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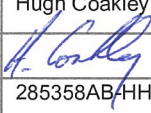


Whitehill & Bordon Relief Road

Options Review Report (Volume 1)

17/02/2014

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LIST OF ABBREVIATIONS

ARCADY	Assessment of Roundabout Capacity and Delay
CCTV	Closed Circuit Television
DfT	United Kingdom Department for Transport
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EHDC	East Hampshire District Council
HAUC	Highways Authorities and Utilities Committee
HCA	Homes and Communities Agency
HCC	Hampshire County Council
LIDAR	Light Detection and Ranging (Surveying Technique)
LINSIG	Traffic Signal Modelling Software
MfS	Manual for Streets
MfS HCC	Manual for Streets (companion version by Hampshire County Council)
MOD	Ministry of Defence
PICADY	Priority Intersection Capacity and Delay
SANG	Suitable Alternative Natural Green Space
SATURN	Simulation and Assignment of Traffic to Urban Road Networks
SINC	Sites of Importance for Nature Conservation
SSD	Stopping Sight Distance
TAL	Traffic Advisory Leaflet
TSRGD	Traffic Signs Regulations and General Directions 2002
WSP-PB	WSP - Parsons Brinckerhoff Consultancy Partnership

1 Introduction

- 1.1.1 WSP - PB were commissioned by Hampshire County Council (HCC) in July 2013 to undertake a review of the route options which had been initially considered by HCC for a proposed relief road to serve the regeneration of the existing towns of Whitehill & Bordon. HCC's options and recommendations were provided in the decision paper '*Whitehill & Bordon Inner Relief Road*' (reference 4636) submitted to the HCC Executive Member for Environment and Transport on 22/1/2013 with Option 2 recommended as the preferred route.
- 1.1.2 The Whitehill & Bordon development regeneration is to be built mainly on land currently owned by the Ministry of Defence. This land, which is planned to be decommissioned in late 2015, will be provided with a new road infrastructure to serve the Masterplan development and joined into the existing road network.
- 1.1.3 The options for the proposed relief road considered are shown in Figure A.
- 1.1.4 The purpose of the relief road has been defined by HCC in the decision paper '*Whitehill & Bordon Inner Relief Road*' as follows:
- **Relieve Congestion on the A325** -The A325 currently carries heavy traffic flows, causing local issues within the town (congestion, severance, driver delay and frustration, pollution) and creates a barrier to strategic travel, with the A325 being seen as a constraint to local movement and growth. The Relief Road would address this issue within the town, providing a free-flow alternative to the existing A325, removing non-local traffic from the core of the town.
 - **Enable the new town centre** -The delivery of the Relief Road would reduce significantly the levels of traffic on the existing A325 which would help deliver the conditions necessary to provide a successful town centre for Whitehill & Bordon.
 - **Provide access to the development** -The Relief Road would deliver critical road based access to the new development areas (4,000 dwellings, 122,000sqm commercial space and 30,000sqm retail).
 - **Reduce severance** - Due to the heavy flow and dominance of traffic on the A325, there is an issue with community severance. The Relief Road would reduce traffic on the A325, providing conditions to encourage a permeable town that links the new development, the town centre and the existing town areas
- 1.1.5 The options can be classed into two groups – an 'outer' relief road which would run around the western edge of the development area (Options 1 and 2) and an 'inner' relief road which would run through the development area (Options 3, 4 and 5). Routes through Viking Park (Options 3A and 3B) are variants on the 'inner' group but are considered separately in this report.
- 1.1.6 In order to effectively assess the options, this report considers Options 2 and 4 in more detail as these options are considered to be a typical representation of the 'outer' and 'inner relief' road schemes respectively. Options 2 and 4 are shown schematically in Figures B and C.
- 1.1.7 All options share the same southern route at the southern end to approximately 800m north of the junction with the A325 (with the exception of Viking Park) and for the 600m length to the junction with the A325 to the north of Station Road at the north end. Whilst these lengths of road are common to all options, their treatment is different due to their context with the proposed development, the speed limit (either 30 mph or 40 mph) and the engineering and environmental constraints.

1.1.8 This report reviews and compares the options against a multi-criteria assessment framework to assess each option in terms of the scheme objectives and outcomes. The review covers the areas required under WebTAG guidance with the exception of the economic assessment which has been done as a direct comparison of capital costs for the options. The criteria assessed and compared are as follows:

1.1.9 **Engineering**

- Technical compliance with the Department for Transport (DfT) Design Manual for Roads and Bridges (DMRB) including an assessment of junction capacity and options
- Traffic capacity and operational impacts
- Drainage
- Impact on Statutory Undertakers equipment
- Construction issues
- Safety

1.1.10 **Environmental**

- Air Quality
- Cultural Heritage
- Landscape
- Nature Conservation
- Geology and Soils
- Noise and Vibration
- Pedestrians and Cyclists
- Effect on Vehicular Travellers
- Road Drainage and the Water Environment

1.1.11 **Cost**

The report compares the estimated capital costs to deliver each option.

1.1.12 **Deliverability**

The report identifies issues that may impact on the ability to deliver the scheme including:

- Funding
- Land Ownership
- Retained and interim uses of existing infrastructure / buildings

1.1.13 **Character of the road**

The report reviews the context of the road within the development area and with regards to wider policy.

1.1.14 The report assesses each of the relief road options against the objectives stated in section 1.1.4 using a Red Amber Green (RAG) approach. The colour scoring has been defined as follows for assessment in this report:

- Green indicates that the scheme objectives are met,
- Amber indicates that the scheme objectives can be met although not in as satisfactory a manner as a green score,
- Red indicates that the scheme objections are not met.

- 1.1.15 The individual assessments are not weighted but are summarised in Section 8 to clearly explain the reasons for the option to be recommended as the preferred route to be taken forward.

1.2 Whitehill & Bordon Masterplan

- 1.2.1 The need for the relief road has been set out in the Whitehill & Bordon Eco-town Masterplan (revised in May 2012) and the Transport Assessment Report.
- 1.2.2 The Masterplan outlines development intended to be delivered which will comprise of up to 4,000 new dwellings, community facilities, 122,000sqm commercial space and 30,000sqm retail space to create the new town centre. The combined effect of this development will deliver 5,500 jobs. It is envisaged that the development will be brought forward between 2015 and 2035.
- 1.2.3 Work undertaken as part of the Transport Assessment has concluded that without the relief road there would be significant congestion on the A325 corridor and as such, without the relief road, the Masterplan with its associated benefits cannot be realised.

2 Scheme Options

2.1 Routes Descriptions – General

- 2.1.1 There are 7 route options for a relief road to serve Whitehill & Bordon which are considered in this report.
- 2.1.2 Options 1 to 5 have a section of common alignment at the south end from the Whitehill Crossroads junction with the A325 at Liphook Road for approximately 800m. Options 3A and 3B through Viking Park do not share this alignment and are described separately. All options have the same alignment for 600m at the north end to the new junction with the A325 north of Station Road. The seven route options diverge onto different paths between these sections. All distances given in the descriptions below are approximate.
- 2.1.3 The seven route options are shown in Figure A 'Route Options Considered'. Options 2 and 4 are shown in more detail in schematic form in Figures B and C.
- 2.1.4 Options 1 to 5 lie within land owned by the MOD. For options 3A and 3B the initial road alignment with the A325 is in 3rd party ownership (see Figure D Land Ownership). The Louisburg Barracks has recently been sold by the MOD to the HCA (not shown in Figure D) for the purposes of redeveloping this area.

2.2 Route Descriptions

Common Alignments

- 2.2.1 Options 1 to 5 share a common alignment from the southern junction with the A325 and Liphook Road as shown in Figure A between the points marked as 'A'. All options (with the exception of Options 3A and 3B) run through the cutting of the former Longmoor Military Railway (now abandoned) for a distance of 500m, where there is existing residential development on both sides with Morse Close and Sutton Field to the east and Champney Close to the west. In order to have an at-grade junction within the existing A325 at Petersfield Road / Liphook Road a significant depth of the cutting will have to be infilled to raise levels from the old track-bed levels (which formally routed under the road).
- 2.2.2 The proposed junction development at the A325 / Liphook Road junction is partially within the South Downs National Park area. Whilst it is recognised that there is a presumption against development within the national park, the options for alternative junction locations are limited. Joining the A325 further north away from the national park is considered within the document but generally discounted due to the difficulties of obtaining the land in the short term as it is in third party ownership. The South Downs National Park has been consulted on the location and layout of the junction and it is recognised that careful design will be required to ensure that the impact of the road on the sensitive habitat is minimised.
- 2.2.3 At the northern end of the relief road all options share a common alignment between the points marked as 'B' in Figure A. The alignment runs through the Louisburg Barracks in a north easterly direction for 420m before turning northwards then curving for 580m to align with the existing A325, Farnham Road. The Relief Road will be tied into the existing A325 to the north with a new junction to connect the existing A325 to the south.
- 2.2.4 At the southern end, a 3m wide combined pedestrian/cycle path will run alongside the west side only of the carriageway as far as a proposed signalised crossing where the path will run into the SANG and continue northwards. Pedestrian routes through

existing development will continue to provide access from the relief road to the town centre for all options. The carriageway will be 7.3m wide with a 2m wide verge on both sides.

- 2.2.5 At the northern end, a 2m wide verge and 3m wide combined pedestrian/cycle path will run alongside both sides of the carriageway with the exception of the east side north of the junction with the existing A325. The provision of pedestrian and cycle paths through Louisburg Barracks is currently subject to review by the HCA.

2.3 Option 1

- 2.3.1 Option 1 is 4025m in overall length from the junction with the A325 at Whitehill to the junction with the A325 north of Bordon and will have a carriageway width of 7.3m. The speed limit will be 40mph with the exception of the section through the railway cutting to the south and through the Louisburg development where a 30mph limit is being considered. From the northern extent of the common alignment marked 'A', it will run for 2000m mostly on embankment. Future development will be to the east of the road and the current Hogmoor Inclosure MOD Training Ground on the west. The Masterplan intends that the Hogmoor Inclosure is redeveloped as a SANG. From this point the road will then run for 750m on embankment, curving to the east and then north east and skirting the south west boundary of the existing officer's mess and running past the existing Waste Recycling Centre and Electricity Sub Station before meeting the start of the common alignment at Point B.
- 2.3.2 Option 1 is considered to be an 'outer' relief road (i.e. it does not predominantly run through proposed Masterplan development) .
- 2.3.3 There are no major structures required for the road with the exception of a bridge or culvert crossing for the Oxney Moss watercourse and an overland flow culvert approximately 1400m from the junction with the A325.
- 2.3.4 Signalised junctions or roundabouts are provided with the A325 at both ends of the Relief Road and with new developments. Pedestrian crossings are provided at each junction and at locations to join into the 'Green Loop' walking / cycling infrastructure at two further locations (see the schematic for Option 2 as typical for this option).
- 2.3.5 A 2m minimum wide verge will run along both sides of the carriageway. A 3m wide combined footway / cycleway will also run alongside both sides of the carriageway with the exception of i) the west side in the vicinity of the SANG up to the Louisburg development area and, ii) through the Masterplan development area where pedestrian and cycle facilities will be provided within the development streets, ii) through Louisburg Barracks where a 2m wide footway will be provided on the north side instead of a 3m wide combined footway / cycleway.

2.4 Option 2

- 2.4.1 Option 2 is 3985 m in overall length and will have a carriageway width of 7.3m. The speed limit will be 40mph with the exception of the section through the railway cutting to the south and through the Louisburg development where a 30mph is being considered. From the northern extent of the common alignment marked 'A', it will run for 2000m mostly on embankment. Future development will be to the east of the road and on the current Hogmoor Inclosure MOD Training Ground to the west. The Masterplan intends that the Hogmoor Inclosure will be redeveloped as a SANG. The road will then run for 750m on embankment along the route of the abandoned railway line, then turn right to pass to the north of the existing officer's mess up to the start of the common alignment marked 'B'.
- 2.4.2 Option 2 is considered to be an 'outer' relief road (i.e. it does not predominantly run through proposed Masterplan development).

- 2.4.3 There are no major structures required for the road with the exception of a bridge or culvert crossing for the Oxney Moss watercourse and an overland flow culvert approximately 1400m from the junction with the A325.
- 2.4.4 Signalised junctions or roundabouts are provided with the A325 and for the new development. Pedestrian crossings are provided at each junction and at locations to join into the 'Green Loop' walking / cycling infrastructure at two further locations (see Figure B).
- 2.4.5 A 2m minimum wide verge will run alongside both sides of the carriageway. 3m wide combined footway / cycleway will run alongside both sides of the carriageway with the exception of i) the west side in the vicinity of the SANG up to the Louisburg development area and, ii) through the Masterplan development area where pedestrian and cycle facilities will be provided within the development streets, ii) through Louisburg Barracks where a 2m wide footway will be provided on the north side instead of a 3m wide combined footway / cycleway.

2.5 Option 3

- 2.5.1 Option 3 is 3,675m in overall length and will have a carriageway width of 7.3m. An alternative nominal 6m carriageway width is being considered within the development area. The speed limit will be 30mph. From Point A it will run on a more southerly route than Options 1 and 2 for 390m, mostly on embankment with open space on both sides. To the west will be the newly created SANG (currently Hogmoor Inclosure MOD Training Ground). The road will then run in a north westerly direction for 1,050m on embankment with the Masterplan development on both sides of the road before skirting the southern boundary of the site of the existing officers' mess with open space on both sides, for a distance of 325m. The road then runs in a north easterly direction for 400m to join the start of common alignment section B.
- 2.5.2 Option 3 is considered to be an 'inner' relief road option (i.e. it runs through the proposed development).
- 2.5.3 There are no major structures required for the road with the exception of a bridge or culvert crossing for the Oxney Moss watercourse to the north of the Masterplan development. The treatment of the Oxney Moss through the Masterplan development will be considered by the developer and would influence the final alignment of this option.
- 2.5.4 Junctions are provided with the A325 and with the new developments. They are signal controlled or roundabouts except in the Masterplan development area where priority crossroads are proposed. Pedestrian crossings are provided at each of the junctions to join into 'Green Loop' walking / cycling infrastructure.
- 2.5.5 Options considered through the development area are i) a 7.3m carriageway with a 2m minimum width verge and 5m wide shared surface service roads on both sides and, ii) a nominal 6m wide carriageway and a 3m wide combined footway / cycleway on both sides. The carriageway width will vary to accommodate right turns at the junctions which will widen the road from 6m to 9.25m and from 7.3m to 10.55m. In some cases, where the junctions are closely spaced the widened widths will be continuous. Exceptions to the footway / cycleway provision are of i) the west side in the vicinity of the SANG up to the Louisburg development where the paths will be located within the SANG and ii) through the Masterplan development area where paths will be provided within the development street network, ii) through Louisburg Barracks where a 2m wide footway will be provided on the north side instead of a 3m wide combined footway / cycleway.

2.6 Option 3A - Viking Park

- 2.6.1 Option 3A provides a new junction with the A325 some 35m north of the existing A325/New Road junction. The option is 3265m in length and will have a carriageway width of 7.3m. The speed limit will be 30mph. From the new junction at the south end, the road alignment curves through the privately owned Viking Park and along a short length of existing industrial estate road in a north-west/south east direction for 125m. It also runs close to established businesses at the Woolmer Trading Estate which is an EDHC asset. Option 3A is coincident with Option 3 in the northern end of the industrial estate.
- 2.6.2 Cross section provision for Option 3A will be as for Option 3.

2.7 Option 3B - Viking Park

- 2.7.1 Option 3B was put forward by the Whitehill & Bordon Eco-town Delivery Board for consideration post completion of the initial feasibility work in January 2012. Option 3B provides a new junction with the A325 Petersfield Road near the site of the existing A325/ Woodlark Public House junction. This option is 3180m in length and will have a carriageway width of 7.3m. The speed limit will be 30mph. From the new junction to the south, the road alignment runs straight in a north-westerly direction for 235m through proposed industrial development and then joins and runs along the same alignment as Option 3A for the next 450m.
- 2.7.2 Cross section provision for Option 3B will be as for Option 3.

2.8 Option 4

- 2.8.1 Option 4 is 3,750m in overall length and will have a carriageway width of 7.3m. An alternative nominal 6m carriageway width is being considered within the development area. The speed limit will be 30mph. For the first 450m from the end of the common alignment marked 'A', it will follow the same route as Option 2 but then run for 1250m mainly in a slight cutting with proposed Masterplan development on both sides of the road up to a proposed junction with B3002 Budds Lane/Station Road /Oakhanger Road, sited just to the south of the existing officers' mess. The road then follows the alignment for Option 3 for 600m up to the common alignment marked 'B'.
- 2.8.2 Option 4 is considered to be an 'inner' relief road option and has been looked at in more detail as the typical 'inner' relief road option.
- 2.8.3 There are no major structures required for the road with the exception of a bridge or culvert crossing for the Oxney Moss watercourse. The treatment of the Oxney Moss through the Masterplan development will be considered by the landowners and would influence the final alignment of this option.
- 2.8.4 Junctions are provided with the A325 and for the new developments. They are signal controlled or roundabouts except through the Masterplan development area where priority crossroads are proposed. Pedestrian crossings are provided at each of the junctions and to join into the 'Green Loop' walking / cycling infrastructure.
- 2.8.5 Cross section provision for Option 4 will be as for Option 3.

2.9 Option 5

- 2.9.1 Option 5 is 3,700m in length and will have a carriageway width 7.3m. An alternative nominal 6m carriageway width is being considered within the development area. The speed limit will be 30mph. The option follows the eastern boundary of the MOD Technical Training Area (TTA). For the first 450m from the end of the common

alignment marked 'A', it will follow the same route as Options 1 to 4. It then runs to the north of Option 3 for 350m before crossing and running to the south of Option 3 with proposed Masterplan development sited on both sides of the road, for a distance of 810m up to a proposed junction with Budds Lane, some 110m to the south east of the existing Budds Lane /Station Road junction. The road then curves to the north east for a length of 610m to join the point marked 'B' by Louisburg Barracks.

- 2.9.2 Option 5 is considered to be an 'inner' relief road option as it runs through the proposed development area.
- 2.9.3 There are no major structures required for the road with the exception of a culvert required to cross the Oxney Moss watercourse. The treatment of the Oxney Moss through the Masterplan development will be considered by the landowners .
- 2.9.4 Junctions are provided with the A325 and with the new developments. They are signal controlled or roundabouts except through the development area where priority crossroads are proposed. Pedestrian crossings are provided at each of the junctions to join into the 'Green Loop' walking / cycling infrastructure.
- 2.9.5 Cross section provision for Option 5 will be as for Option 3.

3 Engineering

3.1 Highways Standards

3.1.1 Preliminary design work has been undertaken on all the options. This section assesses the options against national DMRB standards. As previously noted, Options 2 and 4 are considered to respectively typify the 'outer' (i.e. Options 1 and 2) and the 'inner' (Options 3, 4 and 5) relief road options. These two options have been further developed for the purposes of this review.

3.2 Carriageway Provision and Design Speed

3.2.1 The proposed carriageway is a single 7.3m wide carriageway (except for a nominal 6m wide alternative carriageway through the development for Options 3, 3A, 3B, 4 and 5) with variable width verges on either side. This is in accordance with the DMRB standard TD27/05 'Cross Sections and Headroom'.

3.2.2 On the basis of the frequency of side roads, access to roadside development and pedestrian crossings, the options would be classed as Urban All Purpose (UAP) roads with Option 2 as a UAP2 road and Option 4 as an UAP3 road as defined in the DMRB standard TA 79/99. The road classification enables the traffic carrying capacity of the road to be estimated and compared against the forecasted flow. The table below shows that the proposed single 2 lane carriageway for all options has sufficient link capacity for the forecasted traffic flows.

Option	Road Type	Speed Limit	Traffic Capacity (one-way hourly flow)	Forecast traffic (one-way hourly flow) (2026???)
2	UAP2 7.3m wide carriageway with 2 lanes	40mph	1470	Average AM peak: 712 Average PM peak: 539
4	UAP3 7.3m wide carriageway with 2 lanes	30mph	1300	Average AM peak: 546 Average PM peak: 424
4	UAP3 6.1m wide carriageway with 2 lanes	30mph	900	

3.3 Highway alignment

- 3.3.1 All options generally comply with the DMRB standard TD 9/93 'Highway Link Design' for horizontal and vertical alignment with the exception of Option 1.
- 3.3.2 Option 1 has two bends where it passes south of the former Officer's Mess which are tighter than the desirable minimum recommend for the design speed. This is combined with a change in ground level in the area which restricts visibility of the road ahead so that it does not meet the requirement of the DMRB standards. These aspects would require a relaxation or Departure from Standard to be approved by the local highway authority.

3.4 Junctions

- 3.4.1 The capacities of the junctions proposed for the Option 2 ('outer' relief road) and Option 4 ('inner' relief road) have been assessed using PICADY, ARCADY and LinSig software.
- 3.4.2 AM and PM peak flow scenarios for the 2026 and 2036 forecast years were modelled in the assessment.
- 3.4.3 The assessments have demonstrated that the junctions along both Option 2 and Option 4 can be designed to work with sufficient capacity as predicted for 2026 and 2036 forecasts with either traffic signals or as priority roundabouts.

3.5 Highways Standards Summary

- 3.5.1 In summary, all of the options are feasible in terms of highway design. Options 2, 3, 3A, 3B, a and 5 are generally technically compliant with national design standards for roads. Option 1 has a combination of tight bends and gradient that would require a relaxation or Departure from Standard. On this basis, Option 1 is less desirable in terms of highway design.
- 3.5.2 All of the options can be designed to have junctions (either signalised or roundabouts) with sufficient capacity for 2026 and 2036 traffic flows.

3.6 Traffic Assessment

- 3.6.1 Traffic modelling has been carried out to assess the impact of an outer relief road (Options 1 and 2) and an inner relief road (Options 3, 3A, 3B, 4 and 5). Traffic flows on the relief road and the local highway network of Whitehill & Bordon have been forecast for 2026 using the SATURN analysis software. A full description the traffic modelling and results is contained in Appendix 1.
- 3.6.2 Both of the relief road options modelled decrease traffic flow on the A325 through Whitehill and Bordon by between approximately 1,400 TO 13,000 vehicles per day compared with the do minimum scenario. The outer relief road provides a greater reduction of traffic on the majority of the existing A325 through Whitehill and Bordon with flows between 1.9% and 11.7% lower than with the inner route.
- 3.6.3 Both options are also significant attractors of strategic traffic leading to an increase in flow on the A325 both to the north and south of Whitehill and Bordon demonstrating that the relief road would provide an efficient route for through traffic.
- 3.6.4 All options provide access for traffic to the development and thus perform this aspect of the objectives.

3.7 Traffic Assessment Summary

- 3.7.1 Options 1 and 2 are favoured in traffic terms as they perform significantly better than the Options 3, 3A, 3B, 4 and 5 in attracting traffic away from the existing A325 through Whitehill and Bordon and are thus more successful in relieving congestion on the A325. The higher reduction of traffic flow through the town will better assist meeting the objectives of enabling the town centre and reducing severance.

3.8 Drainage

- 3.8.1 The proposed options for the proposed Whitehill & Bordon Relief Road will require drainage infrastructure to convey rain falling upon the highway away to a discharge location ensuring that the risk of flooding is reduced and increasing the safety of all users of the route.
- 3.8.2 Best practice requires the discharge of surface water from a new highway or development via the following hierarchy:
- To ground via infiltration
 - To a nearby watercourse
 - To a public sewer (least favoured option)
- 3.8.3 Stakeholder consultation has agreed to the above hierarchy and in particular Hampshire County Council and East Hampshire District Council have promoted the use of infiltration wherever possible.
- 3.8.4 It is anticipated, however, that due to geological conditions and constraints identified by the Environmental Impact Assessment (EIA) Options Appraisal within the area of the proposed relief road alignment options, it may not be possible to utilise infiltration to discharge surface water and to reduce the impact of flood risk on receiving watercourses.
- 3.8.5 Initial evidence suggests that the water table beneath the proposed road is shallow (Whitehill & Bordon Eco-town Detailed Water Cycle Study) and the Environment Agency has designated the vicinity as a "Major Aquifer, High" in terms of groundwater vulnerability zone and has expressed concern over the migration of contamination.
- 3.8.6 At the time of writing, however, infiltration testing as part of a larger ground investigation along the proposed highway alignment is being investigated. The results of the tests will inform whether infiltration as a means to discharge surface water runoff is feasible and practical and associated groundwater monitoring will establish the level of the water table.
- 3.8.7 Therefore, while the preferred option is to discharge surface water by infiltration, this strategy assumes as a worst case scenario that infiltration is not possible and therefore proposes to discharge runoff to nearby watercourses and, if this cannot be achieved, to public sewers .
- 3.8.8 Drainage from the proposed relief road will therefore be routed towards the catchment of Oxney Moss (including the Oxney Drain) for north and central sections where the vertical alignment permits, and towards a tributary of the Dead Water for the southern sections of highway.
- 3.8.9 Each of the proposed highway alignment route options represents an increase in impermeable area which will create greater amounts of surface water runoff than the current existing situation. In addition, the majority of the route for each alignment option is through vegetated areas which see low levels of traffic and have low pollution risk to the nearby watercourses.
- 3.8.10 Two fundamental elements of the proposed drainage system will therefore need to be considered; namely the reduction of flood risk to other areas as a result of additional

impermeable surfaces and the risk of migration of contaminants from trafficked areas to local hydrology. The proposed surface water drainage strategy for the highway alignments seeks to replicate the site's existing hydrology and comply with the principles of the Flood and Water Management Act (2010). Changes in the volume and rate of surface water runoff from the relief road could increase the risk of flooding downstream unless sufficient measures are taken within the proposed highway boundary to prevent this from occurring.

- 3.8.11 It is best practice that the surface water drainage arrangement for any development site and associated highways will be such that the volumes and peak flow rates of surface water leaving a new impermeable area is no greater than the rates prior to the proposed development, or at the lowest practicable discharge limit of 5 l/s. Any increase in runoff above the discharge limit will be stored or attenuated on site.
- 3.8.12 The proposed highway will also be drained in accordance with the philosophy of sustainable drainage systems (SuDS) and the management train described by CIRIA document C697 "The SuDS Manual".

3.9 Drainage Strategy

- 3.9.1 The EIA Options Appraisal has identified the condition of watercourses downstream of the proposed discharge into the Oxney Drain, Oxney Moss and tributary of the Dead Water. The Options Appraisal notes that while the Oxney Moss and Dead Water are not Water Framework Directive classified watercourses, the downstream Rivers Slea and Wey are have a chemical quality classification of "Good". In addition, waters entering the tributary of the Dead Water will pass through the designated Deadwater Valley Nature Reserve. Other sensitive areas include local non-statutory ecological sites and the aforementioned groundwater conditions (refer to Appendix 4).
- 3.9.2 In consultation with the EA (refer to correspondence in Appendix 2) and guidance in CIRIA document C697, it is proposed that a minimum of two stages of treatment are adopted as part of this strategy, with three provided wherever possible.
- 3.9.3 This strategy proposes that the drainage of the proposed road alignments adopts the management train as shown in the table below.

SuDS Options

1 st Stage of Treatment	2 nd Stage of Treatment	3 rd Stage of Treatment
Trapped Gullies	Swales	Pond
Filter Strips / Filter Trenches where kerbs are not present	Filter Trenches and Carrier Drain	Detention Basin

- 3.9.4 The proposed SuDs options for each alignment option are shown on drawing numbers 0132-P-500-01 to -05 in Appendix 2.
- 3.9.5 Gullies will collect surface water from the proposed carriageways and associated footways and will route surface water towards swales adjacent to the highway or to filter trenches laid with perforated carrier pipes. It is intended that the gullies will be trapped, therefore providing the first line of defence against pollution.
- 3.9.6 Where kerbs and gullies are not present, surface water will be allowed to flow over grassed filter strips and into the swales or filter trenches. The swales and filter trenches will both provide attenuation volume, slow the rate of discharge of surface water and will provide additional protection against the migration of pollutants suspended in the runoff. If additional storage is required, check dams will be

considered to further reduce the rate of discharge towards the proposed final stage of treatment, the detention basins.

- 3.9.7 Ponds (retention basins) and detention basins will be located either immediately upstream of where the proposed alignments cross an existing watercourse, but outside the flood plain, to allow for discharge from the highway drainage system or at the low points of the proposed vertical alignment of the relief road with connections to the nearest watercourse. The selection of ponds, with a permanent body of water, or detention basins, which contain water only in times of rainfall, will depend on data identifying the depth of groundwater, the height of the proposed vertical alignment above existing ground and whether infiltration is possible.
- 3.9.8 A control device will limit the flow of surface water from these structures to the receiving watercourses at the existing (pre-highway) runoff rates (or the lowest practicable discharge rate of 5 l/s, whichever is higher) and it is intended that released water will have passed through sufficient stages of treatment to provide adequate, low maintenance and sustainable pollution control.
- 3.9.9 To ensure that contaminants cannot migrate to the ground, it is proposed that all SuDS features draining the relief road will be constructed with an impermeable liner. Should infiltration be possible, then it is proposed that the detention basins are unlined to allow for soakage. All SuDS features upstream of these features will still require lining to provide the necessary protection to groundwater.
- 3.9.10 As a further measure of protection against the risk of fuel spills or fire water entering local watercourses, or the ground in case of infiltration, penstocks or other control valves will be installed as appropriate at the outfall of lined sections of the SuDS.
- 3.9.11 Where routes pass close to existing watercourses and water bodies, protection measures will be included within the drainage design to ensure that un-treated, potentially contaminated water does not migrate from the highway to these receptors.
- 3.9.12 It is noted that all options (except Options 3A and 3B) pass through similar topography, geological and ecological conditions and catchment areas. The local constraints have been carefully considered in the preliminary drainage design but drainage issues only form part of the choice of option alignment.

3.10 Drainage Option Assessment

- 3.10.1 All proposed route options would be drained to comply with the strategy outlined above and all alignments, with the exception of Options 3A and 3B (via Viking Park), would drain to the catchments of the Oxney Moss and Dead Water. The main differential between the options will be the amount of impermeable area and thus the amount of runoff directed towards SuDS features upstream of the receiving watercourses (and sewer for Options 3A and 3B).
- 3.10.2 The table below summarises the anticipated storage volume requirements for each option based on a typical volume for 1 hectare of impermeable area in a 1 in 100 storm event (plus 30% for climate change) restricted to the pre-developed greenfield rate. Further detail of these calculations is included in Appendix 2.

Option Impacts

Option	Estimated Impermeable Area (ha)	Estimated 1 in 100 rainfall event discharge limit (l/s)	Estimated Attenuation Volume (m ³)
1	5.6	9.5	5,029
2	5.2	9.4	4,981
3	5.5	9.8	5,205
3A / 3B	5.0	8.9	4,730
4	5.5	9.9	5,253
5	5.5	9.8	5,193

- 3.10.3 While Options 1 and 2 are generally longer than Options 3 to 5, the table above demonstrates that the former routes require less attenuation than the latter due to the design requirement for service roads. Option 3 will require the largest amount of attenuation, with Options 3A and 3B the least. The differences are marginal.
- 3.10.4 A review of catchment areas from the *Flood Estimation Handbook* CD-ROM and the existing ground levels across the site indicates that there will also be differences in the way that surface water is directed to receiving watercourses. The table below outlines the estimated division of surface water to the receptors for each alignment option.

Discharge Receptors

Option	Estimated Discharge to Oxney Moss Catchment (% of Route)	Estimated Discharge to Dead Water Catchment (% of Route)	Estimated Discharge to Other Receptors (% of Route)
1	85-95%	5-15%	0%
2	85-95%	5-15%	0%
3	85-95%	5-15%	0%
3a	90-100%	0%	0-10%
4	85-95%	5-15%	0%
5	85-95%	5-15%	0%

- 3.10.5 The majority of all proposed alignment options are situated within the catchment of the Oxney Moss and, as such, the majority of the surface water from the relief road will be directed to that watercourse directly or via the Oxney Drain and Bordon Camp Stream. To the east of Louisburg Barracks, however, it is estimated that a small area of the proposed route options, where the proposed options tie-in with the existing road are within the direct catchment of the River Wey, of which the Oxney Moss is a tributary. It is proposed that these areas are also directed to the Oxney Moss due to constraints of access to the River Wey and the opportunity to improve water quality through the new SuDS features rather than connect to existing highway drains. Mitigation measures will be incorporated into the design to limit flood risk arising from this small increase in catchment to the Oxney Moss in accordance with the SuDS strategy.
- 3.10.6 All route options will affect the proposed Masterplan development and will require coordination of drainage design with the developer. The drainage design for the proposed relief road within Louisburg Barracks could be integrated with development SuDS systems but will need to reflect constraints on space and the flood risk to property.

- 3.10.7 Alignment Options 1 and 2 cross the Oxney Moss near Louisburg Barracks and Options 3, 3A, 3B, 4 and 5 require the proposed alignment to cross the Oxney Drain and Bordon Camp Stream upstream of their confluences with the Oxney Moss.
- 3.10.8 The proposed alignments of Options 1 and 2 do not pass close to the existing Oxney Drain and it will be necessary to construct either a ditch or below ground pipe to this watercourse to drain the proposed highway. This connection may be up to 100 m in length depending on the final route option, design of the vertical alignment and existing levels within the watercourse. In addition, the connection to the Oxney Drain will need to be coordinated with the design of drainage and flood risk management within the Masterplan development. Initial enquiries with the designers of the Masterplan development suggest that a 'green corridor' can be established to drain both the development and provide a connection to the highway drainage system.
- 3.10.9 All other routes are aligned much closer to the Oxney Drain which will allow for a more direct connection from the highway drainage system should this watercourse remain in its current position. Drainage design for Options 3, 4 and 5 will require an assessment of the effect on land take and means to discharge water within the constraints of the new development.
- 3.10.10 The most southerly section of all highway alignment route options, with the exception of Options 3A and 3B, cross the tributary of the Dead Water. Due to topography a discharge to this watercourse will be required but it will be possible to route surface water from the proposed SuDS management train into the tributary with a short connection of less than 20 m. Ground Levels may not permit a direct connection to discharge surface water from the southern section of Options 3A and 3B to the Oxney Moss or from the lower southern section to the Dead Water further south. A connection to existing highway surface water drains within the vicinity may therefore be the only means to collect surface water from the proposed road. At the time of writing, it is not known whether there is capacity within the local surface water sewer network to accommodate additional highway drainage. Such a connection would constitute the least preferred method of discharge in accordance with the aforementioned hierarchy and could increase flood risk to the below ground surface water drainage.

3.11 Drainage Summary

- 3.11.1 In summary, all of the options are generally capable of being mitigated in drainage terms to a standard which is acceptable to the Environment Agency. However, Options 3A and 3B may require up to 10% of the discharge from the road directly into the existing highway drainage on the A325. This is not the preferred method of discharging highways surface water run-off (which would normally adopt a SuDS approach). Additionally, this discharge may not be feasible due to the capacity of the existing drainage system on the A325.
- 3.11.2 In comparing the merits of the options in road drainage terms, Options 1 and 2 are preferable in that there are fewer constraints to the provision of a SuDS compliant system given their general location outside the Masterplan development. Options 3A and 3B are less favourable than the other options due to the potential requirement for use of existing highway drainage systems.

3.12 Statutory Undertakers' Services

- 3.12.1 This report has considered the impact of the road options on statutory undertakers (SU) plant in the area. Diversions to SU plant can significantly affect cost and programme and are therefore an important aspect to consider.
- 3.12.2 Enquiries (C2) were made to all known SUs to establish the extent and location of SU plant in accordance with HAUC procedures. Information was also sought from the

MOD (through their agents, Amec). The results of the enquiries are shown in Figures E1 to E7.

- 3.12.3 The information received does not indicate any services within the area of the MOD land within the Masterplan development area. This is unlikely to be the case as there are buildings and other infrastructure which will be serviced – as a minimum, with water supply, foul and surface water drainage and electricity. The information obtained is therefore not considered to be exhaustive as it is likely that there are other services in the area. In addition, some utility companies have yet to provide plans. These are generally telecommunications.

3.13 Impact of Statutory Undertakers' Services

- 3.13.1 Options 1 and 2 follow the established disused railway corridor which does not have any utilities, and the periphery of the existing MOD Technical Training Area (TTA). These alignments will have little impact on SU plant.
- 3.13.2 All options cross Budds Lane / Oakhanger Lane and impact equally on the services within that road corridor (telephone, cable, electricity and gas).
- 3.13.3 Options 3, 3A, 3B, 4 and 5 also follow the disused railway but then pass through the Masterplan development area over a length of about 1,300m and will affect existing services within the TTA and the provision of new services to serve the Masterplan development.
- 3.13.4 All options will equally impact on the services along the A325 where the relief road will connect into the A325.

3.14 Statutory Undertakers' Services Summary

- 3.14.1 All options cross and will have some impact on services. This may require diversions or protection measures for services which will affect the cost and will need to be taken into consideration for the programme of the road construction.
- 3.14.2 Options 3, 3A, 3B, 4 and 5 will affect existing SU plant in the TTA and the provision of new utilities to serve the Masterplan development. Options 1 and 2 are on the periphery of existing built estate so would have a lesser impact on the services in the area. On that basis, Options 1 and 2 are marginally more favourable in terms of engineering delivery.

3.15 Construction

3.15.1 The construction will broadly comprise the following:

- Junctions with the A325
- Junctions with the proposed development including the Louisburg Barracks
- Earthworks for the road
- New carriageway construction (excluding the development road network)
- New footpath construction
- Drainage and flood mitigation measures
- Traffic management to minimise disruption to traffic flows on the existing road network including the A325
- There are no major structures envisaged. There is one culvert or bridge required to cross the Oxney Moss watercourse, potentially a retaining wall at Oakhanger Lane and a culvert for overland flow.
- Landscape and environmental mitigation works
- Traffic signing, lighting and road 'white lining'

3.15.2 The construction period, depending on seasonal constraints, is expected to be 12 to 18 months in duration. Construction is likely to be in two phases; phase 1 will be to provide access to the Louisburg Barracks development and phase 2, the remainder of the road

3.15.3 In general, the impacts due to the construction of the road are common to all of the options. These impacts are temporary and confined to the construction period. The key impacts are as follows:

Traffic management

3.15.4 Traffic management will be required for all options at the junctions with the A325.

3.15.5 Options 1 – 5 inclusive (except Options 3A and 3B) will require careful control of the traffic at the junction with the A325 and Liphook Road / Firgrove Road. The work will require re-modelling of the junction to change the priority to the relief road away from the existing A325. Traffic management is likely to be required for 4 – 6 months

3.15.6 Options 3A and 3B will require a new junction with the A325 in the region of New Road and at the access road to the industrial estate (Viking Park) respectively. The new junction will be designed to be largely 'off-line' but will require 4 – months of traffic management

3.15.7 All options will require a junction with the A325 north of Louisburg Road. There is potential for the Louisburg Barracks to be developed ahead of the main development plan and this will require an interim junction with the A325 at the Louisburg Road junction. The new junction will be designed to be mainly 'off-line' but will require 4-6 months traffic management.

Retention of buildings within the MOD technical Training Area (TTA)

3.15.8 Vacant buildings may be used as industrial or business units in the short and medium term. Retained buildings could create a constraint for construction of the relief road by potentially reducing space in which to carry out construction activities and restricting temporary construction access routes. Construction could cause disruption to businesses using the retained buildings and access to them would have to be maintained throughout the relief road construction period.

3.15.9 For all route options access to all retained buildings within the TTA could continue to be via existing internal roads. However, all options result in the existing through route

from Budds Lane to Hogmore Lane being severed. All options would result in some loss of parking area (which may need to be relocated depending on demand) and areas of grass or hardstanding surrounding buildings adjacent to the relief road.

- 3.15.10 All significant buildings within the TTA could be retained for Options 1, 2 and 5 whereas Options 3, 3A, 3B and 4 require the demolition of one or more major buildings. The latter options would reduce the available letting space and therefore the amount of potential business activity that could be affected by construction.

Junctions with the proposed development

- 3.15.11 Options 1 and 2 skirt the majority of proposed new development and have fewer junctions within the Masterplan development area than the 'inner' options (Options 3, 3A, 3B, 4 and 5) which pass through the Masterplan development area. Therefore, there would be more interface between construction works for an 'inner' relief road and development if both are under construction at the same time. These interfaces will require careful management to avoid delays to the programme during construction.

Earthworks

- 3.15.12 Due to the high water table in the area, the road will tend to be on embankment throughout the full length of the road and for all options. This will require importation of fill material

Construction activities through the existing railway cutting

- 3.15.13 This will apply for all options except Options 3A and 3B and would be carried out adjacent to residential properties in Peel Close, Morse Close and Champney Close. The Contractor will need to closely liaise with the EHDC Environmental Health Officer to minimise disruption to the residents during construction. Where possible, environmental mitigation measures, including environmental barriers if required, should be in place as early as possible.

Site Compound

- 3.15.14 The Contractor will need to have a construction site office and storage yard for his equipment for the duration of the construction. This is common to all options. Depending on the timing of the road construction and the development works, the construction site would ideally be located within the area to be developed to minimise adverse environmental impacts.

Access to the site.

- 3.15.15 All options will require access to the site for importation of materials and equipment. Access to the site for construction traffic will be from the A325.

3.16 Construction Summary

- 3.16.1 In general, the impacts of constructing the road are common to all options. The added complication of constructing the road through the area which is being concurrently developed is a potential disadvantage. This consideration may change depending on the timing of the works and the procurement approach. In construction terms, Options 3, 3A, 3B, 4 and 5 are considered to be less favourable than Options 1 and 2.

3.17 Safety

- 3.17.1 A review of the safety aspects of the options has been undertaken. All options are designed to DMRB standards with the exception of Option 1 which has a section of sub-standard alignment. The following issues will be considered further in taking the preferred route forward to detailed design and construction:

- 3.17.2 Consideration needs to be given to speed enforcement on the 30mph Options 3, 4 and 5 particularly in the southern sections where the alignment is appropriate for a 40mph design speed.
- 3.17.3 At grade pedestrian crossings are proposed. This may be considered a risk to more vulnerable road users where speeds are relatively high due to long alignment straights. 'Friction features' to control speeds at these locations may be considered.
- 3.17.4 Inappropriate high speeds through traffic signals can occur where forward visibility to green signals is excessive. Linked signals will be considered where junctions are in close proximity (eg through the Louisburg development) and will provide a safety advantage.
- 3.17.5 The options considered are considered to be equally favourable in safety terms.

3.18 Engineering Summary

- 3.18.1 The table below summarises the assessment of the options in engineering terms. Whilst all options decrease traffic flow on the A325 through Whitehill and Bordon by between 1,400 and 13,000 vehicles per day, the 'outer' options (Options 1 and 2) perform significantly better in attracting traffic away from the existing A325 through Whitehill and Bordon than the 'inner' options (Options 3,3A, 3B, 4 and 5) so are thus more successful in relieving congestion on the A325. This is fundamental to the objective of the road. In addition, drainage, statutory undertaker impacts and construction impacts favour the 'outer' relief road options.
- 3.18.2 Option 2 is preferred over Option 1 as the alignment of Option 1 does not meet the requirements of nation highway design standards.

Criteria	RAG Scores							Assessment
	Options							
	1	2	3	3A	3B	4	5	
Highways Standards – Technical Compliance with Standards	Yellow	Green	Green	Yellow	Yellow	Green	Green	Section of Option 1 is not DMRB compliant.
Traffic Assessment	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Options 1 and 2 provide most effective relief to the existing A325
Drainage	Green	Green	Green	Yellow	Yellow	Green	Green	Options 3A and 3B not SuDS compliant
Statutory Undertaker Impacts	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Options 3, 3A, 3B, 4 and 5 have greater SU impact
Construction Impacts	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Options 3, 3A, 3B, 4 and 5 have greater construction impact
Safety	Green	Green	Green	Green	Green	Green	Green	Marginal difference between options
Engineering assessment	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Options 1 and 2 provide most effective relief to existing A325 and have less impact on the development

4 Environment

4.1 Route Options Appraisal

Introduction

- 4.1.1 WSP-PB has undertaken a route options appraisal of the seven options for the Whitehill & Bordon Relief Road. Given the close proximity of all the route options this appraisal has followed the broad principles of the DMRB and addressed the key subject areas. It was not considered necessary to strictly follow WebTag in this instance as it was considered that a broader approach that addresses the key issues and can feed directly into the Environmental Impact Assessment would be appropriate. However the main elements and principles of WebTag have been taken into consideration.
- 4.1.2 The Environmental Route Options Appraisal report has been included in Appendix 4 of this document and looks to establish which of the options best achieve scheme objectives in environmental terms. This section provides a summary of that report.

Air Quality

- 4.1.3 The potential impact of the different route options in relation to air quality have been considered as part of the route options appraisal and the potential impact of the route options upon sensitive receptors have been considered. The assessment has looked at the 'outer' Option 2 and the 'inner' Option 4 only. Option 4 would be the preferred route in terms of air quality impact if the proposed road is considered in isolation. However, when the future residents of the development are taken into consideration, Option 4 will have a greater potential impact as the route will have development on either side of the road. The impact during the construction phase is only temporary but the operation phase would have a permanent impact primarily from increased vehicle movements in areas where there are currently few vehicles. Therefore, in terms of change to the existing environmental baseline, taking into consideration both the proposed road and the development, Option 2 is preferred as there are fewer residential properties close to the route.

Cultural Heritage

- 4.1.4 The route options have been appraised with regard to the cultural heritage baseline within the study area as shown on Figure 2 of the Environment Options Appraisal (Appendix 4). Overall, there are not considered to be significant differences between the route options in terms of impact upon cultural heritage assets. However, based on the available data for the historic environment, the preferred route would be the most eastern, (Option 5). This option is the furthest from the barrow cemetery and the route which runs through the most built up area, reducing the potential effects on the setting of the listed building within the study area.

Landscape

- 4.1.5 All seven route options have a similar potential effect on local landscape and visual receptors, given their relative proximity and similarity of route alignment. Although all the options are likely to cause adverse landscape and visual effects, it is anticipated that Options 3A and 3B may have slightly fewer adverse effects than the other options, due to its slightly shorter length and use of grassland or existing hard-standing. Options 3, 3A, 3B and 5 pass through existing MoD buildings and highways (resulting in fewer mature trees being lost and being more in keeping with the existing character of the site). Options 3A and 3B are a slightly greater distance from nearby sensitive receptors such as the National Park. These differences are however marginal.

Nature Conservation

- 4.1.6 With consideration to ecology and nature conservation alone, Options 3, 3A, 3B, 4 and 5 are favoured compared to Options 1 and 2. This is primarily as the routes largely span land already developed or likely to be developed in the future. None of the options are likely to result in effects that cannot be mitigated or compensated, although in light of available evidence necessary measures may be substantial depending on the extent of semi-natural habitat loss.
- 4.1.7 Options 1 and 2 affect habitats located within The Croft to the north of TTA Bordon which are known to include heathland and likely to affect greater areas of Hogmoor Inclosure (which is a SINC). Whilst Options 3A and 3B would have significant effects upon habitats and species known to occur on Viking Park, this land is already put forward for employment and commercial leisure development and effects associated with placing the relief road in this area are anticipated to be no greater than other forms of future development.

Geology and Soils

- 4.1.8 It is unlikely that any route option will have significant geotechnical risks, or an adverse impact on the geology and soils of the study area and any mitigation measures are considered unlikely. This will be further considered throughout the design stages.
- 4.1.9 Small scale appropriate engineering solutions will likely solve any low impact geology and soils issues the route option alignments pose. Based on Geology and Soils alone there is no significant difference between alignment options. Selection should be based on other route option appraisal criteria.

Noise and Vibration

- 4.1.10 Considering the road in isolation, to a large extent the options are very similar. With the exception of Options 3A and 3B, the options have a common alignment for the first 800m (at the southern end) and also have a common alignment for the last 600m (at the northern end). Furthermore, whilst there is some variation between the alignments in the central section of the Scheme, the associated area is largely away from sensitive receptors. Thus there will be little difference between the options in this regard.
- 4.1.11 Options 3A and 3B are further from existing dwellings than the other options which all pass along the former Longmoor Military Railway and thus behind the dwellings in Morse Close, Sutton Field and Champney Close. However, given that Options 3A and 3B start somewhat further north along the A325 than the other options, fewer dwellings would benefit from a reduction in noise levels due to any relief provided to the A325. Considering the road in isolation, there is therefore little to choose between the options.
- 4.1.12 Other than alignment, a further difference between the options is the applicable speed limit. For Options 1 and 2 (the outer option), the limit would be generally 40mph whilst for all other options the limit would be 30mph.
- 4.1.13 In terms of effects during the construction of the various options, the favourability of the options is purely based on proximity to dwellings. Therefore, in the same way that there is little difference between the majority of the options in this regard, in terms of construction effects, there is very little difference between the options.
- 4.1.14 When considering the impact of noise and vibration due to the proposed road taking the Masterplan development into account, the 'outer' Options 1 and 2 are considered to be most favourable, even considering the road speed, compared to the 'inner' Options 3, 3A, 3B, 4 and 5. This is due to the 'outer' options being further away from the dwellings proposed within the Masterplan development (up to 4000 dwellings) and thus having less noise and vibration impact.

Pedestrians and Cyclists

- 4.1.15 The potential impact of the various route options upon pedestrians and cyclists have been assessed as part of the route options appraisal. The 'inner' Options 3, 3A, 3B, 4 and 5 provide the most direct route through the centre of the proposed development area therefore providing high quality links to residential and employment areas and the town centre. This will improve amenity compared with the existing situation, reduce journey lengths and delays experienced by pedestrians and cyclists. However, the 'outer Options 1 and 2 also provide excellent pedestrian and cyclist facilities to the development and the SANG. The difference between the options is considered to be marginal.
- 4.1.16 Options 1 and 2 are more effective in removing traffic from the existing A325 and also will remove 'through traffic' from the proposed development areas. Options 1 and 2 are therefore considered to be most effective at reducing severance within the development and on the existing A325 but may increase severance to the SANG. This will, however, be offset by the number and location of pedestrian and cyclist crossing facilities that will be provided. Options 3, 3A, 3B, 4 and 5 will cause some severance between eastern and western parts of the development area but reduce levels of severance to the SANG. Options 1 and 2 are preferred as they provide the most relief to the existing A325 and do not cut through the Masterplan development thus having the lowest severance effect.

Effect on Vehicular Travellers

- 4.1.17 Options 1 and 2 provide a route that will improve driver stress by shortening journey times and minimising junctions and other road interfaces. In comparison with other options, this alignment follows the edge of the proposed development area and therefore will also not be subjected to as many conflicting movements in comparison with Option 3, 3A, 3B, 4 and 5. However, the difference is considered to be marginal.

Road Drainage and the Water Environment

- 4.1.18 With regards to Road Drainage and the Water Environment, the route comparison indicates that there is not a notable difference in potential risks to groundwater quality during construction, to surface water or groundwater quality during operation or to flooding during construction.
- 4.1.19 Notable differences to surface water quality during construction are related to the proximity of the options to and the number of times they are required to cross the surface water course Oxney Moss and its tributaries. Options 1, 2 and 4 are marginally preferable with respect to potential contamination of surface water as Options 3, 3A, 3B and 5 are closer to and cross the water courses more frequently.
- 4.1.20 Options 1 and 2 are preferable in terms of flood risk as they are located furthest from the Oxney Moss and associated flood risk. Overall, the difference between the options is considered to be marginal.

Environmental Summary

- 4.1.21 Overall the potential environmental impacts do not vary greatly between the various route options and no single option stands out over the others. With design and mitigation measures all options are likely to be deliverable without unacceptable environmental impact.
- 4.1.22 However, Options 1 and 2 are preferred in environmental terms as they are most effective at removing traffic from the A325 and have the lowest severance effect, have the least impact on noise and air quality due to having fewer future dwellings close to the road and present the lowest flood risk.

Item	RAG Scores							Assessment
	Options							
	1	2	3	3A	3B	4	5	
Air Quality	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Options 1 and 2 preferred
Cultural Heritage	Green	Green	Green	Green	Green	Green	Green	Option 5 preferred but marginal
Landscape	Green	Green	Green	Green	Green	Green	Green	Options 3A and 3B preferred but marginal
Nature Conservation	Yellow	Yellow	Green	Green	Green	Green	Green	Options 3, 4 or 5 preferred
Geology and Soils	Green	Green	Green	Green	Green	Green	Green	No preference
Noise and Vibration	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Options 1 and 2 preferred
Pedestrians and Cyclists	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Options 1 and 2 preferred
Effect on Vehicular Travellers	Green	Green	Green	Green	Green	Green	Green	Options 1 and 2 preferred but marginal
Road Drainage and Water Environment	Green	Green	Green	Green	Green	Green	Green	Options 1, 2 preferred but marginal
Environmental Assessment	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Options 1 and 2 are furthest from the existing and proposed development

5 Cost

5.1 Capital costs

5.1.1 Capital costs have been estimated by HCC for the options. The estimates are at 2012 prices and are shown in the table below

	OPTIONS						
	1	2	3	3A	3B	4	5
Capital Cost	£12.0m	£11.9m	£11.2m	£10.1m	£10.1m	£11.3m	£11.2m
Professional fees, Utilities, Demolition	£1.2m	£1.2m	£1.2m	£1.2m	£1.2m	£1.2m	£1.2m
TOTAL	£13.2m	£13.1m	£12.4	£11.3m	£11.3m	£12.5m	£12.4m

5.1.2 The figures indicate that the most expensive options are the 'outer' relief roads, Options 1 and 2, with the 'inner' Options 3, 4 and 5 marginally cheaper. This is essentially due to the increased length of road compared to the 'inner' relief road options.

5.1.3 The least expensive are indicated as Options 3A and 3B through Viking Park as they take a truncated, shorter route. However, these options provide no relief to the existing A325 between Liphook Road and Viking Park and the reduced benefit for residents and travellers has not been factored into the costs. In addition, the costs are preliminary and do not take into account the significant risk of delay and additional cost due to need to acquire third party land at Viking Park to achieve either of these options.

5.1.4 For the 'inner' and 'outer' options, no account currently has been taken into account for the area of potential development that the 'inner' route would take compared to the 'outer' route which takes the route of the disused railway corridor which is unlikely to be used for development. In addition, the 'inner' route options pose a greater construction risk as they pass through the Technical Training Area and through the centre of the proposed Masterplan development area. On balance, the 6% maximum difference between the 'inner' and 'outer' options is not considered to be a significant difference at this stage.

5.1.5 On this basis, there is little to choose between the options.

5.2 Cost Summary

5.2.1 In capital cost terms, the costs for the road are dependent on the length of the road proposed. Estimates carried out to date indicate that the 'inner' options and in particular, Options 3A and 3B are cheapest. The 'outer' routes, Options 1 and 2, are the most expensive with Options 3, 4 and 5 marginally less so.

5.2.2 However, these costs estimates are preliminary and based on outline data. There is, overall, little difference between the cost estimates at this time and, when other factors are taken into account (land acquisition risk, development land used by the road footprint etc), it is assessed that there is little to choose between the options at this stage in cost terms.

Criteria	RAG Scores Options							Assessment
	1	2	3	3A	3B	4	5	
Capital Costs								Capital costs are similar

6 Deliverability

6.1 General

6.1.1 Issues which affect the ability to deliver the relief road include:

- i) Funding
- ii) Achieving approval through the statutory procedures
- iii) Enabling a viable scheme including maximising the use of the existing MOD buildings and infrastructure

6.2 Funding

6.2.1 In order to deliver the Relief Road, scheme funding will need to be secured. The viability work that has been completed to support the wider Whitehill & Bordon project so far has demonstrated a funding gap, and that as a result additional public sector funding needs to be drawn into the project.

6.2.2 The current sources of public funding that can be considered for a project of this type are;

- Funding administered through the Enterprise M3 LEP
- Capital reserves of local authorities
- Central government funding sources such as PLIF and LIF

6.2.3 In order to secure funding from any of these sources, it would be necessary to demonstrate that the project unlocks significant additional growth (in housing and jobs), provide a compelling transport business case and is deliverable in the short term.

6.2.4 All of the options considered have the potential to demonstrate that they unlock significant growth. The Whitehill & Bordon Draft Framework Masterplan and the proposed Strategic Allocation in the EHDC/ SDNPA Joint Core Strategy all identify strategic levels of growth on the MoD land, and each option would deliver a key element of infrastructure to provide vehicular access to the land, and mitigate the traffic impacts.

6.2.5 It is feasible that all of the options considered could demonstrate a viable transport business case. The modelling that has been completed identifies that both the inner routes (Options 3, 3A, 3B, 4 and 5) and outer routes (Option 1 and 2) improve journey times through the town and reduce congestion. It is however shown that the options that travel around the site (Options 1 and 2) are more successful in drawing strategic traffic from the existing A325 and so removing congestion on that corridor. Options 1 and 2 are likely to show a more positive business case.

6.2.6 There is limited variance in construction costs between the options which is unlikely therefore to be a material differentiator in applications for public funding.

- 6.2.7 Options 3A and 3B require land outside of the control of the project, which would require land acquisition. This adds a significant risk to deliverability and for that reason those options are unlikely to attract public funding at this time. Options 3, 4 and 5 route through the main garrison area which would limit the ability to re-use buildings for interim purposes, and would limit the ability to retain uses within them. This itself is unlikely to mean funding would not be possible, but it would add a potential risk. Options 1 and 2 avoid the main MoD garrison built estate so limit the need for demolition and reduce the impact on retained uses and are contained within MoD land. Option 1 and 2 are likely to be considered deliverable in the short term.

6.3 Statutory Procedures

- 6.3.1 In general, all land required for the road construction is owned by the MOD (see Figure D) The land is due to be vacated by the MOD in late 2015 leaving the land, subject to planning permission, open to development.
- 6.3.2 Options 3A and 3B are the exception to this in that the initial road alignment from the junction with the A325 at Viking Park is privately owned by Viking Properties. Viking Properties have confirmed that they do not support the delivery of the road through the Viking Park site.
- 6.3.3 For this land to be accessed for road construction, it would either have to be obtained by agreement with the landowner, which is unlikely, or be subject to statutory procedures including compulsory purchase and potentially a Public Inquiry. The programme for the road could therefore be dependent on a successful outcome at a Public Inquiry.
- 6.3.4 Whilst this is not an absolute bar to Options 3A and 3B, it is a very high risk to the scheme programme in terms of uncertainty of delivery (cost, statutory procedures etc) which could add the significant cost of a Public Inquiry and the potential delay of up to a year to the programme.
- 6.3.5 On this basis, Options 3A and 3B are therefore considered significantly less deliverable than Options 1, 2, 3, 4 and 5 in terms of obtaining approval through the statutory procedures.

6.4 Retained and Interim Uses of MOD Buildings

- 6.4.1 The Whitehill & Bordon Eco-town Masterplan envisages low cost employment space being crucial to attracting businesses requiring start-up units, small workshops and larger light industrial units. The MOD will leave vacant a number of buildings in the MOD technical Training Area (TTA) which are currently used for engineering, training, accommodation and office use. These buildings could be put to new employment use in the short to medium term.
- 6.4.2 Where options route through the TTA, the facility for low cost employment space may be reduced or lost.
- 6.4.3 The options are assessed against this reduction in potential employment space as follows:
- 6.4.4 Options 1, 2 and 5 are on the periphery of the MOD TTA within the Masterplan development. No significant buildings within the TTA are affected by these options.
- 6.4.5 Options 3, 3A and 3B pass through the MOD TTA and require the demolitions of one major building described as "High quality engineering shed, high ceiling factory space, with associated offices" (approximate plan area of the building is approximately 80m X 190m).
- 6.4.6 Option 4 passes through the MOD TTA and requires the demolitions of two major buildings described as "Light industrial sheds, flexible low quality space currently

used for tank storage, engineering, indoor sports” (plan area approximately 80m X 310m) and “Light industrial / training facilities” (plan area approximately 45m X 130m).

- 6.4.7 Alignments of the options passing through the TTA could be adjusted to retain existing buildings for use in the short and medium term. However, the alignment would then fix the structure of the future development based on temporary access requirements. This would not result in the best spatial layout for a new residential-led development.
- 6.4.8 On this basis, Options 3, 3A, 3B and 4 are the least favourable in terms of retaining the potential maximum use of existing MOD buildings with potential for providing low cost employment space.

6.5 Deliverability Summary

- 6.5.1 Overall in the context of the options considered for the Whitehill & Bordon Relief Road, Options 1 and 2 provide a greater likelihood of achieving funding because they are more effective in reducing local congestion and improving journey times. These options do not impact on the built MoD areas (so retained or interim uses) and could be constructed in the short term.
- 6.5.2 Options 3A and 3B require land which is in the ownership of a 3rd party who has objected to the land being used for the road. This represents a very high risk to the scheme being able to achieve the land acquisition and would result in delays to the programme and additional costs. Options 3A and 3B would be unlikely to secure public funding because they are not deliverable at this time (owing to requiring land acquisition) and could not be delivered with certainty in the short term.
- 6.5.3 Options 3, 3A, 3B and 4 pass through the MOD TTA and require demolition of major buildings which could otherwise be put to employment use in the short and medium term. Options 3, 4 and 5 would be viable considerations for achieving funding, providing certainty could be given about the ability to construct the options through MoD land, and the ability to facilitate interim uses on the land.
- 6.5.4 On this basis, in terms of ability to deliver the relief road, Options 1, 2 and 5 are preferred.

Criteria	RAG Scores							Assessment
	Options							
	1	2	3	3A	3B	4	5	
Funding	Green	Green	Green	Yellow	Yellow	Green	Green	Options 3A and 3B are least attractive for securing funding
Statutory Procedures	Green	Green	Green	Red	Red	Green	Green	Landtake issues for Options 3A and 3B
Retained use of MOD buildings	Green	Green	Yellow	Yellow	Yellow	Yellow	Green	Options 1, 2 and 5 maximise retained use
Deliverability assessment	Green	Green	Yellow	Red	Red	Yellow	Green	Options 3A and 3B require 3 rd party land

7 Character of the Relief Road









7.1 Background

7.1.1 Two broad route options have been looked at in this section: (1) an 'outer' route designed to predominately a 40mph speed limit and (2) an 'inner' route with a 30mph speed limit. Both options are designed to be integral to the development opportunity.

7.1.2 The primary difference between the two is that the 'outer' route facilitates relatively quick movement for through traffic around the development area. The 'inner' route, however, forms a central street and spine through the development area, carrying both through traffic as well as other more localised movements. The challenge is to consider how these competing objectives might be balanced without undermining the Masterplan. The 'inner' route would have reduced frontage access which would aim to balance the ease of through movement resulting in the need for secondary roads to provide access to properties fronting onto the relief road.

7.1.3 A detailed assessment of the options is contained in Appendix 3. The report has used a traffic light system to assess the options against the objectives for the relief road. This is presented in the table below:

7.1.4 Assessment of options against objectives for the relief road

Objective for Relief Road	Outer Route	Inner Route	Notes
Relieve congestion on the A325			Both options would significantly relieve congestion from the A325, though an 'outer' route would allow a more free-flowing alternative given higher traffic design speeds and fewer junctions with the development area than an 'inner' route.
Enable the new town centre			Both would help reduce traffic levels on the existing A325, though the 'outer' route would remove more.
Provide access to the development			Both would provide road access to the development area, though an 'inner' route would provide more opportunity for direct and regular access given its role as a central spine through the development although it's character, sense of place and operation would be defined by the amount of traffic. Penetration by bus services and the associated catchment area would be greater with an 'inner' route.
Reduce severance			Both would help reduce severance on the current A325 though an 'outer' route would remove more through traffic from the existing A325. In particular, removing a significant volume of traffic away from residential areas will help contribute to an enhanced residential amenity and sense of place within the development area..

7.1.5 In terms of meeting these objectives the 'outer' route performs better than an 'inner' route.

7.1.6 In addition to the core objectives for the relief road as set out and assessed in the table above it is also important to consider the wider policy framework and associated design principles for Whitehill & Bordon. These anticipated an inner relief road running through the development area, designed as a 'street' and balancing the needs of all modes. Development of an 'outer' route also provides access to the development and caters for all modes of travel. Whilst it will not be designed as a 'street' within an urban streetscape, it does not preclude a central spine from also being delivered and, although it would have different role to that envisaged within the Masterplan and wider policy framework, it would provide a practical and advantageous means of implementing the concept.

7.2 Character of the Relief Road Summary

- 7.2.1 In terms of meeting the scheme objectives and practically implementing the policy objectives, the 'outer' routes of Options 1 and 2 are more favourable as they relieve congestion on the A325 better than the 'inner' options thereby better enabling the operation and function of the new town centre.
- 7.2.2 An 'outer' route would remove through traffic from the main residential areas of the new development which would reduce the potential severance impacts of the road. This would enable better movement by all and help create a sense of place within the development area.
- 7.2.3 Additionally, Options 1 and 2 are better suited to the primary function of distributing strategic traffic away from the residential areas. The 'inner' routes may result in a character conflict between the demands of a major through route and a residential road.

Criteria	RAG Scores							Assessment
	Options							
	1	2	3	3A	3B	4	5	
Character of the Road assessment	1	2	3	3A	3B	4	5	Through traffic minimised by Options 1 and 2

8 Summary

8.1 General

- 8.1.1 This report assesses the road alignment options for providing a relief road for Whitehill & Bordon. The road would serve the regeneration which is planned on the MOD land, details of which can be found in the Whitehill & Bordon Masterplan.
- 8.1.2 HCC has set out its objectives for the relief road and these are to:
- Relieve congestion on the A325 – largely by removing through traffic from the heavily congested A325
 - Enable the new town centre – reducing traffic on the A325 and providing the conditions necessary for a successful town centre
 - Provide access to the development – accessing the new development areas (4000 dwellings, 122,000 sqm of commercial space and 30,000 sqm of retail space)
 - Reduce severance – encouraging links to the new development, town centre and the existing town centre
- 8.1.3 The report has reviewed seven options (see Figure A for an overview of the option alignments). These can be largely broken down into three categories;
- ‘Outer’ relief roads (Options 1 and 2). These are options which skirt the Masterplan development area and will generally have a 40mph design speed
 - ‘Inner’ relief road (Options 3, 4 and 5). These will route through the Masterplan development area, in some cases acting as the spine link road for the development and will be designated as a 30mph road
 - Access through Viking Park (Options 3A and 3B). The options are all within land owned by the MOD or HCA who support the development except for land through Viking Park which is in 3rd party ownership.
- 8.1.4 The options assessment which generally follows WebTag guidance, can be summarised under the following headings:
- 8.1.5 **Engineering.** The table at the end of this section summarises the assessment of the options in engineering terms. Whilst all options provide significant relief to the existing A325, the outer options (Options 1 and 2) provide (up to 10%) more traffic reduction on the A325 than the ‘inner’ options (Options 3, 3A, 3B, 4 and 5). This is fundamental to the objective of the road. In addition, drainage, statutory undertaker impacts and construction impacts favour the ‘outer’ relief road options.
- 8.1.6 The ‘outer’ relief road options (Options 1 and 2) are therefore strongly preferred due to the enhanced relief provided to the existing A325.
- 8.1.7 Option 1 however, has a section of sub-standard alignment which does not meet the requirements of national highway design standards. Therefore, in engineering terms, Option 2 is the preferred option.
- 8.1.8 **Environmental.** Overall the potential environmental impacts do not vary greatly between the various route options and no single option stands out over the others. With design and mitigation measures all options are likely to be deliverable without unacceptable environmental impact.
- 8.1.9 However, Options 1 and 2 are preferred in environmental terms as they are most effective at removing traffic from the A325, minimise severance caused by the existing A325 and the Masterplan development, have the least impact on noise and

air quality due to having fewer future dwellings close to the road and present the lowest flood risk.

- 8.1.10 **Capital Costs.** The costs for the road are dependent on the length of the road proposed. Estimates carried out to date indicate that the 'inner' options and in particular, Options 3A and 3B are cheapest. The 'outer' routes, Options 1 and 2, are the most expensive with Options 3, 4 and 5 marginally less so
- 8.1.11 However, the cost estimates undertaken to date are preliminary and based on outline data. When other factors are taken into account (land acquisition risk, development land used by the road footprint etc), it is considered that there is little to choose between the options at this stage in cost terms.
- 8.1.12 **Deliverability.** Options 3A and 3B require land which is in the ownership of a 3rd party who has objected to the land being used for the road. This represents a very high risk to the scheme being able to achieve the land acquisition, would result in delays to the programme and additional costs and would present a difficulty in securing funding.
- 8.1.13 Options 3, 3A, 3B and 4 pass through the MOD TTA and require demolition of major buildings which could be put to employment use in the short and medium term.
- 8.1.14 On this basis, in terms of ability to deliver the relief road, Options 1, 2 and 5 are preferred.
- 8.1.15 **Character of the Relief Road.** In terms of meeting the scheme objectives and practically implementing the policy objectives, Options 1 and 2 are favourable as they relieve congestion on the A325 better than the 'inner' options thereby better enabling the operation and function of the new town centre and reducing severance. Options 1 and 2 are also better suited to the primary function of the relief road of diverting through traffic from the town centre. The 'inner' routes would have to balance the conflict between a street with a large amount of non-vehicle movement and the requirements for an effective through route.
- 8.1.16 A summary of the assessments is shown in the table below. It indicates that Option 2 is assessed as being the route which best achieves the scheme objectives.

Criteria	RAG Scores							Assessment
	Options							
	1	2	3	3A	3B	4	5	
Engineering assessment	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Options 1 and 2 provide most effective relief to existing A325 and have less impact on the development. Option 1 though does not meet requirements of national highway design standards.
Environmental assessment	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Options 1 and 2 are furthest from the existing and proposed development
Capital Costs	Green	Green	Green	Green	Green	Green	Green	Little differentiation
Deliverability assessment	Green	Green	Yellow	Red	Red	Yellow	Green	Landtake issues for Options 3A and 3B
Character of the Road assessment	Green	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Through traffic minimised by Options 1 and 2
Overall assessment	Green	Green	Yellow	Red	Red	Yellow	Yellow	