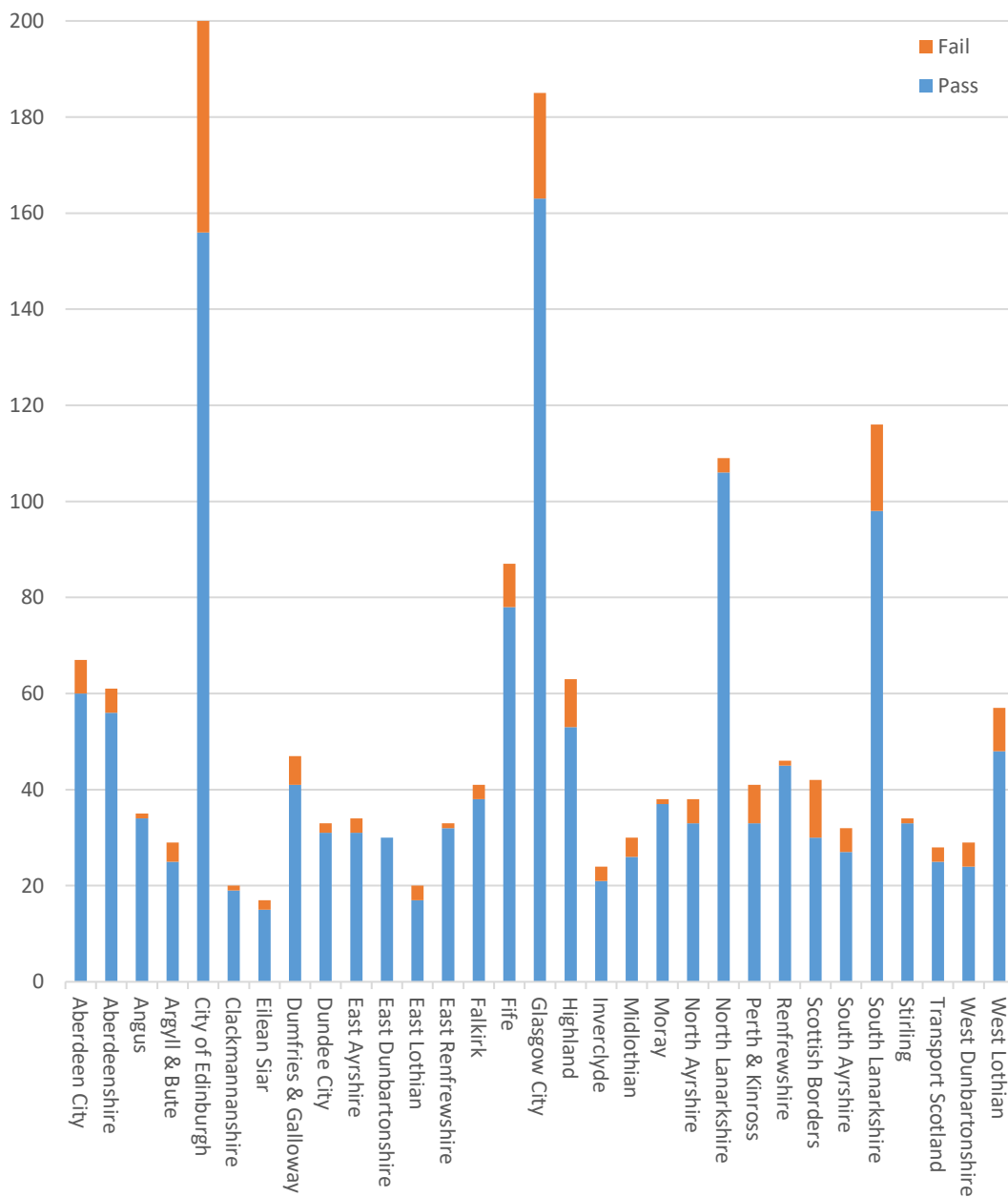


Figure 1 – Passes and Fails by Roads Authority

	No. Cores	Pass	Fail	Pass %
Aberdeen City Council	67	60	7	90%
Aberdeenshire Council	61	56	5	92%
Angus Council	35	34	1	97%
Argyll & Bute Council	29	25	4	86%
City of Edinburgh Council	200	156	44	78%
Clackmannanshire Council	20	19	1	95%
Comhairle nan Eilean Siar	17	15	2	88%
Dumfries & Galloway Council	47	41	6	87%
Dundee City Council	33	31	2	94%
East Ayrshire Council	34	31	3	91%
East Dunbartonshire Council	30	30	0	100%
East Lothian Council	20	17	3	85%
East Renfrewshire Council	33	32	1	97%
Falkirk Council	41	38	3	93%
Fife Council	87	78	9	90%
Glasgow City Council	185	163	22	88%
Highland Council	63	53	10	84%
Inverclyde Council	24	21	3	88%
Midlothian Council	30	26	4	88%
Moray Council	38	37	1	97%
North Ayrshire Council	38	33	5	87%
North Lanarkshire Council	109	106	3	97%
Perth & Kinross Council	41	33	8	81%
Renfrewshire Council	46	45	1	99%
Scottish Borders Council	42	30	12	71%
South Ayrshire Council	32	27	5	84%
South Lanarkshire Council	116	98	18	85%
Stirling Council	34	33	1	97%
Transport Scotland - NE Unit Op Company	3	3	0	100%
Transport Scotland - NW Unit Op Company	10	10	0	100%
Transport Scotland - SE Unit Op Company	9	8	1	89%
Transport Scotland - SW Unit Op Company	6	4	2	67%
West Dunbartonshire Council	29	24	5	83%
West Lothian Council	57	48	9	84%
Total	1666	1465	201	88%

Table NC1b – Numbers of Passes and Fails by Roads Authority

APPENDIX NC2 NUMBERS FOR PASS/FAIL BY UTILITY

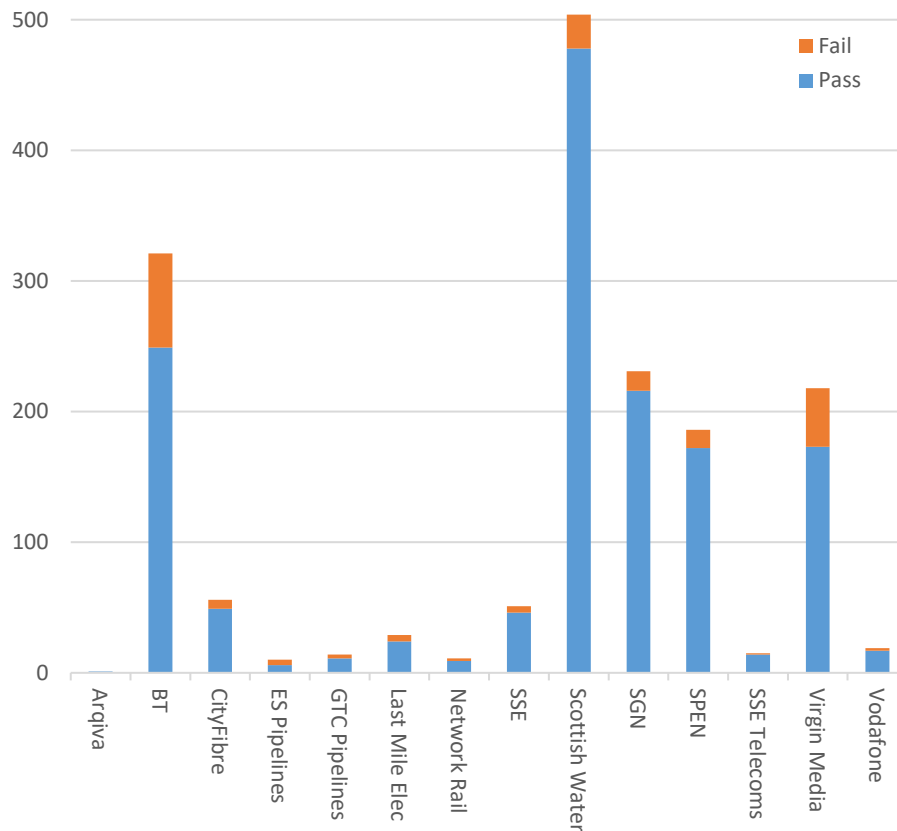


Figure 2 – Failure Type Numbers by Utility

	No. Cores	Pass	Fail	Pass %
Arqiva	1	1	0	100%
BT	321	249	72	78%
CityFibre	56	49	7	88%
ES Pipelines	10	6	4	60%
GTC Pipelines	14	11	3	79%
Last Mile Elec	29	24	5	83%
Network Rail	11	9	2	82%
SSE	51	46	5	90%
Scottish Water	504	478	26	95%
SGN	231	216	15	94%
SPEN	186	172	14	92%
SSE Telecoms	15	14	1	93%
Virgin Media	218	173	45	79%
Vodafone	19	17	2	89%
Total	1666	1465	201	88%

Table NC2a – Numbers for Pass/Fail by Utility Sampled

	Voiding	Layers	Materials	Other	Total
Arqiva	0	0	0	0	0
BT	12	55	21	6	72
CityFibre	0	4	2	3	7
ES Pipelines Limited	0	3	2	0	4
GTC Pipelines Limited	1	1	2	0	3
Last Mile Electricity Ltd.	1	2	2	2	5
Network Rail	0	1	2	1	2
Scottish & Southern Electricity Networks	2	2	1	2	5
Scottish Water	3	21	2	1	26
SGN	0	13	2	3	15
SP Energy Networks	2	11	3	3	14
SSE Telecoms	0	1	0	0	1
Virgin Media Group	4	28	15	13	45
Vodafone Limited	0	1	0	1	2

Table NC2b – Failure Type Numbers by Utility*

***Please Note: A single core can have multiple failure modes**

APPENDIX NC3 CORE FAILURE ANALYSIS

National Results

Cores	Pass	Fail	Pass %
1666	1465	201	88%

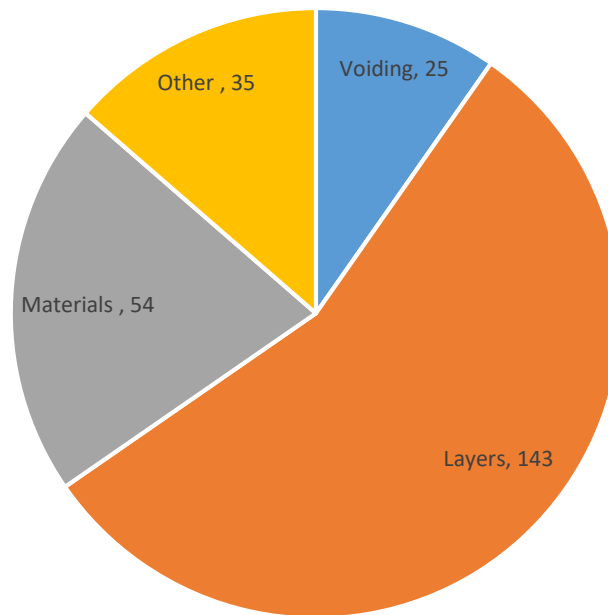


Figure 3 – Reasons for failure

Reason for Failure	Fail	%
Voiding	25	10%
Layers	143	56%
Materials	54	21%
Other	35	14%
Total Failures*	257	100%

*Please Note: The total number of failures adds up to more than 100% of failed cores i.e. there are 257 failures from 201 failed cores. This is because some cores had more than 1 failure each and records need to be taken for all to make worthwhile analysis of the issues.

NoS RAUC Area

Cores	Pass	Fail	Pass %
246	221	25	90%

Reason for Failure	Fail	%
Voiding	6	16%
Layers	17	45%
Materials	7	18%
Other	8	21%
Total	38	100%

SE RAUC Area

Cores	Pass	Fail	Pass %
349	277	72	79%

Reason for Failure	Fail	%
Voiding	3	4%
Layers	67	88%
Materials	0	0%
Other	6	8%
Total	76	100%

TayForth RAUC Area

Cores	Pass	Fail	Pass %
291	266	25	91%

Reason for Failure	Fail	%
Voiding	3	9%
Layers	15	47%
Materials	12	38%
Other	2	6%
Total	32	100%

WoS RAUC Area

Cores	Pass	Fail	Pass %
346	310	36	90%

Reason for Failure	Fail	%
Voiding	7	13%
Layers	24	44%
Materials	12	22%
Other	12	22%
Total	55	100%

SW RAUC Area

Cores	Pass	Fail	Pass %
406	366	40	90%

Reason for Failure	Fail	%
Voiding	6	11%
Layers	18	34%
Materials	22	42%
Other	7	13%
Total	53	100%

Transport Scotland

Cores	Pass	Fail	Pass %
28	25	3	89%

Reason for Failure	Fail	%
Voiding	0	0%
Layers	2	67%
Materials	1	33%
Other	0	0%
Total	3	100%

APPENDIX NC4 UTILITY SECTOR ANALYSIS

Undertaker Percentage Pass Rate Scotland Wide

	No. Cores	Pass	Fail	Pass %	Sector
Arqiva	1	1	0	100%	Telecoms
BT	321	249	72	78%	Telecoms
CityFibre	56	49	7	88%	Telecoms
ES Pipelines	10	6	4	60%	Gas
GTC Pipelines	14	11	3	79%	Gas
Last Mile Electricity	29	24	5	83%	Electricity
Network Rail	11	9	2	82%	Rail
SSE	51	46	5	90%	Electricity
Scottish Water	504	478	26	95%	Water
SGN	231	216	15	94%	Gas
SPEN	186	172	14	93%	Electricity
SSE Telecoms	15	14	1	93%	Telecoms
Virgin Media	218	173	45	79%	Telecoms
Vodafone	19	17	2	89%	Telecoms

Utility Sector Analysis

Sector	Cores	Pass	Fail	Pass %
Gas	255	233	22	91%
Electricity	266	242	24	91%
Rail	11	9	2	82%
Telecoms	630	503	127	80%
Water	504	478	26	95%