



Aberdeen Western Peripheral Route

Kingcausie Alternative Alignment Report

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1 Introduction

1.1 Overview

A request was made for alternative alignment options for the AWPR through the Kingcausie area to be considered as part of the scheme proposals.

Five alternative options were considered for the mainline alignment between Cleanhill Junction and the River Dee through the Kingcausie Estate. The purpose of these alternative options was to investigate ways to reduce the impact of the alignment on Kingcausie Burn and the Kingcausie Designed Landscape through consideration of a raised vertical alignment and westwards movement of the alignment in the vicinity of Eastland House.

2 Options Considered

2.1 Current Scheme Proposal

The current route option as published in the Draft Orders, evaluated as part of the EIA process and presented in the Environmental Statement of December 2006 is as follows: The route passes in cutting through Cleanhill Wood and passes 100m to the east of Eastland House on a 6.5m high embankment. It broadly follows the existing ground profile as the land falls towards the River Dee with the road in slight cutting as it passes Kingcausie House. As a consequence of this alignment, the proposed road passes at existing ground at the crossing of the Kingcausie Burn requiring the burn to be realigned over a length of approximately 400m.

2.2 Alternative Options

The options considered are summarised below and illustrated on the figures contained in Appendix A:

- Options 1A & 1B: These options maintain the current horizontal alignment with a revised vertical alignment such that Kingcausie Burn can be retained on its present course with the road passing approximately 4.5m above the burn. This is intended to permit the construction of a low bridge with drainage still being carried over the burn. Option 1A maintains desirable minimum vertical crest curvature and Option 1B adopts reduced vertical crest curvature of 1 step below desirable minimum. This is a Departure from Standard but gives a reduction in the embankment height as the route passes Eastland House. The embankment height past Eastland House is approximately 15m for Option 1A and 8.5m for Option 1B. The embankment height past Kingcausie House is approximately 4.5m for both options.
- Options 2A & 2B: These options adopt a revised horizontal alignment which is 30m further west than the current route option at the Kingcausie Burn and 80m further west at Eastland House. The route follows a more westerly line through Cleanhill Wood. The vertical alignment of options 2A and 2B have been chosen such that Kingcausie Burn can be retained on its present course with the road passing approximately 4.5m above burn. Option 2A maintains desirable minimum vertical crest curvature and Option 2B adopts reduced vertical crest curvature of 1 step below desirable minimum. This is a Departure from Standard but gives a reduction in the embankment height. The embankment height through Eastland is approximately 15m for Option 2A and 13m for Option 2B. The embankment height past Kingcausie House is approximately 5.5m for both options.
- Option 2C: This option follows the same horizontal alignment as Options 2A and 2B, however, the vertical alignment is similar to that of the current proposal. This permits lower embankment heights similar to the current proposal and avoids direct impact on the Kingcausie Designed Landscape but still requires extensive realignment of the burn.

3 Assessment

A comparative assessment of these options has been made against the current option considering environmental, engineering and economic criteria.

3.1 Environment

A desk based environmental assessment of all of the options was undertaken and details are provided in Appendix B.

3.2 Engineering

Options 1B and 2B introduce vertical crest curvature one step below desirable minimum standards. In combination with the resultant reduced stopping sight distance this is a Departure from Standard. Although no discussion has been held with Transport Scotland regarding these Departures from Standard, it is noted that they are not within a junction area and as a result would be more likely to be granted.

Each of the alternative options would introduce changes to the structure designs for the Eastland Underpass and the Kingcausie Burn. It is assumed that the change at Eastland would be in location only and that the underpass structure would remain similar to the current design with approximately the same cost. At Kingcausie Burn, the culvert which has a budget cost of £72,900, would be replaced with a low bridge structure at increased cost. The budget cost for Option 1A and 1B is £1.25M, and for Option 2A and 2B is £0.6M. The culvert would be retained under Option 2C.

Options 2A, 2B and 2C would require the purchase of Eastland House, Eastland Cottage and the associated outbuildings. Eastland House itself could be retained under Option 2C and with some localised slope steepening could also be retained under Option 2A and 2B. However, it is noted that the proximity of the road embankment along with the loss of the garden, access road and associated outbuildings would render Eastland House uninhabitable.

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The earthworks quantities for each option are presented in the table below. With each option, the cut volumes are reduced and the fill volumes greatly increased in comparison with the current option. The variance shown is the difference between the Current Net Volume and the Net Volume for each option.

Option	Cut Volume (m ³)	Fill Volume (m ³)	Net Volume (m ³)	Earthworks Cost ¹ (£)
Current Opt.	204,800	-172,900	31,900	
Option 1A	149,350	-526,900	-377,550	+£2.7M
Option 1B	225,700	-344,800	-119,100	+£1.4M
Option 2A	61,060	-546,160	-485,100	+£2.7M
Option 2B	61,190	-485,640	-424,450	+£2.2M
Option 2C	115,000	-181,000	-66,000	-£0.1M

Notes

1. Earthworks cost based on £2/m³ saving for reductions in cut volume and £8/m³ increase for increase in fill volume.

The AWPR drainage strategy remains the same for all options with drainage taken to the ponds north of the River Dee. This requires drainage to be carried across the Eastland Underpass, Kingcausie Burn and the River Dee.

3.3 Economics

The estimated cost differences excluding preliminaries etc. for the options are as follows:

- Option 1A: + £3.95M
- Option 1B: + £2.65M
- Option 2A: + £3.30M
- Option 2B: + £2.80M
- Option 2C: - £0.10m

These costs are based on the changes in the structures and earthworks cost as detailed above. The additional cost to purchase Eastland House and the associated buildings is not included but would further increase costs for Options 2A, 2B and 2C.

4.1 Recommendation

Under Options 1A and 1B, the environmental benefits gained by bridging Kingcausie Burn on its current alignment are considered to be outweighed by the disbenefits of increasing the embankment height in the vicinity of Kingcausie House and Eastland House. While under Options 2A, 2B and 2C the cultural heritage impact on Eastland House and its associated outbuildings is not considered to be offset by any reduced impact on the Kingcausie Designed Landscape.

All of the above options with the exception of Option 2C result in a significant increase in the height of the embankment through this area, which would result in substantially greater earthworks movements and disruption during the construction period.

As a result of the larger structures required and the larger volumes of earthworks, Options 1A, 1B, 2A and 2B all result in significant cost increases over the current option. While Option 2C would provide a minor saving, this would not offset the increased cultural heritage impacts. As such the current proposal is preferred over the alternatives considered above.

It is therefore recommended on environmental, engineering and economic grounds, that the current alignment proposed through this area should remain part of the AWPR proposals.

Appendix A: Options Figures

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Appendix B: Environmental Comparative Assessment

	Current Option	Option 1A	Option 1B	Option 2A	Option 2B	Option 2C
Human/Property Demolition: No (Proximity measured from CL. Proximity measured between Cleanhill roundabout and B9077. Figures in brackets are cumulative figures)	0	0	0	1 (Eastland Cottage) + associated outbuildings Eastland House assumed to be saved and included in proximity count.	1 (Eastland Cottage) + associated outbuildings Eastland House assumed to be saved and included in proximity count.	1 (Eastland Cottage) + associated outbuildings Eastland House assumed to be saved and included in proximity count.
Proximity: 0 – 50m	0 (0)	0 (0)	0 (0)	1 (1)	1 (1)	1 (1)
50 – 100m	2 (2)	2 (2)	2 (2)	1 (2)	1 (2)	1 (2)
100 – 200m	3 (5)	3 (5)	3 (5)	3 (5)	3 (5)	3 (5)
200 – 300m	5 (10)	5 (10)	5 (10)	5 (10) (Including Storybook Glen visitor centre)	5 (10) (Including Storybook Glen visitor centre)	5 (10) (Including Storybook Glen visitor centre)
Land Use	Woodland and agricultural land uses affected (Land Capability Assessment Class 3.2). No property demolition required.	Increase in land-take due to increased embankment. No property demolition required. Increased loss of woodland (increase unlikely to change significance assessment).	Increase in land-take due to increased embankment. No property demolition required. Increased loss of woodland (increase unlikely to change significance assessment).	Demolition of Eastland Cottage and outbuildings required. Option 2A is likely to result in a decreased loss of woodland.	Demolition of Eastland Cottage and outbuildings required. Land-take likely to be slightly less than Option 2A. Option 2B is likely to result in a decreased loss of woodland.	Demolition of Eastland Cottage and outbuildings required. Land-take slightly less than Options 2A and 2B. Option 2C is likely to result in a decreased loss of woodland.
Agriculture	Affects agricultural land (Land Capability Assessment Class 3.2), and forestry.	In both options, one additional field would be affected (field to North of Eastland House), however, greater land-take would be required of this field with Option 1A. The reduced cutting would decrease the direct loss of forestry land and would reduce the area of felling necessary to mitigate against windthrow. Access and severance issues are unchanged from		The change in horizontal alignment would result in a greater loss of agricultural land. Two additional fields would be affected to the north and to the south of Eastland House. The significantly reduced cutting would decrease the direct loss of forestry land and would reduce the area of felling necessary to mitigate against windthrow. Access and severance issues are unchanged from		The change in horizontal alignment would result in an increased loss of agricultural land, but less forestry. Two fields would be particularly affected to the north and south of Eastland House.

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	Current Option	Option 1A	Option 1B	Option 2A	Option 2B	Option 2C
		the current option.		the current option.		<p>The higher vertical alignment would reduce the size of the cutting (not as much as with Options 2A and 2B), reducing the agricultural and forestry land-take as well as and the area required to mitigate windthrow.</p> <p>Access and severance issues are unchanged from the current option.</p>
Geology	No discernable differences between options					
Water Environment	<p>Culverting and realignment of Kingcausie Burn would result in disturbance along the watercourse and riparian corridor. This would have a particularly significant impact on the morphology of the lower section of the watercourse. Length of culvert likely to affect water quality due to lack of light.</p> <p>Sediment release into Crynoch Burn is likely to be accelerated due to the requirement for the installation of a culvert.</p>	<p>The provision of bridge as part of Option 1A or 1B at this location is preferred to the installation of a culvert.</p> <p>The short realignment is not anticipated to have a significant adverse impact, as the section that would be lost is currently exhibiting evidence of instability (bed and bank erosion). Mitigation to limit sediment release as a result of the realignment would be required.</p> <p>Potential for erosion is increased slightly due to the lack of vegetation that would be able to establish under the bridge, however, impacts anticipated to be slight.</p>		<p>The provision of bridge at this location is preferred to the installation of a culvert.</p> <p>The burn would maintain its existing course, which would be an improvement on the current option and preferable to Options 1A and 1B.</p>		<p>Culverting and realignment of Kingcausie Burn would result in disturbance along the watercourse and riparian corridor.</p> <p>Although the burn would maintain its existing course, the extensive vertical realignment required to enable the watercourse to pass underneath the proposed road would not present an improvement on the current option.</p>
Ecology	<p>Loss of, and disturbance to, riparian and woodland habitat would occur as a result of culvert installation and realignment of the burn.</p>	<p>Additional land-take would be required. Increased loss of riparian and woodland habitat.</p> <p>Closer proximity of scheme to Kingcausie</p>	<p>Additional land-take would be required. Increased loss of riparian and woodland habitat.</p> <p>Closer proximity of scheme to Kingcausie</p>	<p>Reduces impacts on riparian and woodland habitat. Avoids realignment of burn.</p> <p>Disturbance to woodland and burn would be high,</p>	<p>Avoids riparian and woodland habitat.</p> <p>Two bat roosts would require exclusion and replacement.</p> <p>Less disturbance to</p>	<p>Adverse impacts to aquatic and riparian habitat would occur as a result of the realignment and installation of the culvert.</p>

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	Current Option	Option 1A	Option 1B	Option 2A	Option 2B	Option 2C
	Loss of riparian habitat and woodland would result in commuting route severance, i.e. bats, otters, red squirrel and badger.	<p>Burn.</p> <p>Adverse impacts on aquatic and riparian habitat would occur as a result of the realignment.</p> <p>Loss of riparian habitat and woodland would result in commuting route severance, i.e. bats, otters, red squirrel and badger.</p>	<p>Burn, although less than Option 1A.</p> <p>Disturbance to woodland and burn would be high, but anticipated to be less severe than Option 1A.</p> <p>Adverse impacts to aquatic and riparian habitat would occur as a result of the realignment.</p> <p>Loss of riparian habitat and woodland would result in commuting route severance, i.e. bats, otters, red squirrel and badger.</p>	<p>but anticipated to be less severe than current option.</p> <p>Two bat roosts would require exclusion and replacement.</p> <p>Loss of riparian habitat and woodland would result in commuting route severance, i.e. bats, otters, red squirrel and badger.</p>	<p>Kingcausie Wood and Kingcausie Burn than current option.</p> <p>Avoids realignment of burn.</p> <p>Loss of riparian habitat and woodland would result in commuting route severance, i.e. bats, otters, red squirrel and badger.</p>	<p>Increased risk of potential indirect impacts downstream on Crynoch Burn. Construction and realignment works would occur closer to Crynoch Burn.</p> <p>Two bat roosts would require exclusion and replacement.</p> <p>Loss of riparian habitat and woodland would result in commuting route severance, i.e. bats, otters, red squirrel and badger.</p>
Landscape and Visual	<p>Significant adverse landscape and visual impacts. In particular, the deep cutting through woodland at Cleanhill would be visually intrusive. Areas cleared due to wind-throw risk would create a bigger scar visible from across the Dee valley.</p> <p>Loss of mature woodland and severance of the designed landscape of Kincausie House would both have adverse impacts.</p> <p>Adverse visual impacts would occur at a number of buildings in Kingcausie Estate including Kingcausie House and Eastland House.</p>	<p>Minor reduction in cutting depth would slightly improve fit of road into landscape.</p> <p>Significant increase in embankment to the north of the cutting would result in greater loss of woodland, poorer landform fit and increases in landscape and visual impact.</p>	<p>Adverse impacts would occur as result of increase in embankments to the north of the cutting. This would result in greater loss of woodland, poorer landform fit and increases in landscape and visual impact.</p> <p>Overall, impacts anticipated to be slightly less than Option 1A.</p>	<p>Significant benefit would be gained from reduced cutting depth, realignment further west and reduction in associated woodland loss.</p> <p>Significant increase in landscape and visual impacts from embankment and loss of Eastland grounds and associated buildings.</p> <p>The elevated stretch of road may become more visible from the north and west. Higher elevation and increased loss of woodland north of Kingcausie House.</p>	<p>Marginally better than Option 2A due to slight reduction in embankment, however, impacts essentially similar.</p>	<p>Significant landscape and visual benefit would be gained from reduction in cutting depth, realignment further west and reduction in associated woodland loss.</p> <p>Reduced woodland loss due to realignment north of Eastland House.</p> <p>Severe visual/ landscape setting impacts on Eastland and landscape impacts on grounds and associated buildings (similar to current option).</p>

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	Current Option	Option 1A	Option 1B	Option 2A	Option 2B	Option 2C
Cultural Heritage	Moderate significance of impact on setting of Eastland House.	No significant impact anticipated.	No significant impact anticipated.	<p>Eastland House and Cottage – direct impact due to change of alignment to the west. The use of a retaining wall or steepened embankment would avoid the demolition of Eastland House. However, this would result in the road being extremely close to the building such that it may become uninhabitable and lead to its eventual destruction. Therefore, the impact has been assessed as Substantial.</p> <p>Kingcausie House Designed Landscape – impact would be reduced, would change from direct to indirect due to change of alignment to the west.</p> <p>No significant impact on cultural heritage anticipated for Kingcausie Building, Kingcausie Structure, Kingcausie Shed and Kingcausie House Designed Landscape.</p> <p>Historic Scotland considers that substantial impact on Eastland House is not balanced by the slight improvement in impact in relation to the Kingcausie House Designed Landscape.</p>	<p>Eastland Cottage – direct impact due to change of alignment to the west and demolition of property.</p> <p>Kingcausie House Designed Landscape – impact would be reduced, would change from direct to indirect due to change of alignment to the west.</p> <p>No significant impact on cultural heritage anticipated for Kingcausie Building, Structure, Shed and Designed Landscape.</p> <p>Historic Scotland considers that substantial impact on Eastland House is not balanced by the slight improvement in impact in relation to the Kingcausie House Designed Landscape.</p>	
Pedestrians, Cyclists, Equestrians and Community Effects	No impact on access anticipated.	No impact on access anticipated.		No impact on access anticipated.	No impact on access anticipated.	