Appendix A

Pairing assessments



A1 Pairing assessment - Cyan to Lime

Pairing Assessment								
Discipline	Lime (L1)	Cyan (C1)	Better performing	Comment				
Engineering								
Geometric Standard	Horizontal and vertical geometry to desirable minimum or higher.	Horizontal and vertical geometry to desirable minimum or higher.		No preference between the routes.				
Geotechnics/ Earthworks	 Major Adverse Impacts: Retaining wall of maximum height 18m adjacent to Bogside Cottage, north of Ramstone Brae within Glacial Till. Cutting up to 11m deep through shallow rock at Ramstone Brae for mainline alignment and diverted existing A96. The cutting chases up the slope resulting in maximum depth of 26m. The impact of the earthworks in this location is greater due to the need to accommodate the realigned existing A96, which results in the cutting chasing further up the slope. Hill of Bainshole - Earthworks on side long ground. Height differential max 11m (CL). Max slope height approx. 25m in rock in cut and embankment. Cutting up to 17m deep (CL) through Glacial Till at Rashieslack on approach to Glen Water crossing. Cutting chases up the slope resulting in maximum depth of approximately 30m. New major structure crossing the Glen Water near the Hill of Skares (up to 450-500m) 	 Major Adverse Impacts: Short section of cutting up to 12m deep (CL) through shallow rock at Ordiesnaught. The cutting chases up the slope resulting in a maximum depth of 25m. Embankment up to 8.5m high approximately 450m long on peat near Hillhead of Thomaston (Rack Moss). New structure (underbridge) for new A96 over Glen Water, Wedderburn and diverted existing A96. Ground conditions indicate to be Alluvium and Glacial till at surface. New retaining wall of maximum height 17m adjacent to Bridge of Auchintender to minimise the impact on Glen Water. Moderate Adverse Impacts Embankment up to 12m (CL) high on glacial till at Den of Bogside. Cutting up to 15m deep (CL) through shallow rock at Ramstone Hill. Cutting chases 	Cyar	Cyan is preferred as it less major impacts with Lime requiring a major structure crossing the Glen Water at Hill of Skares founded in an area of compressible material.				
	 New major structure crossing the Gien Water near the Hill of Skares (up to 450-500m long), ground conditions indicated to be alluvium at surface. Moderate Adverse Impacts: Cutting approximately 12m deep through glacial till at Hillhead of Thomastown. Max slope height approx. 15m (chasing slope). New bridge structure over Peterden Burn and gully, ground conditions indicated to be Glacial Till at the surface. Short section of Embankment up to 14m high on glacial till (due north of East-Bog). Generally, earthworks on hillside results in significant sidelong slopes on earthworks. Other Considerations: None. 	 up the topography, giving a potentially bigger impact. Cutting up to 12m deep through shallow rock at Broom Hill. Diverted A96 upon 5m embankment (CL) at Broomhill. Max height 16m chasing slope on Glacial Till. Cutting up to 13m deep (CL) through Glacial Till at East Bog. The cutting chases up the slope resulting in a maximum depth of approximately 25m. Diverted A96 on benched platform resulting in embankment upon alluvium, South of Wedderburn. Max height 13m. Overbridge for diverted existing A96 across new A96 between East Bog and Skares founded upon Glacial Till. Other Considerations: None. 						
Structures	 Major Adverse Impacts: Long underbridge structure required over Glen Water near Hill of Skares (Structure length 450-500m). Skewed crossing of river and flood plain. Moderate Adverse Impacts: Retaining wall of maximum height 18m adjacent to Bogside Cottage, north of Ramstone Brae. Underbridge for crossing of Peterden Burn and Gully. Other Considerations: There are a further four side road crossings required: Other structures required: Overbridge at Ordiesnaught for realigned existing A96 over mainline A96. Overbridge for C66S side road crossing at Hillhead / North Broomhill. Underbridge for local access at Wedderburn / Braehead. Overbridge for wind farm access at Bainshole. 	Major Adverse Impacts None. Moderate Adverse Impacts: • Underbridge for new A96 over Glen Water, Wedderburn and diverted existing A96. Retaining wall required (250m long, retained height 17m) on approach to Hill of Skares to minimise impact on Glen Water. Other Considerations: There are a further four side road crossings required: Other structures required: • Underbridge for C66S side road at Hillhead / North Broomhill. • Underbridge over diverted existing A96 at Broom Hill • Underbridge for access to Mid & East Bog. • Overbridge for diverted existing A96 across new A96 between East Bog and Skares founded upon Glacial Till.	Суаг	Cyan is preferred as Lime requires a skewed viaduct crossing of the Glen Water which is a major impact due to height, length and access.				





Pairing Assessment						
Discipline Drainage & Hydrology	Lime (L1)	Cyan (C1)		rforming	Comment Lime is preferred as Cyan requires a diversion of the Glen Water near to the Hill of Skares.	
	Major Adverse Impacts: None.	Major Adverse Impacts: • None.	Lime			
	Moderate Adverse Impacts:	Moderate Adverse Impacts:				
	None.	Diversion of Glen Water north of the Hill of Skares (250m).				
	Other Considerations:	Other Considerations:				
	No major/moderate impacts on existing floodplains due to bridged crossings of Glen Water and flood plain.	No major/moderate impact on existing floodplains due to bridged crossings of Glen Water and flood plain.				
Utilities	Major Adverse Impacts:	Major Adverse Impacts:			No preference between the routes.	
	Crossing of SGN high pressure pipeline east of North Broomhill.	Crossing of SGN high pressure pipeline near Ordiesnaught.				
	Crossing of SGN high pressure pipeline near Ordiesnaught for mainline alignment.	Crossing of SGN high pressure pipeline near Ordiesnaught for diverted existing A96.				
	Crossing of SGN high pressure pipeline near Ordiesnaught for diverted existing A96.	Crossing of SGN high pressure pipeline south of Wedderburn.				
	Moderate Adverse Impacts:	Moderate Adverse Impacts:				
	None.	None.				
	Other Considerations:	Other Considerations:				
	None.	None.				
Residual hazards for mitigation (CDM)	The following hazards were identified: • Interaction with live traffic and working near carriageway.	The following hazards were identified: • Interaction with live traffic and working near carriageway – More interactions than		Cyan	Cyan is preferred as Lime has a major watercourse crossing and rock cuts.	
	Rock cuts requiring ongoing maintenance – potential access hazard.	Lime.				
	Extensive creation of sidelong earthworks on hillside.	Construction of crossings over existing A96.				
	SGN high pressure gas pipeline crossings (diversion / replacement of live service).	Embankments on compressible material requiring regular maintenance.				
	Potentially compressible material where major viaduct structure is proposed.	SGN high pressure gas pipeline crossings (diversion / replacement of live service).				
	Major watercourse crossing on a skew likely to be more complex to construct – limited access within watercourse corridor and increased spans, requiring more onerous lifts.	Potentially compressible material where structure is proposed.				
Cost Comparison	Comparative cost 124%	Comparative cost 100%		Cyan	The structures and earthworks costs for Lime are higher than Cyan which results in Cyan being	
	Lime requires a longer more complex viaduct (approx. 450m-500m long) to cross the Glen water and its valley at the Hill of Skares. Cyan also requires a structure to cross the Glen Water in a different location and is shorter and less complex. Lime requires more major earthworks				preferred.	
Overall Engineering	Both routes perform similarly for Geometric Standards and Utilities.			Cyan		
Summary	Lime performs better for Drainage and Hydrology.					
	Cyan performs better for Geotechnics/Earthworks, Structures, Residual Hazards and Cos	• • •				
	Overall Cyan is better performing and is therefore preferred.					
Environmental			•		•	
Landscape & Visual	Major Adverse Impacts:	Major Adverse Impacts:		Cyan	Cyan is preferred as the earthworks are of smaller	
Landocape a viouai	Areas of earthworks >15m in height associated with new structure.	Retaining structure required up to 20m high in vicinity of Hill of Skares.			scale with the impacts localised on lower ground	
	Long length of the route is within the undesignated high sensitivity Area 3, which	Moderate Adverse Impacts:			along the glen and online with the existing A96, on an area of the landscape which is quite	
	comprises the northern banks of the Glen Water with undulating ridges that drop down perpendicular to the glen.	Earthworks of 5-15m. This will also affect a moderate number of visual receptors. One runs on lower ground and mostly colling with the existing ASS, although will. One runs on lower ground and mostly colling with the existing ASS.			inconspicuous in character.	
	Retaining wall near to Bogside Cottage.	Cyan runs on lower ground and mostly online with the existing A96, although will require a retaining structure near the Glen Water.			Opportunities for mitigation are limited for both	
	Moderate Adverse Impacts:	Other Considerations:		routes, so the residual impacts of Lime will be higher than those of Cyan.		
	 Areas of earthworks 5-15m in height. The route runs perpendicular to the ridges of the hills as they slope down towards Glen Water, in conflict with the characteristic topography of the area. 	Existing landscape features such as mature treelines will help to reduce distant views towards the proposed route and therefore provide some mitigation. Should this feature be replicated along other field boundaries the mitigation effect could be			dian alooe of Oyan.	
	 The lack of vegetation in the area affords oblique views towards the proposed route, for which mitigation opportunities are limited. 	increased.				
İ	Other Considerations:					
	 Where earthworks are in cutting, there is some visual mitigation from the existing A96 and residential receptors around it, however the footprint will still have an impact. 					





	Pairing Assessment						
Discipline	Lime (L1)	Cyan (C1)		rforming	Comment		
Water	Major Adverse Impacts: Skewed crossing of the Glen Water. At the crossing location the floodplain is approx. 55m wide and there is potential for active morphology which will have a moderate adverse impact. Moderate Adverse Impacts: Crossing of the headwaters of the Keithny Burn / Forgue Burn due to potential for active morphology and the need for a short realignment. Other Considerations: Lime has fewer watercourse crossings in total.	 Major Adverse Impacts: Diversion of the Glen Water (250m) north of the Hill of Skares. Glen Water is currently deemed to have Good status for morphology. Skewed crossing of the Glen Water. At the crossing location the floodplain is approx. 75m wide along the road centre line and there is potential for active morphology which will have a moderate adverse impact. Moderate Adverse Impacts: Cyan passes close to the Glen Water/River Urie and its floodplain at Ch 6400 however plan drawings indicate that the earthworks are unlikely to encroach on the channel here Other Considerations: Cyan has more watercourse crossings in total. 	Lime				
Ecology	 Major Adverse Impacts: Lime would create a separate, additional barrier to wildlife movement which would be a particularly sensitive impact within the Wildcat Priority Area and the Foudland Local Nature Conservation Site (LNCS). In addition, the eastern end of Lime extends into the habitat corridor between Hill of Skares and North Broomhill, thus creating a separate barrier within this sensitive area. Moderate Adverse Impacts: Lime includes a crossing of the River Urie, a named SEPA water body with a floodplain that is likely to contribute to the overall habitat connectivity of the area, as well as the crossing of several minor watercourses, however in total there would be fewer watercourse crossings than Cyan. Other Considerations: All minor watercourse crossings will need to be designed in accordance with ecological parameters to ensure they are suitable for commuting by species such as otter and water vole. In addition, considerations around fish will also need to be taken into account in the design. Larger watercourse crossings, such as that of the Glen Water/River Urie in Lime, should avoid direct impacts to the watercourse and surrounding riparian habitat by being a single span structure. 	 Major Adverse Impacts: Cyan would augment the existing barrier to wildlife movement in the particularly sensitive area of the Wildcat Priority Area and Foudland LNCS. It would also augment the existing barrier caused by the current A96 within the habitat corridor at the easternmost extent of this alignment. Glen Water is an important corridor for a number of species including Otter and potentially Wildcat. Diversion of this watercourse could undermine habitat quality. There are potential adverse impacts for local and downstream fish populations of Brown and Sea Trout. Moderate Adverse Impacts: None. Other Considerations: Mitigation will need to address fragmentation. Both routes would require the incorporation of crossing points either via green bridge or underpass along their length. Benefits of mitigation may be greater for Cyan as potential exists to bridge the fragmentation caused by both the current A96 and the proposed new route, thus addressing the cumulative impact more effectively. All minor watercourse crossings will need to be designed in accordance with ecological parameters to ensure they are suitable for commuting by species such as otter and water vole. In addition, considerations around fish will also need to be taken into account in the design. 		Cyan	Cyan is preferred as Lime has greater impacts on habitat corridors in the area, including the sensitive Wildcat Priority Area due to relative remoteness from existing highway corridor. Benefits of mitigation may be greater for Cyan as potential exists to bridge the fragmentation caused by both the current A96 and the proposed new route, thus addressing the cumulative impact more effectively.		
People & Community	 Major Adverse Impacts: Farm Building at Leys of Dummuies immediately adjacent to the existing A96 and future routes. Potential impact upon access to property. Moderate Adverse Impacts: None. Other Considerations: There is one farm building at Hillhead which sits close to the cutting and a property at Bogside cottage which is close to a proposed retaining wall. Existing access to properties at Bogside of Adamston and Bogside Cottage severed. New access route required. There are no community facilities impacted, NMU routes severed or loss of greenspace as a result of Lime. Lime requires 11km of non-prime agricultural land and does not result in the loss of prime agricultural land. 	 Major Adverse Impacts: Farm Building at Leys of Dummuies immediately adjacent to the existing A96 and future routes. Potential impact upon access to property. Moderate Adverse Impacts: None. Other Considerations: There is one residential property at "Whinbrea" that sits close to Cyan however from the section profile drawing the earthworks are on the opposite side of the existing A96 and therefore should not impact this property. There are no community facilities impacted, NMU routes severed or loss of greenspace as a result of Cyan. Cyan requires 11.5km of non-prime agricultural land and does not result in the loss of prime agricultural land. 			No preference between the routes.		





	Pairing Assessment					
Discipline Noise	Lime (L1)	Cyan (C1)	Better performing		Comment	
	Major Adverse Impacts:	Major Adverse Impacts:	Lime		Lime is preferred as existing traffic through the AS	
	None.	None.			would be rerouted to a road section with fewer	
	Moderate Adverse Impacts:	Moderate Adverse Impacts:			receptors.	
	None.	None.				
	Other Considerations:	Other Considerations:				
	There would be a positive potential impact at the receptors located closest to the A96, because traffic would be rerouted to an area with fewer receptors. Application of the A96, because traffic would be removed to an area with fewer receptors.	 The route runs parallel and is relatively close to the existing A96 and hence there are no clear identifiable potential beneficial impacts from rerouting traffic through this section. 				
	 Within a 300m buffer of the proposed alignment there are approximately 20 residential receptors and ten non-residential receptors. 	Within a 300m buffer of the proposed alignment there are approximately 30 residential receptors and ten non-residential receptors. For context, the section of				
		the existing A96 parallel to Cyan has the same number of receptors within 300m than Cyan.				
Air Quality	Major Adverse Impacts:	Major Adverse Impacts:	Lime		Lime is preferred due to the longer length and the	
	None.	None			numbers of receptors on Cyan.	
	Moderate Adverse Impacts:	Moderate Adverse Impacts:				
	None.	None				
	Other Considerations:	Other Considerations:				
	 Approximately 20 receptors are within 200m of Lime, the majority of which are residential. 	 There are approximately 30 receptors within 200m of the route corridor, of which approximately 25 are residential. 				
	 There are no significant Local Development Plan (LDP) settlement areas within 200m of the route corridor. 	 There are no significant LDP settlement areas within 200m of the route corridor. It is unlikely that calculated pollutant concentrations will be at levels requiring 				
	It is unlikely that calculated pollutant concentrations will be at levels requiring mitigation.	mitigation.				
	 Lime is 11.0km long so has a potential lesser impact than Cyan in terms of greenhouse gas emissions. It is considered that Lime performs slightly better than Cyan. 	 Cyan is 11.5km long so has a potentially greater impact than Lime in terms of greenhouse gas emissions. 				
Cultural Heritage	Major Adverse Impacts:	Major Adverse Impacts:			No preference between the routes.	
	None.	None.				
	Moderate Adverse Impacts:	Moderate Adverse Impacts:				
	None.	None.				
	Other Considerations:	Other Considerations:				
	 There are three SMs, one Category A and two Category B listed buildings and one GDL within 2km of Lime. 	There are three SMs, one Category A and two Category B listed buildings and one GDL within 2km of Cyan.				
Plans & Policies	Major Adverse Impacts:	Major Adverse Impacts:			No preference between the routes.	
	None	None				
	Moderate Adverse Impacts:	Moderate Adverse Impacts:				
	None	None				
	Other Considerations:	Other Considerations:				
	 Route is within the Glens of Foudland Wind Farm Hill of Bainshole Huntly development area. 	Small scale committed development.				
Soil & Geology	Major Adverse Impacts:	Major Adverse Impacts:			No preference between the routes.	
	None	None				
	Moderate Adverse Impacts:	Moderate Adverse Impacts:				
	None	None				
	Other Considerations:	Other Considerations:				
	None	None				





Pairing Assessment						
Discipline	Lime (L1) Cyan (C1)				rforming	Comment
Overall Environmental Summary	 Cyan performs better with less extensive earthworks which are located on lower ground and in relative proximity to the existing A96. Cyan has an impact on Water with the diversion of the Glen Water. Lime impacts on the Wildcat Priority Area with an increased likelihood of fragmentation of the natural habitats. Lime performs better with fewer receptors in terms of Air Quality and Noise. Both routes perform similarly for Cultural Heritage, People and Community, Geology and Soils and Plans and Policies. Overall both routes perform similarly and therefore no preference between the routes. 					
Traffic				•		
SO1.1 Reduced journey times	Routes are comparable		Routes are comparable			No preference between the routes.
SO1.2 Improved journey time reliability	 Improves journey time reliability through f standard. Options offer comparable improvement in 	ull overtaking provision and consistent road i journey time reliability.	 Improves journey time reliability through full overtaking provision and consistent road standard. Options offer comparable improvement in journey time reliability. 			No preference between the routes.
SO1.3 Increased overtaking opportunities;	Both routes attract a similar volume of tra	ffic to the dual carriageway	Both routes attract a similar volume of traffic to the dual carriageway			No preference between the routes. The routes attract a similar volume of traffic to the dual carriageway and therefore offer similar benefits to traffic through increased overtaking opportunities.
SO1.4 Improved efficiency of freight movements along the transport corridor;	 Options offer comparable economic bene There are no industrial areas served by the 	-	 Options offer comparable economic benefits for freight There are no industrial areas served by these options. 			No preference between the routes.
SO1.5 Reduced conflicts between local traffic and strategic journeys		h for traffic travelling through Pitmachie, Pitcaple es reduce strategic trips through these areas	 Both options reduce the average trip length for traffic travelling through Pitmachie, Pitcaple and Drimmies indicating that both routes reduce strategic trips through these areas similarly. 			No preference between the routes. Both routes similarly reduce the average trip length on existing A96 indicating a significant reduction in strategic traffic travelling on the existing A96.
SO1.6 Improved network resilience	 Improved road standard will reduce the like delays/disruption. Provision of secondary carriageway will princident. Both routes will be similarly susceptible to 	rovide alternative road space in the event of an	 Improved road standard will reduce the likelihood of accidents and associated delays/disruption. Provision of secondary carriageway will provide alternative road space in the event of an incident. Both routes will be similarly susceptible to inclement weather conditions. 			No preference between the routes.
SO2.1 Reduced accident rates and severity		number of Personal Injury Accidents (PIA) on	Both routes offer similar reduction in the number of Personal Injury Accidents (PIA) on the new dual carriageway and detrunked A96 route			No preference between the routes. Both routes offer similar reduction in accident rates. Accident severity is likely to be reduced similarly in both options through improved alignment and overtaking provision.
SO2.2 Reduced driver stress	 Potential to reduce driver stress through i introduction of full overtaking provision 	mproved alignment, fewer junctions and	 Potential to reduce driver stress through improved alignment, fewer junctions and introduction of full overtaking provision 			No preference between the routes.
SO2.3 Reduced potential conflicts between Motorised and Non-Motorised Users	 There are no core paths in the vicinity of to or generators in the area. NMU activity is provide as appropriate. 	the alignment and no significant trip attractors assumed to be low. NMU facilities will be	 There are no core paths in the vicinity of the alignment and no significant trip attractors or generators in the area. NMU activity is assumed to be low. NMU facilities will be provide as appropriate. 			No preference between the routes.
SO3.1 Improved access to the wider strategic transport network	 Routes offer similar improvement in journ strategic transport infrastructure. 	ey times from key trip generators to reach	 Routes offer similar improvement in journey times from key trip generators to reach strategic transport infrastructure. 			No preference between the routes Overall the difference in journey times is marginal and therefore both routes are considered to improve access to the wider strategic network similarly.
SO3.2 Enhanced access to jobs and services	Routes offer similar improvement in journ employment and service areas	ey times from key trip generators to reach	 Routes offer similar improvement in journey times from key trip generators to reach employment and service areas 			No preference between the routes Overall the difference in journey times is marginal and therefore both routes are considered to improve access to jobs and services similarly.





Pairing Assessment						
Discipline	Lime (L1)	Cyan (C1)	Better performing	Comment		
SO4 To facilitate active travel in the corridor.	 There are no core paths in the vicinity of the alignment and no significant trip attractors or generators in the area. NMU activity is assumed to be low and it is unlikely that the improved alignment will encourage an increase in active travel. NMU facilities will be provide as appropriate. 	There are no core paths in the vicinity of the alignment and no significant trip attractors or generators in the area. NMU activity is assumed to be low and it is unlikely that the improved alignment will encourage an increase in active travel. NMU facilities will be provide as appropriate.		No preference between the routes.		
SO5 To facilitate integration with Public Transport Facilities.	Improved standard of road will improve journey times for buses and for journeys to and from Huntly rail station.	 Improved standard of road will improve journey times for buses and for journeys to and from Huntly rail station. 		No preference between the routes.		
STAG 2 Safety	See Scheme Objective 2.1	See Scheme Objective 2.1		See Scheme Objective 2.1		
STAG 3.1 Transport Economic Efficiency	Both routes will offer a similar level of economic benefit	Both routes will offer a similar level of economic benefit		No preference between the routes.		
STAG 3.2 Wider Economic Impacts	Not assessed at this stage. Will be considered as part of the Scheme Business Case.	Not assessed at this stage. Will be considered as part of the Scheme Business Case.		Not assessed at this stage. Will be considered as part of the Scheme Business Case.		
STAG 4.1 Transport Integration	See Scheme Objective 5	See Scheme Objective 5		See Scheme Objective 5		
STAG 4.2 Transport and Land-use Integration	 There are no proposed developments in the vicinity of this option. Improved journey times along this route will improve access to development sites in Huntly. 	 There are no proposed developments in the vicinity of this option. Improved journey times along this route will improve access to development sites in Huntly. 		No preference between the routes.		
STAG 4.3 Policy Integration	Both routes support current transport and planning policy	Both routes support current transport and planning policy		No preference between the routes.		
STAG 5 Accessibility & Social Inclusion	No junctions will be provided along this route however local road connectivity will be maintained via collector/distributor roads to maintain access for local communities.	 No junctions will be provided along this route however local road connectivity will be maintained via collector/distributor roads to maintain access for local communities. 		No preference between the routes.		
STAG 6 Public acceptability	Lime likely to be less publicly acceptable due to impact on currently undeveloped land and perception of duplicating existing A96 road.	Cyan likely to receive greater public support due to it's potential to minimise new land take and best use of existing assets.	Cyan	Cyan is preferred as it likely to be more publicl acceptable.		
Value for Money	 Comparative cost 124% Lime offers similar TEE benefits, however has higher construction costs. 	Comparative cost 100% Cyan offers similar TEE benefits and lower construction costs.	Cyan	Cyan is preferred as it offers better value for money		
Overall Traffic Summary	 Both routes offer the same level of benefit in journey time savings, vehicle operating Cyan has lower construction cost with similar TEE benefits and therefore offers bet Lime is fully offline and may be regarded by the public as less acceptable while Cyaless agricultural land. Overall Cyan is better performing and is therefore preferred. 	Cyan				

Overall Pairing Conclusion

- Cyan is preferred by Engineering and Traffic with Environment having no preference between the routes.
- It is recommended that Cyan is progressed for development in further stages.

