

12. Cumulative effects

12.1. Introduction

This section sets out the results of the cumulative impacts assessment (CIA) of the Proposed Scheme.

Cumulative effects can be divided into two broad categories as follows.

- **Intra-project effects:** effects that arise as a result of the combination of topic specific effects defined for a given scheme
- **Inter-project effects:** effects that arise due to the interaction of the Proposed Scheme with other relevant development proposals within the general locality of the scheme area. For example:
 - Construction impacts from more than one project at the same time or concurrently, and/or
 - Operational impacts from more than one project affecting the same receptor(s)
 - How the impacts act together

Intra-project effects between topics are an integral part of the EIA for the Proposed Scheme and have been considered within the various chapters of this ES. Where these occur they are outlined in the introductory sections of each chapter. Intra-project effects are therefore not repeated this assessment.

This chapter therefore focusses on potential inter-project cumulative effects, which are subdivided according to the following categories:

- Additive: where similar impact types from the same or different development affect a receptor at the same time in a similar way
- Synergistic: where different types of impact affect a receptor and interact to increase their combined significance

12.2. Methodology

12.2.1. Guidance

The assessment of cumulative effects for this ES has been informed by the 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' (European Commission, 1999) and professional judgement. DMRB Volume 11 Section 2 (LA 104 Sustainability and Environment. Appraisal. Environmental assessment and monitoring) provides valuable guidance on the assessment of cumulative effects and has been used to determine the methodology for this scheme.

The EIA Regulations state that cumulative effects must be assessed in terms of what is 'reasonably foreseeable'. For the purposes of this assessment, reasonably foreseeable has been defined as:

- Development projects with valid planning permission within 5km of the scheme area featuring ten dwellings or more.
- Development projects at the planning application stage that could be reasonably considered to have a significant cumulative impact, as per professional judgement.
- Major development projects that form part of a formal development plan produced by local planning authorities or government
- Other plans or projects identified as important for consideration by our internal specialists

12.2.2. Study area

The study area for the assessment of cumulative effects is the construction footprint for the Proposed Scheme plus a buffer of 5km and/or watercourses hydrologically linked the Sowy/KSD system and their associated habitats. It should be noted that strategically important projects with planning permission, under design or under construction by SDC were also considered. Information on these projects was obtained via contact with the local planning officer.

12.2.3. Assessment methodology

Identification of relevant projects

The following sources of information were consulted to identify plans and projects relevant to the assessment of inter-project cumulative effects:

- Sedgemoor District Council (SDC) planning portal
- South Somerset District Council planning portal
- Somerset County Council planning portal
- SRA website (www.somsetriversauthority.org.uk)
- SDBC website (<https://somersetdrainageboards.gov.uk/>)
- Our internal national environmental assessment specialist team

It is noted that minor planning applications of a domestic nature, such as improvement to existing residential properties or garage conversions, have not been considered within this assessment as it is considered that the size/scale of these developments are not significant enough to have a generate any cumulative likely significant effects.

Scope of assessment

Using the sources set out in section 12.2.1 other projects or potential developments were identified that could have a cumulative effect when combined with the Proposed Scheme. Projects were considered if:

- The construction period of the Proposed Scheme and the project overlapped
- The Proposed Scheme and the project were hydrologically linked

Where a potential cumulative effect is identified as above, a project is considered 'scoped in' to further assessment and the significance of the cumulative effect is considered in further detail.

Determination of significance

The DMRB (2019) guidance provides a specific methodology for assessing the significance of cumulative impacts. This has been used as a guide for the purposes of this assessment by considering:

- Which receptors or resources are affected?
- How will the activity or activities affect the condition of the resource?
- What are the probabilities of such effects occurring?
- What ability does the receptor/resource have to absorb further effects before change becomes irreversible?

Identified cumulative impacts are categorised as 'construction' (temporary impacts that will only occur during the construction phase of the project) or 'operational' (permanent effects that will be present during the operation of the Proposed Scheme). The significance of the identified effects is defined in line with DMRB guidance, as set out in Table 12.1.

Table 12.1. Criteria used to determine the significance of cumulative effects

Significance	Impacts
Severe	Effects that the decision-maker must take into account as the receptor/resource is irretrievably compromised.
Major	Effects that may become key decision-making issues.
Moderate	Effects that are unlikely to become issues on whether the project design should be selected, but where future work may be needed to improve on current performance.
Minor	Effects that are locally significant.
Not significant	Effects that are beyond the current forecasting ability or are within the ability of the resource to absorb such change.

12.2.5. Limitations

The following assumptions and limitations apply to this assessment:

- To enable consideration of a worst-case situation, it is assumed where planning permission has been granted or has been applied for, developments could be constructed at the same time as the Proposed Scheme or in the following months, thus giving rise to potential construction-related cumulative effects.
- Professional judgement has been used to assess the potential environmental impacts of and planned mitigation measures for other relevant development proposals where pre-existing environmental assessments are unavailable.
- Although there has been consultation undertaken with the local council (SDC) there are limitations to our knowledge in potential planning applications that may be submitted in the future. Therefore, the assessment of cumulative effects is based on our knowledge of submitted planning applications at the time of writing.
- When considering potential cumulative effects between the Proposed Scheme and other developments, in some cases there is limited environmental information for the other developments outlined. Professional judgement has been used to analyse the potential effects of other developments within the area for the purpose of this assessment, and professional judgement has been used to 'fill in' any gaps in information.

12.3. Likely significant effects

Under the process described in section 12.2 above, the following 12 developments and plans/strategies set out in Table 12.1 were identified which either fall within the study area for assessment of cumulative effects (i.e. are located within the 5km buffer zone) or are linked hydrologically or recognised as a strategically important. These projects have then been considered with respect to potential for cumulative effects during the construction or operation phase of the Proposed Scheme and scoped in or out of further assessment accordingly.

A total of projects have been 'scoped in' through this process meaning that they have the potential to have 'cumulative' effects when combined with the Proposed Scheme. These are:

- Oath to Burrowbridge dredge (Parrett IDB)
- Refurbishment of water control structures within West Moor and Moorlinch RWLAs and of Egypt's Clyce (EA)
- Wessex Small Works – Bridges Improvement Project (EA)

Table 12.2 Projects with spatial and temporal overlap and/or hydrologically connected with Proposed Scheme

Name	Brief description	Scoped in or out of assessment
Parrett and Tone maintenance dredging programme (SRA)	Maintenance water injection dredging (WID) takes place annually on the Parrett and Tone in December or January. The locations and volumes of dredged material varies depending on the current need.	<p>Construction – scoped out: Whilst the Proposed Scheme and this scheme are both hydrologically linked to the Parrett TRaC, no impact on the Parrett TRaC is anticipated as a result of the Proposed Scheme.</p> <p>Operation -scoped out. This scheme was included within the baseline for the hydraulic modelling undertaken to inform development of the MAP (see Appendix J) for the combined effects of the Oath to Burrowbridge Dredge and the full River Sowy and King’s Sedgemoor Drain Enhancements Scheme.</p>
Parrett M5 to Northmoor Capital Dredge (SRA)	WID on the Parrett between Northmoor Pumping Station and the M5 is planned to take place during 2020. This scheme will help offset identified adverse effects of the Oath to Burrowbridge Dredge (Parrett IDB) scheme on the Tone and at Currymoor (pers comms. John Rowlands, EA).	<p>Construction – scoped out. Whilst the Proposed Scheme and this scheme are both hydrologically linked to the Parrett TRaC, no impact on the Parrett TRaC is anticipated as a result of the Proposed Scheme.</p> <p>Operation – scoped out. This scheme was mitigates adverse effects on flood risk identified for the Oath to Burrowbridge Dredge.</p>
Wessex Small Works - Bridges Improvement Project (Environment Agency)	This is a project that addresses maintenance issues associated with several bridge structures located on the Sowy.	Construction - scoped in: Construction period aligns with the Scheme and therefore this is potential cumulative effects on ecological features, particularly on water voles within the area.

Name	Brief description	Scoped in or out of assessment
		<p>Operation – scoped out: No potential environmental effects during operation as a result of this scheme alone. Therefore no potential for cumulative effects with the Proposed Scheme.</p>
<p>Bridgwater Tidal Barrier (Environment Agency)</p>	<p>This is project that aims to construct a tidal barrier near Bridgwater with some additional modifications to embankments further downstream along the estuary and River Parrett. The tidal barrier will hold back tidal waters in times of high flood water. The defence is situated upstream from Dunball.</p>	<p>Construction – scoped out: This scheme is four years away from construction and therefore will overlap with the construction period of the Proposed Scheme.</p> <p>Operation – scoped out: During operation the tidal barrier could cause changes to water quality and geomorphology however these are considered to be limited as when the barrier is open the flow will continue as ‘normal’, and geomorphological changes associated with the change in sediment from the barrier closure are thought to be in line with natural variation therefore, no significant effect anticipated.</p>
<p>Oath to Burrowbridge Dredge (Parrett IDB)</p>	<p>This project includes the dredging of the River Parrett from Stathe Bridge to the confluence of the River Parrett and the Tone at Burrowbridge.</p>	<p>Construction - scoped out: Will not have a significant effect during the construction phase as the dredging works were completed in 2019.</p> <p>Operation - scoped in: There is potential for cumulative effects between this project and the Proposed Scheme due to the reduction in the amount of standing water available in designated site which support designated species such as breeding birds.</p>

Name	Brief description	Scoped in or out of assessment
HRA Mitigation Structures Project – (West Moor, Moorlinch, Egypt's Clyce) (EA)	This project forms part of the mitigation proposals for the combined effects of the Oath to Burrowbridge Dredge and the full River Sowy and Kings Sedgemoor Drain Enhancements Scheme (see Appendix J).	<p>Construction - scoped in: May/June 2020 is intended construction period for HRA mitigation structures.</p> <p>Operation - scoped out: These works form part of the MAP (see Appendix J) for the Oath to Burrowbridge Dredge and the full River Sowy and King's Sedgemoor Drain Enhancements Scheme.</p>
Dunball Sluice Refurbishment Project (EA)	Projects aims to refurbish the existing Sluice structure where certain mechanical components are failing.	<p>Construction - scoped out: Construction/work associated with this project will not take place in 2020.</p> <p>Operation – scoped out: This project aims to refurbish the existing sluice with no change to the function of the existing structure and therefore will have no effect on the drainage of the wider area.</p>
West Moor (EA)	This project aims to refurbish or replace the Midelney Siphon and adjacent gravity outfall. The project is currently at the appraisal stage where several options have been considered to address how best to refurbish the existing structures.	<p>Construction - scoped out: Construction period does not overlap with that of the Proposed Scheme.</p> <p>Operation – scoped out: The aim of this project is to replace or refurbish the existing structures to ensure that flow and function of both West Moor and South Moor are maintained. As existing flows will be maintained it is not anticipated that there will be any cumulative effects when combined with the Scheme.</p>

Name	Brief description	Scoped in or out of assessment
Dunball Smoothing (Environment Agency)	This project aims to remove a concrete structure that is currently impeding on the flow of the KSD under the A38 road bridge.	<p>Construction - scoped out: This project is currently on hold and therefore will not have any effect on the construction phase of the project.</p> <p>Operation – scoped out: This project is already partially complete and the removal of the remaining small section of concrete is only likely to have a small effect on the flow regime of the KSD and, as such, is unlikely to act in-combination with the operation of the Proposed Scheme.</p>
Taunton Strategic Flood Alleviation Scheme (Environment Agency and Somerset West and Taunton Council)	The purpose of this scheme is to decrease flood risk within the settlement of Taunton by implementing a series of ‘small’ works.	<p>Construction- scoped out: Construction programme does not coincide with the Proposed Scheme as this project is currently at detailed design.</p> <p>Operation – scoped out: The aim of the scheme is to reduce flooding within Taunton. During detailed design the implication on downstream flood risk were analysed and found to have no significant impact</p>
Hills to Levels (Farming and Wildlife Advisory Group (FWAG) SouthWest)	This is a ‘holistic’ catchment management approach project that aims to reduce run off from land so that peak flows are reduced. This project aims to retain water within the upper and mid catchment areas in an attempt to reduce local flooding. It will also aid in reducing soil loss from the upper catchment	<p>Construction - scoped out: Due to the highly localised areas associated with this project, it is not anticipated that there will be any cumulative effects when combined with the Proposed Scheme.</p> <p>Operation - scoped out: During operation this project aims to retain water within the upper and middle catchment areas. This is anticipated to aid</p>

Name	Brief description	Scoped in or out of assessment
	areas and thus reduce the need for de-silting within the lower catchment areas	in the objectives of the Proposed Scheme as peak water flows within the middle and lower catchment areas (like the Sowy and the KSD) will be reduced. Therefore, no significant cumulative effects are anticipated.
Co-Adapt EU Project Somerset (SCC, SRA, Somerset Wildlife Trust, the FWAG SouthWest, the National Trust and Blackdown Hills Area of Outstanding Natural Beauty (AONB) Trust)	This is a project that aims to ‘co-create’ adaptive management solutions (nature based and natural process solutions), which can demonstrate to the surrounding community how natural flood management measures can deliver cost effective protection as well as their effectiveness in delivering water management.	<p>Construction - scoped out: Due to the highly localised and small-scale nature of this project it is not anticipated that any cumulative effects will occur in combination with the Scheme.</p> <p>Operation - scoped out: During operation this project aims to slow the flow of water throughout the catchment area using natural methods</p>

The following subsections consider in further detail whether there is potential for inter-project cumulative effects between the Proposed Scheme and the three projects scoped into further assessment as per Table 12.2.

12.3.1. Oath to Burrowbridge Dredge

The Oath the Burrowbridge Dredging Project is part of the Somerset Rivers Authority 20 Year Flood Action Plan and aims to reduce flood risk to up to 65km² of land. The project involves dredging 2.2km of the River Parrett from Stathe Bridge to the confluence between the River Parrett and River Tone at Burrowbridge. The dredging will allow for more water to flow within the River Parrett and therefore during times of high rainfall will reduce the area of land flooded. The project is hydrologically linked to the Proposed Scheme. Hydraulic modelling undertaken to support the Oath to Burrowbridge ES and HRA identified that both the Oath to Burrowbridge Dredge and the full River Sowy and King's Sedgemoor Drain Enhancement Scheme together will act to reduce the extents and depths of the surface water flooding events which provide winter 'splash' conditions within the Somerset Levels and Moors SPA and associated habitats. As such it is considered that the Oath to Burrowbridge dredge and the Proposed Scheme could have a major adverse significant cumulative effect, in the absence of mitigation.

12.3.2. Refurbishment of water control structures within West Moor and Moorlinch RWLAs and of Egypt's Clyce

Refurbishment of water control structures within West Moor and Moorlinch RWLAs and of Egypt's Clyce could have a cumulative effect when combined with the Proposed Scheme as the construction phases for both developments overlap. These two developments therefore have potential for impacts on ecological receptors. However, due to the temporary nature and duration of the construction phase of both schemes, impacts on sensitive receptors are considered to be not significant.

12.3.3. Wessex Small Works – Bridges Improvement Project

The Wessex Small Works – Bridges Improvement Project aims to address maintenance issues with several bridge structures along the Sowy and will be undertaken in summer/autumn 2020. Therefore, there could be potential effects on certain receptors, with particular attention to ecological receptors such as water voles. However, large areas of undisturbed water vole habitat are to be maintained throughout the construction phase of the Proposed Scheme in order to ensure a safe refuse for the water voles at all times, in accordance with the conditions of our organisational licence under which displacement will be undertaken for both schemes. Therefore, impacts on sensitive receptors associated with the two developments are considered not significant.

12.4. Mitigation

As outlined in further detail in Chapter 7 a MAP (see Appendix J) has been identified and agreed between ourselves, Natural England and the IDB which will provide mitigation for the potential cumulative impacts of the full River Sowy and King's Sedgemoor Drain Enhancements Scheme and the Oath to Burrowbridge Dredging Project. The MAP can be found in Appendix J and includes the refurbishment of water control structures at Moorlinch, West Moor and Egypt's Clyce during summer 2020 in advance of construction of the Proposed Scheme.

The MAP will be managed and facilitated through the existing governance framework established for the current Water Level Management Plans and the SRA Management Group; to agree the outcomes and actions outlined in the MAP, based on results of ongoing monitoring. This will be achieved through their regular meetings, as deemed necessary and managed by a small group of officers from each partner organisation (Natural England, Environment Agency and the SDBC).

Further detail regarding other measures included within the MAP can be found in section 3.2.2 and also in the strategic level HRA Stage 2 report for the Proposed Scheme (see Appendix C).

12.5. Conclusions and summary of residual effects

Table 12.5 sets out the residual effects associated with the cumulative effects of the Proposed Scheme and associated developments within the area. The cumulative effects assessment has considered all relevant, reasonably foreseeable developments following the methodology established in section 12.2. Whilst the assessment has identified some cumulative effects, these are not considered to be significant enough to require any changes to the Proposed Scheme, and it is considered that these can be managed effectively, through the identified mitigation.

Table 12.5 Residual cumulative effects

Project name	Receptor	Nature of cumulative impact	Significant cumulative effect	Mitigation	Residual cumulative effects
Construction					
No likely significant effects identified.					
Operation					
Oath to Burrowbridge Dredge (Parrett IDB)	Flora and fauna	Reduction extents, durations and depth of flooding which provides 'splash' conditions favoured by overwintering birds on the Somerset Levels and Moors SPA and supporting habitats. Further information provided in Chapter 7 and in the Oath to Burrowbridge dredge ES (Johns Associates, 2019)	Moderate adverse	MAP developed by the EA, NE and IDB, which includes the refurbishment of water level control structures within Moorlinch, West Moor and Egypt's Clyce prior to construction of the Proposed Scheme. See Appendix J for and the strategic level HRA AA (Stage 2) report in Appendix C for further information.	Not significant