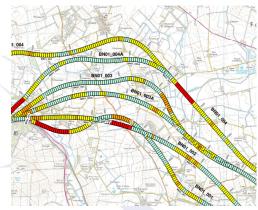
#### **Appraisal Process - Engineering**

- Alignment team generate sectional Plan & Profiles
- Input section alignments into GIS
- Engineering sub-disciplines carry out appraisal of sections (50m interval) based on engineering metrics and applying 7pt scale:
  - Alignment standards compliance use of relaxations and departures (new discipline appraisal)
  - Level difference degree to which alignment follows topography and requires large earthworks (as first fix)
  - Geotechnics Feasibility / complexity of required geotechnical works for local ground conditions (as first fix)
  - Structures Feasibility / complexity of structures required (as first fix)
  - Drainage and Hydrology Flood Plain, Watercourse Crossings, and Attenuation Requirement. (as first fix)
  - Utilities impact (as first fix)



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-3	Major Adverse
-2	Moderate Adverse
-1	Slight Adverse
0	Neutral



## **Appraisal Metrics - Engineering**

**Red Sifting Criteria Examples** 

• Alignment - Not compliant with Standard



- Earthworks/Level Difference Not following existing ground i.e. level diff over 20m in height
- Geotechnics Embankments
  20m+ on Glacial Till or rock
  15m+ on compressible soils (Cat 2)
  5m+ on peat/compressible (Cat 1)

Cuttings 25m+ in Glacial Till / 20m+ in rock 15m+ in compressible soils (Cat 2) 5m+ in peat/ in compressible (Cat 1) /Any cut in landfill

- Structures Very large span (300 m+) and/or complex structure e.g. tunnels and major viaducts, extremely complex maintenance requirements or demolition, onerous third-party requirements, major adverse H&S hazards
- Flooding & Drainage Likely adverse impact upon active flood plain, significant abnormal works or problematic provision of drainage attenuation
- Utilities Impact on Strategic Utility Infrastructure or multiple impacts on Regional Utility Infrastructure

### **Appraisal Process - Engineering**

- Collation of sub-discipline sectional appraisals into engineering sectional spreadsheet
- Collated scores checked and reviewed (moderation)
- The cumulative score is a number from 0 to -18
- A sub-discipline major score (-3, red) is important enough to warrant a summary major score, taking preference over the cumulative scoring
- Generation of 52 end to end spreadsheets by combining sectional spreadsheets – check and review undertaken
- Transfer of end to end spreadsheet to GIS graphical representation of results



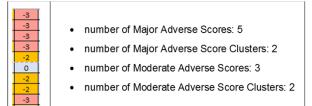
-9 or lower	Major Adverse
-6,-7,-8	Moderate Adverse
-3,-4,-5	Slight Adverse
0,-1,-2	Neutral

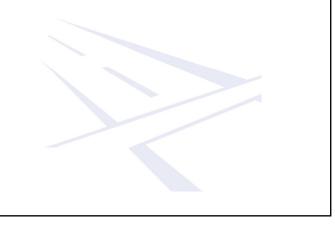
### **Appraisal Process - Engineering**

- To complete the engineering assessment, analysis of the number and type of impacts identified focused on:
  - number of Major Adverse Scores,
  - number of Major Adverse Score Clusters
  - number of Moderate Adverse Scores
  - number of Moderate Adverse Score Clusters
- Adverse scores indicate the number of 50m segments that attract a major, moderate or minor score
- Score Cluster is defined as a group of consecutive instances of the same score.
- Number of major clusters for each end to end alignment are summed up to group the alignments from 1-52 (least number – better performing, larger number – poorer performing)
- Where there are a similar number of major impacts, the number of moderate clusters determine position of alignment in 1-52 table.













#### Engineering Worked Example – Alignment 22

# 2nd Fix Engineering Assessment process Example Alignment 22





- Sectional plan & profiles created OLN Online OLC Online BN01 Inner OLS
- Alignment sections input into GIS
- Sub-discipline appraisal carried out and results collated in sectional spreadsheet
- · Generation of end to end spreadsheet
- End to end Results displayed and stored in GIS
- · Examples of major and moderate impacts
- Scoring and results for Alignment 22



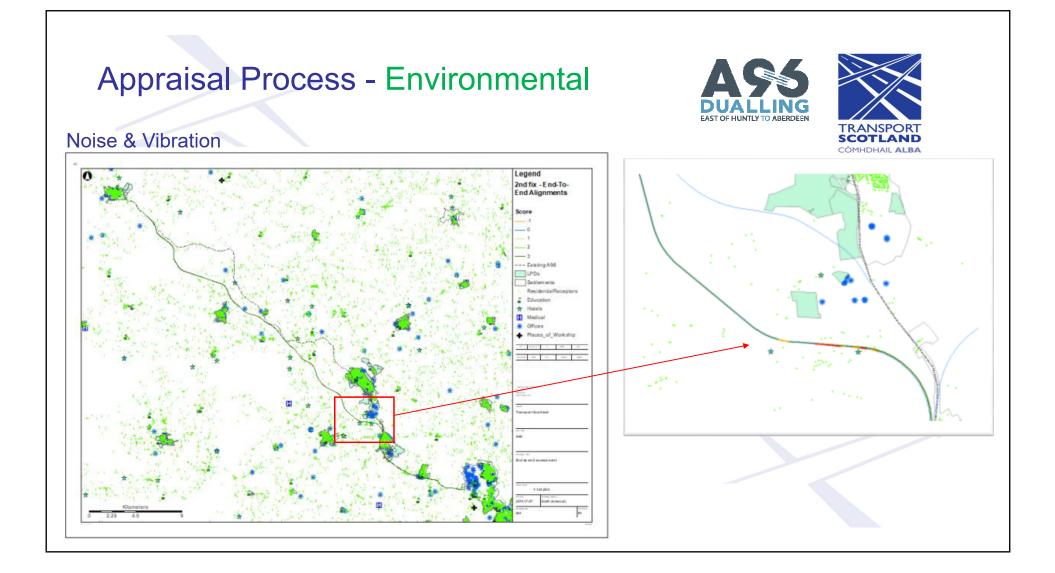
- Nine disciplines air quality, noise & vibration, ecology, cultural heritage, landscape & visual, water environment, planning & policy, geology & soils, people & communities
- Two outputs per discipline:
  - colour coded spreadsheet of appraisal for each 50m segment of the alignment section
  - commentary text to justify appraisal
- Overall environmental score/colour mapped on GIS for each 50m segment based on:
  - Where any discipline identified a major impact, the overall impact was major
  - Where any discipline identified a moderate impact, and there were no major impacts the overall impact was moderate
  - Where any discipline identified a minor impact, and there were no major or moderate impacts the overall impact was minor.

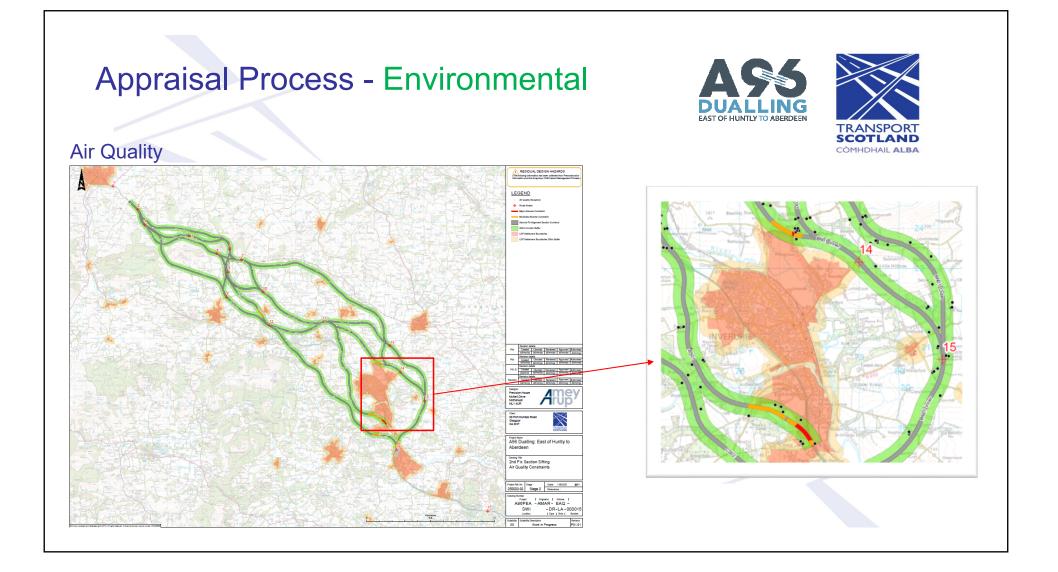
#### 2<sup>nd</sup> fix appraisal – cultural heritage commentary for each section

Scheduled (SMs)	Monuments	Category A Listed Buildings	Inventory Gardens and Designed Landscapes	Inventory Historic Battlefields	Category B Listed Buildings	Conservation Areas	Properties in Care		l e l e Barl	Charage IMPACT		
1			(GDLs)			The alignment does not	There are no PICs within		BHB1_lasr BHB1_lasr	1 .	Incompany Ingos I an ar ling of Pally of Navau Incoming Holara Incompany Ingos I an ar ling of Pally of Navau Incoming Holara Incompany I Ingos I an ar ling of Pally of Navau Incoming Holara	A HT
There are i	no Scheduled	There are no Category A	1/	The alignment does not	There are no Category B	intersect with any CAs.	the alignment.		DHU(Lee DHU(Lee DHU(Lee DHU(Lee DHU(Lee		han ang sant lang sa na lang af B alle af Har sa hannalang Halarat lang sa lang sa lang af B alle af Har sa hannalang Halarat	1 II
Monumen	ts within the	LB within the alignment.	The alignment intersects	intersect with any	LB within the alignment.	,			DHB1_laar DHB1_laar DHB1_laar		lan angenet Ingenet Ingenet an ar ling of Pelly of Merce Insertions Habers Ingenet Ingenet an ar ling of Pelly of Merce Insertions Habers Ingenet Ingenet Ingenet Ingenet Pelly of Merces Insertions Habers	: ::
alignment.			with the north-	Inventory Historic		There are no CAs within	There are two PIC within		BHBC.lasr BHBC.lasr	6 6 <b>1</b> 6 1	Instantial Instantian of Bully of Marcu Installers Malara Instantial Installers of Bully of Marcu Installers Malara Installers Installers (Bully of Marcu Installers Malara	8 HT
		There are four Category A	easternmost corner of	Battlefields.	There are 24 Category B	2km of the alignment.	km of the alignment.		BHB1_lasr BHB1_lasr	58 688 <b>Norm</b> 1997 88 658 <b>Norm</b> 1997 58 788 <b>Norm</b> 1997	lan angenet I sugard on ar llan af Palle of Marau hernhern Helere Ine angenet I sugard on ar llan of Palle of Marau hernhern Helere Ine angenet I sugard on ar llan of Palle of Marau hernhern Helere	8 HT
There are 2	22 SM within	LBs within 2km of the	Keith Hall Inventory GDL,		LB within 2km of the				BHB1_laar BHB1_laar BHB1_laar		Incompany Ingonia ao Magai Pullo at Nuou hao ahay Malaya Ingo agaat Ingonia ao Magai Pullo at Nuou hao ahay Malaya Ingo agaat Ingonia ao Magai Pullo at Nuou hao ahay Malaya Ingo agaat Ingonia ao Magai Pullo at Nuou hao ahay Malaya	8 HT
2km of the	e alignment.	alignment.	and would have a direct	There are two Inventory	alignment.		Brandsbutt Stone (PIC229)		BHBClass BHBClass	58 388 Manage ave.	has a sea and the section of the sec	: ::
		8	impact on the GDL.	Historic Battlefields within			has a localised setting		BEBLiner		lan angenet Ingenet Ingenet an ar ling of Pelly of Merce Insentary Natura Ingenet Ingenet an ar ling of Pelly of Merce Insentary Natura Ingenet Ingenet Ingenet Ingenet Pelly of Merce Insentary Natura	: ::
Ratch-hill.	settlement,	Bourtie House (LB2819) is		2km of the alignment.	Garden Cottage, Bourtie		within area of housing at		BRBClass S	14 1458 Maar 444	In a second in a second	:::
	m & enclosures	located c. 0.5km to the	Keith Hall Inventory GDL	5	House (LB2820) is set		the northern side of		DING ( lass DING ( lass DING ( lass		lan ayad tayataya Hayaf Baliraf Haray karakang Malarat Ian ayad tayataya Gutayaf Baliraf Haray tarakang Malarat Iangal Iangal ayathayaf Baliraf Haray karakang Malarat Iangal yang Tayathayaf Baliraf Haray karakang Malarat	8 HT
(SM6448)			had views out from across	Battle of Harlaw (BTL11)	within the non-inventory		Inverurie. Its setting		BRBCLeer BRBCLeer	13 9433 Noor 224	an annual langed as selling of Bully of Merce Inscalars Malaral	
	area of rough	is set within a non-	its parkland, with many	lies to the immediate west	GDL associated with		would not be impacted by		Dest Class		Incompanya Inggan ng an Inggan Bullo at Hurong Inggan Ng Kangadan ng K	* **
pasture wi	ith a number of	designated GDL and	views westwards towards	of the northern end of the	Bourtie House. The		the alignment.		Bill (lear		Incomposed Incomposed	8 HT
trees prese		surrounded by mature	the River Urie and the	alignment. The proximity	alignment would not have		5		BERLing C		lan manadi lan manadi	: ::
alignment	would lie	woodland which provides	town of Inverurie. An	of the route to the	a significant impact on its		Kinkell Church (PIC251) is		BHBClass BHBClass		Incomposed Incomposed	:::
c.1.1km to	the east of the	a localised setting. Key	avenue dating from the	battlefield means a	setting.		located c. 1.3km to the		BHBClass I BHBClass I	18 2458 Maar ava	ter any coll imposition of Bully of Marca Installary Halary -	: ::
SM, and w	ould not have a	views are to the south.	17 <sup>th</sup> century leads south	significant impact on the	_		north-east of the		Bener Liner	10 2210 <b>0</b> 0 0 0 0 0	lan ang ang lang ang ang lang ang Bully ang Huryan hanya kang Malayan lang ang ang lang ang ang Bully ang Huryan hanya kang Malayan lang ang ang lang ang Hung ang Bully ang Huryan hanya kang Malayan	A HT
significant	impact on its	The alignment may have	from the house, and forms	battlefields setting is	Harlaw Monument		alignment. Its setting is		BART Lass I BART Lass I BART Lass I	13 2413 Noos avan 13 2413 Noos avan	Incomposed Incomposed	8 HT
setting, no	ot least as it	an impact on its setting.	a key view. None of these	likely.	(LB2831) is situated at the		not considered to be		Difficar 1 Difficar 1 Difficar 1	50 250 <b>H</b> ore and 50 255 <b>H</b> ore again 50 255 <b>H</b> ore again 50 255 <b>H</b> ore again 50 276 <b>H</b> ore again	<b>Inc. mp. col.</b> Imposit as arting of Polly of Horow Inserting Holars	· II
follows the	e line of the		key views would be		approximate location of		vulnerable to effects on its		BRBClass I	10 2010 Ro mpani		1
existing A9	96 where it runs	Keith Hall (LB9136) is	affected by the alignment.	Battle of Barra (BTL18) is	the Battle of Harlaw, and		setting due to this use of		Benet, lear	270      Rosseparal        280      Rosseparal		
closest to t	the SM.	located 1.6km to the	The alignment would run	located c. 1.7km to the	within the Harlaw		this alignment.		Demet Lass 2 Demet Lass 2 Demet Lass 2	15 2155 Be apent 15 2155 Be apent		ii -
		south-west of the	very close to the eastern	northeast of the	Inventory Historic				DHBLizer 1 DHBLizer 1 DHBLizer 1	101 Be agent		ii ii
Caskieben	moat, moated	alignment. Its setting is	edge of the GDL, and	alignment. The main area	Battlefield. The ability to				BHBClass BHBClass	80 1218 Ba mpant		HT I
site and sy	mbol stone	within the Keith Hall GDL,	would introduce a new	of fighting is believed to	understand the battlefield			- 11	Beller I Bell Liner			1
170m N of		and the house has a key	feature into what is	have taken place to the	landscape from the				Bener 1	11 1111 Re aprel 12 1123 Re aprel 21 1113 Re aprel		
	located within	view to the south;	currently a rural	northwest of the Hill of	monument forms part of				0000(lear 1 0000(lear 1 0000(lear 1	14 1618 Ba mpost 16 1618 Ba mpost 16 1788 Madecate	<b>argallar ag</b> Ingastorerling of Pauris Hanne Calift (192819)	NT NT
	Hall GDL. Its	topography means that	landscape. This may	Barra. The hill would have	its setting. The alignment						ergedien as Ingeslan as Ingeslan as Ingeslan as Ingeslan of Hagof Hanse Celli (1929) Ingeslan as Ingeslan of Hagof Hanse Celli (1929)	1
	not considered	the alignment would be	adversely affect the	provided, and continues to	lies in very close proximity				Dilling Dilling	58 3388 Maderate	ergallar av Imposites orling of Pearly Hener Col & LD2015 Imposites orling of Pearly Hener Col & LD2015	NT NT
	e significantly	hidden in views to the	setting of the GDL.	provide an excellent	to the eastern edge of the				Dest Lass	5 40 le speel 45 le speel 5 40 le speel 45 le speel		ii.
impacted b		south.		elevated location from	battlefield and is likely to				BARTLasr C BARTLasr C BARTLasr C	58 4288 Ba mpant		NT NT
alignment.			There are no other	which to view the wider	affect its setting, and that				BART, Lear	till Ba mpani		at at
		Balbithan House (LB9140)	Inventory GDL within 2km	battlefield landscape. The	of the monument.				BHBL Lass	000  000  mapped		NT NT
000000000000000000000000000000000000000	, cairn 195m	lies c.0.7km to the south-	of the alignment.	alignment may affect the					PHILIAN PHILIAN	SI GII Re apeal		NT NT
WSE of (SM		east of the alignment. The		setting of the battlefield,	East Balhalgardy Cottar				BABLiser 4 BABLiser 4 BABLiser 4	51 CH Re apart 11 CH Re apart 51 CH Re apart		NT NT
situated c.	1.4km to the	house is accessed by a		but it is considered	Houses (LB2832) are		1		BRBCLear BRBCLear	11 C23 Se apad 23 C80 Se apad 34 C80 Se apad 35 C90 Sec apad 36 C93 Sec apad 36 C93 Sec apad	her mysell her mysell her mysell her mysell her mysell her mysell her mysell	ii i



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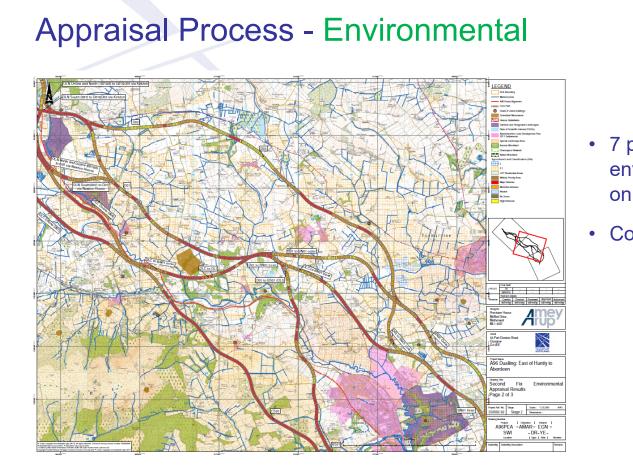








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	END TO END	chanage	2		SECTIONS	Chainage	2			Cross Check												¥4				93 		
2	Alignment_22	Start Chainage	End Chainage	4		Start Chainage	End Chainæe		Section	Start Chainage	Comment		Landscape and visual	Water	Ecology	People and community	Noise	Air quality	Cultural heritage	Plans and policies	Soil and geology	Other	Other	Other	2	Total Score	Moderated score	Comments
3	Alizzana 22	22500	00550		OLC-BIN	2100	2150	-	OLC-BIN	2100	OK		1	0	0	-	0	0	2	0	-2	0	0	0	-	2	0	0
454	Alignment_22 Alignment_22	22500	22550		OLC-BIN OLC-BIN	2100	2150 2200		OLC-BIN	2100	OK		-1 -1	0	0	-2	0	0	-3	0	-2	0	0	0	i:	-3	0	0
455	Alignment_22		22650		OLC-BIN	2200	2250	1	OLC-BIN	2200	OK		-1	0	0	-2	0	0	-3	0	-2	0	0	0	94	-3	0	0
156	Alignment_22		22700		OLC-BIN	2250	2300		OLC-BIN	2250	OK		-1	0	0	-2	0	0	-3	0	-2	0	0	0	\$*	-3	0	0
158	Alignment_22		22750		OLC-BIN	2300	2350		OLC-BIN	2300	OK		-1	0	0	-2	0	0	-3	0	-2	0	0	0	ŝ - 1	-3	0	0
159	Alignment_22	22750	22800		OLC-BIN	2350	2400		OLC-BIN	2350	OK		-1	0	0	-2	0	0	-3	0	-2	0	0	0		-3	0	0
460	Alignment 22		22850		OLC-BIN	2400	2450		OLC-BIN	2400	OK	1	-3	0	-2	-2	0	0	-3	0	-2	0	0	0	î.	-3	0	0
461	Alignment_22	22850	22900		OLC-BIN	2450	2500		OLC-BIN	2450	OK		-3	-3	-2	-2	0	0	-3	0	-2	0	0	0	5	-3	0	0
462	Alignment 22	22900	22950		OLC-BIN	2500	2550	1	OLC-BIN	2500	OK	1	-3	-3	-2	-1	0	0	-3	0	0	0	0	0	8	-3	0	0
163	Alignment_22	22950	23000		OLC-BIN	2550	2600		OLC-BIN	2550	OK	1	-3	-3	-2	-1	0	0	-3	0	0	0	0	0	ų.	-3	0	0
164	Alignment_22	23000	23050		OLC-BIN	2600	2650		OLC-BIN	2600	OK	1	-3	0	-2	-1	0	0	-3	0	0	0	0	0	ũ.	-3	0	0
465	Alignment_22	23050	23100		OLC-BIN	2650	2700		OLC-BIN	2650	OK	1	-3	0	-2	-1	0	0	-3	0	0	0	0	0		-3	0	0
166	Alignment_22	23100	23150	1	OLC-BIN	2700	2750		OLC-BIN	2700	OK	1	-3	0	-2	-1	0	0	-3	0	0	0	0	0	8	-3	0	0
467	Alignment_22	23150	23200	1.1	OLC-BIN	2750	2800	1	OLC-BIN	2750	OK	]	-3	0	-2	-2	0	0	-3	0	0	0	0	0		-3	0	0
468	Alignment 22	23200	23250		OLC-BIN	2800	2850		OLC-BIN	2800	OK	1	-3	0	-2	-2	0	0	-3	0	0	0	0	0		-3	0	0





- 7 point scale end-to-end environmental appraisal summary on GIS output
- Constraints map background

- A mark for each end-to-end alignment was obtained by taking the sum of the total score for all 50m segments in each alignment.
- These marks were then used to group the end to end alignments from better to poorer performing.





1	Alignment	Total Score	Proposed road length (km) +	
2	Alignment_21	-1600	39.036	
3	Alignment_67	-1612	39.479	
4	Alignment_20	-1631	39.195	
5	Alignment_93	-1642	39.21	
6	Alignment_66	-1645	39.704	
7	Alignment_10	-1662	33.299	
8	Alignment_58	-1676	33.796	
9	Alignment_92	-1677	39.435	
10	Alignment_191	-1689	39.069	
11	Alignment_190	-1700	34.204	
12	Alignment_185	-1702	33.627	
13	Alignment_60	-1703	39.569	
14	Alignment_89	-1708	33.53	
15	Alignment_196	-1720	34.703	
16	Alignment_187	-1729	39.4	
17	Alignment_188	-1729	39.977	
18	Alignment_173	-1735	39.303	
19	Alignment_194	-1749	40.476	





#### Environmental Worked Example – Alignment 22

