

Havant Thicket Reservoir Project

Environmental Statement Volume 2 – Main Report Chapter 19 Cumulative and In-Combination Effects

Portsmouth Water Ltd.

03/09/20

Atkins Doc No.: HTR-ATK-ZZ-ZZ-RP-Z-0119

Atkins Revision No.: C03

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This document has 34 pages including the cover.

Document history

PW Revision	Status	Purpose description	Originated	Checked	Reviewed	Authorised	Date
C03	B1	Final	NRC	CB	LJB	LJB	03/09/20
C02	B1	Finalised for PW Check	NRC	CB	LJB	LJB	30/07/20
C01	B1	Working Draft	NC	CB	LJB	LJB	15/05/20

Client signoff

Client	Portsmouth Water Ltd.
Project	Havant Thicket Reservoir Project
Job number	5169117
Client signature / date	

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19. Cumulative effects and in-combination effects

Competent expert evidence

- 19.1. The cumulative effects and in-combination effects assessment has been undertaken by the following individuals who have used their knowledge and professional judgement to undertake this assessment:
- a Principal Planner (qualified Town Planner, BA (Hons), DipTP, full professional membership with the Royal Town Planning Institute (RTPI)) with 20 years town planning experience, including over 10 years knowledge and experience in environmental assessment
 - an Associate Planner (chartered Town Planner, BA (hons), Dip TP and holds full professional membership with the RTPI) with over 20 years of experience.

Legislative and policy framework

- 19.2. The following legislation and policies govern the assessment of cumulative effects and in-combination effects and have been consulted in preparing this chapter, with the relevant portions summarised in Table 19-1.

Table 19-1 - Legislation, regulatory, and policy framework for the cumulative effects and in-combination effects assessment

Legislation/ Regulation/ Policy	Summary of requirements
European	
European Directive 2011/92/EU	European Directive 2011/92/EU, as amended by European Directive 2014/52/EU, requires Environmental Statements to include, inter alia, an assessment of the potential cumulative effects of development.
National	
Town and Country Planning (Environmental Impact Assessment) Regulations (2017) ¹	Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) Regulations (2017) requires an Environmental Statement (ES) to identify and assess the likely significant cumulative effects of a development, either cumulatively with other developments or the in-combination environmental effects on receptors. Schedule 4 part 5 (e) of the 2017 Regulations requires Environmental Statements to include a description of the likely significant effects of development on the environment resulting from the cumulation of effects with other existing and/or approved projects. In doing so Schedule 4 part (e) requires the EIA process to take into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources. The requirement to assess the cumulative effects of development is also set out in Regulation 4(2)(e) of the 2017 Regulations. This regulation states that the EIA must identify, describe and assess in an appropriate manner the direct and indirect significant effects of the proposed development arising from the interaction between the following factors: population and human health; biodiversity; land, soil, water, air and climate; material assets, cultural heritage and the landscape.

¹ Ministry for Housing, Communities and Local Government, 2017: Town and Country Planning (Environmental Impact Assessment) Regulations 2017, Statutory Instrument No. 571

Study area

- 19.3. The study area for the assessment of in-combination effects of the Scheme reflects the study areas, also termed the Spatial Zones of Influence (Zol), identified within the relevant topic chapters of the ES. These thresholds and Zol's are based upon professional judgement and take into account the nature and location of the Scheme and the Zol's for individual environmental topics. Each environmental specialist applies the Zol specific to their environmental topic.
- 19.4. The study area for the identification of 'other development' for inclusion in the assessment of cumulative effects is based upon thresholds and spatial areas. The thresholds and spatial areas are set out in the methodology section below but generally, development within 5 km of the Scheme that could result in cumulative effects by virtue of its timing, size, location or nature has been identified.

Assessment methodology

- 19.5. In-combination (synergistic) and cumulative (additive) effects are defined as follows:
- Intra-projects effects or 'in-combination effects' (synergistic): These effects occur between different environmental topics within the same project and as a result of the development's direct effects i.e. combined effects from a single project (the intra-relationship between different environmental factors); and
 - Inter-project effects or 'cumulative effects' (additive): These effects occur as a result of the combined action of a number of different projects cumulatively with the project being assessed and on a single resource or receptor i.e. cumulative effects from different projects (with the project being assessed).
- 19.6. For the purposes of the in-combination assessment the receptors considered in the ES have been sub-divided into the following groups:
- Human receptors: residents, including community and private assets, sensitive receptors, cyclists, pedestrians and vulnerable groups;
 - Ecological receptors - protected species and existing habitats;
 - The water environment;
 - Heritage assets;
 - Ground conditions; and
 - Landscape receptors.
- 19.7. The value of receptors and magnitude of impact is determined by the criteria set within the individual topic chapters of the ES. More generally, the assessment of cumulative effects considers the following factors:
- The likely timing and duration of the effect (temporary or permanent);
 - The extent of the effect (geographical area of an effect);
 - The type of the effect (additive or synergistic);
 - The frequency of the effect;
 - The value and resilience of receptors; and
 - The likely success of proposed mitigation.
- 19.8. Table 19-2 is a reproduction of Table 3.7 from Design Manual for Roads and Bridges (DMRB) LA 104², which suggests criteria for determining the significance of cumulative effects in terms of their impact on project decision making. Significant effects typically comprise residual effects that are within the moderate, large or very large categories.

² Highways England, July 2019: Design Manual for Roads and Bridges, LA 104 Environmental assessment and monitoring

Table 19-2 - Determining significance of cumulative effects

Significance	Typical description
Very large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making factors.
Slight	Effects at this level are not material in the decision-making process.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Table Source: DMRB LA 104, Table 3.7

Cumulative effects

- 19.9. Cumulative impacts may arise from the combined effects of several different projects, in combination with the project being assessed. This can include multiple impacts of the same or similar type from a number of different projects upon that same receptor.
- 19.10. The 2017 EIA Regulations³ do not specifically state which types of development should be included in the cumulative effects assessment or at what stage in the planning process the other proposed developments need to be.
- 19.11. The assessment of cumulative effects arising from the Scheme, in combination with other development, primarily constituted a desk-top study of planning documents covering the location of schemes considered relevant to the assessment. This broadly focused on the collection of information relating to the background of relevant projects, their expected timelines and likely environmental impacts.
- 19.12. The principle of the cumulative assessment is based on the four-stage assessment approach to cumulative assessment for Nationally Significant Infrastructure Projects, as outlined by the Planning Inspectorate in Advice Note 17:
- Stage 1: Establish the Scheme's Zone of Influence (ZoI) and Long List of 'Other Development';
 - Stage 2: Identify Shortlist of 'Other Development' - apply threshold criteria based on temporal scope, the scale and nature of other development and any other relevant factors to assist in deciding whether to include or exclude 'other development';
 - Stage 3: Information Gathering - compile detailed information on the 'other development' shortlisted, including proposed design and location, programme of construction, operation and decommissioning and environmental assessment information; and
 - Stage 4: Assessment - assess the cumulative effects of the Scheme with the 'other development' based on factors including duration of effect, extent of effect, type of effect, frequency of the effect, value and resilience of receptors and likely success of mitigation.
- 19.13. Further details of each stage are given in the following paragraphs.
- Stage 1**
- 19.14. Larger, more significant, developments will have wider ranging environmental effects than smaller and more local developments. In recognition of this, and to facilitate a proportionate assessment, the search criteria used to identify the list of committed developments was as follows:
- Trunk road and motorway projects which have gone through the statutory processes and have been approved;
 - Sites allocated for development in adopted local plans or emerging plans that are close to adoption that are within 5 km of the Scheme;
 - Planning applications and permissions which are up to 5 years old;

³ Ministry for Housing, Communities and Local Government, 2017: Town and Country Planning (Environmental Impact Assessment) Regulations 2017, Statutory Instrument No. 571

- All Nationally Significant Infrastructure Projects (NSIPs) listed on PINS programme of projects within 5 km of the Scheme;
- Planning applications and permissions accompanied by an ES or a non-statutory EIA within 5 km of the Scheme;
- Planning applications and permissions that do not include any form of EIA within 500 m of the Scheme;
- Planning applications for major development within 500 m of the Scheme; and
- All applications within 250 m of the Scheme.

19.15. Major development and minor development have been defined in accordance with Article 2 of the Town and Country Planning Development Management Procedure (England) Order 2015. Thresholds for a major development includes more than 10 new houses, a site area of 0.5 ha, the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; and all mineral and waste developments. Development falling below these thresholds is classed as minor development.

19.16. A long list of committed developments which, in conjunction with the Scheme, could have significant cumulative effects, was established following a trawl of the adopted/emerging local plans and planning history in each of the following administrative areas: South Downs National Park, West Sussex County Council, Chichester District Council, Hampshire County Council, Havant Borough Council (HBC) and East Hampshire District Council (EHDC). In order to identify relevant Nationally Significant Infrastructure Projects the PINS website was consulted.

Stage 2

19.17. The long list of other development established in Stage 1 was converted into a shorter more proportionate and manageable list by discounting developments which are known to have already been implemented or, by virtue of their scale, nature, location or programme were considered unlikely to give rise to significant cumulative effects.

19.18. The shortlist of developments, along with the methodology used to establish it, were forwarded to HBC and EHDC and feedback incorporated into the cumulative effects assessment. Subsequently, as part of Stage 2 and where appropriate, further screening was undertaken by each environmental topic to identify other relevant proposed development. Table 19-3 summarises the short list of development used for the cumulative assessment.

Table 19-3 - Short List of Developments considered within the Cumulative Assessment

Site Reference	Development Description	Development Location
1	1,944 new dwellings, 76,121 m ² of new employment floorspace and 9,000 m ² of retail floorspace	Land East of B2149, Elmleigh Road
2	Residential dwellings of 49 units	Land east of the railway line, south of Bartons Road.
3	Creation of a community health campus with nursing home, extra care accommodation and health centre. New homes including affordable and extra care housing.	A brownfield site on the site of the former Oak Park School.
4	Residential dwellings of 72 units.	Located on Dunsbury Way; formerly part of the redevelopment of the Procter and Gamble factory site
5	Residential dwellings of 90 units	Brownfield site located on the corner of Petersfield Road and Bartons Road.

Site Reference	Development Description	Development Location
6	Residential dwellings of 116 units.	An open field to the north of the existing built up Warren Park area of Leigh Park.
7	Redevelopment site for provision of 1,300 m ² of new manufacturing and/or warehousing floorspace with between 18 and 36 jobs	Brownfield site left over from the redevelopment of Procter and Gamble
8	Residential dwellings homes including affordable housing and local hub of community facilities	To the east of the site lies the Warren Park Primary School
9	New homes including affordable housing	North east of the Hermitage Stream.
10	Opportunity to regenerate and improve district centre New homes including affordable housing	Leigh Park District Centre
11	Residential dwellings of 84 units.	Situated on the edge of Cowplain. South of Hazleton Wood and west of Waterlooville Golf Club.
12	Development of Greywell Precinct, Park Parade area, Somborne Drive area, Dunsbury way area,	Land South of Bishopstoke Road
13	New floorspace at Havant and South Downs College for teaching/ educational facilities	Land North-west of B2129 Petersfield road, Havant College
14	Residential development of about 90 dwellings	Located to the north of Bartons Road, immediately west of Havant Crematorium
15	Residential development of about 15 dwellings	Located on the south side of Bartons Road.
16	Mixed use development of about 90 dwellings and 5,900 m ² of employment floorspace (classes B1, B2, B8)	Located on the corner of Bartons Road and New Lane at the gateway to the New Lane industrial area; immediately north of Marsh Plant Hire
17	Mixed use development of around 45 dwellings and a builder's yard	Located in a prominent location on the corner of Petersfield Road and Bartons Road.
18	Mixed-use development of about 560 dwellings, a convenience store, open space and community centre with sporting facilities	Located on the northern slope of Portsdown Hill as it slopes down towards Crookhorn; immediately south of South Downs Campus of Havant & South Downs College (HSDC) & adjacent to the A3(M)
19	Residential development of about 40 dwellings on area of 1.3 ha.	Currently used as golf club practice ground. Anvil Close and Farriers Way serve the properties adjacent to the west of the site with Waterlooville Golf Course bounding the remainder of the site

Site Reference	Development Description	Development Location
20	Hybrid planning application comprising outline application for employment uses and hotel with conference facilities and detailed application for new access link road.	Dunsbury Hill Farm, Park Lane, Cowplain, Waterlooville
21	Restoration of historic path landscape, including refurbishment of follies, conversion of coach house and stable block to create visitor/volunteer facilities.	Sir George Staunton Country Park, Middle Park Way, Havant PO9 5HB
22	Conversion of coach house and stable block to create visitor and volunteer facilities and construction of new visitor car park.	Sir George Staunton Country Park, Middle Park Way, Havant PO9 5HB
23	A 1 classroom teaching block north east of existing schools, a 4-classroom teaching block south west of the existing schools, improvement of existing play areas, creation of a MUGA and expansion of the existing car park	Trosnant Infant and Junior School, Stockheath Lane, Havant PO9 3BD
24	Proposed change of use from a paddock to a temporary overflow car park	Storey Gardens, Sir George Staunton Country Park, Middle Park Way, Havant, Hampshire, PO9 5HB
25	AQUIND Interconnector 2000MW subsea and underground High Voltage Direct Current power transmission link between Normandy and Lovedean substation in Portsmouth.	Land and sea between Normandy and Lovedean substation in Portsmouth.
26	A 62 ha site allocated for mixed-use development including: 850 dwellings; a Care Village including 100 independent living units and 60 bed extra care provision; about 2 ha industrial (B2) and business use (B1); and new primary school	Land south of B2149 Havant Road near Rowlands
27	Approx. 50 dwellings.	Near Durrants
28	Between 50 and 60 dwellings	Land east of Bartons Road
29	Between 100 and 115 dwellings.	Near Little leigh farm
30	Creation of 700 dwellings, 1.7 ha of employment land, a Local Centre (retail, primary school and community facilities), a Care Village, playing pitches, a cricket pavilion, allotments together footpaths and cycleways).	Land East of Horndean
31	Residential-led (C3) mixed-use development with up to 800 dwellings, up to 2ha of employment land (uses B1 and B2), a Local Centre (including: retail (A1); financial and professional services (A2); restaurants, cafés, and drinking establishments (A3 and A4),	Land East of Horndean

Site Reference	Development Description	Development Location
	hot food takeaways (A5), together with a primary school and community facilities informal and formal open space and allotments.	
32	Development of 85 restricted dwellings (55 + years) with associated infrastructure, open space and access from Rowlands Castle Road following the demolition of all existing buildings/hardstanding	Land East of Horndean
33	Development of a care village with 60-bed care home, a village care centre with up to 60 care-assisted living apartments and up to 60 extra care units comprising bungalows and apartments, with associated parking, landscaping and drainage	Land East of Horndean
34	60-bed care home and up to 50 no. extra care bungalows and apartments with associated parking, landscaping and sustainable drainage	Land East of Horndean
35	Construction of approximately 210 dwellings	Land North of Long Copse Lane, Emsworth

Stage 3

- 19.19. Some cumulative construction effects may occur as result of the construction programme for the Scheme overlapping with that of other developments. Therefore, the construction programme for the Scheme and for other developments was used to help identify significant cumulative effects that could occur from concurrent construction activities. The construction information for the Scheme includes the sequencing of activities for different aspects of the Scheme along with the resulting construction traffic profile as presented in Chapter 2 Description of the Development in ES Volume 2.
- 19.20. Operational traffic from known committed developments has been captured in the traffic modelling which in turn has been used to assess the air quality, noise and water quality effects for the Scheme. Therefore, the cumulative environmental effects arising from operational traffic generated by the Scheme and other development is already factored into those assessments.

Stage 4

- 19.21. Where significant cumulative effects, beyond those identified as residual effects from the Scheme in isolation, were identified, additional mitigation measures have been set out.

In-combination effects

- 19.22. In-combination effects are the different environmental effects of the same scheme that affect the same receptor, potentially producing a more significant effect when considered together than when considered in isolation. For example, a local resident might be only slightly affected by construction noise and construction dust when considered separately; however, the combination of the two together may be considered to give rise to a significant effect.
- 19.23. The assessment methodology for in-combination effects requires the identification of impact interactions associated with the Scheme on key environmental receptors. This ensures that the ES is not a series of separate assessments collated into one document, but rather a comprehensive assessment drawing together all the environmental effects of the proposals.
- 19.24. In undertaking the assessment, the following receptor groups have been considered:

- Human receptors: residents, including community and private assets, sensitive receptors, cyclists, pedestrians and vulnerable groups;
- Ecological receptors - protected species and existing habitats;
- The water environment;
- Heritage assets;
- Ground conditions; and
- Landscape receptors.

- 19.25. Potential effects acting upon these receptors include changes in noise and air quality, loss of vegetation and habitat, and an increase in traffic. The assessment considered adverse residual effects, after mitigation has been taken into account, with receptors adversely affected by two or more residual effects included.
- 19.26. The effects identified within the technical topic chapters of the ES were assessed to identify potential in-combination effects using professional judgement and a qualitative assessment approach.
- 19.27. Table 19-4 below highlights the potential interactions between environmental topics for the Scheme. Potential interactions between topics are denoted by grey coloured blocks in the table. The interaction of impacts arises from the combined action of several different environmental impacts upon a single receptor, e.g. the removal of trees to construct the Scheme will have a direct impact upon landscape, visual amenity and ecology due to the loss of the amenity/habitat. Furthermore, this could also have an indirect impact on residential receptors in the area, by way of increasing the impact on air quality, noise, etc.

Table 19-4 - Potential interaction between environmental topics

	Air quality	Historic Environment	Landscape and visual	Biodiversity	Ground conditions	Material resources and waste	Noise and vibration	Population and human health	Water	Effects on Climate
Air quality										
Historic Environment										
Landscape and visual										
Biodiversity										
Ground conditions										
Material resources and waste										
Noise and vibration										
Population and human health										
Water										
Effects on Climate										

Assessment assumptions and limitations

- 19.28. The pipeline, reservoir and access roads have been considered as a single development within the in-combination assessments, as this was considered more appropriate than splitting out the pipeline works to be included as part of the cumulative assessment. There are uncertainties around the phasing of the two elements of the Scheme so for the purposes of the in-combination and cumulative assessments a 'reasonable worst case' of concurrent construction programmes has been assumed. This is consistent with the approach taken for the traffic modelling.
- 19.29. The traffic modelling undertaken for the Scheme took into account forecast growth from local and regional developments. The future year baseline traffic data included a consideration of the cumulative impacts of a number of specified developments including Land East of Horndean (ref: 55562) and Dunsbury Hill Farm (Ref: 00338), as agreed in discussion with the local highway authority. Therefore, the application of growth factors in combination with the inclusion of committed developments, account for the assessment of cumulative effects of local developments in transport terms. This data was then carried through and included in the assessment of future noise and air quality impacts.
- 19.30. Due to travel restrictions imposed by the Government during the outbreak of COVID-19 in the UK and subsequent lockdown measures implemented, a site visit to confirm which planning permissions had been implemented, and could therefore be discounted from the cumulative effects assessment, was not undertaken. Therefore, the process of identifying, and subsequently discounting, committed development which has already been implemented has been informed by desk study only.

Baseline conditions including value/sensitivity of resources and receptors

- 19.31. Baseline data for the in-combination and cumulative effects assessments is largely set out in each of the specific topic sections of the ES.
- 19.32. The short list of other developments is set out in Appendix A19.1 List of Committed Developments in ES Volume 4 and summarised in Table 19-3. The location and footprint of those committed developments is shown in Figure 19.1 Plan of Committed Developments in ES Volume 3.
- 19.33. For the purposes of the cumulative effects assessment there are no applicable local plan allocations or planning applications/permissions in the South Downs National Park, West Sussex or Chichester and no applicable allocations in the Hampshire Minerals and Waste Local Plan (Adopted 2013). All the planning applications/permissions or local plan allocations fall within the administrative areas of Hampshire County, Havant Borough or East Hampshire.

Potential impacts

- 19.34. The cumulative effect of construction traffic from the Scheme and other committed development could give rise to significant effects, particularly on human receptors. In the longer term positive cumulative effects from the Scheme and other committed development may arise as a result of the provision of recreational facilities including improvements to the network of non-vehicular routes which can provide the opportunity for active healthy exercise for people of all ages and abilities. Beneficial cumulative effects are also expected in terms of creating jobs and generating income for local businesses during the construction phase.
- 19.35. There is the potential for in-combination effects to arise as a result of effects of the Scheme on landscape and heritage assets, ecological resources and from changes in air quality, noise and visual amenity.

Design, mitigation and enhancement measures

- 19.36. Mitigation measures to minimise cumulative and in-combination effects are recommended either in the topic chapters in ES Volume 2 or in information submitted in support of the planning applications for the other development listed in Appendix A19.1 List of Committed Developments in Volume 4 of the ES. This assessment does not identify the need for any additional mitigation measures to minimise cumulative and in-combination effects.

Assessment of cumulative effects

Air quality

Approach to cumulative assessment

- 19.37. Potential cumulative effects on air quality may occur from interaction with other proposed (committed) developments located near the Scheme during construction, largely as a result of generation of construction dust or traffic emissions. The assessment identifies the other developments which, in combination with the Scheme, could give rise to significant cumulative effects.

Construction

- 19.38. The ZOI for construction dust is a 350 m buffer from the site boundary. During construction, there are a number of other developments in the area which could potentially affect receptors within that zone. For the reservoir, this includes sites 6, 8, 22, 24, 26, 27, 30 and 31. For the pipeline, this includes sites 1, 3, 4, 7, 9, 10, 13, 17, 22, 23 and 24. The timing and phasing for the development of these sites is unknown, so the reasonable worst case assumption is that construction programmes would overlap. However, with appropriate mitigation measures in place for the Scheme as identified in the REAC in the OEMP in Appendix A2.1 in ES Volume 4 and secured through the CEMP prepared by the appointed contractor, adverse effects resulting from construction dust would be minimised and residual effects have been assessed as not significant in Chapter 7 Air Quality in ES Volume 2. It has been assumed that a combination of planning conditions (such as the preparation of construction management plans, good site practice on the part of the appointed

contractor and legal compliance would similarly reduce construction dust arising from other committed development to an acceptable level. Therefore, no cumulative effects on air quality from construction dust are anticipated.

- 19.39. There is the potential for construction traffic from committed developments in the area to contribute to significant cumulative effects, should construction periods occur over the same timeframe, and the traffic use the same road links as that for the Scheme. This could especially be the case for traffic using the B2149 to access sites 26, 30, 31, 32 and 34, as this is the route reservoir HGV traffic is expected to use to access the A3(M). Given that the air quality assessment for the combined reservoir and pipeline proposals, using conservative assumptions, concluded that the impacts of the Scheme on annual mean NO₂, PM₁₀ and PM_{2.5} concentrations at all modelled receptors would be negligible, the cumulative effect of traffic on air quality, when considered with other committed development is highly unlikely to be significant.

Operation

- 19.40. The traffic modelling undertaken for the Scheme once operational, took the effects of future traffic growth and the effects of committed development into account within the future baseline; no significant adverse effects for traffic during the operational phase of the Scheme were identified.

Noise and vibration

Approach to cumulative assessment

- 19.41. Potential cumulative effects on noise and vibration may occur from interaction with other proposed (committed) developments located near the Scheme during construction. Cumulative effects on receptors within the noise and vibration study area could occur through construction activities or construction traffic associated with the Scheme and the other developments.

Construction

- 19.42. During construction of the reservoir and pipeline, there are a number of other developments in the area which could potentially affect existing sensitive receptors within the noise and vibration study area if construction works were to take place at the same time. This includes both construction and traffic noise. For the reservoir, this includes sites 6, 8, 22, 24, 26 and 27. For the pipeline, this includes sites 4, 7, 9, 10, 12, 13, 21, 22 and 23.
- 19.43. However, with appropriate mitigation measures in place, as identified in the REAC in the OEMP in Appendix A2.1 in ES Volume 4 and secured both through the CEMP (and if necessary Traffic Management Plans) prepared by the appointed contractor for the Scheme and in CEMPs prepared for these other developments, it has been assumed that any adverse effects resulting from simultaneous construction activities would be within acceptable levels. Specifically in respect of the pipeline, given the relatively short phases of work within each section, it is unlikely that construction phases with committed development would overlap. However if overlapping were to be identified as a risk by the local planning authority, the appointed contractor will manage phasing of the works to reduce adverse effects on residents and review other mitigation as necessary.
- 19.44. Provided the identified mitigation of noise and vibration effects is implemented, there would not be any significant residual cumulative effects.

Operation

- 19.45. As set out in Chapter 7 Air Quality in ES Volume 2, once the reservoir is operational, traffic forecasts showed negligible impacts with committed development taken into consideration, and significant cumulative effects from traffic are not expected.

Biodiversity

Approach to cumulative assessment

- 19.46. Potential cumulative effects on biodiversity may occur from interaction with other proposed (committed) developments located near the Scheme during construction and operation. Cumulative effects on biodiversity receptors could occur through construction activities associated with the Scheme and the other developments, including noise, lighting, changes in air quality and loss or severance of habitat.

- 19.47. For this Scheme, given the localised nature of the majority of potential effects, the ZoI for cumulative effects does not generally exceed 2 km from the Site. The ZoI for cumulative effects on bats associated with the internationally designated Singleton and Cocking Tunnels SAC was extended to 3 km from the reservoir site due to the mobility of the qualifying bat species.
- 19.48. Due to potential impacts on international sites designated for nature conservation an Information to Inform the Habitat Regulations report has been prepared to review the potential of the scheme to adversely affect features of the SAC. This report identified potential for in-combination effects with three planning applications associated with the Land East of Horndean development (Site Reference Nos. 30, 31 and 32) and one associated with Land North of Long Copse Lane, Emsworth (Site Reference No. 36). This was due to these developments also having the potential to affect rare Bechstein's bats.

Construction

- 19.49. At their nearest points, The Land East of Horndean development (site reference nos. 30, 31 and 32) are located approximately 300 m north of the reservoir site. This development has proposed enhancement to provide additional bat roosting opportunity in Havant Thicket woodland, which is within the reservoir site. Compensation for the reservoir scheme in respect of Bechsteins' bat includes the installation of bat roosting boxes in Havant Thicket woodland. Thus, in the absence of a joined-up compensation / enhancement approach, there is a potential in-combination effect on the conservation status of the Bechstein's bat population.
- 19.50. Planning Application GEN/18/01143 Land North of Long Copse Lane, Emsworth is located approximately 3.4 km south east of the reservoir site and 2.9 km south east of the pipeline corridor. Natural England consultation feedback provided in July 2020 to Portsmouth Water in response to a review of the reservoir Appropriate Assessment stated in respect of the Land North of Long Copse Lane application: "There are outstanding concerns in relation to the loss of Bechstein's bat foraging areas and impacts to roost sites. Land North of Long Copse Lane has significant residual effects on bats are likely at a site level and we are aware that this project is still live".
- 19.51. Portsmouth Water will engage with Forestry England (owner of Havant Thicket) and share information on bat mitigation measures with the LPA and wider development applicants including the Land East of Horndean applicants to assist in developing a strategic mitigation approach that maintains the conservation status of the Bechstein's bat population. In addition, Portsmouth Water has called for, and is supporting the LPAs in developing, the technical content of a Bechstein's Bat conservation policy for the area. This approach will ensure that potential cumulative effects on Bechstein's bats are avoided.
- 19.52. There could also be potential cumulative impacts on other ecological receptors through the cumulative loss of the same habitat types and severing of important habitat links used by ecological receptors of the Scheme. The Scheme will result in the loss of ancient woodland and veteran trees, which are irreplaceable habitats, lowland mixed deciduous woodland priority habitat and watercourses. A suitable compensation package will be provided through onsite and offsite woodland and wood pasture enhancement and creation and aquatic habitat enhancement. The onsite habitat creation will maintain habitat connectivity. Cumulative impacts are not predicted in relation to these receptors.
- 19.53. There will also be a net loss of grassland habitat, which supports nesting skylarks. This is partially compensated by onsite habitat creation and enhancement, but there is potential for a significant cumulative impact with other developments within 2km, particularly sites 6, 16, 20, 30, 31, 32, 33, and 34. Grassland creation and enhancement will be a priority in the reservoir's Capital Grants scheme. Engagement with other landowners and developers will be undertaken to maximise the benefits of the off-site compensation measures and minimise risks of adverse cumulative effects from habitat loss and fragmentation, such as further loss of skylark habitat to woodland creation.
- 19.54. Taking the mitigation and compensation described in Chapter 9 Biodiversity in ES Volume 2, key details of which are summarised above, into account, significant cumulative effects on ecological receptors are not anticipated.

Operation

- 19.55. Proposals to build over 1000 dwellings within 2km of the reservoir site (most notably at sites 31, 32, 33 and 34) could increase the recreational pressure on retained areas of public open space such as the parts of the application site surrounding the proposed reservoir and increase anti-social

behaviour which could damage habitats and disturb animals. Public access to and around the reservoir site would be appropriately managed to minimise access to sensitive areas as well as wider disturbance and damage from recreational users and antisocial behaviour.

- 19.56. Significant cumulative effects on ecological receptors during operation of the Scheme are not anticipated.

Water environment

Approach to cumulative assessment

- 19.57. Potential cumulative effects on the water environment may occur from interaction with other proposed (committed) developments during construction of the pipeline corridor. Cumulative effects in relation to the water environment could occur through changes to water quality, hydromorphology, flood risk or groundwater.
- 19.58. The following committed developments have been considered in the cumulative assessment for the water environment for the construction phase of the pipeline corridor: Site reference numbers 7, 9, 16, 20, 21, 22, 23, and 25.

Construction

- 19.59. In respect of water quality, the potential for site discharges during construction works at site reference numbers 7, 9, 16, 20, 21, 22, 23, and 25 has been identified as a potential cumulative effect risk. No documents have been found that specify use of best practice for flow attenuation, pollution control and emergency procedures during construction of these committed developments. However, it is assumed that a combination of planning conditions, contractor good practice and legal requirements would ensure no cumulative effects would arise.
- 19.60. In terms of hydromorphology, there is the potential for cumulative effect if sediments are discharged or if riverbank works are undertaken during construction works at site reference numbers 7, 9, 16, 20, 21, 22, 23, and 25. No documents were found that specify detail on sediment control or bankside protection measures for development of those sites. However, it is assumed that a combination of planning conditions, contractor good practice and legal requirements would ensure no cumulative effects would arise.
- 19.61. Due to the National Planning Policy Framework, the site-specific flood risk assessment of developments at site reference numbers 7, 9, 16, 20, 21, 22, 23, and 25 is required to demonstrate that flood risk is not increased elsewhere as a result of those developments. There is therefore no risk of a cumulative effect on flood risk.
- 19.62. The committed developments will be subject to the NPPF and will require mitigation and control measures to be adopted during construction as identified in the REAC in the OEMP in Appendix A2.1 in ES Volume 4 and secured through the CEMPs (developed by the appointed contractor) to reduce impacts to the environment including potential mobilisation of contaminants. With this mitigation in place, the cumulative effect on groundwater arising the Scheme in combination with development at site reference numbers 7, 9, 16, 20, 21, 22, 23, and 25 is likely to be negligible.

Operation

- 19.63. There would be no significant cumulative effects on the water environment arising from the operation of the Scheme and other committed development.

Landscape and visual amenity

Approach to cumulative assessment

- 19.64. The Guidelines for Landscape and Visual Assessment (GLVIA3)⁴ address cumulative landscape and visual effects separately.
- 19.65. Cumulative landscape effects are defined as:

⁴ Landscape Institute and Institute of Environmental Management & Assessment, Third edition, 2013, Guidelines for Landscape and Visual Impact Assessment

“...effects that can impact on either the physical fabric or character of the landscape, or any special values attached to it”.

19.66. A significant cumulative effect on landscape character usually occurs when the addition of the Scheme results in significant landscape character effects that overlap with the significant landscape character effects generated from another development.

19.67. Cumulative visual effects are defined as:

“...effects that can be caused by combined visibility, which ‘occurs where the observer is able to see two or more developments from one viewpoint’ and/or sequential effects which ‘occur when the observer has to move to another viewpoint to see different developments’”.

19.68. A significant cumulative visual effect usually occurs where the addition of the Scheme results in a significant visual effect that coincides in combination with significant visual effects from another development in the view. In some cases, the new development itself may not be visually significant but may raise the overall magnitude of impact from built development, when combined with other schemes, to a significant level of effect. With sequential views, the distance between significant views of different schemes and the mode of transport will affect the professional judgement on whether these effects are cumulatively significant or not.

19.69. Details of the assessment of likely cumulative effects are included in Appendix A11.6 Schedule of Likely Cumulative Effects in Volume 4 of the ES. The following summarises the assessment.

Cumulative effects on landscape character (the reservoir site and access roads)

19.70. Table 19-5 provides an overview of the likely cumulative effects of the reservoir site and access roads, and other proposed development (referred to as site reference numbers) on relevant landscape character areas (refer to Chapter 11 Landscape and Visual Assessment in ES Volume 2).

Table 19-5 - Cumulative effects on landscape character (the reservoir site and access roads)

Ref	Character area	Site reference no.	During construction	Completion (year 0)	Post mitigation (year 15)
			Significance	Significance	Significance
LR.1	LCA D2a: Hambledon to Clanfield Downland Mosaic (Enclosed)	26, 30, 31, 32, 33 and 34	Slight	Neutral	Neutral
LR.2	Landscape Character Area 10a: Havant Thicket and Southleigh Forest	26, 27, 29, 30, 31, 32, 33 and 34	Moderate	Slight	Neutral
LR.3	LCA10: Blendworth Common and woodlands	6, 20 and 26	Moderate	Slight	Slight
LR.4	LCA11: A3 (M) Eastern Corridor	6 and 20	Slight	Neutral	Neutral
LR.7	LCA16: Leigh Park	4, 8 and 9	Moderate	Slight	Neutral
LR.8	LCA20: Staunton Country Park	6, 21, 22 and 26	Moderate	Moderate	Slight
LR.9	Sub Area 10aii: Sink Hole Belt – Manor Lodge Road and Blendworth Common	26, 30, 31, 32, 33 and 34	Moderate	Slight	Slight
LR.10	Sub Area 10aiii West: Wooded Claylands – Havant Thicket	26	Slight	Neutral	Neutral
LR.12	Reservoir Site Landscape Character (author defined)	6, 21, 22, 26, 30, 31, 32, 33 and 34	Moderate	Moderate	Slight

- 19.71. As set out in Appendix A11.6 Schedule of Likely Cumulative Effects in ES Volume 4, moderate cumulative effects are expected during construction for six landscape character areas covering and adjacent to the reservoir site and access roads. Following completion, four of the six potentially significant effects (moderate or above) would reduce to be a slight cumulative effect due to the removal of any temporary construction features in the landscape. Two would remain as a moderate cumulative effect in the medium term until the landscape has recovered from the works and mitigation planting has established. By year 15 all effects would have been reduced or neutralised and those areas with initial significant effects, most affected at construction stage, are expected to be reduced to a non-significant slight cumulative effect. No additional mitigation for cumulative effects is proposed. Mitigation proposed for the non-cumulative effects of the Scheme in association with mitigation planting proposed as part of other developments proposals is likely to reduce effects.
- 19.72. LR.2. If works were to proceed in Schemes 26, 30, 31, 32, 33 and 34 at the same time as The Scheme, there would be the potential for these construction activities to combine and increase their influence on the character of the landscape. However, influence would be short term, the effects reducing once construction is completed. These sites have potential for medium term effects on the landscape character following construction completion. Masterplans show large areas of green infrastructure and buffer planting, which take time to establish and reduce effect on character. The reservoir site is well separated from these schemes by existing woodland and surrounding enclosed landscape, therefore The Scheme is unlikely to contribute to any cumulative effect post construction.
- 19.73. LR.3. The Scheme and the schemes are all not within the LCA, however they are all located closely adjacent. Scheme 6 to the south, scheme 20 to the south east, scheme 26 to the north and the proposed site to the east. Therefore, there is potential for effects on the character of the surrounding landscape to combine. If works were to proceed in Schemes 6, 20 and 26 at the same time as the Scheme, there would be the potential for construction activities to combine however, influence would be short term, the effects reducing once construction is completed. All schemes masterplans or potential masterplans have or would have large areas of green infrastructure and buffer planting. These combine with existing areas of woodland and other features giving good containment. Although existing features help reduce effect once construction is complete, new mitigation planting will take time to establish and contribute to reduction of effects.
- 19.74. LR.7. Given the large areas of surrounding built form, there is good separation from the proposed pipeline corridor and scheme 4, therefore they are not likely to give raise cumulative effects. If works were to proceed in Scheme 8 and 9 at the same time as the pipeline corridor, there would be the potential for these construction activities to combine and increase their influence on the character of the landscape. However, influence would be short term, the effects reducing once construction is completed. Once construction is completed there is potential for medium term combined effects on character to continue until mitigation planting has established and reduced the effects on character from the proposed pipeline route, scheme 8 and 9.
- 19.75. LR.8. Scheme 26 is located to the north west of the site beyond Havant Thicket, Bell's Copse and other woodland on Blendworth Common. On that account inter relationship with The Scheme and the other schemes would be unlikely to result in any cumulative effects. Schemes 21 and 22 are already under construction, if construction of The Scheme and scheme 6 were to coincide, there is a good chance that effects would combine and have greater influence on the landscape character. Nevertheless, any effect from schemes 21 and 22 would be short term until construction is completed. The effects from The Scheme and scheme 6 would be medium-long term, lasting beyond construction completion until mitigation planting and new green infrastructure establishes, thus reducing effects.
- 19.76. LR.9. If works were to proceed in Schemes 26, 30, 31, 32, 33 and 34 at the same time as The Scheme, there would be the potential for these construction activities to combine and increase their influence on the character of the landscape. However, influence would be short term, the effects reducing once construction is completed. These Schemes have potential for medium term effects on the landscape character following construction completion. Masterplans show large areas of green infrastructure and buffer planting, which take time to establish and reduce effect on character. The reservoir site is well separated from these schemes by existing woodland and surrounding enclosed landscape, therefore The Scheme is unlikely to contribute to any cumulative effect post construction.
- 19.77. LR.12. Scheme 26, 30, 31, 32, 33 and 34 are located to the north west of the site beyond Havant Thicket, Bell's Copse and other woodland on Blendworth Common. On that account inter

relationship with The Site and the other schemes would be unlikely to result in any cumulative effects. Schemes 21 and 22 are already under construction, if construction of the proposed reservoir and scheme 6 were to coincide, there is a good chance that effects would combine and have greater influence on the landscape character. Nevertheless, any effect from schemes 21 and 22 would be short term until construction is completed. The effects from the Scheme and scheme 6 would be medium-long term, lasting beyond construction completion until mitigation planting and new green infrastructure establishes, thus reducing effects.

Cumulative visual effects (the reservoir site and access roads)

- 19.78. Table 19-6 provides an overview of the likely cumulative visual effects of the reservoir site and access roads in combination with other proposed development (referred to as site reference numbers) on relevant visual receptors (refer to Chapter 11 Landscape and Visual Assessment in ES Volume 2).

Table 19-6 - Cumulative visual effects (the reservoir site and access roads)

Ref	Visual receptor	Site reference no.	During construction	Completion (year 0)	Post mitigation (year 15)
			Significance	Significance	Significance
VR.1	Sir George Staunton	6, 21 and 22	Moderate	Moderate	Slight
VR.2	Leigh Park (Staunton Country Park), Grade II* listed historic park and garden	6, 21 and 22	Moderate	Moderate	Slight
VR.4	Leigh Park Mansion Terrace, Grade II listed. The Staunton Memorial, Grade II* listed. Pathway (to the south of Staunton Memorial), Grade II listed. Footbridge, Grade II listed	6, 21 and 22	Moderate	Moderate	Slight
VR.6	Bridleway 120	6	Moderate	Moderate	Slight
VR.7	Bridleway 121	6	Moderate	Moderate	Slight
VR.8	E9 European Long Distance Route, Staunton Way	6 and 21	Moderate	Slight	Slight
VR.19	Properties on Swanmore Road.	6	Moderate	Slight	Slight
VR.22	B2149 Durrants Road /Manor Lodge Road	21, 22, 26, 30, 31, 32, 33 and 34	Slight	Neutral	Neutral
VR.23	Swanmore Road	6	Moderate	Slight	Slight

- 19.79. As set out in Appendix A11.6 Schedule of Likely Cumulative Effects in ES Volume 4, moderate cumulative effects are expected during construction for eight visual receptors that are either on or adjacent the reservoir site. Following completion three of the eight potentially significant effects (moderate or above) would reduce to be a slight cumulative effect due to the removal of any temporary construction features, disturbance and activity from the view. Five would remain as a moderate cumulative effect medium term until landscape has recovered from the works and mitigation planting has established. By year 15 all effects would have been reduced or neutralised and those areas with initial significant effects, most affected at construction stage, are expected to be reduced to a non-significant slight cumulative effect. No additional mitigation for cumulative effects is proposed. Mitigation proposed for the non-cumulative effects of the Scheme in association with mitigation planting proposed as part of other developments proposals is likely to reduce effects.

- 19.80. VR.1, 2, 4 and 8. Construction of schemes 21 and 22 are already underway, if construction continues and coincides with construction of the reservoir and access roads, then it's likely that visual cumulative effects will be encountered. There is potential for further cumulative effects if scheme 6 was brought forward at the same time. Some existing screening is provided between the conservation area and scheme 6 by woodland at Cabbagefield Row. However, from certain locations it might be possible to see development in scheme 6, depending on the building heights. This would result in cumulative visual effects with the Site, these being considered to be short to medium term, until such time as the landscape recovers from the works disturbance and new mitigation planting has established.
- 19.81. VR.6 and 7. If scheme 6 is brought forward it's likely that the bridleway, for part of its length, would have views of the reservoir and access roads to the east and scheme 6 to the west. This would result in a cumulative visual effect, largest at the construction stage, reducing post construction and when proposed green infrastructure and mitigation planting has established.
- 19.82. VR.19. If scheme 6 was brought forward, a small number of properties would encounter cumulative visual effects. These properties are likely to have views of the new access roads required for the reservoir and scheme 6. The greatest cumulative visual effect would be if construction was to proceed on both sites at the same time, introducing high levels of activity into the views. Both routes would also be used for construction access, worst effects would be short term. Effects would reduce in the medium to long term once construction finished, landscape has recovered, and any mitigation planting has established. Some slight cumulative effect would be permanent.
- 19.83. VR.23. If scheme 6 was brought forward, a small section of road would encounter cumulative visual effects. From this section of road in the north, it's likely that views of the new access road required for the reservoir and scheme 6 would be visible. The greatest cumulative visual effect would be if construction was to proceed on both sites at the same time, introducing high levels of activity into the views. Both routes would also be used for construction access, worst effects would be short term. Effects would reduce in the medium to long term once construction finished, landscape has recovered and any mitigation planting has established. Some slight cumulative effect would be permanent.

Cumulative effects on landscape character (the pipeline corridor)

- 19.84. Table 19-7 provides an overview of the likely cumulative effects of the pipeline corridor and other proposed development (referred to as site reference numbers) on relevant landscape character areas (refer to Chapter 11 Landscape and Visual Assessment in ES Volume 2).

Table 19-7 - Cumulative effects on landscape character (the pipeline corridor)

Ref	Character area	Site reference no.	During construction	Completion (year 0)	Post mitigation (year 15)
			Significance	Significance	Significance
LR.6	LCA15: Bedhampton and Havant – north western suburbs	9	Moderate	Slight	Neutral
LR.7	LCA16: Leigh Park	4, 8 and 9	Moderate	Slight	Neutral
LR.13	Pipeline corridor Section 1-6 Landscape Character (author defined)	4, 8 and 9	Moderate	Slight	Neutral
LR.14	Pipeline Corridor Section 7-8 Landscape Character (author defined)	6	Slight	Neutral	Neutral

- 19.85. As set out in Appendix A11.6 Schedule of Likely Cumulative Effects in ES Volume 4, moderate cumulative effects are expected during construction for three landscape character areas covering the pipeline corridor. Following completion all potentially significant effects (moderate or above) would reduce to be a slight cumulative effect due to the removal of any temporary construction features in the landscape. Slight cumulative effects would last medium term post construction, until

landscape has recovered from the works and mitigation planting has established. By year 15 all effects would have been neutralised. No additional mitigation for cumulative effects is proposed. Mitigation proposed for the non-cumulative effects of the Scheme in association with mitigation planting proposed as part of other developments proposals is likely to reduce effects.

- 19.86. LR.6. If works were to proceed in Scheme 9 at the same time as the pipeline corridor, there would be the potential for these construction activities to combine and increase their influence on the character of the landscape. However, influence would be short term, the effects reducing once construction is completed. Once construction is completed there is potential for medium term combined effects on character to continue until mitigation planting has established and reduced the effects on character from the proposed pipeline route and scheme 9.
- 19.87. LR.7 and 13. If works were to proceed in Scheme 8 and 9 at the same time as the pipeline corridor, there would be the potential for these construction activities to combine and increase their influence on the character of the landscape. However, influence would be short term, the effects reducing once construction is completed. Once construction is completed there is potential for medium term combined effects on character to continue until mitigation planting has established and reduced the effects on character from the proposed pipeline route, scheme 8 and 9.

Cumulative visual effects (the pipeline corridor)

- 19.88. Table 19-8 provides an overview of the likely cumulative visual effects of the reservoir site and access roads, and other proposed development (referred to as site reference numbers) on relevant visual receptors (refer to Chapter 11 Landscape and Visual Assessment in ES Volume 2).

Table 19-8 - Cumulative visual effects (the pipeline corridor)

Ref	Visual receptor	Site reference no.	During construction	Completion (year 0)	Post mitigation (year 15)
			Significance	Significance	Significance
VR.9	Footpath 33	9	Slight	Neutral	Neutral
VR.12	Footpath 506b	9	Slight	Neutral	Neutral
VR.13	Pipeline corridor Section 4: Hermitage Stream	9	Slight	Neutral	Neutral
VR.24	Routes on pipeline corridor Section 1-6	9	Slight	Neutral	Neutral

- 19.89. Slight non-significant cumulative effects are expected during construction for all four visual receptors adjacent the pipeline corridor. Following construction completion all would be neutralised due to the removal of any temporary construction features, disturbance and activity from the view. Therefore, the pipeline corridor would have no further cumulative visual effect.

Ground conditions

Approach to cumulative assessment

- 19.90. Potential cumulative impacts in relation to ground conditions may occur from interaction with other proposed (committed) developments located near the Scheme during construction and operation. Cumulative effects could occur through the following:
- An increase in soil erosion and the amount of dust and surface water runoff generated through a larger construction area affecting geological receptors, controlled waters (groundwater and surface water), human health and ecological receptors;
 - Sterilisation of larger areas of land from future mineral extraction either above or below ground;
 - Destabilisation of ground, where the developments are located in close proximity, causing ground stability issues to geological and property receptors; and
 - An increase in the mobilisation of contaminants in the air, ground and groundwater through the disturbance of a larger area of potentially contaminated ground mobilising contaminants

causing the exposure of human health, controlled waters (groundwater and surface water) and ecological receptors to potential contaminants.

19.91. The Zone of Influence (ZOI) used to identify other developments and potential receptors and impacts for consideration in the ground conditions assessment was 500 m.

19.92. Several schemes were scoped out of the ground conditions assessment due to their nature and scale. These schemes included house extensions/conversion and variations to existing land use where the depth and extent of ground excavations is limited. Based on the screening exercise outlined above, the following schemes have been considered in the cumulative assessment for ground conditions for both the construction and operational phases of the Scheme as summarised in

19.93. Table 19-9 below:

Table 19-9 - Summary of committed developments with potential to give rise to cumulative effects

Site reference no.	Development	Planning application reference / policy reference	Distance and direction
1	Havant Public Service Village - Land East of B2149, Elmleigh Road.	CS18.1 Havant Public Service Village	340m east of pipeline corridor.
4	Located on Dunsbury Way and formerly part of the redevelopment of the Procter and Gamble factory site.	Site L119	180m north of pipeline corridor.
6	An open field to the north of the existing built up Warren Park area of Leigh Park.	Site UE6a	Adjacent to west of reservoir and access roads.
7	Brownfield site left over from the redevelopment of Procter and Gamble.	Site BD65	75m west of pipeline corridor.
8	Land to the east of the site lies the Warren Park Primary School.	Site L25	280m west of reservoir and access roads.
9	Land north east of the Hermitage Stream.	Site L83	Adjacent to pipeline corridor.
10	Leigh Park District Centre	Site L138	40m east of pipeline corridor.
12	Land south of Bishopstoke Road	KS3	50m south of pipeline corridor.
13	Land north-west of B2129 Petersfield Road, Havant College	KS7	115m east of pipeline corridor.
16	Land on corner of Bartons Road and New Lane at the gateway to the New Lane industrial area.	H35	420m west of reservoir and access roads.
19	Site adjacent to Anvil Close and Farriers Way	H48	250m west of reservoir and access roads.
23	Trosnant Infant and Junior School, Stockheath Lane	APP/17/00049	20m east of pipeline corridor.
26	Land south of B2149 Havant Road near Rowlands	Site SA33. Policy HN1 in adopted Housing and Employment Allocations	175m north of reservoir and access roads.
27	Near Durrants	SA39	320m east of reservoir and access roads.
31	Land East of Horndean	55562/005	175m north of reservoir and access roads.

Construction

- 19.94. The construction of these developments is likely to be concurrent with the construction of the Scheme and due to their proximity to the site, may cause cumulative impacts. However, the developments themselves will be subject to the NPPF and will require mitigation and control measures to be adopted as identified in the REAC in the OEMP in Appendix A2.1 in ES Volume 4 and secured through the CEMP (developed by the appointed contractor) during the construction to reduce impacts to the environment including potential mobilisation of contaminants. The detailed design will also take into consideration any impacts associated with destabilising the ground due to construction activities close to the site. Therefore, it is not expected that the combined impact of these cumulative effects would be greater than those effects predicted for ground conditions as outlined in Chapter 10 Ground Conditions in ES Volume 2. Only negligible to minor adverse cumulative effects are anticipated, which are classified as not significant. No additional mitigation is anticipated.

Operation

- 19.95. The committed developments include residential houses, schools, offices and retail and commercial buildings and are yet to be completed so would therefore be potential receptors for the operation of the Scheme. Receptors may be impacted by the potential introduction of new sources of contamination and the generation of waste during the operation of the Scheme. However, the Scheme would be operated in accordance with granted consents and the relevant regulations and best practice guidance. Therefore, it is not expected that cumulative effects would be greater than those effects predicted for ground conditions as outlined in Chapter 10 Ground Conditions in ES Volume 2. Only negligible to minor adverse cumulative effects are anticipated, which are classified as not significant. No additional mitigation is anticipated.

Historic Environment

Approach to cumulative assessment

- 19.96. Potential cumulative impacts may occur from interaction with other proposed (committed) developments located near the Scheme during construction and operation.
- 19.97. The Zone of Influence (ZOI) used to identify other developments and potential receptors and impacts for consideration in the cultural heritage assessment was 500 m from the red line boundary of the reservoir.
- 19.98. Several developments were scoped out because, due to their nature, scale and location they were unlikely to have cumulative effects either from direct harm or impacts on setting.
- 19.99. Based on the scoping exercise outlined above, proposed development at sites 6, 11, 21, 22, 23 and 24 have been considered in the cumulative assessment for both the construction and operational phases of the Scheme.

Construction

- 19.100. Taking into account the list of other developments identified, impact of the construction of these developments in combination with construction of the reservoir site, the access roads and the pipeline corridor will not result in any significant cumulative effects. The developments outside of the RPG and Conservation area would not have any direct physical impacts on those assets within the Reservoir Site, access roads, or pipeline. The contribution of the setting of the RPG and Conservation Area does not extend far beyond the current boundaries due to the surrounding development and urban/suburban nature of the area. As such, the proposed developments outside of the RPG are not considered to have a noticeably impact on the setting of the RPG and Conservation Area.
- 19.101. Proposed developments within the RPG and Conservation Area have the stated aims of restoring and enhancing the understanding of the RPG and Conservation Area. Should the construction of these developments overlap with the construction of the Reservoir, access roads, and pipeline, there would be a change to the appreciation of the internal components within the RPG and Conservation Area. The proposed developments would occur within a relatively small and confined area of the RPG and Conservation Area; much of the larger area would remain accessible and easily discernible. The existing interpretation of the RPG and Conservation Area within the Leigh

Park attraction is expected to offset the disruption caused by construction works within the park. As such, even if the construction of the proposed developments there were to occur simultaneously with the Reservoir, access road, and pipeline construction, the overall impact to the significance of the RPG and Conservation Area would be negligible. The nature of the proposed developments, designed to create an improvement to the conservation and enhancement of the heritage assets being restored, would therefore not create any adverse cumulative impacts on the RPG and Conservation Areas.

Operation

- 19.102.** Cumulative effects related to cultural heritage during the operation of the reservoir and access roads and other developments are outlined in Table 19-10.

Table 19-10 - Operational cumulative effect on cultural heritage

Site reference no.	Policy document/Application reference	Development reference	Development impact	Assessment
6	Havant Borough Core Strategy (July 2014)	UE6a	Possible minor indirect impacts on the significance of the Grade II* Leigh Park RPG and Sir George Staunton Conservation Area due to additional development near the setting of a small portion of the boundary of the RPG and Conservation Area	Possible negligible adverse cumulative effect. Mitigation possible through landscape design of the Scheme and the committed development. Not significant.
11	Havant Borough Core Strategy (July 2014)	W126	Documents submitted with Planning Application APP/19/00224 ⁵ determined that there would be no impact on the RPG and Conservation Area	Neutral cumulative effect
21	APP/17/00736	Hampshire County Council planning application	Impact on restoration of landscape and features in Leigh Park RPG. Proposal is designed to provide a beneficial impact on the RPG.	Development would have a beneficial impact on the RPG and Conservation Area through restoration of historic landscape features. Neutral or slight beneficial cumulative effect, not significant
22	APP/17/00735	Hampshire County Council planning application	Conversion of coach house and stable block to create visitor and volunteer facilities and construction of new visitors' car park on former Beacon Nursery site	Development would have a beneficial impact on the RPG and Conservation Area through restoration of historic buildings and improved access for visitors.

⁵ https://planningpublicaccess.havant.gov.uk/online-applications/applicationDetails.do?activeTab=documents&keyVal=DCAPR_245553, accessed 26/08/2020

Site reference no.	Policy document/Application reference	Development reference	Development impact	Assessment
			and associated works. Proposal is designed to provide a beneficial impact on the RPG.	Neutral or slight beneficial cumulative effect. Not significant
23	APP/17/00049	Hampshire County Council planning application	Impact of 1 classroom teaching block to the north east of existing schools, a 4 classroom teaching block to south west of the existing schools, some internal refurbishment, the adaptation and improvement of the existing external play areas, the creation of a new MUGA and the expansion of the existing car park. Proposal is designed to provide a beneficial impact on the RPG.	Development would have a beneficial impact on the RPG and Conservation Area through restoration of historic buildings and improved visitor access. Neutral or slight beneficial cumulative effect. Not significant
24	APP/16/00063	Hampshire County Council planning application	Impact of a proposal for a change of use from a paddock to a temporary overflow car park. Proposal is designed to provide a beneficial impact on the RPG.	Development would have a beneficial impact on the RPG and Conservation Area through improved visitor access. Neutral or slight beneficial cumulative effect, not significant.

- 19.103. There would be no significant cumulative effects related to cultural heritage during the operation of the pipeline corridor in combination with the operation of other committed development.

Materials and waste

Approach to cumulative assessment

- 19.104. Potential cumulative impacts in respect of materials and waste may occur from the interaction with other proposed (committed) developments during construction. Consumption of resources and generation of waste could lead to adverse cumulative effects due to depletion of resources and implications for waste infrastructure capacity.
- 19.105. Cumulative effects have been assessed where suitable information on materials and waste associated with other committed development is available.

Construction

- 19.106. The concurrent construction of the Scheme and nearby developments will result in cumulative effects through consumption of primary, recycled or secondary resources and generation of construction, demolition and excavation wastes. The potential adverse effects of this are the depletion of resources, including key construction materials and waste infrastructure capacity, resulting in the temporary or permanent degradation of the natural environment.

- 19.107. The Scheme includes design and mitigation measures to reduce the effect on materials and waste—primarily by using site-won materials in its construction and preventing waste by reusing excavated materials. However, the Scheme requires the import of primary aggregates for use as drainage material in the reservoir (sand and gravel) and rock armour (limestone blocks) for protection along the shoreline of the reservoir.
- 19.108. The developments in Appendix A19.1 List of Committed Developments in ES Volume 4 that have the potential to require large quantities of aggregate and generate large quantities of construction, demolition and excavation waste are presented in below. Several applications for residential and care home developments have been granted planning permission or are currently in the process of applying. The planning applications for these developments do not detail the quantities of materials or wastes expected to be used/generated and therefore are not included in the cumulative effects assessment.

Table 19-11 - Assessment of cumulative effect on materials resources and waste

Site reference no.	Application description	Assessment of cumulative effect on material resources and waste
25	The Aquind Interconnector is a high voltage direct current marine and underground electric power transmission link between Lovedean in Portsmouth and France. The proposed construction period is between 2021 and 2023.	The aggregate required for construction of the converter station and onshore cable corridor is largely expected to be recycled aggregate and therefore the cumulative effect with the Scheme will be limited. The development also requires 'rock' in construction of the marine cable corridor. This is expected to be from 'European sourcing' and details of the type of material are not provided. Due to the lack of information, it is not possible to determine the cumulative effect. The development is expected to generate large quantities of CDE wastes that will need to be recovered via local waste infrastructure capacity.

- 19.109. The Scheme has identified design and mitigation measures to reduce its impacts on materials and waste and these are presented in Chapter 14 Material Resources and Waste in ES Volume 2. With mitigation in place the impacts of the Scheme on construction, demolition and excavation waste infrastructure was assessed as negligible. Therefore, it is not practicable to further reduce the effects. The overall effect of the Scheme on materials and waste remains as described in Chapter 14 Material Resources and Waste in ES Volume 2.

Operation

- 19.110. There will be no significant cumulative effects in respect of materials and waste arising from the operation of the Scheme and other committed development.

Population and human health

Approach to cumulative assessment

- 19.111. Potential cumulative impacts may occur from interaction with other proposed (committed) developments located near the Scheme during construction and operation. Cumulative effects in relation to population and human health could occur through changes to the following health determinants: air pollution, access to open space, access to opportunities for recreation and leisure, active travel, access to work and training and noise pollution and vibration.
- 19.112. In the absence of prescriptive guidelines, the Zone of Influence (ZOI) used to identify other developments and potential receptors and impacts for consideration in the population and health assessment was 500 m from the red line boundary of the Scheme. Some population and health effects are derived from changes in wider health determinants identified by other relevant technical

assessments undertaken as part of the EIA. The study area for the cumulative population and health assessment has been extended where other technical assessments have identified a study area that extends beyond the core area identified above. Furthermore, the study area was extended to define characteristics and sensitivity of communities near the Scheme based on likely effects on physical, mental and social wellbeing.

- 19.113. The following committed developments have been considered in the cumulative assessment for Population and Health for the construction and operational phases of the Scheme: Site Reference Numbers 4, 6, 7, 8, 16, 20, 22, 24, 27, 30, 31, 32 and 34.

Construction

- 19.114. The construction of other developments could be concurrent with the construction of the Scheme and due to their proximity to the site, may cause cumulative impacts.
- 19.115. There is potential for construction dust and air emissions from construction traffic from the development of site numbers 4, 6, 7, 8, 20, 22, 24, 27, 30, 31, 32 and 34, in combination with the Scheme, to affect human health receptors. With appropriate mitigation measures, as set out in Chapter 18 Population and Human Health in ES Volume 2 and as identified in the REAC in the OEMP in Appendix A2.1 in ES Volume 4 and secured through the CEMPs for the committed development, any such adverse effects on human health receptors would be minimised. The cumulative effect is unlikely to be significant.
- 19.116. Noise from construction plant and from construction traffic generated by both the Scheme and the development of site numbers 4, 6, 7, 8, 20, 27, 30, 31, 32 and 34 could affect human health receptors. The effects will be mitigated by measures set out in Chapter 18 Population and Human Health in ES Volume 2, as identified in the REAC in the OEMP in Appendix A2.1 in ES Volume 4 and secured through the CEMPs for the committed development. No significant cumulative effects are likely.
- 19.117. The Scheme in combination with development at site numbers 8, 20, 27, 30, 31, 32 and 34 will generate construction employment opportunities and potentially generate income for local businesses. This, in turn, would improve financial security and self-esteem particularly among low-income groups. However, this beneficial cumulative health effect is not likely to be significant.
- 19.118. Construction of the Scheme, alongside the identified list of committed development, is unlikely to have significant cumulative effects on the following health determinants: access to open space, access to opportunities for recreation and leisure, access to work and training and active travel.

Operation

- 19.119. The operation of development at site numbers 7, 20, 30, 31, 32, 33, and 34 alongside the Scheme could have beneficial effects by increasing trade for local businesses and potentially creating jobs. This would positively influence mental and physical health particularly for low-income groups.
- 19.120. The operation of development at site numbers 22 and 24 alongside the Scheme is likely to have significant cumulative physical and mental health effects by improving access to opportunities for recreation and leisure. The developments would be encouraging activity and connect people to nature, particularly benefitting children and adolescents.
- 19.121. Significant beneficial effects on the following health determinants has been identified in Chapter 18 Population and Human Health in ES Volume 2: access to open space, access to opportunities for recreation and leisure, active travel and access to work and training. Operation of the Scheme, in combination with the identified list of committed development, is unlikely to have any additional significant effects.

Effects on climate change

- 19.122. The atmosphere is equally affected by all emissions worldwide. It is therefore not appropriate to consider the effects of the Scheme cumulatively with other developments in the local area. However, it is noted that the effects of all GHG emissions are essentially cumulative, as it is their concentration in the atmosphere, rather than the level of emissions per time period, that determines the warming effect (i.e. it is the 'stock' rather than the 'flow' which is important). For this reason, the effects of the Scheme have been considered in Chapter 16 Effects on Climate in ES Volume 2 in the context of the overall UK emissions to which it contributes.

Assessment of in-combination effects

- 19.123. The in-combination effects arising from the construction of the pipeline, reservoir and the access roads have been assessed using a receptor based approach based on the following receptor groups:
- Human receptors - residents, including community and private assets, sensitive receptors, cyclists, pedestrians and vulnerable groups;
 - Ecological receptors - protected species and existing habitats;
 - The water environment;
 - Heritage assets;
 - Ground conditions; and
 - Landscape.
- 19.124. Impacts identified by the different environmental topic assessments with the potential to work in combination to affect a particular receptor group were identified via a matrix-based approach (see Table 19-4). A review of the residual effects identified within each of the topic chapters was then undertaken to identify receptors experiencing more than one effect classified as at least minor adverse or equivalent. Receptors potentially experiencing minor or greater adverse effects were included in the assessment. Any negligible or neutral effects were discounted from the assessment.

Human Receptors

Local residents

- 19.125. Construction works for the reservoir, access roads and the installation of the pipeline are likely to adversely affect local residents and other sensitive human receptors via dust, visual intrusion, noise and vibration, temporary road closures and potentially night-time working.
- 19.126. The air quality assessment concluded that with mitigation in place, dust arising from any of the construction works would be unlikely to give risk to significant adverse effects for any receptors. Similarly, construction traffic effects are considered to be negligible at all receptors.
- 19.127. **Reservoir and Access Roads:** All daytime site construction noise levels for the reservoir and access road are predicted to be below the threshold for potentially significant effects and are therefore not considered to be significant. Night-time works are not routinely expected during the construction of the reservoir, however they may be required in very exceptional circumstances. If night-time working is required there would be the potential for impacts at some sensitive receptors. For receptors in Rowland's Castle and most of Havant, night-time impacts would be mitigated through the use of temporary acoustic screens. However, for receptors along Swanmore Road, it may not be possible to completely mitigate night-time impacts from earthworks activities and such activities will be avoided around the south west of the reservoir.
- 19.128. The following properties have been identified as experience moderate adverse effects on views during reservoir construction, with receptors either located within the reservoir site or closely adjacent its boundaries. This is due to the large scale and comprehensive nature of the proposals and construction required, including the effects from construction traffic and plant movement:
- To the east - properties on the northern end of Durrants Road, and properties on the west side of the southern end of Manor Lodge Road,
 - To the south west - properties on Well Meadow and properties on Winterslow Drive,
 - To the west - properties on Swanmore Road.
- 19.129. **Pipeline:** The assessment of trenchless construction of the pipeline shows that there is potential for significant daytime impacts at up to 11 residential receptors. Given the short duration of works, it is likely that impacts can be mitigated through good communication with residents both prior to and during the works and not undertaking works at night unless absolutely necessary. Therefore, it is not considered that noise effects from trenchless pipeline construction are significant.

Table 19-12 - Assessment of in-combination effects

Receptor	Chapter											Comment
	Air Quality	Historic Environment	Biodiversity	Ground Conditions	Landscape & Visual Amenity	Noise & Vibration	Transport	Material, Resources & Waste	Water	Climate	Pop. & Human Health	
Human Beings	Y	N	N	Y	Y	Y	Y	N	Y	N/A	Y	Population and human health assessment has already taken into consideration the effects on accessibility and visual amenity and the effects of air, noise, soil and water pollution
Ecological	Y	N	Y	N	Y	Y	N	N	Y	N/A	N	The Biodiversity assessment has already taken into consideration the effects of noise, air quality, water quality and habitat loss on ecological receptors
Water Environment	N	N	Y	Y	N	N	N	N	Y	N/A	N	The Water chapter has already considered the in-combination effects on water quality
Heritage	N	Y	N	N	Y	N	N	N	N		N	-
Ground Conditions	N	N	N	Y	N	N	N	N	N		N	-
Landscape	N	Y	N	N	Y	N	N	N	N		N	-

- 19.130. Where open trench methods are proposed, the noise assessment shows that there is the potential for significant daytime effects along all sections of the pipeline and from all four sections where night- time works might be necessary (Sections 2,3, 10 and 11). However, the assessment assumed all plant would be operating simultaneously at the closest point to the receptor. In reality this is unlikely to happen and therefore noise levels would be lower than those predicted. The assessment also does not account for any screening that may benefit receptors that do not front onto the works. Therefore, the actual numbers of receptors affected are likely to be lower than those reported in this assessment. All sections of open trench construction are programmed to last at least 10 days, with 4 sections lasting longer than 40 days. However, the works would not be taking place in close proximity to all receptors for the whole of the durations stated and therefore it is unlikely that noise levels at receptors would exceed the relevant thresholds for extended periods of time. Through good communication with residents and employment of Best Practicable Means it is likely that impacts can be minimised and therefore noise effects from open trench pipeline construction is not considered to be significant.
- 19.131. Open trench construction methods will also give rise to the potential for significant vibration effects in most sections when the road compaction plant is operating at its maximum amplitude of vibration. However, when it is operating at its minimum amplitude there are only 2 receptors that may be affected, namely 1, North Street, Havant, PO9 3HD (section 2) and the St Johns Ambulance Headquarters, Fraser Road, Havant, PO9 3EJ (section 4). It should be noted that impacts at these receptors would be short term and through good communication with residents and employment of Best Practicable Means it is likely that impacts can be minimised and were therefore not considered to be significant.
- 19.132. Views from properties along the roads identified below will be adversely affected by construction works associated with the installation of the pipeline:
- Section 2 - Chadswell Meadow to Bidbury School: Properties on Chadswell Meadow, Brunswick Gardens, Bedhampton Road and North Street
 - Section 3 - Bidbury School to Fraser Road: Properties on Fraser Road, Woodgreen Avenue and James Road
 - Section 4 – Fraser Road to Highclere Avenue: Properties on Barncroft Way, Stockhealth Lane, Purbrook Way, Corhampton Crescent, Ewhurst Close and Bootley Drive.
 - Section 5 – Highclere Avenue to Ellisfield Road: Properties on Highclere Avenue, Hursley Road, Eversley Crescent and Iping Avenue.
 - Section 6 – Ellisfield Road to High Lawn Way: Properties on Ellisfield Road, Blackdown Crescent and Dunsbury Way.
 - Section 7 – High Lawn Way to Middle Park Way: Properties on High Lawn Way, Foxcoft Grove, Somborne Drive and Broadmere Avenue
- Only minor adverse (and non-significant) effects on views are expected during construction for all the visual receptors identified along the pipeline corridor. This is due to the limited nature of construction required to install the pipeline and the small-scale enclosed nature of the urban and public green space in which the route passes.
- 19.133. The following temporary full road closures are likely to be required to allow trenched construction of the pipeline:
- High Lawn Way;
 - Ellisfield Road;
 - Highclere Avenue;
 - Fraser Road;
 - North Street;
 - Brunswick Gardens; and
 - Chadswell Meadow.
- 19.134. Phasing and timings of these closures are yet to be determined. The assessment was based on the assumption that all but one closure would be for 11 weeks or less, with the exception being Highclere Avenue, with a reasonable worst case assumption of a 27 week closure.
- 19.135. There is the potential for some residential receptors in the location of both the reservoir and access roads and the pipeline route to experience significant in combination effects from the construction

works. Due to current uncertainty over the phasing of the works and construction techniques to be employed at each location it is not possible to identify those roads or properties that might be significantly affected with any degree of certainty. The appointed contractor will work closely with local communities potentially affected to ensure works are phased to reduce adverse effects as far as reasonably practicable, and to ensure residents are kept informed on timing and duration of works.

- 19.136. No in combination effects have been identified once the reservoir is operational.

Users of Bridleway 120:

- 19.137. Construction of the reservoir will require the permanent diversion of a section of Bridleway 120 which currently runs east-west through the site. The bridleway will be diverted to the north of the reservoir, before reconnecting back with the existing route. The effect on users of the bridleway has been assessed as minor. In addition, construction works and subsequently the presence of the reservoir will result in adverse impacts on views from the bridleway. This effect was assessed as moderate adverse for the duration of the construction phase, lessening to minor adverse for year 1 on completion of the Scheme. By Year 15 planting will have matured and the effect on views is predicted to have become minor beneficial. Neither the construction nor the operational in-combination effects have been assessed as significant due to the low number of bridleway users affected.

Ecological Receptors

- 19.138. In combination effects on designated sites have already been considered within Chapter 9 Biodiversity in ES Volume 2. The assessment concluded that there were no direct impacts and no air quality or noise impacts on internationally or nationally designated sites likely to result from the Scheme.

The Water Environment

- 19.139. No in combination effects have been identified for water environment receptors.

Heritage Assets

Leigh Park Registered Park and Garden (RPG)

- 19.140. The permanent loss of 850m of The Avenue located within the RPG has been assessed as resulting in a moderate adverse effect on the setting of the RPG from a heritage perspective. The landscape assessment undertaken identified a moderate adverse visual effect on the landscape character of the RPG during construction due to the large scale and comprehensive nature of the proposals and construction required, including the effects from construction traffic and plant movement. In addition to the above the location of a temporary construction compound to service the installation of the pipeline on Middle Park Way would cause a slight adverse effect on the setting of the RPG. Given the temporary nature of the latter effect, lasting for the duration of the pipeline construction, and the fact that mitigation has already been identified for both effects, no further mitigation is proposed.
- 19.141. Following completion of the construction phase the compound would be dismantled and land restored, so no in combination effects would arise.

Sir George Staunton Conservation Area

- 19.142. The construction of the reservoir embankment would remove a portion of the Sir George Staunton Conservation Area located outside of the RPG, an area of open space north of Thicket Lawn, resulting in a moderate adverse effect from a heritage perspective. This effect was also classified as a moderate adverse visual effect on the landscape character of the RPG during construction due to the large scale and comprehensive nature of the proposals. In addition the location of a temporary construction compound along the pipeline corridor, within the George Staunton Conservation Area, in a small field located at the north-east corner of the junction of Middle Park Way and Bitterne Close would result in a temporary slight adverse effect on the setting of the Conservation Area. Given the temporary nature of the latter effect, lasting for the duration of the pipeline construction, and the fact that mitigation has already been identified for both effects, no further mitigation is proposed.

- 19.143. Following completion of the construction phase the compound would be dismantled and land restored, so no in combination on the Conservation Area would arise.

Landscape Receptors

- 19.144. The potential in combination effects on landscape receptors potentially affected including Leigh Park Registered Park and Garden, Sir George Staunton Conservation Area and views from some of the key receptors have been captured in the sections above, specifically human and heritage receptors, so it is not proposed to repeat the assessment here.

Monitoring

- 19.145. For cumulative and in-combination effects no monitoring of effects over and above that recommended in the specialist topic chapters is proposed.

Summary

Cumulative effects

- 19.146. Assuming committed developments have appropriate mitigation measures in place, (such as the preparation of construction management plans, good site practice on the part of the appointed contractor and legal compliance) construction dust from other developments in combination with the Scheme would not give rise to any significant residual effects. Therefore, no cumulative effects on air quality from construction dust are anticipated.
- 19.147. There is the potential for construction traffic from committed developments to contribute to significant in combination effects on air quality, should construction phases overlap; this is particularly pertinent for traffic using the B2149, as this is the route reservoir HGV traffic is expected to use to access the A3(M). However, the air quality assessment for the combined reservoir and pipeline proposals concluded that the impacts of the Scheme on annual mean NO₂, PM₁₀ and PM_{2.5} concentrations would be negligible, so the cumulative effect of traffic on air quality, when considered with other committed development is considered unlikely to be significant.
- 19.148. With appropriate mitigation measures in place as identified in the REAC in the OEMP in Appendix A2.1 in ES Volume 4 and secured through such as CEMPs and if necessary Traffic Management Plans for the Scheme and any committed development, any adverse construction effects resulting from simultaneous construction noise and vibration activities from several committed developments and the Scheme would be minimised such that there would not be a significant cumulative effect.
- 19.149. Portsmouth Water's commitment to share information on bat mitigation measures with the LPA and wider development applicants including the land East of Horndean applicants will assist LPAs in developing a strategic mitigation approach that maintains the conservation status of the Bechstein's bat population. Potential for a significant cumulative effect due to loss of grassland has been identified. To compensate for this, grassland creation and enhancement will be a priority in the reservoir's Capital Grants scheme. Taking this mitigation and compensation into account, significant cumulative effects on the conservation status of Bechstein's bat, grassland or other biodiversity receptors are not anticipated.
- 19.150. Several of the committed developments entail provision of additional housing which could bring increased numbers of people into the area, increasing recreational pressure on areas of public open space which could increase anti-social behaviour and damage habitats and disturb species. Public access to and around the reservoir site would be appropriately managed to minimise access to sensitive areas as well as wider disturbance and damage from recreational users and antisocial behaviour.
- 19.151. There is anticipated to be significant cumulative effects on landscape character during construction of the reservoir site, access roads and development at site reference no. 4, 8, 6, 9, 20, 21, 22, 26, 27, 29, 30, 31, 32, 33 and 34. Post construction, significant cumulative effects would remain for up to 15 years until the landscape has recovered from the works and mitigation planting has established. Mitigation proposed for the non-cumulative effects of the Scheme in association with mitigation planting proposed as part of other developments proposals is likely to reduce effects. No significant long term cumulative visual effects have been identified for the operational phase of the Scheme.

- 19.152. Moderate cumulative effects on landscape character are expected during construction of the pipeline corridor and other committed development. Following completion all potentially significant effects would reduce to be a slight cumulative effect in the medium term. Once the landscape has recovered from the works and mitigation planting has established all effects would be neutral. No significant cumulative visual effects during or post construction.
- 19.153. It is assumed with mitigation embedded within the Scheme to manage effects on ground conditions along with mitigation required for any committed development to minimise effects including potential mobilisation of contaminants the likelihood of significant cumulative effects is low.
- 19.154. The effects of the Scheme on heritage assets including the Grade II* Leigh Park Registered Park and Garden and the George Staunton Conservation Area when considered alongside potential effects arising from committed development, have been assessed as not significant.
- 19.155. Despite the fact that at least one other development (Site 25 the Aquind Interconnector) has been identified as potentially giving rise to large quantities of construction demolition and exaction waste, the effects from the Scheme have been assessed as negligible, so no further mitigation is deemed necessary or proposed.
- 19.156. Construction and operation of the Scheme, in combination with committed developments, could have significant beneficial mental and physical health effects as well as benefits for the local economy through the generation of jobs and trade. Benefits would particularly affect low-income groups.
- In-combination effects**
- 19.157. Many of the in-combination effects arising during construction of the reservoir and the access roads are already captured in the various topic chapters within the ES, including Biodiversity and Population and Human Health.
- 19.158. There is the potential for some residential receptors in the location of both the reservoir and access roads and the pipeline corridor to experience significant in combination effects from the construction works, resulting from dust, visual intrusion, noise and vibration, temporary road closures and potentially night time working. Due to current uncertainty over the phasing of the works and construction techniques to be employed at each location it is not possible to identify those roads or properties that might be significantly affected with any degree of certainty. The appointed contractor will work closely with local communities potentially affected to ensure works are phased to reduce adverse effects as far as reasonably practicable, and to ensure residents are kept informed on timing and duration of works.
- 19.159. The effects of the permanent loss of areas of Leigh Park Registered Park and Garden and the Sir George Staunton Conservation Area on the setting of and views to and from the assets when considered in combination with the effects of temporary construction compounds have been assessed as not significant.

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