



Date of Issue: 16.05.2013

**Leiths (Scotland) Ltd  
Rigifa  
Cove  
Aberdeen  
AB12 3LR**

**TS 2010  
PRODUCT PROPOSAL  
TAIT STAGE 1**

***Laboratory Validation  
Of  
Necessary Properties***

<b>Mixing Plant:</b>	<b>Blackhills Quarry, Cove, Aberdeen.</b>
<b>Mix Designation:</b>	<b>SMA 10 surf (Nypol 103, 0.3% fibres)</b>

## Constituents

### Aggregates

SIZE	SOURCE	TYPE
6,3/10mm	Blackhills Quarry	Crushed Rock
4/6,3mm	Blackhills Quarry	Crushed Rock
0/4mm	Blackhills Quarry	Crushed Rock

### Binder

TYPE	GRADE	
Nypol 103	75/130 - 75 PMB	

### Filler

TYPE	SOURCE
Crushed limestone	Highland Lime, Torlundy, Highlands.

### Fibre

TYPE	SOURCE
Viatop Premium	J. Rettenmaier

### List of attached information

<b>Property</b>	<b>Test method / procedure</b>	<b>Comments</b>
Coarse aggregate – particle Density	BS EN 1097 – 6: 2000	See CE certificate
Coarse aggregate – resistance to polishing	BS EN 1097 – 8: 2009	See CE certificate
Coarse aggregate – resistance to abrasion	BS EN 1097 – 8: 2009, Annex A	See CE certificate
Coarse aggregate – resistance to fragmentation	BS EN 1097 – 2: 2010	See CE certificate
Coarse aggregate – resistance to wear	BS EN 1397 – 1: 1996 Micro Deval method	See CE certificate
Air voids content	BS EN 13108 – 20: 2006	See attached report
Binder content	BS EN 12697 – 1:2005	See attached report
Binder penetration	BS EN 1426: 2007	See attached product information sheet
Binder softening point	BS EN 1427: 2007	See attached product information sheet
Grading	BS EN 12697 – 2: 2002	See attached report
Binder drainage	DD 232	See attached report
Resistance to permanent deformation	BS EN 12697 – 22: 2003	See attached report



TECHNICAL SERVICES

**DECLARED TARGET GRADING AND TARGET COMPOSITION LIMITS**

MIX	SMA 10 surf (Nypol103, 0.3% fibres)
SPECIFICATION	BS EN 13108 – 5 / PD 6691 / TS 2010
SUPPLIER	Leiths (Scotland) Ltd
SOURCE	Blackhills Coating Plant, Cove, Aberdeen.

SIEVE SIZE (mm)	DECLARED TARGET GRADING (% PASSING)	LIMITS FOR COMPOSITION (TS 2010: Table 2.1A)
14	100	100
10	96	93 – 100
6,3	45	35 – 52
4	32	-
2	26	20 – 32
0,500	17	-
0,250	13	-
0,063	9,0	8 - 12

Binder Content (%)	6,7	6,5 – 6,9
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Issued By:   
Date of Issue: 10.02.2012



**LEITHS**

**Leiths (Scotland) Ltd  
Blackhills Quarry  
Cove  
Aberdeen  
AB12 3LR  
Telephone: 01224 897568  
Fax: 01224 897590**

**1'**

**EN 13043**

**Aggregates for Bituminous Mixtures**

Aggregate Type	Declared	Crushed Rock
Particle shape	Category	Fl <sub>25</sub>
Particle size	Designation	4/10mm G <sub>C</sub> 85/20
	Tolerance Category	G <sub>20/17.5</sub>
Fines Content	Category	f <sub>4</sub>
Particle density	Declared Value	2.69 Mg/m <sup>3</sup>
Resistance to Fragmentation /Crushing	Category	LA <sub>30</sub>
Resistance to Polishing/ Abrasion/Wear		
Polished stone value	Category	PSV <sub>51</sub>
Aggregate abrasion value	Category	AAV <sub>10</sub>
Resistance to Wear of Coarse Aggregate	Category	M <sub>DE</sub> 15
Durability against Freeze/Thaw	Category	MS <sub>18</sub>
	Category	WA <sub>242</sub>



0086-CPR-595350



**Leiths (Scotland) Ltd**  
**Blackhills Quarry, Cove, Aberdeen. AB12 3LR**  
 Telephone: 01224 897568  
 Fax: 01224 897590


**13**  
**Certificate No. BLKQ-B821**

**BS EN 13108 – 5**  
**Stone Mastic Asphalt**  
**B821 SMA 10 surf (Nypol 103) Rigatex - Blackhills Asphalt Plant**

**General requirements**

Temperature of the mixture		150 °C to 200 °C
Grading (passing)	14 mm test sieve	100 %
	10 mm test sieve	96 %
	6,3 mm test sieve	45 %
	2 mm test sieve	26 %
	0,063 mm test sieve	9,0 %
Binder content		$B_{min\ 6,6}$ (6,7 %)
Water Sensitivity	BS EN 12697 – 12: 2008	ITSR <sub>90</sub>
Binder Drainage	BS EN 12697 – 18: 2004, 5	D <sub>0,3</sub>
Resistance to permanent deformation		
- small size device: wheel tracking slope	BS EN 12697 – 22: B in Air	WTS <sub>AIR 0,05</sub> (0,02mm)
- small size device: proportional rut depths	BS EN 12697 – 22: B in Air	PRD <sub>AIR 1,5</sub> (1,4%)

**Leiths (Scotland) Ltd confirms that the asphalt concrete referred to in this certificate complies with the requirements of BS EN 13108 – 5, including Annex ZA**

<b>Authorised by:</b>	 <i>N. Anderson. Group Technical Director</i>
Date Valid from	01/03/2013
Date Valid to	Currently Valid
Date of Certificate Issue	06 September 2013

Client: Leiths (Scotland) Ltd.  
 Rigifa  
 Cove  
 Aberdeen  
 Attn: Neil Anderson

Authorised Signatories  
 N. Anderson   
 Technical Manager  
 A. Trickett – Bell   
 Laboratory Manager

**DETERMINATION OF AIR VOIDS CONTENT**

<b>Report No.: P.44.BLACKHILLS.P15015</b>		Sample Ref.: P15015	
<b>Scheme / Site:</b>	<b>SMA 10 surf TS 2010 Specification</b>		
Client:	Leiths (Scotland) Ltd.		
<b>Material:</b>	<b>SMA 10 surf (Nypol 103, 0.3% fibres, 6.7% binder)</b>		
Specification:	TS 2010		
Source:	Leiths – Blackhills Coating Plant		
Location:	Laboratory Trial		
Test Method:	BS EN 12697 – 8		
Date Sampled From:	09.04.2013	Date Received:	09.04.2013
Date Sampled To:	09.04.2013	Date Tested From:	09.04.2013
Sampled By:	Lab Staff	Date Tested To:	10.04.2013
Sample Type:	Bulk	Certificate Received:	Yes

TEST RESULTS

Sample No.	Bulk Density (kg/m <sup>3</sup> )	Air Voids Content (%)	Mean Air Voids Content (%)	Specification
P15015/1	2314	3.8	3.5	Average of a set of 3 specimens = $V_{min3}; V_{max3,5}$ .
P15015/2	2325	3.3		
P15015/3	2324	3.4		

REMARKS

Sample complies with the requirements. Void content calculated using maximum density in report P.11.BLACKHILLS.P14221

Issued By: 

Date of Issue: 12.04.2013

Client: Leiths (Scotland) Ltd.  
 Rigifa  
 Cove  
 Aberdeen  
 Attn: Neil Anderson

Authorised Signatories  
 N. Anderson   
 Technical Manager  
 A. Trickett – Bell   
 Laboratory Manager

**DETERMINATION OF MAXIMUM DENSITY**

<b>Report No.: P.11.BLACKHILLS.P15015</b>		Sample Ref.: P15015	
<b>Scheme / Site:</b>	<b>SMA 10 surf TS 2010 Specification</b>		
Client:	Leiths (Scotland) Ltd.		
<b>Material:</b>	<b>SMA 10 surf (Nypol 103, 0.3% fibres, 6.7% binder)</b>		
Specification:	BS EN 13108 – 5 / PD 6691 / TS 2010		
Source:	Leiths – Blackhills Coating Plant		
Location:	Laboratory Trial		
Test Method:	BS EN 12697 – 5: 2002: Method A		
Date Sampled From:	11.04.2013	Date Received:	11.04.2013
Date Sampled To:	11.04.2013	Date Tested From:	11.04.2013
Sampled By:	Lab Staff	Date Tested To:	12.04.2013
Sample Type:	Bulk	Certificate Received:	Yes

TEST RESULTS

Sample No.	Maximum Density (kg/m <sup>3</sup> )	Mean Maximum Density (kg/m <sup>3</sup> )
P15015/1	2403	2405
P15015/2	2408	

REMARKS

Issued By: 

Date of Issue: 12.04.2013



Client: Leiths Technical Services  
 Rigifa  
 Cove  
 Aberdeen  
 Attn: Neil Anderson

Authorised Signatories  
 N. Anderson   
 Technical Manager  
 A. Trickett – Bell   
 Laboratory Manager

**DETERMINATION OF BINDER DRAINAGE**

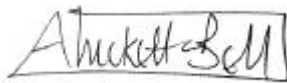
<b>Report No.: P.14.BLACKHILLS.P14221</b>		Sample Ref.: P14221	
<b>Scheme / Site:</b>	<b>SMA 10 surf TS 2010 Specification</b>		
Client:	Leiths (Scotland) Ltd.		
<b>Material:</b>	<b>SMA 10 surf (Nypol 103, 0.3% fibres, 6.7% binder)</b>		
Specification:	BS EN 13108 – 5 / PD 6691 / TS 2010		
Source:	Leiths – Blackhills Coating Plant		
Location:	Laboratory Trial		
Test Method:	BS DD 232: 1996		
Date Sampled From:	19.12.2011	Date Received:	19.12.2011
Date Sampled To:	19.12.2011	Date Tested From:	19.12.2011
Sampled By:	Lab Staff	Date Tested To:	20.12.2011
Sample Type:	Bulk	Certificate Received:	Yes

TEST RESULTS

<b>BINDER DRAINAGE @ 6.7% Bitumen</b>	<b>0.0 %</b>
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REMARKS

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Issued By:   
 Date of Issue: 10.02.2012



**NYNAS UK AB**  
**Technical Service Report**  
**Leiths 6mm and 10mm SMA Nypol 103 testing**

**Background**

Leiths requested that Nynas assist them in testing 6mm and 10mm SMAs using Nypol 103 for wheeltracking.

**Results**

***Resistance to Permanent Deformation (BS EN 12697-22 Small device procedure B)***

The aggregates for wheeltracking were supplied pre-blended, with the 10mm SMA slabs produced using Nypol 103 at a binder content of 6.7% and fibres at 0.3% to a density of 2.330Mg/m<sup>3</sup>. The slabs were produced 40mm thick and tested for 10,000 cycles at 60°C.

	Rut depth at 10,000 cycles (mm)	Proportional rut depth at 10.000 cycles	Wheeltracking slope (mm/1000cycles)
Run 1 P15015	1.3	3.3%	0.03
Run 2 P15015	1.4	3.6%	0.03

The 6mm SMA slabs produced again using Nypol 103 but at a binder content of 7.1% and fibres at 0.3% to a density of 2.300Mg/m<sup>3</sup>. The slabs were produced 30mm thick and tested for 10,000 cycles at 60°C.

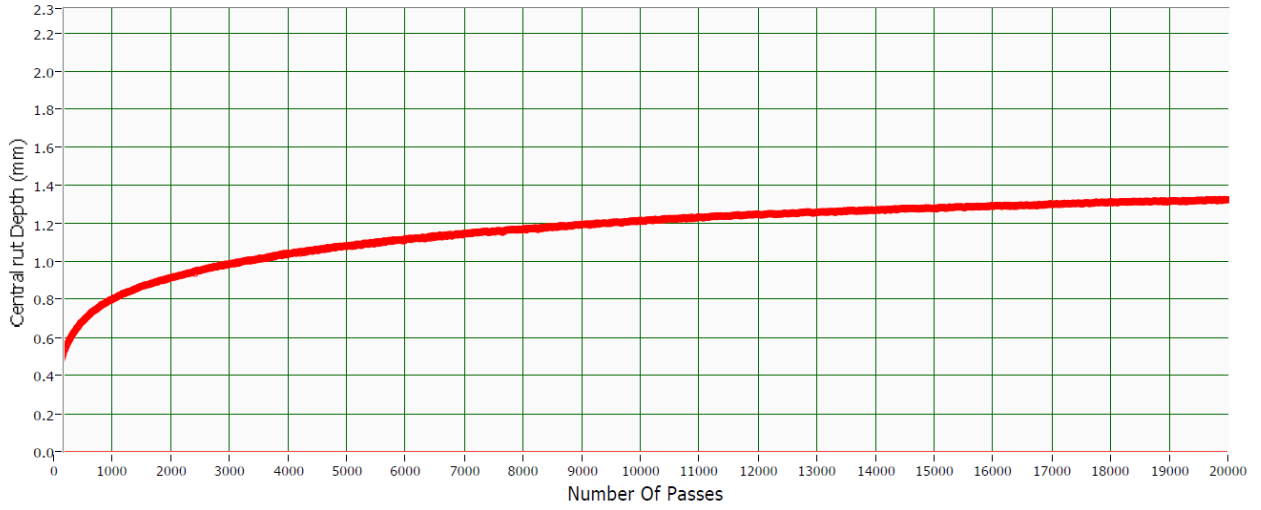
	Rut depth at 10,000 cycles (mm)	Proportional rut depth at 10.000 cycles	Wheeltracking slope (mm/1000cycles)
Run 1 P12192	1.2	4.4%	0.03
Run 2 P12192	1.4	4.7%	0.04

I M Lancaster 16-05-12

## Wheeltracker EN 12697-22

TEST REFERENCE   
Rut Profile Data

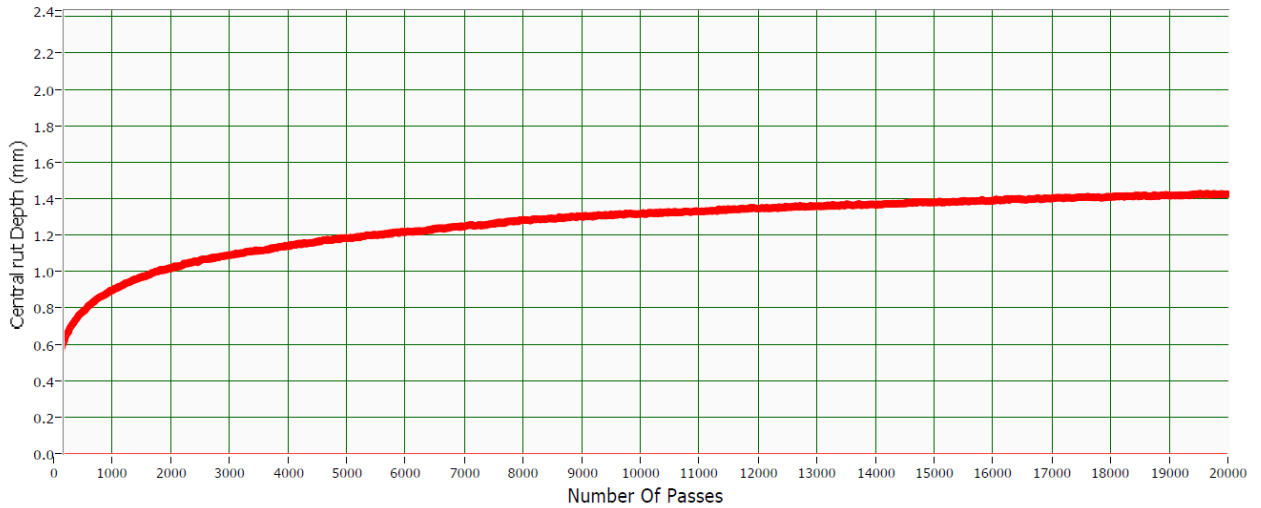
Final Rut Depth  (mm)  
Rut Rate  (mm/1000 Passes)  
 (mm/1000 Cycles)



## Wheeltracker EN 12697-22

TEST REFERENCE   
Rut Profile Data

Final Rut Depth  (mm)  
Rut Rate  (mm/1000 Passes)  
 (mm/1000 Cycles)



# Nypol 103

Previous name : Nynas Nypol 200

Nypol 103 is a highly modified elastomeric binder with exceptional resistance to permanent deformation and cracking. It is a versatile binder suitable for most types of asphalt mixtures and a wide range of paving applications. It complies with EN 14023 and the Nynas sales specification.

## PMB 75/130-75

**Table 1 : Specification information**

	Test description	Method	Unit	Min	Max	Class
Consistency at intermediate temperature	Penetration at 25°C	EN 1426	0.1mm	75	105 <sup>2</sup>	7
Consistency at elevated service temperature	Softening Point	EN 1427	°C	75	95 <sup>2</sup>	3
Cohesion	by Force Ductility at 5°C	EN 13589	J/cm <sup>2</sup>	3	-	2
Durability	Change in mass	EN12607-1	%-wt	-	1.00	5
Resistance to hardening EN 12607-1	Retained Penetration	EN 1426	%	55	-	6
	Increase in softening point	EN 1426	%	-	8	2
Other characteristics	Flash Point	EN ISO 2592	°C	250	-	2

**Table 2 : Additional information**

	Test description	Method	Unit	Min	Max	Class
Safety & Handling *	Minimum pumping temperature	-	°C	140	-	-
	Typical handling temperatures	-	°C	170	185	-
	Maximum safe handling & storage temperature	-	°C	-	190	-
Technical characteristic	Fraass breaking point	EN 12593	°C	-	-20	9
	Elastic recovery at 25°C	EN 13398	%	80	-	2
	Storage stability	EN 13399	°C	-	5	2
	Difference in softening point	EN 1427				
	Typical density at 25°C	EN 3838	g/cm <sup>3</sup>	1.020 <sup>1</sup>	-	-
Solubility in toluene	EN 12592	%	99	-	-	

\* For specific information on binder handling and storage please refer to the Product Information and Safety Data sheets.

<sup>1</sup> Typical value

<sup>2</sup> Nynas specification

Nynas UK  
North Road, Ellesmere Port  
CH65 1AJ South Wirral  
United Kingdom (UK)  
T +44 151 327 31 71  
F +44 151 327 61 95  
E bitumen.uk@nynas.com  
W www.nynas.com

Nynas UK  
East Camperdown Street  
DD1 3LG Dundee  
United Kingdom (UK)  
T +44 1382 46 22 11  
F +44 1382 45 03 08

Although the data reported in the present document is, to the best of our knowledge, accurate and reliable, Nynas shall not be liable for any loss or damage that may occur.

SdS available on nynas.com

# VIATOP®

VIATOP® premium is a pelletized blend of 90 % by weight ARBOCEL® ZZ 8 - 1 and 10 % by weight bitumen.

## Characteristics of the pellets

grey, cylindrical pellets

content ARBOCEL® ZZ 8 – 1	approx. 90 %
average pellet length	2 mm - 8 mm
average pellet thickness	4 mm +/- 1 mm
bulk density	470 g/l - 540 g/l
sieve analysis: finer than 3.55 mm	max. 10 %

Non-toxic and physiologically safe.

## Characteristics of ARBOCEL® ZZ 8 - 1

grey, fine fibrilled and long-fibred cellulose.

basic raw material	technical raw cellulose
cellulose content	80 % +/- 5 %
pH-value (5 g/100 ml)	7.5 +/- 1
average fibre length	1100 µm
average fibre thickness	45 µm

## Characteristics of the bitumen used

Road construction bitumen according to DIN EN 12591.

Needle penetration (according to DIN 52 010) at 25 °C in 1/10 mm	approx. 50 - 70
Softening point (ring and ball, according to DIN 52 011) in °C	46 - 54



J. Rettenmaier & Söhne GmbH + CO  
Fibers designed by Nature  
Holzmuehle 1  
D-73494 Rosenberg

Telephone: +49 79 67/1 52 - 0  
Telefax: +49 79 67/ 1 52 - 222

0702



Date of Issue: 30.05.2013

**Leiths (Scotland) Ltd  
Rigifa  
Cove  
Aberdeen  
AB12 3LR**

**TS 2010  
PRODUCT PROPOSAL  
STAGE 2**

***Product Mix Trial***

<b>Mixing Plant:</b>	<b>Blackhills Quarry, Cove, Aberdeen.</b>
<b>Mix Designation:</b>	<b>SMA 10 surf (Nypol 103, 0.3% fibres)</b>

### **List of attached information**

<b>Property</b>	<b>Test method / procedure</b>	<b>Comments</b>
Air Voids in mat	BS 594987: 2010: Annex G	See attached report
Binder Content	BS EN 12697 – 1:2005	See attached report
Grading	BS EN 12697 – 2: 2002	See attached report
Texture	BS 598 - 105: 1990	See attached report

Client: Leiths (Scotland) Ltd.  
Rigifa  
Aberdeen  
AB12 3LR

Authorised Signatories  
N. Anderson   
Technical Manager  
A. Trickett – Bell   
Laboratory Manager

Attn: Sean Cocker

**BITUMINOUS ANALYSIS**

Test Method: BS EN 12697 – 1: 2000 (Binder by Difference) / BS EN 12697 – 2: 2002 (Grading)

<b>Report No.: P.02.BLKQ TAIT.R36750</b>		Sample Ref.: R36750	
<b>Scheme / Site:</b>	<b>SMA 10 surf TS2010 – TAIT Stage 2</b>		
Client:	Leiths		
<b>Material:</b>	<b>SMA 10 surf TS2010 (Nypol 103)</b>		Ticket No.:
Specification:	TS 2010	-	
Source:	Blackhills Coating Plant		
Location:	North Last Quarry – Entrance to Quarry		
Date Sampled From:	28.05.2013	Date Received:	28.052013
Date Sampled To:	28.05.2013	Date Tested From:	28.05.2013
Sampled By:	CS	Date Tested To:	29.05.2013
Sample Type:	Bulk	Certificate Received:	Yes

TEST RESULTS

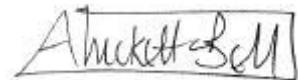
Sieve Size	% Passing	Limits For Composition
14mm	100	100
10mm	94	93 - 100
6,3mm	45	35 – 52
4mm	33	-
2mm	26	20 – 32
1mm	19	-
0,500mm	17	-
0,250mm	13	-
0,125mm	12	-
0,063mm	9,7	8 - 12

Constituent	Result	Specification
Determined Binder Content (%)	6,7	6,5 – 6,9 (6,7)

\* Denotes outwith specification.

Remarks:

Sample complies with the sampling and analysis requirements



Issued by:

Date of Issue: 30.05.2013

**LEITHS (SCOTLAND) LIMITED**

Rigifa • Cove • Aberdeen • AB12 3LR  
Telephone: 01224 876333 • Fax: 01224 876332

QUARRY PRODUCTS • CONCRETE PRODUCTS • CONSTRUCTION & SURFACING • TECHNICAL SERVICES • PLANT & TRANSPORT • ROAD MARKING

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Client: Leiths (Scotland) Ltd.  
Rigifa  
Cove  
Aberdeen  
Attn: Neil Anderson

Authorised Signatories  
N. Anderson   
Technical Manager  
A. Trickett – Bell   
Laboratory Manager

**DETERMINATION OF AIR VOIDS CONTENT**

<b>Report No.: P.12.BLKQ TAIT.R36750</b>		Sample Ref.: R36750	
<b>Scheme / Site:</b>	<b>SMA 10 surf TS 2010 TAIT Stage 2</b>		
Client:	Leiths (Scotland) Ltd.		
<b>Material:</b>	<b>SMA 10 surf TS2010 (Nypol 103, 0.3% fibres, 6.7% binder)</b>		
Specification:	TS 2010		
Source:	Leiths – Blackhills Coating Plant		
Location:	N/A		
Test Method:	BS EN 12697 – 8		
Date Sampled From:	29.05.2013	Date Received:	29.05.2013
Date Sampled To:	29.05.2013	Date Tested From:	29.05.2013
Sampled By:	Lab Staff	Date Tested To:	30.05.2013
Sample Type:	Cores	Certificate Received:	Yes

TEST RESULTS

Sample No.	Bulk Density (kg/m <sup>3</sup> )	Air Voids Content (%)	Mean Air Voids Content (%)	Specification
R36750/1	2286	4.9	5.0	V <sub>min2</sub> ; V <sub>max5</sub>
R36750/1	2293	4.6		
R36750/3	2276	5.4		

REMARKS

Sample complies with the requirements.  
Air Voids calculated by using maximum density in report no. P.11.BLACKHILLS.P14221

  
 Issued by: \_\_\_\_\_  
 Date of Issue: 30.05.2013

**LEITHS (SCOTLAND) LIMITED**

Rigifa • Cove • Aberdeen • AB12 3LR  
Telephone: 01224 876333 • Fax: 01224 876332

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Client: Leiths (Scotland) Ltd.  
Rigifa  
Cove  
Aberdeen  
Attn: B Lund

Authorised Signatories  
N. Anderson   
Technical Manager  
A. Trickett – Bell   
Laboratory Manager

**DETERMINATION OF TEXTURE DEPTH – SAND PATCH METHOD**

<b>Report No.: R.04.A90 CHARLESTON.R36774</b>		Sample Ref.: R36774	
<b>Scheme / Site:</b>	<b>A90 Charleston – SMA Trial at North Last Quarry Road</b>		
Client:	Leiths (Scotland) Ltd.		
<b>Material:</b>	<b>SMA 10 surf TS2010 (Nypol 103)</b>		
Specification:	LTS Proprietary Mix		
Source:	Leiths –Blackhills Quarry		
Location:	See Below		
Test Method:	BS 598: Part 105: 1990: 4		
Date Sampled From:	N/A	Date Received:	28.05.2013
Date Sampled To:	N/A	Date Tested From:	31.05.2013
Sampled By:	Lab Staff	Date Tested To:	31.05.2013
Sample Type:	N/A	Certificate Received:	No

**TEST RESULTS**

LOCATION	TEXTURE DEPTH (mm)	LOCATION	TEXTURE DEPTH (mm)
At Quarry Road Entrance	1.29		
At Quarry Road Entrance	1.27		
At Quarry Road Entrance	1.33		
AVERAGE	1.3		

REMARKS

Surface Condition: Dry, Lightly Trafficked

  
 Issued By: \_\_\_\_\_  
 Date of Issue: 31.05.2013

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Telephone: 01224 876333 • Fax: 01224 876332

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Date of Issue: 22.05.2014

**Leiths (Scotland) Ltd  
Rigifa  
Cove  
Aberdeen  
AB12 3LR**

**TS 2010  
PRODUCT PROPOSAL  
STAGE 3**

***Trunk Road Network Trial***

<b>Mixing Plant:</b>	<b>Blackhills Quarry, Cove, Aberdeen.</b>
<b>Mix Designation:</b>	<b>SMA 10 surf (Nypol 103, 0.3% fibres)</b>

## Constituents

### Aggregates

SIZE	SOURCE	TYPE
4/10mm	Blackhills Quarry	Crushed Rock
4/6,3mm	Blackhills Quarry	Crushed Rock
0/4mm	Blackhills Quarry	Crushed Rock

### Binder

TYPE	GRADE	
Nypol 103	75/130-75 PMB	

### Filler

TYPE	SOURCE
Crushed limestone	Highland Lime, Torlundy, Highlands.

### Fibre

TYPE	SOURCE
Viatop Premium	J Rettenmaier

### List of attached information

<b>Property</b>	<b>Test method / procedure</b>	<b>Comments</b>
Air Voids in mat	BS 594987: 2010: Annex I	See attached report
Binder Content	BS EN 12697 – 1:2005	See attached report
Grading	BS EN 12697 – 2: 2002	See attached report
Texture	BS EN 13036 – 1: 2010	Not available
Grip test number after 4 weeks	BS 7941 – 2: 2000	See attached report
Grip test number after 6 months	BS 7941 – 2: 2000	See attached report

Client: Leiths (Scotland) Ltd.  
Rigifa  
Cove  
Aberdeen

Attn: B Lund

Authorised Signatories  
N. Anderson   
Technical Manager  
A. Trickett – Bell   
Laboratory Manager

**BITUMINOUS ANALYSIS TEST REPORT**

Test Method: BS EN 12697 – 1: 2000 (Soluble binder content – by difference)  
Test Method: BS EN 12697 – 2: 2002 (Particle size distribution)

<b>Report No.: P.02.A90 CHARLESTON.R36787</b>		Sample Ref.: R36787 / R36788 / R36790 / R36854 / R36855 / R36857 / R36858 / R36934 / R36935	
<b>Scheme / Site:</b> Client:	<b>A90 Charleston to Damhead (Northbound)</b> Leiths (Scotland) Ltd.		
<b>Material:</b> Specification:	<b>SMA 10 surf RIGATEX TS2010 (Nypol 103)</b> BS EN 13108 – 5 / PD 6691 / BS 594987		
<b>Source:</b> Location:	Leiths – Blackhills Coating Plant Southbound.		
Date Sampled From:	02.06.2013	Date Received:	02.06.2013 to 22.06.2013
Date Sampled To:	22.06.2013	Date Tested From:	02.06.2013
Sampled By:	Lab Staff	Date Tested To:	22.06.2013
Sample Type:	Bulk	Certificate Received:	Yes

**TEST RESULTS**

Results are in Tabulated Form

**REMARKS**

Tolerances applied to the declared target grading in accordance with BS EN 13108 – 21: Table A.1 Individual Samples.

Issued By:   
Date of Issue: 24.06.2013

**LEITHS (SCOTLAND) LIMITED**

Rigifa • Cove • Aberdeen • AB12 3LR  
Telephone: 01224 876333 • Fax: 01224 876332

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**TABULATED TEST RESULTS – RIGIFA LABORATORY**

SCHEME / SITE: **A90 CHARLESTON – DAMHEAD (NORTHBOUND)** MATERIAL: **SMA 10 surf RIGATEX TS2010 (Nypol 103)** SPECIFICATION: **BS EN 13108 – 5 / PD 6691**  
 SOURCE: **BLACKHILLS COATING PLANT, COVE.**

Sieve Size (mm)	14	10	6,3	4	2	1	0,500	0,250	0,125	0,063	Binder	
Target Grading	100	96	45		26		17	13		9.0	6.7	
Tolerance	98 – 100	88 – 100	38 – 52		20 – 32		13 – 21	9 – 17		7.0 – 11.0	6.5 – 6.9	
Sample No.	Date Made											
R36787	02/06/2013	100	91	43	33	26	19	16	14	12	8.8	6.6
R36788	02/06/2013	100	96	45	30	24	20	16	13	11	9.1	6.5
R36790	02/06/2013	100	92	39	31	24	18	15	14	12	9.1	6.5
R36791	02/06/2013	100	96	39	28	22	17	15	13	12	9.4	6.8
R36854	09/06/2013	100	91	38	29	23	18	16	14	11	8.8	6.6
R36855	09/06/2013	100	95	43	29	22	17	14	13	11	8.7	6.8
R36857	09/06/2013	100	93	48	31	22	17	14	13	11	9.6	6.7
R36858	09/06/2013	100	95	43	32	24	19	16	13	11	9.1	6.7
R36934	22/06/2013	100	93	43	29	24	21	18	15	12	8.8	6.6
R36935	22/06/2013	100	95	43	30	24	19	17	14	12	9.0	6.6
<b>Average</b>		<b>100</b>	<b>94</b>	<b>42</b>	<b>30</b>	<b>24</b>	<b>19</b>	<b>16</b>	<b>14</b>	<b>12</b>	<b>9.0</b>	<b>6.6</b>
SD		0	1.9	3.0	1.5	1.3	1.4	1.3	0.7	0.5	0.3	0.1

= Denotes non-compliance (if present)

Issued By:   
 Date of Issue: 24.06.2013

Client: Leiths (Scotland) Ltd.  
Rigifa  
Cove  
Aberdeen

Attn: B Lund

Authorised Signatories  
N. Anderson   
Technical Manager  
A. Trickett – Bell   
Laboratory Manager

**INDIRECT DENSITY GAUGE TEST REPORT**

Test Method: SHW: BS 594987: 2007: Annex G

<b>Report No.: P.02.A90 CHARLESTON.R36933B</b>		Sample Ref.: R36933B	
<b>Scheme / Site:</b>	<b>A90 Charleston to Damhead (Northbound)</b>		
Client:	Leiths (Scotland) Ltd.		
<b>Material:</b>	<b>SMA 10 surf Rigatex (Nypol 103) TS2010</b>		
Specification:	TS2010: clause NG 2.4.2 paragraph 2		
Source:	Leiths – Blackhills Coating Plant		
Location:	Northbound.		
Date Sampled From:	01.06.2013	Date Received:	01.06.2013 to 22.06.2013
Date Sampled To:	22.06.2013	Date Tested From:	01.06.2013
Sampled By:	Lab Staff	Date Tested To:	22.06.2013
Sample Type:	Bulk	Certificate Received:	Yes

**TEST RESULTS**

Results are in Tabulated Form

**REMARKS**

Void content calculated using maximum density of 2405 kg/m<sup>3</sup> (Maximum Density value taken from mix design and corroborated by samples tested during Trunk Road Network trial)

This report has been re-issued. The results have been re-calculated in accordance with a rolling mean of 3 consecutive results, as opposed to a rolling mean of 6 results as previously reported.

Issued By:   
Date of Issue: 08.07.2013

**LEITHS (SCOTLAND) LIMITED**

Rigifa • Cove • Aberdeen • AB12 3LR  
Telephone: 01224 876333 • Fax: 01224 876332

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**INDIRECT DENSITY GAUGE TEST REPORT**

Scheme / Site:	A90 Charleston to Damhead	<b>Report No.: P.02.A90 CHARLESTON.R36933B</b>	
Location:	Northbound, Slow Lane.	Sample No.:	R36933B

Chainage	Wheel Track (N or O)	In-Situ Density (kg/m <sup>3</sup> )	In-Situ void content (%)	Average 3 readings (%)
230	O	2355	2.1	
300	N	2326	3.3	
350	O	2289	4.8	3.4
390	N	2297	4.5	4.2
860	O	2270	5.6	5.0
880	N	2275	5.4	5.2
900	O	2267	5.7	5.6
920	N	2307	4.1	5.1
940	O	2301	4.3	4.7
960	N	2393	0.5	3.0
980	O	2349	2.3	2.4
1000	N	2281	5.1	2.7
1020	O	2362	1.8	3.1
1040	N	2298	4.4	3.8
1060	O	2322	3.5	3.2
1080	N	2347	2.4	3.4
1100	O	2304	4.2	3.3
1120	N	2311	3.9	3.5
1140	O	2316	3.7	3.9
1150	O	2276	5.3	4.3
1170	N	2315	3.7	4.3
1190	O	2369	1.5	3.5
1210	N	2378	1.1	2.1
1230	O	2337	2.8	1.8
1250	N	2344	2.6	2.2
1270	O	2349	2.3	2.6

Chainage	Wheel Track (N or O)	In-Situ Density (kg/m <sup>3</sup> )	In-Situ void content (%)	Average 3 readings (%)
1290	N	2326	3.3	2.7
1310	O	2353	2.1	2.6
1330	N	2276	5.3	3.6
1350	O	2292	4.7	4.1
2280	N	2300	4.4	4.8
2300	O	2290	4.8	4.6
2320	N	2296	4.5	4.5
2340	O	2348	2.4	3.9

**INDIRECT DENSITY GAUGE TEST REPORT**

Scheme / Site:	A90 Charleston to Damhead	<b>Report No.: P.02.A90 CHARLESTON.R36933B</b>	
Location:	Northbound, Fast Lane.	Sample No.:	R36933B

Chainage	Wheel Track (N or O)	In-Situ Density (kg/m <sup>3</sup> )	In-Situ void content (%)	Average 3 readings (%)
550	N	2274	5.5	
870	O	2381	1.0	
890	N	2321	3.5	3.3
910	O	2330	3.1	2.5
930	N	2361	1.8	2.8
970	O	2365	1.7	2.2
1000	N	2369	1.5	1.7
1040	O	2368	1.6	1.6
1080	N	2369	1.5	1.5
1110	O	2297	4.5	2.5
1130	O	2315	3.7	3.2
1150	N	2278	5.3	4.5
1170	O	2349	2.3	3.8
1190	N	2354	2.1	3.2
1210	O	2317	3.7	2.7
1230	N	2363	1.7	2.5
1250	O	2326	3.3	2.9
1270	N	2363	1.7	2.3
1290	O	2298	4.4	3.2
1310	N	2375	1.2	2.5
1330	O	2361	1.8	2.5
1350	N	2313	3.8	2.3
1610	O	2316	3.7	3.1
1630	N	2327	3.2	3.6
1650	O	2318	3.6	3.5
1670	N	2288	4.9	3.9

Chainage	Wheel Track (N or O)	In-Situ Density (kg/m <sup>3</sup> )	In-Situ void content (%)	Average 3 readings (%)
1690	O	2291	4.8	4.4
1710	N	2354	2.1	3.9
1730	O	2359	1.9	2.9

Measurement of Wet Skid Resistance using the GripTester  
braked wheel fixed slip device – BS7941-2:2000

Location	A90 Charlestown to Damhead N/B	GripTester No	GT-501
Test Date	14/08/13	Test Wheel No	A6 051208
Client	REF: BTR/13/273 Neil Anderson Leiths (Scotland) Ltd. Rigifa, Cove, Aberdeen AB12 3LR	Weather	Dry and Clear
Survey Team	S Thompson (Technician) J Bruce (Technician)	Test Number	140813_1126 140813_1138

Material Tested: Panel 1, 3 & 5 – TS2010 Spec. 10mm PSV53  
Panel 2 & 4 – TS2010 Spec. 6mm PSV68+

Location <small>**details from planned works</small>	Direction	Length	Lane	Site Class*	Average Grip Number	Minimum Grip Number*
Panel 1: Ch 0 – 674	N/B	674m	1		0.64	0.62
Panel 2: Ch 674 – 878	N/B	204m	1		0.66	0.62
Panel 3: Ch 878 – 1583	N/B	705m	1		0.64	0.62
Panel 4: Ch 1583 – 1736	N/B	153m	1		0.63	0.62
Panel 5: Ch 1736 – 2349	N/B	613m	1		0.63	0.62

\* From Table 2.4 TS2010 Surface Course Specification & Guidance

**FOR AND ON BEHALF OF**  
**BEAR SCOTLAND Ltd.**



S Thompson – Planned Maintenance Technician  
Date: 20/08/13

Griptest Scheme Summary

VaryC Scheme: **A90 Charlestown to Damhead**  
 Survey Date: **14/08/2013**  
 Laid Date: **23/06/2013**  
 Reason: **4 weeks** Actual time (weeks) 7

			Patch 1	Gap		Patch 2	Gap		Patch 3	Gap		Patch 4	Gap		Patch 5	
			Length			Length			Length			Length			Length	
			660			200			690			150			600	
File		Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result
1126	Run 1	1891	2565	0.634	2565	2769	0.655	2769	3474	0.637	3474	3627	0.612	3627	4240	0.629
1138	Run 2	1863	2536	0.647	2536	2740	0.673	2740	3444	0.649	3444	3597	0.641	3597	4209	0.636
Chainages		0	660		660	860		860	1550		1550	1700		1700	2300	
Calculated panel length			674			204			705			153			613	

**Patch Average**                      **0.64**                      **0.66**                      **0.64**                      **0.63**                      **0.63**

Length of Site                      2300                      Total Length of Patches                      2300

Details in from survey data  
 Details from Constructed data  
 Use chainage detail to calculated average Gn  
 Calculated

Survey	End chainage	Length of survey	Difference	
			M	%
Run 1	4240	2349	49	2.1%
Run 2	4209	2346	46	2.0%

Note:- VaryCH  
 Site Details recieved:  
 P1 - ch0>660 - 10mm 53psv  
 P2 - ch660>860 - 6mm 68+psv  
 P3 - ch860>1550 - 10mm 53psv  
 P4 - ch1550>1700 - 6mm 68psv  
 P5 - ch1700>2300 - 10mm 53psv

Scheme Average **0.64** Gn

SCRIM (factor)                      0.89                      **0.57**

Measurement of Wet Skid Resistance using the GripTester  
braked wheel fixed slip device – BS7941-2:2000

Location	A90 Charlestown to Damhead N/B	GripTester No	GT-501
Test Date	15/05/14	Test Wheel No	A65-140427
Client	REF: LEPO-035032 Neil Anderson Leiths (Scotland) Ltd. Rigifa, Cove, Aberdeen AB12 3LR	Weather	Dry and Clear
Survey Team	S Thompson (Engineer) J Bruce (Technician)	Test Number	150514-1218 150514-1246

**Material Tested:** Panel 1, 3 & 5 – TS2010 Spec. 10mm PSV53  
Panel 2 & 4 – TS2010 Spec. 6mm PSV68+

Location <small>**details from planned works</small>	Direction	Length	Lane	Site Class*	Average Grip Number	Minimum Grip Number*
Panel 1: Ch 0 – 680	N/B	680m	1		0.67	0.62
Panel 2: Ch 680 – 886	N/B	206m	1		0.69	0.62
Panel 3: Ch 886 – 1597	N/B	711m	1		0.68	0.62
Panel 4: Ch 1597 – 1752	N/B	155m	1		0.64	0.62
Panel 5: Ch 1752 – 2370	N/B	618m	1		0.64	0.62

\* From Table 2.4 TS2010 Surface Course Specification & Guidance

**FOR AND ON BEHALF OF**  
**BEAR SCOTLAND Ltd.**



**S Thompson – Planned Maintenance Engineer**  
Date: 16/05/14

Griptest Scheme Summary

VaryC

Scheme:	A90 Charlestown to Damhead
Survey Date:	15/05/2014
Laid Date:	23/06/2013
Reason:	Actual time (weeks) 47

		Patch 1			Patch 2			Patch 3			Patch 4			Patch 5		
		Length	Gap	Length	Gap	Length	Gap	Length	Gap	Length	Gap	Length	Gap	Length		
		660		200		690		150		600						
File	Run	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result	Start survey chainage	End survey chainage	Gn result
1218	Run 1	1893	2573	0.661	2573	2779	0.685	2779	3490	0.666	3490	3645	0.633	3645	4263	0.64
1246	Run 2	1895	2575	0.684	2575	2781	0.695	2781	3492	0.69	3492	3646	0.652	3646	4264	0.641
Chainages		0	660		660	860		860	1550		1550	1700		1700	2300	
Calculated panel length		680			206			711			155			618		

<b>Patch Average</b>	<b>0.67</b>	<b>0.69</b>	<b>0.68</b>	<b>0.64</b>	<b>0.64</b>
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Length of Site	2300
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Total Length of Patches	2300
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Details in from survey data
Details from Constructed data
Use chainage detail to calculated average Gn
Calculated

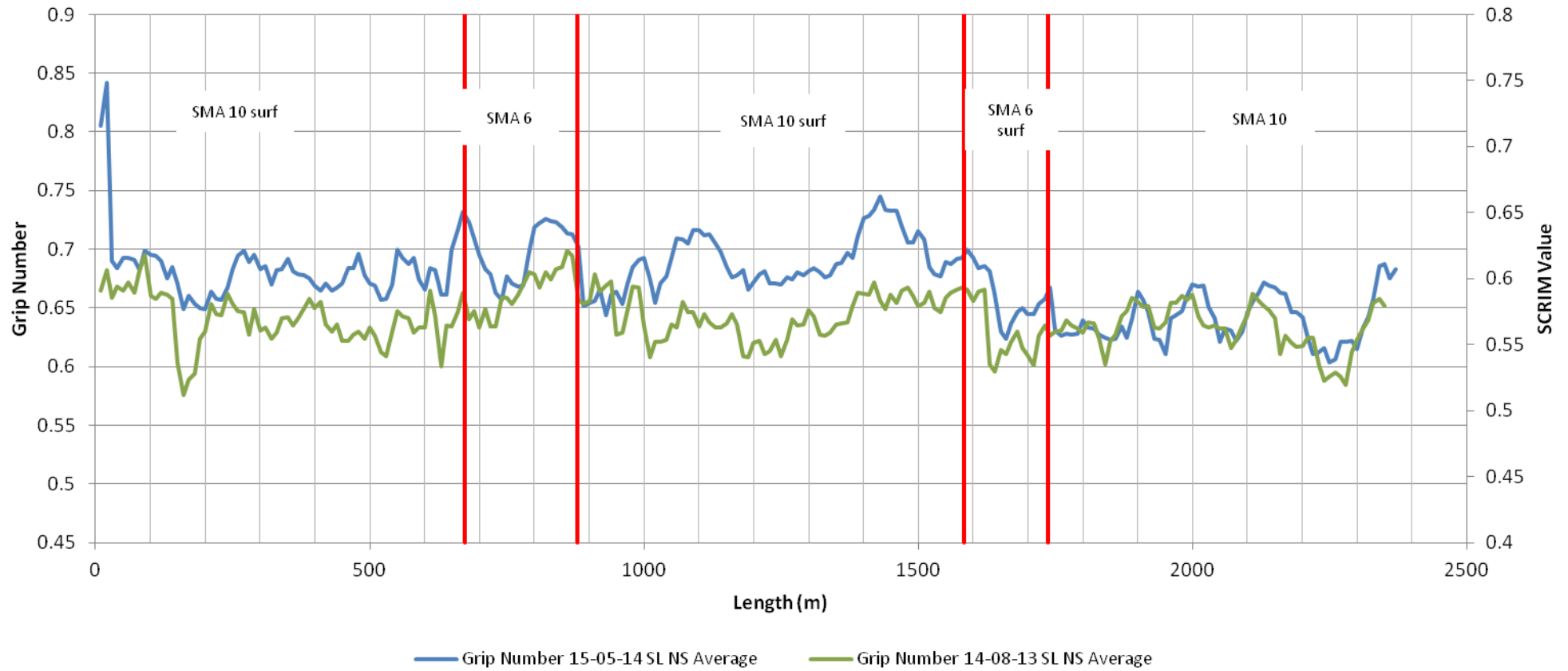
Survey	End chainage	Length of survey	Difference	
			M	%
Run 1	4263	2370	70	3.0%
Run 2	4264	2369	69	3.0%

Note:- VaryCH
Site Details recieved:
P1 - ch0>660 - 10mm 53psv
P2 - ch660>860 - 6mm 68+psv
P3 - ch860>1550 - 10mm 53psv
P4 - ch1550>1700 - 6mm 68psv
P5 - ch1700>2300 - 10mm 53psv

Scheme Average	<b>0.67</b> Gn
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SCRIM (factor)	0.89	<b>0.59</b>
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### A90 Charleston to Damhead - Northbound SL NS





A90 Charleston to Damhead Map of site.