APPENDIX F

UTILITIES DRAWINGS

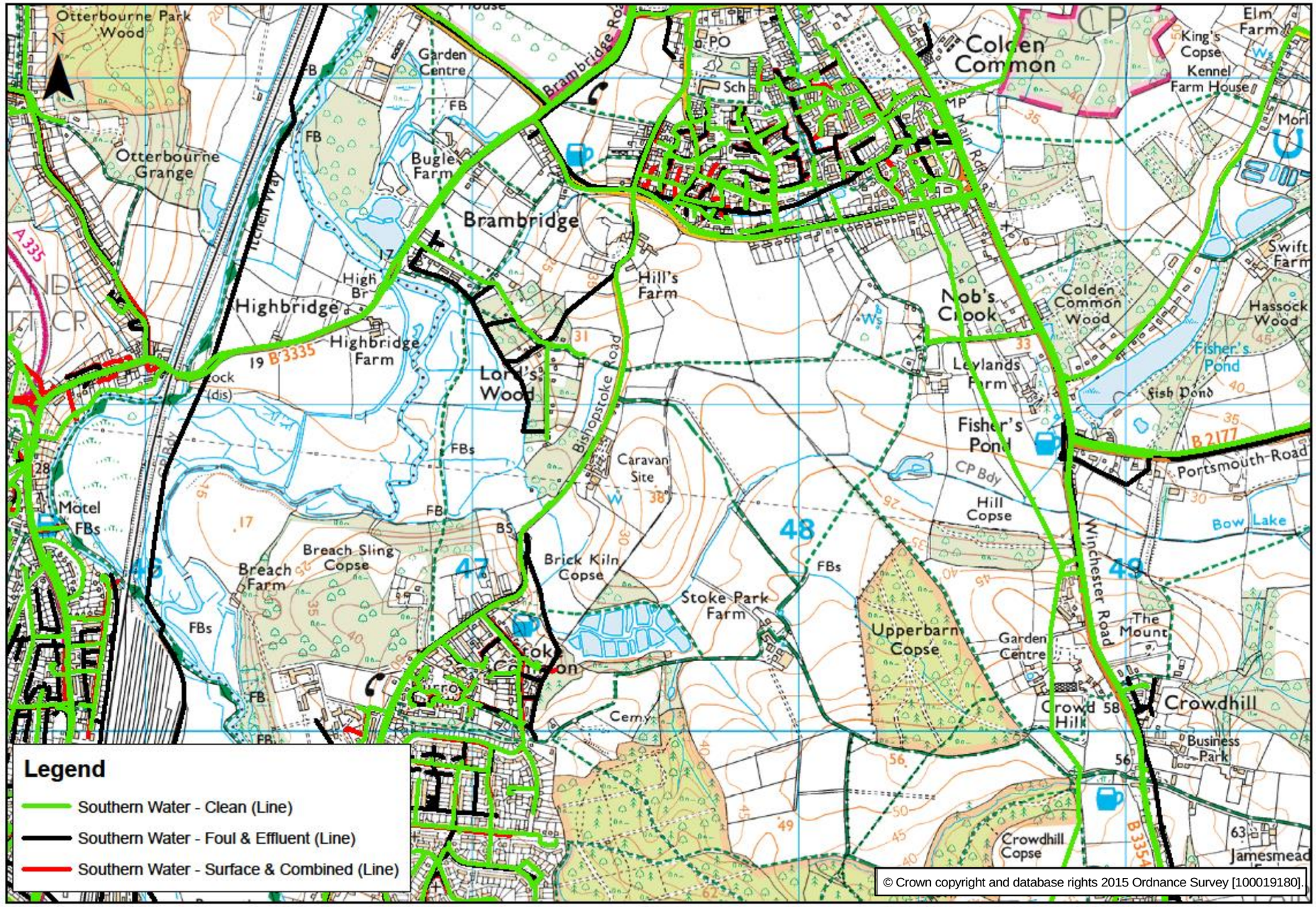

Figure F1: Water

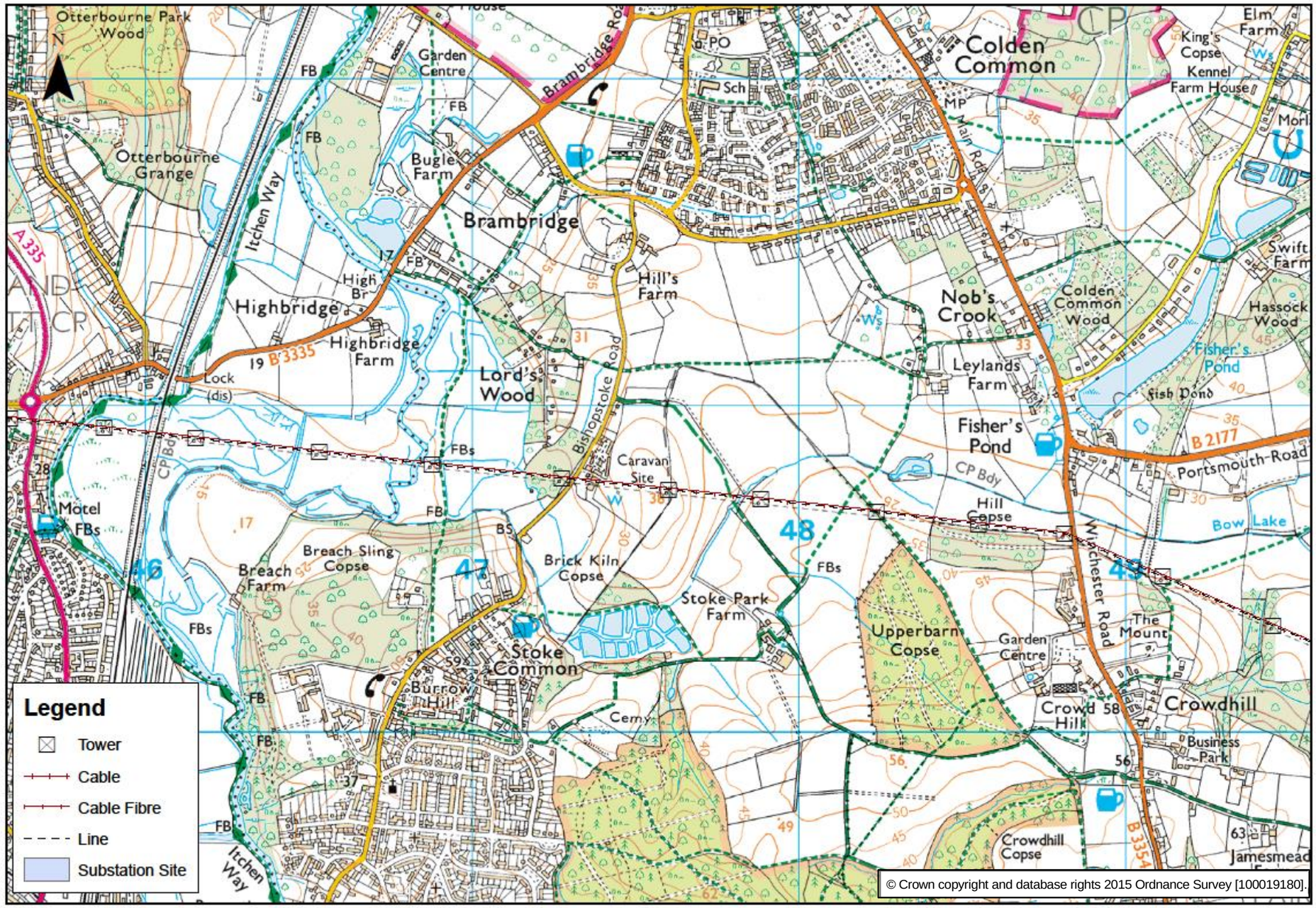

Figure F2: Electricity

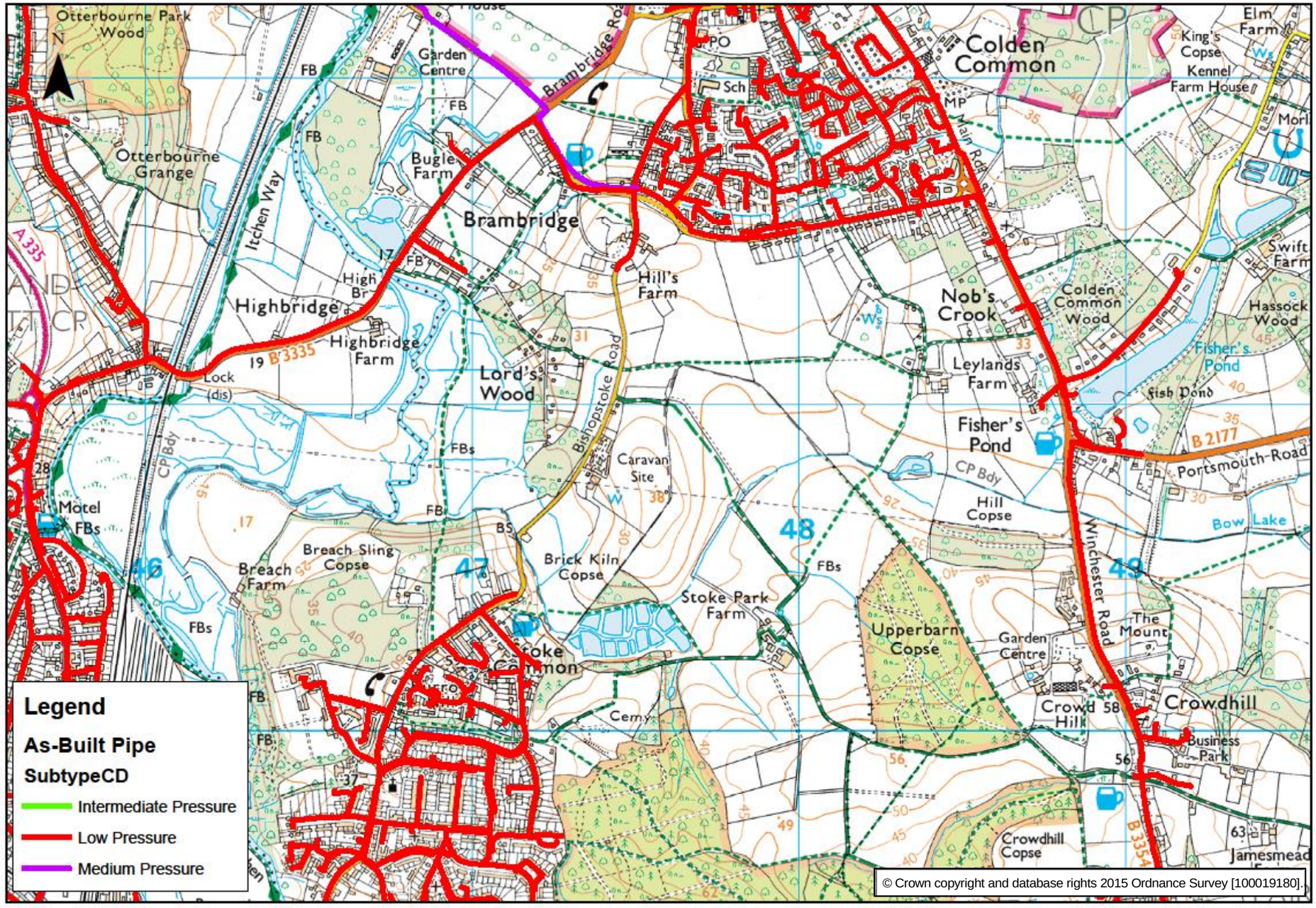

Figure F3: Gas

APPENDIX G

LIAISON WITH ENVIRONMENT AGENCY

Hampshire County Council
Economy, Transport and Environment Department

engineering CONSULTANCY

EASTLEIGH STRATEGIC TRANSPORT STUDY **R.J567621.01**

Notes of Meeting with the Environment Agency held at 2:00pm on 10 September 2015 at Elizabeth II Court, Winchester

Present: **HCC Engineering Consultancy**
Linda Wickens – Project Manager
Rob Ward – Lead Design Engineer
Pat Warrener – Group Engineer Structures
John Burrows – Project Engineer, Structures
John Dimond – Graduate Engineer, Structures

Environment Agency
Alex Haydon – Partnership & Strategic Overview

Circulation: Those above + Adrian Ingerson, Tom Griffiths, Sarah Reghif, Pat McKenna, Chris Murray

REF	ITEM	ACTION
1.	**BOTLEY BYPASS** – Drg No. EC/RJ567621/03/011	
1.1	Alex confirmed that everything EA related in the 2013 Waterman report is still valid.	
1.2	Alex advised: • The further away from the railway bridge the better for the road bridge • If the channel is to be realigned then a Water Framework Directive assessment would be required • Need to prove that the flood risk is not increased • Would probably need to provide replacement capacity for piers within the watercourse – Alex to check • The existing railway bridge is the bottleneck, road bridge to provide additional flow capacity	AH
1.3	Alex to check with colleagues whether there are any restrictions with regard to the fish in the river, and send design guidelines.	AH
1.4	The drainage strategy is to use balancing ponds to take the run-off and discharge into existing watercourses at a rate of 5l/sec, designed for a 100yr storm. It is assumed that soakaways would not be an option.	
1.5	The balancing ponds would have a hydro break and pollution control before discharge.	

REF	ITEM	ACTION
1.6	Pat to provide a photograph of a similar structure to that proposed, for EA review.	PW
1.7	NB: cross-section, verges, parapet height, sight lines, not all considered in Waterman's report.	
2.	**BISHOPSTOKE ROAD CORRIDOR**	
2.1	**Chickenhall Lane Roundabout**	
2.1.1	The existing trough decked structure is nearing the end of its life, therefore the preference is to demolish and rebuild. Another crossing would need to be provided for traffic during construction.	
2.1.2	The River Barton could be diverted if it is made bendier, not straighter, in order to keep span to a minimum.	
2.1.3	Alex to check if there would be an issue regarding fish ecology with keeping the roundabout open in the middle.	AH
2.2	**Riverside Junction**	
2.2.1	The river is much wider to the south of the existing road bridge. This is probably because of scour created by the flow rushing past the constricted width of the old mill, so the new bridge would not have to be wide enough to span the scour areas. Alex to check, and advise. Bagwork protection to the banks would be required.	AH
2.2.2	The new road bridge would have to be over-wide such that half could be used to keep traffic flowing during construction.	
2.2.3	A copy of the WSP drgs was handed over to Alex.	
3.	**NORTH BISHOPSTOKE BYPASS**	
3.1	Any crossing of the flood plain would need to be modelled. Alex to advise of the flood level required (Option 2B).	AH
3.2	There are buildability issues with replacing the existing bridge over the River Itchen beside the railway on Highbridge Road; a new structure would need to be constructed with a wider span(s) before the old is demolished.	
3.3	Structures will be looking at an option to widen the three bridges over the River Itchen channels east of Highbridge Farm, and provide a broad order cost estimate. However the options currently considered do not widen the road that far east.	

Linda Wickens, Engineering Consultancy
20-Sep-15

Environment Agency
Asiantaeth yr Amgylchedd

Flood Risk Management: Bridges – advice for Development and Flood Risk activities

Operational instruction 278_04 **Issued** 05/07/2010

What's it about?

This document outlines the consenting and planning issues surrounding the construction and maintenance of different types of bridges. It focuses on the impact of bridges on flood risk.

It also sets out our basic design requirements for the construction and maintenance of bridges, and other issues we require developers to consider.

Who does it apply to?

This document applies primarily to Development and Flood Risk Officers assessing proposals for works involving bridges. It may also be useful to other staff within Flood and Coastal Risk Management (FCRM).

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Matthew Kean

Consent and planning permission

Background

We must consider whether anyone intending to construct or alter a bridge over a watercourse requires our consent. In the text below 'developer' refers to anyone wanting to construct or maintain a bridge, including property developers, highway authorities, private landowners and maintenance contractors.

Bridges over 'main rivers'

Any proposed new bridge or significant change to an existing bridge over a main river requires a consent under Section 109 of the Water Resources Act 1991 (except proposals for road schemes being carried out under a Highway Order). Temporary works in watercourses may also need consent (see below). Developers must pay a fee for a S.109 consent.

Works to bridges may also require consent under our local land drainage / flood defence byelaws. You should consult the relevant set of byelaws when considering a proposal. There are usually '**savings**' (limitations of applicability of the byelaws) for individual bodies such as highway authorities, utilities etc, so you should also check these.

Bridges over ordinary watercourses

The planning situation for bridges over ordinary watercourses is less straightforward than for main rivers. Developers need a consent under Section 23 of the Land Drainage Act 1991 for "any mill, dam, weir or other like obstruction" or "to erect any culvert" in an ordinary watercourse. Developers must pay a fee for a S.23 consent.

A bridge which crosses an ordinary watercourse in a free span technically doesn't require a S.23 consent. If it's clearly evident to you prior to a developer making an application that a proposed bridge won't cause an obstruction to the flow, advise the developer that they don't require a consent. However, it's good practice for the developer to confirm their proposal in writing to you, and you must also respond to their proposal in writing. The developer may need to submit detailed drawings to you to confirm no obstruction will be caused.

Highway authorities using the Highways Act 1980

A highways authority may claim powers to do work to bridges and watercourses under the Highways Act 1980. Highways authorities proposing works, particularly under Section 110 and under other sections noted in Section 339 must seek our consent as a 'drainage authority' before commencing. If a highway authority claims powers to do work without seeking our consent, you must ask them under which section of the Act they are claiming these powers. Check their response with your regional solicitor or the primary contact for this document, to determine what consenting powers if any are appropriate.

Highway orders using Schedule 1 of the Highways Act 1980

Bridges for road schemes being carried out by highway authorities under an Order in accordance with Schedule 1 of the Highways Act 1980 don't require our consent. In such cases we must resolve all our flood risk concerns (that would otherwise need a consent) via the pre Order consultation process. If we can't resolve our concerns satisfactorily, we must consider objecting to the entire road scheme and be prepared to argue our case at a public enquiry.

A joint memorandum of understanding (MoU) was signed by the Highways Agency and us in November 2006, with a technical Water Environment paper in November 2009 – see links at end of this document. The MoU only applies to the Highways Agency (in England) in these circumstances, but not with individual county councils and other road promoters, including Welsh Assembly Government (WAG) / Transport Wales.

Our policy on culverting

Some 'bridge' proposals, particularly for highways may actually be large section culverts with the invert placed below the bed level of watercourse. Developers often favour culverts rather than true bridges as they are often cheaper than bespoke designed bridge foundations. Where such culverts are proposed, you must treat them according to the guidelines set out in our culverting policy and its associated documents.

Temporary works

You will need to pay special attention to proposals for temporary works around bridges as these can create an increased flood risk. On a main river, you can address the issues surrounding temporary works by a separate consent or you can include a condition in a consent to ensure the design for such proposals meets our requirements before work is allowed to commence.

Considering existing problematic bridges

You must not accept the fact that there are existing sub-standard bridges along a river stretch as justification for allowing further inadequate structures to be installed. Only by insisting on higher standards for new bridges can we achieve improvements where poor structures are a problem. You may need to point out that we take a long term view on river and flood risk management.

That said, there will be occasions where the best outcome we can achieve is a bridge that is as high as possible (to minimise the impediment to flow) if the crossing is to be useable. Many old bridges, although they present restrictions to flow, are historic structures which may be listed for protection. These bridges are unlikely to be demolished or radically altered as a result.

Planning permission requirements

Most new bridge proposals will require planning permission and therefore a flood risk or consequence assessment (FRA or FCA respectively). Proposals to alter a bridge may require planning permission depending on the extent of the changes and the listed status of the structure.

The FRA or FCA must show that there'll be no worsening of flooding as a result of the changes, and ideally an overall benefit. You must consider the effects on the surrounding land, especially properties, as well as the immediate effect on the river and its flow. If planning permission isn't required you must still encourage developers to provide you with the kind of information an FRA or FCA would contain.

Catchment Flood Management Plans (CFMPs) and other studies may offer you information about design criteria and the planned future management of a locality when you're considering proposals.

Our design requirements

Best practice

We recommend the following design criteria as best practice.

Soffits

- Road or rail bridge soffit levels and flood spans must normally be 600 mm or more above the design flood level (or the maximum known flood level on minor watercourses) in order to allow floating debris to pass freely through the structure. The soffit level may be further influenced by what is in the vicinity, particularly upstream of the proposed bridge. This requirement may be relaxed on very small watercourses where we don't know the maximum flood level so long as the soffit is above bank level and there is a low risk of damage nearby.
- The soffit must be no lower than 300 mm above either of the upstream banktops. If a lower soffit is required on technical grounds, we may require a wider span to compensate.
- Footpath and bridleway bridges in large flood plains can be treated differently. It may be more practical to construct a bridge with the soffit 300mm above bank top level and with open handrails, which will be submerged in a flood. A large structure raised above flood level with approach ramps could not be reached during a flood in any case.
- Soffit levels on navigable rivers will need to take account of the clearance level required for boats legally using the river. You must ensure the developer consults the relevant navigation authority (British Waterways, ourselves as navigation authority, the county council, or a private company, as appropriate) if bridge works are proposed where they operate.

Design flows

- Design flows must be based on a 1% annual event with an additional allowance for climate change in accordance with FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts, October 2006. Planning Policy Statement 25 in England uses the same climate change allowances as FCDPAG3. WAG have confirmed that these allowances are also applicable in Wales. Most structures will remain in place for a long time and we must ensure (as far as possible) their future suitability. Major new bridges will have a design life specified, and climate change allowances must be incorporated for the duration of the design life. If an application does not specify a lifetime, discussions between us and the developers should result in an agreement of what would be realistic. This will vary with the kind of bridge. Developers should justify why they have adopted a given lifetime when they are formulating their proposals. The impacts of climate change need to be taken account of in a realistic way.
- We must consider the effect on overland flow routes of bridges and the transport routes leading to them. Long embankments across flood plains may cause more problems than the bridge itself. Where additional flood openings are proposed, we expect a model study to identify the optimum number, size and location. We're likely to require a physical or detailed computer flow model in complex situations or if there is a wide floodplain requiring a number of openings
- The developer must adequately consider local scour to piers and abutments. A study of bridge failures has indicated that between 60 and 70% are caused by hydraulic action. This is the bridge owner's responsibility.
- Flood velocities should ideally be limited to between 1.5 and 2.0 m s^{-1}. If this can not be achieved developers will need to use training walls to design for velocities of up to 3.5 m s^{-1}. The developer must include the design for any training walls in their consent application
- We must make developers aware that they need to take account of foreseeable increases in flow within a catchment due to further development and climate change. There is legal precedent for this.

Bridge span

- Developers must provide clear span bridges as a general rule, though in larger rivers this may not be possible. In such cases, design calculations must confirm the capacity of the bridge is maintained. On rivers where a navigation right exists, there may be issues with proposals for piers in the channel. The developer must consult us and the navigation authority, in such cases.
- If a multiple span design is needed, a single span covering the normal wetted channel with an approach span on each side (a three span bridge) can sometimes be more appropriate than a two span design which requires a central pier located in the channel.

Afflux

- A new bridge must produce no difference in water levels between the upstream and downstream sides (afflux) since this would increase flood risk upstream of the bridge.

Inverts

- We must encourage the use of soft inverts to allow the natural river bed to be retained. The top of abutment footings of bridges with no solid invert must be set at least 600 mm below the existing bed level.
- Solid inverts must be set at least 600 mm below the existing hard bed level to allow for future re-grading. The void up to the existing bed level must be filled a suitable inert material, commonly a clean local gravel. Developers can consider shaping the materials to allow dry weather flow to be concentrated rather than spread over the entire base, to prevent silting.

Parapets

- Open parapets/handrails may be appropriate to allow some flow over the deck in case the bridge opening becomes blocked or in an extreme flood event. Developers must consider the safety of bridge users in these circumstances. Although this is the developers responsibility, we must also make them aware of it

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Deck design

- Service pipes carrying utilities crossing the watercourse must not impinge into the cross section of the bridge opening. It's better to include any necessary pipes in the deck structure, as this allows access to them without disturbing the river. Developers can lay extra ducts into the deck in anticipation of future services being laid.

Ecology

- Developers must consider the choice of materials and their environmental implications for all works affecting a watercourse. They may need surveys to ascertain if any protected species are present, particularly water voles. The results of the surveys must accompany consent applications.
- Bridges can provide potential nesting sites for a number of bird and bat species. Nest boxes can be incorporated into the design of new bridges. Our Biodiversity staff will be pleased to advise developers.
- Developers must take account of fish, otters and other fauna. They can include flood arches, marginal shelves or wildlife underpasses (commonly a 600 – 1000 mm pipe) in the structure to allow wildlife to move up and downstream. Developers may need to install wildlife proof fencing alongside roads in particular to encourage animals to use these features.
- We must consider and propose any suitable ecological features during pre-application discussion, as it's not suitable to impose these features on already approved designs.

Repairs to bridges

Maintaining flow capacity

When a developer proposes to repair or strengthen an existing bridge, we must seek (within the bounds of reason) flood risk and environmental improvements through the consenting process. Amendments to the bridge's cross section must not obstruct existing capacity or flood flow routes near the existing bridge. There may even be scope to improve the capacity of a bridge during repairs, however we must consider the implications of increased downstream flow before we advocate this.

Consenting repair works

Developers need our consent for any repairs affecting the cross section of a bridge or any works requiring access to the channel of a main river. In many cases, for example re-pointing stonework, our main issue when consenting will be the impact of temporary works rather than the end result, which may not materially change the structure. Strengthening the deck of a bridge or resurfacing a highway shouldn't require our consent provided the works can be done from the surface of the road and there is no change to the bridge opening.

Related documents

Links

- Consenting operational instruction (Spring 2010)
- Design manual for roads and bridges
- FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts, October 2006
- http://intranet.ea.gov/policies/environmentalwork/compliance/43214.aspx introduction and link to the general Highways Agency MoU
- http://intranet.ea.gov/policies/environmentalwork/compliance/48688.aspx index of annexes for the Highways Agency MoU
- http://intranet.ea.gov/static/documents/Policy/m090145_MoU_09-09_ANNEX_1_Water.pdf for MoU water annex, including consenting. Note that flood risk and water quality are interwoven in the document, so you need to review the whole annex for details

Environment Agency
Asiantaeth yr Amgylchedd

Flood Risk Management: considering the use of flood plain compensatory storage (England)

Operational instruction 178_05 **Issued** 06/07/2010

What's it about?

This document explains the issues surrounding the use of flood plain compensatory storage as one means of managing flood risk arising as a result of development.

It aims to provide good practice guidance to staff and to allow them to make consistent, robust, timely and transparent decisions with good environmental outcomes.

This document only applies to developments in England.

Who does it apply to?

This document applies to Development & Flood Risk Officers. It will be useful to anyone involved in managing flood risk to new developments.

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Matthew Kean

Introduction to compensatory storage

Background

The Environment Agency is a statutory consultee for most development applications within flood plains. When development takes place within a flood plain, it can reduce the volume of flood storage available. Compensatory storage options can be incorporated into development plans and individual applications to replace the lost storage volume and potentially even to increase the overall space available for water.

As with many types of flood plain development, the individual effect of not carrying out compensation works is usually minor. However we're concerned with the cumulative affect of many such proposals.

PPS25 and the Practice Guide

Sequential approach and flood risk hierarchy

PPS25 set out a sequential approach to development and flood risk. The Practice Guide to PPS25 goes further by suggesting that development in flood prone areas should follow a risk hierarchy. This means that development should preferentially avoid areas of high flood risk. If this is not possible, then the lowest hazard parts of a development (open space for example) should be placed in the portions of a site at highest probability of flooding, instead of elements such as housing, thereby substituting the highest risk. Only when these options have been deemed unachievable should risk control or mitigation options be used.

Risk substitution

Flood plain compensatory storage is a form of risk substitution, since it makes land liable to flood more frequently, but with a low risk use – normally open space or conservation type uses. It must not be used as a reason to advocate flood plain development when lower risk alternatives are available.

Caution

You must only use this document for advice when compensatory storage has been deemed necessary. You must not use it to establish a principle of developing in any location. That will be determined by use of the Sequential and Exception tests of PPS25, though flood plain compensation can be considered within part [c] of the Exception test.

Our philosophy

Providing and enhancing compensatory flood storage can be seen as a literal application of the Government's strategy 'Making Space for Water'. It also supports the aims of Defra policy.

Paragraph 5 of PPS25

Paragraph five of PPS25 states: "Where new development is, exceptionally, necessary in such areas [at risk of flooding], policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall."

This gives a clear message that where practical compensatory works should aim to reduce overall flood risk, and they may be presented as a flood plain enhancement. This can be most easily achieved by providing more storage than is lost due to the development, although other options may exist in particular cases.

This principle is also supported in part [c] of the Exception Test where a development is being considered in that context.

Our general principles

Our aim

We aim to preserve, enhance and restore where possible natural flood plain storage and flow capacity. In some locations it's possible to re-contour the land adjoining a flood plain to allow development without increasing, and ideally reducing, overall flood risk. One way to achieve this is by incorporating compensatory flood plain storage into the development plan, provided the Sequential and Exception tests have been demonstrated properly.

We require that compensation works are carried out when development is to take place in undefended areas of flood plain. Where a development is proposed in a defended area, we must calculate the impact of the development on flood risk to see if compensation is appropriate.

There are other ways to achieve this aim, however compensation has the advantages of being easy to calculate, and is usually carried out on land within the control of the developer. Other proposals may require more complex design and assessment.

Coastal locations

We don't normally require compensation in coastal locations as the volume of flood plain displaced by the development will be transferred to the sea.

Surface water flooding

Compensation may be appropriate in locations prone to sewer and overland flooding. We must involve the water company and the local authority in such cases. Our degree of involvement here will depend on how much we have engaged with urban drainage issues. In future, this will change as development of the local authority's role in urban drainage takes place, once the Floods and Water Management Act 2010 is formally commenced.

Groundwater flooding

Compensation for groundwater flooding can be difficult to achieve due to the source of flooding. The local authority must consider such cases as part of a Strategic Flood Risk Assessment (FRA) and individually as part of a site specific risk assessment.

Planning for compensation works – flood risk assessment

Compensation works must be considered as part of a planning application or consent application (if needed) since they will affect the final appearance of a development, particularly its landscaping. The compensation proposal will therefore form part of the flood risk assessment and be included in application drawings of the site layout.

Types of compensation

Compensation works are divided into direct and indirect. These terms come from CIRIA report C624 "Development and flood risk – guidance for the construction industry (2004)".

Direct or 'level for level' methods as they are also known re-grade the land at the same level as that taken up by the development. Direct schemes therefore provide a direct replacement for the lost storage volume.

Indirect methods rely on water entering a storage area which then releases water at a slower rate, akin to a surface water attenuation scheme. The storage area can be remote from the flood plain or even a tank. Indirect schemes are complicated to design and construct and require a more intensive maintenance regime, which must be continued indefinitely. For these reasons we are generally opposed to indirect schemes unless a planning decision has already been made and they are the only remaining option.

Guidance for direct schemes

Some general considerations

You must consider the following issues before approving a 'direct' compensation scheme:

- The principle of developing a particular site must be in line with the sequential test of PPS25. There may be better sites to develop that are at lower risk. Alternatively, a development could be designed to fit the lowest risk part of a site, largely or even completely removing the need for compensatory storage. The developer must consider why the development can't be built in the area earmarked for compensatory storage.
- Normally, direct compensation works won't increase the land available for development on a site, they'll merely reconfigure it for more convenient use. In order to increase the land available on site, further land off site is required.
- Assuming the proposed development will extend above the design flood level (for example, a building), some land will be required to compensate at that design flood level. By definition this will be at or beyond the edge of the existing flood plain. As a result of this, compensatory storage schemes can't be carried out on sites entirely within a flood plain.

Level for level compensation

Level for level compensation is the replacement of volumes lost from the flood plain through development with new flood plain volume, by reducing nearby ground levels. The compensatory volume must be at the same level (within reasonable working limits) as the lost storage.

In general, level for level compensation should only be applied in areas where flood water is stored; flood flow routes should be protected. There may sometimes be benefits in altering routes or increasing flood flow

capacity, however it should only be carried out after careful assessment of the downstream impacts. This assessment must be included in the developer's FRA.

Floodplain enhancement

Floodplain enhancement can generally be achieved in two ways. Firstly, and most simply is where the volume provided for compensation is greater than the volume lost through development, so increased storage is provided. Secondly, it can be achieved by carrying out work in a different manner to normal compensation to achieve certain clearly specified objectives. It may sometimes be appropriate for example to deliver works in a different location to where the development is proposed. Steered by our CFMPs, such locations need to have been identified as being required for compensation and be established, typically at the LDF level. Developers won't normally have mechanisms or finance to carry out compensation works on land outside their influence. Therefore, if we are seeking works at offsite locations (that may contribute to a larger scheme to manage flood risk), the commitment of the LPA and any other relevant landowners is vital.

Long term planning frameworks

Ideally over time, we'll embed our CFMP objectives and policies within the Regional Spatial Strategies, Local Development Frameworks, or other comparable plans, so they identify the locations where the effectiveness of the floodplain needs to be enhanced in order to deliver sustainable outcomes.

In such instances, we will work to establish frameworks for voluntary agreements to achieve this, with associated funding and delivery mechanisms (for instance, as part of supplementary planning guidance). Where these mechanisms are not yet in place, we'll have to work within the context of the immediate site.

Our requirements for acceptable compensation schemes

Considering the consequences of flooding

As stated in PPS25, development must be directed away from the areas of highest risk. Where new development is necessary, it must aim to reduce flood risk overall. Developers must therefore ensure there'll be no loss of flood flow or flood storage capacity for floods up to the severity of the 1% fluvial flood as a result of their development. Developers must consider climate change predictions when designing their development, and they should seek to create a net benefit to flood risk wherever possible.

You must consider the consequences of more extreme flood events when deciding on the appropriateness of a developer's compensation proposals. In some circumstances, you may deem the consequences to be in excess of what we consider 'safe'. In these circumstances the proposals won't be acceptable to us and we will object to the scheme.

Our requirements

There is no lower volume limit below which compensation is not required. You must however consider what might be deemed reasonable if an appeal is made against our requirements. Focus your efforts on securing improvements to higher risk proposals rather than forcing changes to relatively low risk proposals.

Our basic requirements for compensatory flood plain storage are as follows:

- A volume of flood plain equal or larger than that lost to the proposed development must be created
- The equal volume must apply at all levels between the lowest point on the site and the design flood level. Normally this is calculated by comparing volumes taken by the development and the volume offered by the compensatory storage for a number of horizontal slices through the range defined above. See Example of compensatory storage for a depiction of this.
- The thickness of a slice should be typically 0.2 metres. In the case of large flat sites or very steep sites this may be varied, for example for flat sites to 0.1 or even 0.05 metres. The slice thickness should be set to provide between ten and fifteen slices for such unusual sites.
- Compensatory storage must be provided equal to or exceeding the development for each of these slices

This approach allows you make a simple comparison of volumes to ensure there will be no net loss of flood storage. If a more complicated proposal is made by a developer, they'll need to back it up with more detailed analysis to allow you to reach a clear conclusion.

Liaison with the developer

The developer must prepare suitably detailed plans and calculations to show in their FRA how they'll achieve the 'no net loss' condition. Your pre-application discussions with the developer should agree the scope of the work prior to calculations being undertaken. The calculations must include the upper and lower levels over which the compensation works will apply, the slice thickness to be used and the general location of the works.

Acceptable compensation

The location of the compensation works must relate hydraulically and hydrologically to the location of the site. It may not be acceptable for a developer to propose compensation several kilometres away or separated from the site by a significant structure such as a weir or restrictive bridge. Each proposal must be judged on its own merits.

A developer may provide compensation as a block to match the development (that is, all the slices occupy the same plan area) or they may distribute the compensation in convenient locations around the site.

Important!

We must insist that excavation of the compensation is complete before infilling commences to ensure that flood plain capacity is maintained during construction of the development.

Compensatory storage in defended areas

Carry out a sensitivity test

In defended areas you must consider the need for compensation based on the results of a sensitivity test. The test can be assessed in three parts:

- What increase in flood levels may result from development in the defended area if the defences were breached or overtopped?
- What is the effect of this change, how much better or worse will flooding be to properties in particular?
- Are the effects acceptable, and what to do about it if not? Compensation will be an appropriate solution if the principle of development in the area is in accordance with PPS25

Identifying the changes

The (S) FRA for the development proposal must identify the resulting change. Rather than saying "the change in levels is X", it must say " if the change in levels is X, how many more or less properties will be at what changed risk of flooding?". If an increase of 0.12m means that water gets above the threshold of ten more properties in a design flood event then that is likely to be unacceptable. Proposals that would raise that level are either inappropriate and must be resisted, or compensatory storage or other mitigation works should be investigated.

If however the increase is 0.0012 m, it probably means (though the (S) FRA would have to demonstrate it) that no more properties would be flooded. This is more likely to be acceptable without the need for compensation.

In principle, flood risk must be reduced for up to and including the 1% fluvial and 0.5% tidal events and people must remain 'safe' during an extreme event.

Extra risk assessment required

This means some more work is required for the (S) FRA. We might need survey work to identify the extent of change of flooding (a ground level survey) or the numbers of houses at increased risk (a threshold or floor level survey). The developers need to carry out this extra work at their own expense.

Making sensitive decisions

Due to the fact that areas protected by defences are by their nature low lying and at risk of flooding, it can be difficult to find areas that are suitable for flood plain compensation in the vicinity. You'll have to decide if the sensitivity of the defended area is so great that compensation must be provided.

The ultimate outcome of your decision could be an objection (or consent refusal if applicable) as compensation is not feasible. We're unlikely to want to defend an appeal against our objection on the basis of lack of compensation within a defended area. We'll only want to defend our decision at appeal if the consequences of not compensating were very severe.

Consulting your internal colleagues

Considering our other duties

Although our primary concern when assessing compensation schemes is mitigating and reducing flood risk, we must also consider our wider duties. You must consult with your colleagues to ensure that we take account of our biodiversity, recreation and heritage duties, along with our CFMPs and Water Level Management Plans where they apply.

Biodiversity

Compensation schemes must conserve and where possible enhance the biodiversity value of a site. Developers should avoid areas of particular conservation interest when selecting sites. This not only means sites with statutory designations and protected species but also higher quality local environments such as county wildlife areas.

We must not promote or allow developers to undertake ground lowering or raising close to trees without the approval of a qualified tree specialist. This is because roots can be damaged and trees made unstable.

Suitable planting of the compensation area should form part of a scheme wherever possible. Planting within a compensation area should comprise native species, preferably of local origin, and bearing in mind the increased frequency and duration of flooding.

All compensation works must be sustainable on a long term basis and include provision for appropriate maintenance of the planting.

Our wetlands policy

Where developers are providing compensatory storage close to normal river levels, you should promote the creation or restoration of wetlands. You should also make developers aware of any opportunities to improve river corridors and add value to the landscapes character.

Our wetlands policy states:

- "We will take action to conserve, enhance and re-create the wetland capacity of catchments as part of our contribution to rebuilding the biodiversity of England and Wales on a landscape scale"
- "We will work to secure the long term sustainable management of wetlands when planning and implementing our regulatory and operational business, thereby meeting our local, national and international responsibilities"
- "The role of wetlands in reducing floods will be recognized, and the environmental benefits from natural floods will be maximised"

Where possible you must promote the enhancement of existing wetland features in the locality of a scheme, particularly those of importance to species covered by a Biodiversity Action Plan (BAP).

Landscape

Compensation schemes should at least conserve and where possible enhance the landscape value of a site. Developers must avoid areas of particular landscape interest when selecting sites for compensatory storage. This not only means designated sites but also higher quality local sites taking on board landscape character.

Recreation	We must consider both existing and future recreation needs when considering compensation schemes. Developers can use compensation areas to provide open spaces associated with a development, however these areas are by their nature liable to flooding. Compensation areas can place access such as footpaths at risk from flooding, and developers may need to divert such routes to keep them passable in times of flood.
Heritage	Our heritage duty applies to buildings and sites of archaeological, architectural or engineering interest. Developers must protect these features when providing compensation schemes, for example they should avoid excavating alongside foundations. Developers may need to refer to a county archaeologist or similar person if they expect any archaeological finds. Developers should be made aware of their heritage obligations by the LPA, but as promoters of the need for compensation works we should also point out the heritage implications.

Unacceptable options for compensation schemes

Our position	As stated earlier we don't favour indirect replacement of flood storage. We're likely to object to any such proposal, in the first instance at least, however you must consider each proposal on its own merits.

Some unacceptable examples

We are likely to consider the following examples unacceptable options for compensatory flood storage:

- Excavating a hole in the flood plain below the level of the development. During extreme events this may already be full and therefore offer no storage during a flood. This is direct compensation but it's not 'level for level'.
- Excavating a landlocked area isolated from the flood plain or linked by a narrow access such as a culvert. These are prone to accidental blocking and infilling, especially when only used every few years. This is a form of indirect compensation.
- Providing low level compensation to match high level development or vice versa. This arrangement will affect how the compensatory flood plain operates relative to the pre-development condition of the site, and therefore doesn't replicate the natural behaviour of the flood plain.
- Works that will damage sensitive habitats or the heritage of the site.
- Works that may place surrounding properties at risk. For example, lowering the ground level close to 'at risk' properties, thereby increasing their flood risk further.
- The use of stilts or voids. This is not flood plain compensation, it's mitigation of risk. The use of stilts reduces the impact on the development but does not guarantee that the flood plain will be retained in the same way as a compensation scheme (which is a form of risk substitution). Although you mustn't consider it at this stage, this option may be appropriate in some circumstances.

Note: Further guidance on the use of stilts and voids is available in the revised PPS 25 Practice Guide.

Liaising with local planners

Planning permission

Due to our limited powers to impose our requirements on developers, we should seek to have developers include their compensation scheme in their request for planning permission. Proposals for a compensation scheme will form part of the developer's FRA and can, once agreed usually be covered by a 'Grampian' condition. Developers are likely to need a Section 106 agreement if any component of their compensation scheme is outside the application site. This is likely if we're suggesting works remote to the site as a result of a CFMP or similar.

Pre-application discussions

We must encourage pre-application discussions in all cases. Developers may be able to provide a complete acceptable scheme prior to applying for planning permission, which can then go into the planning application. They may require a byelaw consent in some cases (for works affecting the flood plain or within the margin of a main river) but the scheme must also be addressed through the planning consultation.

Objecting

If we are consulted on a planning application that doesn't contain an acceptable compensation scheme, we must object to the application. Our objection must remain in place until we agree a scheme as part of the FRA.

Protecting future land use

We must insist that the future land use of the compensation area is guaranteed by legal agreements, as there can be pressure to build on open spaces many years after they were designated as compensatory flood plain. Both we and the LPA will need to keep records showing the presence of compensation areas, and to record them in NFCDD. It may be appropriate for us to designate compensation areas as flood storage areas (and hence functional flood plain in PPS25).

Maintaining flood plain capacity during phased works

Where a development is built in phases, developers have two options regarding providing compensatory storage. They can:

- provide the complete compensation scheme in advance of development work starting.

or

- provide a compensation area matching the volume of each phase in advance of that stage commencing.

Adhering to these options ensures that flood plain capacity is maintained during the entire construction period of the development.

'As built' surveys'

The developer must provide us with an 'as built' survey to ensure they've complied with their planning approval and to allow us to alter our flood zones if required. This requirement is equally important to the developer as if it's not done, the development may be shown as being within a flood plain, which will affect its ability to be sold and insured.

What about maintenance?

Direct, level for level schemes should be self maintaining with respect to their flood storage aspects, as there are no structures involved. Developers will however need to provide for their maintenance with respect to their landscaping, biodiversity and other aspects in their planning application. More complex schemes will need approved maintenance plans and funding to ensure they are maintained – we will need to approve these jointly with the LPA, though the LPA will enforce it. Normally we expect the future occupiers of the development (either individuals, or more commonly companies maintaining grounds) or local authority to carry out the maintenance

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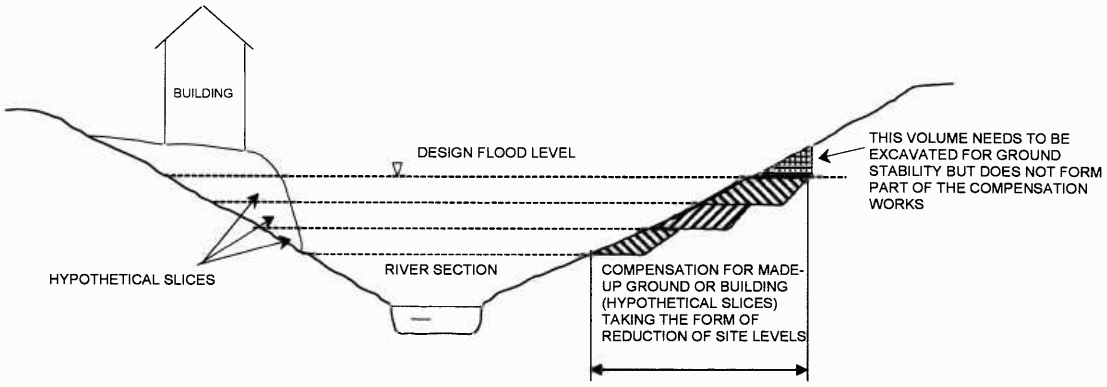
Related documents

Links

- 123_04 A policy for wetlands in England and Wales
- Planning Policy Statement 25 (PPS25)
- Updated PPS25 Practice Guide
- CIRIA report 624 – Development and flood risk – guidance for the construction industry (requires purchase)

Example of compensatory storage



Any loss of flood storage must be compensated for by the reduction in level of nearby ground, such that the same volume is available at every flood level before and after the works and it can freely fill and drain. In other words, in order to mirror the existing situation for a particular flood, each stage or level (say at 0.2 metre vertical intervals for example) is provided with the same storage volume, cut and fill must equate on a level for level basis.

The timing at which the storage effect comes into operation is significant. If this volume is reduced for any stage of a flood then the lost storage results in floodwater being diverted elsewhere, leading to third party detriment. The detriment caused by a small encroachment may not be significant, or even measurable, when taken in isolation but the cumulative effect of many such encroachments will be significant.

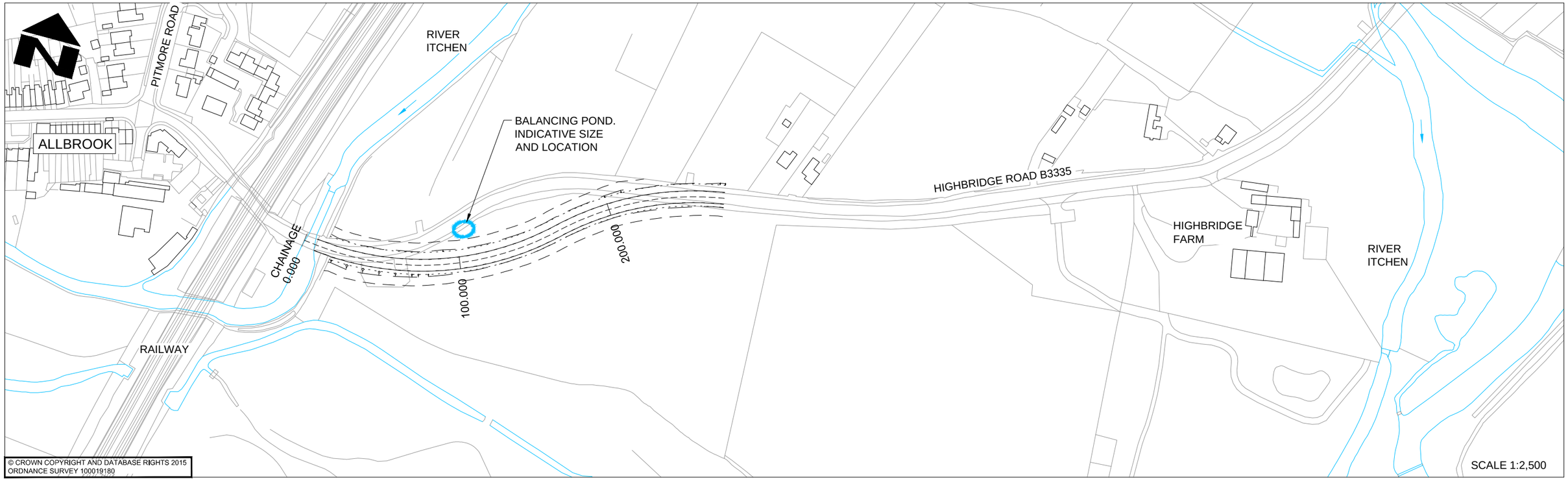
Wherever possible schemes should not impact on the channel of the river. However, if as a result of forced changes in flow and velocity suitable bed and bank erosion protection may need to be provided as necessary, and maintained in perpetuity to ensure a stable hydraulic system is upheld

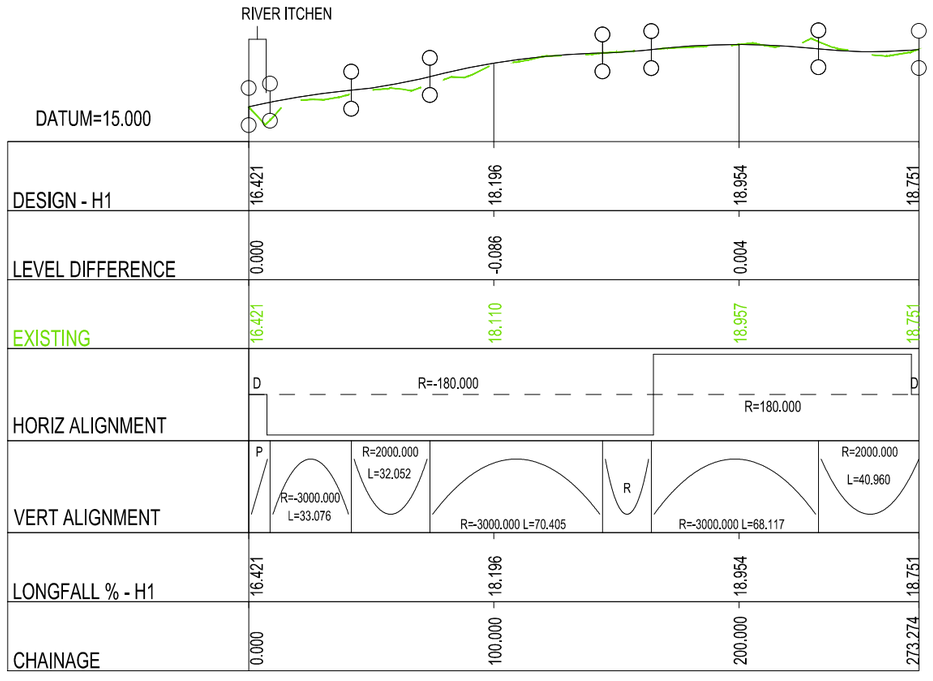
It is not adequate compensation to:

- *excavate holes in the floodplain*
- *create landlocked areas of lower ground, even if connected to the main floodplain by channels or culverts*
- *provide low level volumes to replace high level floodplain and vice-versa*

APPENDIX H

OPTIONS DRAWINGS





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NOTES

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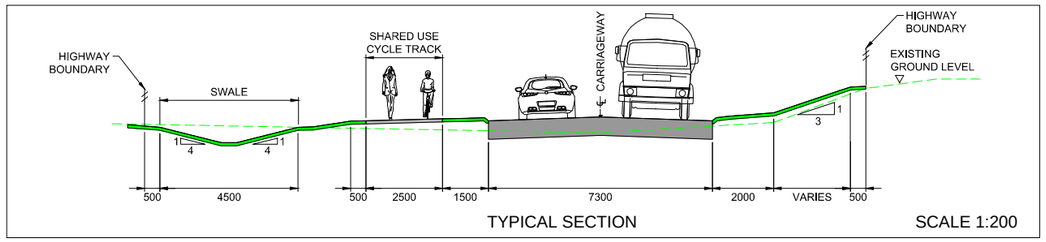
2. SEE DRG.No EC/RJ567621/01/001 FOR LOCATION PLAN.
3. TYPICAL SECTION DETAILS ARE INDICATIVE.
4. SWALE & DITCH REQUIREMENTS TO BE CONFIRMED WITH DETAILED DRAINAGE DESIGN.
5. BATTER SLOPE ANGLE TO BE CONFIRMED WITH SOIL INVESTIGATION.



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STRATEGIC TRANSPORT

CONSULTANT

Hampshire County Council Engineering Consultancy

STUART JARVIS BSc DipTP FCIHT MRTPI: DIRECTOR OF ECONOMY, TRANSPORT & ENVIRONMENT

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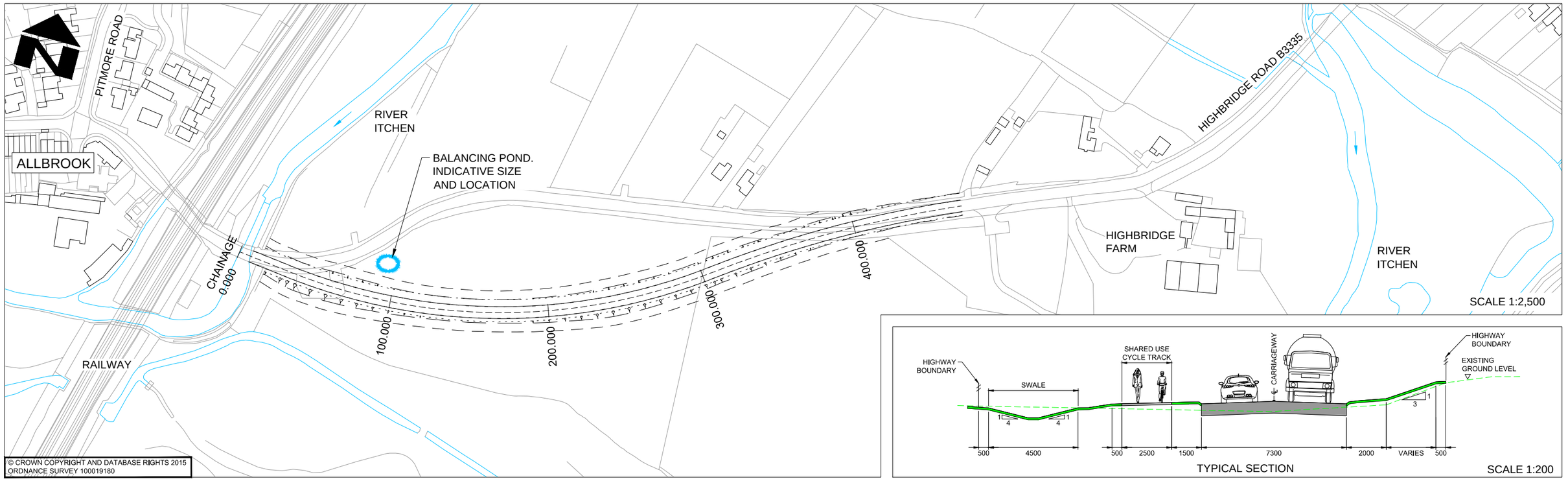

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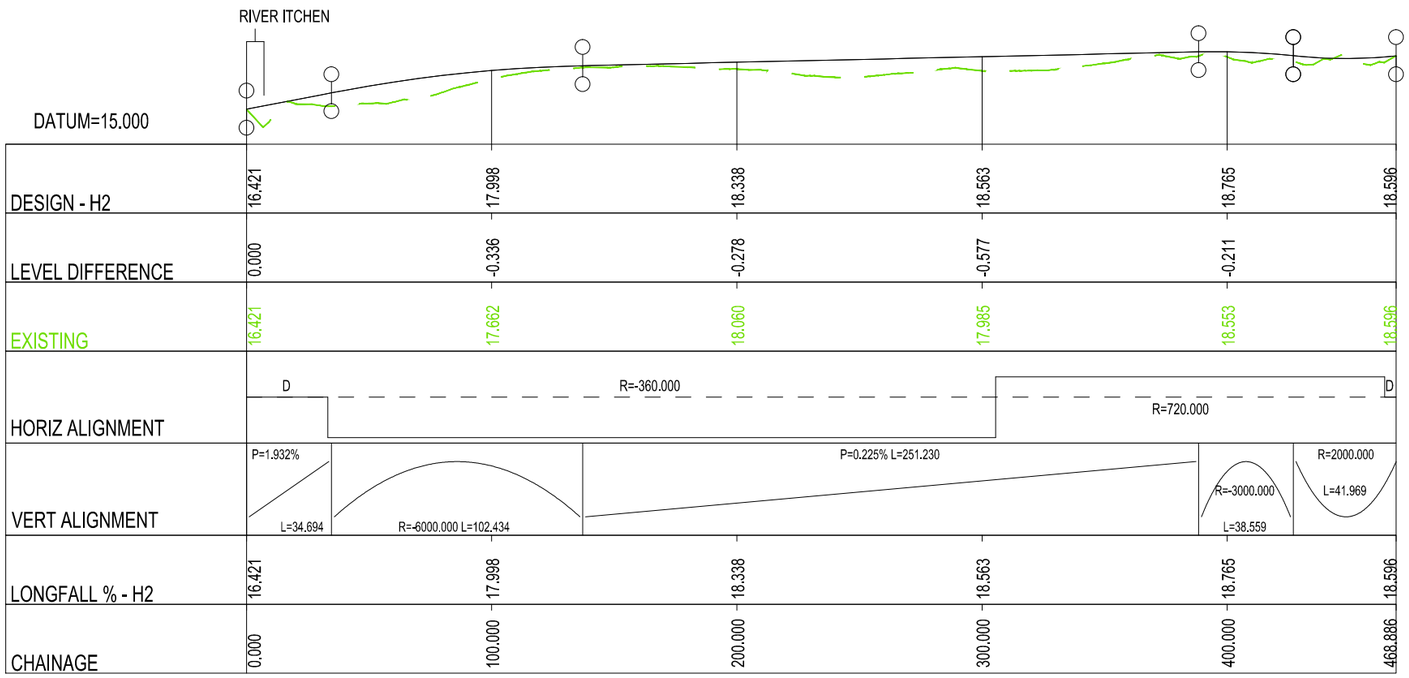

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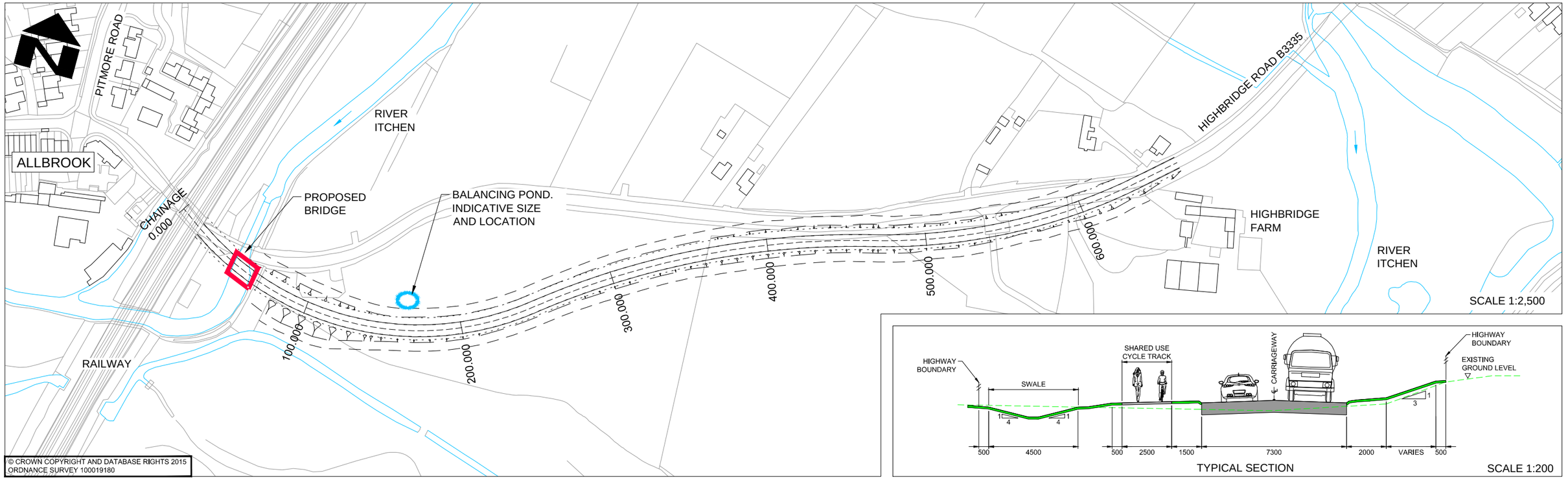

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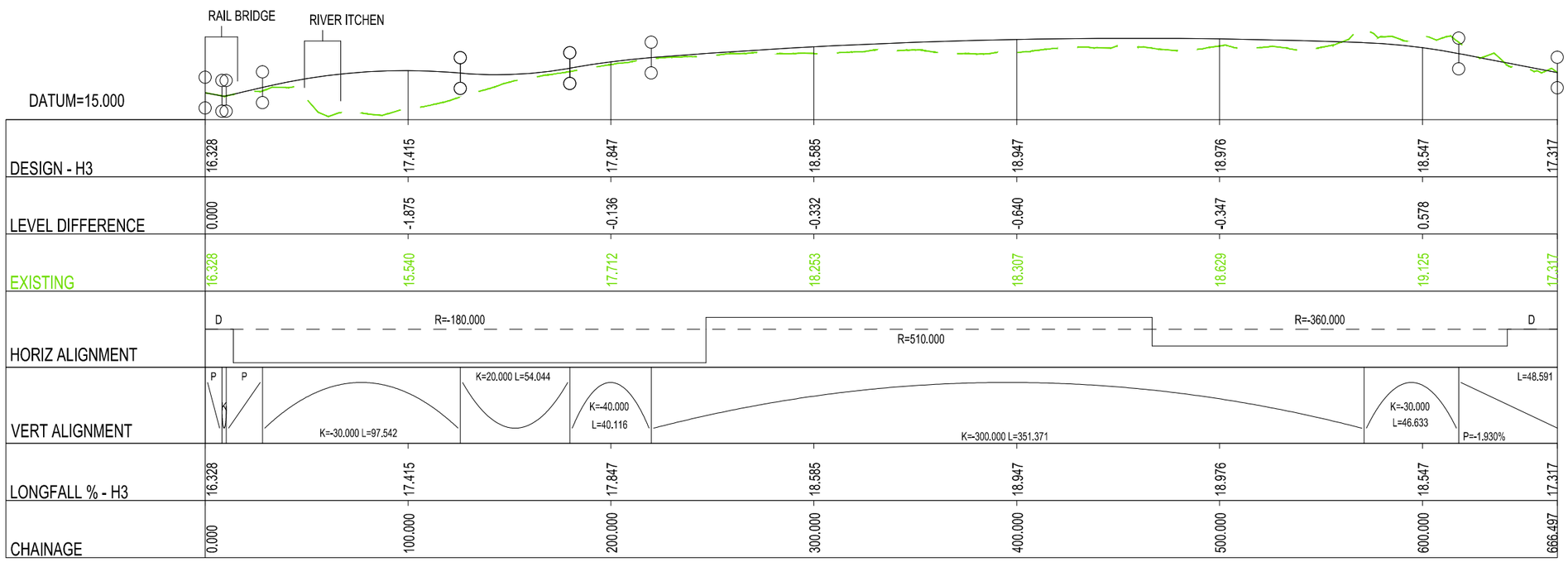

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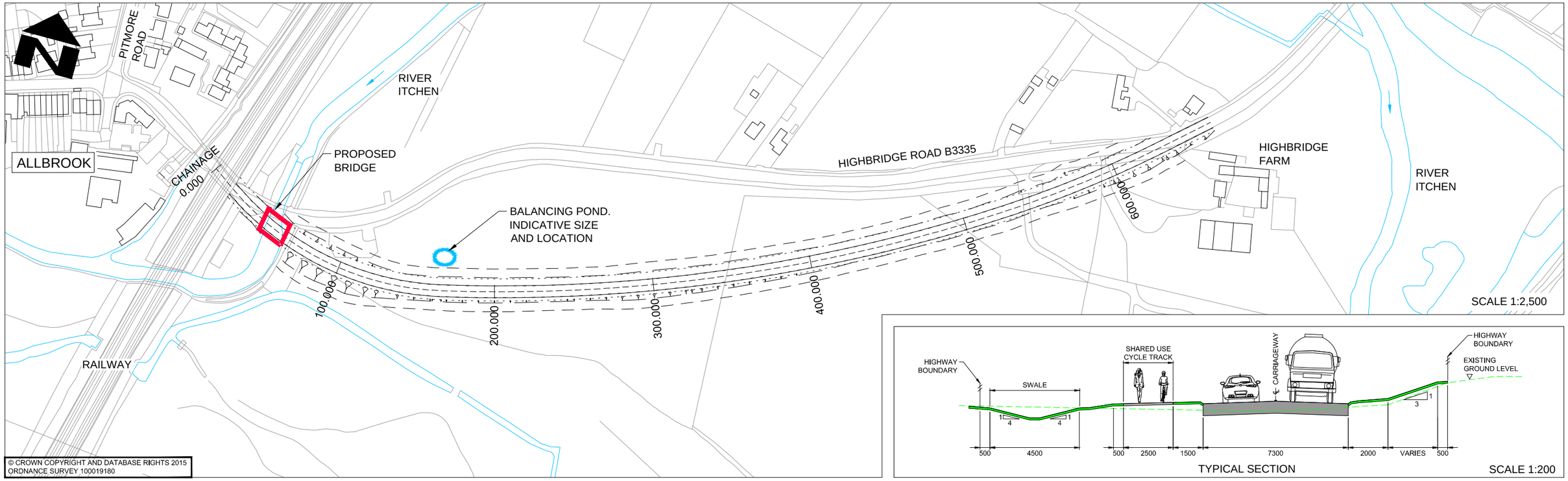

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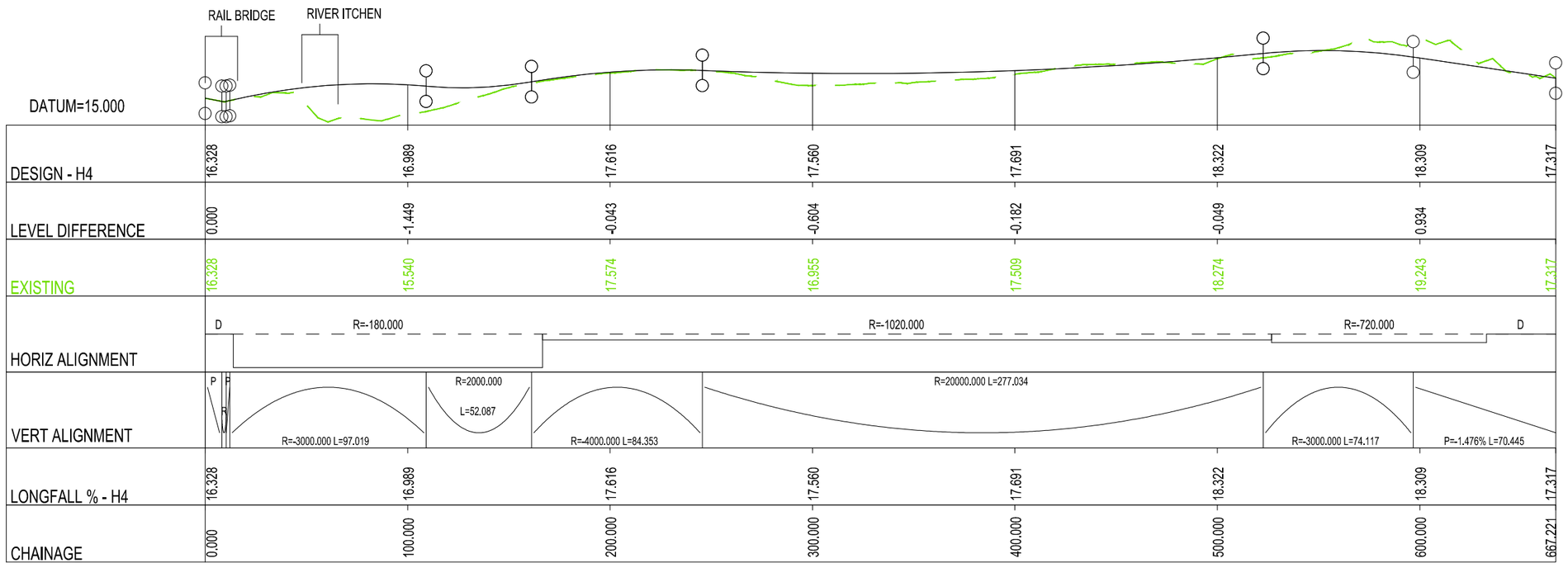

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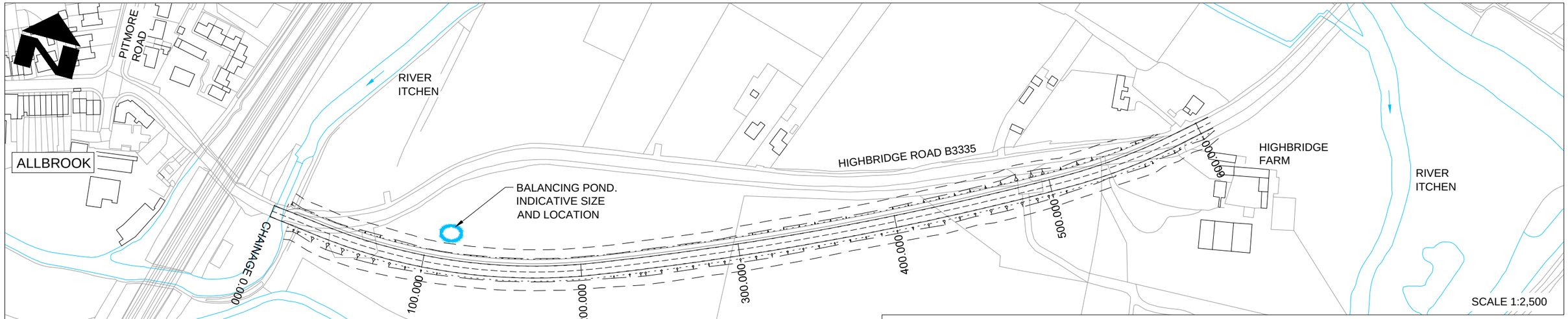

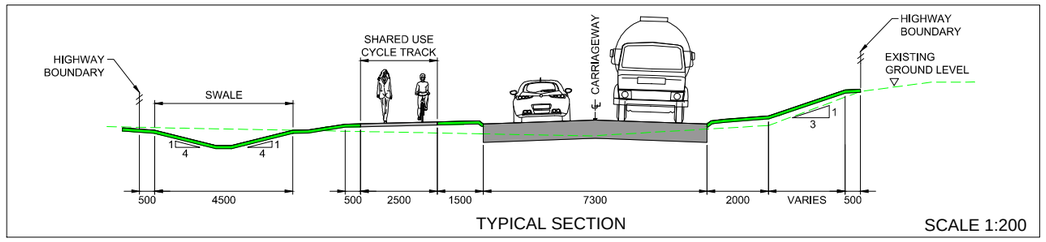

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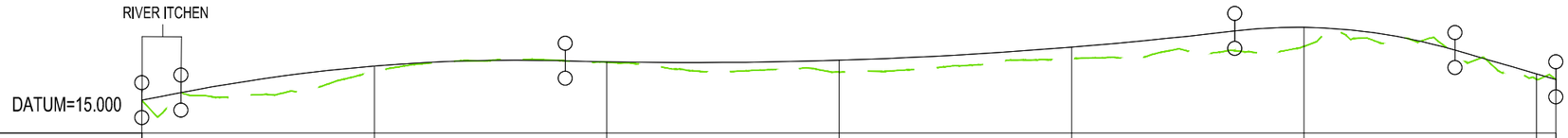

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APPROVED	CM | CM

SCHEME

EASTLEIGH STRATEGIC TRANSPORT STUDY

JOB No.

DRAWING TITLE

NORTH BISHOPSTOKE BYPASS
HIGHBRIDGE ROAD
OPTION H5
PLAN & PROFILE

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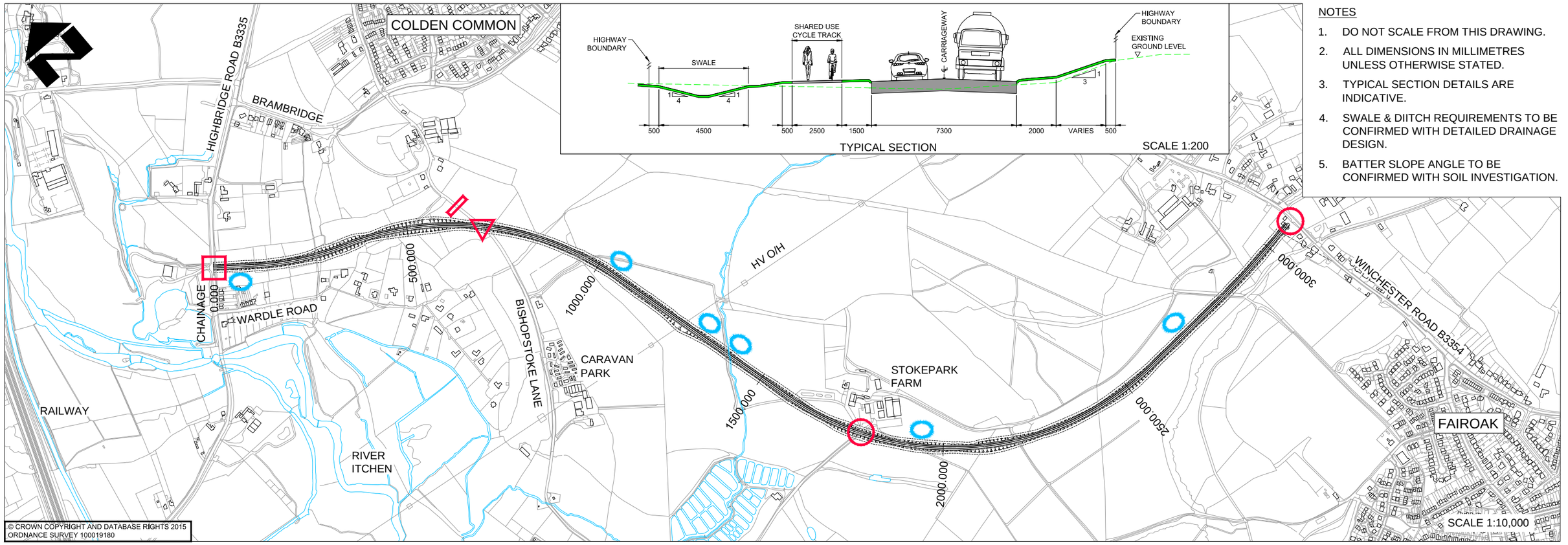

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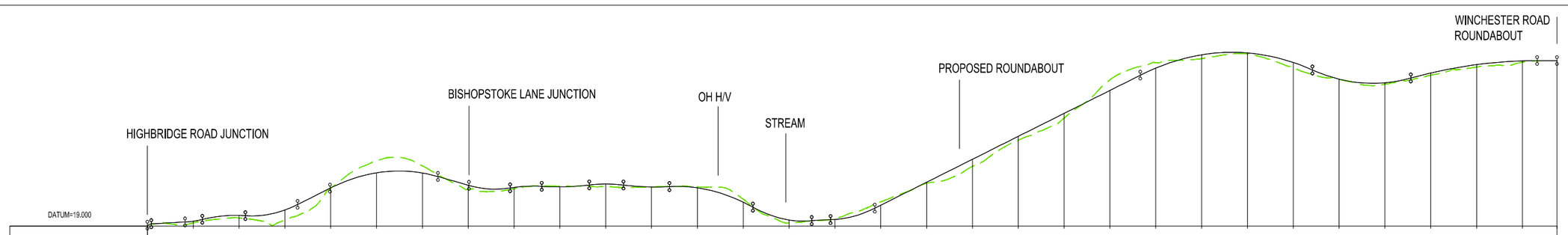

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KEY

- PROPOSED SIGNAL JUNCTION
- PROPOSED ROUNDABOUT
- PROPOSED GHOST ISLAND
- PROPOSED TURNING HEAD
- BALANCING POND. INDICATIVE SIZE AND LOCATION

SCALE H1:10,000
V1:1,000

REV	AMENDMENTS	DATE	CAD	CHKD	APPD

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APPROVED	CM | CM
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DRAWING NUMBER	EC/RJ567621/01/031
REV	

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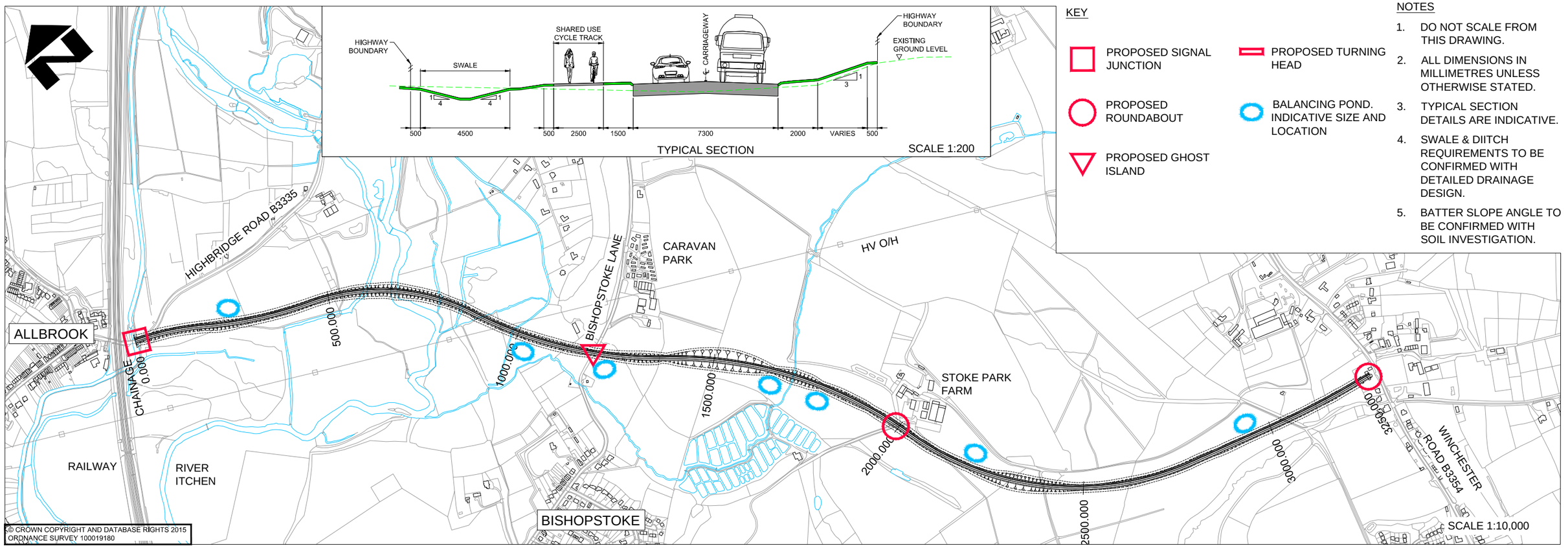
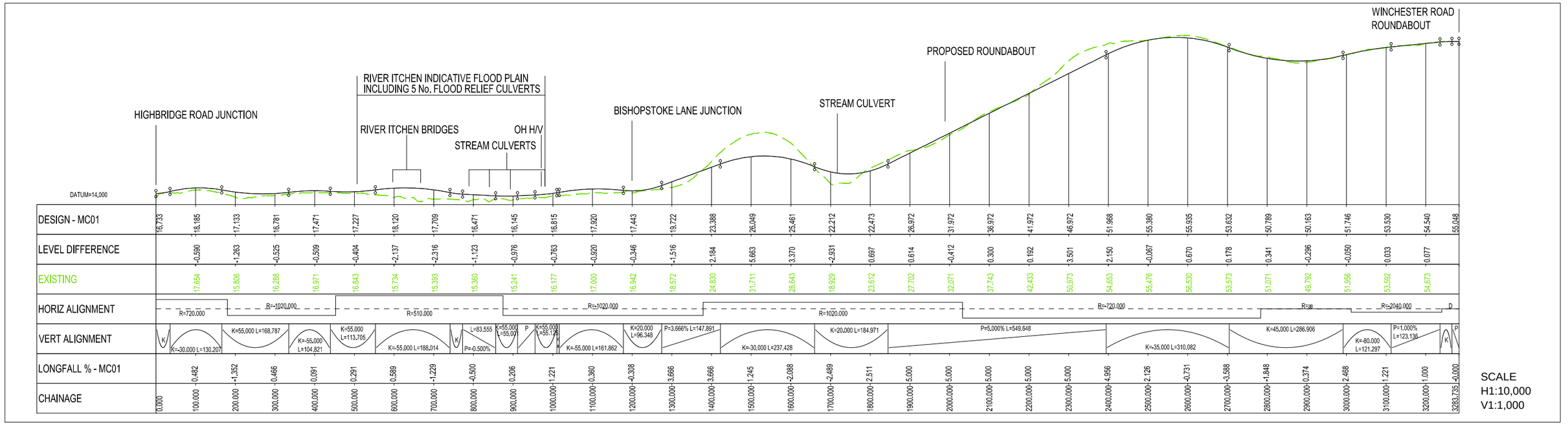




REV	AMENDMENTS	DATE	CAD	CHKD	APPD	

CLIENT

HAMPSHIRE COUNTY COUNCIL
ECONOMY, TRANSPORT AND ENVIRONMENT DEPARTMENT
STRATEGIC TRANSPORT

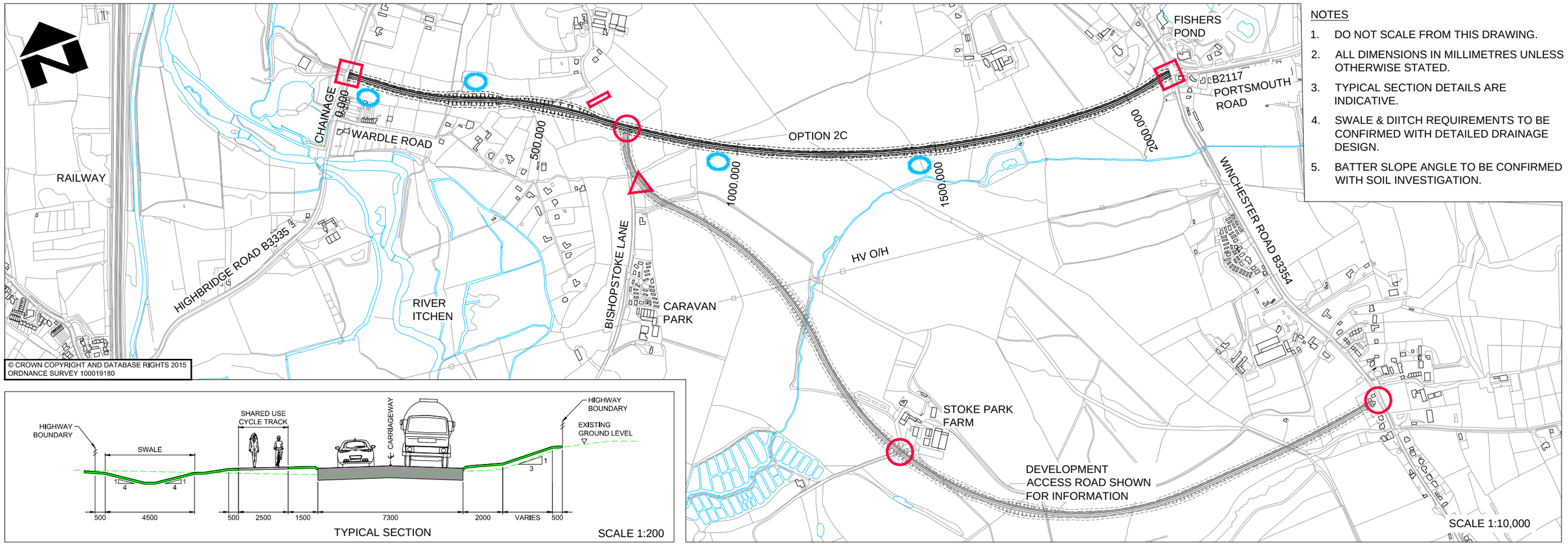
CONSULTANT

Hampshire County Council Engineering Consultancy

STUART JARVIS BSc DipTP FCIHT MRTPI: DIRECTOR OF ECONOMY, TRANSPORT & ENVIRONMENT

DESIGNER RW	SCHEME		DRAWING TITLE	
CAD DF			NORTH BISHOPSTOKE BYPASS OPTION 2B PLAN & PROFILE	
CHECKED LW | LW	EASTLEIGH STRATEGIC TRANSPORT STUDY			
APPROVED CM | CM	JOB No.		HCC CAD PLOT: 11/12/2015 9:52:50	
	SCALE @ A3: AS SHOWN	DATE: 24.08.2015	SHEET NUMBER: 1 OF 1	DRAWING NUMBER: EC/RJ567621/01/032 REV

HCC CAD FILE: K:\Eng\Roads\Schemes\RJ567621.01 - Eastleigh Strategic Study\AutoCAD\General\01- North Bishopstoke Bypass\EC_RJ567621-01-032 PLAN & PROFILES.dwg

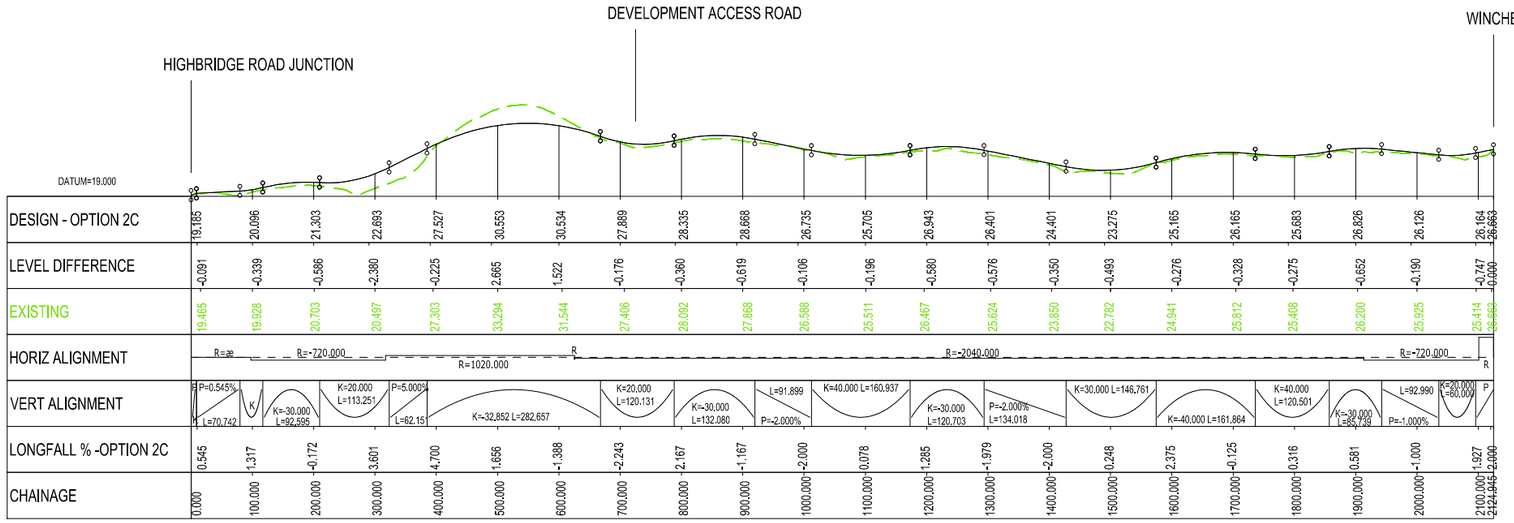


TYPICAL SECTION

SCALE 1:200

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
3. TYPICAL SECTION DETAILS ARE INDICATIVE.
4. SWALE & DIITCH REQUIREMENTS TO BE CONFIRMED WITH DETAILED DRAINAGE DESIGN.
5. BATTER SLOPE ANGLE TO BE CONFIRMED WITH SOIL INVESTIGATION.



KEY

- PROPOSED SIGNAL JUNCTION
- PROPOSED ROUNDABOUT
- PROPOSED GHOST ISLAND
- PROPOSED TURNING HEAD
- BALANCING POND. INDICATIVE SIZE AND LOCATION

SCALE H1:10,000
V1:1,000

REV	AMENDMENTS	DATE	CAD	CHKD	APPD

CLIENT
HAMPSHIRE COUNTY COUNCIL
ECONOMY, TRANSPORT AND ENVIRONMENT DEPARTMENT
STRATEGIC TRANSPORT

CONSULTANT
Hampshire County Council Engineering Consultancy
STUART JARVIS BSc DipTP FCIHT MRTPI: DIRECTOR OF ECONOMY, TRANSPORT & ENVIRONMENT

DESIGNER	RW
CAD	DF
CHECKED	LW | LW
APPROVED	CM | CM

SCHEME
EASTLEIGH STRATEGIC TRANSPORT STUDY
JOB No.

DRAWING TITLE
NORTH BISHOPSTOKE BYPASS
OPTION 2C
PLAN & PROFILE
HCC CAD PLOT: 11/12/2015 9:53:05

SCALE @ A3	DATE	SHEET NUMBER	DRAWING NUMBER	REV
AS SHOWN	24.08.2015	1 OF 1	EC/RJ567621/01/033	

HCC CAD FILE: K:\Eng\Roads\Schemes\RJ567621.01 - Eastleigh Strategic Study\AutoCAD\General\01- North Bishopstoke Bypass\EC_RJ567621-01-033 PLAN & PROFILES.dwg

APPENDIX J

OPTIONS ASSESSMENT TABLE

Allbrook Hill			Option 1A		Option 1B		Option 1C	
Factor	**Consideration**	**Assessment**	**Tick**	**Justification**	**Tick**	**Justification**	**Tick**	**Justification**
Operation	Connectivity and economy of junction provision Accident prevention	Negative - 1	✓	Five-arm roundabout provided at bottom of hill connecting the Relief Road, Pitmore Road, Highbrideg Road, Osborne Mews and Albrook Hill. Five-arm roundabouts are considered to be high risk for accidents, particularly for such a small ICD.		The Relief Road and Highbridge Road become continuous, with staggered priority junctions provided for Pitmore Road and Osborne Mews. Allbrook Hill connects to Osborne Mews. The staggers are left to right, which is not the preferred way round. The junctions are at the bottom of a steep hill.		The Relief Road and Highbridge Road become continuous. A priority junction is provided with Pitmore Road. No access from Allbrook Hill or Osborne Mews to the Relief Road. Reduces the number of potential conflicts by having just a single junction on the new road.
		2						
		3			✓			
		4						
		Positive - 5					✓	
Impact on Environmental Constraints	Increase in noise Impact on listed buildings	Negative - 1		Will bring traffic noise to the rear of the properties on the north side of Allbrook Hill and the west side of Pitmore Road. Frontages of the properties on Allbrook Hill will benefit from some reduction in traffic noise. Minimal impacts on Allbrook Farmhouse, a Grade II listed building.		Will bring traffic noise to the rear of the properties on the north side of Allbrook Hill and the west side of Pitmore Road. Frontages of the properties on Allbrook Hill will benefit from some reduction in traffic noise. Widened road impacts on Allbrook Farmhouse, a Grade II listed building.		Will bring traffic noise to the rear of the properties on the north side of Allbrook Hill and the west side of Pitmore Road. Properties on Allbrook Hill will benefit from removal of through traffic, and subsequent reduction traffic noise. Widened road impacts on Allbrook Farmhouse, a Grade II listed building.
		2	✓		✓			
		3					✓	
		4						
		Positive - 5						
Impact on Statutory Undertakers Plant	Number of existing services on route of bypass	Negative - 1		Diversionary works required at tie-ins to existing network. Minimal private services within greenfield section.		Diversionary works required at tie-ins to existing network. Minimal private services within greenfield section.		Diversionary works required at tie-ins to existing network. Minimal private services within greenfield section.
		2	✓		✓		✓	
		3						
		4						
		Positive - 5						
Land-take	Extent of land-take and number of different landowners	Negative - 1		Requires the demolition of four residential properties - the first four on the west side of Pitmore Road. Requires land from one more residential property on the west side of Pitmore Road, plus the first residential property on the east side of Pitmore Road, plus the first property on Allbrook Hill, north-west side.	✓	Requires the demolition of four residential properties - the first four on the west side of Pitmore Road. Requires land from one more residential property on the west side of Pitmore Road, plus the first residential property on the east side of Pitmore Road, plus the first property on Allbrook Hill, north-west side, Allbrook Farmhouse, and the landscaping area to the front of Osborne Mews.	✓	Requires the demolition of four residential properties - the first four on the west side of Pitmore Road. Requires land from one more residential property on the west side of Pitmore Road, plus the first residential property on the east side of Pitmore Road, plus the first property on Allbrook Hill, north-west side, Allbrook Farmhouse, and the landscaping area to the front of Osborne Mews.
		2	✓					
		3						
		4						
		Positive - 5						
Adherence to Standards		Negative - 1		A gradient of 8% is a Departures from Standard (TD9/93 para 4.2). A design speed greater than 30mph will require additional vertical alignment DfS Detailed design may show that a small five arm roundabout may not meet junction design criteria.		A gradient of 8% is a Departures from Standard (TD9/93 para 4.2). A design speed greater than 30mph will require additional vertical alignment DfS		A gradient of 8% is a Departures from Standard (TD9/93 para 4.2). A design speed greater than 30mph will require additional vertical alignment DfS
		2						
		3						
		4	✓		✓		✓	
		Positive - 5						
Well Being	Protection from increased noise Severance and access to local amenities and services?	Negative - 1		Will bring traffic noise to the rear of the properties on the north side of Allbrook Hill and the west side of Pitmore Road. Frontages of the properties on Allbrook Hill will benefit from some reduction in traffic noise. Noise bunds / accoustic barriers can be installed along sections of the Relief Road as identified by noise calculations. No severance issue.		Will bring traffic noise to the rear of the properties on the north side of Allbrook Hill and the west side of Pitmore Road. Frontages of the properties on Allbrook Hill will benefit from some reduction in traffic noise. Noise bunds / accoustic barriers can be installed along sections of the Relief Road as identified by noise calculations. No severance issue.		Will bring traffic noise to the rear of the properties on the north side of Allbrook Hill and the west side of Pitmore Road. Properties on Allbrook Hill will benefit from removal of through traffic, and subsequent reduction traffic noise. Noise bunds / accoustic barriers can be installed along sections of the Relief Road as identified by noise calculations. Short diversion for traffic wanting to head east from Allbrook Hill and Osborne Mews.
		2						
		3	✓		✓			
		4					✓	
		Positive - 5						
Capital Cost (£m)	Approximate comparitive costs Cost includes:- 20% civils contingency 20% fees, site super and testing 21.6% Inflation (5%/yr for 4 years) 44% Optimism Bias	Highest - 1		£5.0m. Some widening of carriageway required for approachs to roundabout.		£5.7m. Widened carrigeway to provide for the two, staggered priority junctions. Includes optional dedicated left turn lane for N/B traffic on A335 Allbrook Way.		£5.7m. Widened carriageway to provide single priority junction. Includes optional dedicated left turn lane for N/B traffic on A335 Allbrook Way.
		2						
		3			✓		✓	
		4	✓					
		Lowest - 5						

Highbridge Road			Option H1		Option H2		Option H3		Option H4		Option H5	
Factor	**Consideration**	**Assessment**	**Tick**	**Justification**	**Tick**	**Justification**	**Tick**	**Justification**	**Tick**	**Justification**	**Tick**	**Justification**
Operation	Improved alignment Accident prevention	Negative - 1		Approximately 250m of new carriageway provided.		Approximately 450m of new carriageway provided.		Approximately 650m of new carriageway provided, plus a new river bridge.		Approximately 650m of new carrigeway provided, plus a new river bridge.		Approximately 600m of new carrigeway.
		2	✓	Eases left-hand and right-hand bends heading east from river crossing.		Takes out sharp reverse curves heading east from river crossing.		Takes out sharp reverse curves heading east from railway bridge, but maintains some reverse curvature.		Takes out sharp reverse curves heading east from railway bridge and removes later reverse curves.		Takes out sharp reverse curves heading east from river crossing and removes later reverse curves.
		3		May reduce accident risk to immediate east of railway bridge.	✓	May reduce accident risk to immediate east of railway bridge.						Reduces accident risks immediately to east of railway bridge, and outside Highbridge Farm.
		4					✓	Reduces accident risk to east of railway bridge.		Reduces accident risks immediately to east of railway bridge, and outside Highbridge Farm.	✓	
		Positive - 5							✓			
Impact on Environmental Constraints	Increase in noise Impact on flood plain Impact on listed buildings	Negative - 1		No direct impact on SAC, SSSI or SINCs in the area.Noise not an issue.		Reduces traffic noise to Roselea and Dunoon, two residential properties on the north side of Highbridge Road.		Reduces traffic noise to Roselea and Dunoon, two residential properties on the north side of Highbridge Road.		Reduces traffic noise to Roselea and Dunoon, two residential properties on the north side of Highbridge Road.		Reduces traffic noise to Roselea and Dunoon, two residential properties on the north side of Highbridge Road.
		2		New road completely in Zone 3 flood plain, but least of all options.		New road completely in Flood Zone 3.		New road completely in Flood Zone 3.		New road completely in Flood Zone 3, has most impact of all options.		New road completely in Flood Zone 3.
		3	✓	No impact on listed buildings.	✓	No impact on listed buildings.	✓	Moves traffic away from The Chapel House slightly, little impact on Highbridge Farmhouse.	✓	Moves traffic away from The Chapel House, little impact on Highbridge Farmhouse.	✓	Moves traffic away from The Chapel House, little impact on Highbridge Farmhouse.
		4										
		Positive - 5										
Impact on Statutory Undertakers Plant	Number of existing services on route of bypass	Negative - 1	✓	Diversionary works required at tie-ins to existing network. Minimal private services within greenfield section.		Diversionary works required at tie-ins to existing network. Minimal private services within greenfield section.		Diversionary works required at tie-ins to existing network. Minimal private services within greenfield section.		Diversionary works required at tie-ins to existing network. Minimal private services within greenfield section.		Diversionary works required at tie-ins to existing network. Minimal private services within greenfield section.
		2			✓		✓		✓		✓	
		3										
		4										
		Positive - 5										
Land-take	Extent of land-take and number of different landowners	Negative - 1		Approx 0.5 Ha of farmland required.		Approx 1.1 Ha of farmland required.		Approx 1.8 Ha of farmland required.		Approx 1.8 Ha of farmland required.		Approx 1.8 Ha of farmland required.
		2					✓		✓		✓	
		3			✓							
		4	✓									
		Positive - 5										
Adherence to Standards		Negative - 1		No new Departures from Standard identified at this stage.		No new Departures from Standard identified at this stage.		No new Departures from Standard identified at this stage.		No new Departures from Standard identified at this stage.		No new Departures from Standard identified at this stage.
		2										
		3										
		4	✓		✓		✓		✓		✓	
		Positive - 5										
Well Being	Protection from increased noise Severance and access to local amenities and services?	Negative - 1		Noise and severance not an issue.		Existing road outside Roselea and Dunoon will become a cul-de-sac providing a quieter environment. Short diversion for traffic depending on location of access.		Existing road outside Roselea, Dunoon and Highbridge Farm (north) will become a cul-de-sac providing a quieter environment. Short diversion for traffic depending on location of access.		Existing road outside Roselea, Dunoon and Highbridge Farm (north) will become a cul-de-sac providing a much quieter environment. Short diversion for traffic depending on location of access.		Existing road outside Roselea, Dunoon and Highbridge farm (north) will become a cul-de-sac providing a quieter environment. Short diversion for traffic depending on location of access.
		2										
		3	✓									
		4			✓		✓		✓		✓	
		Positive - 5										
Capital Cost (£m)	Approximate comparitive costs Cost includes:- 20% civils contingency 20% fees, site super and testing 21.6% Inflation (5%/yr for 4 years) 44% Optimism Bias	Highest - 1		£2.1m.		£3.1m.	✓	£5.9m.	✓	£6.0m.		£4.3m.
		2										
		3									✓	
		4			✓							
		Lowest - 5	✓									

North Bishopstoke Bypass			Option 2A		Option 2B		Option 2C	
Factor	**Consideration**	**Assessment**	**Tick**	**Justification**	**Tick**	**Justification**	**Tick**	**Justification**
Operation	Connectivity and economy of junction provision Accident prevention	Negative - 1		Approx 3.0km of new carriageway provided between Highbridge Road, just north of Wardle Road, and Winchester Road at Crowdhill. Signal controlled junction on Highbridge Road, priority junction with the southern part of Bishopstoke Lane (no access north), roundabout at Stokepark Farm to connect to new development, roundabout on Wincheaster Road. Additional priority junctions for new development as required. Potential to reduce the number of accidents on existing roads.		Approx 3.2km of new carriageway provided between Highbridge Road, just to the east of the railway bridge, and Winchester Road at Crowdhill. Signal controlled junction on Highbridge Road, priority junctions with Bishopstoke Lane, roundabout at Stokepark Farm to connect to new development, roundabout on Wincheaster Road. Additional priority junctions for new development as required. Potential to reduce the number of accidents on existing roads.	✓	Approx 2.1km of new carriageway provided between Highbridge Road, just north of Wardle Road, and Winchester Road at Fishers pond. Signal controlled junction on Highbridge Road, roundabout connecting to the southern part of Bishopstoke Lane (no access north), and the new development road, roundabout on Wincheaster Road. Potential to reduce the number of accidents on existing roads.
		2						
		3			✓			
		4	✓					
		Positive - 5						
Impact on Environmental Constraints	Environmental designations Impact on listed buildings Increase in noise Impact on flood plain	Negative - 1		No direct impact on SAC, SSSI or SINCs in the area. Joins Winchester Road opposite Fielders Farm Meadows SINC, and the Park Pale at Marwell Scheduled Monument. Passes within 100/150m of Hill Farmhouse and Woodcroft Lodge, on Bishopstoke Lane, grade II listed buildings. Increases noise to rear of properties on Wardle Road/Lordswood, and properties on Bishopstoke Lane. Crosses approx 50m of Flood Zone 3 north-west of Stokepark Farm	✓	Crosses River Itchen SAC and SSSI. Joins Winchester Road opposite Fielders Farm Meadows SINC, and the Park Pale at Marwell Scheduled Monument. Minimal noise impact. 2 bridges and 4 culverts required to cross approx 1.2km of Flood Zone 3 from Highbridge Road.		No direct impact on SAC, SSSI or SINCs in the area. Passes within 100/150m of Hill Farmhouse and Woodcroft Lodge, on Bishopstoke Lane, grade II listed buildings. Increases noise to rear of properties on Wardle Road/Lordswood, and properties on Bishopstoke Lane. Meets Flood Zone 3 at junction with Winchester Road.
		2	✓					
		3					✓	
		4						
		Positive - 5						
Impact on Statutory Undertakers Plant	Number of existing services on route of bypass	Negative - 1		Diversionary works required at tie-ins to existing network. Minimal private services within greenfield section.		Diversionary works required at tie-ins to existing network. Minimal private services within greenfield section.		Diversionary works required at tie-ins to existing network. Minimal private services within greenfield section.
		2	✓		✓		✓	
		3						
		4						
		Positive - 5						
Land-take	Extent of land-take and number of different landowners	Negative - 1		Approx 9 Ha of farmland required, more than half of which is earmarked for development.		Approx 10 Ha of farmland required, more than half of which is earmarked for development.		Approx 6 Ha of farmland required.
		2			✓			
		3	✓					
		4					✓	
		Positive - 5						
Adherence to Standards		Negative - 1		No new Departures from Standard identified at this stage.		No new Departures from Standard identified at this stage.		No new Departures from Standard identified at this stage.
		2						
		3						
		4	✓		✓		✓	
		Positive - 5						
Well Being	Protection from increased noise Severance and access to local amenities and services?	Negative - 1		Noise bunds / accoustic barriers can be installed along sections of the Bypass as identified by noise calculations. Severance of Bishopstoke Lane may be an issue.		Noise bunds / accoustic barriers can be installed along sections of the Bypass as identified by noise calculations. No severance issue.		Noise bunds / accoustic barriers can be installed along sections of the Bypass as identified by noise calculations. Severance of Bishopstoke Lane may be an issue.
		2						
		3	✓		✓			
		4					✓	
		Positive - 5						
Capital Cost (£m)	Approximate comparitive costs Cost includes:- 20% civils contingency 20% fees, site super and testing 21.6% Inflation (5%/yr for 4 years) 44% Optimism Bias	Highest - 1		£22.1m.	✓	£32.0m.		£15.7m.
		2						
		3	✓					
		4					✓	
		Lowest - 5						

APPENDIX K

COST ESTIMATES

North Bishopstoke Bypass - Full Scheme

Job No. R.J567621
Feasibility Estimate for SE7 Regional Framework

	Allbrook Hill Relief Road		Highbridge Road		Bypass		Total
	Option 1C		Option H2		Option 2A		
200 - Site Clearance	105,000		1,000		60,000		166,000
300 - Fencing and Barriers	29,420		36,656		238,200		304,276
400 - Safety Barriers	0		0		0		0
500 - Drainage and Ducts	241,213		125,605		1,003,311		1,370,129
600 - Earthworks	569,260		136,150		2,433,000		3,138,410
700 - Pavements	675,303		401,547		2,387,060		3,463,910
1100 - Kerbs, Footways and Paved Areas	179,412		92,379		590,715		862,506
1200 - Traffic Signs and Road Markings	12,000		1,750		35,750		49,500
1300 - Road Lighting	41,300		6,195		82,600		130,095
Structures	0		266,000		31,400		297,400
Special elements	10,000		10,000		111,000		131,000
Preliminaries and Temporary work	359,596		122,599		1,561,437		2,043,632
Price Fluctuation - Not Included	0		0		0		0
Civils total	2,222,504		1,199,881		8,534,473		11,956,858
Civils Contingency 15%	333,376		179,982		1,280,171		1,793,529
ITS	0		0		85,000		85,000
Landscaping 3%	57,785		31,197		221,896		310,878
Fees, Supervision, Support, Investigations 23.5%	761,438		411,084		2,943,918		4,116,440
Land - not included							
Utilities - covered in Risk Allowance							
Inflation - covered in Risk Allowance	0		0		0		0
Risk Register	626,498		338,233		2,405,769		3,370,500
Optimism Bias 44%	1,760,705		950,566		6,807,340		9,518,610
Grand Total	5,762,306		3,110,942		22,278,567		31,151,815
Construction Duration	48 Weeks		20 Weeks		78 Weeks		

Exclusions/Assumptions:
VAT - excluded
Construction detail as per Rob Ward Request for QS Services dated 14th September 2015
Allowed 600mm capping for main carriageway.
No allowance made for any PU Works, Gas, Comms and the like.
No allowance for site specific restrictions or environmental constraints.

North Bishopstoke Bypass - Allbrook Hill

PRE-RISK ALLOWANCE

Job No. R.J567621
Feasibility Estimate for SE7 Regional Framework

		Option 1A		Option 1B		Option 1C
200 - Site Clearance		105,000		105,000		105,000
300 - Fencing and Barriers		25,720		29,420		29,420
400 - Safety Barriers		0		0		0
500 - Drainage and Ducts		174,068		241,213		241,213
600 - Earthworks		623,190		570,060		569,260
700 - Pavements		563,228		676,723		675,303
1100 - Kerbs, Footways and Paved Areas		114,948		177,900		179,412
1200 - Traffic Signs and Road Markings		10,750		12,500		12,000
1300 - Road Lighting		41,300		41,300		41,300
Structures		0		0		0
Special elements		10,000		10,000		10,000
Preliminaries and Temporary work		267,820		360,306		359,596
Price Fluctuation - Not Included		0		0		0
Civils total		1,936,024		2,224,422		2,222,504
Civils Contingency	20%	387,205		444,884		444,501
ITS		0		0		0
Landscaping	3%	50,337		57,835		57,785
Fees	15%	348,484		400,396		400,051
Site Supervision	4%	92,929		106,772		106,680
Lab Test	1%	23,232		26,693		26,670
Land						
Utilities						
Inflation 5%/yr for 4 yrs compound	21.6%	613,054		704,377		703,769
Risk Register		0		0		0
Optimism Bias	44%	1,518,557		1,744,767		1,743,262
Grand Total		4,969,821		5,710,146		5,705,223
Construction Duration		16 Weeks		20 Weeks		20 Weeks

Exclusions/Assumptions:
VAT - excluded
Construction detail as per Rob Ward Request for QS Services dated 14th September 2015
Allowed 600mm capping for main carriageway.
No allowance made for any PU Works, Gas, Comms and the like.
No allowance for site specific restrictions or environmental constraints.

North Bishopstoke Bypass - Highbridge Road

PRE-RISK ALLOWANCE

Job No. R.J567621

Feasibility Estimate for SE7 Regional Framework

		Option H1	Option H2	Option H3	Option H4	Option H5
200 - Site Clearance		1,000	1,000	26,000	26,000	1,000
300 - Fencing and Barriers		22,152	36,656	51,308	51,308	46,942
400 - Safety Barriers		0	0	0	0	0
500 - Drainage and Ducts		73,726	125,605	179,316	179,316	166,980
600 - Earthworks		79,500	136,150	341,850	367,850	365,250
700 - Pavements		225,896	401,547	578,792	578,792	529,999
1100 - Kerbs, Footways and Paved Areas		52,143	92,379	132,997	132,997	121,728
1200 - Traffic Signs and Road Markings		1,750	1,750	1,750	1,750	1,750
1300 - Road Lighting		6,195	6,195	6,195	6,195	6,195
Structures		266,000	266,000	816,800	816,800	246,000
Special elements		5,000	10,000	10,000	10,000	10,000
Preliminaries and Temporary work		87,629	122,599	169,200	169,200	168,698
Price Fluctuation - Not Included		0	0	0	0	0
Civils total		820,991	1,199,881	2,314,208	2,340,208	1,664,542
Civils Contingency	20%	164,198	239,976	462,842	468,042	332,908
ITS		0	0	0	0	0
Landscaping	3%	21,346	31,197	60,169	60,845	43,278
Fees	15%	147,778	215,979	416,557	421,237	299,618
Site Supervision	4%	39,408	57,594	111,082	112,330	79,898
Lab Test	1%	9,852	14,399	27,770	28,082	19,975
Land						
Utilities						
Inflation 5%/yr for 4 yrs comp'd	21.6%	259,972	379,950	732,808	741,041	527,087
Risk Register		0	0	0	0	0
Optimism Bias	44%	643,960	941,149	1,815,192	1,835,586	1,305,615
Grand Total		2,107,504	3,080,124	5,940,629	6,007,372	4,272,920
Construction Duration		16 Weeks	20 Weeks	24 Weeks	24 Weeks	24 Weeks

Exclusions/Assumptions:
VAT - excluded
Construction detail as per Rob Ward Request for QS Services dated 14th September 2015
Allowed 600mm capping for main carriageway.
No allowance made for any PU Works, Gas, Comms and the like.
No allowance for site specific restrictions or environmental constraints.

North Bishopstoke Bypass - Bypass

PRE-RISK ALLOWANCE

Job No. R.J567621
Feasibility Estimate for SE7 Regional Framework

		Option 2A		Option 2B		Option 2C
200 - Site Clearance		60,000		60,000		17,000
300 - Fencing and Barriers		238,200		253,370		167,826
400 - Safety Barriers		0		0		0
500 - Drainage and Ducts		1,003,311		1,083,488		710,792
600 - Earthworks		2,433,000		3,754,900		1,535,920
700 - Pavements		2,387,060		2,558,495		1,724,889
1100 - Kerbs, Footways and Paved Areas		590,715		568,920		422,388
1200 - Traffic Signs and Road Markings		35,750		35,750		35,750
1300 - Road Lighting		82,600		82,600		82,600
Structures		31,400		2,401,000		0
Special elements		111,000		111,000		85,000
Preliminaries and Temporary work		1,561,437		1,561,437		1,206,480
Price Fluctuation - Not Included		0		0		0
Civils total		8,534,473		12,470,960		5,988,645
Civils Contingency	20%	1,706,895		2,494,192		1,197,729
ITS (£85,000 / Junction)		85,000		0		170,000
Landscaping	3%	221,896		324,245		155,705
Fees	15%	1,536,205		2,244,773		1,077,956
Site Supervision	4%	409,655		598,606		287,455
Lab Test	1%	102,414		149,652		71,864
Land						
Utilities						
Inflation 5%/yr for 4 yrs compound	21.6%	2,720,852		3,949,004		1,933,060
Risk Register		0		0		0
Optimism Bias	44%	6,739,651		9,781,830		4,788,262
Grand Total		22,057,041		32,013,262		15,670,676
Construction Duration		72 Weeks		72 Weeks		56 Weeks

Exclusions/Assumptions:
VAT - excluded
Construction detail as per Rob Ward Request for QS Services dated 14th September 2015
Allowed 600mm capping for main carriageway.
No allowance made for any PU Works, Gas, Comms and the like.
No allowance for site specific restrictions or environmental constraints.

APPENDIX L

RISK REGISTER

Risk Management - is a modern management discipline and is about getting the right balance between innovation and change on the one hand, and the avoidance of shocks and crises on the other

Putting Risk into Context - What objectives are we trying to achieve?

Identify risks

Risk: the **Effect** of **Uncertainty** on **Objectives**

Determine what the Uncertainties are
Cause + Consequence⇒Impact

Includes:
Threats & Opportunities

When:
Setting strategic aims
Setting business objectives
Early stages of project planning & key stages
Options appraisals
Service improvement plans
Determining risk-based priorities

Categories can help:
Strategic/Operational
Internal/External

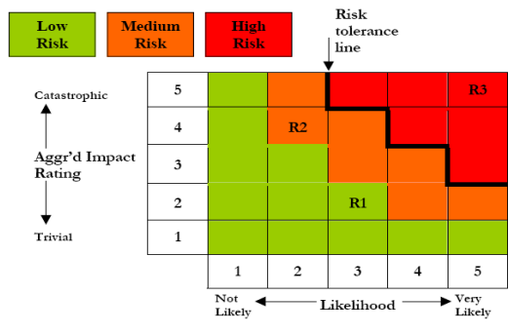
Best done in groups – by those responsible for delivering the objectives

Evaluate risks

Combination of the probability (**Likelihood**) of an event and its consequences (**Impact**)

Impact x Likelihood

Set ratings for levels of risk (e.g. what is a high, medium, low risk?)



Consider impact in Financial, Reputation and Business/Service terms

Determine what level of risk can be tolerated

Treat risks

Named person responsible for each risk

Concentrate on 10-15 Top Risks

What can we do to:
- influence the likelihood?
- influence the impact or consequences?
- influence the cause?

Avoid
Reduce
Transfer
Tolerate

Evaluate current control measures

Devise **Contingencies**
- Business Continuity Planning

Undertake identified risk treatment measures

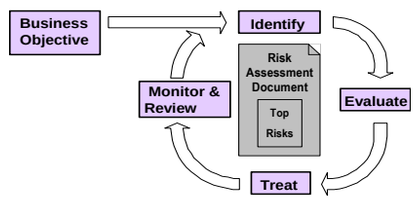
Monitor & Review

Risk Registers:
Baseline data to be prepared and monitored regularly. These should clearly indicate consequences, countermeasures and contingencies as well as the risk owner

Assessment before controls, with current control, with proposed controls

Review **Top Risks** regularly as agenda item

Report progress to senior management



Project Risk Register **CONFIDENTIAL**

Scheme Title: **North Bishopstoke Bypass** **Job Number:** **R.J567621.01**

Date of Assessment: 18/11/2015 **Client Manager:** **Walmsley**

Date of Last Assessment: **Project Manager:** **Linda Wickens**

<----------This section to be developed by CM and PM----------->

Risk ID	Risk Category	Description of Potential Risk	Effect of Risk Occuring	Mitigating Action	Residual Risk	Residual Risk Scoring			Financial Impacts				Risk Owner	Potential Programme Impact of Residual Risk	Comments (to include details of any revisions, date and who by)
						Impact	Likelihood	Risk Score	Lowest Cost Estimate	Highest Cost Estimate	Probability	Current Estimated Risk Value			
1	**Design**	Cost estimate exceeds budget due to work not identified within scope of project	Delays scheme and costs increase	Review and control changes to scope of works		**4**	**3**	**12**	£100,000	£200,000	0.350	**£52,500**	Client		
2	**Design**	Inadequate resources across disciplines to deliver the project	Delays scheme and costs increase	Consider alternative means of procuring design resources		**3**	**3**	**9**	£25,000	£100,000	0.350	**£21,875**	Design		
3	**Design**	EA or Natural England may have additional restrictions	Delays scheme and increases fee costs			**3**	**4**	**12**	£0	£300,000	0.650	**£97,500**	Design		
4	**Design**	Drainage design can only be finalised with SI info and details of existing drainage in the area.	Increases costs			**2**	**4**	**8**	£0	£50,000	0.650	**£16,250**	Design		
5	**Ecological/ Environmental**	Unknown cost and extent of existing tree removal	Increases costs			**2**	**2**	**4**	£0	£50,000	0.125	**£3,125**	Arboriculture		
6	**Ecological/ Environmental**	Unknown cost for Geophysical issues	Delays scheme and costs increase	Extensive trial pits to 5% of area be carried out		**2**	**2**	**4**	£5,000	£100,000	0.125	**£6,563**	Archaeology		
7	**Ecological/ Environmental**	Additional ecological mitigation measures				**4**	**4**	**16**	£0	£50,000	0.650	**£16,250**	Design		
8	**Ecological/ Environmental**	Habitat Regs Assessment costs				**2**	**4**	**8**	£0	£20,000	0.650	**£6,500**	Design		
9	**Statutory Undertakers**	SU services diversions and protection	Cost	None		**5**	**5**	**25**	£350,000	£1,500,000	0.900	**£832,500**	Design		
10	**Construction**	Unknown services encountered - inaccurate records	Delays scheme and costs increase	Trial pits to establish locations of services		**3**	**3**	**9**	£10,000	£200,000	0.350	**£36,750**	Design		
11	**Construction**	Adverse weather conditions during the works i.e Flooding requiring remediation such as de-watering	Delays scheme and increases works and fee costs			**2**	**2**	**4**	£25,000	£50,000	0.125	**£4,688**	Design		
12	**Construction**	Prolongation costs (site prelims and site super - £22,000/wk)	Delays scheme and costs increase			**3**	**4**	**12**	£20,000	£100,000	0.650	**£39,000**	Site		
13	**Construction**	Unforeseen ground conditions	Delays scheme and costs increase	Carry out full ground survey		**2**	**1**	**2**	£10,000	£100,000	0.025	**£1,375**	Design		
14	**Construction**	High groundwater may pose issues for excavations during construction; both structures and the pavement.	Delays scheme and costs increase			**2**	**3**	**6**	£100,000	£500,000	0.350	**£105,000**	Design		
15	**Construction**	It is hoped that surplus soil can be used elsewhere for bunds etc –there's a risk these soils will be unsuitable and hence disposal/import will be required (structural fill for embankments will probably need to be imported in any case				**2**	**2**	**4**	£50,000	£200,000	0.125	**£15,625**	Design		
16	**Maintenance**	Unable to secure suitable funding to support revenue costs for special non standard items				**2**	**3**	**6**	£0	£0	0.350	**£0**	Client		
17	**Programme**	Inflation				**5**	**5**	**25**	£700,000	£4,000,000	0.900	**£2,115,000**	Client		
									Sum Total of Forseen Risk			**£3,370,500**			

http://intranet.hants.gov.uk/project_risk_management.doc << click on link for guidance or refer to scoring criteria and examples attached for details

Please Note Contingencies should still be added for Unforseen Risk Occurring i.e. those not listed above

Scoring Criteria

What is the likelihood of the risk occurring?

The frequency-based score is appropriate in most circumstances and is easier to identify. It should be used whenever it is possible to identify a frequency.

Instructions for use

1 Define the risk(s) explicitly in terms of the adverse impacts(s) that might arise from the risk.

2 Use Table 1 to determine the impacts score(s) (I) for the potential adverse outcome(s) relevant to the risk being evaluated.

3 Use Table 2 to determine the likelihood score(s) (L) for those adverse outcomes. If possible, score the likelihood by assigning a predicted frequency of occurrence of the adverse outcome. If this is not possible, assign a probability to the adverse outcome occurring within a given time frame, such as the lifetime of a project. If it is not possible to determine a numerical probability then use the probability descriptions to determine the most appropriate score.

4 Calculate the risk score the risk multiplying the impact by the likelihood: I (impact) x L (likelihood) = R (risk score)

Table 1

Likelihood score	1	2	3	4	5
Descriptor	**Rare**	**Unlikely**	**Possible**	**Likely**	**Almost certain**
Frequency	This will probably never happen/recur	Do not expect it to happen/recur but it is possible it may do so	Might happen or recur occasionally	Will probably happen/recur but it is not a persisting issue	Will undoubtedly happen/recur,possibly frequently
How often might it/does it happen ?	(0 to 5% chance of occurrence)	(6 to 20% chance of occurrence)	(21 to 50% chance of occurrence)	(51 to 80% chance of occurrence)	(81 to 100% chance of occurrence)

Table 2

		Impact score (severity levels) and examples of descriptors				
		1	2	3	4	5
Domains		**Negligible**	**Minor**	**Moderate**	**Major**	**Catastrophic**
Cost		Small loss / Insignificant cost increase	<5 per cent over project budget	5–10 per cent over project budget	10–25 per cent over project budget	>25 per cent over project budget
		Variations manageable against internal project budget headings	Requires some additional funding from the programme	Requires significant additional funding from the programme	Requires significant reallocation of funds from programme	Increases threaten the viability of the programme
Time		Slight Slippage against internal targets	Slight slippage against key milestones or published targets	Delay affects key stakeholders & causes loss of confidence in the enterprise	Failure to meet deadlines in relation to priority outcomes	Delay jeopardizes viability of the enterprise or partnership
Quality	Business objectives/ projects	Barely noticeable reduction in scope or quality	Minor reduction in quality/scope	Reduction in scope or quality	Failure to meet secondary objectives	Failure to meet primary objectives
	Service/ business interruption	Little or no impact on service delivery	Minimal service disruption having limited impact on service delivery	Moderate service disruption having adverse impact on service delivery	Major service disruption having serious impact on service users	Major service disruption having serious impact on the public Permanent loss of service or facility
	Statutory duty/ inspections	No or minimal impact or breech of guidance/ statutory duty	Breech of statutory legislation Reduced performance rating if unresolved	Single breech in statutory duty Challenging external recommendations/ improvement notice	Multiple breeches in statutory duty Critical report /Improvement notices / Enforcement action Low performance rating	Multiple breeches in statutory duty Prosecution Complete systems change required Severely critical report

	Adverse publicity/ reputation	Rumours (Potential for public concern)	Local media coverage – short-term reduction in public confidence Elements of public expectation not being met	Local media coverage – long-term reduction in public confidence	National media coverage with <3 days service well below reasonable public expectation	National media coverage with >3 days service well below reasonable public expectation. Total loss of public confidence
	Sustainability / Environmental impact	Minimal or no impact on the environment or sustainability targets	Minor impact on environment or sustainability targets	Moderate impact on environment or sustainability targets	Major impact on environment or sustainability targets	Catastrophic impact on environment or sustainability targets

Table 3

		Likelihood				
		1	2	3	4	5
Impact score		**Rare**	**Unlikely**	**Possible**	**Likely**	**Almost certain**
5	**Catastrophic**	5	10	15	20	25
4	**Major**	4	8	12	16	20
3	**Moderate**	3	6	9	12	15
2	**Minor**	2	4	6	8	10
1	**Negligible**	1	2	3	4	5

red zone : risk unacceptable

Table 4

Risk Score	Risk Level	Recommended Response
15 – 25	High Threat	Risk : Immediate action or detailed planning to be included within implementation plans
8 - 14	Medium Threat	Measures to be included into action plans and monitored
1 - 7	Low Threat	Limited action and review will be undertaken