

Havant Thicket Reservoir Project

Environmental Statement Volume 2 - Main Report Chapter 18 Population and Human Health

Portsmouth Water Ltd.

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18. Population and Human Health

Competent expert evidence

- 18.1. The population and human health chapter has been prepared 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 impact assessment (EIA) of People and Communities and Population and Human Health assessment.
 - a Technical Director (chartered Town Planner and holds full professional membership with the RTPI) with over 20 years' experience.

Legislative and policy framework

- 18.2. European Directive 2011/92/EU, as amended by European Directive 2014/52/EU, requires Environmental Statements to include, inter alia, an assessment of potential effects upon population and human health. As a result of the introduction in European Directive 2014/52/EU of Human Health as an EIA topic, the requirement to assess the effects of development on human health is set out in Regulation 4(2)(a) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (from here on in referred to as the EIA Regulations 2017). That includes the potential impacts/effects on physical, mental and social wellbeing and not merely the absence of disease or infirmity (WHO, 1948). Health and wellbeing may be affected by the provision, or not, of adequate services, amenities and a sense of community to support healthy lives.
- 18.3. The following legislation and adopted policies govern the assessment of population and human health and have been consulted in preparing this chapter, with the relevant sections summarised in Table 18-1.

Table 18-1 - Legislation, regulatory, and policy framework for the assessment of population and human health

Legislation/ Regulation/ Policy	Summary of requirements
National	
National Planning Policy Framework (February 2019);	The NPPF establishes national planning policy to achieve sustainable development, through themes that include promoting sustainable transport, supporting a prosperous rural economy and promoting healthy communities, with a presumption in favour of sustainable development.
Draft National Policy Statement for Water Resources (November 2018);	Paragraph 2.2.6 states that, due to projected population growth, we need to ensure that there are sufficient water supplies to provide water for a growing population. Paragraphs 2.6.4 and 2.6.5 go on to state that reservoirs “ <i>reduce the need for increased abstraction from rivers or groundwater during drought periods, therefore reducing the potentially negative impact on the environment and supporting the government’s ambition to enhance the environment.</i> ” Furthermore, “ <i>recreational and wellbeing benefits can also be achieved</i> ”. Paragraph 2.6.7 states that “ <i>new reservoirs are likely to play an important role in securing resilient supplies and supporting transfers of water across the country in the future and it is likely that reservoir schemes will feature in water companies WRMPs.</i> ”
Planning Practice Guidance: Healthy and Safe Communities (November 2019)	A healthy place is one which supports and promotes healthy behaviours and environments and a reduction in health inequalities for people of all ages. It meets the needs of children and young people to grow and develop, as well as being adaptable to the needs of an increasingly elderly

Legislation/ Regulation/ Policy	Summary of requirements
	population and those with dementia and other sensory or mobility impairments.
Fair Society, Healthy Lives (the Marmot Review) 2010;	Policy Objective C: Create fair employment and good work for all, outlines a key priority objective which is to <i>"Improve access to good jobs and reduce long-term unemployment across the social gradient."</i> Policy Objective E: Create and develop healthy and sustainable places and communities, provides a priority objective in which to <i>"Develop common policies to reduce the scale and impact of climate change and health inequalities."</i>
Health and Social Care Act 2012	In respect of reducing inequalities Part 1 Section 4 1C of the Act states that <i>"In exercising functions in relation to the health service, the Secretary of State must have regard to the need to reduce inequalities between the people of England with respect to the benefits that they can obtain from the health service."</i>
Public Services (Social Value) Act 2012	Part 1 Section 3 states that the authority must consider <i>"how what is proposed to be procured might improve the economic, social and environmental well-being of the relevant area."</i>
Public Health England Strategy 2020-25;	A main aim of the Public Health England Strategy is to reduce fine particulate air pollution in England by 1 microgram per m ³ , resulting in the prevention of an estimated 50,000 cases of coronary heart disease, 16,500 strokes, 9,000 cases of asthma and 4,000 lung cancers over 18 years.

Local

Havant Borough Core Strategy (March 2011)	Policy CS1 Health and Wellbeing looks to retain open spaces, including children's play space, which are valued by local communities unless a superior alternative can be provided. Staunton Country Park is identified as being particularly important to safeguard as a strategic open site. Policy CS13 states that <i>"development proposals that adversely affect green infrastructure will not be permitted unless superior alternative provision can be provided or where it is part of a service provider's plans to provide improved local services in equally accessible locations."</i> Policy CS19 Effective Provision of Infrastructure states that new infrastructure developments must ensure that if there is a proven need for additional infrastructure, a programme of delivery has been agreed with the relevant infrastructure provider. Furthermore, it must support the local economy.
Havant Borough Local Plan (Allocations) (July 2014)	Policy AL6 Havant Thicket Reservoir Pipeline states: <i>"Planning permission will be granted for development proposals that help deliver the Havant Thicket Reservoir pipeline as shown on the Policies Map. Development proposals will not be permitted in the pipeline route buffer zone, where it could prevent the future delivery of the pipeline."</i>
Pre-Submission Havant Borough Local Plan 2036 (February 2019)	Policy KP9 states that planning permission will be granted at Havant Thicket for a winter storage reservoir comprising recreational provision including a visitor centre, provided certain criteria are met including delivering environmental, recreational and community benefits. Policy E7 sets out ways in which development can contribute to the improvement of the Hermitage Stream. Policy E8 sets out the criteria that would make development of protected open space acceptable.
East Hampshire District Local Plan Joint Core	Policy CP18 states: <i>"...Opportunities to improve physical fitness and wellbeing will be enhanced by the provision of accessible green spaces in towns and villages and encouraging opportunities for walking and cycling"</i>

Legislation/ Regulation/ Policy	Summary of requirements
Strategy, June 2014	<i>wherever possible.</i> The policy supports the provision of well-designed high-quality play spaces for children and young people, and the implementation of green infrastructure opportunities to encourage informal recreation.
East Hampshire District Draft Local Plan 2017-2036 (February 2019)	Policy S4: Health and Wellbeing states <i>"the potential for achieving positive health and wellbeing outcomes will be taken into account when considering development proposals.</i> Policy DM1.2 sets out requirements for open space, sports and recreation provision. Policy DM1.3 states <i>'A holistic approach to the design of new open space should be taken including considering the contribution to place making, the green network and protecting and enhancing nature conservation and the water environment.'</i> Policy DM1.4 states <i>'New provision should also aim to protect, enhance and manage integrated paths for active travel and/or recreation, including new and existing links to the wider countryside.'</i> Policy DM2.1 sets out the requirements to make Development involving the loss of open space acceptable. Policy S31 sets out the criteria against which the proposals for a winter storage reservoir and recreational provision at Havant Thicket will be judged.
Hampshire Joint Strategic Needs Assessment (JSNA) 2017-2022	A key recommendation is to <i>"create an enabling environment through good urban design, creating and maintaining spaces that encourage social interaction, good transport access to services."</i>
Hampshire Joint Health and Wellbeing Strategy 2019-2024	Key priorities for improvement include: - Improving population level mental wellbeing and reduce mental ill-health; - Enabling people with long-term conditions to live healthier lives for longer; and - Continue to develop connected communities which can support people to live happy, healthy lives
Hampshire Local Transformation Plan (2018/9)	The plan outlines its commitment to continuing work for vulnerable groups. The Transforming Care Programme will be a critical driver of change to support those young vulnerable groups. Demand is high for services for children and young people with Autism, so ensuring good services are in place both for young people and adults is identified as being crucial to success

- 18.4. Further details of the relevant policies from the documents listed above can be found in Appendix A18.1 Planning and Health Policies in ES Volume 4.

Study area

- 18.5. In the absence of prescriptive guidelines for EIA for population and health assessment study areas, the core study area has been defined as land within the Scheme area (i.e the red line boundary), plus a 500 m buffer from the red line boundary of the reservoir site.
- 18.6. 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 (eg (e.g. Chapter 7 Air Quality, Chapter 10 Ground Conditions, Chapter 11 Noise and Vibration, and Chapter 15 Water (including flows, quality and groundwater) in ES Volume 2). The study area for the 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 the characteristics and sensitivity of communities near the Scheme based on the likely effects on physical, mental and social wellbeing. This includes the NHS England and the South Eastern Hampshire Clinical Commissioning Group (CCG) area, the local authority districts of Havant and East Hampshire within which the Scheme itself is located, the county of Hampshire and England.

- 18.7. Baseline data has been collected for the area within the red line boundary and the surrounding area based on census boundaries and areas covered by public health data and by health and wellbeing strategies.
- 18.8. By using professional judgement, industry best practice and knowledge of the Scheme, it is considered that these study areas will capture all (or most) relevant population and human health impacts and effects, including those on physical, mental and social wellbeing, resulting from the Scheme.

Assessment methodology

- 18.9. The assessment of effects has been undertaken in accordance with the EIA Regulations 2017 and general guidance documents including the Guidelines for Environmental Impact Assessment¹.
- 18.10. The assessment establishes the baseline population and human health conditions within those areas likely to be affected by the Scheme. The assessment then ascertains the likely positive and negative effects of the construction and operation of the Scheme and identifies opportunities for improving health and reducing inequalities.
- 18.11. The local human health profile of affected communities forms the baseline for the health assessment, and is focused on population demographics, socio-economic status and community health. Analysis of these data identifies any specific sensitivities that could affect the population's susceptibility to health effects. These may include socio-economic status, health status, age profile or disability.
- 18.12. The effects on the population arising from improving water supply are covered in Chapter 2 Description of the Development and Chapter 15 Water (including flows, quality and groundwater) in ES Volume 2.
- 18.13. The Human Health assessment considers the effects of the Scheme on both the health of the population affected by the Scheme overall and the distribution of those impacts within the affected population having regard to the public health and economic profile of the area, particularly the presence of any vulnerable groups who may be most affected by any impacts arising from the Scheme.
- 18.14. Human health is underpinned by several wider environmental, social and economic aspects considered relevant to the Scheme. The human health sub-topics scoped in for assessment closely follow IEMA guidance on the UK public health profession's 'wider determinants of health' model. Those health determinants are as follows:
 - Air pollution;
 - Risk of injuries and death;
 - Soil and water pollution;
 - Access to healthcare services, education and other social infrastructure;
 - Access to green space;
 - Access to opportunities for recreation and leisure;
 - Active travel;
 - Access to work and training; and
 - Noise pollution and vibration.
- 18.15. The majority of baseline data gathering for the Population and Human Health chapter has taken place through the collection of various online data sources, including Census data, mapping applications and local policy.

¹ Institute of Environmental Management and Assessment (IEMA) (2004): Guidelines for Environmental Impact Assessment

- 18.16. To inform the access and circulation strategy for the Scheme, Portsmouth Water has consulted a variety of stakeholders through scoping the EIA, via conference calls and through public consultation events in May and June 2020. The following stakeholders were consulted: members of the public, Hampshire County Council (HCC) Definitive Map Manager, HCC Highways Development Team, HCC Area Manager, HCC Manager of Staunton Country Park, Forestry England, the Ramblers and British Horse Society.

Assessment criteria

Health

Identifying the sensitive human health receptors

- 18.17. Despite the requirement to consider 'population and human health' amongst the other environmental topics for assessment, the 2017 EIA Regulations do not establish the way in which the topic is to be addressed and there is no prescribed EIA definition for 'population and human health'. The human health part of this assessment is based upon Institute of Environmental Management and Assessment (IEMA) guidance contained in 'Health in Environmental Impact Assessment: A Primer for a Proportionate Approach' (IEMA 2017) and the World Health Organisation (WHO) definition of health used by the public health profession in the UK, in which health is defined as 'a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.
- 18.18. The human health assessment considers the effects of the Scheme on both the health of the population affected by the Scheme overall and the distribution of those impacts within the affected population. It is well established in the UK and internationally that the factors that influence health and wellbeing vary by age, gender, ethnicity and disability. These factors lead to health inequality and health and social equity issues and therefore align closely with the equality groups identified by equalities legislation. It is thus necessary in human health assessment to identify priority population sub-groups because changes to overall health determinants can have greater or lesser effects on these sub-groups depending on, for example, their age, health status, income and social support. This can inform the iterative design process with the aim of maximising the Scheme's positive health effects and minimising its negative health effects.
- 18.19. The priority population sub-groups identified have been divided into sensitive sub-groups and other relevant wider groups. Sensitive sub-groups include those that have been identified according to age: children and adolescents, and elderly people; health status: people who are disabled and/or with other health problems, and; income and social support: low-income groups/ people without access to a car. Sensitive sub-groups are more likely to be susceptible to the Scheme's impacts than other social groups due to various factors as explained in Table 18-2 below.

Table 18-2 - Sensitive groups

Factor influencing health and wellbeing	Sensitive group	Social receptor	Justification
Age	Children and adolescents	Residential houses, open space, public rights of way (PRoW) and footpaths, schools and nurseries, community facilities	Children and adolescents constitute a sensitive population group due partly to their need to be able to move around freely to and from school and for recreational activities, whilst they lack the experience and judgement displayed by adults when moving around in traffic and public spaces. Hence, children and adolescents as pedestrians and cyclists are at elevated risk from the dangers of motorised transport. Furthermore, children are more sensitive than adults to air pollution, noise, odour and other environmental factors and their bodies and minds are less able to deal with them. Particularly susceptible children are those living in deprived areas.

Factor influencing health and wellbeing	Sensitive group	Social receptor	Justification
	Elderly People	Residential houses, retirement homes, healthcare facilities, open space, PRoW and footpaths, bus stops, community facilities	Elderly people constitute a sensitive group as they are more sensitive than young and middle-aged adults. Generally, the older people are, the slower their movement and reactions and the poorer their hearing. They can be more at risk from injury and may also fear falls and short crossing times at safe crossing points. This can deter them from outdoor activity, especially walking, whereas walking is critical for muscle strength and reduces the risk of falls amongst other benefits. They find the neighbourhood setting particularly anxiety-provoking and worrying, leading to withdrawal and isolation or an increase in accidents.
Health status	People who are disabled and/or with other health problems	Residential houses, healthcare facilities, open space, PRoW and footpaths, bus stops, community facilities	People who are disabled and/or with other health problems are likely to be vulnerable to changes in health determinants. Chronically ill persons, for example, people with impaired lung function, can be more adversely affected by air pollution. The same is true of hypersensitive individuals such as asthmatics. Noise can cause hypertension and cardio-vascular problems. Those who already have these conditions can be more troubled by noise than others. People with existing physical and mental illnesses, including anxiety and depression, are likely to be more sensitive to changes to their local environment.
Income and social support	Low-income groups/ people without access to a car	Residential houses, local businesses, open space, PRoW and footpaths, bus stops, community facilities	People living in deprived areas tend to suffer the most from road traffic incidents (deaths and injuries), noise and air pollution, as such areas tend to be characterised by high traffic volume. This group may have increased stress levels due to the factors above. They can also have reduced access to health and social care as well as other services and amenities. These groups may benefit from employment opportunities created by the Scheme.

Table Source: adapted from IEMA 2017

- 18.20. Wider receptor groups include residents and workers living/working in the proximity of the Scheme, construction workers, walkers, runners and cyclists, passers-by, and public transport users who are likely to be exposed to changes in health determinants. Other relevant wider groups are covered in Table 18-3.

Table 18-3 - Wider groups

Target Group	Identified human health receptor	Justification
Adults/ working people	Residential houses, local businesses, open space, PRoW and footpaths, bus stops, community facilities	The key challenges to the physical health, mental and social wellbeing of the local resident population arise from inactivity and unhealthy lifestyle choices. Residents of properties in the study area, employees and customers at businesses in the area, walkers and cyclists using recreation routes and the local footpath, cycleway and road network, visitors to leisure attractions, and public transport users are likely to be most exposed to health impacts.

Table Source: adapted from IEMA 2017

Health determinants

- 18.21. Following IEMA guidance on the UK public health profession's 'wider determinants of health' Wider Groups model, this assessment considers human health to be underpinned by a range of determinants encompassed in the environmental, social and economic impacts of the Scheme. This includes the natural environment: air pollution; built environment: risk of injuries and death, soil and water pollution; activities: access to healthcare services and other social infrastructure; access to opportunities for recreation, leisure and active travel; lifestyle: noise pollution and vibration and local economy: access to work and training. This is illustrated in Table 18-4.

Table 18-4 - Health determinants scoped in for assessment

Aspect	Wider health determinants
Natural environment	Air pollution
Built environment	Risk of injuries and death Soil and water pollution
Activities	Access to healthcare services, education and other social infrastructure Access to open space Access to opportunities for recreation, leisure and active travel
Lifestyle	Noise pollution and vibration
Local Economy	Access to work and training

Sensitivity of the receptors

- 18.22. The potential effects of the Scheme on physical and mental health, and the social wellbeing of local population groups depend on the receptors' sensitivity to changes to the wider health determinants identified in Table 18-4. Sensitivity of human health receptors depends on whether the receptor is likely to be directly affected by changes to health determinants caused by the Scheme and whether the receptor is well placed to deal with impacts. The criteria are set out in Table 18-5.

Table 18-5 - Sensitivity of receptors for Human Health

Sensitivity of receptor	Importance / resilience of receptor
Very High	Health receptor is expected to be directly affected. Receptor is very well placed to take advantage of beneficial impacts, and/or is very poorly placed to deal with any adverse impacts.
High	Health receptor is likely to be directly affected. Receptor is well placed to take advantage of beneficial impacts, and/or is not well placed to deal with any adverse impacts.
Medium	Health receptor is likely to be indirectly affected. Average ability to maximise beneficial impacts or cope with adverse impacts.
Low	Health receptor is unlikely to be affected. Receptor is not well placed to take advantage of beneficial impacts, and/or is well placed to deal with any adverse impacts.

- 18.23. The assessment involves a review of evidence on pathways for the transmission of changes in health determinants to the health of population groups as set out in Table 18-6.

18.24.

Table 18-6 - Pathways of impact to human health

Health determinant	Impact to health, including sensitive groups
Air pollution	Poor environmental quality and exposure to waste is linked to increased risk for physical health, including respiratory and gastrointestinal problems, and lower mental health outcomes. Those with existing health issues are likely to be more sensitive. Asthma, allergies and some types of cancer are of particular concern to children.
Risk of injuries and death	An individual's risk of injury may be impacted by many social, personal, economic and environmental factors. The physical environment such as infrastructure and land use can affect the rate of incidents, injuries and death. Road traffic injuries are a major public health issue. Injuries resulting from motor vehicle accidents are the leading cause of death for young people.
Soil and water pollution	Soil and water pollution can lead to public health impacts directly when people encounter water and soil through recreation activities and or indirectly through the use of water for gardens and allotments watering.
Access to open space and opportunities for recreation and leisure	Greenspace, open space, and recreational and leisure-time facilities reduce air pollution and have been linked to higher levels of physical activity ² , reduced levels of obesity in children and reductions in the number of long-term conditions such as heart disease, diabetes, cancer and musculoskeletal conditions ³ . The proportion of green and open space is linked to reported levels of health and mental health ⁴ for all ages and socio-economic groups, through improving companionship, sense of identity, belonging and happiness. Access to opportunities for recreation and leisure contribute towards a good quality of life.
Access to healthcare services and other social infrastructure	Availability and use of healthcare services that prevent and treat disease and other social infrastructure are important for promoting and maintaining health, preventing and treating disease, reducing unnecessary disability and premature death, and achieving health equality for the population. Groups more vulnerable to illness, such as the elderly and children, benefit disproportionately.
Active Travel	Active travel promotes mental and physical wellbeing by encouraging walking and cycling which improve health. Such communities are generally more physically active, experience increased social contact, lower levels of traffic injuries and are less exposed to air pollution. Regular physical activity has many benefits to health. It reduces the risk of chronic conditions such as cardiovascular disease, diabetes, cancer, obesity, musculoskeletal conditions, and mental health problems and improves mood. Footpaths and cycle lanes contribute to physical activity. Research shows that keeping physically active can reduce the risk of heart and circulatory disease and risk of early death. Physical activity is also shown to reduce the chances of asthma, diabetes and cancer.
Access to work and training	Income and work are two of the most important determinants of health and wellbeing. Employment and skills influence mental and physical health, with low education levels and unemployment linked with increased stress, lower self-confidence, increased rates of illness and premature death. Those on lower incomes due to low skills or unemployment are also less likely to be able to engage in healthy behaviours which impact physical and mental health.
Noise pollution and vibration	Noise is linked to potential negative effects on physical, social and mental wellbeing. Potential health effects identified include hearing loss or loss of hearing sensitivity, sleep disturbance, cardiovascular and physiological effects, mental health effects and behavioural effects, including poor school performance by school children.

² Coombes et al 2010; Lee and Maheswaran 2010

³ Department of Health 2012

⁴ Barton and Pretty 2010

- 18.25. The understanding of the health receptors in the study area obtained through the baseline assessment combined with a review of evidence of pathways of impact to human health (Table 18-6) inform the assessment of the sensitivity of each receptor to each health determinant. This is set out in Table 18-7.

Table 18-7 - Health receptor sensitivity to health determinants

Health receptor	Determinant and sensitivity
Wider Groups	Air pollution - High Risk of injuries and death - Medium Soil and water pollution – Medium Access to open space, recreational and leisure-time activities – Medium Active travel – Medium Access to work and training - Low Access to healthcare services, education and other social infrastructure - Medium Noise pollution and vibration - High
Children and adolescents	Air pollution - Very High Risk of injuries and death - Very High Soil and water pollution – High Access to open space, recreational and leisure-time activities – High Active travel – Medium Access to work and training - Low Access to healthcare services, education and other social infrastructure - High Noise pollution and vibration - High
Elderly people	Air pollution - Very High Risk of injuries and death - Very High Soil and water pollution – High Access to open space, recreational and leisure-time activities – Medium Active travel – Medium Access to work and training - Low Access to healthcare services, education and other social infrastructure - High Noise pollution and vibration - High
People who are disabled and/or with other health problems	Air pollution - Very High Risk of injuries and death - High Soil and water pollution – High Access to open space, recreational and leisure-time activities – Medium Active travel – Medium Access to work and training - Low Access to healthcare services, education and other social infrastructure - High Noise pollution and vibration - High
Low-income groups/ people without access to a car	Air pollution - High Risk of injuries and death - Medium Soil and water pollution – Medium Access to open space, recreational and leisure-time activities – High Active travel – Medium Access to work and training - Medium Access to healthcare services, education and other social infrastructure - High Noise pollution and vibration - High

Impact magnitude

- 18.26. Identification and assessment of the health determinants affected by the Scheme draws upon the health baseline for the study area and residual effects identified in other relevant Chapter topic assessments for the Scheme (e.g. Chapter 7 Air Quality, Chapter 10 Ground Conditions, Chapter 11 Noise and Vibration, and Chapter 15 Water (including flows, quality and groundwater) in ES Volume 2). The reported changes to wider health determinants are therefore inclusive of cumulative effects and any mitigation measures identified in the topic assessments.
- 18.27. However, the following determinants are not covered by other topic assessments: risk of injuries and death; access to open space and opportunities for recreation and leisure; access to healthcare services and other social infrastructure; active travel and access to work and training. Professional judgement, informed by the description and scope of the Scheme, has therefore been used to assess the level of change to these determinants.
- 18.28. The likely magnitude of impact of the changes to human health has been assessed according to the criteria in Table 18-18. Table 18-8 - impact magnitude also considers the direction of change (beneficial/adverse), scheme stage (construction/operation) and where relevant, any impacts on sensitive groups. For consistency, the criteria closely match those used in assessment of the other environmental impacts of the Scheme.

Table 18-8 - Impact criteria for changes to human health

Magnitude	Description of impact
Major	Permanent impact to the health determinant Impact affecting large number of people Impact affects sensitive population groups
Moderate	Long-term impact (over a year) to the health determinant Impact affecting moderate number of people Impact affects some sensitive population groups
Minor	Short-term, temporary impact (several months) to the health determinant Impact affecting low-moderate number of people Impact affects few sensitive population groups
Negligible	No or non-perceptible impact to the health determinant or to sensitive groups

Table Source: Atkins own methodology 2018

Health baseline and community health profile

- 18.29. The baseline and community health profile has been established from analysis of local socio-economic, demographic and health data in comparison with sub-regional and national data and review of health strategies. It provides an understanding of the health determinants and receptors in the study area, particularly the presence of any sensitive groups which may be more susceptible to potential impacts. It covers the following aspects:
- Demographic and socio-economic: age, employment, deprivation;
 - Health: health and wellbeing status; and
 - Natural and built environment: local amenities and facilities.

Reporting of significance

- 18.30. The level of significance is the product of the sensitivity of receptors and magnitude of impact. The significance of effects within this assessment is measured according to the significance of effect matrix set out in Table 18-9.

Table 18-9 - Significance of effect matrix

		Magnitude of impact/risk				
		No change	Negligible	Minor	Moderate	Major
Receptor Sensitivity	Very High	Neutral	Slight	Moderate or large	Large or very large	Very Large
	High	Neutral	Slight	Moderate or slight	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Moderate or slight
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Table source: DMRB Volume 11, Section 2, Part 5 HA 205/08

Table 18-10 - Descriptors of the significance of effect changes

Significance category	Typical descriptors of effect
Very large	Only adverse effects are normally assigned this level of significance. These effects represent key factors in the decision-making process. They are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
Large	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
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: From Highways England DMRB, Volume 11, Section 2, Part 5, Table 2.3

- 18.31. Using the described classification (Table 18-10) and professional judgement, effects considered to be Very Large, Large or Moderate are deemed significant and those Slight, or Neutral, to be not significant, for the purposes of the EIA Regulations.

Assessment assumptions and limitations

- 18.32. As part of this assessment a walkover survey of part of the Site was made. The section of footpath from Swanmore Road along the western boundary of both the reservoir site and Havant Thicket woodland was walked. Due to travel restrictions imposed by the Government during the outbreak of COVID-19 and subsequent lockdown measures implemented, a second site visit to complete a walkover survey of the pipeline corridor, the rest of the reservoir site and the surrounding area had to be cancelled. The baseline study has therefore been informed by a combination of a site visit and desk study.
- 18.33. The assessment of effects on Population and Human Health is based on guidance and professional judgement and considers both the adverse and beneficial impacts that the Scheme could have on receptors.
- 18.34. The assessment identifies and assesses the likely effects on population and human health based on a proportionate assessment. Whilst it will be possible to identify changes to some of the determinants of health likely to arise from the Scheme, health outcomes are dependent on multiple factors, some of which rest with individuals and/or are outside the powers or influence of physical infrastructure and/or planning decisions. Identifying the health effects of the Scheme and their

significance is therefore be a qualitative exercise. The findings are based upon a desk-based study of the area, along with consultants' professional judgement and knowledge based on previous similar schemes. Where relevant, information from other specialist topic assessments has been used to help to assess the significance of effects of the Scheme on receptors.

- 18.35. In the absence of prescriptive guidance for population and human health assessment study areas, the likely effects for population and human health have been assessed within core and wider study areas. Whilst this creates overlap and uncertainty, it is considered that these study areas capture the most relevant population and human health impacts.
- 18.36. The health assessment section of this chapter is by nature a cumulative assessment which considers the population and human health impacts of all environmental effects of the Scheme. Therefore, there will be a degree of overlap between this chapter and the other technical chapters (notably, Chapter 7 Air Quality, Chapter 12 Noise and Vibration, Chapter 11 Landscape and Visual, and Chapter 15 Water Environment in ES Volume 2) that will also be summarised in Chapter 19 Cumulative and In-Combination Effects in ES Volume 2.
- 18.37. It has been assumed that installation of the pipeline would require temporary full road closures on the following roads which are less than 5 m wide: High Lawn Way; Ellisfield Road; Highclere Avenue, Fraser Road; North Street; Brunswick Gardens; and Chadswell Meadow. At this stage the presence of utilities is uncertain and there is no contractor's method statement. Therefore, it is possible that roads over 5 metres in width may require temporary full closure.

Baseline conditions Including value/sensitivity of resources and receptors

Access to open space

- 18.38. The following open space areas are present in proximity to the Site:
- Staunton Country Park within the reservoir site and adjacent to its southern boundary;
 - Great Copse located to the south-west of the reservoir site;
 - St John The Baptist's Church Open Greenspace located to the south-east boundary of the reservoir site;
 - Leigh Park located approximately 480 m south-west of the reservoir site and along the pipeline corridor;
 - Green space to the south of Ewhurst Close; and
 - Warren Park Children's Play Area.

Access to opportunities for recreation and leisure

- 18.39. The reservoir site provides a varied and interesting landscape and is generally used for informal recreation, primarily walking, jogging, horse riding and mountain biking.
- 18.40. The south of the reservoir site is designated as Staunton Country Park, which is managed by HCC. Staunton Country Park comprises parkland and gardens, a lake, a petting farm, a barn play area and a Victorian glasshouse. Staunton Country Park is a listed Regency landscaped parkland and forest covering approximately 1,000 acres (4.0 km²). Leigh Park Gardens, within Staunton Country Park, is a Grade II* Registered Park and Garden. Part of the land within the Site, including the Avenue, forms part of the Sir George Staunton Conservation Area which also covers Staunton Country Park to the south of the reservoir site.
- 18.41. The 'Visitor number and recreational and amenity facilities review' (July 2019), prepared by Planning Solutions Consulting Limited (PSCL) on behalf of Portsmouth Water to inform the Scheme, states that Staunton Country Park currently attracts in excess of 280,000 admissions and Leigh Park Gardens is estimated to attract some 120,000 annually (A summary of this report is included as Appendix A18.3 in ES Volume 4). Leigh Park Gardens is forecast to boost this figure by some 60,000 annual visits to 180,000 following the completion of the Heritage Lottery Fund project. A proportion of the visits are made by the same people to both Leigh Park Gardens and Staunton Country Park.
- 18.42. Woodland to the north of the reservoir site (Havant Thicket) is owned by Forestry England and has a recreational and commercial forestry use. This woodland along with woodland to the north west of

the reservoir site is designated as open access land under Section 16 of the Countryside and Rights of Way Act 2000.

- 18.43. The Site is accessible by a number of different forms of transport including car, public transport, walking, cycling and horse-riding. Permissive footpaths provide linkages between the reservoir site and the adjacent country park and woodland, while a bridleway runs through the Site from east to west (Bridleway 120).
- 18.44. Allotments to the west of St Francis Place lie on the eastern boundary of the pipeline corridor red line.

Active Travel

- 18.45. Information on walkers, cyclists and horse riders has been derived from 'row maps', an online information source which uses Ordnance Survey mapping to display PROW mapping.
- 18.46. There are two public rights of way within the Site. Bridleway 120 extends across the Site from east to west offering open views of the surrounding landscape. The bridleway runs from Manor Lodge Road in the east to Park Lane in the west linking Rowlands Castle with Cowplain. Local horse riders say the current bridleway exit onto B2149 Manor Lodge Road is on a blind corner and is therefore hazardous. As a result, current users use either permissive access through Forestry England land or an entrance opposite Castle Road into Havant Thicket. Local horse riders have permits from Forestry England to enter Havant Thicket.
- 18.47. Staunton Way, which connects the Queen Elizabeth Country Park to the north with Staunton Country Park, is a long-distance path which runs along and just inside the south eastern boundary of the Site.
- 18.48. In addition to the public rights of way mentioned above, there are further access points into the Site from the public highway. These are as follows: a path off the corner of Swanmore Road; a path from Bitterne Close via the Country Park, Whichers Gate at the Manor Lodge Road/Whichers Gate Road junction; a path from Manor Lodge Road park via the Forestry England car park and a logging track also off Manor Lodge Park Road.
- 18.49. To provide a safe environment for non-motorised users of Calshot Road and Swanmore Road, these roads have a speed limit of 30mph and incorporate traffic calming measures.
- 18.50. There are permissive paths within the Site and within the adjoining part of Staunton Country Park including along the Avenue. Staunton Country Park currently has three types of walking trails: Easy Access (2.6 km). Medium (2.2 km) and Long (5.1 km).
- 18.51. Within the Havant Thicket woodland there is a mixture of gravel logging routes and grassed routes. There is a variety of permissive tracks from the car park all around Havant Thicket. A number of footpaths run adjacent to and in the proximity of the Site to the south and east in Rowlands Castle and Staunton Country Park.
- 18.52. A cycleway runs along Swanmore Road immediately to the west of the Site. To the east of the Site National Cycle Route 22 runs from north to south and passes close by the farm at Staunton Country Park. More than 29,500 people live within a reasonable walking distance of the Site (1.5 km) and 120,000 people live within a reasonable cycling distance of the Site (4.5 km)
- 18.53. In order to estimate the level of current use of the Site Portsmouth Water carried out two visitor surveys at various entry point locations at the Site on Saturday 25th August 2018 (August bank holiday) and on Wednesday 29th August 2018. The data gathered from this survey included information on why people were visiting the Site and where they had travelled from. The data collected has been reproduced in Appendix A18.2 Visitor Survey (August 2018) in Volume 4 of the ES.
- 18.54. The 'Visitor number and recreational and amenity facilities review' (July 2019) prepared by PSCL included an analysis of the visitor survey results. The report made some adjustments to account for throughput at different periods through the year and to reflect the estimated level of duplication in the counting process caused by individuals using more than one entry / exit point. The total estimate for the current level of use of the Site is some 93,000 visits per annum.
- 18.55. The report concluded that the survey very strongly indicates how the Site is currently being used with a very high proportion being dog walkers (just under 50% at weekends) which leads to a high level of daily (repeat) use. Also, a significant number of cyclists were surveyed in certain parts of the Site, especially entering from Cowplain via the PROW and the bridleway and utilising Forestry England tracks. Two equestrians were recorded using the Site on Saturday 25 August 2018.

- 18.56. Forestry England has a small car park located off the B2149 Manor Lodge Road at Rowlands Castle. Many of the people surveyed coming from the Forestry England car park indicated that they mainly stayed in the Forestry England Havant Thicket site where there are gravel paths. The PSCL report concluded that the existing Forestry England car park can cope with the current level of car borne visits to the Site via this entry point. Following consultation with HBC it is understood there is an undersupply within the Borough of non-vehicular routes which can provide the opportunity for active healthy exercise, particularly for the elderly.
- 18.57. Along the pipeline corridor the following non-vehicular routes have been identified:
- An undesignated footpath from Middle Park Way to High Lawn Way;
 - A footpath linking Ellisfield Road with Riders Lane;
 - A public right of way to the north of High Lawn Way which crosses Dunsbury Way;
 - Shared use paths on the eastern and western sides of Hermitage Stream including two public rights of way; and
 - A public right of way between Fraser Road and North Street.
- 18.58. The following facilities within 500m of the Site have been identified as recreation and leisure facilities:
- Rowlands Castle;
 - Rowlands Castle Golf Club;
 - Havant Rugby Club; and
 - Warren Park skate park.

Access to Work and Training

Local businesses

- 18.59. There are a number of businesses within the study area. In the vicinity of Warren Park, the following businesses have been identified:
- Restaurant;
 - Public house; and
 - Catering company.
- 18.60. In the vicinity of Leigh Park, the following businesses have been identified:
- Musical repair shop;
 - Car service centre;
 - Funeral care centre; and
 - St John's Ambulance building.
- 18.61. In the vicinity of Rowlands Castle, the following businesses have been identified:
- Tyre and trailer centre;
 - Petrol filling station;
 - Restaurant;
 - Hotel;
 - Salon;
 - Bed and breakfast; and
 - Public house.

Access to healthcare services, education and social infrastructure

- 18.62. There are a number of healthcare Services and Social Infrastructure facilities within the study area.
- 18.63. In the vicinity of the reservoir site, the following social infrastructure have been identified:
- Jigsaw Nursery;
 - Saint John's Primary School; and

- Saint John's the Baptist place of worship.

18.64. In the vicinity of Warren Park, the following social infrastructure have been identified:

- Warren Park Primary School;
- Front Lawn Primary School;
- St Francis Church;
- Bidbury Primary and Infant Schools;
- Bedhampton Community Centre.
- A scout hall; and
- Bedhampton Community Centre.

Risk of injuries and death

18.65. No existing risk of injury or death has been identified.

Public health profile

18.66. The human health baseline focuses on the human health profile for the wider study area, including demographic profile, socio-economics, deprivation, health and wellbeing characteristics, and general characteristics of the natural and built environment. The baseline data for Human Health has used the 2011 census data on the Office of National Statistics webpage as a data source.

18.67. The Scheme, including the pipeline corridor, falls into five electoral wards (based on the 2011 Census datasets):

- Rowlands Castle;
- Battins;
- Warren Park;
- Bedhampton; and
- St Faith's.

18.68.

18.69. Figure 18-1 to Figure 18-5 show the boundaries of the five wards within which the Scheme sits.



Figure 18-1 - Rowlands Castle Ward Boundary

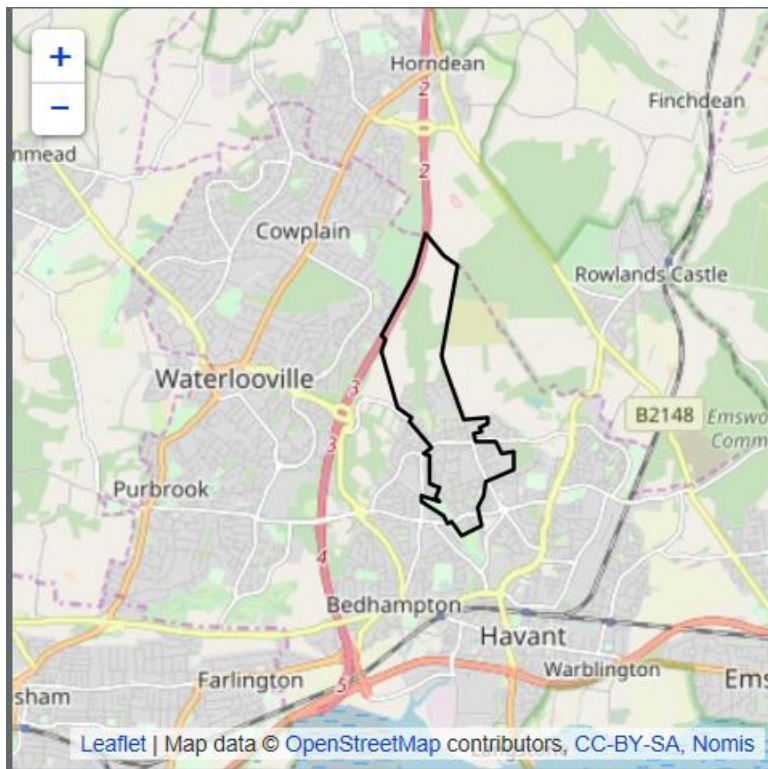


Figure 18-2 - Warren Park Ward Boundary

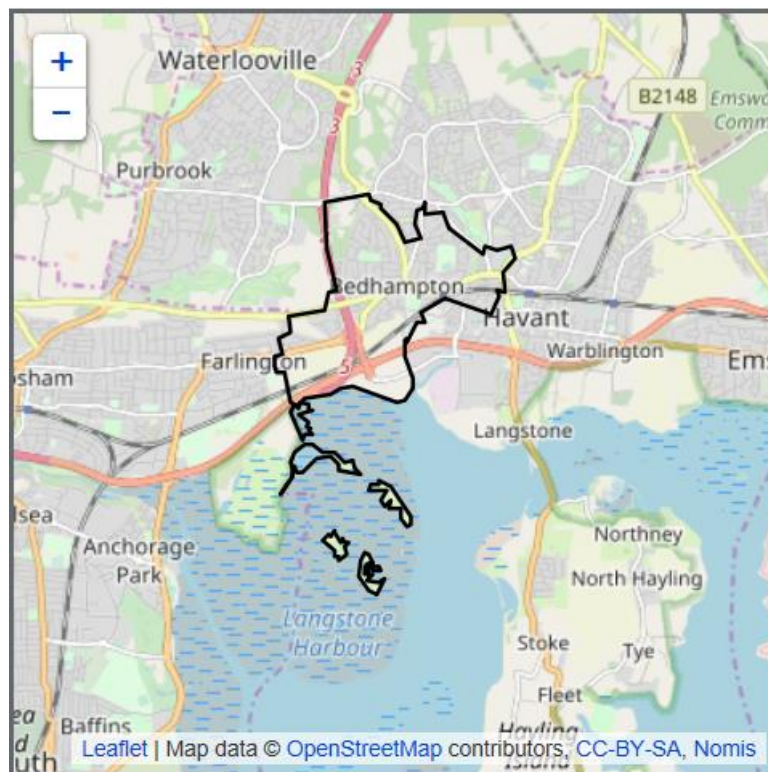


Figure 18-3 - Bedhampton Ward Boundary

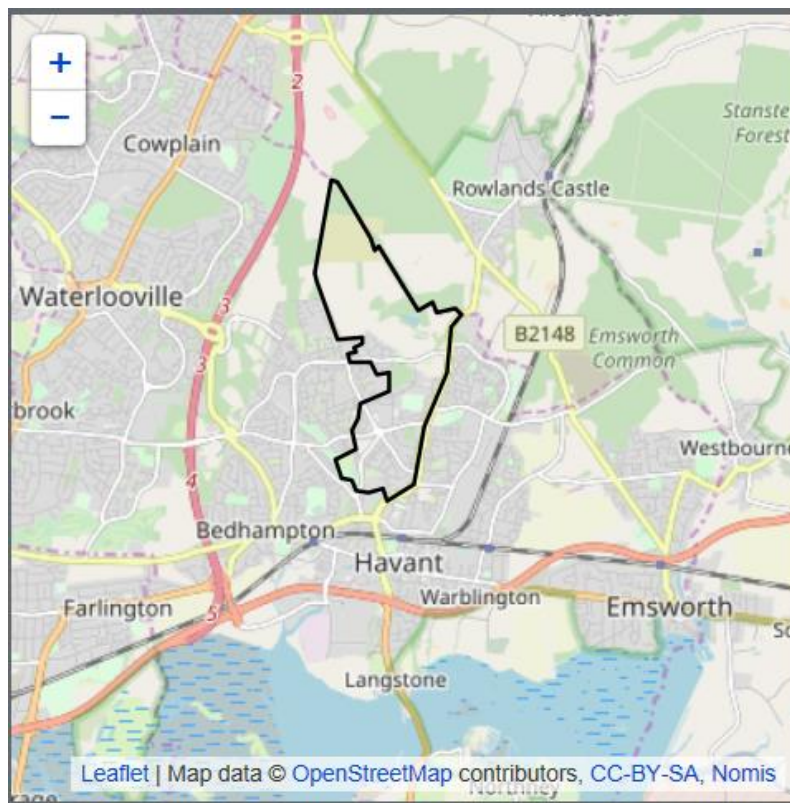


Figure 18-4 - Battins Ward Boundary



Figure 18-5 - St Faiths Ward Boundary

- 18.70. A comparison between local and national average data on communities with increased susceptibility to health issues (i.e. % population under 16 and % over 65) is set out in Table 18-11. Havant and East Hampshire and all the wards in which the Scheme sits have below the national average for the proportion of under 16s in the population. Havant and the wards of Warren Park and Battins are below the national average for the proportion of the population over 65. East Hampshire and the wards of Rowlands Castle, Bedhampton and St Faiths are above the national average for the proportion of over 65s in the population.

Table 18-11 - Demographic profile

Geography	Population	% Under 15	% Over 65
Havant Borough	120,684	6.4%	11%
East Hampshire	115,608	3.35%	19.29%
Rowlands Castle	2,530	2.65%	27.55%
Warren Park	7,619	4.75%	10.85%
Bedhampton	8,835	2.98%	21.63%
Battins	7062	3.82%	14.40%
St Faiths	8882	2.53%	22.24%
England	53,012,456	18.9%	16.4%

Source: NOMIS 2019 <https://www.nomisweb.co.uk>

- 18.71. The general health of the local population compared to the national picture is set out in Table 18-12. The notable statistics are as follows: Havant and the wards of Warren Park, Bedhampton and Battins are below the national average for 'very good' health. Warren Park and Battins are also above average for 'bad' health. East Hampshire is above average for 'very good' health and below average for 'bad' health.

Table 18-12 - General health of residents

Geography	Very good health	Good health	Fair health	Bad health	Very bad health
Havant Borough	44.31%	35.86%	14.24%	4.29%	1.26%
East Hampshire	50.45%	34.70%	11.15%	2.89%	0.82%
Rowlands Castle	47.98%	36.59%	14.17%	4.12%	1.26%
Warren Park	44.51%	34.49%	14.21%	5.18%	1.60%
Bedhampton	43.86%	36.59%	14.17%	4.12%	1.26%
Battins	42.51%	34.06%	15.86%	5.61%	1.97%
St Faiths	47.95%	35.18%	12.55%	3.30%	1.01%
England	47.2%	34.2%	13.1%	4.2%	0.9%

- 18.72. Table 18-13 shows that Battins as a ward generally performs poorly in terms of limitations on day-to-day activities when compared to the national average.

Table 18-13 - Limitations on day-to-day activities

Geography	Day-to-day activities limited a lot	Day-to-day activities limited a little	Day-to-day activities not limited
Havant BC	8.82%	10.52%	80.66%
East Hampshire	6.40%	8.51%	85.08%
Rowlands Castle	7.63%	9.25%	83.12%
Warren Park	9.37%	8.93%	81.12%
Bedhampton	8.89%	10.74%	80.37%
Battins	10.38%	11.06%	78.56%
St Faiths	7.98%	10.44%	81.58%
England	8.3%	9.3%	82.4%

- 18.73. Table 18-14 shows that the death rate for cardiovascular disease in Havant and East Hampshire boroughs is below the national average.

Table 18-14 - Cardiovascular disease (CVD) death rates per 100,000 – under 75's

Geography	Death rate
Havant BC	65.8
East Hampshire	46.6
South East Hampshire	61.5
England	74.2

Source: British Heart Foundation Statistics

- 18.74. Havant has a population of 122,900 across 14 wards. The areas estimated to have lower mental health and wellbeing are Barncroft, Battins, Bondfields and Warren Park. These wards are amongst the lowest 10% in the country. Statistics on mental health related detentions are set out in Table 18-15.

Table 18-15 - Detentions under the Mental Health Act 1983, by Sustainability and Transformation Partnership (STP) area, 2018-19 per 100,000

Geography	Detentions per 100,000
Hampshire	79.8
England	89.9

Source: NHS Digital - <https://digital.nhs.uk/data-and-information/publications/statistical/mental-health-act-statistics-annual-figures/2018-19-annual-figures>

Level of deprivation

- 18.75. The Indices of Multiple Deprivation (IMD) are produced by the Ministry of Housing, Communities and Local Government (MHCLG) and provide information on deprivation on a range of economic, social and housing issues. The indices give an indication of the communities with increased susceptibility to economic changes. In 2015, Havant Borough had 18 areas within the 20% most deprived areas in England; of these, 6 were in the 10% most deprived. The 18 areas were located in Waterlooville and Leigh Park. Leigh Park lies to the western boundary of the Site. The Site is adjacent to one of the more deprived areas of south east Hampshire. Data analysis shows that in 2015, Havant Borough was ranked 142nd out of the 326 local authorities in England in terms of deprivation.

18.76.

18.77. Table 18-16 shows that the Percentage of Children in Havant living in Child Poverty is above the national average. The figure for East Hampshire is below the national average.

18.78.

Table 18-16 - Percentage of children living in child poverty

Geography	Percentage of children living in child poverty
Havant BC	21.9
East Hampshire	8.6
Hampshire	11.8
England	19.9

Source: Indices of Multiple Deprivation 2015 - <https://fingertips.phe.org.uk/search/child%20poverty/page-options/ovw-tdo-0#page/0/gid/1/pat/6/par/E12000008/ati/101/are/E07000084/cid/4/tbm/1/page-options/ovw-tdo-0>

18.79. The unemployment rate for Havant, East Hampshire, Hampshire and Great Britain as a whole is provided in Table 18-17.

Table 18-17 - Unemployment Rate

Geography	Unemployment rate (%)
Havant BC	3.2
East Hampshire	2.1
Hampshire	2.7
Great Britain	3.9

Source: NOMIS 2019 <https://www.nomisweb.co.uk>

18.80. Average household income for Havant, East Hampshire, Hampshire and Great Britain is shown in Table 18-18.

Table 18-18 - Average household income gross weekly pay (£)

Geography	Average household income gross weekly pay (£)
Havant BC	594.7
East Hampshire	654.5
Hampshire	636.4
Great Britain	587

Source: NOMIS 2019 <https://www.nomisweb.co.uk>

Summary

- 18.81. The analysis of the data shows that people in Havant and 3 of the 5 wards that the Scheme falls within, namely Warren Park, Bedhampton and Battins, generally suffer from poorer health compared to the national average. The statistics show that some of the wards in which the Scheme is located suffer from relatively high levels of deprivation and the health of such areas is more susceptible to certain health determinants such as noise and air pollution.
- 18.82. The above health profile of the study area provides the baseline against which the positive and negative health effects of the Scheme may be assessed.

Potential impacts

- 18.83. This section provides a description of the specific, direct and indirect, impacts that the Scheme may have during both the construction and operational phases. To understand the potential impact of the Scheme during the construction phase, the assessment considers both the construction sequence of the reservoir and access roads, and the pipeline corridor identified within Chapter 2 Description of the Development in ES Volume 2.

Access to open space

Reservoir - construction

- 18.84. Designated open spaces lie either within the boundary of the reservoir or adjacent to the two access roads proposed for the construction phase. During construction of the reservoir, which would last approximately five years (plus a further year to construct the Visitor Centre), access to the following open spaces would be affected by construction traffic using access roads within or adjacent to those open spaces:
- Staunton Country Park; and
 - Havant Thicket.

Reservoir - operation

- 18.85. The part of the reservoir site which lies within Havant Borough is designated as protected open space by Policy E8 in the Pre-Submission Havant Borough Local Plan 2036 (February 2019). Part of the Scheme involves the provision of space for recreational use which is of equivalent or greater community benefit in terms of quality, quantity and accessibility. The Scheme would enhance the value of the protected open space consistent with Policy E8.
- 18.86. Consistent with Policy DM1.2a in the Draft East Hampshire Local Plan (2017-2036), open space and recreation provision is proposed as part of the Scheme around the reservoir. The provision would be multifunctional and would support health and outdoor recreation consistent with Policy DM1.2b.
- 18.87. Consistent with Policy DM1.3 the Scheme would make a positive contribution to place making, the green network and protecting and enhancing nature conservation and the water environment.
- 18.88. In accordance with Policy DM1.4 the Scheme would enhance the provision of paths for active travel improve links to the wider countryside
- 18.89. Consistent with Policy DM2.1b the Scheme would provide alternative and improved open space provision in a location well related and accessible to local users.
- 18.90. The improvement in open space provision in an area accessible to local users would support health and outdoor recreation, help make a sense of place and enhance nature.
- 18.91. New recreational facilities for all ages, abilities and groups would be provided adjacent to a relatively deprived area. This would bring physical and mental health benefits by encouraging activity and connecting people to nature.
- 18.92. During the operation phase of the reservoir, visitor and operational traffic using the northern or southern accesses could impact on the amenity of recreational users of the adjacent Forestry England woodland. However, the Scheme would improve open space provision in the area.

Pipeline - construction

- 18.93. It is likely that the construction of the pipeline corridor would be broken down into sections to allow multiple sections to be constructed simultaneously. The total project timeline is 679 days which includes an additional 20% for wet weather and delays. The pipeline corridor runs from Bedhampton pumping station to the reservoir. Each section of the pipeline route that is being worked would be fenced off to secure the site and protect the public.
- 18.94. During the construction of the pipeline the following impacts on access to open space are to be considered:
- Traffic generated by the transportation of construction materials and site operatives back and forth between the Construction Support Site (CSS) at the reservoir site and the pipeline workforce;
 - 45 round trip journeys throughout the day from each section of the pipeline route to the reservoir;
 - Full temporary closure of the following roads (at different times), which are approximately 5 m wide, and need to be closed to employ the trenched construction technique:
 - High Lawn Way;
 - Ellisfield Road;
 - Highclere Avenue;
 - Fraser Road;

- North Street;
 - Brunswick Gardens; and
 - Chadswell Meadow.
- 18.95. Construction of the pipeline would entail the temporary loss of open space which could inhibit physical activity and adversely affect wellbeing.
- 18.96. Construction traffic, temporary road closures and traffic management have the potential to cause increased delays which could have a temporary adverse impact on accessibility to open spaces near the pipeline route. A different construction traffic route is proposed for the northern, middle and southern portions of the pipeline to mitigate the impact of construction traffic.
- 18.97. The following mitigation measures are embedded into the Scheme to minimise disruption to access to open space:
- Trench excavated in short sections;
 - Steel plates and mobile pedestrian walkways proposed to maintain vehicular and pedestrian private means of access;
 - Traffic management and temporary signals to enable single lane operation; and
 - Night-time road closures when the pipe is installed across Eversley Road, Botley Drive, Bedhampton Road and the upgrades to the three culverts take place.
- 18.98. The following open spaces within or adjacent to the pipeline corridor would be affected during the construction of each section of the pipeline route. These open spaces lie along the route of the pipeline.
- 18.99. The route section of the pipeline route has a chainage route of CH 00 to CH 4596. The chainage route CH 00 starts at Bedhampton Springs Pumping Station and ends at CH 4596 (Proposed Havant Thicket Reservoir). For ease of reference a map has been drawn up which identifies the chainage route. The route has been split into seven sections in order to identify the chainage of the pipeline route as shown in figure 18-6.

Table 18-19 - Pipeline route

Route section	Chainage routes	Relevant roads affected
1	CH 00 – CH 350	Chadswell Meadow, Brunswick Gardens, Bedhampton Road, North Street and Fraser Road
2	CH 350 – CH 750	Fraser Road
3	CH 750 – CH 1150	Barncroft Way
4	CH 1150 – CH 2000	Purbrook Way
5	CH 2000 – CH 2650	Ewhurst Close, Highclere Avenue and Ellisfield Road
6	CH 2650 – CH 3600	Dunsbury Way and High Lawn Way
7	CH 3600 – CH 4550	Middle Park Way

Figure 18-6 – Chainage split across the seven sections of the proposed pipeline route

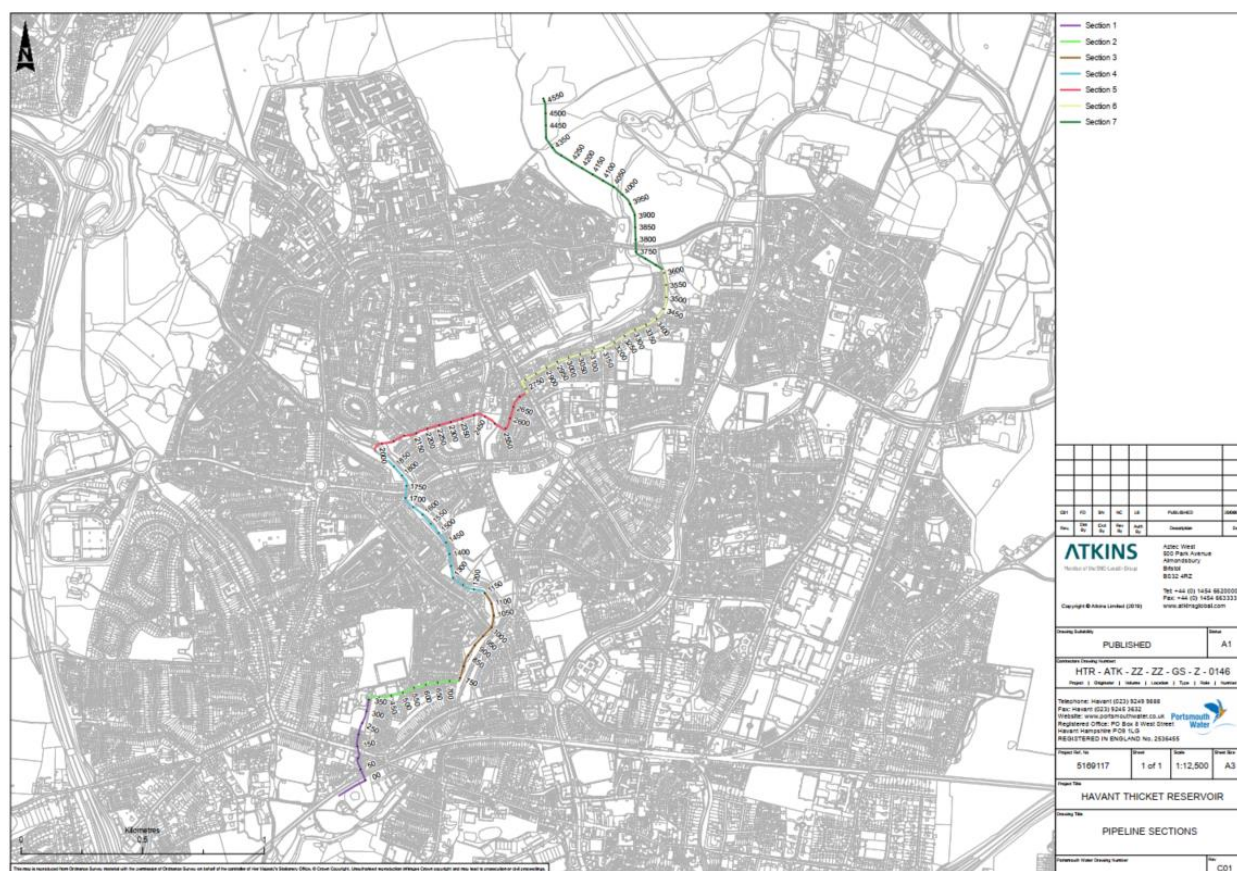


Table 18-20 - Pipeline construction impacts on access to open space

Route section	Affected open spaces	Impacts
Section 3	Section 3 of the route lies within the open space around Hermitage Stream.	Approximately 260 metres of the route would require the diversion of the existing footpath for 33 working days.
Sections 3 and 4	Sections 3 and 4 of the route lie within amenity land.	During construction of approximately 250 m of pipeline over 32 working days and approximately 350 m of pipeline over 44 working days, access to the affected open space would not be possible. Approximately 300 m of footpath would need to be temporarily diverted.
Section 4	Leigh Park open space lies within section 4 of the proposed pipeline route.	Approximately 380m of the footpath would be diverted for approximately 50 workings days Access to this section of Leigh Park open space would not be possible during the construction of this section of the route
Section 5	Open space along Highclere Avenue	Temporary loss of open space for the pipeline construction area
Section 5	Amenity space to the south of St Francis Church.	Temporary loss of open space for the pipeline construction area and for culvert improvement works
Section 6	3 amenity spaces immediately to the north of High Lawn Way	Temporary loss of open space

Section 7	Section 7 cuts through amenity land to the south of Middle Park Way	Temporary loss of amenity land for approximately 18 working days in order to construct approximately 140m of pipeline.
Section 7	Section 7 cuts through amenity land to the north of Middle Park Way.	Access to this section of amenity land would not be possible during the construction of 150m of the route over 19 working days. There would be temporary loss of land within Staunton Country Park land to accommodate a pipeline construction compound.

Pipeline - operation

- 18.100. There would be no effects on open spaces once the pipeline is in operation.

Access to opportunities for recreation and leisure

Reservoir - construction

- 18.101. There are a number of recreation and leisure facilities surrounding the reservoir site which could be affected during the construction of the reservoir. Construction traffic has the potential to cause delays which could have a temporary adverse impact on accessibility and connectivity to recreation and leisure assets near the reservoir site.
- 18.102. Access to the following recreation and leisure facilities may be impacted during the construction of the northern access road and haulage of materials during the construction of the reservoir: Rowlands Castle (located to the north-east on Bowes Hill); Rowlands Castle Golf Club located (along the B2149).
- 18.103. Access to recreational land surrounding the reservoir site would be affected during the construction of the reservoir. Recreational users would be unable to use the northern section of the Forestry England Havant Thicket woodland due to the construction of passing bays located along the logging track and the use of that track by construction traffic during the construction of the reservoir.
- 18.104. During the construction of the access roads to the south and north of the reservoir and the construction of the reservoir itself, there would potentially be an impact to the amenity for people visiting the adjacent woodland and country park.
- 18.105. The diversion of a bridleway and the general disturbance that would occur during construction would potentially affect the use of these areas for recreation as people are generally disinclined to use such resources where there are chances of disruption and noise. This would subsequently potentially impact on physical fitness, particularly for people within the local residential areas who would become 'cut off' from footpaths either south or north of the boundary of the reservoir during the construction period.
- 18.106. For example, residents to the east of Rowlands Castle would have access on footpath (Rowlands Castle:29) disrupted which would reduce access by foot to areas of open space south of the new alignment. The disruption of the Public Rights of Way highlighted above during the construction would reduce accessibility options to open space for the local communities.

Reservoir - operation

- 18.107. The reservoir would provide significant new green infrastructure and recreational facilities for the existing communities surrounding the study area and beyond. The reservoir would provide recreational and educational benefits to facilitate the quiet enjoyment of the countryside setting, adjacent to one of the more deprived areas in South East Hampshire.
- 18.108. These features would provide benefits at a local and regional level to existing communities. The reservoir is predicted to attract 318,000 visitors a year. The Scheme is being designed primarily for use by local communities and is located in an area which is accessible to these communities by foot, bike, or through existing bus routes. However, the Scheme is also expected to attract visitors from within a 20-mile radius including from places such as Portsmouth, Fareham, Chichester and Petersfield. The recreational use of the site would also indirectly bring health and wellbeing benefits by encouraging activity and connecting people to nature.
- 18.109. As part of the reservoir development, new footpaths, cycleways and bridleways would be created to improve connectivity and encourage daily activity. The improvements would open up the site to all ages, abilities and groups. The existing facilities which support recreational use of the site are

limited to the Forestry England car park, bridleway and permissive paths. The following recreational aspects of the reservoir would help deliver health benefits:

- Visitor centre including café, toilets, space for education and community activities;
- Car park (including 2 disabled spaces and parking for 3 buses);
- Children's playground and open play area (away from the wetlands to minimise disturbance);
- Facilities for bird watching;
- Picnic areas;
- Viewing points;
- New woodland; and
- Walking, running, cycling equestrian routes.

18.110. The facilities for bird watching would include an educational bird hide, viewing areas on the north shore which would align both with existing access points (gated to minimise disturbance) and areas of interest in the wetland. Interpretation signage around the reservoir would enhance the visitors experience.

18.111. All aspects of the reservoir site would be open all the time except for the visitor centre and the car park. The reservoir would be signposted from the north to discourage use of the southern access road. This would limit the impact of visitor traffic on access to opportunities for recreation and leisure to the south of the reservoir.

Pipeline - construction

18.112. There are a number of recreation and leisure facilities within the core study area of the pipeline route. Construction traffic, temporary road closures and traffic management have the potential to cause increased delays which could have a temporary adverse impact on accessibility to recreation and leisure facilities near the pipeline route. Different construction traffic routes are proposed for the northern, middle and southern portions of the pipeline to mitigate the impact of construction traffic.

18.113. The following mitigation measures are embedded into the Scheme to minimise disruption to access to opportunities for recreation and leisure:

- Trench excavated in short sections;
- Steel plates and mobile pedestrian walkways proposed to maintain vehicular and pedestrian private means of access;
- Traffic management and temporary signals to enable single lane operation;
- Night-time road closures when the pipe is installed across Eversley Road, Botley Drive, Bedhampton Road and the upgrades to the three culverts take place; and
- School term times will be avoided where the pipeline runs close to schools.

18.114. During construction, there is a potential for journey times and access to be temporarily affected by an increase in the number of HGVs or employee vehicles on the road and temporary traffic management at certain locations. These have the potential to lead to temporary delays and temporarily reduce access to local services.

Operation

18.115. There would be no potential impacts on access to recreation and leisure facilities along the pipeline route once the pipeline is in operation other than maintenance of the pipeline. Such impacts would not result in significant effects.

Active travel

Reservoir - construction

18.116. During construction, there are a number of permissive footpaths and a bridleway which would be temporarily closed or diverted. The bridleway, which extends across the reservoir site, would be the subject of a temporary diversion to the north along Forestry England tracks in Havant Thicket.

18.117. The bridleway and permissive paths within the reservoir site would be diverted for the duration of all reservoir works.

18.118. In addition to the public rights of way, a path off the corner of Swanmore Road which provides access into the reservoir site from the public highway would be affected during the construction of the reservoir. The following access points would remain open:

- Whichers Gate at the Manor Lodge Road/Whichers Gate Road junction;
- A path from Manor Lodge Road park via the Forestry England car park; and
- A logging track also off Manor Lodge Park Road.

Reservoir - operation

- 18.119. New public footpaths, cycle routes and bridleways would be created as part of the Scheme to encourage sustainable active travel.
- 18.120. The routes for pedestrians, cyclists and equestrians would offer a variety of terrain and landscapes. A long circular route of 5km (3.1miles) would be provided with seating to enable walkers and runners to rest and view the landscape. A shorter 1km circuit through the woodland to the north would provide an alternative for visitors who want to stay closer to the café and car park.
- 18.121. A new bridleway for pedestrian, cycle and equestrian use would join the existing one along the western boundary of the reservoir site with a link into the site where it runs west just south of Bells Copse. The diverted bridleway would run south and cross the proposed access road near the site entrance off Swanmore Road and then run along the southern boundary of the reservoir at the toe of the proposed embankment. This route would retain connectivity between the proposed trails around the reservoir and the paths within Staunton Country Park including Staunton Way and Shipwrights Way long distance path.
- 18.122. Compared to the current situation, a new access point located on Cedar Drive at the junction of Manor Lodge Road and Durrants Road would provide a safer access to and from the B2149 for all users including pedestrians, cyclists and equestrians. This has been designed in response to discussions held with the British Horse Society and HCC.
- 18.123. The temporary bridleway diversion along existing Forestry England tracks within the Havant Thicket woodland to the north of the reservoir during construction would revert back to a permissive path upon operation of the permanent bridleway diversion and provide a circular equestrian route around the reservoir. Replacing the existing bridleway with a circular route that runs close to the reservoir would give a different experience to the current route.
- 18.124. Provision of an integrated network of cycle routes through the landscape would see a variety of options for cyclists. The longest circular route on site would be 5.5km (3.4miles) and there would be opportunities to connect to existing neighbouring routes. Cycle parking would be provided at the visitor centre. Without mitigation there is the potential for conflict between cyclists and other users of non-motorised routes.
- 18.125. Whilst the views for people travelling through the area would change, the Scheme includes a number of measures to minimise the adverse effects on visual amenity or to enhance the views. In the construction of the visitor centre, the educational hide, the control house and the Avenue Staircase building materials which are sympathetic to the local landscape would be used where possible to avoid them detracting from the rural setting. Furthermore, the steps of the Staircase would be partially sunk into the ground and the single storey control house would be partially embedded into the embankment. The viewing area at the top of the embankment would provide a 360 degree look out with views across the water to the visitor centre and wetlands as well as looking back above the tree line of The Avenue.
- 18.126. There is the potential for vehicular access to the control building to conflict with non-motorised user routes. However, vehicles would only need to access the control house for routine checks, which are not expected to be more frequent than once a week.
- 18.127. Both proposed road junctions have been designed to comply with the safety requirements of the Design Manual for Roads and Bridges (DMRB) CD123.
- 18.128. The reservoir will be signposted from the north to discourage use of the southern access road. This will limit the impact of visitor traffic on active travel in residential areas to the south of the reservoir, particularly along Swanmore Road and Calshot Road.

Pipeline - construction

- 18.129. Construction traffic, temporary road closures, temporary footpath closures and traffic management have the potential to have a temporary adverse impact on active travel. Different construction traffic routes are proposed for the northern, middle and southern portions of the pipeline to mitigate the impact of construction traffic.
- 18.130. The fencing of construction sites would enable pedestrian access along all footways to be maintained during construction. One exception to this would be during loading/unloading of lorries. This activity would require an excavator access and would therefore require temporary closure of the footways.

Table 18-21 - Pipeline construction impacts on active travel

Route section	Affected active travel route	Impacts
Section 3	Section 3 of the route incorporates the footpath along Hermitage Stream.	Approximately 260 metres of the route would require the diversion of the existing footpath for 33 working days.
Sections 3 and 4	Sections 3 and 4 of the route incorporate the footpath along Hermitage Stream.	During construction of approximately 250 m of pipeline over 32 working days and approximately 350 m of pipeline over 44 working days, approximately 300 m of footpath would need to be temporarily diverted.
Section 4	Section 4 of the proposed pipeline route incorporates the footpath along Hermitage Stream.	Approximately 200 metres of the footpath south of Purbrook Way would be diverted for approximately 25 working days.
Section 4	Section 4 of the proposed pipeline route incorporates the footpath along Hermitage Stream.	Approximately 200 metres of the footpath north of Purbrook Way) would be diverted for approximately 25 working days.
Section 5	Section 5 of the proposed pipeline route incorporates a footpath between Ewhurst Close and Hermitage Stream.	Closure of the footpath for approximately 25 days
Section 5	This section incorporates a footway between Ellisfield Road and Riders Lane.	Closure between Ellisfield Road and Riders Lane for approx. 28 working days
Section 7	Section 7 incorporates a footpath to the south of Middle Park Way, a cycleway on Middle Park Way and a path into Staunton Country Park from Bitterne Close	Temporary diversion of the footpaths for approximately 18 working days. Temporary disruption to use of the cycleway during both the upgrade to the culvert and the laying of the pipeline under the road.

- 18.131. During the works to upgrade the capacity of the culvert under Dunsbury Way there would be a temporary loss of the seating area and footway in this location for up to one month.

Pipeline – operation

- 18.132. There would be no potential impacts on walkers, cyclists and horse-riders once the pipeline is in operation other than maintenance of the pipeline route. Such impacts would not give rise to significant effects.

Access to Work and Training

Reservoir – construction

- 18.133. Construction of the pipeline would have the potential to disrupt the daily transport/delivery movements of businesses due to temporary road closures and/or movement of construction traffic. These effects would be temporary in nature, as they would only occur during the construction period and would be short lived.
- 18.134. A range of local businesses on the approach to the northern entrance to the reservoir site (e.g. Fuller's Distribution Centre located at Dell Piece E) have been identified. Construction traffic would affect these businesses by changing amenity (e.g. noise, air quality, visual amenity) and accessibility which could influence trading conditions.
- 18.135. Accessibility may be highly important to certain businesses in the wider study area reliant on the transport network (e.g. logistics or distribution), particularly access to the A3 (M) at Junction 2.
- 18.136. The construction of the Scheme would help support construction firms operating within the region and provide jobs in the industry. Businesses in the local area would benefit from the trade linkages that would be established during the construction of the Scheme, meaning that indirect jobs would be supported locally in suppliers of construction materials and equipment. This could provide financial security and contribute to self-esteem, particularly for low-income groups in the area.
- 18.137. Local businesses would generally also benefit to some extent from temporary increases in expenditure as a result of the direct and indirect employment effects of the construction phase, for example, as construction workers spend their wages in local shops, accommodation and other facilities.

Reservoir – operation

- 18.138. A small number of jobs would be created to manage and run the reservoir and visitor centre. A number of businesses surrounding the study area may also benefit due to the increase of visitors once the reservoir is operational. The Scheme would lead to the creation of new direct and indirect jobs, through supply chain benefits and new expenditure introduced to the local economy. Job creation could potentially influence mental and physical health, reduce stress, improve self-confidence, and reduce rates of illness and premature death.

Pipeline – construction

- 18.139. Construction traffic, temporary road closures and traffic management have the potential to cause increased delays which could have a temporary adverse impact on accessibility to work and training near the pipeline route. Different construction traffic routes are proposed for the northern, middle and southern portions of the pipeline to mitigate the impact of construction traffic at any one location.
- 18.140. Full temporary road closures on the following roads (at different times) which are less than 5 m wide are expected: High Lawn Way, Ellisfield Road, Highclere Avenue, Fraser Road, North Street, Brunswick Gardens; and Chadswell Meadow. This would give rise to temporary adverse effects on access to and from land uses located on these roads.
- 18.141. The following mitigation measures are embedded into the Scheme to minimise disruption to access to work and training:
- Trench excavated in short sections;
 - Steel plates and mobile pedestrian walkways proposed to maintain vehicular and pedestrian private means of access;
 - Traffic management and temporary signals to enable single lane operation;
 - Night-time road closures when the pipe is installed across Eversley Road, Botley Drive, Bedhampton Road and the upgrades to the three culverts take place; and
 - School term times will be avoided where the pipeline runs close to schools.
- 18.142. The outline planning approval would be subject to detailed Traffic Management and Construction Environmental Management Plans which would include further measures to reduce disruption.

Table 18-22 – Pipeline construction impacts on access to work and training

Route section	Access to work and training	Impact
Sections 1, 2 and 3	Section 1 lies in close proximity to businesses along Bedhampton Road including Volvo Cars, Cambridge Garage, National Tyres and Autocare, Bedhampton Garage, Hartley Store News Agents and Masala Lounge. A number of businesses are located along the construction traffic route for Sections 1, 2 and 3 including Hartley Stores, Bedhampton Piano shop, Booze and More, Belmont News, Imperial Palace all located along Bedhampton Road and Rusty Cutter Restaurant located at the southern end of Bedhampton Hill	Construction of the route would require single-lane operation and night closure on Bedhampton Road. The businesses along Bedhampton may be subject to disruption as a result. Depending on the timing of the night road closure this may affect access to the Masala Lounge Restaurant. However, businesses along Bedhampton Road may benefit from an influx of construction workers spending in local shops which could provide financial security and contribute to self-esteem, particularly for low-income groups A temporary increase in traffic on the construction route for this section of pipeline could disrupt access to businesses along Bedhampton Road.
Section 3, 4 and 5	Businesses located along the construction traffic route for Sections 3, 4 and 5 are Rowlands Pharmacy and the BP Petrol Station located to the west along Purbrook Way.	A temporary increase in traffic on the construction route for this section of pipeline could disrupt access to businesses along Purbrook Way
Section 6	This section lies in close proximity to businesses along Dunsbury Way and Bishopstoke Road including (Heart of the Park Café), Apex Centre, Thomas Wellburn Jewellers, The Co-operative Funeralcare and the Greywell Shopping centre).	This section of the route will take 29 workings days to construct. Construction of this section of the route is expected to temporarily disrupt access to local businesses located along Dunsbury Way through increased traffic congestion and/or the introduction of traffic management. Businesses along Dunsbury Way and Bishopstoke Road may benefit from an influx of construction workers spending in local shops.
Culvert located along Middle Park Way	Local businesses located along Middle Park Way	The upgrade of the culvert is expected to temporarily disrupt access to local businesses through increased traffic congestion and/or the introduction of traffic management. The upgrading of the existing culvert located along Middle Park Way would require a night-time road closure. It is assumed that the upgrade would take place at the same time as the construction of Section 7 of the pipeline route.
Culvert located along Dunsbury Way	Local businesses located along Dunsbury Way	The upgrade of the culvert is expected to temporarily disrupt access to local businesses through increased traffic congestion and/or the introduction of traffic management. Night-time closure may be required for the upgrading of the culvert. This would potentially occur at the same time as construction of Section 6 of the pipeline route.

Route section	Access to work and training	Impact
Culvert located at Purbrook Way	Local businesses located along Purbrook Way	The upgrade of the culvert is expected to temporarily disrupt access to local businesses through increased traffic congestion and/or the introduction of traffic management. The works will potentially take place independently from construction of Section 5 of the pipeline. A road closure may be required however this will take place during night-time to minimise disruption.

Pipeline - operation

- 18.143. There would be no potential impacts on access to work and training once the pipeline is in operation other than maintenance of the pipeline route. Such impacts would not give rise to significant effects.

Access to healthcare services, education and other social infrastructure

Reservoir - construction

- 18.144. No impacts on access to social infrastructure during construction of the reservoir have been identified.

Reservoir - operation

- 18.145. The visitor centre with its waterside terrace would provide a number of flexible spaces and an attractive backdrop both for a family day out and for an array of other user groups. The visitor centre will incorporate a shop, toilets and adaptable space with flexible furniture to facilitate use by community groups and groups of school children. The educational bird hide is being designed to accommodate a school group.
- 18.146. The reservoir, the landscape, the visitor centre and the main educational bird hide would provide a space for a hands-on approach to nature education. The visitor centre would inform visitors about water resource management and the protection of wetland environments. To engage children and young people in nature, nature-themed playground equipment and educational signage are proposed in pockets along the shorter 1km pedestrian route which would provide an adventure trail through the woodland and board walks over the wetlands to pond dipping areas.
- 18.147. The reservoir would only be signposted from the north to discourage use of the southern access road. This would limit the impact of visitor traffic on access to healthcare services, education and other social infrastructure to the south of the reservoir.

Pipeline - construction

- 18.148. There are a number of healthcare services and social infrastructure facilities in close proximity to the pipeline route such as health centres and educational facilities within the core study area of the pipeline route. Construction traffic, temporary road closures and traffic management have the potential to cause increased delays which could have a temporary adverse impact on accessibility and connectivity to healthcare and social infrastructure facilities near the pipeline route. Different construction traffic routes are proposed for the northern, middle and southern portions of the pipeline to mitigate the impact of construction traffic in any single location
- 18.149. The following mitigation measures are embedded into the Scheme to minimise disruption to access to healthcare services, education and other social infrastructure:
- Trench excavated in short sections;
 - Steel plates and mobile pedestrian walkways proposed to maintain vehicular and pedestrian private means of access;
 - Traffic management and temporary signals to enable single lane operation;
 - Night-time road closures when the pipe is installed across Eversley Road, Botley Drive, Bedhampton Road and the upgrades to the three culverts take place; and

- School term times will be avoided where the pipeline runs close to schools.

Table 18-23 - Pipeline construction impacts on access to healthcare, education and other social infrastructure

Route section	Affected healthcare and social infrastructure	Impact
Section 1	The Bedhampton Community Centre lies within Section 1 of the proposed pipeline route.	Access to Bedhampton Community Centre would be impacted temporarily during the construction of approximately 230 m over 39 working days and 90 m over approximately 15 working days. Section 1 would require single lane operation along Bedhampton Road with temporary traffic signals at night
Sections 1 and 2	These sections of the route run through the Bidbury Infant and Junior School playing field	There would be temporary disruption to access to and parking at the school during construction of 180 m of pipeline over 30 working days. This section of the route would lead to disruption to access to the school along Fraser Road.
Section 5	This section of the pipeline lies in close proximity to St Francis Church.	During the construction of approximately 430 m of pipeline over 54 working days, St Francis Church would be impacted by cumulative changes (e.g. noise and vibration and air quality effects.)
Section 6	This section of the pipeline route lies along Dunsbury Way adjacent to the Oakleigh Family Centre.	During the construction of approximately 170 m of pipeline over approximately 29 working days, Oakleigh Family Centre would be impacted by cumulative changes (e.g. noise and vibration, air quality and traffic effects.)
Section 6	Front Lawn Primary Academy.	There would be temporary access impacts and increased traffic delays to Front Lawn Primary Academy during the construction of 200 m of pipeline over 34 days involving installation of traffic management and signals for single lane operation at junctions

Risk of injuries and death

Reservoir - construction

- 18.150. All construction health and safety risks would be identified and managed using established procedures and protocols. Therefore, no significant construction health and safety impacts are predicted.

Reservoir - operation

- 18.151. In compliance with the Reservoirs Act (1975) a Qualified Civil Engineer under the All Reservoirs Panel would be appointed to supervise the design. The safety of the dam design is ensured through this supervision. The risk of the public falling off the embankment crest into the reservoir would be mitigated by a post and rail fence with mesh on the crest of the embankment. At the Viewing Area a 1.2m height fencing will be installed along the edge of the reservoir.
- 18.152. In areas of congregation like the viewing area and the staircase there is the potential for clashes between cyclists and walkers if either become distracted.
- 18.153. The proposed location of the control house building partially embedded into the embankment means that a security fence would be required around the perimeter of the building to prevent the public accessing the roof.
- 18.154. The risk of the public falling into the water at the visitor centre would be minimised by balustrading and handrails around the building at the water's edge. Safety rings will be provided as additional protection.

Pipeline - construction

- 18.155. All construction health and safety risks will be identified and managed using established procedures and protocols. This includes emergency vehicle access during partial and full road closures. Therefore, no significant construction health and safety impacts are predicted.

Pipeline - operation

- 18.156. There would be no potential risk of injury or death once the pipeline is in operation other than maintenance of the pipeline route. Such impacts would not give rise to significant effects.

Impact magnitude

- 18.157. The construction of the reservoir is anticipated to generate impacts to health determinants as outlined in Table 18-24.

Table 18-24 - Reservoir construction phase health determinant impacts

Health Determinant	Impact description	Impact magnitude
Air pollution	Generation of dust during vegetation removal, earthworks and construction Construction traffic emissions	Minor
Access to open space	Temporary loss of access to open space on the reservoir site for a period of 5 years (plus 1 year for construction of the visitor centre). The amenity of open space within Havant Thicket would be affected by construction traffic for approximately 4 years.	Moderate
Access to healthcare services, education and other social infrastructure	No impacts have been identified.	Negligible
Risk of injuries and death	No significant construction health and safety impacts are predicted.	Negligible
Access to opportunities for recreation and leisure	Access to Havant Thicket would be temporarily restricted during construction of both access roads and use of those routes by construction traffic. The short diversion of the bridleway and the impact on amenity of footpaths is unlikely to discourage access to open space or discourage physical activity.	Minor
Active travel	The bridleway and permissive paths would be the subject of short diversions around the construction site but these diversions are not expected to discourage use of them.	Minor
Access to work and training	Construction of the Scheme would generate new employment opportunities, which could provide financial security and contribute to self-esteem, particularly for low-income groups in the area. Whilst the construction period would be temporary, access to skills and training schemes for new workers, would have long-term benefits. Construction would support the local supply chain.	Moderate Beneficial
Soil and water pollution	Contamination of soil from on-site and off-site sources and risk of temporary watercourse pollution as a result of reservoir dewatering activities. These risks will be mitigated by the implementation of pollution prevention measures	Negligible
Noise pollution and vibration	Noise from construction of the northern site access road and/or from night-time works. Vibration from earth compaction activities.	Minor

18.158. The operational phase of the reservoir is anticipated to generate impacts to health determinants as outlined in Table 18-25.

Table 18-25 - Reservoir operational phase effects on Human Health

Health determinant	Impact description	Impact magnitude
Air pollution	Impact of traffic emissions	Negligible
Access to open space	The reservoir would improve open space provision in an area which is accessible to all local users. The multifunctional provision of, and improvements to, open space around the reservoir would support health and outdoor recreation, help make a sense of place and enhance nature.	Major
Access to healthcare services, education and other social infrastructure	All facilities have been designed to engage families, schools and community groups in education.	Major
Risk of injuries and death	The Scheme includes fencing around parts of the reservoir, the provision of safety rings and measures to minimise clashes between cyclists and walkers. This would minimise the risk of injuries and death.	Moderate
Access to opportunities for recreation and leisure	New recreational facilities for all ages, abilities and groups would be provided adjacent to a deprived area. The Scheme may be accessed through a variety of forms of transport by both the local community and visitors from a 20-mile radius. The Scheme would bring physical and mental health benefits by encouraging activity and connecting people to nature.	Major
Active travel	The Scheme would provide a variety of terrain, landscapes and route lengths for walkers, cyclists and horse riders. The Scheme would connect to existing routes around the reservoir site and provide a safer access point on the B2149. Cycle parking would be provided at the visitor centre. These improvements in provision would support physical activity and social connectivity.	Major
Access to work and training	The management and running of the reservoir and the visitor centre would generate employment opportunities and potentially provide benefits to unemployed and low-income groups in the area. The increase in visitors would indirectly benefit local businesses and potentially create jobs.	Moderate
Soil and water pollution	Contamination of soil from on-site and off-site sources. Potential impact on water quality due to run-off from roads, car park and buildings. These risks would be mitigated by the implementation of pollution prevention measures. Water discharged from the reservoir into the Riders Lane Stream would be of a more consistent quality.	Negligible
Noise pollution and vibration	Noise from operation of the reservoir including operational and visitor traffic.	Minor

18.159. The construction of the pipeline is anticipated to generate impacts to health determinants as outlined in Table 18-26.

Table 18-26 - Pipeline construction phase effects on human health

Health determinants	Impact description	Impact magnitude
Air pollution	Generation of dust during earthworks and construction	Minor
Access to open space	Construction activities, construction traffic, temporary road closures and traffic management would have a temporary adverse impact on access to open space near the pipeline route. The impacts would be minimised by establishing short temporary diversions and fencing of construction sites to maintain safe access where possible.	Minor
Access to healthcare services, education and other social infrastructure	Construction traffic, temporary road closures and traffic management would have a temporary adverse impact on access to Bedhampton Community Centre, Bidbury Infant and Junior School and Front Lawn Primary Academy. Disruption to access would be minimised by establishing short temporary diversions and careful timing of road closures.	Minor
Risk of injuries and death	No impacts have been identified.	Negligible
Access to opportunities for recreation and leisure	Construction traffic, temporary road closures and traffic management would have a temporary adverse impact on access to recreation and leisure facilities near the pipeline route.	Minor
Active travel	Construction traffic, temporary road closures, temporary footpath closures and traffic management have the potential to have a temporary adverse impact on active travel. The fencing of construction sites would enable pedestrian access along all footways to be maintained during construction. One exception to this would be during loading/unloading of lorries. This activity would require an excavator to slew over footpath and would therefore require temporary closure of the footways.	Minor
Access to work and training	Temporarily, construction traffic, temporary road closures and traffic management associated with the pipeline and the upgrade of the three culverts would have an adverse impact on access to places of work on Bedhampton Road, Purbrook Way and Dunsbury Way. Disruption to access would be minimised by establishing short temporary diversions. Local businesses may benefit from the influx of construction workers and increased demand for construction plant and materials. Construction of the Scheme would generate new employment opportunities, which could provide financial security and contribute to self-esteem, particularly for low-income groups in the area. Whilst the construction period would be temporary, access to skills and training schemes for new workers, would have long-term benefits	Minor
Soil and water pollution	Contamination of soil from on-site and off-site sources. With mitigation, temporary impacts on water quality would not be significant.	Negligible
Noise pollution and vibration	Daytime and/or night-time noise effects from both open trench construction and trenchless construction methods. Vibration effects from road compaction plant which is to be used as part of the open trench construction method.	Minor

Design, mitigation and enhancement measures

- 18.160. The Population and Human Health assessment is mostly based upon residual effects identified by other technical assessments and incorporates the appropriate mitigations measures identified in those chapters. For example, to minimise the effects on physical health from air pollution and noise pollution, proposed mitigation measures include general communication, temporary noise barriers, general dust management, site monitoring, construction management and best practice construction practices.

Reservoir - construction

- 18.161. A clear and concise traffic management plan will be designed to facilitate access to local facilities during construction of the Scheme.
- 18.162. The Outline Environmental Management Plan (OEMP) sets out outline proposed measures to minimise and mitigate construction impacts. It considers the phasing and sequencing of works with respect to environmental management and mitigation within the site. This will be developed into a Construction Environmental Management Plan (CEMP) to be approved by the local planning authority before development commences.
- 18.163. All mitigation measures for the construction phase are identified in Table 18-30.

Reservoir - operation

- 18.164. It is proposed to implement a Travel Plan for the Scheme. This will involve the implementation of various measures to encourage the use of sustainable travel modes and reduce traffic-related air pollution when travelling to the reservoir, including the management of coach operations.
- 18.165. All mitigation measures are identified in Table 18-31.

Pipeline - construction

- 18.166. A clear and concise traffic management plan will be designed to facilitate access to local facilities during construction of the Scheme.
- 18.167. The Outline Environmental Management Plan (OEMP) sets out outline proposed measures to minimise and mitigate construction impacts. It considers the phasing and sequencing of works with respect to environmental management and mitigation within the site. This will be developed into a Construction Environmental Management Plan (CEMP) to be approved by the local planning authority before development commences.
- 18.168. All mitigation measures are identified in Table 18-32.

Assessment of effects

- 18.169. Effects on Population and Human Health are assessed by bringing together the assessment of receptors' sensitivity with the magnitude of impacts to health determinants, outlined in Table 18-27.

Reservoir - construction

- 18.170. Table 18-27 identifies the effects on human health during the construction phase of the reservoir.

Table 18-27 - Reservoir construction phase effects on human health

Health Determinants	Receptors				
	Wider groups	Children and adolescents	Older people	People who are disabled and/or with other health problems	Low-income groups
Air pollution	Moderate or slight adverse	Moderate or large adverse	Moderate or large adverse	Moderate or large adverse	Moderate or slight adverse

Access to open space	Moderate Adverse	Moderate or large Adverse	Moderate Adverse	Moderate Adverse	Moderate or Large Adverse
Access to healthcare services, education and other social infrastructure	Neutral or slight adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Risk of injuries and death	Neutral or Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Neutral or Slight Adverse
Access to opportunities for recreation and leisure	Slight Adverse	Moderate or Slight Adverse	Slight Adverse	Slight Adverse	Moderate or Slight Adverse
Active travel	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Access to work and training	Slight Beneficial	Slight Beneficial	Slight Beneficial	Slight Beneficial	Moderate Beneficial
Soil and water pollution	Neutral or Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Neutral or Slight Adverse
Noise pollution and vibration	Moderate or Slight Adverse	Moderate or Slight Adverse	Moderate or Slight Adverse	Moderate or Slight Adverse	Moderate or Slight Adverse

Reservoir - operation

- 18.171. The operational phase effects of the reservoir on Population and Human Health are set out in Table 18-28.

Table 18-28 - Reservoir operational phase effects on human health

Health Determinants	Receptors				
	Wider groups	Children and adolescents	Older people	People who are disabled and/or with other health problems	Low-income groups
Air pollution	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Access to open space	Moderate or Large Benefit	Large or Very Large Benefit	Large or Very Large Benefit	Large or Very Large Benefit	Large or Very Large Benefit
Access to healthcare services, education and other social infrastructure	Moderate or Large Beneficial	Large or very Large Beneficial	Large or very Large Beneficial	Large or very Large Beneficial	Large or very Large Beneficial
Risk of injuries and death	Moderate Adverse	Large or very large Adverse	Large or very large Adverse	Moderate or Large Adverse	Moderate Adverse
Access to opportunities for	Moderate or Large Beneficial	Large or very Large Beneficial	Moderate or Large Beneficial	Moderate or Large Beneficial	Large or very Large Beneficial

Health Determinants	Receptors				
	Wider groups	Children and adolescents	Older people	People who are disabled and/or with other health problems	Low-income groups
recreation and leisure					
Active travel	Moderate or Large Beneficial	Moderate or Large Beneficial	Moderate or Large Beneficial	Moderate or Large Beneficial	Moderate or Large Beneficial
Access to work and training	Slight Beneficial	Slight Beneficial	Slight Beneficial	Slight Beneficial	Moderate Beneficial
Soil and water pollution	Neutral or Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Neutral or Slight Adverse
Noise pollution and vibration	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse

Pipeline - construction

18.172. Table 18-29 identifies the effects on human health during construction of the pipeline.

Table 18-29 - Pipeline construction phase effects on human health

Health Determinants	Receptors				
	Wider groups	Children and adolescents	Older people	People who are disabled and/or with other health problems	Low-income groups
Air pollution	Moderate or slight adverse	Moderate or large adverse	Moderate or large adverse	Moderate or large adverse	Moderate or slight adverse
Access to open space	Slight Adverse	Moderate or Slight Adverse	Slight Adverse	Slight Adverse	Moderate or Slight Adverse
Access to healthcare services, education and other social infrastructure	Slight Adverse	Moderate or Slight Adverse	Moderate or Slight Adverse	Moderate or Slight Adverse	Moderate or Slight Adverse
Risk of injuries and death	Neutral or Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Neutral or Slight Adverse
Access to opportunities for recreation and leisure	Slight Adverse	Moderate or Slight Adverse	Slight Adverse	Slight Adverse	Moderate or Slight Adverse
Active travel	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Access to work and training	Neutral or Slight Benefit	Neutral or Slight Benefit	Neutral or Slight Benefit	Neutral or Slight Benefit	Slight Benefit

Soil and water pollution	Neutral or Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Neutral or Slight Adverse
Noise pollution and vibration	Moderate or Slight Adverse	Moderate or Slight Adverse	Moderate or Slight Adverse	Moderate or Slight Adverse	Moderate or Slight Adverse

Summary Table

Table 18-30 - Reservoir construction phase effects on population and human health

Activity	Baseline	Impact assessment			Mitigation	
Impact	Receptor	Receptor sensitivity	Impact severity	Impact relevance	Mitigation measures	Residual effect
Air pollution	Wider Groups *	High	Minor	Slight or Moderate Adverse	- CEMP to specify stakeholder communication before and during work on site and to specify the clear display of contact details for those responsible for dust issues on site. - Any complaints and exceptional incidents should be logged along with the appropriate measures taken to reduce emissions. - General dust management - Daily visual inspections of activities especially during dry conditions including recording of activities, controls, weather (wind direction, precipitation) and ground conditions, and observations of surface dust deposits at and beyond the site boundary near sensitive receptors. - Preparing and maintaining the site - Construction management and best practice	Slight Adverse
	Children and adolescents	Very High	Minor	Moderate or Large Adverse		Slight Adverse
	Older people	Very High	Minor	Moderate or Large Adverse		Slight Adverse
	People who are disabled and/or with other health problems	Very High	Minor	Moderate or Large Adverse		Slight Adverse
	Low-income groups	High	Minor	Slight or Moderate Adverse		Slight Adverse
Access to open space	Wider Groups *	Medium	Moderate	Moderate Adverse	- Maintain safe access for the public whenever possible and use fencing to separate the public from construction activity and traffic. - Traffic marshalling - Keep the public informed on project progress, on the timing and extent of road/footpath/PROW closures/diversions and which areas are safe to access - Clearly communicate proposals to close amenity spaces, close roads and introduce traffic management - Use material won on site where possible to minimise the importation of material - Stagger elements of construction to distribute traffic movements across the construction period.	Slight Adverse
	Children and adolescents	High	Moderate	Moderate or Large Adverse		Slight Adverse
	Older people	Medium	Moderate	Moderate Adverse		Slight Adverse
	People who are disabled and/or with other health problems	Medium	Moderate	Moderate Adverse		Slight Adverse
	Low-income groups	High	Moderate	Moderate or Large Adverse		Slight Adverse
Access to healthcare services, education and other social infrastructure	Wider Groups *	Medium	Negligible	Neutral or Slight Adverse	- Use material won on site where possible to minimise the importation of material - Construction management and best practice - Stagger elements of construction to distribute traffic movements across the construction period.	Negligible
	Children and adolescents	High	Negligible	Slight Adverse		Negligible
	Older people	High	Negligible	Slight Adverse		Negligible
	People who are disabled and/or with other health problems	High	Negligible	Slight Adverse		Negligible
	Low-income groups	High	Negligible	Slight Adverse		Negligible
Risk of injuries and death	Wider Groups *	Medium	Negligible	Neutral or Slight Adverse	- Maintain safe access for the public whenever possible and use fencing to separate the public from construction activity and traffic. - Use material won on site where possible to minimise the importation of material - Construction management and best practice - Traffic marshalling - Encourage construction staff to travel to and from the site by public transport	Negligible
	Children and adolescents	Very High	Negligible	Slight Adverse		Negligible
	Older people	Very High	Negligible	Slight Adverse		Negligible
	People who are disabled and/or with other health problems	High	Negligible	Slight Adverse		Negligible
	Low-income groups	Medium	Negligible	Neutral or Slight Adverse		Negligible
	Wider Groups *	Medium	Minor	Slight Adverse		Slight Adverse

Activity	Baseline	Impact assessment			Mitigation	
Impact	Receptor	Receptor sensitivity	Impact severity	Impact relevance	Mitigation measures	Residual effect
Access to opportunities for recreation and leisure	Children and adolescents	High	Minor	Moderate or Slight Adverse	- Maintain safe access for the public whenever possible and use fencing to separate the public from construction activity and traffic. - Traffic marshalling - Keep the public informed on project progress, on the timing and extent of road/footpath/PROW closures/diversions and which areas are safe to access - Clearly communicate proposals to close amenity spaces, close roads and introduce traffic management - Use material won on site where possible to minimise the importation of material - Encourage construction staff to travel to and from the site by public transport	Slight Adverse
	Older people	Medium	Minor	Slight Adverse		Slight Adverse
	People who are disabled and/or with other health problems	Medium	Minor	Slight Adverse		Slight Adverse
	Low-income groups	High	Minor	Moderate or Slight Adverse		Slight Adverse
Active travel	Wider Groups *	Medium	Minor	Slight Adverse	- Maintain a safe and accessible pedestrian, cycle and horse-riding environment on the diversion routes around the reservoir site using fencing to separate the public from construction activity and traffic - Traffic marshalling - Keep the public informed on project progress, on the timing and extent of road/footpath/PROW closures/diversions and which areas are safe to access - Clearly communicate proposals to close amenity spaces, close roads and introduce traffic management - Use material won on site where possible to minimise the importation of material - Encourage construction staff to travel to and from the site by public transport	Slight Adverse
	Children and adolescents	Medium	Minor	Slight Adverse		Slight Adverse
	Older people	Medium	Minor	Slight Adverse		Slight Adverse
	People who are disabled and/or with other health problems	Medium	Minor	Slight Adverse		Slight Adverse
	Low-income groups	Medium	Minor	Slight Adverse		Slight Adverse
Access to work and training	Wider Groups *	Low	Moderate	Slight Beneficial	- Retain access to employment and training in the area - Traffic marshalling - Clearly communicate proposals to close roads and introduce traffic management - Use material won on site where possible to minimise the importation of material - Encourage construction staff to travel to and from the site by public transport	Slight Beneficial
	Children and adolescents	Low	Moderate	Slight Beneficial		Slight Beneficial
	Older people	Low	Moderate	Slight Beneficial		Slight Beneficial
	People who are disabled and/or with other health problems	Low	Moderate	Slight Beneficial		Slight Beneficial
	Low-income groups	Medium	Moderate	Moderate Beneficial		Moderate Beneficial
Soil and water pollution	Wider Groups *	Medium	Negligible	Neutral or Slight Adverse	Mitigation is set out in Chapter 10 Ground Conditions and Chapter 15 Water Environment in ES Volume 2.	Neutral or Slight Adverse
	Children and adolescents	High	Negligible	Slight Adverse		Slight Adverse
	Older people	High	Negligible	Slight Adverse		Slight Adverse
	People who are disabled and/or with other health problems	High	Negligible	Slight Adverse		Slight Adverse
	Low-income groups	Medium	Negligible	Neutral or Slight Adverse		Neutral or Slight Adverse
	Wider Groups *	High	Minor	Moderate or Slight Adverse	Targeted noise monitoring;	Slight Adverse

Activity	Baseline	Impact assessment			Mitigation	
Impact	Receptor	Receptor sensitivity	Impact severity	Impact relevance	Mitigation measures	Residual effect
Noise Pollution and Vibration	Children and adolescents	High	Minor	Moderate or Slight Adverse	- Monitoring of vibration levels; - Keep public and residents fully informed over the scale, nature and timing of the works; - Careful selection of plant; - Ensure as much work as practicable takes place during the daytime; - Tool box talks to brief all staff and operatives on the requirement to minimise noise; - Use of temporary noise screens; and - Undertake building surveys before and after works.	Slight Adverse
	Older people	High	Minor	Moderate or Slight Adverse		Slight Adverse
	People who are disabled and/or with other health problems	High	Minor	Moderate or Slight Adverse		Slight Adverse
	Low-income groups	High	Minor	Moderate or Slight Adverse		Slight Adverse

* Wider groups are defined as residents, workers, visitors, by-passers, cyclists, walkers, runners, users of public transport

Table 18-31 - Reservoir operational phase effects on Population and Human Health

Activity	Baseline	Impact assessment			Mitigation	
Impact	Receptor	Receptor sensitivity	Impact severity	Impact relevance	Mitigation measures	Residual effect
Air pollution	Wider Groups *	High	Negligible	Slight Adverse	Inclusion of electric vehicle charging points within the proposed car park	Slight Adverse
	Children and adolescents	Very High	Negligible	Slight Adverse		Slight Adverse
	Older people	Very High	Negligible	Slight Adverse		Slight Adverse
	People who are disabled and/or with other health problems	Very High	Negligible	Slight Adverse		Slight Adverse
	Low-income groups	High	Negligible	Slight Adverse		Slight Adverse
Access to open space	Wider Groups *	Medium	Major	Moderate or Large Benefit	No mitigation is required	Moderate or Large Benefit
	Children and adolescents	High	Major	Large or Very Large Benefit		Large or Very Large Benefit
	Older people	Medium	Major	Large or Very Large Benefit		Large or Very Large Benefit
	People who are disabled and/or with other health problems	Medium	Major	Large or Very Large Benefit		Large or Very Large Benefit
	Low-income groups	High	Major	Large or Very Large Benefit		Large or Very Large Benefit
Access to healthcare services, education and other social infrastructure	Wider Groups *	Medium	Major	Moderate or Large Beneficial	No mitigation is required	Moderate or Large Beneficial
	Children and adolescents	High	Major	Large or very Large Beneficial		Large or very Large Beneficial
	Older people	High	Major	Large or very Large Beneficial		Large or very Large Beneficial
	People who are disabled and/or with other health problems	High	Major	Large or very Large Beneficial		Large or very Large Beneficial
	Low-income groups	High	Major	Large or very Large Beneficial		Large or very Large Beneficial
Risk of injuries and death	Wider Groups *	Medium	Minor	Slight Adverse	- Delineation and/or provision of other measures to slow cyclists down and remove potential conflict points with pedestrians. - Reduce the risk of drowning by following Environment Agency guidance and adopting best practice from similar assets including education in local schools on risks of swimming in deep open water, appropriate signage and public safety measures e.g. life rings.	Neutral or slight
	Children and adolescents	Very High	Minor	Moderate or Large Adverse		Slight adverse
	Older people	Very High	Minor	Moderate or Large Adverse		Slight adverse
	People who are disabled and/or with other health problems	High	Minor	Moderate or Slight Adverse		Slight adverse
	Low-income groups	Medium	Minor	Slight Adverse		Neutral or slight

Activity	Baseline	Impact assessment			Mitigation	
Impact	Receptor	Receptor sensitivity	Impact severity	Impact relevance	Mitigation measures	Residual effect
Access to opportunities for recreation and leisure	Wider Groups *	Medium	Major	Moderate or Large Beneficial	No mitigation is required	Moderate or Large Beneficial
	Children and adolescents	High	Major	Large or very Large Beneficial		Large or very Large Beneficial
	Older people	Medium	Major	Moderate or Large Beneficial		Moderate or Large Beneficial
	People who are disabled and/or with other health problems	Medium	Major	Moderate or Large Beneficial		Moderate or Large Beneficial
	Low-income groups	High	Major	Large or very Large Beneficial		Large or very Large Beneficial
Active travel	Wider Groups *	Medium	Major	Moderate or Large Beneficial	- Introduce additional traffic calming to discourage visitors and operational traffic from using the southern access to enter the reservoir site - Development of a travel plan.	Moderate or Large Beneficial
	Children and adolescents	Medium	Major	Moderate or Large Beneficial		Moderate or Large Beneficial
	Older people	Medium	Major	Moderate or Large Beneficial		Moderate or Large Beneficial
	People who are disabled and/or with other health problems	Medium	Major	Moderate or Large Beneficial		Moderate or Large Beneficial
	Low-income groups	Medium	Major	Moderate or Large Beneficial		Moderate or Large Beneficial
Access to work and training	Wider Groups *	Low	Moderate	Slight Beneficial	No mitigation required. Scheme enhancements would include identifying opportunities for the local community for example: providing work and training opportunities for local communities, the unemployed and low-income groups.	Slight Beneficial
	Children and adolescents	Low	Moderate	Slight Beneficial		Slight Beneficial
	Older people	Low	Moderate	Slight Beneficial		Slight Beneficial
	People who are disabled and/or with other health problems	Low	Moderate	Slight Beneficial		Slight Beneficial
	Low-income groups	Medium	Moderate	Moderate Beneficial		Moderate Beneficial
Soil and water pollution	Wider Groups *	Medium	Negligible	Neutral or Slight Adverse	Mitigation is set out in Chapter 10 Ground Conditions and Chapter 15 Water Environment in ES Volume 2.	Neutral or Slight Adverse
	Children and adolescents	High	Negligible	Slight Adverse		Slight Adverse
	Older people	High	Negligible	Slight Adverse		Slight Adverse

Activity	Baseline	Impact assessment			Mitigation	
Impact	Receptor	Receptor sensitivity	Impact severity	Impact relevance	Mitigation measures	Residual effect
	People who are disabled and/or with other health problems	High	Negligible	Slight Adverse		Slight Adverse
	Low-income groups	Medium	Negligible	Neutral or Slight Adverse		
Noise Pollution and Vibration	Wider Groups *	High	Negligible	Slight Adverse	• No mitigation is necessary	Slight Adverse
	Children and adolescents	High	Negligible	Slight Adverse		Slight Adverse
	Older people	High	Negligible	Slight Adverse		Slight Adverse
	People who are disabled and/or with other health problems	High	Negligible	Slight Adverse		Slight Adverse
	Low-income groups	High	Negligible	Slight Adverse		Slight Adverse

* Wider groups are defined as residents, workers, visitors, by-passers, cyclists, walkers, runners, users of public transport

Table 18-32 - Pipeline construction phase effects on Population and Human Health

Activity	Baseline	Impact assessment			Mitigation	
Impact	Receptor	Receptor sensitivity	Impact severity	Impact relevance	Mitigation measures	Residual effect
Air pollution	Wider Groups *	High	Minor	Moderate or Slight Adverse	- Stakeholder communication before and during work on site and the clear display of contact details for those responsible for dust issues on site. - Any complaints and exceptional incidents should be logged along with the appropriate measures taken to reduce emissions. - General dust management - Daily visual inspections of activities especially during dry conditions including recording of activities, controls, weather (wind direction, precipitation) and ground conditions, and observations of surface dust deposits at and beyond the site boundary near sensitive receptors. - Preparing and maintaining the site - Construction management and best practice	Slight Adverse
	Children and adolescents	Very High	Minor	Moderate of Large Adverse		Slight Adverse
	Older people	Very High	Minor	Moderate of Large Adverse		Slight Adverse
	People who are disabled and/or with other health problems	Very High	Minor	Moderate of Large Adverse		Slight Adverse
	Low-income groups	High	Minor	Moderate or Slight Adverse		Slight Adverse
Access to open space	Wider Groups *	Medium	Minor	Slight Adverse	- Maintain safe access for the public whenever possible and use fencing to separate the public from construction activity and traffic. - Traffic marshalling - Keep the public informed on project progress, on the timing and extent of road/footpath/PROW closures/diversions and which areas are safe to access - Clearly communicate proposals to close amenity spaces, close roads and introduce traffic management - Keep amenity spaces open to the public where possible - Minimise the time required to occupy amenity space; - Consider night-time working where the pipeline crosses busy roads to minimise disruption to traffic movements brought about by road closures or traffic signals for one-way operation. - Where possible the upgrade to culverts should be carried out at the same time as pipeline works to minimise periods of disruption to accessibility. - To minimise impact on local traffic movements, construction vehicles should only use junctions 2 and 3 of A3(M) and suitable designated routes unless directly accessing the works. - Construction traffic to avoid a.m. and p.m. peak where possible. - Stagger elements of construction to distribute traffic movements across the construction period.	Negligible
	Children and adolescents	High	Minor	Moderate or Slight Adverse		Negligible
	Older people	Medium	Minor	Slight Adverse		Negligible
	People who are disabled and/or with other health problems	Medium	Minor	Slight Adverse		Negligible
	Low-income groups	High	Minor	Moderate or Slight Adverse		Negligible
Access to healthcare services, education	Wider Groups *	Medium	Minor	Slight adverse	- Retain and minimise disruption to footways - Construction management and best practice	Negligible
	Children and adolescents	High	Minor	Moderate or Slight Adverse		Negligible

Activity	Baseline	Impact assessment			Mitigation	
Impact	Receptor	Receptor sensitivity	Impact severity	Impact relevance	Mitigation measures	Residual effect
and other social infrastructure	Older people	High	Minor	Moderate or Slight Adverse	- Encourage construction staff to travel to and from the site by public transport - Stagger elements of construction to distribute traffic movements across the construction period.	Negligible
	People who are disabled and/or with other health problems	High	Minor	Moderate or Slight Adverse		Negligible
	Low-income groups	High	Minor	Moderate or Slight Adverse		Negligible
Risk of injuries and death	Wider Groups *	Medium	Negligible	Neutral or Slight Adverse	- Maintain safe access for the public whenever possible and use fencing to separate the public from construction activity and traffic. - Construction management and best practice - Traffic marshalling - Retention of existing pedestrian accesses where possible - Encourage construction staff to travel to and from the site by public transport	Negligible
	Children and adolescents	Very High	Negligible	Slight Adverse		Negligible
	Older people	Very High	Negligible	Slight Adverse		Negligible
	People who are disabled and/or with other health problems	High	Negligible	Slight Adverse		Negligible
	Low-income groups	Medium	Negligible	Neutral or Slight Adverse		Negligible
Access to opportunities for recreation and leisure	Wider Groups *	Medium	Minor	Slight Adverse	- Maintain safe access for the public whenever possible and use fencing to separate the public from construction activity and traffic. - Traffic marshalling - Keep the public informed on project progress, on the timing and extent of road/footpath/PROW closures/diversions and which areas are safe to access - Clearly communicate proposals to close amenity spaces, close roads and introduce traffic management in advance - Keep open spaces open to the public where possible	Negligible
	Children and adolescents	High	Minor	Moderate or Slight Adverse		Negligible
	Older people	Medium	Minor	Slight Adverse		Negligible
	People who are disabled and/or with other health problems	Medium	Minor	Slight Adverse		Negligible
	Low-income groups	High	Minor	Moderate or Slight Adverse		Negligible
Active travel	Wider Groups *	Medium	Minor	Slight Adverse	- Maintain a safe and accessible pedestrian and cycle environment using fencing to separate the public from construction activity and traffic - Traffic marshalling - Keep the public informed on project progress, on the timing and extent of road/footpath/PROW closures/diversions and which areas are safe to access - Encourage construction staff to travel to and from the site by public transport	Negligible
	Children and adolescents	Medium	Minor	Slight Adverse		Negligible
	Older people	Medium	Minor	Slight Adverse		Negligible
	People who are disabled and/or with other health problems	Medium	Minor	Slight Adverse		Negligible
	Low-income groups	Medium	Minor	Slight Adverse		Negligible
Access to work and training	Wider Groups *	Low	Minor	Neutral or Slight Beneficial	- Retain access to employment and training in the area - Traffic marshalling - Clearly communicate proposals to close roads and introduce traffic management - Encourage construction staff to travel to and from the site by public transport	Slight Beneficial
	Children and adolescents	Low	Minor	Neutral or Slight Beneficial		Slight Beneficial
	Older people	Low	Minor	Neutral or Slight Beneficial		Slight Beneficial
	People who are disabled and/or with other health problems	Low	Minor	Neutral or Slight Beneficial		Slight Beneficial
	Low-income groups	Medium	Minor	Slight Beneficial		Moderate Beneficial

Activity	Baseline	Impact assessment			Mitigation	
Impact	Receptor	Receptor sensitivity	Impact severity	Impact relevance	Mitigation measures	Residual effect
Soil and water pollution	Wider Groups *	Medium	Negligible	Neutral or Slight Adverse	Mitigation is set out in Chapter 10 Ground Conditions and Chapter 15 Water Environment in ES Volume 2.	Neutral or Slight Adverse
	Children and adolescents	High	Negligible	Slight Adverse		Slight Adverse
	Older people	High	Negligible	Slight Adverse		Neutral or Slight Adverse
	People who are disabled and/or with other health problems	High	Negligible	Slight Adverse		Slight Adverse
	Low-income groups	Medium	Negligible	Neutral or Slight Adverse		Neutral or Slight Adverse
Noise Pollution and Vibration	Wider Groups *	High	Minor	Moderate or Slight Adverse	- Targeted noise monitoring; - Monitoring of vibration levels; - Keep public and residents fully informed over the scale, nature and timing of the works; - Careful selection of plant; - Ensure as much work as practicable takes place during the daytime; - Tool box talks to brief all staff and operatives on the requirement to minimise noise; - Use of temporary noise screens; and - Undertake building surveys before and after works.	Slight Adverse
	Children and adolescents	High	Minor	Moderate or Slight Adverse		Slight Adverse
	Older people	High	Minor	Moderate or Slight Adverse		Slight Adverse
	People who are disabled and/or with other health problems	High	Minor	Moderate or Slight Adverse		Slight Adverse
	Low-income groups	High	Minor	Moderate or Slight Adverse		Slight Adverse

* Wider groups are defined as residents, workers, visitors, by-passers, cyclists, walkers, runners, users of public transport

Monitoring

- 18.173. The monitoring of effects will be carried out across both construction and operation of the development. During construction the movement of HGV traffic will be closely monitored with reference to OEMP, which sets out intended construction programme and sequencing. The OEMP will be updated as development of design becomes fixed, and contractors will be bound to the construction movements set out in final EMP.
- 18.174. Portsmouth Water will develop a detailed Travel Plan for the operational phase of the development, which will seek to minimise the proportion of visitors using single occupancy car trips and maximise opportunities for attracting visitors on sustainable modes of travel. As part of a Travel Plan, annual monitoring of visitors' travel patterns will be recorded, in terms of how they travel to and from the site. The monitoring framework will include tools for implementing a set of remedial sustainable travel initiatives if the targets in the Travel Plan are not being achieved.

Summary

Reservoir – construction

- 18.175. With mitigation, the effect of air pollution from construction dust and construction traffic emissions is predicted to have a slight adverse effect on all human receptor groups.
- 18.176. In the medium term, whilst the reservoir is under construction, and with mitigation in place, all groups are expected to experience slight adverse effects on physical activity and stress and wellbeing due to the temporary but prolonged reduction in access to open space.
- 18.177. With mitigation all groups are expected to be subject to negligible effects as a result of disruption to access to healthcare, education and other social infrastructure and due to an increase in the risk of death or injury.
- 18.178. Access to opportunities for recreation and leisure would be restricted during construction of, and use of, the two access roads during construction. With mitigation this would have slight adverse effects on all groups by discouraging access and physical activity.
- 18.179. Provided a suitable diversion for the public rights of way is in place, a slight adverse on active travel for all groups is expected.
- 18.180. Slight or moderate beneficial effects on access to work and training is expected for all groups as construction would support the local supply chain and create employment opportunities. This could provide financial security and contribute to self-esteem, particularly for low-income groups in the area.
- 18.181. All groups would be expected to experience neutral or slight adverse effects as a result of soil and water pollution.
- 18.182. With mitigation the risk of injuries and death for all groups is expected to have a negligible effect.
- 18.183. With mitigation, daytime and night-time construction activities could have a slight adverse noise effect on all human health receptor groups.

Reservoir - operation

- 18.184. The effect of air pollution from reservoir traffic on all human health receptors is slight adverse.
- 18.185. The improvement in open space provision in an area accessible to local users would support health and outdoor recreation, help instill a sense of place and enhance nature. This is anticipated to have moderate to very large benefits on all groups.
- 18.186. All facilities proposed as part of the Scheme have been designed to engage families, schools and community groups in education. This is expected to result in moderate to very large beneficial effects on access to healthcare, education and other social infrastructure for all groups.
- 18.187. With mitigation the reservoir presents a slight to moderate adverse in terms of risk of death or injury to most groups.
- 18.188. New recreational facilities for all ages, abilities and groups would be provided adjacent to a relatively deprived area. This would bring physical and mental health benefits by encouraging activity and connecting people to nature. This is expected to have a moderate or large beneficial on

all groups except for children and adolescents and low-income groups for whom large or very large beneficial effects are predicted

- 18.189. The Scheme comprises of a variety of terrain, landscapes and route lengths for walkers, cyclists and horse riders which would be well connected to existing routes beyond the site and would provide safer access into the site. This improved provision would support physical activity and social connectivity and in terms of active travel is expected to have a moderate or large beneficial effect on all groups
- 18.190. The operation of the reservoir and the visitor centre would generate employment opportunities whilst the increase in visitors would benefit local businesses and potentially create jobs. This could potentially influence mental and physical health, reduce stress, improve self-confidence, and reduce rates of illness and premature death. Therefore, in respect to access to work and training, moderate beneficial effects for low-income groups are expected and slight beneficial effects for all other groups.
- 18.191. The effect of soil and water pollution on all groups would be neutral or slight adverse during operation of the reservoir.
- 18.192. The effects of noise from operation of the reservoir including operational and visitor traffic on all human health receptors is expected to be slight adverse.

Pipeline - construction

- 18.193. With mitigation, the effect of air pollution from construction dust and construction traffic emissions is predicted to have a slight adverse effect on all human receptor groups.
- 18.194. Construction of the pipeline would entail the temporary loss of open space which could inhibit physical activity and adversely affect wellbeing. With mitigation, this is likely to have a negligible or slight adverse effect on all groups
- 18.195. Construction traffic, temporary road closures and traffic management would have a temporary adverse impact on access to Bedhampton Community Centre, Bidbury Infant and Junior School and Front Lawn Primary Academy. With mitigation the effect on access to healthcare, education and other social infrastructure would be negligible or slight adverse for all groups.
- 18.196. With mitigation, any increase in the risk of injury or death is likely to have a negligible effect on all groups
- 18.197. Construction traffic, temporary road closures and traffic management would have a temporary adverse impact on access to recreation and leisure facilities near the pipeline route. With mitigation, the effect on health for all groups is assessed as negligible.
- 18.198. With mitigation, construction traffic, temporary road closures, temporary footpath closures and traffic management would all have a negligible effect on all groups in terms of active travel.
- 18.199. The influx of construction workers and increased demand for construction plant and materials would potentially generate new employment opportunities which could provide financial security and contribute to self-esteem, particularly for low-income groups. The Scheme has the potential to improve access to skills and training schemes which could bring longer term health benefits. The effect is rated as neutral or slight beneficial.
- 18.200. Construction of the pipeline and any associated soil or water pollution is expected to have a neutral or slight adverse effect on all groups.
- 18.201. With mitigation, slight adverse noise effects on all human health receptor groups are predicted from open trench and/or trenchless construction activities in the daytime or the night-time. With mitigation, road compaction plant in open trench pipeline construction method is likely to have slight vibration effects on all receptor groups



Atkins
The Hub
500 Park Avenue
Aztec West
Bristol
BS32 4RZ