Oxford Flood Alleviation Scheme

Response to Regulation 25 request **February 2023**

Note: Response to letter dated 17 August 2022, further information required under Regulation 25 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. Response to additional further information request dated 9 November 2022.

Planning Application ref: MW.0027/22

Please note that the Oxfordshire County Council original request is in black text, Environment Agency response is provided in blue. The request responds to the following questions against the following elements:

- Biodiversity
- Soils
- Landscape (including points related to Heritage landscape impacts)
- Arboriculture
- Air Quality
- Flood Risk and Climate Change
- Groundwater Flood Risk (LLFA comments)

We have also provided further explanation in response to queries raised relating to the security of maintenance of the scheme.

Biodiversity

Both Biodiversity Officers state the MG4 grassland at Hinksey Meadows should be considered irreplaceable. National Planning Policy Framework (NPPF) paragraph 180 (c) states that development resulting in the loss or deterioration of irreplaceable habitats should be refused, unless there are wholly exceptional reasons, and a suitable compensation strategy exists. This should be covered in the alternatives section of the Environmental Statement (ES). More detail is needed in Section 2.3.3 of the ES (alternatives design options) when considering the impact of biodiversity when reviewing alternative schemes.

More information has been provided in relation to the process followed, the consideration of reasonable alternatives and the wholly exceptional reasons. Please see Section 2.3 and Appendix U of the ES Addendum which provides additional information on the process used to select the proposed channel route.

It is proposed to translocate some of the MG4 turfs, but this might not be successful,

the applicant has proposed the creation of 17.8ha of MG4 grassland by sowing from existing MG4 meadows. The area is broadly suitable in terms of hydrology and nutrient status. However, further information on the current habitat quality of the fields is required to understand the uplift in biodiversity value that would be achieved through the proposed seeding. It is apparent from the baseline habitat information submitted that some of these areas support more species-rich grassland, whilst others had been cut at the time of survey; further information on the existing botanical value of these fields is requested, as well as an assessment of the increase in biodiversity that would be achieved through their enhancement.

In the 2020 botanical survey, the majority of the proposed MG4 creation area was classified as g3c6 Other Neutral Grassland, in either good or moderate condition. There was also a small area of Modified Grassland in poor condition. The 2020 survey was carried out after the hay cut, meaning that a condition assessment could not be undertaken at that time. The notes in the 2020 survey explain that the conditions assigned were based on what had been seen on the site in the Spring.

In the 2022 botanical survey, presented in ES Addendum Appendix C-7, the majority of the proposed MG4 creation area was classified as g3c Other Neutral Grassland in moderate condition. There was also a small area of Modified Grassland in moderate condition. The 2022 survey was carried out before the hay cut so that a condition assessment could be undertaken at that time. This led to areas that had been classified as being in good condition (based on the flora in Spring 2020) to be classified as moderate.

As set out in the MG4 Mitigation Strategy, the aim will be to scarify, overseed and manage these areas with a hay cut and aftermath grazing, so that they become Lowland Meadow in Good Condition. We will be creating an area of MG4 that is twice the size of the existing area of MG4 in Hinksey Meadow and it will represent a significant uplift in biodiversity value. If fed into the metric, it would create around 280 habitat units and deliver a net gain of approximately 130 biodiversity units, but the loss of the irreplaceable MG4 lowland meadows and the proposed compensatory habitats have been excluded from the metric calculations, in line with guidance.

In relation to Kennington Pool Local Wildlife Site (LWS), further information is required on the consideration of the need for the scheme, and alternatives considered relating to Local Wildlife Sites and the mitigation hierarchy to be applied.

The background and need for the scheme is covered in Section 1 of the Environmental Statement. During the development of the design a number of options were considered, all of these avoided Local Wildlife Sites where possible. Please see Section 2.3 and Appendix U of the ES Addendum which explains further the consideration of options for the route of the scheme and in particular the areas of Hinksey Meadows and Kennington Pond. Mitigation for any remaining impacts on LWS's is addressed throughout the ES. However, if a separate mitigation strategy is required as a condition on any planning permission granted, we would be happy to comply with this.

The ES states in table 8.2 that some hedgerows along ancient boundaries and/or with old trees are considered irreplaceable; clarification is required as to whether any of these are to be lost?

The scheme will result in the loss of part of one species-rich hedgerow (HID59 in the 2020 botanical survey ES Appendix C-3) that is on the same boundary as a hedgerow illustrated on a

pre-1850 enclosure map (Figure 6a ES Appendix J-2 Heritage Desk Based Assessment). This is a hedgerow that divides horse paddocks to the south of South Hinksey.

The scheme will also result in the loss of one hedgerow with old trees (HID 16 in the 2020 botanical survey ES Appendix C-3). This is a line of shrubs and trees that have grown along the Hogacre Ditch, rather than a planted boundary feature. The hedgerow includes a line of crack willows which are old but aren't classified as veteran.

When using professional judgement alongside the NPPF definition of irreplaceable habitat (and the interpretation of this in Table 8.2) and looking specifically at the hedgerows in question, we do not consider that these two hedgerows qualify as irreplaceable habitat. Both hedgerows are not an uncommon habitat type and support mature willows as the dominant tree type. It is not technically difficult to recreate either the mix of hedgerow shrubs or the trees because willow is a relatively fast- growing species.

In relation to Strawberry Clover, the population at Oatlands Road Recreation ground is reported as being of County importance and is likely to be lost under the footprint of a raised embankment. It is stated that mitigation at this location is not practical. Please provide clarification as to how you have considered avoidance, mitigation and compensation measures, and why no options are being taken forward? Consideration should be given for the reinstatement of turves on the embankment, or elsewhere within the recreation ground, or populations established elsewhere in habitats to be created as part of the scheme.

The raised embankment cannot be moved further east to avoid the strawberry clover because this would lead to the loss of a line of mature trees between the park and Ferry Hinksey Road. Moving the embankment further to the west would lead to encroachment into the open space at Oatlands Road Recreation Ground. In order to mitigate for the impacts on strawberry clover, the turves that include the strawberry clover population can be lifted and carefully stored and watered before being reinstated in Oatlands Recreation Ground once the earthworks have been completed. The turves will be reinstated on the line of the informal footpath at the Willow Walk side of the park in order to replicate the damper, trampled conditions that the strawberry clover population is growing in at the moment. These mitigation measures are included in the updated Environmental Action Plan provided in Appendix G of the ES Addendum.

It is stated that an eDNA survey to establish the presence or absence of Great Crested Newts (GCN) at 3 ponds has not been possible since the ponds were dry at the point of survey in 2020, and recent communication confirms they are currently dry (May 2022). Confirmation should be provided as to whether these ponds are still considered to be potential GCN habitat, and the proposed approach to licensing (i.e. whether a development licence will be sought for the scheme, or use of the District Licence).

The three ponds in question have been dry every time we have tried to survey them and, as such, we do not consider them to be suitable GCN habitat. However, we will carry out pre-construction checks on the ponds and, should GCN be found, we will meet any licensing requirements and develop mitigation plans as necessary.

In terms of biodiversity net gain, DEFRA Biodiversity Metric 3.0 has been used to work out both gains and losses. A key principle of biodiversity net gain is that it does not change the protection afforded to biodiversity, therefore the legislation and policy considerations with regard to irreplaceable habitats, local wildlife sites and protected species still apply. The loss of the

irreplaceable MG4 lowland meadows and the proposed compensatory habitats have been excluded from the metric calculations, in line with guidance.

The condition scores are required to be reviewed, using the methodology in the Biodiversity Metric 3.1 Technical Supplement. A comparison of the interactive map and Figure 2 of the Biodiversity Net Gain Calculator Technical Memorandum highlights several issues[1]:

- There are inconsistencies between the conditions reported on the interactive map and Figure 2.

Figure 2 (Habitat Condition Baseline) has been updated so that it is consistent with the 2020 and 2022 botanical surveys. The updated figure is provided in Appendix S of the ES Addendum. The Biodiversity Metric Report 2023 IMSE500177-CH2-XX-ZZ-VS-EN-1111 also in Appendix S of the ES Addendum provides a description of changes.

- Many areas of modified grassland habitats are reported as being in poor condition, but it is unclear from the information supplied on which condition scores they failed. A comparison with the photographs and species lists supplied suggest they may not in fact be in poor condition e.g. potential sites east of Hinksey Meadow, earmarked for the creation of new MG4 grassland.

An additional botanical survey was undertaken in Summer 2022, the results of which can be found in ES Addendum Appendix C-7. Many of the areas that were previously classified as Modified Grassland have been changed to Other Neutral Grassland. The Defra Metric and associated Figure 1 (Baseline Habitat) have been updated accordingly. Please see Appendix S of the ES Addendum.

It is reported for some polygons that no condition assessment was undertaken, and yet the habitats are reported as being in poor condition. The Biodiversity Metric 3.0 Technical Supplement indicates that if survey limitations prevent any criteria from being confidently and accurately assessed, then a precautionary approach should be taken. If a definitive pass or fail cannot be assigned for condition criteria, then it should be assumed that they have passed. The assumed condition of on-site baseline habitats should be reviewed in accordance with this guidance, or additional data collected to support condition assessments.

Additional condition assessments were undertaken as part of the botanical survey in Summer 2022, the results of which can be found in Appendix C-7 of the ES Addendum. The Defra Metric and associated Figure 2 have been updated accordingly.

Please see the revised BNG calculator and the Biodiversity Metric Report 2023 IMSE500177-CH2-XX-ZZ-VS-EN-1111 which are provided in Appendix S of the ES Addendum.

It is noted that the functions in the metric for ‘habitat created in advance’ or ‘delay in starting habitat creation’ have not been used. Please confirm the timescales for implementing both on-site and off-site habitat creation and enhancement measures. The metric will need to be recalculated once reviewed.

The functions for the timing of habitat creation have been completed in the updated metric that is included with this submission. Please see the revised BNG calculator and the Biodiversity Metric Report 2023 IMSE500177-CH2-XX-ZZ-VS-EN-1111 which are provided in Appendix S of the ES

[1] The Interactive Map is accessed through the Habitat and Botanical Survey Report at ES Appendix C-3

Addendum.

The Biodiversity Officer states that off-site biodiversity net gain delivery is needed in order to deliver a net gain in hedge units, as well as to meet trading rules for high distinctiveness habitats. However, very little information is currently available as to where or when these off-site gains will be delivered. Information is required to be provided regarding potential off-site delivery areas and/or delivery bodies in order to give sufficient certainty that the off-site gains needed are achievable.

In terms of the off-site biodiversity, site selection criteria are required to be provided along with information around the location of, and arrangements for securing potential sites for off-site delivery as this is the remaining element where additional assurance is needed around deliverability.

We will need to provide wet woodland and reedbed off-site to meet the Metric's habitat trading rules. We will also need to create hedgerow off-site to achieve at least 10% net gain in hedgerows. The type and quantity of off-site habitats that we will create in order to deliver an overall 10% net gain is set out in the Off-Site tabs of the Defra Metric in Appendix S of the ES Addendum.

The Site Selection Criteria for Off-site BNG are provided in Appendix D of the Biodiversity Metric Report 2023 IMSE500177-CH2-XX-ZZ-VS-EN-1111 in Appendix S of the ES Addendum. Using the selection criteria, we have identified a number of suitable sites, ranging from less than 0.5km from the Scheme area to less than 15km; all within Oxfordshire.

For delivery of the wet woodland, reedbed and other terrestrial habitats, discussions with landowners are progressing well and the necessary agreements will be in place before construction of the Scheme begins. All of these landowners have worked successfully with us in the past on environmental improvement and habitat creation schemes and have a proven track record of environmental project delivery.

We will secure the required combination of sites either by purchasing the land and creating and managing the habitats ourselves (as per the main Scheme), or by entering into a legal agreement/conservation covenant with the existing landowner under which they will create, monitor and manage the habitats for a period of 30 years to meet the specification and condition criteria set out in the Defra 3.1 Metric Technical Supplement and the Specification for off-site BNG Delivery is provided in Appendix C of the Biodiversity Metric Report 2023 IMSE500177-CH2-XX-ZZ-VS-EN-1111 in Appendix S of the ES Addendum.

We will be working towards the Environment Agency's own target of 20% net gain, but for planning application purposes we are demonstrating a minimum of 10% net gain.

Under Section 17.2 of the ES, it is stated that the applicant is committed to producing a detailed monitoring plan. In addition, that the applicant has submitted a Landscape and Habitats Management Plan detailing management for the first 5 years of aftercare with a further 20 years of long-term management. The 25-year management proposals appear to only cover land within ownership of the applicant. It is important that management is secured for all areas delivering habitat creation and enhancement that have been included in the biodiversity metric calculation or which delivers compensation for impacts both on and off site. Further information is required to demonstrate how the long-term management of these areas will be delivered to ensure the

habitats creation and enhancement will be achieved and maintained.

The long-term management and monitoring arrangements for all habitats created on site are explained in the Landscape and Habitat Creation: Delivery and Management Plan (LHCDMP) in Appendix V of the ES Addendum. The long-term management and monitoring arrangements for the off-site BNG are set out in Appendix C of the Biodiversity Metric Report 2023 IMSE500177-CH2-XX-ZZ-VS-EN-1111 in Appendix S of the ES Addendum.

There appear to be discrepancies in how the grassland is classified across all submitted documents. The inconsistences in classifications should be corrected as part of the further environmental information.

All drawings have been checked, and updated where necessary, so that the classifications are consistent. Updated figures are provided in the ES Addendum Appendix S.

The City Council's Biodiversity Officer raises some concerns as to how the development will impact the Oxford Meadows Special Area of Conservation (SAC). The Habitats Regulation Assessment (sHRA) concludes there are no likely significant effects on the Oxford Meadows SAC, however additional detail is required to support this assessment, in particular greater clarity regarding the changes in groundwater levels in the SAC during flood events and potential for this to affect the qualifying features of the SAC. In addition, the air quality impact resulting in an increase in traffic flows must also be assessed for its potential to affect the SAC[2].

The Groundwater Modelling Report, reference Appendix E of the FRA document, shows that during flood events, groundwater levels at the SAC may be slightly lowered (by 100mm) and this is set out in the Habitats Regulation Assessment (HRA) for Port Meadow SAC (Appendix K to the ES). This slight lowering is as a result of being linked to flood levels but will not have an adverse effect on any qualifying features in the SAC because at this point the whole area will be flooded. Hence the conclusion that there will be no significant effects on designated habitat due to changes in groundwater levels during flood events.

Our Transport Assessment (Appendix M to the ES) estimates 134 additional trips on the A34 per day going north travelling past the Oxford Meadow SAC which is an increase of 0.2% in HGV movements. This is shown in Tables 6.1 and 6.2 of the Transport Assessment. The impact of the construction traffic on the Oxford Meadows SAC was assessed as part of the Habitats Regulation Assessment (HRA) (Appendix K to the ES) and this concludes there will be 'No significant effects on designated habitat due to changes in air quality'. Therefore, we do not believe this will have an impact on the Oxford Meadow SAC.

Seven Landscape and Habitat Plan maps and a Landscape Maintenance Operation Schedule are attached to the application. The Planning Statement on page 17 references a Landscape and Habitat Creation- Delivery and Management Plan. In the previous 2018 application a management plan was produced and submitted. There doesn't appear to be a comparable document submitted with the current application. A detailed plan is required to be provided in order to fully understand whether compensation can be fully mitigated for potential biodiversity losses, including the losses of MG4 grassland, trees and hedgerows.

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[2] The Habitats Regulation Assessment (sHRA) can be found under reference 'ES App Hra Imse500177 Ch2 00 00 Dt En 0012' (Appendix K)

The Landscape and Habitat Creation: Delivery and Management Plan 2022 was uploaded onto the Planning Portal along with our other planning application documents but did not transfer over onto the County Council website. It is now included as Appendix V of the ES addendum.

Soils

Following comments and questions below linked to soils were compiled from the consultation response from the Environment & Heritage Group Manager at Oxfordshire County Councill. Please read the full cap for details.

Para 12.2 Effects on individual agricultural holdings are to be included in this ES (see 4.3.8). However, although farms are stated to be affected there is no supporting appendix identifying the individual farms and likely scheme impacts. Please provide further information to address this.

Para 12.3 Mitigation proposals for the operation of farm holdings are missing. For example, it is not clear whether for temporarily acquired land be restored, will access be provided to temporarily severed land etc?

Table 12.1 Financial compensation is not an environmental mitigation. It is a matter for the district valuer. The references to liaison are not clear and more mitigation detail is requested regarding severance impacts.

An agriculture impact assessment has been carried out which covers the queries raised. Please see Section 12.4 and Figure 12.2 of the ES Addendum.

The mapping of topsoils in Map 2 of the soil resources report does not extend into the larger of the two areas currently proposed for MG4 grassland 'creation' – Figure 3 in MG4 Grassland: Mitigation Strategy.

This area was not mapped because the soil in the proposed MG4 creation areas will not be excavated so there is no requirement to assess its suitability for re-use. It will remain in-situ.

The soil resource report Map 1 does show one unit-based soil sample point 10B, and two point-based samples 11* and 18* which are relevant to the proposed MG4 areas.

We can confirm this is correct. These points were deliberately selected to match those assessed by the Floodplain Meadow Partnership in ES App C-5 Appendix A Examples of restoration potential and ES App C-5 Appendix E Cross sections and possible restoration areas.

Soil phosphorous measures in mg/l are 18, 11.2 and 8.6 respectively. The soil resource report notes that point 18* falls within the MAFF low phosphate index range of 0 – 1. Please provide further detail. Please provide further information to clarify the evidence in terms of soil quality on which the proposed area has been selected as a location for MG4 grassland and how this relates to the target soil phosphorous levels identified by the Floodplain Meadows Partnership in MG4 Grassland: Mitigation Strategy.

The answer to this query is provided in Section 8.3.2 of the ES addendum.

Landscape (including points related to Heritage landscape impacts)

Following comments and questions below linked to landscape impact were compiled from consultation responses from the County's Landscape Specialist, Vale of White Horse District Council and Oxford City Council. Please read the full responses for details. Clarification is required on the location and extent of off-site compensatory tree and hedgerow planting.

Please see the response given above relating to offsite Biodiversity Net Gain and the information provided in the BNG calculator and Appendices C and D of the Biodiversity Metric Report 2023 IMSE500177-CH2-XX-ZZ-VS-EN-1111 in Appendix S of the ES Addendum.

Further information/clarification is required that allows a more informed judgement on how proposed mitigation compares to the vegetation lost. A tree canopy assessment should be provided, which provides information on existing tree cover to be lost, tree cover to be retained and coverage envisaged by year 15. It is recommended that this information is presented in percentages by area, e.g. stage 1 channel, stage 2 channel, compound and construction access areas.

Please see ES addendum Section 8.4.2 Habitat Gains and Losses, sub heading Other Habitats and Table 8.13 which details tree canopy gains and losses for the answer to this query.

More information is required with regard to the consideration given to the design of bridges including a review of the proposed bridge designs. Consideration should be given to further improvements, which not only ensures functionality and integration in the surrounding area, but also creates interest, e.g. through the integration of bespoke design elements and/or public art. Therefore, clarification on the design process and alternative designs is requested.

Section 7.1.7 provides the detail of how we reached the design for the bridges within the scheme area, in the section entitled Bridge Structure and Design summary. Section 2.3.3 of the ES explains the Alternative finishes to the new structure which were considered.

In summary the span and height above the new channel of the proposed bridge at Willow Walk is set by the requirements for flood water conveyance during flood events and freeboard levels required by the Environment Agency consenting arm. The space from the underside of the bridge to the flood level has been reduced as much as possible to allow the flow of flood water whilst reduce the risk of debris being caught; the thickness of the base of the bridge is directly related to the design loading and span; the width of the bridge by the need to carry occasional vehicular traffic and the height of the parapets are set by the Highway Authority standards for footpaths, cycleways and bridleways. As mentioned in the ES, the width of the new Willow Walk Bridge will be similar to the width of the existing stone bridge at the west end.

In her consultation response the Landscape Officer, Oxfordshire County Council, accepts the design and material choices for the bridges and states 'the chosen designs in combination with habitat creation and replacement planting will ensure that the 7 proposed bridges, whilst being visible in the landscape, will not appear overly prominent over time.'

The bespoke design and materials for both Willow Walk and the Devil's Backbone followed consultation with the public and reflects the desire for a form which complements the rural setting. During the public consultation in the summer of 2017 people were given the opportunity to

comment on the design of the handrails for the bridges and materials. The consultation is reported in the Statement of Community Involvement and the related Appendix C. People were asked about their views on panels and incorporating cut out designs. 73 % of people did not want panels with cut-out designs incorporated into the bridges. People had safety concerns and felt that these were fussy, would increase costs, and would invite vandalism. As there was a lack of public support this was not pursued any further.

To try and aid understanding of what the bridge will look like, we have prepared a sketch of Willow Walk provided in Plates 10 and 11 within Section 7.1.7 of the ES Addendum.

Further clarification is sought on the impacts on South Hinksey village and its setting caused by the compound (including HGV movements), potential flood walls/embankments and potential new haul road.

The proposed flood walls around the village are approximately 1.2m high and, as stated in Table 3.1 of the Environmental Statement, will have a natural random stone cladding on both faces to match existing properties which are close to the flood wall location.

The flood wall will have a coping made from a reconstituted stone to match the general colour of the stone cladding. Grass covered earth embankments have been used in fields and paddocks where space permits, to blend in with the existing fields as far as possible.

The proposed site compound is temporary for the duration of the works and will be completely removed and the existing fields reinstated once the works are finished.

Following concerns from local residents, we have produced an indicative proposed site compound layout plan which is provided as Figure 3.2 in the ES. This shows the cabins being located away from the village and a 4m high visual and acoustic bund formed between the working compound area and the village using topsoil stripped from the scheme which will stored in this location for the duration of the works then reused upon completion of the construction works. We have also agreed with the local farmer that he will allow the hedge alongside Manor Farm Access track to grow up in the intervening period to act as a further screen to the compound area.

The traffic impacts have been reviewed and are presented in ES Appendix M; Transport Assessment.

The new haul road will be a temporary stone surfaced track suitable for site plant. It will be wide enough to allow site plant to pass each other and allow two-way working. It will be installed at ground level and only left in place for the necessary duration of the site works. Upon completion of the site works, the width of the haul road will be reduced to 5m wide and will form the permanent maintenance access track shown on the planning application drawings. The final track will be top-dressed with grass seed so that it takes on the appearance of a traditional stone farm track but will still be suitable for occasional maintenance vehicles. The proposed view on Figure 7.35 in the submitted Environmental Statement Appendix 1-8 shows an impression of how the permanent maintenance track will appear for the section of new channel south of the Devil's Backbone. This is representative of the whole length of the maintenance track running past South Hinksey.

The scheme will result in the permanent loss of some public access land at the existing open

spaces. This is proposed to be compensated by the scheme delivering long-term public access and recreational benefits in the form of a new permissive path along the second stage channel between Willow Walk and South Hinksey, improved bridges and paths and by reducing flooding at the existing open spaces, the latter of which increase the usability of the open spaces. The Landscape Specialist believes that these measures will assist in compensating adverse effects on the open space resource, but she wonders whether more could be done to improve the recreational provision e.g. by improving nearby open spaces or improving links between the city and the surrounding countryside in line with the Green Infrastructure Strategy. Therefore, clarification is sought on what other alternative measures have been considered within the scheme area or beyond.

The approach that we have taken to improve recreational provision as part of the Scheme is set out in the ES at Section 2.1.2 Green and Blue Infrastructure.

Various opportunities were identified in the Green Infrastructure Study to improve access, habitat connectivity, green space and heritage, which we investigated to determine their viability. We also consulted landowners to identify if there were other opportunities, not identified by the original study. The opportunities that were taken forward are listed in Section 2.1.2. The main alternative measures that were considered but not taken forward are set out in Section 2.3.3 Alternative design options for the Scheme.

As part of the consultation with the public during the scheme option selection and design, questions were asked about additional benefits which could be considered alongside the scheme. The results of this consultation are outlined in the Statement of Community Involvement (SCI) submitted with this application and in the Appendix to the SCI, Report of Consultation, which explains that improvements to footpaths and cycleways were supported as recreational opportunities.

More information is required about the impact on the City Council's view cones. We recommend fully assessed CGI imaging for these to understand the impact on the setting of the city. As a minimum, we would recommend wireframes are used for the assessments.

The photomontages that have been produced are Computer Generated Images (CGI) and they have been produced following the Landscape Institute/IEMA Guidelines for Landscape and Visual Impact Assessment; Landscape Institute Advice Note 01/09 (Use of photography in landscape and visual assessment).

A view from St Mary's Tower should also be considered as this vantage point is higher than others selected and a critical vantage point from which you can appreciate the landscape setting of the city to the south and west.

Existing viewpoint 16 in the original ES is from Carfax Tower, Queen's Street with photos looking west over towards the scheme. Although the foreground would be different from St Mary's Tower the background would be the same. A further viewpoint to show this is therefore not necessary. This was confirmed in an email dated 10 September 2018 with Oxford City Council who originally made this request.

Raleigh Park and Hinksey Interchange, whilst having visualisations of the existing view have not been included in verified views. These view cones cover the areas of the scheme, the central

part, where the intervention will have the greatest impact, across the open meadows that provide the uninterrupted foreground to the city and its ‘dreaming spires’ and to parts of the city that offer potential for substantial change.

These visualisations are included in ES App I-8 Viewpoint Sheets. See Fig 7.25 Raleigh Park and Fig. 7.38 Hinksey Interchange.

Arboriculture

The following comments and questions below linked to arboriculture were compiled from the county’s Arboricultural Specialist. Please read the full response for details. The application includes an Arboricultural Impact Assessment (AIA) and Arboricultural Method Statement (AMS).

The AIA draws upon survey work undertaken in 2017/18 and presented in the previous withdrawn application. Additional survey work was carried out to inform the current proposal in 2020/21. The survey work is summarised in a tabular form but does not include all the information expected. The overview table should be compliant with ‘BS5837:2012 Trees in relation to design, demolition and constructions Recommendations’. Please provide the information in BS5837:2012 format.

A revised tree survey document is submitted in Appendix F of the ES Addendum entitled Tree Survey Report Feb 23 with the details provided in accordance with BS5837.

Root protection areas (RPA) would have increased in diameter since 2017/18. In some cases, trees may have lost condition as a result of damage or deterioration. Please advise whether you have taken into account potential changes that might have a material effect?

Whilst we appreciate that RPA's may have slightly increased since 2017/2018, a hardwood tree will put on around 1 to 5cm a year, so we do not consider that the difference over this period would be significant. Nevertheless, the tree surveys that were undertaken in 2020/21 not only covered additional areas on the periphery of the scheme but also more detailed surveys in areas of particular sensitivity such as Seacourt Nature Park, Willow Walk and the edge of Kendall Copse, where there is the possibility of retaining trees by working around root protection areas with careful planning. Therefore, we do have more recent survey information for the more sensitive areas of the Scheme. This is submitted as part of Appendix F of the ES Addendum.

The drawings in the AIA show a scheme of working area hatched in grey. Within this area trees are shown as both requiring removal and retention. Whilst tree removal within the working area is understandable it is not clear from the AIA why tree retention is possible within the scheme working area e.g. Around G49 as just one example. It would be helpful for the applicant to confirm that these trees are indeed to be retained and provide a general comment as to why this is the case.

Rather than take a blanket approach to removing all trees within the proposed working areas we carefully reviewed the space required for the anticipated operations in each part of the site and identified where trees within the temporary working areas can be protected and retained whilst still allowing space to construct the scheme. The trees illustrated as retained are to be retained. This will involve close working on site between the contractor and ecological clerk of works. An arboriculturalist will also be present on site if any specialist tree advice is required during construction. This is set out in the Environmental Action Plan.

Amongst the proposed tree removals, the trees alongside the proposed channel east of North Hinksey (Trees 1011 – 1042) form a notable feature. Many are categorised as Cat C or U indicating lower value or poor condition. As many are old willows, they are also amenable to regular management. Further information is required to explain whether realignment of the proposed channel with appropriate long-term regenerative management of the trees was considered as a way of retaining these trees and the feature and, if not possible why this was the case?

During the options appraisal stage we considered a number of alternative alignments across North Hinksey Meadow. A number of these avoided this line of trees however the alternatives had a much greater impact on the high value MG4a grassland in the meadow. After detailed review and consultation the final alignment of the channel in this location was chosen to minimise the impacts on the MG4 grassland, this does result in the loss of trees on the east bank of the Seacourt Stream, trees on the west bank are retained with some additional planting on this bank.

The Environmental Statement refers to 8.9ha of new native woodland being planted using 3632 trees. At an average of 408 trees per hectare, this is a relatively low stocking density for woodland creation. Confirmation is required that this figure is correct and further information on how this might influence the longer-term development and management of the new woodland areas.

Planting schedules are submitted in ES Addendum Appendix A. We will be planting 3891 larger-growing woodland tree species e.g. oak, alder, cherry, willow. We will also be planting 20287 smaller-growing woodland trees and shrubs e.g. hazel, hawthorn, blackthorn, dogwood etc. Our intention for the long-term development and management of the new woodland areas is set out in the Landscape and Habitat Creation: Delivery and Management Plan.

A small number of trees on the drawings do not have a removal / retention status showing e.g. T1201 as one example, or RPAs not included on trees to be retained e.g. T1156 as one example. These should be updated on the drawing so that they are consistent with the data tables and across the drawing series.

The arboricultural plans have been reviewed and updated. These plans are included in the updated Arboricultural Impact Assessment provided in Appendix F of the ES Addendum.

In Appendix F - IMSE500177-CH2-XX-00-DR-EN-0740 Revision A – Overall Plan is not included in the drawings. Please update.

This drawing has now been added to the updated documents in Appendix F of the ES Addendum.

In addition, in Appendix F, the very pale colour of the base mapping in both the AIA and AMS makes it harder than needs to be to interpret drawings. The drawings don't show the scheme proposals in grey hatch, which makes it hard to interpret impacts on the trees. Please can you amend the plans to make it easier to interpret.

We have replotted the plans in the updated documents to make the background mapping slightly darker. These are provided in Appendix F of the ES Addendum.

Air Quality

Following comments and questions below linked to air quality were compiled from consultation responses from the Oxford City Council (Planning), Vale of White Horse District Council (Planning), and Environmental Protection Team at Vale of White Horse District Council. Please read the full responses for details.

There are potential dust impacts from excavation, spoil handling and construction activities and additional vehicle emissions from the removal of significant quantities of spoil from site by road. The input data is now 6 years out of date, taking data obtained from the 2016 Oxfordshire County Council traffic survey, and monitoring data was obtained from the air quality annual status report of 2016. Therefore, modelling is now out of date and is required to be undertaken again using up to date traffic counts and air quality monitoring data, using the current version of the Defra Emission Factor Toolkit (EFT). The modelling should use 2019 as the base year, as this is the last year of robust and reliable monitoring data, partly due to the Covid restrictions.

In addition, there have been changes to the monitoring sites along the A34 since the original modelling was undertaken and the model accuracy should also be validated against the monitoring from these sites.

Following receipt of these comments we discussed the requirements with the relevant officers in Oxford City Council and Vale of White Horse District Council. We have updated our Air Quality Assessment using the 2019 data as the base year and included the additional monitoring sites. The revised Air Quality Assessment is submitted as ES Addendum Appendix H and the conclusions included in the ES addendum Section 13.

Flood Modelling and Climate Change

Following comments and questions below are linked to modelling of the alternative schemes to what has been proposed. The questions relate to Environment Statement Appendix Q and were compiled from consultation responses from the Oxford Flood and Environment Group, North Hinksey Parish Council, Environment & Heritage Group Manager at Oxfordshire County Councill, Hinksey and Osney Environment Group, Oxford Preservation Trust and observations taken from comments produced by representatives, and residents. Please read the full responses for details.

In tables 1-4 in ES Appendix Q, the values for Willow Walk Bridge have been left with '#N/A' please either provide the missing water levels missing in the tables or provide full explanation why the data was not available.

The N/A is included in the tables as we do not have corresponding nodes in some model runs due to the differences in the 1D and 2D sections of the models between the scenarios. The new channel is represented as part of the 1D model within the 2D floodplain, where the channel is removed there is no corresponding 1D node within the 2D floodplain so we cannot compare all results directly.

Please note an updated Appendix Q is included in the ES addendum, this document has been updated to reflect the latest Environment Agency guidance on dealing with the current economic conditions and potential inflation impacts on construction costs.

When reviewing scenario A2 on page 2 of the ES Appendix Q. please confirm that element 2 (channel improvements on Seacourt stream...) has been applied in the modelling? Please also explain the environmental reason for not applying locally lowered beds at elements 3 (new bridge at Willow Walk…), 5 (new bridge at Devils backbone…) and 11 (new bridge on North Hinksey Causeway).

Section 2 of Appendix Q (Oxford FAS - Western Conveyance Channel Review) details which elements are included in each model run. Bullet point 2 notes all model runs include channel improvements on Seacourt Stream upstream and extending 200m downstream of Botley Road including the new West Way Cycle Bridge.

Lowered beds at the 3 new bridge locations have not been omitted for environmental reasons. The OFAS provides a new continuous channel, including under these bridges, the bed level of which is below the existing surrounding field levels to provide additional flow capacity through the floodplain and is therefore included within the model. In the no-channel scenarios the bed level at these locations is set at the surrounding field levels as localised lowering will provide no hydraulic benefit and will silt up to the surrounding field levels over time.

Please provide map references for the model nodes used to compile date in ES Appendix Q. The model nodes are not presently illustrated on either Figure 2 or ‘Figure 2 continued’ in order to properly access the proposed design against Scenario A2.

The descriptive location of each nodal point in Appendix Q (Oxford FAS - Western Conveyance Channel Review) are shown in Figure 2 of this document. These locations were chosen to best compare flood depths and flows across the whole river system for the Oxford FAS and the 2 'no channel' scenarios. The positions of the locations are clearly marked in Figure 2 and we do not consider grid references are required for comparative purposes of the flood levels and flows in Table 1 for the different scenarios and therefore these have not been provided.

In addition, please provide the roughness values used in Appendix Q in modelling the proposed scheme and Scenario A2. If this is not possible, please explain why this is not possible. Roughness is referred to in the Flood Risk Assessment, in Appendices B and Q.

The roughness values (known as Mannings 'N') used are detailed on page 130 of the Detailed Design Hydraulic Modelling Report dated 28 Jan 22, which supports the Flood Risk Assessment (Appendix B). For consistency these values have been used across all the hydraulic modelling, including Appendix Q.

The ES states on para 2.3.2 and 2.3.3 that ‘various alignments’ for the new channel were considered when reviewing the alternatives. There appears to be no details on the alternative alignments reviewed in the ES. Please provide more details on the alternative routes, rather than just comparing channel vs no channel.

Please see Section 2.3 and Appendix U Of the ES Addendum which provides additional information on the selection process used to finalise the proposed channel route.

ES Appendix D23 states in the introduction: “Jacobs has also carried out modelling of surface water flows and groundwater levels under a number of scenarios to determine the effect of

constructing the Scheme. The most important scenario for the mitigation strategy is the Q95 flow, which is when water levels in local streams are at levels which they exceed 95% of the time. This represents the water levels in the driest period of a reasonably normal summer, i.e. not drought levels." However, the modelling has not been provided as part of the application. Please provide further details on the results produced.

We have used the Q95 flows (the magnitude of flow in the rivers which is exceeded 95% of the time i.e. it only occurs for the low flow in the rivers which occurs during the 5% of the driest times of the year) recorded within the river network to check that our proposed scheme and changes to the river channels does not have any major impact during low flow periods. This was done to ensure that there are no significant changes to channel wetness and groundwater levels which could create adverse environmental changes during dry periods. Where changes were identified mitigation has been designed into the scheme. The changes to the flows in the various watercourses for the mean monthly flows and the Q95 flows are provided in Table 5.20 in Section 5.4 of the submitted Flood Risk Assessment.

We have liaised with Thames Water regarding the modelling of surface water and drainage and confirmed that as the proposed scheme reduces flood levels throughout the area there is a general benefit to both surface water and drainage across the area as the systems will be able to drain for longer and reduce water backing up through drainage systems.

The ESI report para 7c of 1.2 states it is proposed to install weirs in Bulstake Stream to raise water levels in the MG4 grassland area of Hinksey Meadows by 8cm. Elsewhere in Appendix E23 section 5.3 the level of potential derogation to the groundwater regime in the meadows is indicated to be a figure of 'only' 250mm. The discrepancy between these figures is not explained. Please provide further explanation.

Section 1.2 of the ESI report in Appendix EA of the Flood Risk Assessment lists sequentially the updates to the model through the modelling process. Item 7 relates to the difference between item 6 and the baseline. It is indicating the weirs in the Bulstake Stream were raised above those originally included in Item 6 to create an additional increase in groundwater levels above the existing dry year scenario. ES Appendix D23 Section 5.3 refers to a possible reduction in groundwater levels in the Hinksey Meadow area in the original model runs prior to the inclusion of the weirs, this relates to Item 4 in Section 1.2 of the Groundwater Modelling Report. As stated in ES Appendix D23 section 5.3 the weirs were then added (Item 6 in Section 1.2 of the GW report). These weirs were then further raised in Item 7 which resulted in a 300-400mm increase in levels compared to the original modelling i.e. approx. 8cm higher than the existing conditions for the dry year scenario.

The climate chapter is not supported by emissions calculation to validate the assessment. The calculations for generation of carbon have not been supplied. This is something that should be provided in order to assess the environmental impact of the proposed scheme. The calculation should cover carbon generated from construction, excavation and tree removal.

Please clarify why the operations emissions have been scoped out but not construction emissions.

We have included the outputs from the tool used to calculate the whole life carbon emissions associated with the scheme in Appendix T of the ES Addendum. This is an internal tool used on all Environment Agency projects and breaks down capital carbon for construction and operational

carbon. In our Environmental Statement this operational carbon has been documented as maintenance. As this is a passive flood alleviation scheme, once built, the carbon emissions will come from our ongoing maintenance activities to manage vegetation and ensure no blockages occur.

Lead Local Flood Authority (LLFA)

Queries raised in letter dated 9 November 2022.

Query Reference, Comment 2 – 2D model resolution of 10m – quite coarse.
Model simulation time for a large suite of simulations for the study and 48hr run time for this large-scale model is acknowledged.

It is understandable that a higher resolution model in its totality was not realistic. It was noted that updated modelling software were tested to be able to run higher resolution models in faster times, but stability issues prevented successful testing of this.

It was also noted that a 5m resolution model was tested and stability was also an issue. The main concern raised is ensuring the 10m resolution model is fully robust. A higher resolution test run for the 1% AEP would remove all doubt.

Please simulate a higher resolution or multi-domain set up with a higher resolution in key areas to ensure correct routing and extents for the entirety of the modelled area and to back up the robust calibration process.

As noted in Section 7.2 of the Modelling report provided as Appendix B of the FRA, the original modelling was undertaken in 2016/18 using the current versions of Flood Modeller / TUFLOW at the time. Based on the hardware available at the time the run times for 2D grids smaller than 10m were prohibitive. The final design modelling undertaken in 2021/22 incorporating the latest climate change guidance did attempt to update the model with the latest TUFLOW technology, TUFLOW HPC and TUFLOW Quadtree, to reduce model run times on a GPU machine which could have allowed a smaller grid size to be used. However, these attempts were unsuccessful and resulted in unreliable performance of the model. Considerable time was spent unsuccessfully trying to determine the reasons for this, including discussions with the TUFLOW support service. Given the very flat nature of the topography in the main areas of floodplain around Oxford it is considered that reducing the grid size would not yield any significantly improved levels of accuracy in the 2D domain and a decision was made to continue with the original grid size.

Query Reference, Comment 3 – No evidence of hydrogeomorphology or velocities pre/ post scheme being assessed.
The scheme includes in / on channel works. It would be reasonable to expect that a hydrogeomorphology assessment assesses the effect of the scheme on hydrogeomorphological changes (primarily influences on channel and frequent flood velocities) in order to thoroughly understand the potential impacts of the scheme. Please provide these assessments to clarify this issue.

Whilst not presented in the modelling report, velocities are available from the modelling both at the 1D model nodes and across the 2D domain. Section 6.5.2 of the Flood Risk Assessment uses these velocities to present information on pre and post scheme flood hazards during flood

events. As part of the overall design process the velocities have been assessed throughout the system to ensure that changes in velocities are not created both at low and flood flows and ensure that the risk of additional erosion and silt deposition will not occur. The proposed new first stage channel has been designed considering hydrogeomorphology including inputs by an experienced geomorphologist and the resulting layout and features of this channel are shown on the submitted plans. Section 9 of the Environmental Statement accompanying the planning application covers a detailed review of water and hydromorphology aspects for both the proposed permanent scheme and during the construction stage. Table 9.1 of the Environmental Statement covers the impacts on water and hydromorphology receptors, this summarises impacts as either Minor Beneficial or Minor Adverse.

Query Reference, Comment 5 – A clear groundwater monitoring plan for post-construction is not evident when reviewing documentation.
A clear groundwater monitoring plan for post-construction is not evident when reviewing documentation. Please provide this post-construction groundwater monitoring plan.

The Environment Agency currently have an ongoing groundwater monitoring programme across the proposed scheme area following the completion of ground investigation works in 2017. Table 17.1 of the Environmental Statement submitted as part of the planning application provides full details of the proposed 25 year post-construction monitoring plan for a range of receptors including groundwater, with specific mention of the proposals for the three environmentally sensitive areas raised in the original LLFA query. The Environmental Statement Addendum contains an updated version of Table 17.1 which proposes the post construction monitoring programme to be extended from the 25 years originally proposed to 30 years. Readings will be on a monthly basis in Years 1-5 and we will then then set the frequency of future readings on the basis of findings in the first 5 years.

Query Reference, Comment 6 – Operation and Maintenance …. assessment of potential backing up of water behind defences and ...requirements for pumps is reviewed.

Any potential backing up of any water from groundwater or surface water behind defences relies solely on the existing drainage infrastructure and existing permeable ground infiltration once the fluvial flood levels have subsided. This is based on the assumption that the system will handle it better because water levels are reduced from the scheme.

No results of modelling have been observed that assess the surface water risk post-scheme. ES Appendix D23 states “Jacobs has also carried out modelling of surface water flows and groundwater levels under a number of scenarios to determine the effect of constructing the Scheme”. However, without the results there is no basis to agree that the potential impacts and potential severity of the backing up of water behind defences has been assessed suitably.

It is stated that one pump is to be reviewed for Munday's Bridge in North Kennington but there is no clear evidence of this in the Operation and Maintenance plan.

Further to this, it is stated that the Operation and Maintenance plan for the scheme will specify local areas where pumping and other interventions in an exceedance event should be focused for maximum benefit to delay the onset of local flooding or properties. The Operation and Maintenance Plan provides no evidence of this for Munday's Bridge or any further area.

Please provide a review of the assessment of potential backing up of water behind defences.

Please provide the results of the surface water flows and groundwater levels modelling and results. This should also be reviewed to determine if work to date is sufficient or if further assessment for the potential backing up of water behind defences is required.

Please review the requirement for pumps with the inclusion of these within the Operation and Maintenance Plan.

The modelling results presented in the Flood Risk Assessment and associated appendices demonstrate that the proposed scheme will lower flood levels for any given flood event compared to the current situation. This will help to reduce surface water flood risk during flood events from the current situation but some backing up behind defences may still occur whilst discharge points are still restricted by fluvial flood water. The defences have been designed to allow existing surface water systems to continue to operate and in some areas, such as the Osney Mead Industrial Park, flap valves have been included in the defence wall to aid discharge of surface water once fluvial flood levels have receded.

As noted, the facility for a pump has been included in Kennington should surface water pond behind these defences within private property boundaries. A number of other areas in Oxford, such as Earl Street, already have emergency contingency plans which involve pumping. Section 6.5.2 of the Flood Risk Assessment details areas where defences will overtop or be bypassed first to focus emergency efforts to in the right locations to reduce the risk of surface water ponding. The existing emergency response plan (joint with Oxfordshire County Council) will be updated following completion of the scheme, to ensure that pumps and other emergency measures are mobilised to the right locations during flood events.

Maintenance

Queries were raised in submissions to the planning application consultation relating to the security of maintenance of the scheme. Section 3.4 of the Planning Statement includes information on Maintenance and Management, Funding, Monitoring and our Land Management Partner. The paragraphs below provide further clarity.

The Oxford Flood Alleviation Scheme will be maintained. Environment Agency Field Teams will undertake operational maintenance, such as blockage clearance, to ensure the scheme functions as it should to manage flooding. For wider landscape and habitat maintenance, we will partner with an environmental organisation to deliver this on our behalf. Earth Trust are currently advising us to ensure this approach will work and then we will tender competitively to secure the long term partner ahead of construction starting. Under our partnership agreements we will ensure we can meet all monitoring and reporting requirements.

Our business case considers the expected cost of all of the maintenance work over a 100 year appraisal period and we will maintain the scheme for at least this amount of time. To gain HM Treasury sign off of this business case, we are required to demonstrate that cash is available up front for the first 10 years. Beyond this period, maintenance (operational and landscape) will be funded from Environment Agency annual budgets. There is no uncertainty in this position.

Through the partnership with an environmental organisation we would like to reinforce this by

continuing to seek further funding on top. This will enable the partner organisation to potentially deliver even greater outcomes for the local environment. It is not intended to replace core funding from the Environment Agency but will work towards our ambition that this location becomes a significant environmental asset for future generations.

February 2023