

Havant Thicket Reservoir Project

Environmental Statement Volume 4 - Appendices **Appendix A13 Traffic and Transport** **A13.1 Transport Assessment Report**

PART 2 of 2

Portsmouth Water Ltd.

03/09/20

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2.0 Standalone catering

If a visitor centre was not developed there are two catering options which could be considered as set out below:

2.1 Standalone café

Standalone cafe	
Core component elements	• Cafe and servery, with WIFI, kitchen (dry stores and lockable store) • External covers on seating / terrace space with cover • Toilets (visitors and staff) • Small office (staff) • Potentially incorporate community room/space which could be hired out for community use, functions etc
Pros	Cons
• Success dependent on throughput generated by wider masterplan proposals for the site • Potential to become a destination waterside cafe • Use of space for social functions outside of core operating hours to maximise revenue generation and use of asset • Could act as 'first phase of development'	• Missed opportunity • Likely to need high footfall on year round basis to operate commercially • Catering is a specialist activity and requires dedicated qualified staff which may have high associated costs • Ongoing need for maintenance and reinvestment to refresh the experience (otherwise potential to generate negative feedback)

Generates a commercial rent for Portsmouth Water	- Size / attractiveness will drive increased parking demand - Would add to urbanisation of the site and detract from the rural character.
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Velo Café at The Level, Brighton



New café at Weald and Downland Living Museum and café at Alice Holt

2.2 Seasonal permanent kiosk

Seasonal permanent kiosk (satellite catering offer as second phase if there is demand or could be a core element if the 'low activity' offer is selected).

Core component elements	- Small-scale kiosk - Linked toilets - Potential architectural treatment of the kiosk (see:
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	http://tonyhobba.com/865004006353/) or architectural competition
Pros	Cons
• Low risk intervention • Low capital costs • Low level of rental secured • Catering is essential component element for the development of the wider site (could be second phase) • Straightforward to deliver	• Does not add in a major way to the profile of the site • Still requires a level of services and infrastructure which may be difficult to deliver to more remote part of the site • Security could be a potential issue



Example of low key catering outlets at London Wetland Centre WWT



Seasonal kiosk incorporating toilets – Queen Elizabeth Country Park

3.0 Cluster of craft units

Cluster of craft units	
Core component elements	• Craft units • Toilet facilities
Pros	Cons
• Adds to things going on at the site • Opportunity for local producers / makers / crafts people	• Can be very difficult to manage e.g. rent collection, crafts people being on site when visitors are onsite (e.g. weekends and holiday periods) • Low rent roll and void periods • Will be reliant on significant footfall to attract crafts practitioners, artists and artisans • To create destination will need additional infrastructure e.g. cafe, toilet etc (i.e. very unlikely to create significant footfall in its own right) • Seasonal opening periods • Extra built space would urbanise the site, which is not in keeping with maintaining the rural character • Impact on historic landscape



Ferrers Centre Workshops and Carsington Reservoir

4.0 Bike hire, shop and workshop for repairs

Bike hire, shop and workshop for repairs	
Core component elements	• Front of house retail space • Back of house workshop area • Bike wash • Could be integrated within visitor centre if demand • Option for mobile offer which could be brought to the site to meet demand
Pros	Cons
• Fit with wider site masterplan, which includes cycle paths • Generates 'rental payment' (albeit low level) • Fits with health and wellbeing agenda • Straightforward to deliver • Could involve community group during design phase/operation • Partners have experience in the sector • 5km route around the reservoir, which is ideal for family cycling	• Reliant on high throughput generated from wider proposals (therefore potential later phase of development) • Area not an established cycling destination (Queen Elizabeth Country Park has a good reputation for mountain biking) • Conflict of use between different user groups • Seasonal operation • Low rental level • Ongoing maintenance of cycling routes



Bike hire at Sherwood Pine and bike wash at Glyncorrwg



Bike hire at Alice Holt prior to refurbishment – note use of shipping containers

5.0 Indoor play (standalone)

Indoor play (standalone)	
Core component elements	• Play areas (age defined) • Catering offer and separate party rooms • Reception point and office • Toilets • Stores • Office Potentially integrated within the visitor centre (would reduce capital costs)
Pros	Cons
• Engaging with the family market • Increases appeal of the offer • Creates a balanced product offer • Builds wet weather resilience	• Competes with Havant Leisure Centre and play barn at Staunton Country Park • Staffing requirement • Increased building size which conflicts with maintaining rural character • Difficulty of finding an operator • Potential to increase parking demand • Typically developed in large 'box type' buildings which would impact negatively on the landscape and would be visually intrusive



Bespoke indoor play offer at Pensthorpe Natural Park, building designed by Adam Khan

6.0 Education use

Education offer	
Core component elements	• Area for welcome / briefing and to leave bags in as the outdoor environment will be key part of the education experience • Potentially separate toilets and changing area • Outdoor shelter and separate fenced off area within the wider site which could incorporate a pond dipping area • Non-commercial water based activities (see below) • Could be integrated within ground floor of visitor centre with separate access
Pros	Cons
• Strong fit with ethos of project • Potential to work with HCC and HIWWT to deliver education service (building on existing partnerships) • Could attract forest school offer or nursery use	• Competes with existing market at Staunton and QECP (reinforces need to work in partnership with HCC) • Potential conflict with other users (careful consideration to be given to design/location of any education space)

• Considerable community benefits for Portsmouth Water and opportunity to deliver subjects linked to national curriculum • Opportunity to delivery information on wider issues such as water safety, water resource management	• Outdoor shelter element could be prone to vandalism and this will need to be carefully considered during the design phase
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Itchen Valley Country Park

6.1 Multi-use space

In terms of the multi-use room/space which could accommodate different groups e.g. education, meetings, social uses and community group meetings

Pros	Cons
• Maximises revenue generation (higher revenue / occupancy for a single space) • Lower capital cost to build a flexible space rather than individual dedicated rooms/spaces • Enables local children to use the site in a positive way	• Costs of making the room ready for different uses (setting up / clear down) • Likely to require significant space for storage of equipment and furniture • Can't decorate or theme space in a significant way (needs to remain neutral)

• Enables community groups to get involved at the site	• Potential for conflict of use but avoided by pre-booking
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6.2 Non-commercial water based activities for education and other groups

There may be opportunities for group pre-booked based water activities linked to specific education groups or organisations such as the Scouts, Guides or Sea Cadets. This would be dependent upon securing a third-party operator.

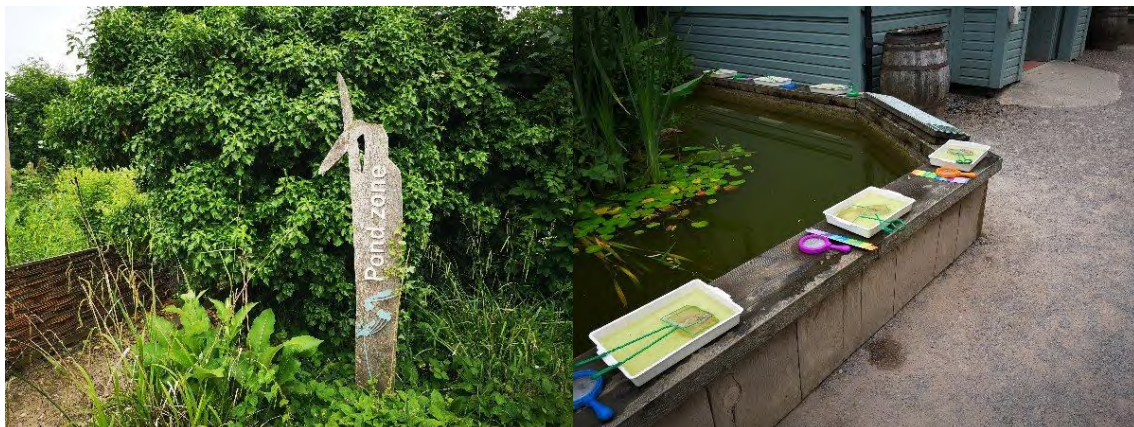
Indicative requirements in terms of facilities are set out under 12.0.

We set out the associated pros and cons below.

Pros	Cons
• Engaging with education and other groups • Limited impact on visitor throughput / car parking requirements • Makes good use of water body without conflict with biodiversity as all activity supervised and low intensity of use	• Schools market is becoming more challenging (lack of funding and health and safety) • School based 'water activity offers' are struggling (financially) and are seeking to diversify their offer (engaging with the public to generate income) • Existing competition – Andrew Simpson Watersports Centre (in Portsmouth) and Calshot Activities Centre • Similar to commercial water based activities there are ongoing risks of accidents generating negative PR for Portsmouth Water

6.3 Pond dipping areas

Pond dipping areas	
Core component elements	The site could accommodate more than one pond dipping area which would reduce the visitor pressure within a single point.
Pros	Cons
• Positive PR opportunities • Enables visitors to engage with nature • Strong fit with site ethos	• H&S concerns linked to water usage • Ongoing maintenance



Pond dipping at Slimbridge



Blashford Lakes and Testwood Lakes

7.0 Play

There are multiple forms of play which could be considered as part of the project and we set out several examples below.

7.1 Adventure play

Adventure play	
Core component elements	• Different play elements, linked to age of visitors (4-8, 8-11 and 12+) • Can be within fenced area
Pros	Cons
• Key to engaging with the family market • Increases appeal of the offer • Increases dwell-time • Opportunity to reuse material from the site (timber)	• Ongoing maintenance and health and safety implications • Risk of some duplication with Staunton CP and other nearby sites • Does not readily address issues around wet-weather resilience



Dinton Pastures Country Park – climbing tree trunks and an interesting play feature at Castell Henllys



Play in the trees at Black Park

7.2 Sand and water play

Sand and water play	
Core component elements	Water and sand play elements for under 12s)
Pros	Cons
- Opportunity to promote safety messages round water - Linked into science / technology (STEM subjects) - Key to engaging with the family market - Increases appeal of the offer - Increases dwell-time - Unique offer compared to play offered at other local sites e.g. Staunton, Stansted and local parks	- Ongoing maintenance (can be issues with maintenance which can be costly and time consuming to resolve) - Capital and ongoing costs can be higher than other forms of play - Costs in terms of running play e.g. electrically powered water pumps - Health and safety implications



Water play at Pensthorpe Natural Park in Norfolk

7.3 Play trail

Play trail (spaced play)	
Core component elements	• Play elements placed along an existing trail for whole family • Opportunity to provide interpretation alongside play
Pros	Cons
• Help to manage visitor flows around the site (i.e. away from sensitive areas) • Encourages ‘family to play and explore together’ • Key to engaging with the family market	• Ongoing maintenance • More difficult to secure compared to other forms of play • More difficult to create dog-free area for children’s play features which has health and hygiene considerations

• Reuse of materials from the site (timber) • Increases appeal of the offer • Increases dwell-time • Encourages children and families to be active. In keeping with health and wellbeing agenda	• Health and safety implication • Ongoing inspections
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Start of the play trail at Bewilder Wood in Norfolk and a play station at Pensthorpe

7.4 Natural play

Natural play	
Core component elements	• Use of wood and other natural materials to create piece of interesting play for under 12s (usually in a dedicated space)

Pros	Cons
• Relatively inexpensive • Easy to replace • Could potentially use felled trees from The Avenue • Key to engaging with the family market • Increases appeal of the offer • Increases dwell-time • In line with health and wellbeing agenda	• Needs regular inspection for Health and safety concerns • A number of recreation site have added natural play so perhaps distinctiveness of play features has been diminished



Natural play at Box Hill, Surrey

7.5 Covered or non-covered play area

Covered play area

Pros	Cons
• Encourages year-round usage (helping to support café in shoulder periods) • Key to engaging with the family market (likely to target younger children) • Increases appeal of the offer • Increases dwell-time	• Capital costs of cover • Ongoing maintenance and cleaning • May compete with urban based play centres • Health and safety inspection requirements • Careful consideration needs to be given to location and design of cover to reduce risk of vandalism / damage



Play undercover at Springfield's Adventure Land

Non-covered play area

Pros	Cons
• Lower capital cost and ongoing support (than covered play) • Can be placed in attractive outdoor setting	• Ongoing health and safety and maintenance • No wet weather resilience (and also lack of shade on hot sunny days) • Decreases appeal of the offer • Decreases dwell-time during periods of inclement weather • More accessible for anti-social behaviour outside opening hours

8.0 Wildlife

An essential part of the wider offer at Havant Thicket Winter Storage Reservoir is linked to creating a wetland area, which will become a haven for wildlife.

Innovative bird hide/bird screen	
Core component elements	Clearly, there are a number of different options open in terms of the design and scale of bird hides and / or screens. There are landmark / destination / interpretation hides with large sealed windows, which are comfortable to make them accessible to all members of the community and not just bird watchers.

	Potential to create larger floor areas which are suitable for education groups and guided groups / non-guided group visits.
Pros	Cons
• Engaging with new audiences (linked to new habitat creation), who have different seasonal visitation patterns to general visitors • Work with third party e.g. Wildlife Trust and community environmental groups to deliver 'wildlife' projects / initiatives and encourage volunteering • Strong links to education and learning opportunities • Provides opportunities for interpretation, highlighting messages from Portsmouth Water, environmental and education groups • Bird hides provide wet weather resilience	• Structures need to make sure they blend into environment • Can be difficult to construct close to wetland areas • Requires ongoing maintenance budget and regular inspection • Careful design considerations e.g. siting to minimise disturbance, need to avoid south facing to ensure good visibility • Security at night. Design to minimise vandalism risk

It is interesting to note that the Leicestershire and Rutland Wildlife Trust have reported:
*"The Rutland Osprey Project has enjoyed its best year yet, with 23 adult ospreys returning to the area and a record eight pairs of breeding birds. Visitor numbers were high – over 26,000 people came to see the ospreys at the Lyndon area of Rutland Water Nature Reserve and many more followed online and watched our webcam."*¹¹

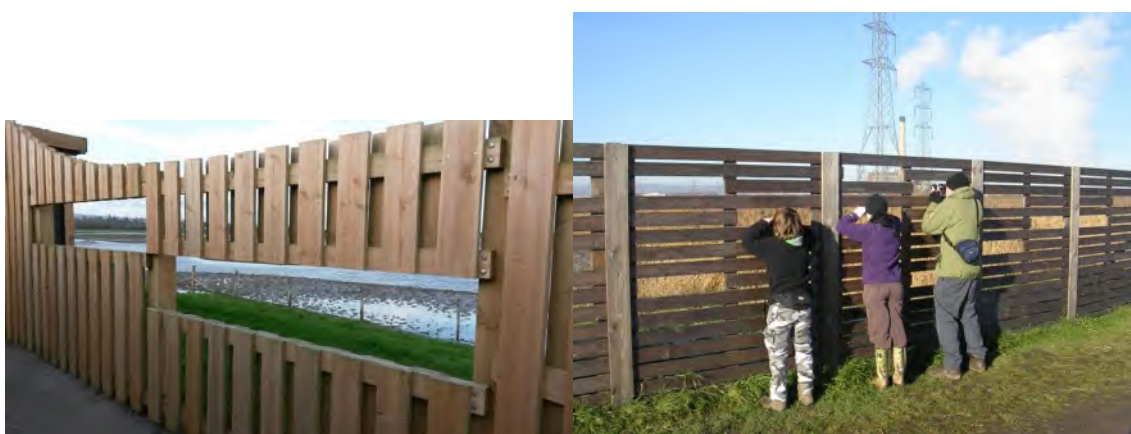
¹¹ <http://www.lrw.org.uk/news-events/news/433-record-breaking-year-rutland-ospreys/>



Large-scale and significant level of investment – Slimbridge



A noticeboard highlighting recent sightings and lowkey bird hide at Paxton Pits Nature Reserve



Bridgewater Stairt and Newport Wetland Centre viewing screens

It is recognised that the site currently faces some challenges in terms of anti-social behaviour and this will need to be considered carefully in the design, development and operational phases of the project. It is interesting to note at the Teifi Marshes nature reserve one of the bird hides was recently burnt down and the Welsh Wildlife Trust are raising funds to replace it and a key component element of the new design is to create a vandal 'proof' hide which is being built by <http://greenfuturebuilding.org.uk/>

9.0 Visitor infrastructure

9.1 External sense of welcome, external interpretation and signage

External sense of welcome, external interpretation and signage	
Core component elements	• Welcoming entry signage • Provision of orientation map within car park, built facilities and main entry points • Route/network of brand trail signage and interpretation • There is need to ensure that signage is in keeping with the rural character and heritage landscape of the site
Pros	Cons
• Comparably low level of capital expenditure • Essential part of the visitor experience • Provision of information helps to manage visitor flows and encourage exploration of the wider site (avoiding any sensitive environments) • Provides opportunity for Portsmouth Water to present messages about their work alongside educational messages • Increases dwelltime	• Not a direct revenue generator • Need to factor in long-term maintenance costs • Need to avoid over-proliferation of external signs and unsightly panels (must be in keeping with rural character of the site)

- Access gate provides a potential opportunity for a landmark feature incorporating art opposite South Downs National Park boundary



A positive sense of welcome at Martin Mere and Slimbridge WWT

9.2 Picnic area and seating

Picnic area and seating	
Core component elements	Picnic and seating is considered as a key element or basic element of a recreation site. Seating along trails is particularly important for older visitors.
Pros	Cons
• Meets a basic visitor need • There is an opportunity make a feature out of the seating itself, for example, incorporating art	• Ongoing maintenance costs • Need to make sure potential littering is managed effectively • Risk of becoming a target for vandalism. Robust design is needed



Seating can become an architectural feature – Hayling Island and Littlehampton



Picnic area at RSPB Middleton Lakes

9.3 Outdoor shelter

Outdoor shelter	
Core component elements	Small-scale outdoor shelter which could take different forms
Pros	Cons
- Provides wet weather cover - Used by rangers as a 'storytelling hut' during holiday periods and for education groups - Could be used by groups visiting e.g. education groups	- Ongoing maintenance - Risk of becoming a target for vandalism. Robust design required - Careful consideration is respect of the location to minimise risk of use for anti-social behaviour and wildlife disturbance (especially at night)



Shelter at Denham Country Park, Buckinghamshire

9.4 Network of trails

Network of trails	
Core component elements	• Network of circular trails linking key elements or nodes within the site boundary (perhaps graded on time taken to complete/accessibility) • Boardwalks potentially could be used to access some of the wetlands (e.g. a pond dipping area) • Design consideration given to surface materials / gradients to ensure access to visitors (people with disabilities through to parents with pushchairs) • The different types of paths/trails can be used to manage access e.g. primary routes with good surfacing and secondary paths in more sensitive areas are narrower, not surfaced e.g. in wetland and

	woodland areas. Main paths kept away from the wetland and other sensitive areas. • Potentially themed trails
Pros	Cons
• Increases accessibility • Used to manage visitor flows • Could provide access to areas which some visitors may not have first-hand experience of e.g. wetlands environment • Opportunity to introduce education/interpretation elements	• Ongoing maintenance costs • Needs to address how to accommodate different users (e.g. pedestrians, cyclists, horse-riders)

It is interesting to note a comment in Forest Enterprise's England Annual Report and Accounts 2016-17 in respect of themed trails: *"visitor numbers have been driven by **strong marketing campaigns around the Gruffalo and Stick Man books, with new activity trails delivering significant uplifts in off-peak visitor numbers.**"* The report continued *"A wide range of marketing activity has helped to promote the trail across digital channels, advertising, PR, marketing partners and on-site promotion. This has reached more than 70 million people and has seen 78,000 people actively engage with us on social media. Since launch the campaign has attracted 1.1 million visitors to the trails and an 18% increase in visits to participating forest centres. More than 102,000 activity packs have been sold on-site, generating more than £0.3 million of revenue for Forest Enterprise England's leisure business."*



Pensthorpe trails have been made interesting and integrate learning – boardwalks providing access to a wetland environment at Arundel

9.5 Accessible island ‘feature’

Accessible island	
Core component elements	Island with trail, view point, picnic area and landmark hide linked to shore
Pros	Cons
- Key part of feedback from younger people during consultation - By providing controlled access to one island may help to reduce desire for visitors to access other islands - Can be created before area is flooded to provide bespoke interesting land form	- Health and safety considerations - Potential impact on wildlife on neighbouring islands (careful design e.g. screening and siting to minimise disturbance to wildlife) - Ongoing maintenance to manage visitor impact

10.0 Events

10.1 Events and activity programmes

Events and activity programmes	
Core component elements	The site could accommodate a range of different events from locally organised wildlife walks through to bush craft activities and large-scale sporting and music events.
Pros	Cons
• Positive PR opportunities • Small-scale events to engage with local community • Visitor centre provides opportunity for pre-booked talks by specialists e.g. wildlife talks (if held in the evening there are operational implications and potential impacts on the bio-diversity e.g. lighting) • Engages with local community	In respect of major events: • Significant congestion on local road network • Car parking on site not able to cope with extra demand at single time • H&S concerns for any water-based events • Security • Competition from HCC at Staunton and Queen Elizabeth Country Parks (both sites are geared up to host large events) • Negative impact on environment and day-to-day operation of 'visitor offer'

There will be a number of opportunities to develop a range of low impact events and activities such as pond dipping, wildlife walks, bushcraft and survival skill courses.



Low key ranger events involving the local community

10.2 Major amphitheatre

Major events amphitheatre / viewpoint	
Core component elements	Introduce dedicated covered events space. This would need to be linked to another intervention and would not operate as a standalone facility/use. • Landscaped amphitheatre or similar space with cover • Staging + lighting (purchased and brought in for specific events) • Power and utilities to distribution point on site

	• Toilets bought in when needed per event
Pros	Cons
• Rental/licence fee secured • Adds to critical mass of facilities and works well alongside visitor centre • Helps to extend offer into the evening period	• Low level of return • Need to bring in stage/lighting and assemble / dismantle for each show • Seasonal usage • Relatively remote therefore need for onsite security during periods of shows • May not be looked upon favourably by local community • Competition with Staunton • Impact on local road network • Onsite car parking • Night time usage has low fit with local community • Night time usage will impact on biodiversity • Security and ongoing maintenance of the cover itself • Careful consideration will need to be given to location otherwise danger of negatively impacting on character of the landscape



Amphitheatre at CONKERS – used during the day and evening periods

10.3 Minor amphitheatre

Minor events amphitheatre	
Core component elements	Low key intervention overlooking the reservoir, near Leigh Park. The amphitheatre would be created as part of the land forming exercise (with no hard landscaping or cover). Multiple low impact uses/user groups: • Schools and other groups • As a viewpoint • For picnics
Pros	Cons
• Low environmental impact • Straightforward to deliver • Difficult to vandalise	• Very limited income generation potential • Seasonal usage • Ongoing maintenance

11.0 Adventure type of activities

11.1 Aerial experience

Aerial experience (pole or tree based)	
Core component elements	Likely to be fenced off / secure area of land and include a number of component elements: • Paypoint/kiosk • High and low rope offer • Climbing wall • Zip wire • Power descender • Fenced area
Pros	Cons
• Adds to profile of the site as an 'activity destination' (differentiating itself from Staunton) • Potentially attracts third party operator • Secures rent roll • Broadens appeal	• Level of investment required • Successful examples generally located on sites with existing throughput (therefore may be a secondary phase of development if taken forward) • Conflicts with mitigation and compensation requirements for remaining woodland around the site



Vertigo Adventures at Stanborough Park, managed by our sister company Planning Solutions Limited

11.2 BMXing area and/or jumps area

BMXing area and/or jumps area	
Core component elements	• Specific jumps / track area • At Moors Valley we understand that local teenagers were involved in the design process
Pros	Cons
• Involves local community (teenagers) in the project. Engendering pride and commitment to the project from a group which can be difficult to engage with • Can be used for competition level events	• Ongoing management • Health and safety • Risk of creating a 'no-go' zone for general visitors • Conflicts with biodiversity objectives • Potentially competes with Queen Elizabeth Country Park



Biking area at Rushcliffe Country Park



Biking area at Trysil, a ski resort in Norway seeking to extend their offer outside of the ski season

12.0 Commercial water-based activities

12.1 Beach

Beach	
Core component elements	• Creating a beach area with sand • Lifeguard posts • Buoy-line to control movements • Rescue boat Would need supporting infrastructure of café/visitor centre, including toilets and changing rooms.
Pros	Cons
• Broadens market appeal and helps to create destination	• Significant health and safety liability • Ongoing costs in terms of lifeguarding and operating costs e.g. keeping sand clean • Local beaches on Hayling Island and further afield at West Wittering and Southsea • Potential impact on water/island habitats (people swimming out to islands) • Likely to encourage out of hours use (increasing risk of injury) and swimming in other areas of the reservoir (mixed message)

	• May prove difficult to access water during periods of water drawdown and may render beach area unattractive • Did not have widespread support during previous consultation. Public felt that adequate facilities were available locally so not required. There were also significant health and safety concerns.
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Beach at Cotswold Country Park and Beach (inland beach no local competition)

12.2 Solar boat

Solar boat	
Core component elements	• Solar boat • Pontoon to access boat with charging point • Secure yard for storage when not in use • Slipway (likely to be a requirement of Portsmouth Water to access the reservoir for inspection)
Pros	Cons

• Safe and controlled access to water body • Accessible experience for people with disabilities • Solar / electric boat no potential to pollute the water itself • Direct income generation	• Health and safety considerations • Chichester Harbour also offers a similar experience • May prove difficult to operate if water levels recede (also applies to other water based uses)



Solar boat operated by the Broads Authority - photo kindly provided by the Broads Authority www.broads-authority.gov.uk

12.3 Inflatable floating play

Inflatable floating play	
Core component elements	• Wibit or waterplay elements • Rescue boat • Payment point with office (could be low key e.g. converted shipping container)

	• Toilets / changing area • Wetsuits/buoyancy aids • Lifeguards • Access point to the water • Slipway • Secure compound
Pros	Cons
• Helps to raise profile of site • Significant revenue generator • Creating a 'destination' • Relatively easy to install and deliver as start-up operation	• Seasonal use (and requires cleaning, annual set up and takedown along with storage) • Destination usage (i.e. attract significant throughput of users) • Health and safety / first aid (including access for ambulances) • Relies on specialist operator to invest in and set up the offer • Potentially excludes members of the local community (high tariff) • Concerns about anti-social uses as could encourage out of hours usage as remains inflated for the season • Established competition (Chichester) • Could be a leisure 'fad'



Floating play and lifeguard at Cotswold Country Park and Beach operated by our sister company Planning Solutions Limited

12.4 Stand-up paddleboards /canoes

Stand-up paddleboards, canoes etc	
Core component elements	Managed by a separate operator, who would hire out stand-up paddleboards and canoes to members of the public. • Equipment • Rescue boat • Payment point with office (could be low key e.g. converted shipping container) • Toilets / changing area • Lifeguards • Access point to the water • Secure storage required • Slipway • Secure compound

Pros	Cons
• Attractive low impact use • Appeals to broad range of potential users	• Seasonal use • Health and safety • Relies on specialist operator to invest in and set up the offer • Encourage out of hours usage • Cost may exclude some members of the local community • More difficult to stop local community bringing in their own craft to the site • Potential conflict with biodiversity objectives. Would require careful zoning and management



Hollingworth Lake Activity Centre, Rochdale (linked to the wider country park)



Canoes in use

12.5 Floating lido

Floating lido	
Core component elements	• Floating lido • Café • Reception area • Staff area • Storage/plant room • Toilets and changing area • Lifeguards For example please see: https://www.archdaily.com/11216/copenhagen-harbour-bath-plot
Pros	Cons
• Potentially a significant revenue generator (via third partner) • Positive PR for Portsmouth Water • Step-change for Havant	• Transform the offer (attracting significant number of visitors) • Large installation may compromise environmentally sensitive areas • Health and safety

	• Relies on specialist operator to invest in and set up the offer • Consideration given to water pollution and water quality of the reservoir • Significant capital investment required • Competition from nearby beaches, Havant and Waterloo Leisure Centres
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12.6 Dive centre

Dive centre	
Core component elements	This could take two different forms. Either (1) as a commercial 'dive centre' operation or (2) as a club membership structure. • Office / meeting / briefing / training spaces • Changing facilities • Secure storage compound and workshop area • Slipway to access water • Potential need for own parking adjacent to the building/water • Specialist equipment e.g. air recharging facility • Potential to create interesting 'sunken' features / staging posts for divers prior to filling of the reservoir • Boat

	• Pontoon
Pros	Cons
• Low key irregular use with minimal impact on other users • Potential demand at a regional level	• May exclude other uses from the water in a defined area • No real link to the community • Providing facility for such a niche user group may cause some disharmony among some locals / visitors • Local competition e.g. http://www.andarklake.co.uk/ near Southampton. But diving depth at Andark Lake is limited. Closest diving centre with a depth greater than 5m is located approximately 3 hours away • Invasive species on diving equipment used elsewhere could impact on biodiversity • Access to water during periods of draw down could be difficult • Health and safety issues • Feeling of urbanisation of the site with separate standalone building alongside visitor centre

13.0 Other

13.1 Onsite transport

Onsite transport	
Core component elements	Could take a number of different forms: • Land train type of operation • Miniature railway • Secure storage yard and office space • Own network of roadway / track
Pros	Cons
• High capital cost • Adds a memorable element to the experience • Helps visitors to explore the wider site • Adds to the appeal of the offer • Could be managed by 'community' or small volunteer group e.g. similar to offer at Stansted House	• Revenue implications e.g. staffing and maintenance • Potential conflict of use if not set up on separate trail/track • Possible negative environmental impact • Tranquillity and rural feeling of wider site will be impacted on



Train at Lakeside Country Park, photo kindly supplied by Portsmouth Water

13.2 Dog agility area

Dog agility area	
Core component elements	• Dog agility elements • Potentially with a fenced or controlled area
Pros	Cons
• Makes the site appealing to dog owners • Helps to control movement of dogs	• Depending on attractiveness site could become 'overwhelmed' with dog walkers and this would impact on the visitor experience and habitats • Ongoing maintenance / operating costs associated with day-to-day management • Competition at Queen Elizabeth Country Park

	• Woodland needed for biodiversity mitigation/compensation. Lack of space for other leisure uses • Potential impact on biodiversity
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New dog agility area at Queen Elizabeth Country Park, photo kindly provided by Hampshire County Council

13.3 Viewing tower

Viewing tower	
Core component elements	• Accessible viewing tower with different levels • Interpretation panels • Potentially integrate within / adjacent to the visitor centre
Pros	Cons

• Offers attractive views over water and wider parkland / forest • Provides elevated views and provides a different perspective to the reservoir • Adds positively to the visitor experience • Potential to create a 'wow' factor	• Limited revenue generation opportunity • Need to secure outside of operating hours • Health and safety considerations • Ongoing maintenance
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Viewing tower at CONKERS and view from observatory at Slimbridge

13.4 Seasonal mobile catering vehicle

Seasonal moveable catering offer	
Core component elements	• Small-scale moveable seasonal food offer (e.g. ice-cream van, coffee etc). Similar to offer at West Walk

Pros	Cons
• Low risk intervention • Low capital costs • Rental secured • Straightforward to deliver	• Does not add in a major way to the profile of the site • Still requires a level of services and infrastructure which may be difficult to deliver to more remote part of the site such as power and water



Examples of low-key catering outlets at Dinton Pastures Country Park and Langley Park

13.5 Cluster of seasonal yurts

Cluster of seasonal yurts	
Core component elements	• Secure area to introduce yurts • Requires supporting facilities (shower + toilet block)

Pros	Cons
• Provides a unique accommodation offer and encourages overnight stays • Potential to be marketed and let by a third-party agency such as Canopy and Stars • Overnight stays help to generate additional income compared to day visitors • Straightforward to deliver • Adds to tourism profile of area	• Difficult to secure area within the site to leave yurts unoccupied (may be issues of vandalism) • Not an established destination for overnight stays • Seasonal nature of business • May not meet local need and might generate some resistance • Lack of available space onsite • Night time use (e.g. lighting) conflicts with biodiversity objectives especially in relation to bats • Staffing/supervision • Maintenance



Interior of a yurt with a wood burning stove

13.6 Hostel type of accommodation linked to watersports uses

Hostel type of accommodation	
Core component elements	More likely to be a secondary / long-term phase of development: • Accommodation spaces able to accommodate different group sizes (some rooms ensuite) • Toilets / washing facilities • Kitchen preparation area (for use by guests) • Briefing space/recreation room (with wood burning stove) • WI-FI • Small office space • Storage area
Pros	Cons
• Overnight stays generate greater income than day visitors • Adds to accommodation base in Havant Borough	• Site is not an established destination • More appealing areas locally • Difficult to introduce built structure into countryside site which is undeveloped (in planning and aesthetic terms) • Urbanisation of the site as requires additional building with own car parking • Lack of available space on site

- Night time use and lighting conflicts with biodiversity objectives, especially in relation to bats.



Southease YHA

Appendix 4: Scoring matrix (with standard weighting at + or - 1)

Options	Learning	Environment		Health and safety	Market appeal				Contributing to policy	Financial considerations		Deliverability			Total score
	Opportunity to deliver education experiences	Potential impact on bio-diversity*	Maintains rural character	Health and safety implications related to intervention*	Potential to attract existing users	Potential to attract additional local community and immediate population (up to 30 minutes drivetime)	Potential to attract people living outside 30 minute catchment*	Potential to engage with tourism market place*	To what degree will the intervention contribute to policy outcomes	Indicative capital cost*	Potential need for revenue support	Ease of deliverability	Level of risk*	Potential partner interest	
Weighting index (multiplier)	1.0	-1.0	1.0	-1.0	1.0	1.0	-1.0	-1.0	1.0	-1.0	1.0	1.0	-1.0	1.0	
Option 1: Minimum level of intervention	4.0	4.0	7.5	4.0	8.0	6.0	3.0	3.0	3.0	2.0	2.0	7.0	3.0	1.0	19.5
Option 2: Medium level of intervention – visitor centre	7.0	6.0	5.0	5.0	8.0	8.0	6.0	6.0	7.0	6.0	5.0	5.0	5.0	8.0	19.0
Option 3: High level intervention – visitor centre and associated water based uses	7.0	7.5	3.0	7.5	7.5	9.0	8.0	8.0	8.0	8.0	6.0	4.0	7.0	5.0	3.5

* Negative index shows that lower score is preferable outcome in this category

Appendix 5: Approaches to data collection (Draft)

There is already informal recreation use at the site (walking, dog walking, cycling and jogging).

The overall site (including the Forestry Commission's and HCC's land) does not have a secure boundary. There are multiple points whereby people access the site. The site is also served by a small Forestry Commission car park on the B2149 located to the west of Rowlands Castle.

In future it would be desirable to capture onsite research data to help calculate the latest baseline visitor numbers and forecast future visitor numbers. Potential approaches to capturing data are set out below with their associated 'pros' and cons.

Face-to-face survey/counting

Description	Surveys using questionnaires are a popular method of trying to estimate and total visitor numbers. They are useful for providing a range of information about a site, its users, types of activity and associated motivations of visitors. The face-to-face interview is a labour intensive method but can be useful as a complementary approach, to consult with a sample of visitors to query their profile, characteristics and activities. It can also be used to understand visitor flows and preferences seeking information on routes and visit behaviours, both past and intended. The positioning and timing of the data collection requires a sampling strategy, particularly where there are multiple entry points. Interviews will need to take place throughout the day, on both weekdays and weekends.
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	Seasonality should also be considered where possible.
Pros	Cons
• Accurate, flexible and mobile • Can include descriptive data (e.g. visitor characteristics, behavior, intentions and motivations) • Data can be collected on weather conditions along with any other factors that might have an influence on the results • Is a preferred method for calibrating other counts • No infrastructure requirements	• Costly in staff time in terms of set up, resourcing and analysing data, (although potentially could work with students from South Downs College) • Staff safety is also a consideration • Normally produces a small sample size • Often used in unsystematic and opportunistic ways • Subjective unless highly structured • Site crowding can bias the sample as on busy days a smaller proportion of the visitors are sampled, however this can be corrected by weighting the sample • No information provided on non-site users • Less feasible away from permanent sites or key access points and routes • Potential multiple counting as people pass more than one survey point (which would require extensive supporting face to face surveys rather than counting) • At peak times can be difficult to accurately record count while engaged in face to face surveys

Vehicle counters at the Forestry Commission car park

There are several approaches to counting vehicles at the Forestry Commission's car.

Pneumatic Road Tube Counting

Description	Pneumatic Road Tube Counting - an older style of vehicle counter - one or more rubber hoses are stretched across the road and connected to a data logger. The data logger can establish vehicle direction by recording which tube is crossed first.
Pros	Cons
- Reportedly very accurate on number counts although less so on speed indicators and type of vehicle (however some errors cancel each other out - see https://trid.trb.org/view/1257430) - Relatively low cost and non-invasive - Can assess vehicle classification and direction of travel - Temporary or permanent solutions available - Can be battery powered	- Counts need to be physically downloaded - Does not estimate average numbers in cars - Two vehicles close together can be confused as an articulated vehicle - Equipment can fail or get vandalised

Inductive loop

Description	A square of wire embedded into or under the road. A device at the roadside records the signals generated.
Pros	Cons
Can assess vehicle classification and direction of travel to identify trends in visitors	Does not estimate average numbers in cars

• Temporary or permanent solutions available • Can be solar powered and 3G	• Two vehicles close together can be confused as an articulated vehicle • Equipment can fail
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Example: <https://metrocount.com/products/mc5805-inductive-loops-counter/>

Magnetic sensor

Description	Detects vehicles by measuring the change in the magnetic field as the vehicles pass over the detector. The sensor is either buried in the road, or enclosed in a box by the side of the road.
Pros	Cons
• Can be self-contained with no wires or tubes, installed above or below ground • Maximum range: 8m (26ft.) • Ideal for rural, rugged and remote roads • Permanent or portable • Very small and easy to hide — reduces vandalism risk • Long battery life/solar powered • Large storage capacity (millions of counts) • Low operating costs • Used in many national parks. Low cost.	• Does not estimate average numbers in cars • Equipment can fail • If vehicles are following each other very closely, the magnetic detector may have difficulty discriminating between them • Most require manual data download

Examples: <https://www.trafx.net/products.htm> - can be put into pedestrian or bike mode.
https://www.trafx.net/case_studies.htm
<http://www.chambers-electronics.com/automag-car-counter.html>

Passive infrared and active infrared

Description	Passive infrared devices sense temperature changes and are more commonly known as motion detectors. Active infrared devices are used as a beam technology that provides an invisible line that counts when it is broken.
Pros	Cons
• Passive is more precise than active infrared • Small size • High sensitivity • Automatic adaptation to the room temperature	• Most require power/internet infrastructure • Equipment can fail • Variable detection range depending on an object's infra-red characteristics relative to the background • Sudden lighting changes may trigger false counts • Lenses may be obscured or soiled • Requires careful placement to minimise environmental variations

Other options:

Doppler and Radar Microwave Sensors

A continuous signal of low-energy microwave radiation or radar is transmitted at a target area. The detector registers a change in the frequency of waves which allows the device to detect moving vehicles.

Radar is capable of detecting distant objects and determining their position and speed of movement. With vehicle detection, a device directs high frequency radio waves at the roadway to determine the time delay of the return signal, thereby calculating the distance to the detected vehicle.

Ultrasonic

A vehicle moving into or through the detection area reflects a high frequency signal back to the detector. The presence of standing vehicles can be detected and continuously monitored, unlike with passive infra-red or radar sensors, which require movement.

People counters

Description	Suited to sites with many visitors and where the majority of visitors use paths where counters can be placed. Generally the same type of technology is used as for vehicle counting, including infra-red and radio beam systems.
Pros	Cons
- Counters can be used that can distinguish between walkers, cyclists and horse riders - Some people counters can identify and track groups of people to understand movement habits. - Some systems offer high levels of accuracy - Most offer remote management and reporting - Generally small and light - Can be inexpensive - Sensitivity and interval can be adjusted to exclude some false counts - Can obtain time and date information - Low power consumption	- Rough estimates of visitor numbers are needed to be able to validate the measurements - Technical failure due to weather or damage can occur - Can count wild animals as well as people - Wet jackets can mask a visitor's infra-red signature - May undercount groups if distance between sensor and groups are large - May require power/internet - Price ranges hugely

Example: <https://www.eco-compteur.com/en/products/multi-range/multi-nature> - combines a variety of different technologies. Price ranges from £2,000-£4,000 per unit plus around £300 per year maintenance costs.

<https://www.eco-compteur.com/blog/2017/07/20/new-mobile-multi-count-pedestrians-cyclists/>

Pressure sensors - similar to vehicle tube sensors

Description	Pads or slabs fitted under gates or on stiles
Pros	Cons
• Small size and weight • Inexpensive • Accurate if used appropriately • Not sensitive to temperature • Long range across wider tracks • Sensitivity, interval and placement can be adjusted to exclude some false counts • Can be used to obtain time and date information	• Need careful alignment of transmitter and receiver (or reflector if not a through-beam system) • Alignment is highly sensitive to disturbance • Can be hard to conceal making them susceptible to vandalism • Lenses/reflectors may be obscured or soiled • Wildlife may trigger counts • Results vary depending on gradient of travel

Example: <http://www.linetop.co.uk/sensors.htm>

Video counting

Video traffic counting typically takes place continuously, year-round, giving precise figures.

Description	Video counting can now offer similar accuracy to that of people watching a video. It is cost-effective for monitoring hi-volume traffic area as only one camera is needed for several lanes or exits at a junction. Counts are uploaded in real-time via the internet, so can be viewed live (down to 15 minute intervals for example) and historic counts from their web browsers.
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	Counts are easily verified simply by watching the video and checking the automated counts. Video traffic counting typically takes place continuously, year round, giving precise figures.
Pros	Cons
• Can allow visual interpretation of visitor characteristics • Highly accurate in multiple directions - 98% • Enables different types of visitors to be identified e.g. joggers, dog walkers, cyclists etc • Continuous measurement over time and can provide values per time interval • Variable settings to optimise the count accuracy • An embedded video server lets you view live video footage and verify the counts via the internet at any time of the day or night • Motion-triggered recording or time-lapse video with adjustable recording intervals allow for longer observation periods without tape change	• Difficult to estimate average numbers in cars • If manually checking - staff time is needed to interpret films • Less accurate if large proportion of visitors arrive on foot • Requires power/internet infrastructure • Equipment is costly to use and maintain and is vulnerable to damage • Difficult to distinguish passenger numbers when using vehicle counts • Power requirements mean it is not a long-term option at unattended sites • Can raise ethical privacy issues • Possible security / vandalism at site

Example: <http://videoturnstile.com/people-counting-outdoors.html>

Summary commentary

Research has shown that a variety of techniques are often needed to build a detailed picture of the baseline visitor numbers. We believe that it would be beneficial to carry out a module of research among current users (including users of the Forestry Commission's car park). This would help to, for example:

- Identify a more reliable baseline of existing users
- Examine usage pattern
- Identify future intentions e.g. likelihood of people visiting Leigh Park Gardens extending their visit to incorporate the new visitor offer at HTWSR.

However, the site does present a number of challenges – there are multiple points of formal and informal entry and these can't all be covered. During the summer of 2018, Portsmouth Water carried out a module of visitor research at the site and difficulties were encountered with duplication of recorded visitors and limited face to face engagement alongside counting process. Calculating visitor numbers can be problematic - it is interesting to note the experience of the National Portrait Gallery which reported issues with the equipment used to count visitors to the museum. We understand that the system uses infra-red and optical sensors to count visitors through the museum's entrance.¹²

We would recommend that a multi-channel approach is adopted:

- At formal entry points (e.g. route leading from FC carpark, Staunton Way leading to HTWSR site, path opposite Shell Garage and Warren Park entry point) introduce people counters, which record the number of people entering the site and times of use. This will build up quantitative data. However, this does have its limitations and we believe it would be beneficial to periodically use field researchers to identify qualitative characteristics e.g. motivations of current and future usage, repeat visits/frequency of visits, future intentions etc. This field research should cover Summer and Winter weekends and weekdays on multiple occasions (at least four completed days for each category).
- Forestry Commission's car park – introduce a vehicle counter. The FC is likely to have a preferred system and supplier and it would be prudent to use the same approach. A key consideration is that vehicle counters do not count/estimate the number of people in each vehicle. Therefore, it would be beneficial to count the number of people per car over a specific period of time on multiple dates to work out the average number of people per car.

It is recognised that this approach does not cover all bases but given the informal access points it will help to build the baseline of evidence.

¹² <https://www.forestresearch.gov.uk/research/estimating-visitor-and-visit-numbers-to-woodlands/>

Appendix B. Scoping information

Technical Note

Project:	Havant Thicket Reservoir Project (HTRP)		
Subject:	Transport Assessment TN02: Trip Generation		
Author:			
Date:	20/04/2020	Project No.:	5169117
Distribution:	Tom Fisher	Representing:	Hampshire County Council

Document history

Revision	Purpose description	Origin-ated	Checked	Reviewed	Author-ised	Date
Rev 1.0	Draft for Comment	LV	CW	SL/AH	WI	20/04/2020

Client signoff

Client	Portsmouth Water
Project	Havant Thicket Reservoir Project (HTRP)
Project No.	5169117
Client signature / date	

Introduction

Background and Purpose

This technical note provides an update to the estimated trip generation of the proposed Havant Thicket reservoir and the ancillary Visitor Centre. The detail contained within this note follows the scoping note submitted to the local highway authority (LHA) at Hampshire County Council (HCC) in February 2020, to initiate discussions for a Transport Assessment (TA) to support the planning application. The previously submitted scoping note included an early estimate of trip generation based on a number of assumptions, due to the unique non-standard development being proposed.

The purpose of this note is to provide an update to the operational trip generation forecasts, following receipt of additional data from a comparable visitor attraction in Hampshire, namely the Queen Elizabeth Country Park (QECP), and should be read in conjunction with the spreadsheet provided within **Appendix A**.

It is considered that the information provided by QECP provides a more robust evidence base to determine how the trip generation at the Havant reservoir may change across the year, and this note presents the updated analysis and presents the intended trip generation to be used within the TA.

Data Sources and parameters

The trip generation forecasts have been derived using a first principles approach, utilising the following key data sources and assumptions:

- Visitor Number and Recreational Amenity Facilities Review, by Planning Solutions Consulting Limited (PSL) ¹ – The annual visitor numbers expected to be generated at the site is presented within the Havant Thicket Winter Storage Reservoir: Visitor number and recreational amenity facilities review, which is broadly based on:
 - Local population and demographics analysis;
 - Existing user surveys (of Havant Thicket); and
 - Penetration rates based on other comparable visitor attractions².
- The Visitor Number and Recreational Amenity Facilities Review has also been used to derive the visitor number to vehicle ratio, with references to vehicle mode share assumptions for each visitor user type, and overarching vehicle occupancy.
- Hampshire County Council Automatic Number Plate Recognition Data (ANPR) – ANPR data has been provided for the nearby Queen Elizabeth Country Park which has been used to determine:
 - Annual profile of visitors month on month;
 - The split of weekday and weekend visitors within a given month; and
 - The average daily arrival profile for winter and summer periods.
- Hampshire County Council ticketing information – Ticketing information at the Queen Elizabeth Country Park has been used to inform assumptions on the departure profile of visitors in winter and summer periods.

The process within which these trip generation parameters have been applied are set out within the remainder of this technical note.

¹ Planning Solutions Consulting Limited (PSL) on behalf of Portsmouth Water: *Havant Thicket Winter Storage Reservoir: Visitor number and recreational amenity facilities review* (July 2019).

² Representing the proportion of the population within each category who would be expected to visit over a 12-month period.

Trip Generation Calculations

Annual Visitor Numbers

The number of annual visitors expected to be generated at the site is presented in the PSL report, and is based on a comprehensive review of comparable visitor attractions across the UK. The analysis estimates the potential penetration rate that the reservoir may have on the local / regional population³.

The estimated number of visitors from each market catchment, and the calculated annual total visitor number of 317,598 can be seen in **Table -1**⁴.

Table -1 – Summary of Annual Visitors

Market	Size	Penetration	Level of repeat visits (Per Year)	Visitors
Up to 15 mins ⁵	248,580	12%	5	149,148
16 to 30 mins	449,329	5%	3	67,399
31 to 60 mins	1,045,720	3%	1.25	39,215
61 to 90	2,502,115	1%	1	12,511
Dual use visitors from Leigh Park Gardens (Staunton)	180,000	7.5%	1	13,500
Tourists and others				
Tourists (excl SFR ⁶)	227,000	1.25%	1	2,838
SFR	129,000	8%	1	9,675
Day visits	2,218,000	0.3%	1	5,545
Passing visitors	23,780,480	0.05%	1	14,268
Education				2,500
Events				1000
Estimated total				317,598

The total annual visitor number of **317,598** has been taken forward as the basis for estimating the number of vehicular trip generation at the reservoir.

Annual Profile of Visitors

Automatic Number Plate Recognition (ANPR) Data from the car park at QECP has been provided by HCC for 10 months of the financial year 2019/20 (April 2019 – January 2020). In the absence of data being available for months of January to March, it has been assumed that in terms of the proportion of annual visitor numbers, the months of January and February would be broadly consistent with December, whilst March would be broadly consistent with April.

The monthly distribution of visitors observed at QECP is presented in **Figure 1**, and is available within the 'Monthly Profile' page of Appendix A.

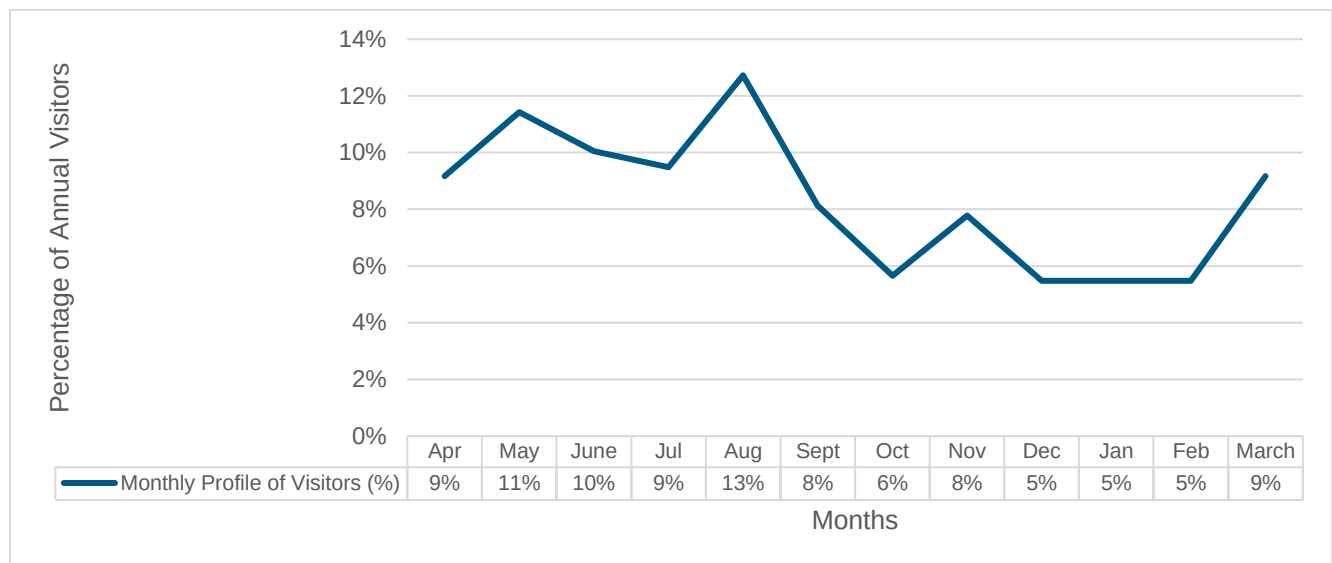
³ Derived by CACI using Office for National Statistics data, undertaken by CACI.

⁴ As presented in Table 1 of the Initial Scoping Note.

⁵ Drivetime catchment based on normal driving speeds derived by CACI using Geometric Buffering method.

⁶ Staying with friends or relatives.

Figure-1 – Annual Monthly Distribution of Visitors at QECP from ANPR Data.



As shown in **Figure 1**, during the peak month of August 13% of the annual visitors visit the site, with monthly visitor totals dropping to approximately 5% during the mid-winter months. The monthly profile presented in **Figure 1** has been applied to the annual total of visitors (317,598) forecast for the visitor centre. This provides the monthly visitor totals in **Table -2**.

Table -2 – Summary of Annual Visitors

Month	Monthly visitors
Apr	29103
May	36300
June	31901
Jul	30117
Aug	40413
Sept	25813
Oct	17970
Nov	24690
Dec	17396
Jan	17396
Feb	17396
March	29103
Total	317,598

Weekday and Weekend split

The split of visitors who would visit the facility on a weekday, or a weekend has been determined using the average split per month captured by the HCC QECP data, for 'winter' and 'summer' months. The number of 'weekend' days and 'weekday' days has been assumed based on the typical number of days within a calendar month.

A summary of the weekday and weekend split, in the winter and summer months, is presented in **Table -3**.

Table -3 – Weekend and Weekday Proportional Splits, Summer and Winter

Scenario		Proportion
June-Sept	Weekday (Mon – Fri inclusive)	44%
	Weekend (Sat & Sun)	56%
Oct-May	Weekday (Mon – Fri inclusive)	46%
	Weekend (Sat & Sun)	54%

As shown in Table 3, it is expected that during the summer months 44% of the total weekly visitors will arrive on a weekday and 56% during a weekend. During the winter months, the weekend becomes marginally less dominant with 54% of visitors arriving.

The proportional split of weekday vs weekend visitors for each month, in **Table -3**, has been applied to the total monthly visitors expected at Havant Thicket Reservoir, presented in **Table -2**. The number of weekdays and number of weekend days per month has then been applied to establish the average number of visitors per typical weekday and typical weekend day, for each month.

The subsequent number of visitors on a typical weekday and weekend for each month can be seen in **Table -4**.

Table -4– Number of Daily Visitors on a Weekday and Weekend for Each Month

Month	Average Weekday Daily Visitors	Average Weekend Daily Visitors
Apr	607	1968
May	757	2182
June	675	1969
Jul	609	1859
Aug	817	2494
Sept	546	1593
Oct	375	1080
Nov	540	1484
Dec	347	1177
Jan	347	1177
Feb	399	1177
March	607	1750

Monthly Visitor to Vehicle Numbers

The visitor numbers have been translated to a daily vehicle number using a visitor to vehicle ratio of 1 vehicle for every 3.45 visitors. This is based on the assumed split of visitors expected to make up the annual visitor total derived from the 2019 Portsmouth Water total⁷. This briefly assumes that:

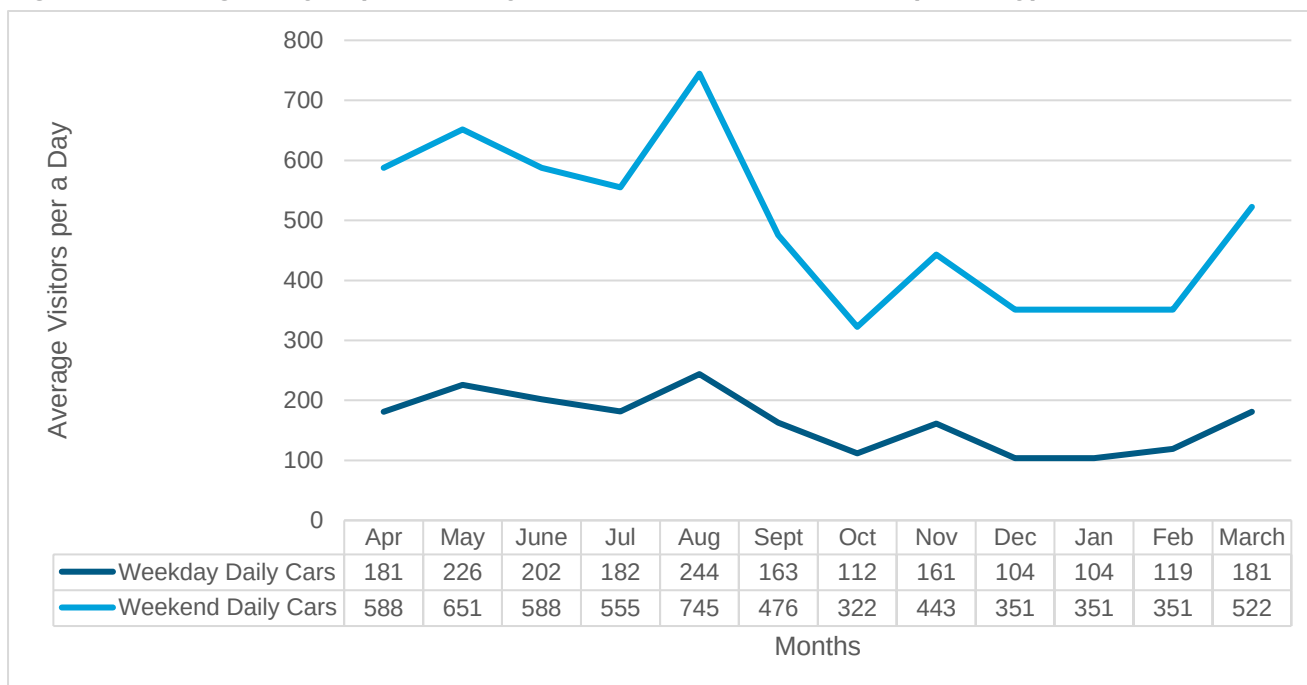
- 70% of visitors within the 15 min drivetime catchment will drive⁸;
- 20% of dual visitors (with Leigh Valley park) will drive;
- 75% of visitors staying with friends will drive;
- 100% of all other visitors will drive; and

⁷ Planning Solutions Consulting Limited (PSL) on behalf of Portsmouth Water: *Havant Thicket Winter Storage Reservoir: Visitor number and recreational amenity facilities review* (July 2019).

⁸ Based on a comparison against other country parks as presented within the PSL report.

- Vehicle occupancy rate of 2.2 for all visitors except for passing traffic, which assumes an occupancy of 1.2. It is pertinent to note that the vehicle occupancy rates are considered conservative, with some country parks capturing vehicle occupancy rates of 2.9, it is therefore considered that the vehicle number estimates are robust. The subsequent number of daily vehicular trips (one-way) to the site during a weekday and weekend for each month can be seen in **Figure-2**.

Figure-2 – Average Daily Trips, Weekday and Weekend for Each Month (One-way)



Profile of Arrivals and Departures

The ANPR car park data at QECP details the profile of arrivals during the winter and summer months. In the absence of recorded departures at QECP car park, reference has been made to the ticketing information from the QECP car park to establish a departure profile. The proportion of each ticket type has been applied to each of the hours across the day, with a summary being provided in

Table -5 for the summer and winter months.

Table -5 – Seasonal Ticketing Data

Season	1 hour	2 hours	4 hours	All day Tickets
Summer	21%	31%	36%	12%
Winter	21%	34%	31%	14%

To determine the trip generation profile for each month, the arrival / departure profile for summer and winter months has been applied to the number of average daily trips estimated within the 'daily trips' page of Appendix A.

Average Trip Generation

The average two-way summer and winter month trips are presented in **Table -6** and **Table -7** for a weekday and weekend respectively.

Table -6 – Average Weekday Trips (two-way)

Weekday (Two-way trips)		
Scenario	Average Winter Month	Average Summer Month
Weekday AM Network Peak (08:00-09:00)	5	6
Weekday PM Network Peak (17:00-18:00)	14	25

Table -7 – Average Weekend Trips (two-way)

Weekend (Two-way) trips		
Scenario	Average Winter Month	Average Summer Month
Weekend Development Peak (12:00-13:00)	124	161

Assessment Scenarios

To present a reasonable assessment of the potential impact of the reservoir on the local highway network, it is proposed to assess the typical weekday peaks and a weekend development peak for the average summer month. This provides a balance between assessing when the network is expected to be at its busiest, and when the trip generation of the reservoir itself is expected to be at its busiest.

Table -8 – Assessment Scenarios

Scenario	Arrival	Departure	Two-Way
Weekend Development Peak (12:00-13:00)	92	69	161
Weekday Network AM Peak (08:00-09:00)	5	1	6
Weekday Network PM Peak (17:00-18:00)	12	13	25

Next Steps

This Technical Note is intended to set out a comprehensive summary for the methodology used to determine the trip generation for a non-standard development using a first principles approach. Proposed assessment scenarios have been put forward, and the views of the Local Highway Authority are sought to establish an acceptable assessment methodology.

Appendices

DRAFT

Technical Note

Project:	Havant Thicket Reservoir Project (HTRP)		
Subject:	Transport Assessment TN03: Trip Distribution		
Author:			
Date:	29/05/2020	Project No.:	5169117
Distribution:	Tom Fisher	Representing:	Hampshire County Council

Document history

Revision	Purpose description	Origin-ated	Checked	Reviewed	Author-ised	Date
Rev 1.0	Draft for Comment	LV	CW	SL	SL	29/05/2020
Rev 2.2	Update due to refinement of access strategy	LV	CW	SL	SL	23/06/2020

Client signoff

Client	Portsmouth Water
Project	Havant Thicket Reservoir Project (HTRP)
Project No.	5169117
Client signature / date	

Introduction

Background and Purpose

This technical note supplements previous Technical Notes intended to establish an agreed methodology for the Transport Assessment of the proposed Havant Thicket Reservoir and the ancillary Visitor Centre. The detail contained within this note follows an initial scoping note submitted to the local highway authority (LHA) at Hampshire County Council (HCC) in February 2020, to initiate discussions for a Transport Assessment (TA). A Technical Note titled 'TN02 Trip Generation' has also been submitted to the LHA.

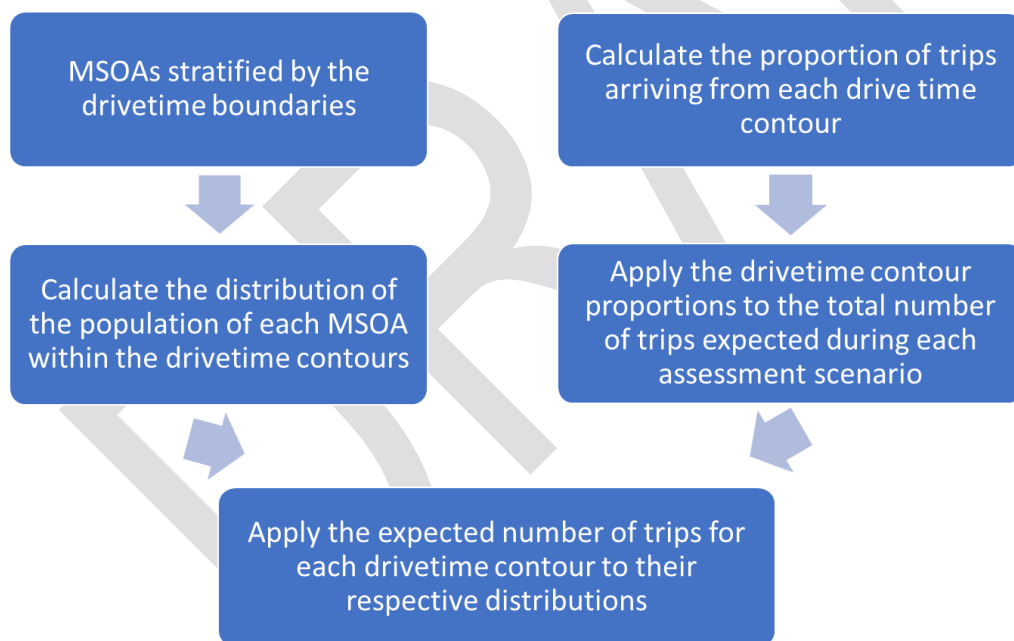
The purpose of this note is to provide more detail regarding the proposed trip distribution and assignment relating to the operational assessment of the reservoir and visitor centre.

Distribution Model

Methodology

The trip distribution has been calculated based on a combination of population and distance information. The population information has been derived from 2011 Census Data¹ for Medium Super Output Areas (MSOAs). Distance information has been calculated using journey time cordons that have been derived using straight line distances from the site (with an assumed average speed of 55kph). A distribution model has been developed which assigns a spatial proportion of each travel catchment band. The flow diagram presented in **Figure-1** summarises the steps taken to derive the distribution model.

Figure-1 - Flow Diagram of Distribution Methodology

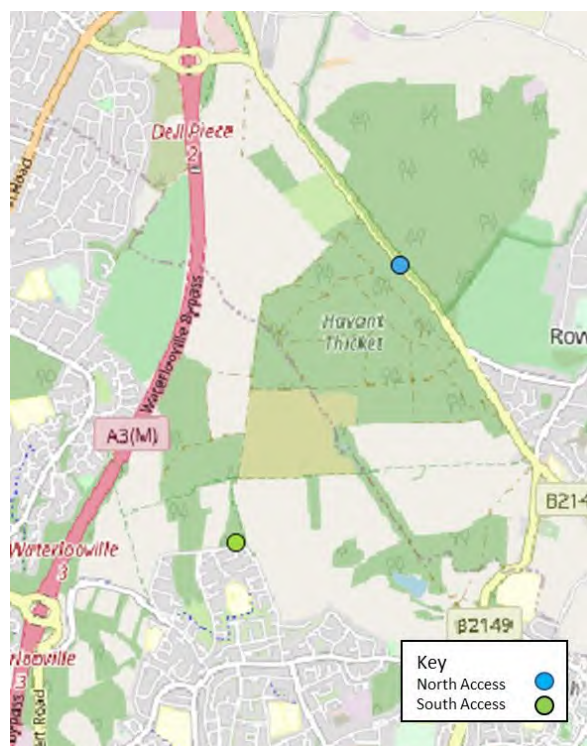


Access Strategy

The current proposals include two potential accesses which are from the B2149, and Swanmore Road / Calshot Road, referred to as the 'north access' and 'south access' respectively. The access locations are indicatively shown in Figure 2.

¹ <https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=144>

Figure-2 – Access Proposal Locations



The distribution of trips has assumed that both accesses will be available for visitors of the site, with route choice being based on the most direct route in terms of journey time from the origin (place of residence) to the destination (the reservoir).

It is intended that the northern access is designated as the main access, and will be signed as such, with the southern access being available as a minor local access.

Distribution catchments

Reference is made to the forecasted number of annual visitor number forecast to the site from each visitor market, as presented within the technical note TN02 - Trip Generation. The proportion of visitors from each visitor market is summarised in **Table 1**.

Table -1 – Market Category Visitor Proportions

Market	Visitor Proportions
Residential market	
Up to 15 mins	19.3%
16 to 30 mins	33.2%
31 to 60 mins	19.3%
61 to 90	6.2%
Dual use visitors from Leigh Park Gardens (Staunton)	1.3%
Tourists and Others	

Tourists (excl SFR ²)	1.4%
SFR	3.6%
Day visits	2.7%
Passing traffic*	12.9%
Education	N/A
Events	
Estimated total	

The distribution used for the non-residential markets (Tourists and Others) has been assumed as follows:

- Dual use visitors from Leigh Park Gardens (Staunton) – Most direct route between the two sites
- Tourists (excluding SFR) – 15-minute drivetime distribution
- SFR– 15-minute drivetime distribution
- Day visits– 15-minute drivetime distribution
- Passing traffic – 15-minute drivetime distribution

To account for the potential difference in route choice between local and regional trips, in addition to the visitor number forecasts the distribution and assignment has been calculated for the following drivetime cordons³:

- 0-15 minutes;
- 16-30 minutes;
- 31-60 minutes, and;
- 61-90 minutes.

The population weighted centroids of each MSOA has been referenced in allocating them within an appropriate drivetime cordon, to account for the location of the dominant population density.

0- 15-minutes drivetime contour

Judgement on the access and route choice to the site has been made based on the most efficient route to the principle road network and / or subsequent access to wider residential areas to distribute a proportion of the visitor traffic across local roads. The MSOAs served by the north and south accesses within the 15-minute contour can be seen in **Figure 3**.

² Staying with friends or relatives

³ Based on a 'crow-flies' drive speed of 55kph

Figure-3 – Northern and Southern Access Distribution – Up to 15 Minutes⁴



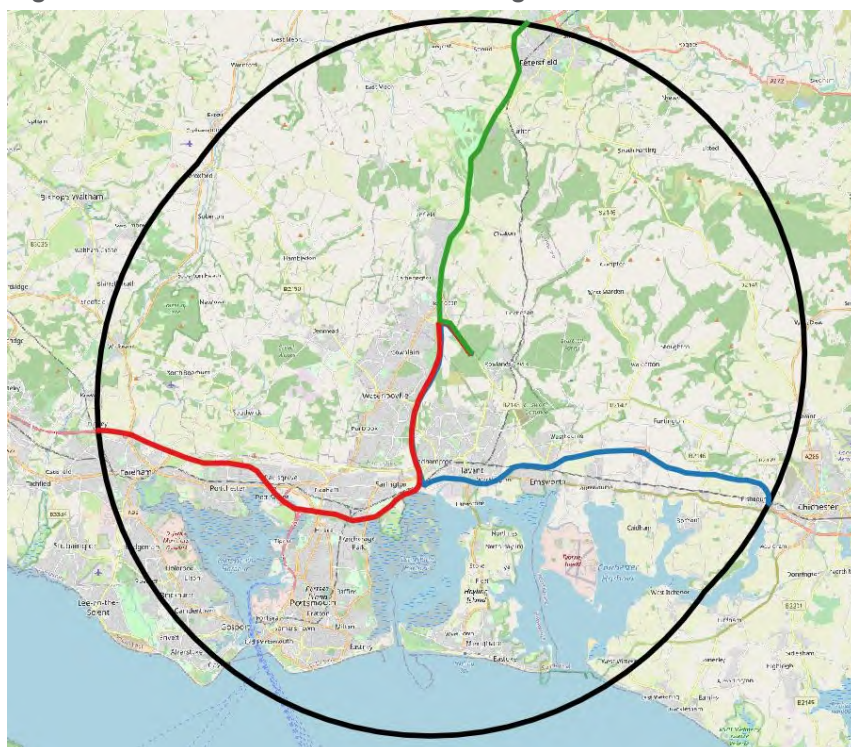
Above the 15-minutes drivetime contour

In broad terms, the assignment of trips on to key routes for the longer distance bands, i.e. above a 15-minute drivetime, have been attributed to the northern access. This will be supported by signage strategy as well as information and directions on the site's website.

The principle routes expected to be used when travelling outside the 15-minute drivetime boundary network are shown in **Figure 5**. The TA will therefore review the impact at Junction 2 on the A3(M) as the most direct route to either to north or south junctions. The distribution and assignment of traffic on the A3(M) has not been calculated beyond these junctions.

⁴ Labels refer to access choice and legend refers to origin

Figure-4 –Traffic Routes When Travelling Outside the 15 Minute Boundary



Distribution model Outputs

Using the most direct routes along the principle road network to the site, the distribution of trips for each of the residential catchments from each of the accesses is shown in **Table 2**.

Table -2 – Visitor Trip Distribution Proportions

Visitor Origin	Drivetime Catchment							
	Up to 15 mins ⁵		16 to 30 mins		31 to 60 mins		61 to 90	
	North Access	South Access	North Access	South Access	North Access	South Access	North Access	South Access
Regional North	11%	0%	3%	0%	46%	0%	64%	0%
Regional South / South East	0%	70%	17%	0%	17%	0%	12%	0%
Regional West	0%	0%	80%	0%	36%	0%	25%	0%
West of the A3 (Waterlooville)	0%	10%	-	-	-	-	-	-
Calshott Road	0%	1%	-	-	-	-	-	-
Middle Park Way	0%	1%	-	-	-	-	-	-
Hulbert Road	0%	2%	-	-	-	-	-	-
Bartons Road	1%	0%	-	-	-	-	-	-
Purbrook Road	0%	2%	-	-	-	-	-	-
Petersfield Road	2%	0%	-	-	-	-	-	-

⁵ Inclusive of non-residential markets

North/South Access Split Total	14%	86%	100%	0%	100%	0%	100%	0%
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DRAFT

Appendices

DRAFT

Appendix A. Distribution of Trips for Each Market

DRAFT

Visitor Origin	Drivetime Catchment																	
	Up to 15 mins		16 to 30 mins		31 to 60 mins		61 to 90		Dual use visitors		Tourists (excl SFR)		SFR		Day visits		Passing traffic	
	North Access	South Access	North Access	South Access	North Access	South Access	North Access	South Access	North Access	South Access	North Access	South Access	North Access	South Access	North Access	South Access	North Access	South Access
Regional North	0%	2%	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Regional South / South East	0%	0%	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Regional West	0%	0%	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
West of the A3 (Waterlooville)	0%	0%	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Calshott Road	0%	0%	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Middle Park Way	0%	0%	-	-	-	-	-	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Hulbert Road	0%	0%	-	-	-	-	-	-	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bartons Road	2%	0%	1%	0%	9%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Purbrook Road	0%	13%	6%	0%	3%	0%	1%	0%	0%	0%	0%	1%	0%	2%	0%	2%	0%	9%
Petersfield Road	0%	0%	27%	0%	7%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
North/South Access Split Total	3*%	17*%	33%	0%	19%	0%	6*%	0%	1%	0%	1%	1%	1%*	3%*	0%	2%	2%	11%

*rounding applied

Technical Note

Project:	Havant Thicket Reservoir Project (HTRP)				
Subject:	Transport Assessment TN04: Construction				
Author:					
Date:	06/07/2020	Project No.:	5169117		
Distribution:	Tom Fisher	Representing:	Hampshire County Council		

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 1.0	Draft for Comment	CW	AH	SL	WI	07/07/2020

Client signoff

Client	Portsmouth Water
Project	Havant Thicket Reservoir Project (HTRP)
Project No.	5169117
Client signature / date	

Introduction

Background and Purpose

This Technical Note supplements previous Technical Notes intended to establish an agreed methodology for the Transport Assessment (TA) of the proposed Havant Thicket Reservoir and the ancillary Visitor Centre. The detail contained within this note follows an initial scoping note submitted to the local highway authority (LHA) at Hampshire County Council (HCC) in February 2020, to initiate discussions for a TA. A Technical Note titled 'TN02 Trip Generation' and 'TN03 Distribution' has also been submitted to the LHA.

The purpose of this note is to provide a brief overview of the current proposals for the construction traffic expected as part of the Havant Reservoir, in addition to the ancillary pipeline between Havant Reservoir and Bedhampton. It sets out the 'peak' construction trip generation, which will be taken forward for assessment as part of the EIA.

Construction Traffic

Methodology

The volume of construction traffic has been estimated based on the required construction activities and an assumed construction programme as stated in the outline construction programme, which includes the proposed ancillary pipeline to Bedhampton.

The number of construction vehicles likely to be required for each activity has been established based on typical vehicle payloads and known material requirements for the reservoir construction. The assessment will apply an indicative peak construction day, whereby activities that generate HGV movements associated with both the construction of the reservoir and of the pipeline are assumed to occur concurrently, although in practice they may not take place at the same time.

The main welfare facilities and laydown areas for the pipeline will be located within the red line boundary of the reservoir site, requiring pipeline construction traffic to route between the reservoir and the relevant section of the pipeline.

It is anticipated that during the peak construction period there would be a potential for 200 HGV movements a day (100 arrivals, and 100 departures) associated with the construction of the reservoir, which will be undertaken during the main embankment construction activity in 2023. For assessment purposes, it will be assumed that the pipeline construction will be undertaken concurrently, which is expected to generate up to 30 HGV movements a day (15 arrivals and 15 departures).

In addition to construction HGVs, there will also be staff trips to and from the reservoir and pipeline. There are expected to be approximately 250 construction staff at its peak. For assessment purposes it will be assumed that all staff will arrive to the reservoir site as the single occupant of a car, which is considered a robust assumption. Reservoir construction staff will remain on site for the duration of the working day. Pipeline construction staff will be transported to and from the pipeline using minibuses, or a comparable light goods vehicle (LGV).

This will result in approximately 20 trips a day using the robust assumption that staff will be transported back to the reservoir welfare facilities for lunch and then returned to the pipeline. A summary of all construction traffic assessed for the robust case is provided in the table below.

Construction traffic – assessed scenarios

Activity	Daily HGVs (two-way)	Daily Cars / LGVs (two-way)
Reservoir	200	250
Pipeline	30	270

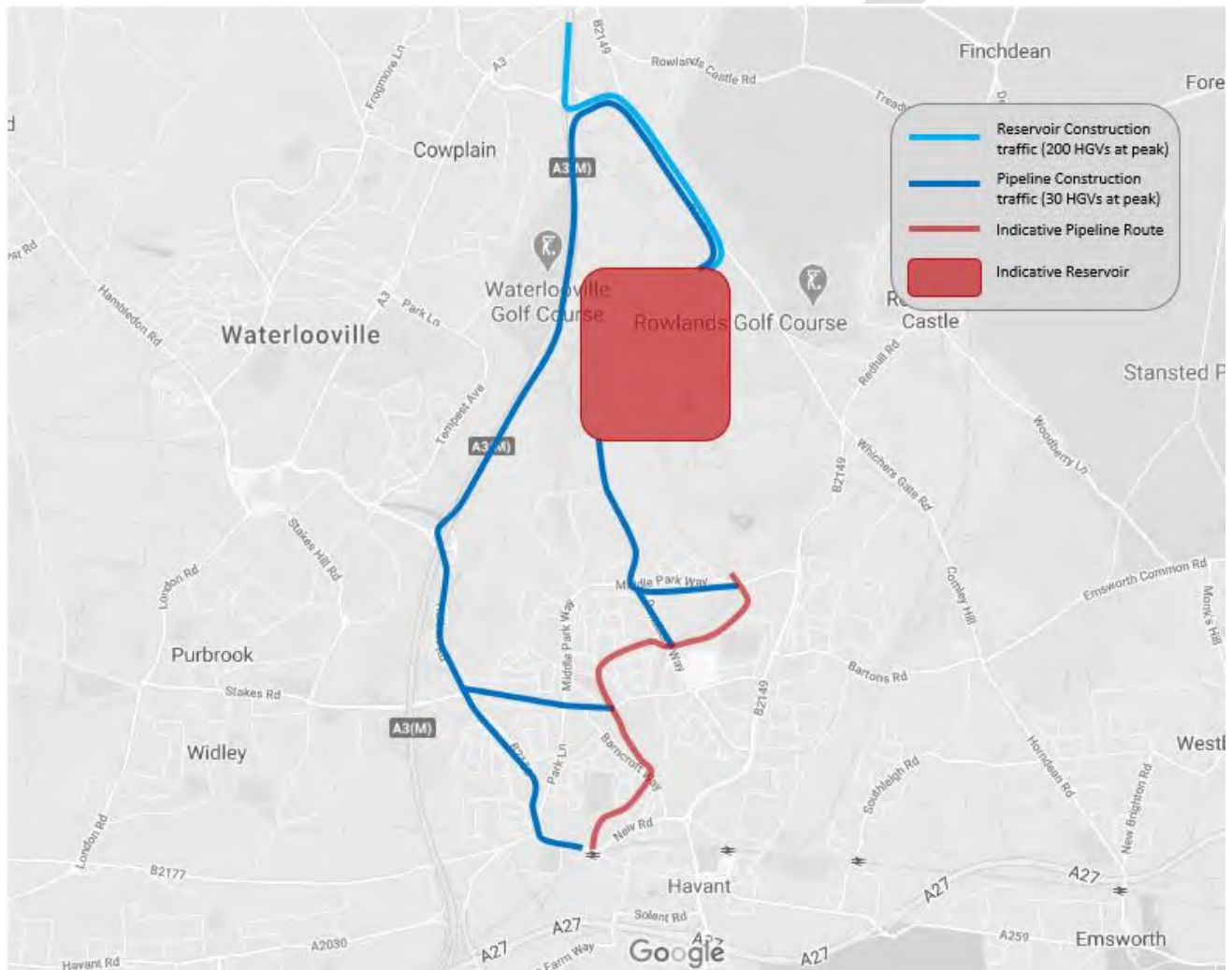
The construction HGV traffic will be distributed across the highway network, on the principle that construction vehicles will take the most suitable and direct route to the principal road network (i.e. the A3(M)). This routing will be set out in the draft Construction Traffic Management Plan that will form the basis of the Final Construction Management Plan that the appointed contractors will be required to agree with the LHA.

Whilst it is expected that both the north and south access points will be available, the HGV construction traffic will be required to use the northern access as the main access point, with the southern access only being used for part of the pipeline construction.

All reservoir HGV traffic is therefore expected to use the B2149 to access the A3(M) directly via junction 2, routing through the Dell Piece East roundabout. HGV traffic associated with the pipeline is expected to be split into three time periods where the peak HGV generation will occur, which are:

- Period One: pipeline HGV traffic will route between the northern site access and the A3(M) at junction 2, before routing south to leave the A3(M) at junction 3; accessing the pipeline construction area principally via Purbrook Way.
- Period Two, the pipeline HGV traffic will route between the northern site access and the A3(M) at junction 2, before routing south to leave the A3(M) at junction 3; accessing the pipeline construction area principally via the B2150 and Bedhampton Way.
- Period Three, pipeline HGV traffic will access the northern part of the pipeline using the southern reservoir access, Swanmore Lane and principally Middle Park Way.

A summary of the construction HGV traffic used within the assessment is presented in the figure below.



Consideration will be given to potential road closures that will be required during construction of the pipeline. A robust approach will be taken within the assessment, whereby a road closure is assumed if the pipeline is running along the length of road; however further development of the construction sequencing and methodology may allow a partial lane closure within a section of road removing the need for a full closure.

Meeting Notes

Project:	Havant Reservoir Project		
Subject:	Highway Access Options and Transport Assessment		
Meeting place:	Microsoft Teams	Meeting no:	n/a
Date and time:	05 May 2020 at 10:30	Minutes by:	Chris Williams
Present:	Andy Hills (AH) Chris Williams (CW) Simon Hughes (SH) Holly Drury (HD) Tom Fisher (TF) Oliver Joyce (OJ)	Representing:	Atkins Atkins Portsmouth Water Hampshire County Council Hampshire County Council Hampshire County Council

Introduction

The purpose of this note is to provide a brief summary of the items discussed during a meeting relating to the highway access options and associated Transport Assessment considerations for the Havant Reservoir Project. Specific actions are highlighted in bold, with specific initials bracketed where appropriate.

Meeting Notes

Access Options

- AH introduced the scheme, summarising the two access options (Northern route and Southern route). HCC to treat [REDACTED] as confidential due to on-going discussion with [REDACTED].

Northern Route

- AH presented the current junction design, inclusive of right-turn ghost island and visibility splays based on a 60mph road.
- TF highlighted that HCC have county specific guidance notes, which should be referred to. Atkins to check concept design against HCC guidance notes. *(Post meeting note: TF has circulated HCC guidance documents to Atkins).*
- TF advised that the Land East of Horndean (LEH) development includes a proposed reduction in speed limit, however visibility splays should be based on observed speeds (rather than existing or proposed speed limits). **Atkins to review observed speeds captured during ATC surveys on the B2149** *(Post meeting note: 85th percentile speeds captured at 53mph).* CW queried the

NOTE TO RECIPIENTS:

These meeting notes record SNC-Lavalin understanding of the meeting and intended actions arising therefrom. Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.

Contains *sensitive* information

Highway access options_HCC meeting notes_Issue_redacted

acceptability of using speed limits for design, if speed surveys are deemed unacceptable due to the Covid-19 pandemic. TF advised that the fallback position would need to be discussed with HCC engineers on a case-by case basis, once the acceptability of surveys is understood.

- TF queried the possibility of rationalising access roads with the LEH site. SH advised that the reservoir scheme access is required early in the construction process, and would therefore come forward before the and East of Horndean development. SH also advised that discussions have been held with the land-owner for the LEH development, and a shared access does not appear feasible at this stage, although may be a future option.
- TF recommends that visibility splays are checked for any potential conflict with LEH access proposals. TF recommended additional context be added to access design plans (such as other nearby access points). **Atkins to update plans to include wider context.**

Southern Route

- AH presented the southern route junction, which takes the form of a simple priority T-junction due to the lower mainline flows and nature of surrounding streets.
- HD request detail on the traffic flows. AH provided brief summary, explaining fluctuation across the year, and CW highlighted the trip generation note that has been issued to TF. **HCC to provide comment on the acceptability of the proposed trip generation.**
- SH provided brief summary of background to visitor number forecasts. **Atkins to share PSL visitor number report with HCC.**
- AH queried the potential relaxation of the bus corridor link between Fitzwygram Way and Woolston Road. HD confirmed that HCC would not support this and consider it inappropriate, as it would mean a through road is created with the use of residential roads in Leigh Park would be increased. This would not be acceptable, and it should not be considered further.
- AH queried the status of the road through Dunsbury Farm development. HD confirmed that HCC have asked for the stage 3 audit items to be completed to allow a Completion Certificate to be issued, a request which has not been completed by PCC. HCC therefore at present have no jurisdiction of the road and it is likely to still solely be under private ownership when the reservoir works are taking place. HCC would need to discuss the proposed use of the road for additional construction traffic and the implications on adoption with PCC directly once more information is available.

Pipeline

- HD requested information on the ancillary pipeline route. SH advised that Portsmouth Water are finalising route, but expect the route presented within the local plan is likely to be close to finalised scheme.
- HD queried consultation requirements. SH confirmed that the pipeline is included within the public consultation running through May 2020.
- HD is aware of a major DCO in the area, and is conscious that LPA have not consulted with HCC on pipeline. HCC raised the matter of the major DCO to highlight that there may be potential delays to road space in the area which could have implications on the delivery programme currently planned for Portsmouth Water. **HCC to discuss pipeline route with the local planning authority case officer.**

General

- SH queried whether HCC had any comments, or immediate concerns about the use of two access points (north and south). TF advised that HCC would be willing to explore this option, but would need to see evidence of control through the site.
- HCC raised concerns with regards to construction traffic using residential roads in Leigh Park, and withhold further comment until further understanding of impact on local roads is presented.
- TF recommends that pedestrians and cyclists be considered in terms of access, to make sure that opportunities are maximised for the local area. This is to ensure the mode share of 70% included within the trip generation stands up to scrutiny.

- CW advised that the mode share assumption is relative only to the local catchment, with wider visitors all broadly assumed to be driving. AH advised that masterplan does consider pedestrians and cyclists.
- SH advised that discussions are continuing, to ensure connection between the three country park sites in the area (inclusive of the reservoir site), to ensure opportunities for non-car travel between sites are maximised.
- HCC raised the need to hold a discussion between the HCC PRoW team and the Highways DM team when details are available to discuss the matter of crossing the PRoW to gain access via Dunsbury.
- AH introduced potential construction approaches. HD advised that HCC need to be involved, to ensure any highway works can be coordinated.
- The impact of covid-19 on surveys was discussed. CW explained that some surveys were completed during the week the government announced restrictions on movement, but suggested that ATC surveys could be used to factor the turning counts affected by restricted movement. TF requested raw survey data (*Post meeting note: TF has circulated surveys within the area for a neighbouring development. Atkins to review potential for use in calibration. CW has circulated raw survey data for HCC review*).
- HD advised that guidance may be available on HCC website which outlines potential relaxations in Road Safety Audit processes, due to Covid-19.

Meeting Notes

Project:	Havant Reservoir Project		
Subject:	Highway Access Options and Transport Assessment		
Meeting place:	Microsoft Teams	Meeting no:	2
Date and time:	25 June 2020 at 14:30	Minutes by:	Chris Williams
Present:	Andy Hills (AH) Chris Williams (CW) Holly Drury (HD) Tom Fisher (TF)	Representing:	Atkins Atkins Hampshire County Council Hampshire County Council

Introduction

The purpose of this note is to provide a brief summary of the items discussed during a follow up meeting relating to the highway access options and associated Transport Assessment considerations for the Havant Reservoir Project. The discussion followed the structure of comments provided by HCC on the draft minutes from the previous meeting, in addition to the Technical Notes provided to HCC by Atkins. Specific actions are highlighted in bold, with specific initials bracketed where appropriate.

Meeting Notes

Previous Minutes

- Minutes from the previous meeting were discussed and agreed with specific reference to:
 - Status of the highway link through Dunsbury Park. **Atkins to update minutes in accordance with HCC clarification.**
 - HCC concerns over construction traffic using residential roads in Leigh Park. **Atkins to update minutes to reflect this.**
 - HCC not accepting opening of the bus gate at Dunsbury Park. **Atkins to update minutes in accordance with HCC clarification.**
 - HCC raised the matter of a DCO in the area, to regards to potential delays to road space and implications on the delivery programme for Portsmouth Water. **Atkins to update minutes in accordance with HCC clarification.**
 - HCC clarified that guidance on the COVID-19 impact on processes is in relation to Road Safety Audits. **Atkins to update minutes in accordance with HCC clarification.**
- Post meeting note: Revised minutes have been issued to HCC for agreement.*

NOTE TO RECIPIENTS:

These meeting notes record SNC-Lavalin understanding of the meeting and intended actions arising therefrom. Your agreement that the notes form a true record of the discussion will be assumed unless adverse comments are received in writing within five days of receipt.

Access Strategy

- Atkins provided an update on the access strategy, specifically with reference to the southern access and potential use of PCC land. Discussions have ceased, and therefore a new links from Dunsbury Park is no longer being considered. This removes the need to cross the PRow to gain access via Dunsbury. HCC highlighted that a joint meeting with the PRow and DM team would still be beneficial. **Atkins to liaise with colleagues with a view to setting a meeting up. Atkins to share minutes of the meeting separately held with the HCC PRow team.**
- Atkins explained the vehicular access strategy includes two access points (north and south), with the north being the signed as the main access, with the south used for local trips.
- HCC raised concerns about the creation of a rat-run through the site. Atkins explained that the access routes would be to and from a car park, and the nature of the access route would not be conducive to through traffic. **Atkins to share plans of the car park layout in relation to the access routes with HCC. Atkins to provide commentary within TA on the consideration of a rat-run.**
- During construction, the north access would be the main access, with the southern access only being used for a short period of time for a section of the pipeline. HCC highlighted that Leigh Park is an unfavourable route for construction traffic. Atkins explained that this has been considered in developing the dual access strategy, and efforts have been made to avoid local roads through Leigh Park where possible. **Atkins to share a briefing note on construction traffic proposals.**

Trip Generation

- The circulation of the report *Visitor number and recreational amenities review* report was noted. HCC raised no specific comments or concerns with regards to the visitor report.
- The circulation of the trip generation spreadsheet was noted. HCC had reviewed the spreadsheet in terms of principles but not had a detailed check of the analysis at the time of the meeting.
- It was agreed that the trip generation should reflect the 'busy period' of May to August. Atkins clarified that this is what is presented within TN02 Trip Generation, and will be assessed.
- Clarification on the basis of the proposed occupancy levels was provided by Atkins, with reference to information included within the *Visitor number and recreational amenities review* report and the close working partnership with Hampshire County Council parks.
- The data provided by the Hampshire County Council parks department was discussed, and Atkins explained the similarities between the proposed facilities at the reservoir and the QECP site used to inform the trip generation assessment.
- Clarification was provided by Atkins on the term 'pass-by' visitors, explaining that this is a visitor catchment group, but for transport assessment purposes these would not be netted off the trip generation (i.e. they would be assumed as new trips within the assessed network).
- Subject to a detailed check of the working spreadsheet, HCC appear content with the trip generation, raising no further comment on the principles of the trip generation approach.

Distribution

- HCC raised queries with regards to the distribution presented within TN03 Distribution, in relation to the southern access appearing dominant, and suggested that more traffic would route along the Park Road North corridor.
- Atkins explained that the distribution presented was on the basis of a new link being constructed through PCC land, and this is no longer proposed. The distribution is expected to reflect the access strategy with the northern access being the dominant access, with the southern access being used for local trips. Atkins explained the expected route assignment. **Atkins to re-issue technical note TN02 Distribution to reflect access strategy.**

Data

- Atkins explained the proposed approach to mitigation the potential impact of the COVID-19 pandemic on traffic surveys. HCC were comfortable with the approach of using the ATC data to factor any surveys captured prior to UK Government lockdown measures.
- HCC advised that consideration should be given to the need for annualisation factors within the TA. *Post meeting note – The surveys were undertaken in March, which is a neutral month (according to TAG Unit M1.2). A review of Highways England data indicates that there is a difference of 4% between data from March and the annual average which is not considered a material difference, and it is considered unlikely difference would be this high on the local road network. Therefore, no factoring is considered necessary.*
- The programme of surveys was discussed, with clarification given to the locations captured in relation to the recommendations from HCC and the uncertainty with access strategy at the time. It was discussed that the survey locations may now be reasonable on the basis of the proposed access strategy and distribution of trips.

General

- HCC were not in a position to comment on the design of the access junctions. **Atkins to share general arrangement plans of revised access proposals for north and south access junctions.**
- The first principles approach to parking was explained by Atkins, to justify the level of parking being proposed. HCC suggested that the parking requirements should be discussed with Havant Borough Council. *Post meeting note: Havant BC have seen parking numbers, and have not raised any concerns.*
- HCC suggested that if there is the potential for parking overspill, there may be a need to seek contributions towards a TRO associated with parking or waiting restrictions in the local residential areas.
- The committed developments that need to be taken account of within the assessment were discussed, with HCC providing information on Land East of Horndean. HCC advised that it is expected that the development will be built out at a rate of 80 dwellings per year.

Appendix C. HTR-ATK-XX-XX-RP-Z-0021

Technical Note Access Route - Options Appraisal at Havant Thicket

Technical Note

Project:	Havant Thicket Outline Design		
TN Ref. No:	HTR-ATK-XX-XX-RP-Z-0021		
Subject:	Access Route Option Evaluation		
Author:	LV		
Date:	03/03/20	Project No.:	5169117
Distribution:	Andy Forestiero	Representing:	Portsmouth Water

Document history

Revision	Status	Purpose description	Origin-ated	Checked	Reviewed	Author-ised	Date
C01	A1	First Issue	LV	CW	SL	KIO	03/03/20

1. Introduction

1.1. Background

- 1.1.1. Atkins has been commissioned by Portsmouth Water to prepare a planning application for the Havant Thicket Reservoir Project. To inform the design of the reservoir site, potential access routes have been assessed as part of an option appraisal. This Technical Note provides a summary of this option appraisal. It is noted that the review is entirely focussed on the access *route* to the proposed reservoir and does not consider the method of connecting the access route to the existing highway network (e.g. junction form) that will be the subject of further design development and assessment.
- 1.1.2. This technical note has been informed by a desktop study and makes reference to the previous study undertaken by Arup; the previous consultant engaged by Portsmouth Water.

1.2. Purpose

- 1.2.1. The purpose of this report is to reassess the existing proposals developed by Arup and investigate new options. The assessment considers the impact of the routes on local environment and any changes since the Arup assessment in 2010.

1.3. Approach to Appraisal

- 1.3.1. A four-stage appraisal approach has been used in considering the most appropriate access route to the reservoir:
- **Stage One:** Review of background information;
 - **Stage Two:** Development of a long list of route options;
 - **Stage Three:** Multidisciplinary analysis and appraisal of options. This has two key streams of appraisal with separate methodologies and are as follows:
 - Environment;
 - Engineering and
 - Project Drivers
 - **Stage Four:** Identification of next steps.

1.4. Limitations and Assumptions

- 1.4.1. The appraisals included in the report are based on the desk top analysis of each option. Further survey and ground investigation work will be required.
- 1.4.2. The following assumptions have therefore been made:
- The cost per metre is the same for all routes;
 - The cost per metre is only used for the length of new access construction on each option and not the overall length used for assessment and
 - Where the option traverses over root protection areas then a cellular construction method will be used. Elsewhere a traditional form of pavement construction will be utilised.

2. Background Information Review

2.1. Previous Study

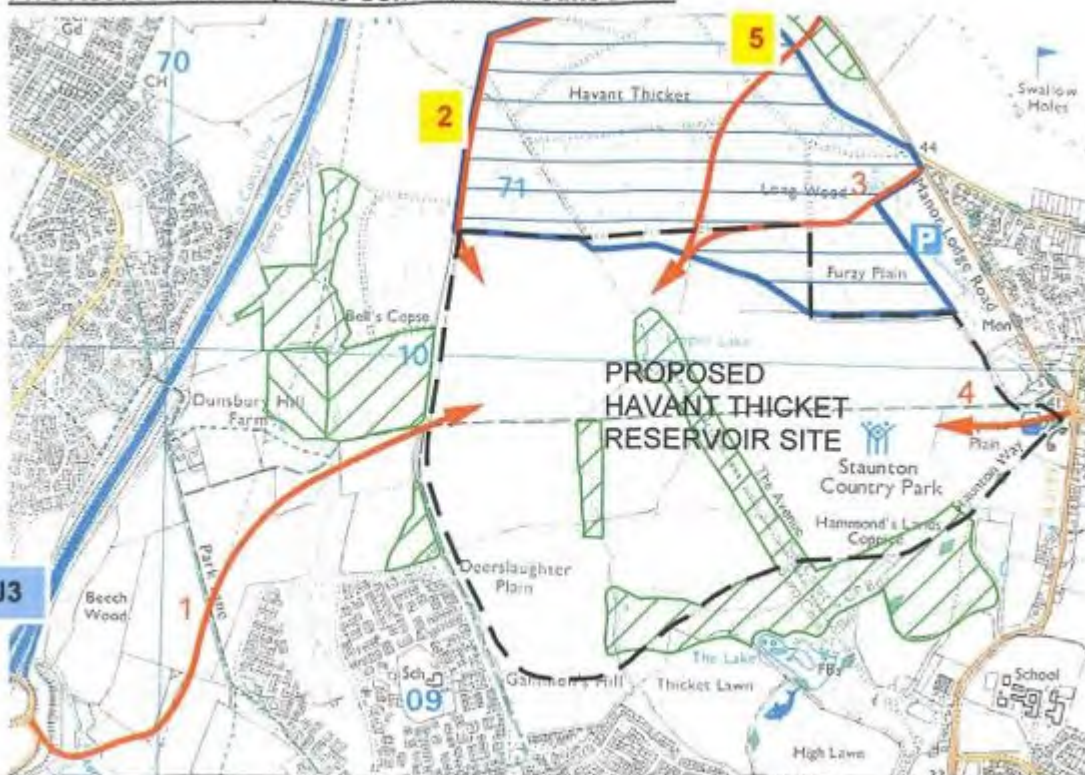
2.1.1. Several options for accessing the reservoir site were previously considered by Arup in the *Traffic Route Options Considered by the HTWSR Stakeholder Group Report* dated December 2010. The previous work considered five separate access route options for the site between 2006 and 2008. The access route options are listed below. It is noted that the Arup report states that for the purposes of this previous study it was assumed that 'the construction and permanent access should be the same to minimise detrimental effects':

- Access Route Option 1 – Access via the A3(M) Junction 3 Roundabout;
- Access Route Option 2 – Access from the A3(M) Junction 2 via the B2149/Manor Lodge Road;
- Access Route Option 3 – North-east Access from Manor Lodge Road at its junction with Castle Road;
- Access Route Option 4 – East Access from the Manor Lodge Road/Durrants Road, and;
- Access Route Option 5 – North-east Access from Manor Lodge Road North of Castle Road.

2.1.2. The indicative alignments of each route are illustrated in **Figure 1-1**. The main advantages and disadvantages for routes 1-5 identified by Arup in 2010 are also detailed in paragraphs 2.1.3 to 2.1.16 together with observations made by members of the stakeholder group. It is important to note that the routes identified by Arup in 2010 have been reassessed in this report. Further detail regarding the reassessment is included in Section 3.

Figure 1-1 - Access Locations and Routes Proposed by Arup

Five Access Route Options Considered in June 2006:



Access 1 – Access via the A3(M) Junction 3 Roundabout

- 2.1.3. As shown in Figure 1-1, Access 1 is towards the south western corner of the site.
- 2.1.4. The main advantage was that it would provide a direct access off the A3(M) and keep traffic off local roads. Main disadvantages;
- No roadway or path exists at present; therefore, a new road would have a significant impact on the landscape & environment, which is currently mainly open countryside and as a result any new road would be very visible.
 - There would be a need to cross two streams (Park Lane and Hermitage Streams) and the associated wetland habitat. This would be difficult requiring significant engineering which would increase the complexity and the environmental impact. The Environment Agency (EA) expressed concerns.
 - The route crosses a Site of Importance for Nature Conservation (SINC EA), wet woodland (with bluebells) and mature hedgerows, the environmental impacts would need to be considered.
 - There would be health & safety (H&S) issues associated with crossing two rights of way including the bridleway.
 - This is the longest (1635m) most undulating and expensive route. (It should be noted that 235m of this route has been built as part of the Dunsbury Hill Farm development and the revised length of new pavement is 1400m).
 - Havant Borough Council (HBC) expressed concerns about a potential conflict with the Dunsbury Hill Farm development.
- 2.1.5. Note: There is also potentially a concern that providing a new road through this area of open countryside may increase pressure for development to the north of Leigh Park.

Access 2 – Access from the A3(M) Junction 2 via Manor Lodge Road

- 2.1.6. As shown in Figure 1-1, Access 2 is towards the north western corner of the site.
- 2.1.7. The main advantage would be that traffic could enter the site from the A3(M) to the north, without passing through any residential areas. In addition;
- The majority of the route follows an existing Forestry Commission (FC) track which could be upgraded minimising the landscape & environmental impact. Only 200m of completely new track would be required through young birch dominated woodland.
 - The route would be screened by the existing trees on either side minimising any visual impact.
 - The route would not create a significant disturbance in the centre of the woodland.
 - The route does not divide the woodland, minimising H&S concerns with respect to recreational users of the site.
- 2.1.8. The main disadvantages are that the route;
- Is within the ancient woodland and the environmental impacts need to be considered.
 - Is a longer route (1,400m).
 - The track is currently used by walkers, if this route were adopted there would be a need to consider H&S issues and provide a safe path for walkers

Access 3 – North-east Access from Manor Lodge Road at its junction with Castle Road

- 2.1.9. As shown in Figure 1-1, Access 3 is towards the eastern perimeter of the site.
- 2.1.10. The main advantage would be that it follows an existing FC access track that could be upgraded, and traffic would avoid most of the residential area of Manor Lodge Road. The route would be screened by the existing woodland. The disadvantages;
- The entrance on to Manor Lodge Road is opposite a residential area, concerns were expressed about disturbance and safety issues, especially during construction. Concern was expressed that construction traffic may stray on to local roads.
 - The woodland area close to Rowlands Castle and the existing FC car park is heavily used by walkers giving rise to H&S concerns with respect to recreational users of the site.
 - The route would create a significant disturbance in the centre of the woodland and the environmental impacts need to be considered.
 - The new route would divide the ancient woodland giving rise to H&S concerns with respect to recreational users of the site.
 - The route crosses a small stream along the line of the existing track.
 - The route passes through nightjar territory
 - It is a longer route 1390m.

Access 4 – East Access from the Manor Lodge Road/Durrants Road

- 2.1.11. As shown in Figure 1-1, Access 4 is towards the south western corner of the site.
- 2.1.12. This is the shortest most direct route for access. The route avoids the ancient woodland and utilises a direct access which is already present off the roundabout in Rowlands Castle. The main disadvantages identified were;
- Significant concerns about increased traffic and H&S issues associated with use of this busy double mini-roundabout and traffic backing up on to the local roads, especially during peak times.
 - The proximity to a local school was raised as a H&S concern.
 - The track is a key existing pedestrian access point, which also provides footpath and cycleway access to SCP, as it is part of the Staunton Way.
 - There were significant concerns about disturbance in the short and long-term to immediately adjacent residents, especially during construction.
 - Concern that the work force may use local roads and park in residential areas.
 - It is the longest route of all the routes (2155m) considered in terms of pavement construction

Access 5 – North-east Access from Manor Lodge Road North of Castle Road

- 2.1.13. As shown in Figure 1-1, Access 5 is towards the north eastern corner of the site.
- 2.1.14. This is a slightly longer route which for 2/3 of its length follows an existing FC track which would need to be upgraded. Traffic would enter from the north avoiding the residential area of Rowlands Castle. The route would be screened by the existing woodland. The disadvantage sare:
- New 400m track required through the ancient woodland, whereas route 2 only requires a new track through less than 200m of woodland.
 - Area close to Rowlands Castle is heavily used by walkers giving rise to H&S concerns.
 - The new route would divide the ancient woodland giving rise to H&S concerns with respect to recreational users of the site.
 - The route would create a significant disturbance in the centre of the woodland and the environmental impacts need to be considered.

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- The route passes through nightjar habitat.
- It is 1,430m in terms of new pavement length/

2.1.15. As part of the previous assessment undertaken in 2006, Arup notably highlighted a number of engineering and environmental constraints with Access Route Option 1. In addition potential impacts on local residents and recreational users of the site were identified for Access Routes 3 and 4. This resulted in Access Routes 1, 3 and 4 being discounted from further assessment and Access Routes 2 and 5 being taken forward to the subsequent 2008 public consultation. (See Section 2.3 Stakeholder Engagement).

2.2. Planning Applications

- 2.2.1. A review has been undertaken to determine whether there are any potential developments within the surrounding area of Havant Thicket that could affect the feasibility and / or suitability of an access route. A summary of planning applications considered of relevance is provided below.
- 2.2.2. The locations of the planning applications in the vicinity are shown in drawing HTR-ATK-RZ-ZZ-GS-Z-003- **Figure 2.1**.
- 2.2.3. The locations of the allocations in the vicinity are shown in drawing HTR-ATK-RZ-ZZ-GS-Z-004- in **Figure 2.2**.
- 2.2.4. The applications and allocations located near the site are shown in **Figure 2.1 and 2.2** respectively and are as follows:
- **55562/001** | Development Land East of Horndean - Residential development for 700 dwellings, a care village including independent living units and extra care provision for older people, land for 2ha of B1 (business) and B2 (industrial) uses and a new primary school and land for future expansion | Development Land East of Horndean, Rowlands Castle Road, Horndean, Waterlooville
 - Status at time of assessment:
 - **PP/12/00338** | Hybrid planning application comprising a part outline application relating to development for employment uses and a hotel with conference facilities and a part detailed application for a new access link road with bus gate to Woolston Road; together with landscaping, infrastructure and associated works (approved 19.02.14). Request to discharge conditions A5, A10, A11, A12, A13, A14, A16, A17, A18, B4 and B10 (05.01.16). | Dunsbury Hill Farm, Park Lane, Cowplain, Waterlooville
 - Current status: several buildings built and occupied.
- 2.2.5. In the Havant Borough Council's draft *Pre-Submission Havant Borough Local Plan 2036 (2019)*, Cabbagefield Row site H34 allocation has been identified for 155 dwellings subject to planning requirements being met. This site is located off Swanmore Road. See **Figure 2.3**.

Figure 2.1 – Applications Near the Site

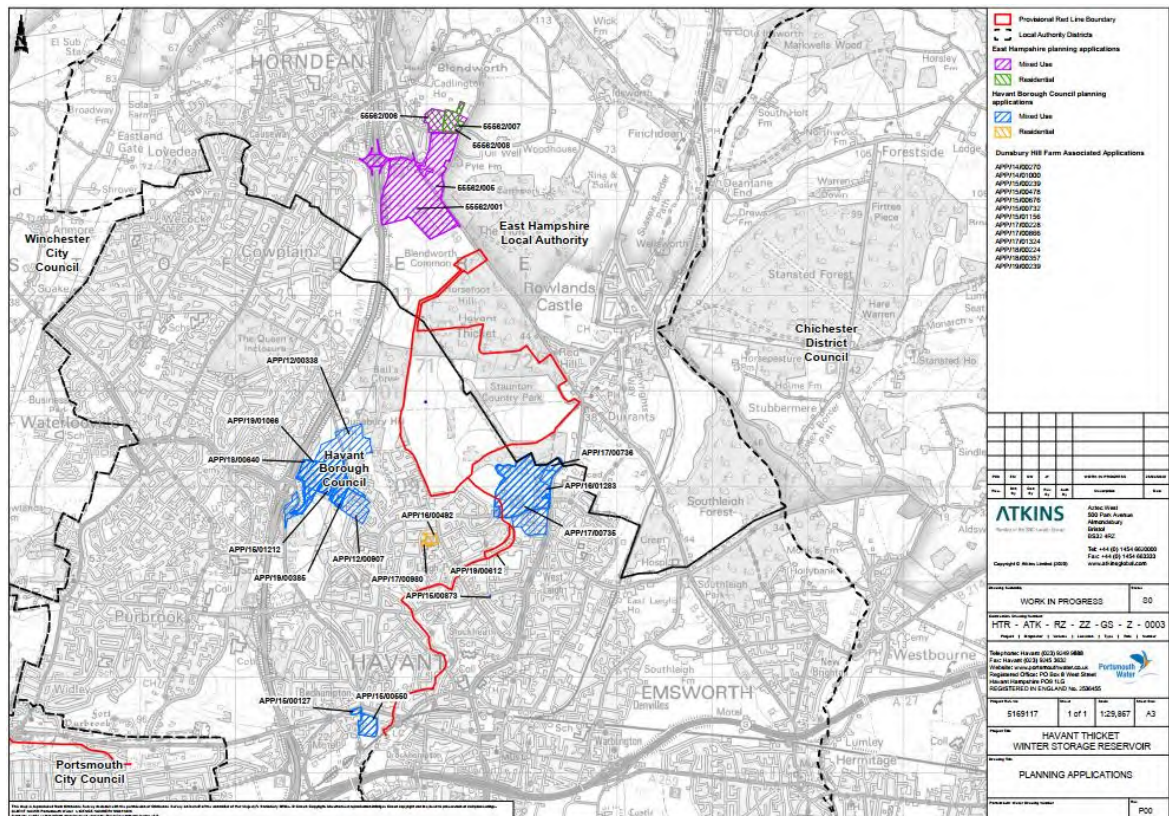


Figure 2.2 – Allocations Near the Site

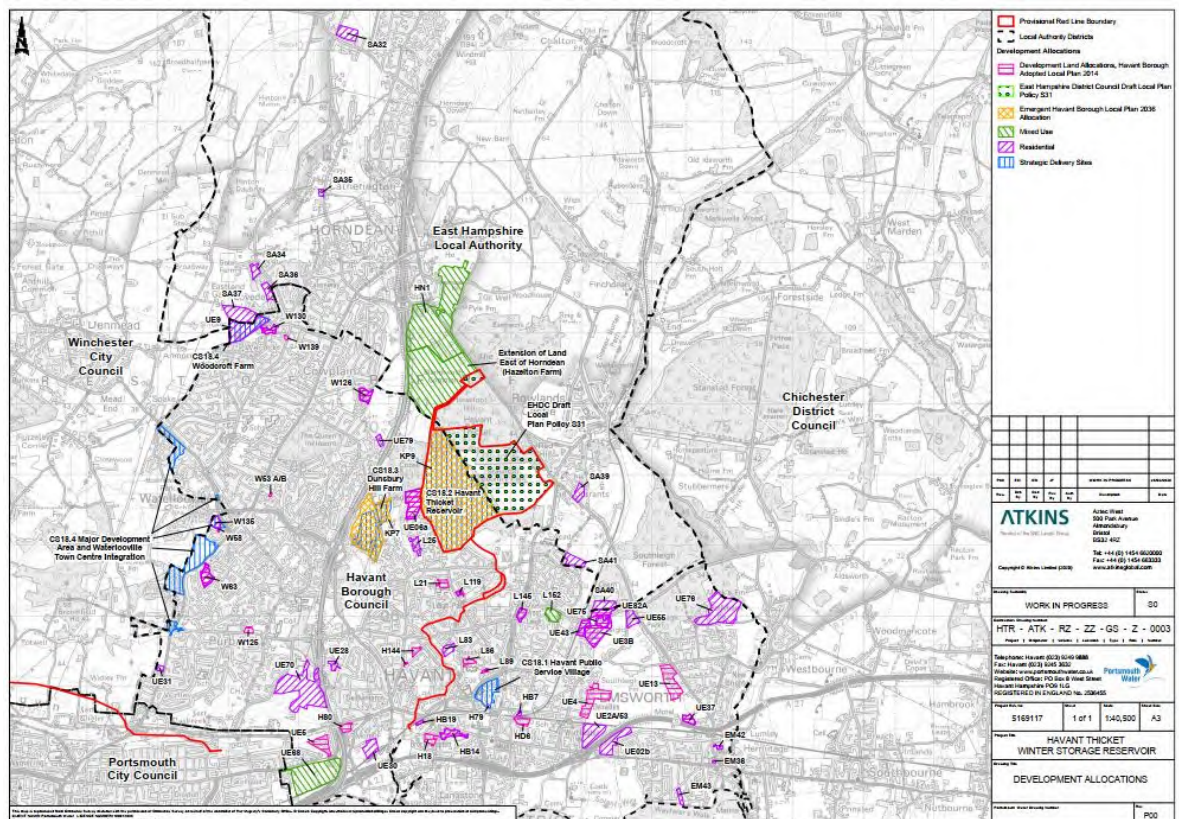


Figure 2.3- Cabbagefield Row Site H34 Allocation



2.2.6. The masterplan for application 55562/001 is shown in **Figure 2.4** below.

Figure 2.4 – Masterplan for Application 55562/001¹



¹ Land East of Horndean - Application 55562/004 Source: <https://planningpublicaccess.easthants.gov.uk/online-applications/simpleSearchResults.do?action=firstPage>

Application:PP/12/00338 – Dunsbury Park and Fitzwygram Way

- 2.2.7. The analysis has identified application PP/12/00338 - Dunsbury Park which has a large impact on Access Route Option 1 as assessed by Arup. The masterplan of the application PP/12/0033 and associated Fitzwygram Way link road from the A3(M) to Woolston Road can be seen in **Figure 2-3**.

Figure 2-5 – Masterplan for Application PP/12/00338²



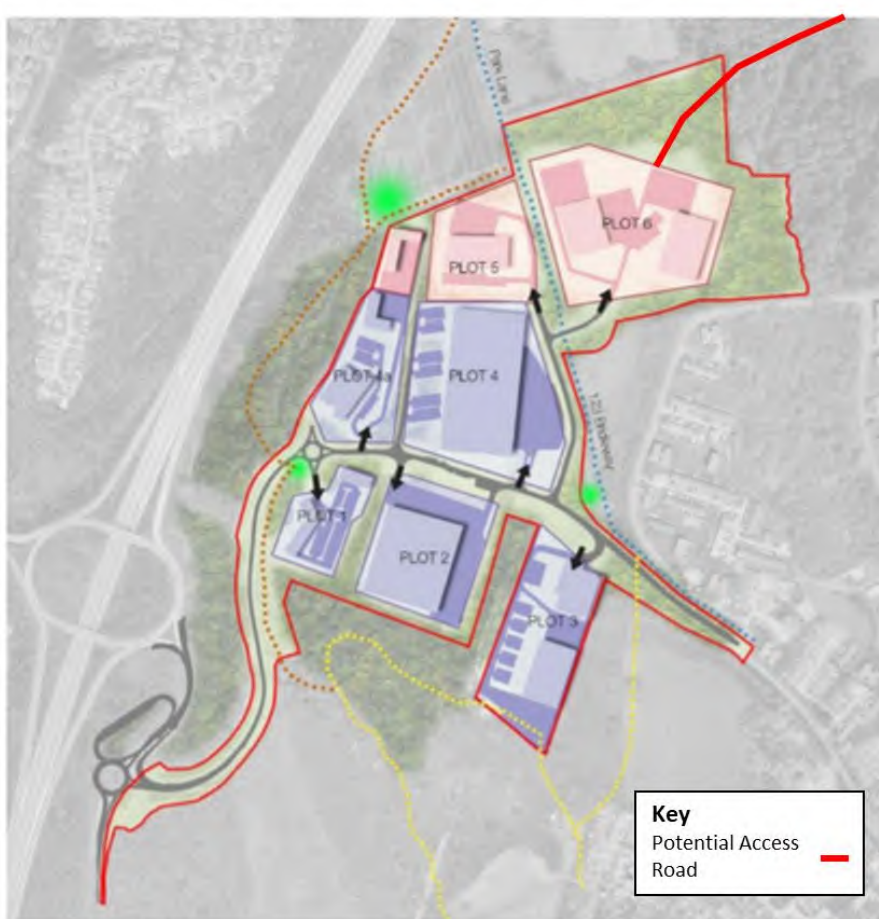
KEY

- Existing Pedestrian/ Cycle Routes
- Park Lane/ 123 Brickway
- Possible Trim Trail/ Leisure Route
- Opportunity or Landscape 'feature'/ Public Art

² Portsmouth City Council (2010) *Dunsbury Hill Farm Design Code*

- 2.2.8. The Fitzwygram Way link road and application PP/12/00338 had not been submitted in 2010 and was not, therefore, considered by Arup in the previous access route options study. Access Route Option 1, as assessed by Arup would need to be incorporated into the masterplan of application PP/12/00338 as shown in **Figure 2-6** if it were to be taken forward.

Figure 2-6 – Access 1 shown on the Application: PP/12/00338 Dunsbury Park Masterplan



- 2.2.9. Further information about the proposals at Dunsbury Park can be found at: <https://dunsburypark.co.uk/>

2.3. Stakeholder engagement

Stakeholder Group

- 2.3.1. The HTWSR Stakeholder Group was formed in December 2004 in order to provide essential feedback to guide the direction of all aspects of the reservoir project. In 2006 the group comprised representatives from:
- Local Authorities; EHDC, HBC, HCC (councillor & officer representatives);
 - Environment Agency;
 - Rowlands Castle Parish Council;
 - Wildlife organisations; Hampshire & IOW Wildlife Trust & Hampshire Ornithological Society;
 - Consumer Council for Water;
 - Forestry Commission;
 - Staunton Country Park.
- 2.3.2. In June 2006 the Stakeholder Group was consulted on a number of reservoir layout and Access Route Options. The consultation included the provision of written information and a workshop. Section 2.1.1-2.1.16 above provides a summary of Arup's conclusions that include feedback from the engagement with the Stakeholder Group.
- 2.3.3. Overall, Access Routes Option 3 and 4 were not favoured by stakeholders due to the potential impacts on local residents and recreational users of the site. The stakeholder group feedback, in addition to Arup's conclusion on Access Route Option 1 (see Section 1), led to Access Route Options 2 and 5 being taken forward for full public consultation in 2008.

Public Consultation

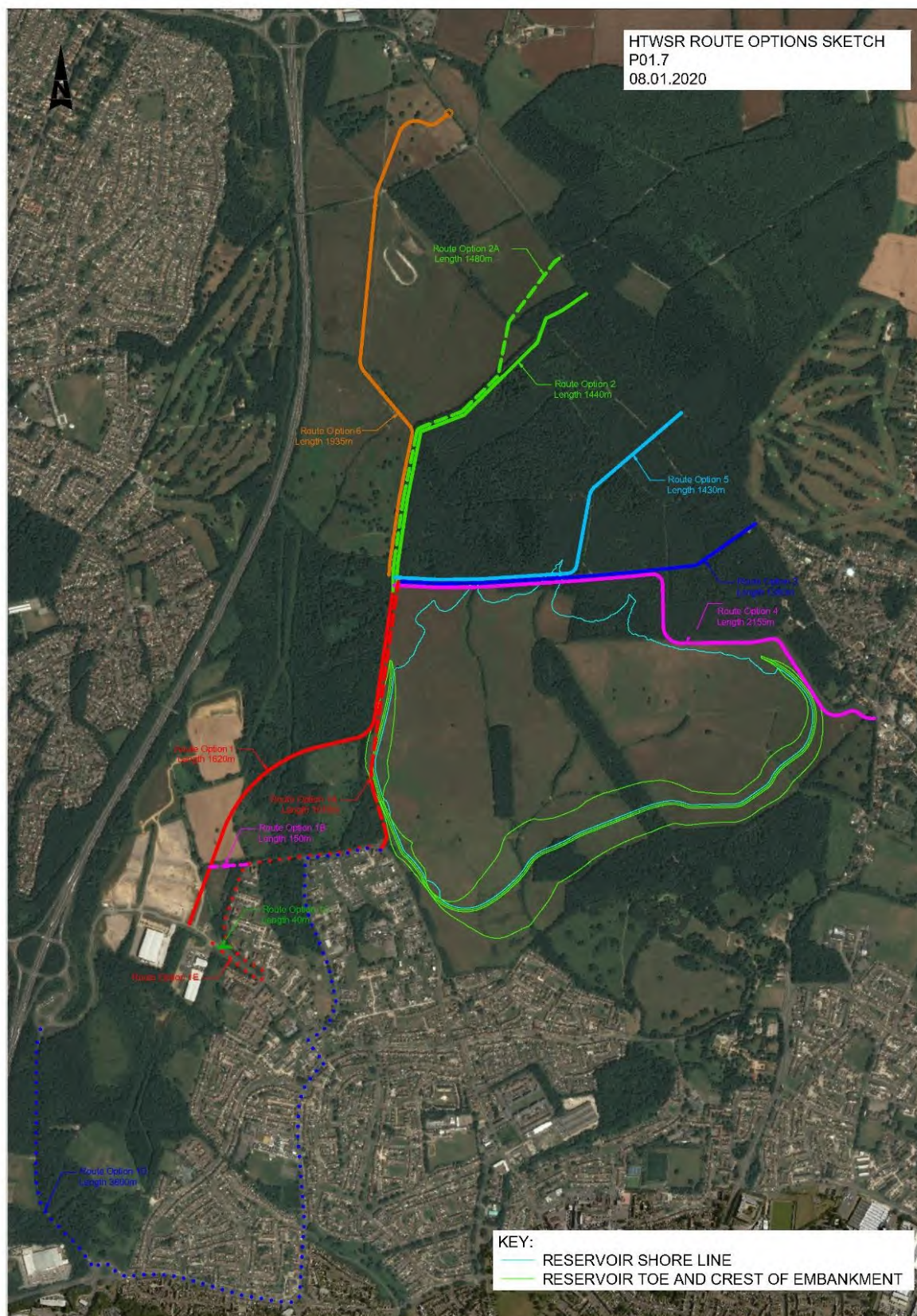
- 2.3.4. At the 2008 public consultation, local residents raised concerns about the potential impacts the reservoir proposal might have on traffic levels in Leigh Park and Rowlands Castle. The Arup report states that: *"of the two Access Route Options 2 and 5, a clear majority of respondents (79%) indicated they were in favour of the longer northern access route into the site from the B2149 Horndean to Havant Road (Option 2). This is the route closest to Junction 2 on the A3(M) and avoids the need for traffic to pass through Leigh Park and Rowlands Castle."*
- 2.3.5. It should be noted that Portsmouth Water has carried out further consultation with the key stakeholders since 2010, this consultation related to the development principle of the reservoir regarding its location and size, and not the access route.
- 2.3.6. In addition, a public exhibition was held in November 2019 to provide an update on the project. It is noted that feedback was received from attendees that highlighted concerns in relation to the increase in traffic along the B2149 and proposed future housing development in the area.
- 2.3.7. A Stakeholder Group workshop to be held on 4th February 2020 will include discussion around access route options.

3. Appraisal

3.1. Routes Options

- 3.1.1. In addition to the five Access Routes Options 1-5 included within the previous assessment as described in Section 2, several new options have been developed. These new options allow for changes introduced to the local highway layout through the development of Dunsbury Park (application PP/12/0033) and associated Fitzwygram Way link road and spur from the A3(M) to Woolston Road, as well as potential changes resulting from the Land East of Horndean development (application:55562/004).
- 3.1.2. The Access Route Options 1 – 5 considered by Arup have been re-assessed with the context of any changes along the indicative route alignments that have arisen since 2010, with the following variations included within the Access Route Options long-list:
- Access Route Option 1A;
 - Access Route Option 1B;
 - Access Route Option 1C;
 - Access Route Option 1D;
 - Access Route Option 2A and;
 - Access Route Option 6.
- 3.1.3. The alignment of each of the routes assessed can be seen in the respective **Figure 3.1**.

Figure- 3.1 – Indicative Alignments of the Route Options Assessed*



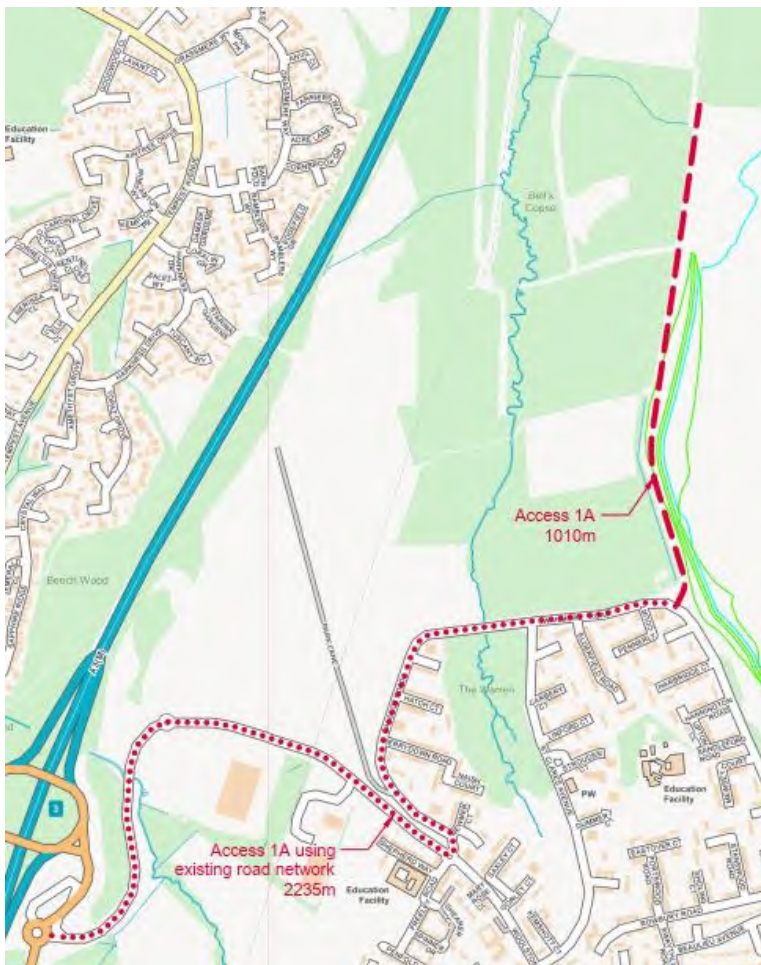
*Satellite imagery is from google maps and therefore may not be up to date
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Access Route Option 1A

- 3.1.4. Access Route Option 1A is a variation of Access Route Option 1 included within the Arup assessment in 2010. Access 1A is 1010m of new road and has a north-south alignment running parallel to the existing bridleway and is within land owned by Portsmouth Water. It runs from the proposed area identified for the visitor centre and car parking and joins the highway network at the north eastern corner of Swanmore Road. Access to Option 1A would come from A3(M) Junction 3 through the Dunsbury Park development via Fitzwygram Way and the dedicated bus corridor. The bus corridor runs on Fitzwygram Way between the entrance to Breeze Van Centre and the Calshot Road/ Fitzwygram Way roundabout. The status of the bus corridor is current closed to all traffic and would need to be revised when circumstances change. The alignment of Route Option 1A can be seen in **Figure 3.1.1A** below.

Figure- 3.1.1A – Access Route Option 1A

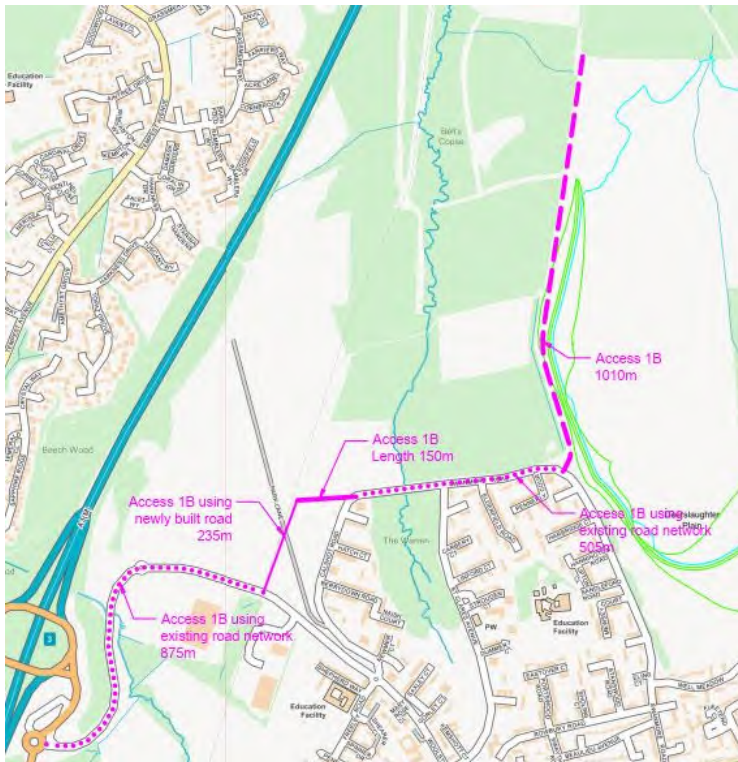


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Access Route Option 1B

- 3.1.5. Access Route Option 1B is a further development and variation of Access Route Option 1A. The Access Route Option 1B is 150m (1160m in total) of new road and links Swanmore Road and the Fitzwygram Way spur at Dunsbury Park, therefore providing a more direct route for traffic travelling to the A3(M) and avoids the requirement to suspend the bus corridor (see commentary in 3.1.4). The alignment of Route Option 1B can be seen in **Figure 3.1.1B**.

Figure- 3.1.1B – Access Route Option 1B

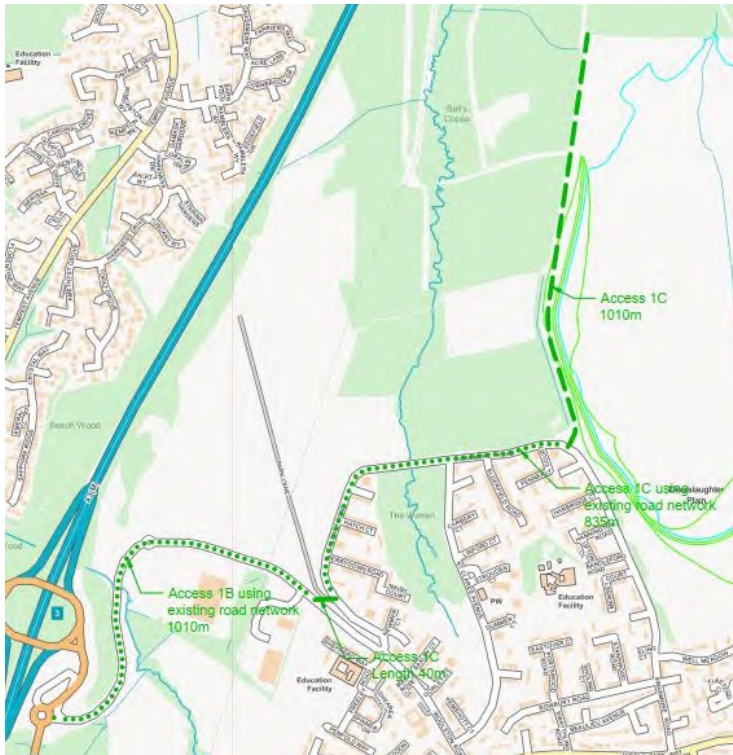


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Access Route Option 1C

- 3.1.6. Access Route Option 1C is a further development of Access Route Option 1B. Access Route Option 1C is 40m (1200m in total) and links Swanmore Road and Calshot Road to Fitzwygram Way at the eastern end of the bus gate. Access Route Option 1C therefore provides a more direct route for traffic travelling to the A3(M) and requires a partial suspension of the bus corridor (see commentary in 3.1.4). The alignment of Route Option 1C can be seen in **Figure 3.1.1C**.

Figure- 3.1.1C – Access Route Option 1C



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Access Route Option 1D

- 3.1.7. Access Route Option 1D is the proposed route for traffic travelling to the reservoir after its construction via Access Route Option 1A from the A3 (M). Access Route Option 1D is 3800 m and will utilise the existing road network via the most suitable and direct route to the A3(M). A signage strategy for traffic from the A3(M) will be developed with this option. This seeks to suspend the bus corridor during the construction phase and then reinstate at the operational phase (see commentary in 3.1.4). The alignment of Route Option 1D can be seen in **Figure 3.1.1D** below.

Figure- 3.1.1D – Access Route Option 1D



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Access Route Option 2A

- 3.1.8. Access Route Option 2A is a variation of Access Route Option 2 included within the Arup assessment in 2010. The Access 2A proposal forms a junction with the B2149 approximately 375m north of the existing Access Route Option 2 proposal and is 1480m long. This option was developed as an alternative to Access 2 to reduce the potential impact on the existing ancient woodland at Havant Thicket adjacent to the B2149. The alignment of Route Option 2A can be seen in **Figure 3.1.2A**.

Figure- 3-1.2A – Access Route Option 2A



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Access Route Option 6

- 3.1.9. Access Route Option 6 has been developed as a result of the submission of the Land East of Horndean application 55562/004, to the north of the reservoir. As shown in **Figure 3-2**, the turning head near the football pitch in the masterplan for application 55562/004 provides a possible location for an access road to be developed. The route would be 1480m long extending from the turning head and have an overall length of 1935m from the B2149. The masterplan of application:55562/004 with the link to Access Route Option 6 can be seen in **Figure 3.1.6**.

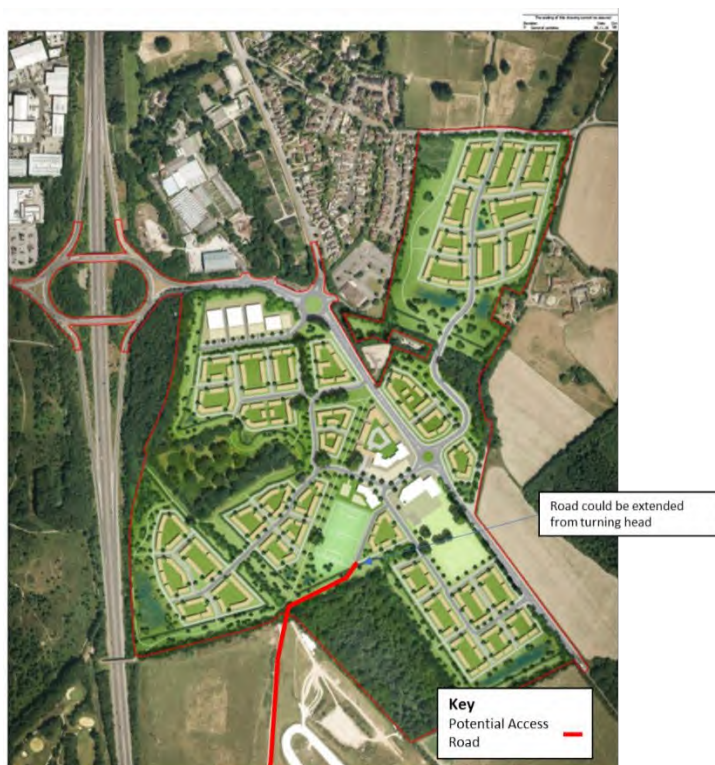
Figure- 3.1.6 – Access Route Option 6



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Figure 3.2 – Access Route Option 6 on the masterplan of application:55562/004

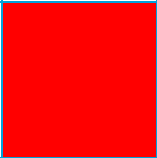


3.2. Environmental Summary

Methodology

- 3.2.1. A high-level desk-based assessment of each access route option has been undertaken to assist in differentiating between the relative impacts of different access route options. A list of environmental topics and receptors was determined having regards to the Early Assessment and Sifting Tool (EAST) and other key drivers including the National Planning Policy Framework 2019 (NPPF 2019) and environmental context:
- Historic Environment;
 - Biodiversity;
 - Air Quality;
 - Noise;
 - Landscape and Visual;
 - Water;
 - Geology, Soils and Materials;
 - People and Communities, and;
 - Climate.
- 3.2.2. The approach was developed with reference to the decision-making criteria identified under the relevant environmental headings within the generic impacts section of NPPF. Consideration was given as to whether they were relevant to the environmental context and, in the interest of proportionality, could be meaningfully assessed on the basis of the information available.
- 3.2.3. A desk-based qualitative assessment of the potential impacts of each access route option was undertaken for each receptor by technical specialists, based primarily on the presence or absence of a receptor within, or in proximity to, each access route option.
- 3.2.4. A 5-point scale-based approach to scoring was adopted for the assessment of options against each environmental receptor, which were defined by technical specialists for each environmental receptor. Where feasible, the scoring considered adverse and beneficial effects.
- 3.2.5. Following the assessment against each environmental receptor, the technical specialists then provided an overall topic score. The 5-point scale provides an indication of the level of environmental risk or benefit associated with each access route option, based on the likelihood of impacts to high value receptors and the number of receptors likely to be affected. Based on the EAST methodology, it was not intended that 5-point scale scores for individual questions / criterion are aggregated or averaged to provide a final 5-point scale status for each topic. Each overall topic score was determined based on a qualitative assessment informed by a combination of assessments against individual receptors and expert judgement. The 5-point scale is set out in **Table 3-1**.

Table 3-1 - Point Scoring Scale

Numerical Scoring	Colour Code	Assessment	Scale
1		Moderate - high level of risk of an adverse impact to high value / sensitivity designations or receptors; or for adverse impacts on a moderate - large number of sensitive receptors within the route corridor	Very Poor
2		Low-moderate level of risk of an adverse impact to high value / sensitivity designations or receptors; or for adverse impacts on a low- moderate number of sensitive receptors within the route corridor	Poor
3		Neutral or limited effects or a low level of risk of an adverse impact to high value / sensitivity designations or receptors; or a limited number of sensitive receptors within the route corridor	Neutral
4		Potential for beneficial effects or enhancements to high value / sensitivity designations or receptors; or for beneficial effects to a low - moderate number of sensitive receptors within the route corridor	Good
5		Potential for substantial beneficial effects or enhancements (inbuilt as part of the scheme) to high value / sensitivity designations or receptors; or for beneficial effects to a moderate - large number of sensitive receptors within the route corridor	Very good

Baseline Screening

A desk-based qualitative assessment of potential impacts was undertaken for each environmental topic and corresponding receptors by technical specialists. This assessment was based primarily on the presence or absence of environmental receptors included in **Table 3-2** below within, or in proximity to each route access option.

Table 3-2 - Environmental Receptors Point Scoring Scale

Environmental Receptors	Southern routes 1, 1A, 1B, 1C, & 1D	Northern routes 2, 2A, 3, 4, 5, 6
Sensitive receptors inc residential properties, PRoW inc bridleways and cycle routes, and open space in the vicinity of Warren Park, Leigh Park, Rowlands Castle and Staunton Country Park, and local road network, as well as human health receptors using these	✓	✓
Hampshire Historic Environment Record (HER) records several finds of flint artefacts in the area, and records cropmarks	✓	x
Grade II Listed buildings along the B2149 at Rowlands Castle	x	✓
Site of Brickworks (HER Record 54724)	x	✓
Sir George Staunton Conservation Area	x	x
Staunton Historic Park and Garden	x	x
Noise Important Areas (IAs) (IA14795 and IA1859)	✓	✓
Air Quality Monitoring Sites (site 10 and 15)	✓	✓
South Downs National Park	x	✓
Staunton Country Park	✓	✓
Ancient woodland, ancient semi-natural woodland, and planted ancient woodland at Havant Thicket and Bells Copse	✓	✓
European protected species - bats, dormouse, reptiles and great crested newts	✓	✓
Priority habitats	✓	✓
Cabbage Field Row SINC, Dunsbury Hill Grassland 2 SINC, Dunsbury Hill Wood SINC and The Warren Havant SINC on Calshot Road and Cherry Tree Row SINC and Beechwood SINC and Bells Copse SINC	✓	✓
Hazelton Common LNR	✓	✓
Woodland owned by Forestry England with permitted access along logging tracks		✓
Park Lane Stream, Hermitage Stream unnamed watercourses	✓	✓
Source Protection Zone 1 associated with the regional Chalk Principal Aquifer	✓	✓
Bedhampton and Havant Springs groundwater Drinking Water Safeguard Zone	✓	✓
Flood Zones 1 and 3	✓	✓
Clay Minerals Safeguarding Area (MSA) and a Minerals and Waste Consultation Area	✓	✓
Grade 3 with low likelihood of BMV, Grade 4, and Grade 5	✓	✓
Historic landfill at Dunsbury Hill Farm, Padnell Farm, Pyle Fram and Five Heads Farm	✓	✓
Dunsbury Park Development	✓	x
Future housing at land east of Horndean and Cabbage Field Row	✓	✓

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Environmental Appraisal Results

- 3.2.6. Overall Option 1B is considered to have a low to moderate risk of an adverse impact to high value / sensitivity designations or receptors in comparison with other northern and southern options.
- 3.2.7. It is noted that the receptor count for Option 1B is lower than for Options 1, 1A, 1C, 1D, broadly equal to Option 4, but higher than Options 2, 2A, 3, 5 and 6. Further noise assessment will be required to assess the level of impact once traffic flows for the construction and operation scenarios is available.
- 3.2.8. A programme of archaeological evaluation and/or recording, are likely to mitigate impacts from all Options 1 and 1A, 1B, 2, 2A, 3, 4, 5 and 6 on the historic environment reducing impacts to neutral to low risk.
- 3.2.9. It is unlikely that Options 1, 1A, 1B, 2, 2A, 3, 4, 5, and 6 would have any significant impacts on statutory designated ecological sites due to the distance to such sites.
- 3.2.10. In the south, apart from Option 1, Options 1A, 1B, 1C and 1D have the potential to avoid significant impacts on woodland and grassland SINC, deciduous woodland priority habitat, and habitat likely to support notable and legally protected species. Mitigation measures during construction would limit indirect impacts through noise, air and water pollution on SINC and ancient woodland.
- 3.2.11. The majority of the access route options in the north are located along existing logging tracks. Option 2, 2A and 5 result in loss of irreplaceable ancient woodland habitat, designated as part of Idsworth Common SINC and Havant Thicket SINC that support EPS - dormice, bats and great crested newts (Option 5). Option 3, 4 and 6 would result in little or no tree clearance but a greater disturbance to woodland habitat than Option 2 and 2A.
- 3.2.12. Whilst Options 1, 1A, 1B, 1C and 1D would not impact directly on national or regional landscape designations, Options 2, 2A, 5 and 6 have the potential to have adverse landscape and visual impacts on the adjacent South Downs National Park, with Options 2 and 5 also resulting in the loss of existing woodland.
- 3.2.13. All options would impact on the visual amenity of users of PRow and permissive routes in Havant Thicket. Access route options in the south have the potential to detract from the local landscape character and visual amenity of Staunton Country Park although the design development of the reservoir site has the potential to mitigate this impact.
- 3.2.14. Option 1 requires a new crossing of Park Lane Stream and is considered to have a moderate – high risk to the water environment. The effect of 1A, 1B, 1C and 1D would depend on the level of modification work needed (if any) to existing stream crossings. Option 2 would not cross or run immediately adjacent to any watercourses and would have a negligible impact on flood risk.
- 3.2.15. There is a low to low-moderate risk that Options 1A, 1B, 1C, 1D, 2A, 3, 4, 5, and 6 would have an adverse impact on watercourses and flood risk. Suitable mitigation would need to be in place requiring: suitable flood compensation; sensitive design mitigation to manage water quality and morphological issues to ensure compliance with the Water Framework Directive (WFD); and implementation of environmental management measures.
- 3.2.16. Options 1A, 1B, 1C and 1D would result in a neutral or limited level of risk in relation to ground conditions. Option 1 in the north and Options 2, 2A and 6 would result in a moderate-high level of risk due to the presence of the landfill and the important agricultural and mineral resources, whilst within Options 2, 2A, and 6 the overall assessment is that Options 2, 2A and 6, would result in a moderate-high level of risk, Options 3, 4 and 5 would result in and a low-moderate level of risk.
- 3.2.17. All options in the north and south would affect the amenity of users of open space and non-vehicular routes, whilst Options 1A, 1B, 1C, and 1D would all adversely affect the local amenity in residential areas, with Options 1D and 1A having the highest receptor count. Options 2, 2A, 3, 4 and 5 would adversely affect the amenity of a significant number of recreational users of woodland.
- 3.2.18. Options 1 and Option 6 have the potential to impact on proposed development at Dunsbury Park and south of Horndean.
- 3.2.19. In terms of Climate effects and vulnerability, all options are likely to be negligible compared with overall UK emissions. Emissions from the construction of the route access options would vary

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according to the overall length and length of new highway. Options 1, 1A, 1B, 1C, and 1D all include at least 1010m of new highway. This means that even the shorter Route 1 Access Options may have higher emissions e.g. Options 1, 1B and 1C than other options where minimal or no new infrastructure is required e.g. Option 1C and Option 1D. Emissions from Option 2 will be higher than the Route 1 Access Options and Options 3 and 5, but lower than Options 4 (the highest), 6 and 2A.

Table 3-3 - Summary of Assessment Results for Each Option

Environmental Criteria	Option 1	Option 1A	Option 1B	Option 1C	Option 1 D	Option 2	Option 2A	Option 3	Option 4	Option 5	Option 6
Historic Environment	3	3	3	3	3	3	3	3	3	3	3
Biodiversity	2	3	2	3	3	1	2	2	2	1	2
Air Quality	2	2	2	2	2	2	2	2	2	2	2
Noise	3	1	2	1	1	2	2	2	1	2	2
Landscape and Visual	2	2	2	2	2	2	2	3	2	1	2
Water	2	2	2	3	3	3	2	2	2	2	2
Ground Conditions	1	3	2	2	2	1	1	2	2	2	1
Material Resources and Waste	2	3	3	3	3	2	2	3	3	3	2
Population and Health	2	2	2	2	2	1	1	1	1	1	2
Climate Effects	2	2	2	2	2	2	2	2	2	2	2
Climate Vulnerability	3	3	3	3	3	3	3	3	3	3	3
Overall Assessment	1 (24)	1 (26)	2 (25)	1 (26)	1 (26)	1 (22)	1 (22)	1 (25)	1 (23)	1 (22)	1 (23)

Environmental Appraisal of Access Route Options

- 3.2.20. The highest scoring route option 1B fell into the low-moderate risk of an adverse impact. All other options fell into a moderate to high risk of an adverse impact.

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3.3. Engineering Summary

Methodology

- 3.3.1. The assessment of the engineering viability of each route has considered the criteria and 5-point scoring methodology detailed in **Table 3-4**. The categories and criteria developed to assess each route are based on the requirements of the site and professional judgement.

Table 3-4 - Engineering 5 Point Scoring Criteria

Impact	Low/good		Average/neutral		High/adverse
Score	5	4	3	2	1
Approximate length of proposed access road	<1.38KM	No entry	1.38-1.48km	No entry	1.935km and greater
Viability of the construction of the potential access with the existing highway network	Likely to meet standard and feasible	No entry	This is likely to have an adverse impact and liable to require additional work	No entry	Likely to require complete remodelling of existing junction
Safety of proposed junction location with the existing highway network	No concerns	No Entry	No Entry	Some concerns about safety	Does not meet visibility or safety standards due to constraints
Land Acquisition for access junction	No Entry	Agreement required from developer - PCC	May require additional land on the existing carriageway for widening and some tree loss for visibility splays	Will require land leading to tree/hedgerow loss.	Will require land leading to significant tree and hedgerow loss
Ease of construction for proposed access	No Entry	Green field and/or off public developer road	6m access road on existing logging road with width for widening, or developer road	6m access road in woodland small percentage, large percentage on logging road with width for widening, open field or utilisation of developer road	6m access road on woodland or large percentage on private developer road or over developer land

Impact	Low/good		Average/neutral		High/adverse
Score	5	4	3	2	1
Potential legacy issues with road pavement construction	Low traditional road construction	No entry	Medium Mixture of traditional road pavement construction and pavement over tree root	Small traditional road pavement content with higher pavement over tree root content	Very high to all pavement over tree root pavement
Traffic impact at Warren Park, Leigh Park or Rowlands Castle	No impact	No entry	Exiting visitor traffic may leave through residential area		Large traffic impact
Status of potential land ransom	Land owned by East Hants DC/Forestry England	No entry	No Entry	Developer land	Developer land/private land
Status of Existing Stakeholder Engagement	Yes, the preferred option in previous public consultation	Yes, the second preferred option in public consultation	Not considered	No entry	No entry
Watercourse crossing	None	No Entry	Upgrade existing stream crossings	No Entry	Requirement for stream crossings

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Engineering Appraisal Results

3.3.2. The results of the engineering appraisal for each of the options is shown in **Table 3-5** below.

Table 3-5 - Engineering Appraisal Results

	Option 1	Option 1A	Option 1B	Option 1C	Option 1D	Option 2	Option 2A	Option 3	Option 4	Option 5	Option 6
Approximate length of proposed access road	3	5	5	5	5	3	3	3	1	3	1
Viability of the construction of the potential access with the existing highway network	5	5	5	5	5	5	5	3	1	3	5
Safety of proposed junction location with the existing highway network	5	5	5	5	5	5	1	5	2	1	5
Land Acquisition for access junction	4	4	4	4	4	3	1	3	1	1	5
Ease of construction for proposed access	1	1	3	3	3	1	3	3	3	1	1
Traffic impact at Warren Park, Leigh Park or Rowlands Castle	5	1	1	1	1	5	5	2	1	2	2
Potential Legacy issue of pavement construction	3	5	5	5	5	1	2	2	2	2	3
Status of potential land ransom	2	3	3	3	3	5	1	5	1	1	1
Status of Existing Stakeholder Engagement	1	3	3	3	3	5	3	1	1	4	3
Watercourse crossing	1	5	5	5	5	5	3	3	3	3	1
Overall Total	30	37	39	39	39	38	27	30	16	21	27
Ranking	6	5	1	1	1	4	8	6	11	10	8

Engineering Appraisal of Access Route Options.

3.3.3. Access Route Options 1B, 1C and 1D are the joint highest scoring options with a score of 39.

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3.4. Appraisal Against Project Drivers

3.4.1. An appraisal against the seven project drivers; quality, timeline, innovation, responsibility, flexibility, connectivity and environment has also been carried out. The criteria used to form this basis of assessment is shown in **Table 3-6** below. The appraisal has used a 3-point scale to remain consistent with project driver appraisals undertaken by different disciplines. The scoring criteria is as follows:

- 1 - High impact
- 2 - Medium Impact
- 3 - Low Impact

Table 3-6 - Appraisal Criteria Against the Seven Project Drivers

	High Impact	Medium Impact	Low Impact
	1	2	3
Quality			
Durability of access road	Cellweb granular pavement (low)	Mix	Flexible pavement (high)
Loss of existing amenity (track conversion to access)	High	Medium	Low
Timeline			
Programme (length of new pavement)	>1480	1200 - 1480	<1200
Ease of construction	Linear potential access issues	Linear enclosed site	Open site
Land owners	Private	PCC/EHDC/FE	PWC
Size/ features	Large (lengths and embankment)		Small
Innovation			
Technical Innovation		Standard	Specialist system
Responsibility			
Safety of access junction	High speed road/poor layout		Low speed road
Safety impact of additional traffic in residential areas	High	Medium	Low
Flexibility			
Whole Life Costing	High	Average	Low
Availability of asset		Regular intervention required	Nearly always available
Connectivity			
Third Party Land	Private developer	Neutral landowner	None
Operational access length	>4000m	>3000m and <4000m	<3000m
Environment			
Overall assessment	Moderate Impact	Low-moderate Impact	

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3.4.2. The appraisal results for each route against the project drivers in shown in **Table 3-7**

Table 3-7 - Project Driver Appraisal Results

Length new road (m)	1400	1010	1170	1040	1010	1440	1480	1390	2155	1430	1935
Operational length (m)	2510	3245	2775	2895	4810	2590	2480	3620	5225	3175	2770
	Option 1	Option 1A	Option 1 B	Option 1 C	Option 1 D	Option 2	Option 2A	Option 3	Option 4	Option 5	Option 6
Quality											
Durability of access road	3	3	3	3	3	1	1	2	2	1	3
Loss of existing amenity	2	3	3	3	3	1	1	1	1	1	3
Timeline											
Programme	2	3	3	3	3	2	2	2	1	2	1
Ease of construction	1	3	3	3	3	2	2	2	1	2	1
Land owners	2	2	2	2	2	2	1	2	1	1	1
Size/features	1	3	3	3	3	2	2	2	1	1	1
Innovation											
Technical Innovation	2	2	2	2	2	3	3	2	2	2	2
Responsibility											
Safety of access junction	3	3	3	3	3	1	1	1	1	1	3
Safety impact of additional traffic	3	1	2	2	1	3	3	3	3	3	1
Flexibility											
Whole Life Costing	3	3	3	3	3	1	1	2	1	2	2
Availability of asset	3	3	3	3	3	2	2	3	3	3	2
Connectivity											
Third Party Land	2	3	2	2	3	2	1	2	2	2	1
Operational access length	3	2	3	3	2	3	3	1	1	1	2
Environment											
Overall Impact	1	1	2	2	2	1	1	2	1	1	1
Total Score	31	35	37	37	36	26	24	27	21	23	24

3.4.3. As shown in

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3.4.4. **Table 3-7**, the appraisal against project drivers has identified route options 1B and 1C as scoring most favourably.

3.5. Overall recommendation

3.5.1. By comparing the results of the three appraisals; Option 1 B scores the best consistently.

3.6. Additional Access Points and Satellite Parking

3.6.1. Additional access points to the site from the existing highway network will be needed for maintenance purposes. These will provide the most accessible and direct routes to the relevant maintenance points in order to minimise the impact on the surrounding environment.

3.6.2. If Route Access Route Option 1B is taken forward, then the current proposal for an 8-12 car parking spaces from Swanmore Road will no longer be needed to be considered.

3.7. Junction Design

3.7.1. Once the preferred route is confirmed the carriageway and the access junction with the local highway will be designed to accommodate the number of trips generated by the site. Further details of the expected number of vehicular trips and visitor numbers generated by the site is detailed in a further technical note. This technical note is supported by the findings of the *Havant Thicket Visitor Numbers Review* produced by Planning Solutions Consulting in July 2019. As detailed in the note, it is expected that the site will generate 104 arrivals and 77 departures during the average Saturday peak (14:00-15:00) and 133 arrivals and 99 departures during the absolute Saturday peak (14:00-15:00).

3.7.2. The access junction will be subject to swept path analysis and will need to be provided with visibility splays in accordance the standards set in Hampshire's *'Technical Guidance Note TG3 - Stopping Sight Distances and Visibility Splays'*³.

Strengths and Weakness Summary of Access Option 1 B

3.7.3. Key Strengths

- Avoids impacting on ancient woodland, most of the construction is on Portsmouth Water Company/ Portsmouth City Council land;
- Retains and maintains amenity of access to and on site on Forestry England land;
- Relative ease of construction due to mostly open site;
- Relative speed of construction of due to ease of access;
- Long life pavements
- Low intervention levels for maintenance of access pavement.
- Ease of access to site for residents of Leigh Park and Warren Park.

3.7.4. Key Weaknesses

- Construction traffic and operational traffic will pass through Leigh Park / Warren Park with commensurate noise, air quality and safety considerations. Mitigation – shortest length passing through Leigh Park/ Warren Park selected for non-local traffic thereby limiting the number of receptors;
- Need to gain access via Portsmouth City Council land – Dunsbury Park development. Mitigation close consultation on proposed development and traffic levels;

³Hampshire County Council (2019) *Technical Guidance Note TG3 - Stopping Sight Distances and Visibility Splays* <https://documents.hants.gov.uk/highways/TG3TechnicalGuidanceNote-StoppingSightDistancesandVisibilitySplays.pdf>

- Potential use of road as rat-run from Warren Park/ Leigh Park to A3(M) leading to increase in non-visitor traffic. Mitigation – consideration given to additional traffic calming measures to discourage this behaviour; and
- Low quality visual approach through residential estate. Mitigation consider the potential to provide enhanced landscaping on the approach in agreement with Portsmouth CC and Hampshire CC.

4. Next Steps and Recommendations

- 4.1.1. Access Option 1B has been determined as the leading access option.
- 4.1.2. A key factor in gaining endorsement for the recommended option is the support of Portsmouth City Council as access through the Dunsbury Park development is required. Early discussions have already taken place. Further dialogue is required to secure their support to the scheme and to facilitate the delivery of the project.
- 4.1.3. Further consultation will be pursued with key stakeholders and the local highway authority to further investigate the viability of the leading access option.
- 4.1.4. If the support of Portsmouth City Council is not secured; then the next best solution would be access option 2. An arboriculture survey has been carried out in the area impacted by the alignment of option 2. This will determine whether the impact on the ancient woodland can be minimised to an appropriate level.
- 4.1.5. Following the stakeholder consultation, a clear preferred option should be confirmed or an alternative derived. This will then be proposed as the preferred option which will be subject to public consultation in May 2020 and the subsequent planning application.

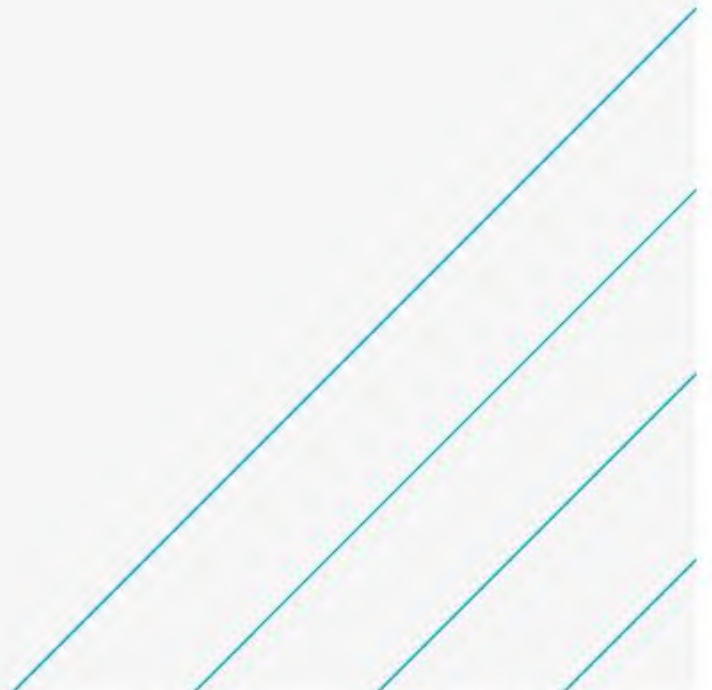
Appendix D. Stage One Road Safety Audit (RSA)

Access Proposals to Havant Thicket Reservoir, Havant

Stage 1 Road Safety Audit Response Report

Hampshire County Council

July 2020



Notice

This document and its contents have been prepared and are intended solely as information for Hampshire County Council and use in relation to the Stage 1 Road Safety Audit Response report.

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This document has 15 pages including the cover.

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev P01.1	Draft for Comment	EC				15/7/2020

Client signoff

Client	Hampshire County Council
Project	HTR Havant Thicket Outline Design
Job number	5169117
Client signature / date	

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Introduction

1. Authorisation Sheet

Project: HTR Havant Thicket Outline Design
Report Title: Stage 1 Road Safety Audit Response Report

PREPARED BY:

Name: **Andrew Hills**

Position: Design Team Leader

Signed:



Organisation: Atkins

Date: 15th July 2020

APPROVED BY:

Name:	Tom Fisher
Position:	Project Sponsor
Signed:	
Organisation:	Hampshire County Council
Date:	
Route Number:	Swanmore Rd / B2149
Road Name:	Swanmore Rd / B2149
Scheme:	HTR Havant Thicket Outline Design
Road Safety Audit:	Stage 1

Comments:

2. Introduction

2.1. Commission and Terms of Reference

Atkins has been commissioned by Hampshire County Council (HCC) to undertake a Stage 1 Road Safety Audit (RSA) of the proposals to provide two separate points of highway access to the Havant Thicket Winter Storage Reservoir, which will be located in the 'Upper Lake' area of Havant Thicket, between A3(M) to the west and B2149 to the east. Hampshire County Council is the highway authority for both the Swanmore Road and the B2149 and on this basis the RSA has been undertaken in accordance with GG 119 Road Safety Audit with the variations provided in the HCC TG18 (reference para. 2.2). Also noted are the relaxations under COVID 19 restrictions as described under the TG18 on the Hants CC webpage. This allows attendance on site by the RSA Team Leader only.

The RSA team comprised the following staff:

Rebecca Thomas	BSc (Hons), MCIHT, MSoRSA (Certificate of Competency in Road Safety Audit gained in 2017) Senior Operational Safety Consultant Atkins RSA team leader
Kate Hatton	BA (Hons), MCIHT (Certificate of Competency in Road Safety Audit gained in 2019) Transport Planner Atkins RSA team member

Both team members are approved by HCC.

The RSA consisted of:

- A review of the information provided in the RSA Brief; and
- The primary site visit completed to undertake the RSA inspection was carried out during daylight hours on the 16 June 2020 Between 10:30am and 11:30am. During this visit weather conditions were bright and sunny and the road surface was dry. Traffic conditions during the site visit were light to moderate. The Team Leader only attended the site visit recording their observations with photographs and video evidence to share with the Audit Team Member. This was agreed by the Overseeing Organisation, HCC, as part of their COVID-19 requirements as follows:
For Stage 1 and 2 Road Safety Audits:
 - *These audits are still required for a design submission to pass inception, however we will accept the either of the following:*
 - a) The lead auditor visits the site, takes photos/video and then supplies this information to the other auditor, so they are both reviewing the same information. The report will need to clearly state how the audit was undertaken.*
 - b) Both auditors visit the site, travelling independently and keep the 2m distance rule in place. Again report will need to clearly state how the audit was undertaken.*

The site visit to the B2149 (northern point of access to the site) was conducted via a layby north of the site due to the absence of footway provision and drive-throughs were undertaken to obtain video evidence. The site off Swanmore Road (southern access) was visited on foot.

The RSA Brief was provided by Andrew Hills of Atkins to Tom Fisher of HCC as the nominated representative of the Overseeing Organisation and Rebecca Thomas of Atkins as the RSA team leader. As per para. 2.2 in TG18, the RSA brief does not require formal approval by the Project Sponsor before proceeding with the RSA.

This stage 1 RSA has been conducted in accordance with the procedures and scope set out in the Design Manual for Roads and Bridges, Volume 5, Section 2, Part 2, GG 119 Road safety audit. The RSA Team has examined and reported only on the road safety implications of the measures as proposed and has not specifically examined or verified the compliance of the designs to any other criteria. Where there are issues that may be of interest to the scheme designer, but not necessarily within the scope of the RSA, these have been provided to the client separately.

Details of the information provided within the RSA Brief are included in **Appendix A**. Problems and recommendation locations are indicated on the plan of the scheme included in **Appendix B**.

2.2. Scheme and Design Objectives

The RSA brief states:

"The scheme involves the construction of a storage reservoir for Portsmouth Water, in the 'Upper Lake' area of Havant Thicket, between A3(M) to the west and B2149 to the east. To provide access for construction and visitors traffic to/from the Havant Thicket Reservoir site, two options have been chosen to be developed at the preliminary design stage.

The South Option consists of a 6m wide new link (two lanes single carriageway) of new carriageway between Swanmore Road and the reservoir visitor's car park. This option joins the existing road network through a simple T junction with Swanmore Road. For this junction, 15m corner radiuses were adopted.

The North Option is designed as a new 3.65m wide single lane single carriageway, with passing bays to allow for two-way traffic. At locations where there are sharp bends there will be a need to widen the carriageway to prevent verge over-run. This design was adopted to reduce the loss of Ancient Woodland land. This option will be connected with the B2149 through a ghost island junction. The layout adopted for this junction is as per DMRB CD123 rev. 1, para. 5.6.3. The access road adjacent to the junction will be 6m wide and will then taper down to 3.65m.

The construction of the reservoir is programmed from 2021 to 2029. The construction of the access roads will have to be completed before this to provide access to reservoir construction traffic and will require temporary traffic management to be in place on both Swanmore Road and B2149.

The two junctions mentioned above are to be covered under the requested Road Safety Audit report.

A stage 2 Road Safety Audit will have to be undertaken after the completion of the detail design."

3. Items Raised at previous Road Safety Audits

This was the first Road Safety Audit produced for the scheme.

DRAFT

4. Road Safety Audit Decision Log

RSA Reference	RSA Problem	RSA Recommendation	Design Organisation Response	Overseeing Organisation Response	Agreed RSA Action
A	Problem A Location: A (drawing HTR-ATK-AR-RE-DR-D-0006) New access off Swanmore Road Summary: Absence of footway provision could lead to trips and falls The southern access to the site will be provided off Swanmore Road opposite a large housing estate. This residential area is likely to generate a large number of pedestrian trips to the site. Current pedestrian provision includes an informal path from Swanmore Road which leads into the wooded reservoir area and towards a style over a fence where another footpath is provided. The drawings do not show any provision for pedestrians accessing the site (or retention of existing provision) such as footways along the access road or footpaths into the site. There are also no proposals to provide any crossing facilities to cater for a likely desire line between the housing estate and the site access which is likely to be due to the absence of proposals to provide pedestrian access into the site at this location. In the absence of pedestrian routes into the site from Swanmore Road pedestrians may walk along the grass verge of the access road where they will be at risk of slips and falls particularly during wet conditions. Furthermore, pedestrians may walk in the carriageway where they could be at risk of being struck by vehicles particularly during the hours of darkness when they would be less conspicuous. In the absence of a crossing facility on Swanmore Road, mobility impaired pedestrians and those in wheelchairs may experience difficulties at full height kerbs which present a trip hazard and could leave them stranded in the carriageway and at risk of being struck by a passing vehicle. The lack of crossing facility may also lead to pedestrians crossing at unsafe locations where visibility is compromised which could increase the risk of a pedestrian being struck by a vehicle.	Recommendation It is recommended that a safe means of pedestrian access into the site is provided from Swanmore Road and that a crossing facility based on likely flows is provided to assist pedestrians crossing between the housing estate and the site	Agreed We believe pedestrians can use the existing uncontrolled crossing, which is located adjacent to the existing bus stop, approx. 130m south from the new junction. There is a proposed pedestrian access to the site at the back of the bus shelter at that location which is connected with the operational maintenance track by a proposed footpath. Considering the low frequency of vehicle usage of the operational maintenance track and the low speed of these vehicles, it is proposed that the operational maintenance track will be shared with pedestrians/cyclists. Also, after joining/crossing the maintenance track, the proposed footpath joins the footpath which runs around the top of the reservoir embankment.		
B	Problem B Location: B (drawing HTR-ATK-AR-RE-DR-D-0006) New access off Swanmore Road Summary: On street parking could obstruct visibility and lead to junction collisions The proposals involve the construction of a new T-junction off Swanmore Road. There are currently no parking restrictions along either side of Swanmore Road. During periods of high demand the car parks within the site may be full to capacity. As a result, visitors may park along Swanmore Road close to the new junction. Vehicles parked along Swanmore Road in the junction visibility splay may obstruct intervisibility between drivers exiting the access	Recommendation It is recommended that parking within the visibility splay of the junction is discouraged through the use of double yellow lines extending along Swanmore Road and around the junction radii.	Agreed This was identified and is being in discussion with the Local Highway Authority with the view to include a Traffic Regulation Order to control on street parking. Double yellow lines will have to be included in the next design phase to discourage parking on the bellmouth of the new junction.		

	road and drivers approaching the junction. This may increase the risk of a driver pulling out into the path of a vehicle on Swanmore Road with a side impact or nose-to-tail collision occurring as a result.				
C	Problem C Location: C (drawing HTR-ATK-AR-RE-DR-D-0002) New access off B2149 Summary: Vegetation within visibility splay could lead to junction collisions A new T-junction will be constructed on the B2149 to provide access to the site from the north. The B2149 is subject to national speed limit with an 85th percentile speed of 53mph. Vegetation in the verge of the B2149 adjacent to the junction could obstruct the visibility splay increasing the risk of a driver pulling out of the access into the path of a vehicle on the mainline with a side-swipe or nose-to-tail collision resulting.	Recommendation It is recommended that all obstructions which fall within the junction visibility splay are removed.	Agreed We agree that vegetation trimming is required on both sides of the new junction and undertaken on a regular basis after opening.		
D	Problem D Location: D (drawing HTR-ATK-AR-RE-DR-D-0002) New access off B2149 Summary: Propensity for overtaking manoeuvres increases risk of junction collisions The B2149 is a high speed road subject to national speed limit. Four of the seven collisions which occurred along the route in the 7-year period to 31 December 2019 involved overtaking vehicles. Although this equates to less than one collision per year the new junction creates an additional hazard along the route. Drivers who fail to realise there is a junction ahead may attempt to overtake a slower moving vehicle and find themselves on the wrong side of the carriageway as another driver turns out of the site access road resulting in a head-on collision or they may encounter a stationary vehicle in the right turn lane and a nose-to-tail collision result.	Recommendation It is recommended that measures such as solid white lines are provided along the centre of the B2149 on the approaches to the junction (see figure 5-7 of Chapter 5 of the Traffic Signs Manual) to deter overtaking.	Agreed We agree with forbidding overtaking on the approaches to the new junction and with the use of double white lines around the ghost island. Formal agreement for extent of double white lines will have to be agreed with the Local Highway Authority. 'No overtaking' signs to be used on the approaches. Considering the new development further north of the proposed junction, the related section of road is proposed to have a 40mph speed restriction which is continued south until adjacent to the north end of the taper for the proposed ghost island junction. We believe the local Highway Authority are not too keen to extend the 40mph limit further south because this will be perceived as an urbanisation of a rural area, however, the start of the centre double white lines combined with the 'No overtaking' and the 'Side road' signs will prevent drivers going south from starting an overtaking manoeuvre on this section of road.		
E	Problem E Location: E (drawing HTR-ATK-AR-RE-DR-D-0002) Northbound and southbound on B2149 on access approaches Summary: Substandard Stopping Sight Distance increases risk of nose-to-tail and side impact collisions at the junction The B2149 is a high speed road with an 85th percentile speed of 53mph and during the drive through site visit it was observed that, particularly in a northbound direction, the junction was not immediately visible on the approach. Due to the vertical alignment which includes crest curve to the south of the junction, stopping sight distance on both approaches is substandard and this is confirmed by the visibility reports and long sections.	Recommendation It is recommended that measures are taken to achieve compliant SSD. These may include: • Alterations to the vertical alignment of the B2149 • Relocation of the junction • A reduction in speed limit with supporting measures to ensure compliance If none of the measures listed above can be implemented approval of a Departure from Standard will need to be sought with accompanying mitigation measures to ensure that the new junction does not compromise road user safety along the route.	Disagreed "As a result of reduced SSD, drivers waiting to turn out of the junction may not see a vehicle approaching the junction" – The visibility splays from the junction for both left and right directions meet the required length criteria. Agreed Only the 0.26m high target for the SSD check is not achieved for vehicles traveling along B2149. The required SSD is achieved for a target object higher than 0.5m above ground.		

	CD 109 paragraph 2.13 specifies that on immediate approaches to a junction there should not be any relaxations for SSD. As a result of reduced SSD, drivers waiting to turn out of the junction may not see a vehicle approaching the junction and may not be seen by a driver on the mainline until the last minute leading to an increased risk of nose-to-tail and side-impact collisions at the junction. The alignment is such that a driver may not see a vehicle ahead slowing to turn into the access leading to late braking and a subsequent nose-to-tail collision at the junction. The vertical alignment of the approaches may also increase the risk of a southbound vehicle turning right across the path of a northbound vehicle with a side-impact collision resulting due to reduced intervisibility between drivers.		Site will be open only during daylight hours which will help drivers having a better perception on the new junction layout and observing any vehicles ahead slowing down. Considering the new development further north of the proposed junction, the related section of road is proposed to have a 40mph speed restriction which is continued south until adjacent to the north end of the taper for the proposed ghost island junction. We believe the local Highway Authority are not too keen to extend the 40mph limit further south because this will be perceived as an urbanisation of a rural area, however, the start of the centre double white lines combined with the 'No overtaking' and the 'Side road' signs will inform drivers on the south bound about the new junction layout and make them concentrate more on the road ahead.		

Appendix A – Information Contained Within the Audit Brief

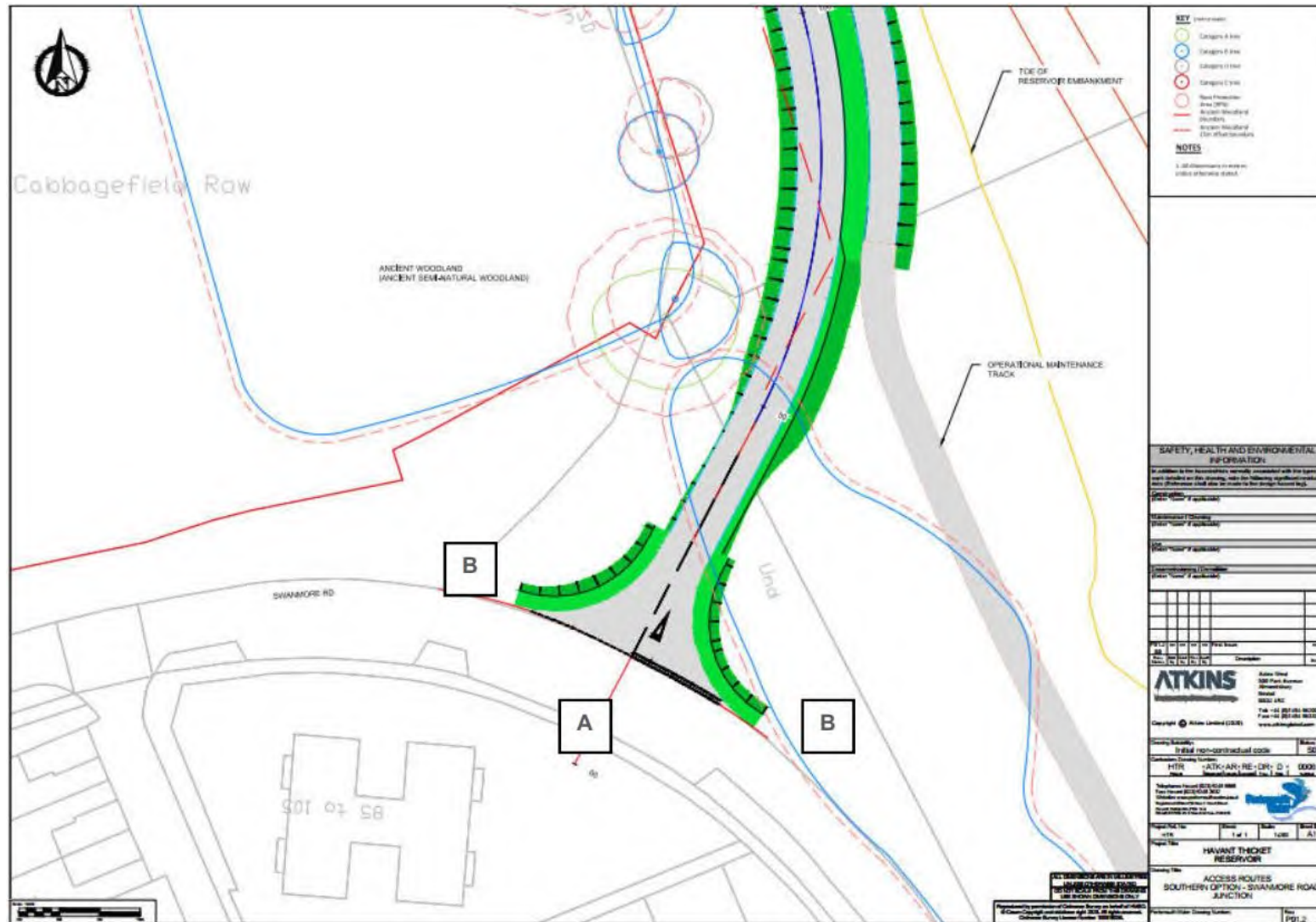
A.1. Documents

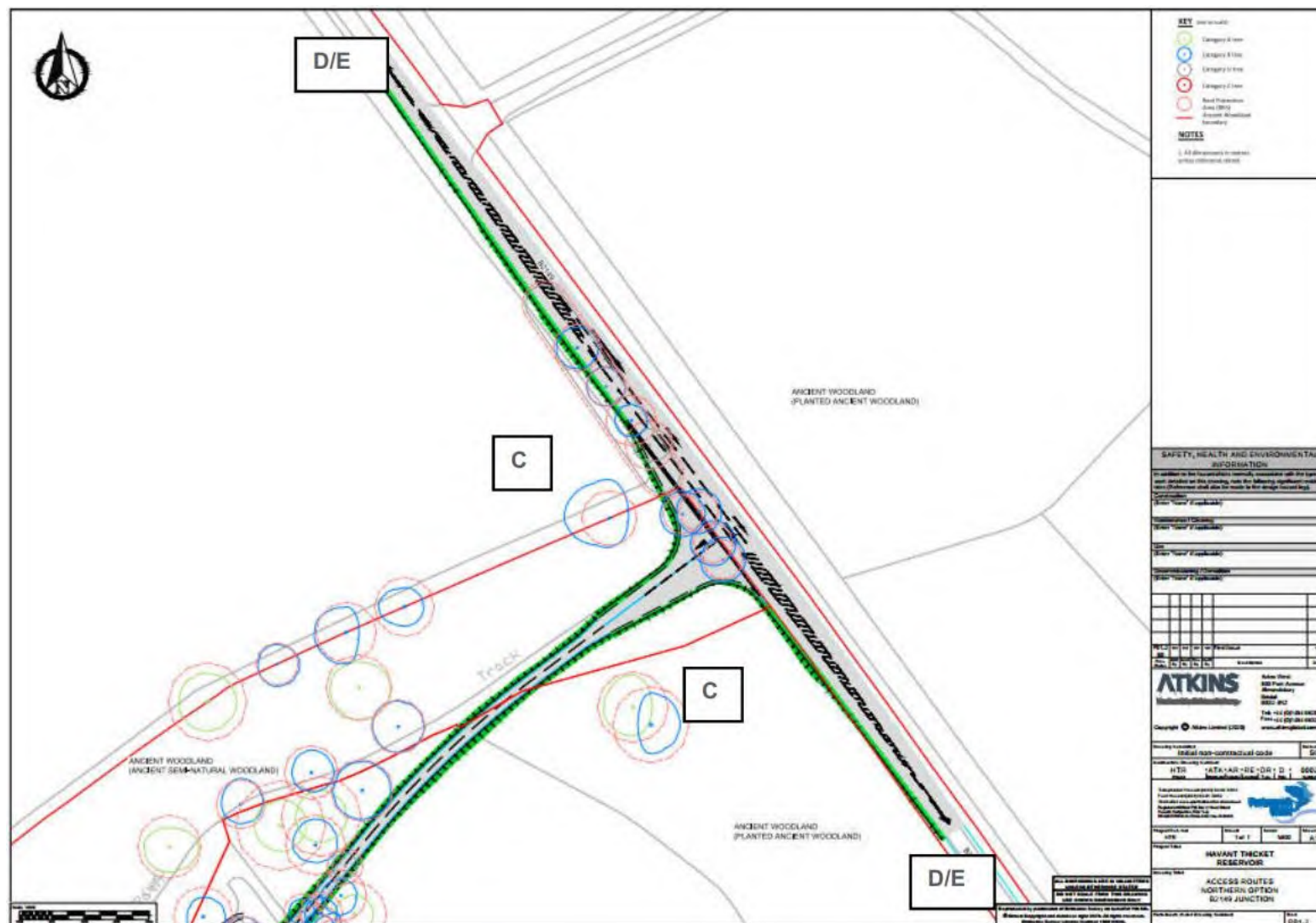
HTR-ATK-XX-ZZ-RP-Z-0002 - Havant Thicket Reservoir Access Route Access Options Basis of Design Technical Note
HTR-ATK-XX-XX-RP-Z-0021 - Technical Note Access Route Options Appraisal at Havant Thicket
BACSSR0620059 - MAP - CALSHOT ROAD (003).JPG – Swanmore Rd and Calshot Rd Accidents Map
BACSSR0620059 - REPORT - CALSHOT ROAD.PDF – Swanmore Rd and Calshot Rd Accidents Details
BACSSR0620059 - MAP - B2149 HORNDEAN (002).JPG – B2149 Accidents Map
BACSSR0620059 - REPORT - B2149 HORNDEAN.PDF – B2149 Accidents Details

A.2. Scheme Drawings

HTR-ATK-AR-RE-DR-D-0001 - HTR - Access Routes - Northern Option - Scale 1:2000
HTR-ATK-AR-RE-DR-D-0002 - HTR - Access Routes - Northern Option B2149 Junction - Scale 1:500
HTR-ATK-AR-RE-DR-D-0005 - HTR - Access Routes - Southern Option – Swanmore Road - Scale 1:2000
HTR-ATK-AR-RE-DR-D-0006 - HTR - Access Routes - Southern Option – Swanmore Road Junction - Scale 1:200

Appendix B – Locations of Problems

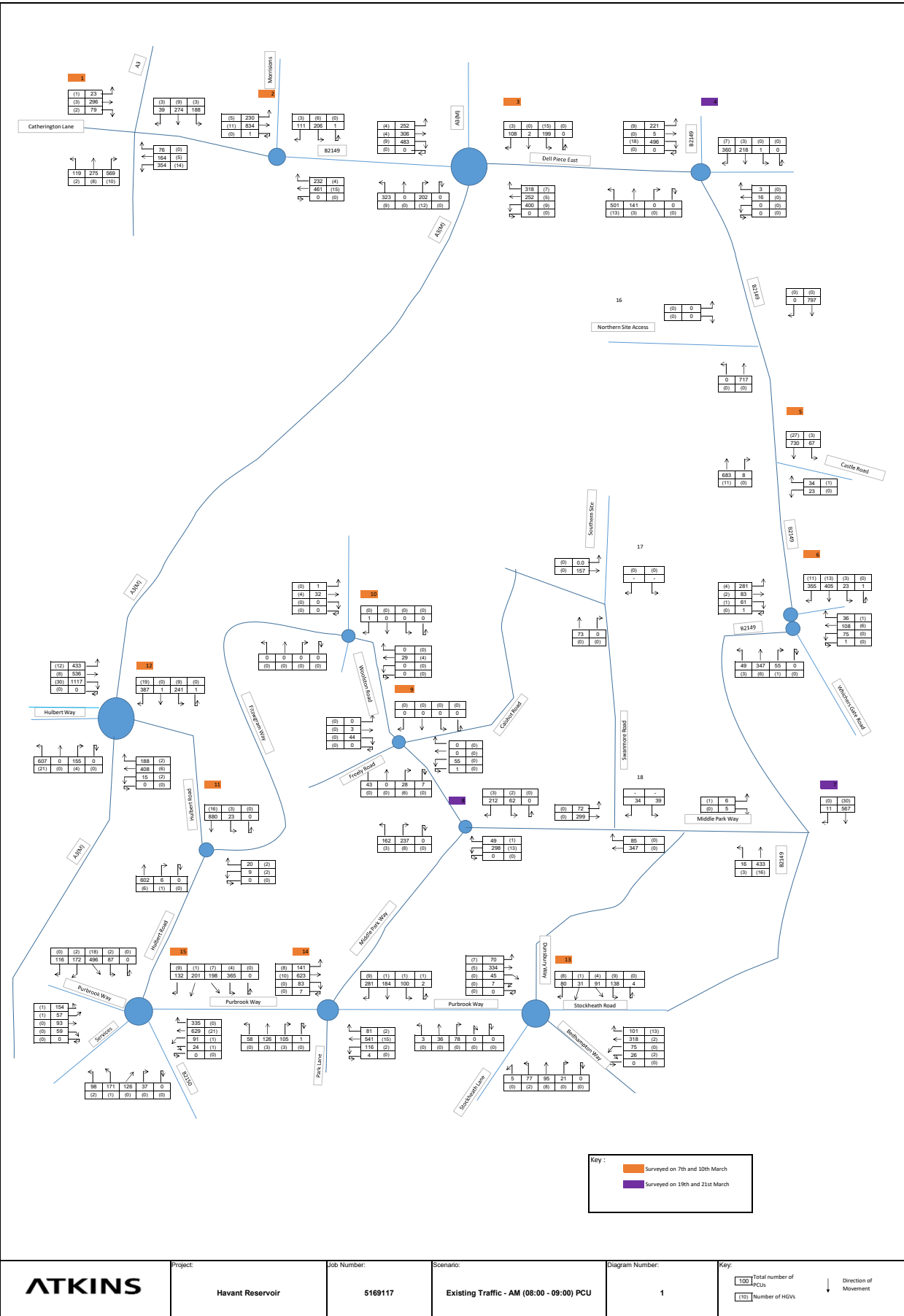


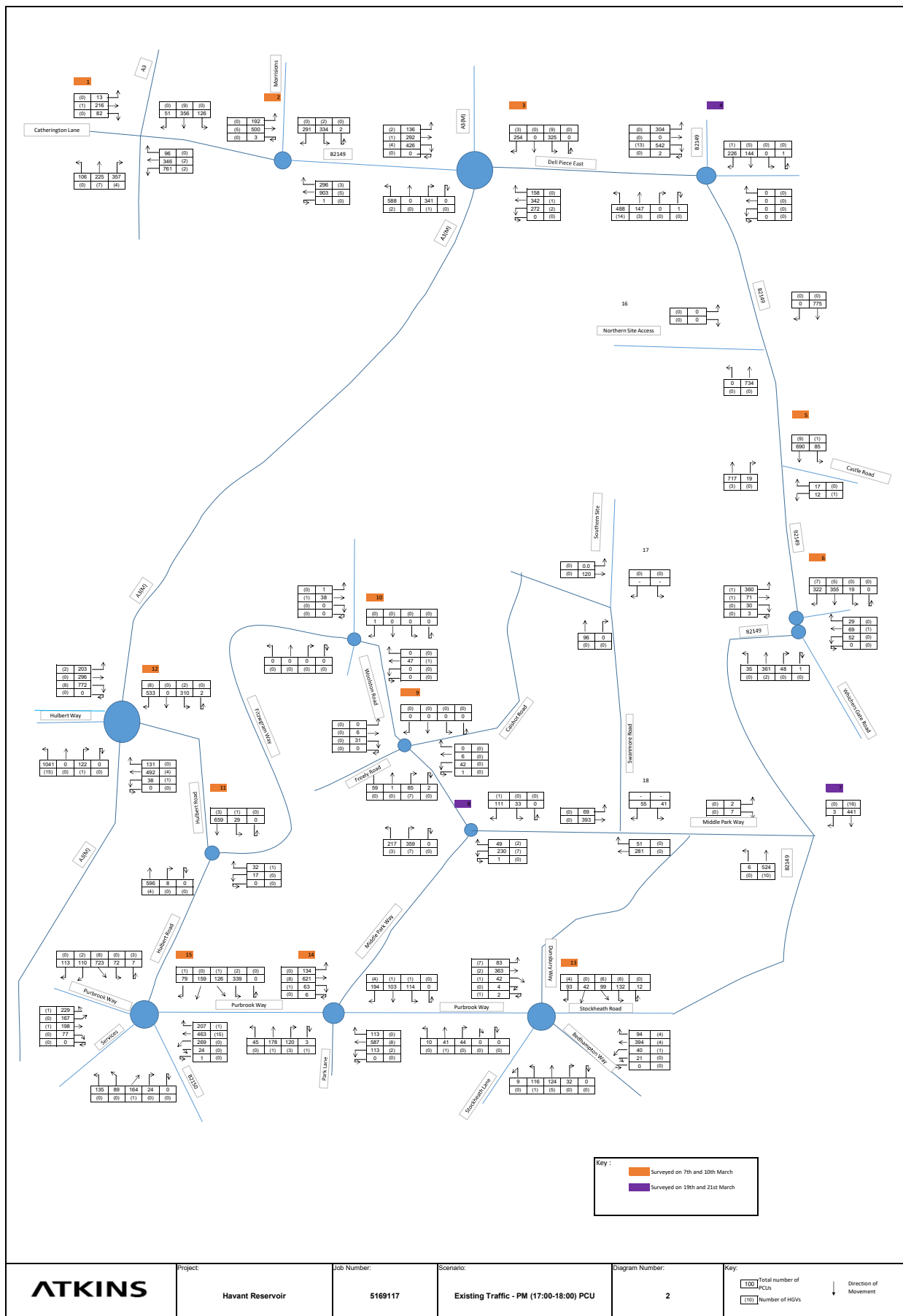


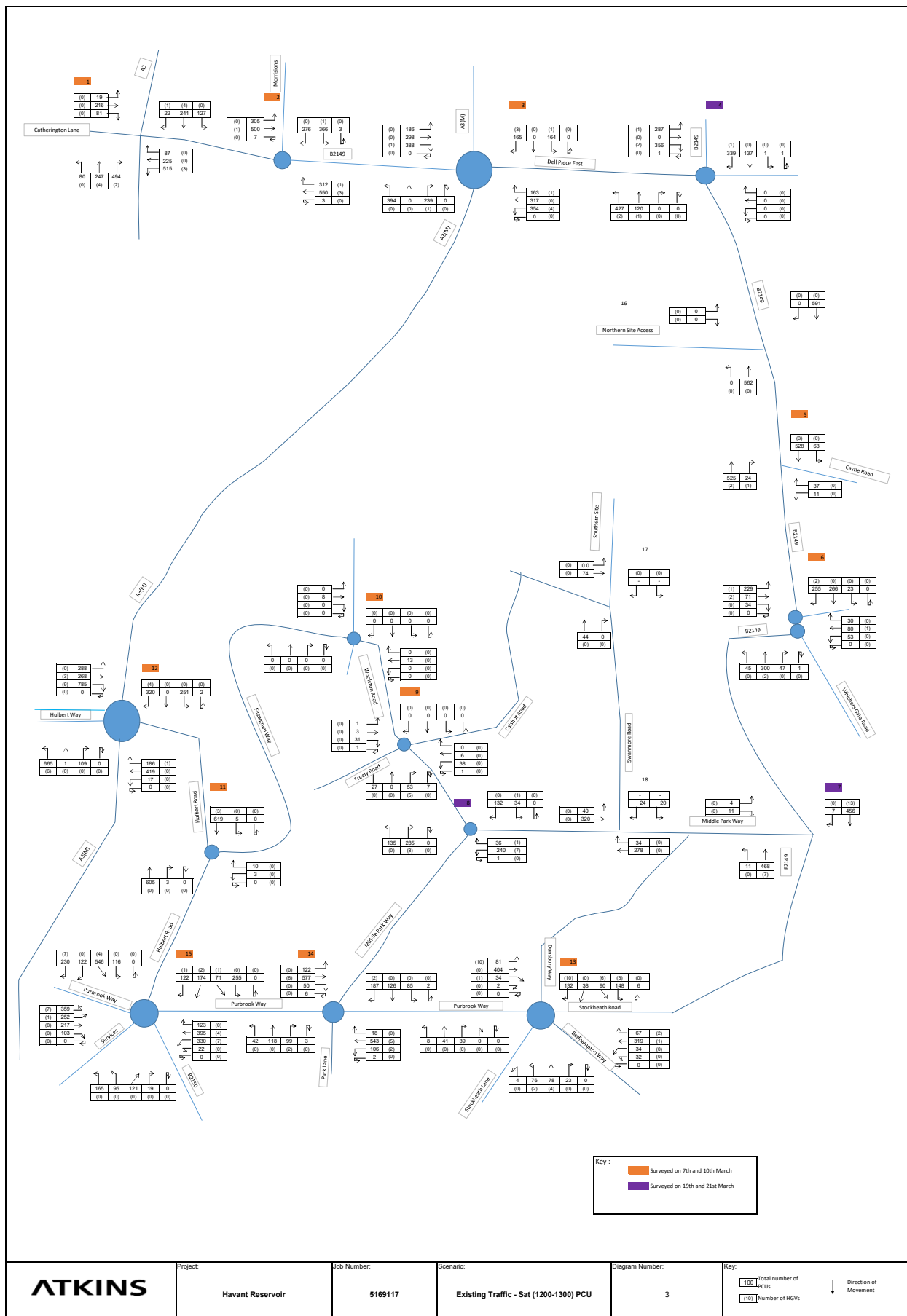
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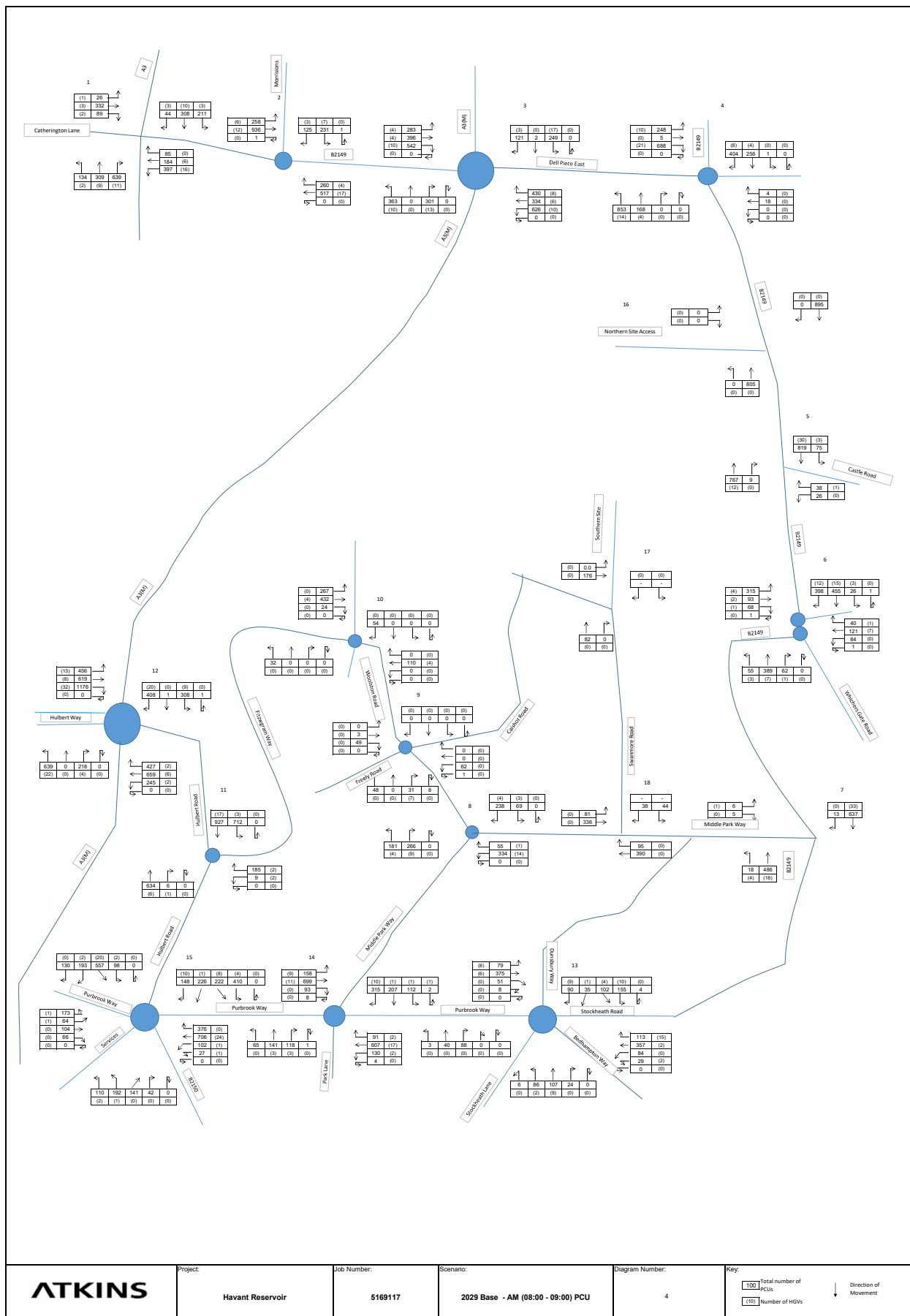
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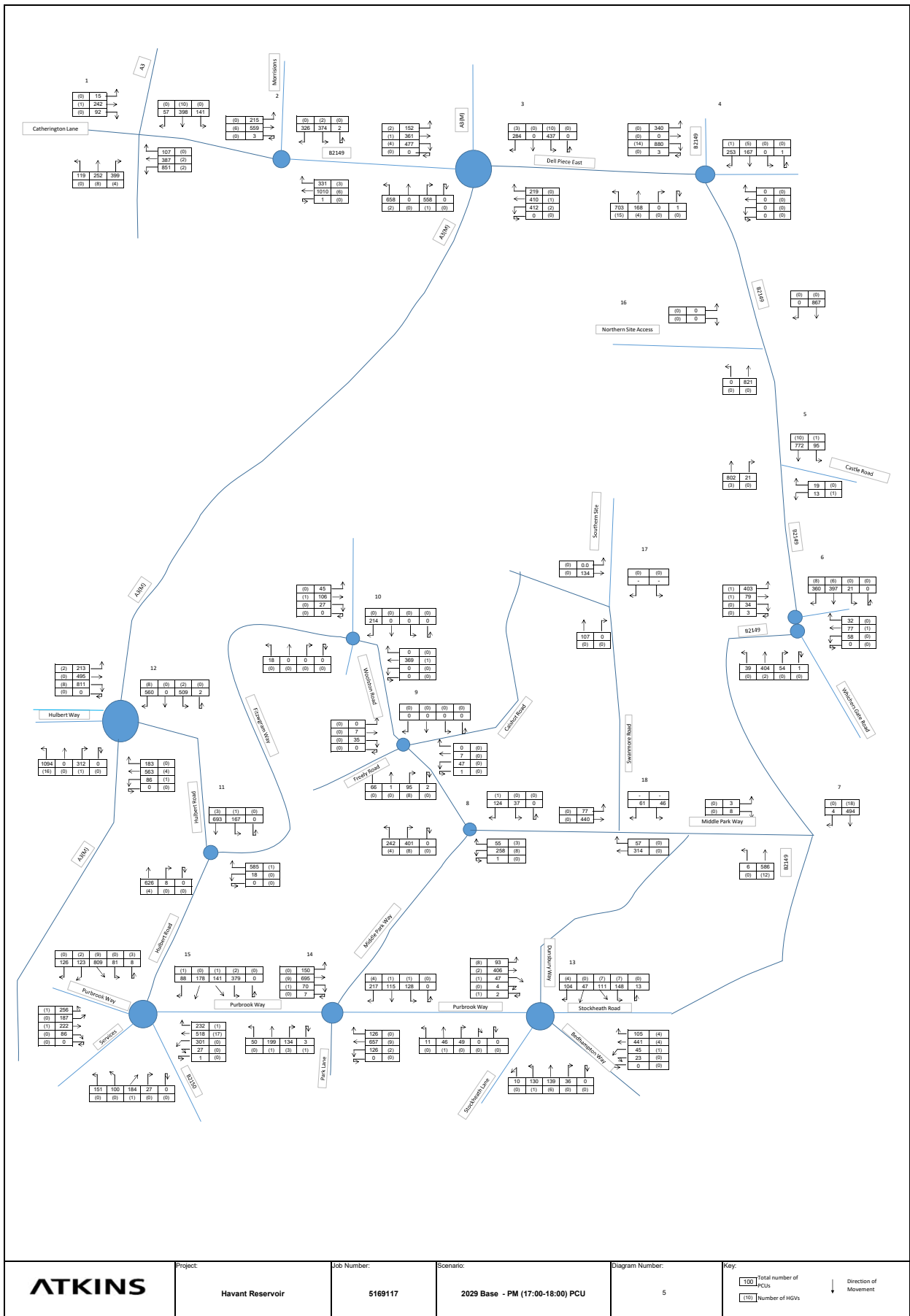
Appendix E. Flow Diagrams

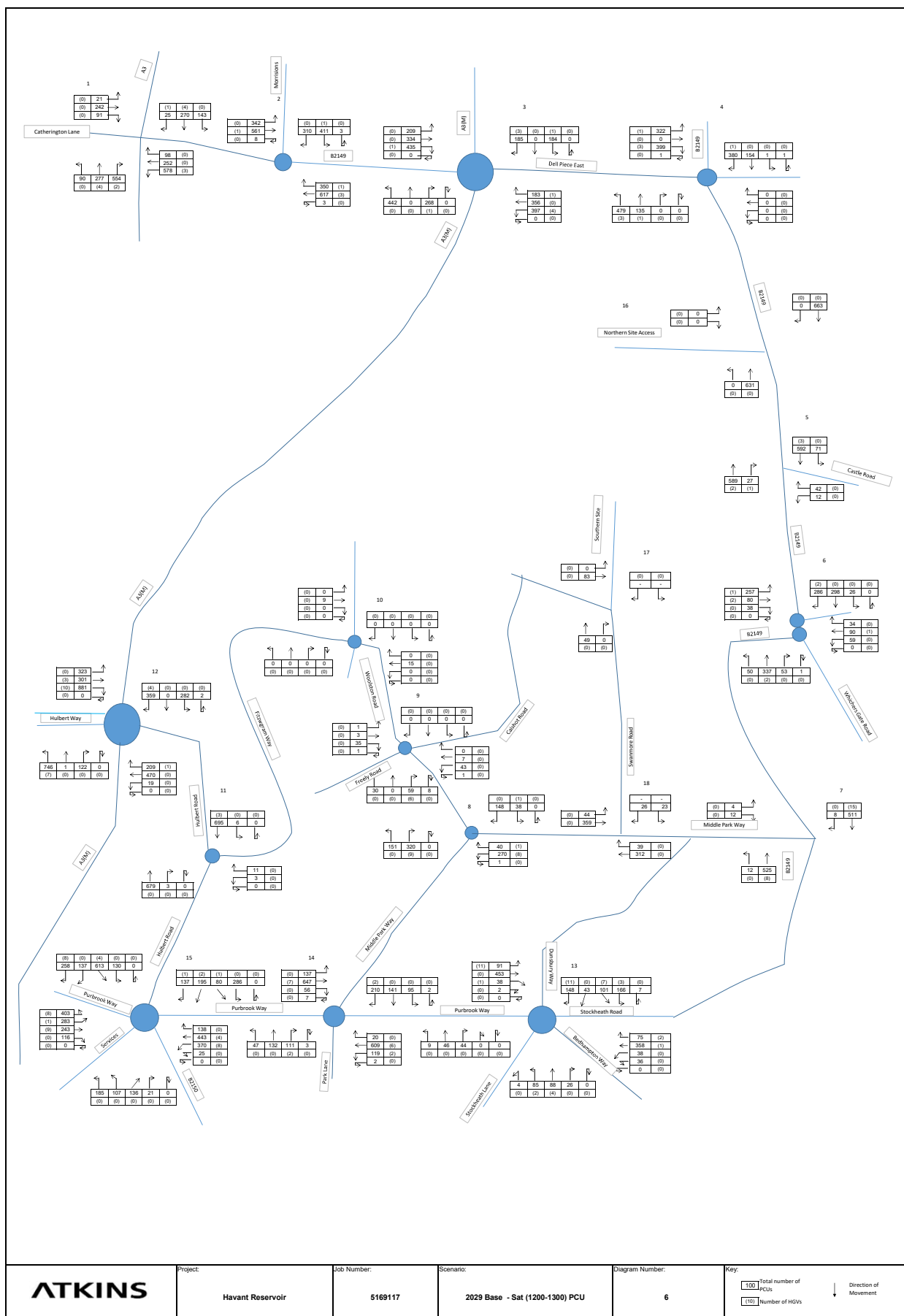


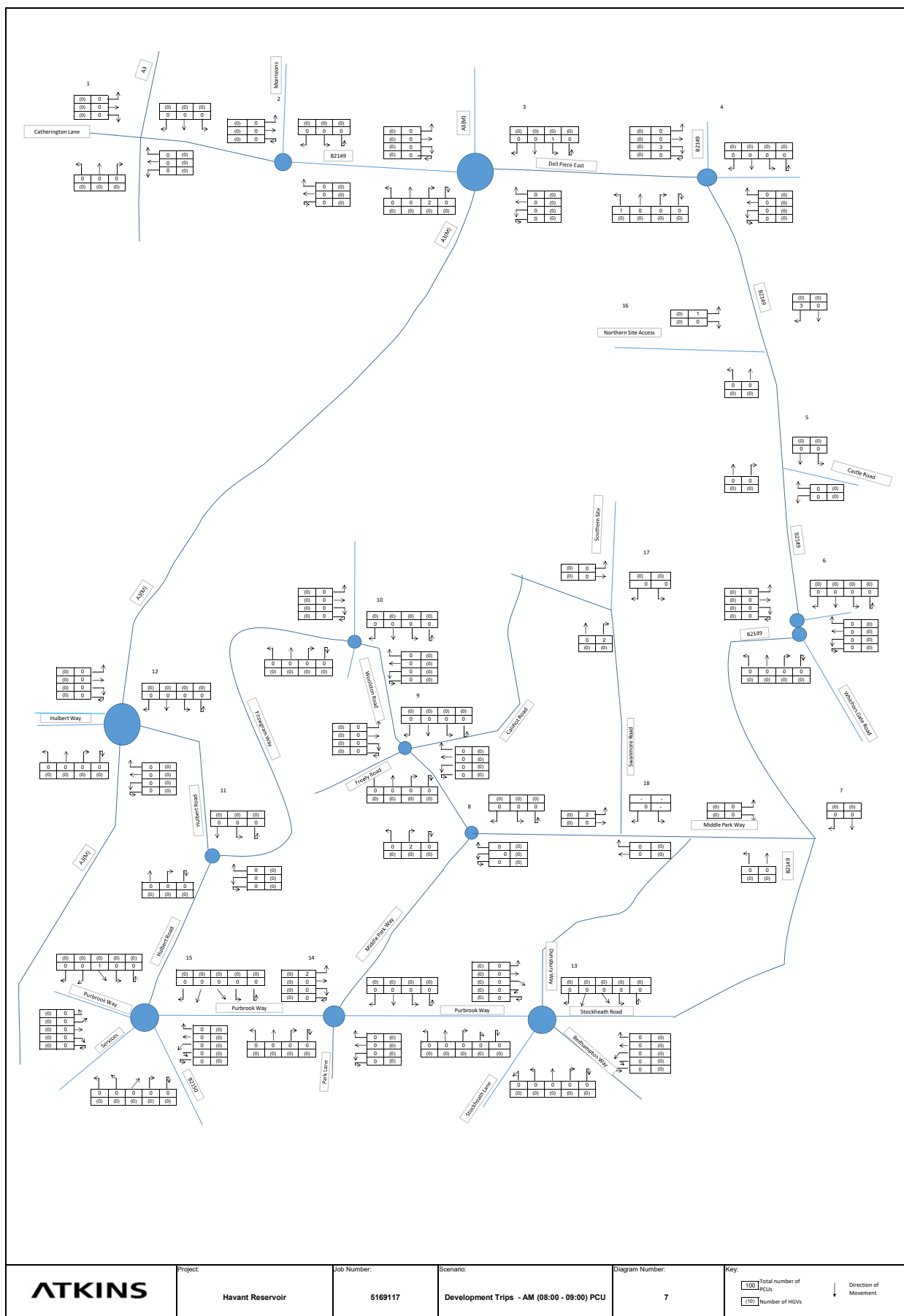


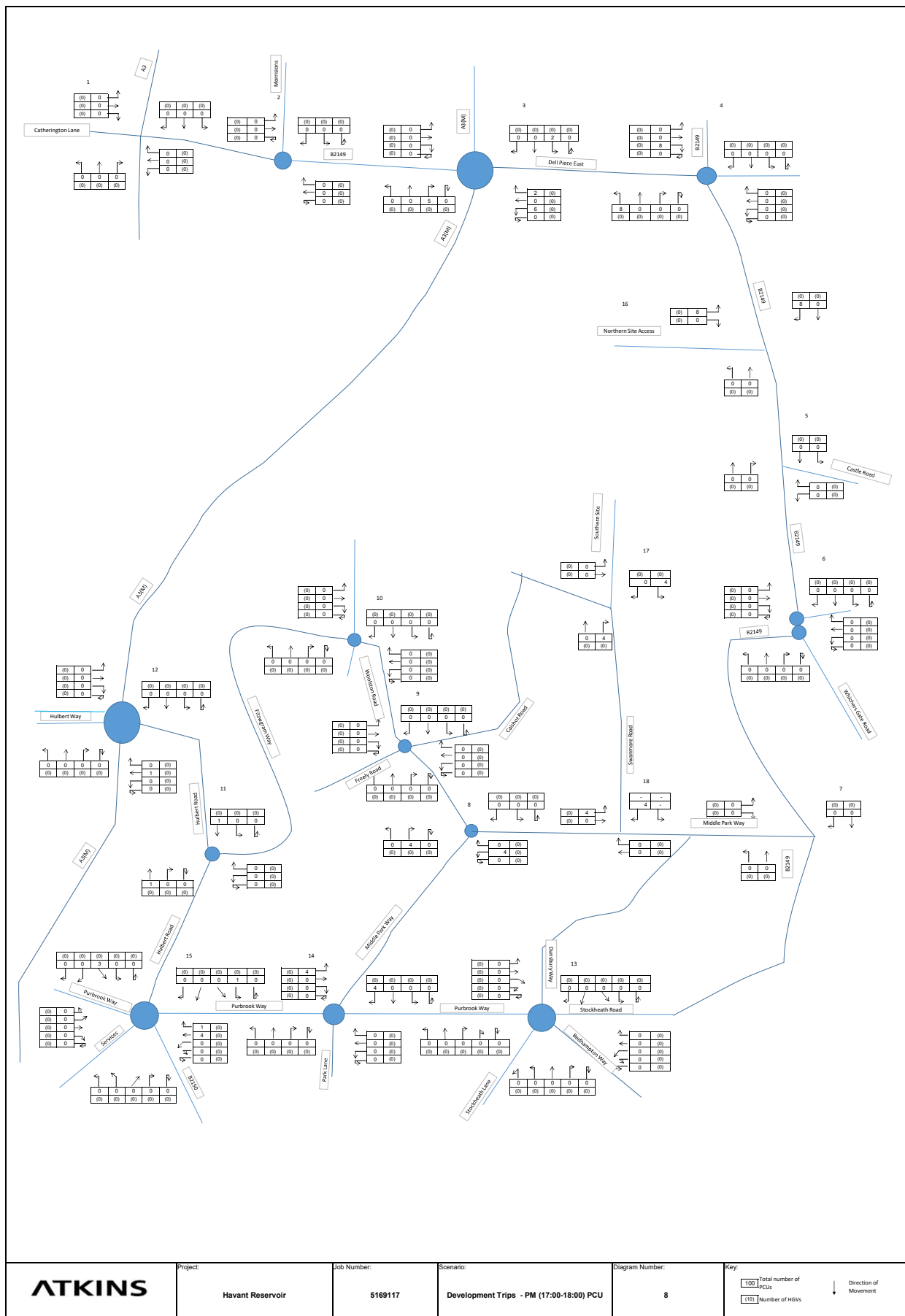


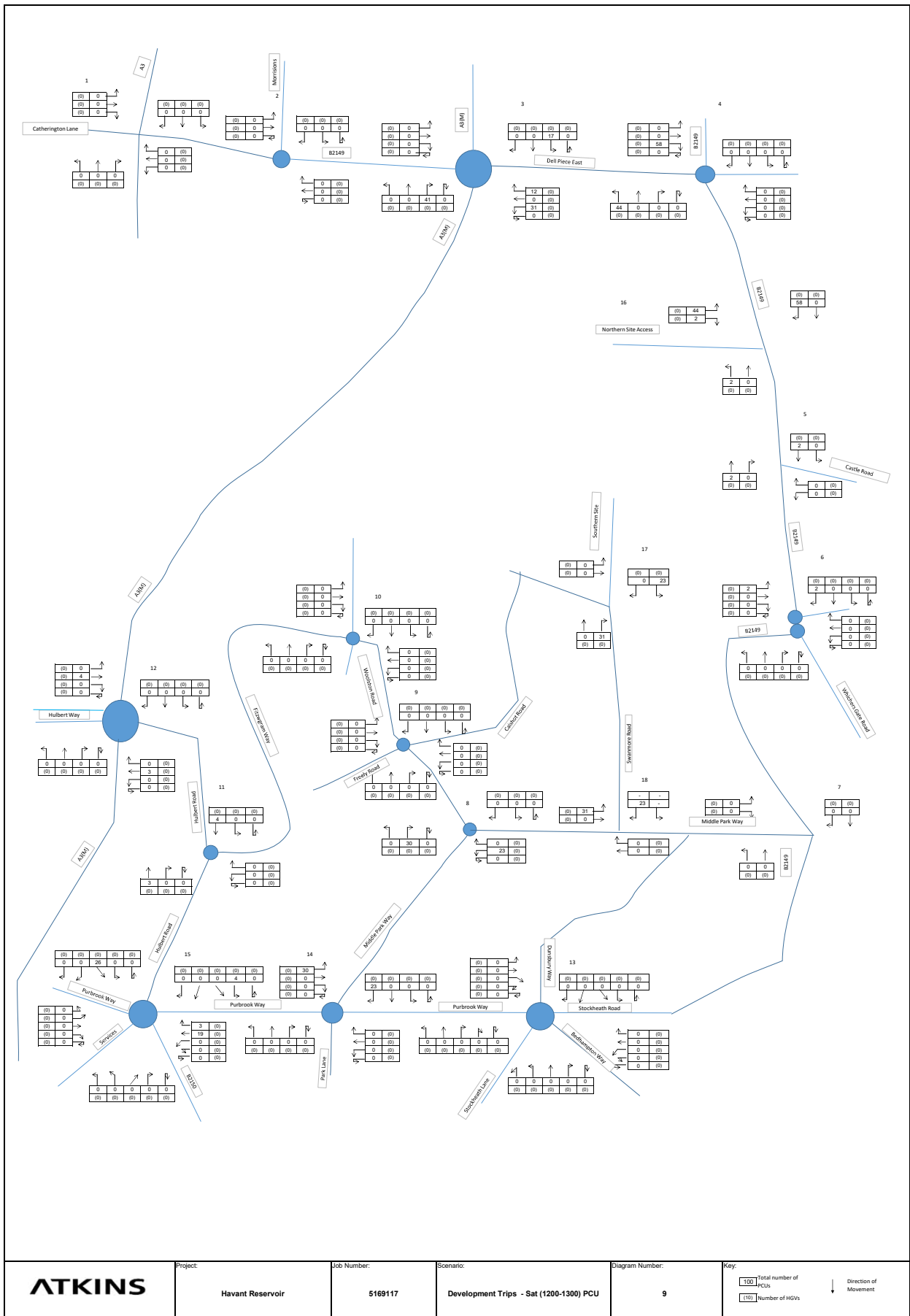


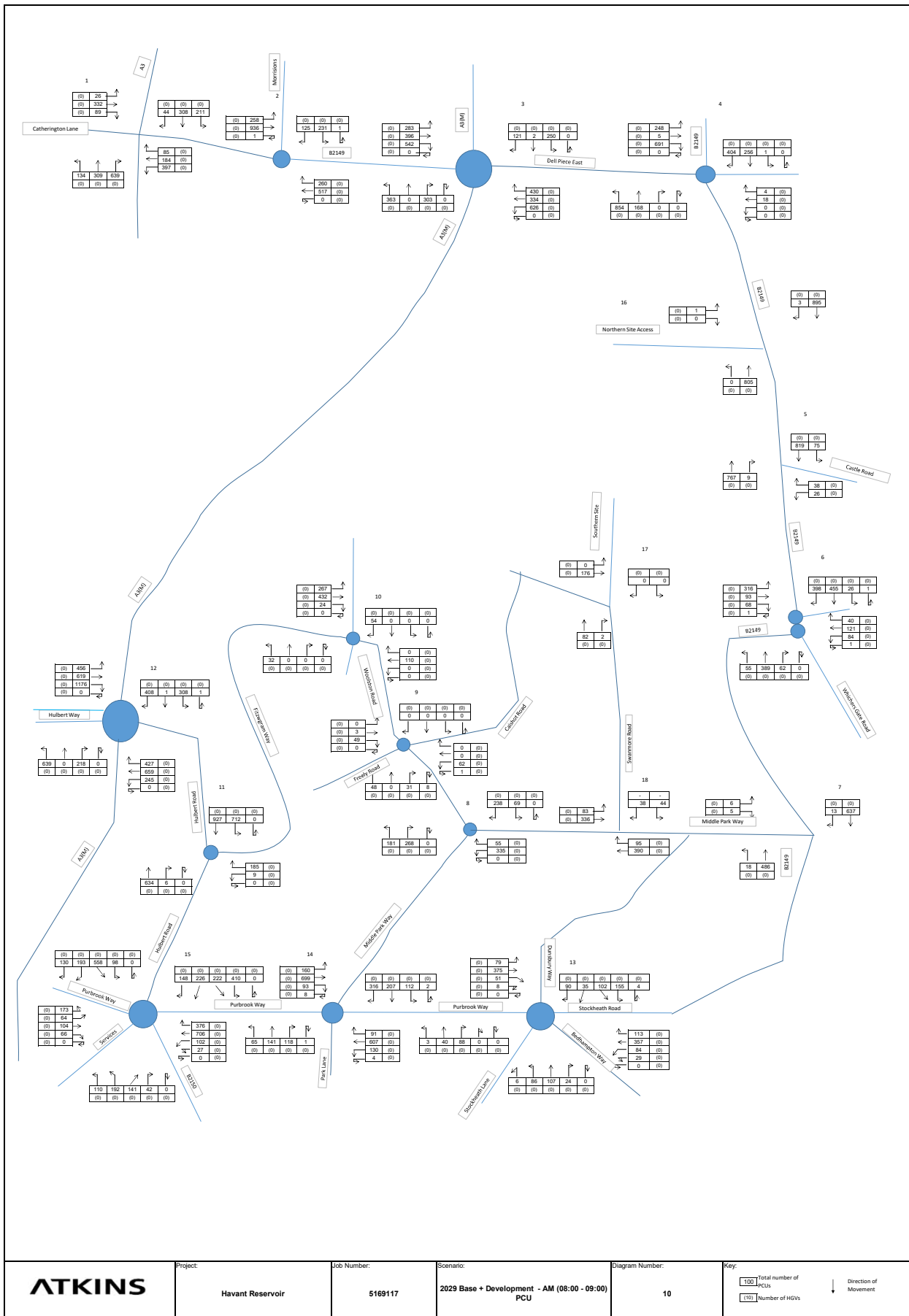


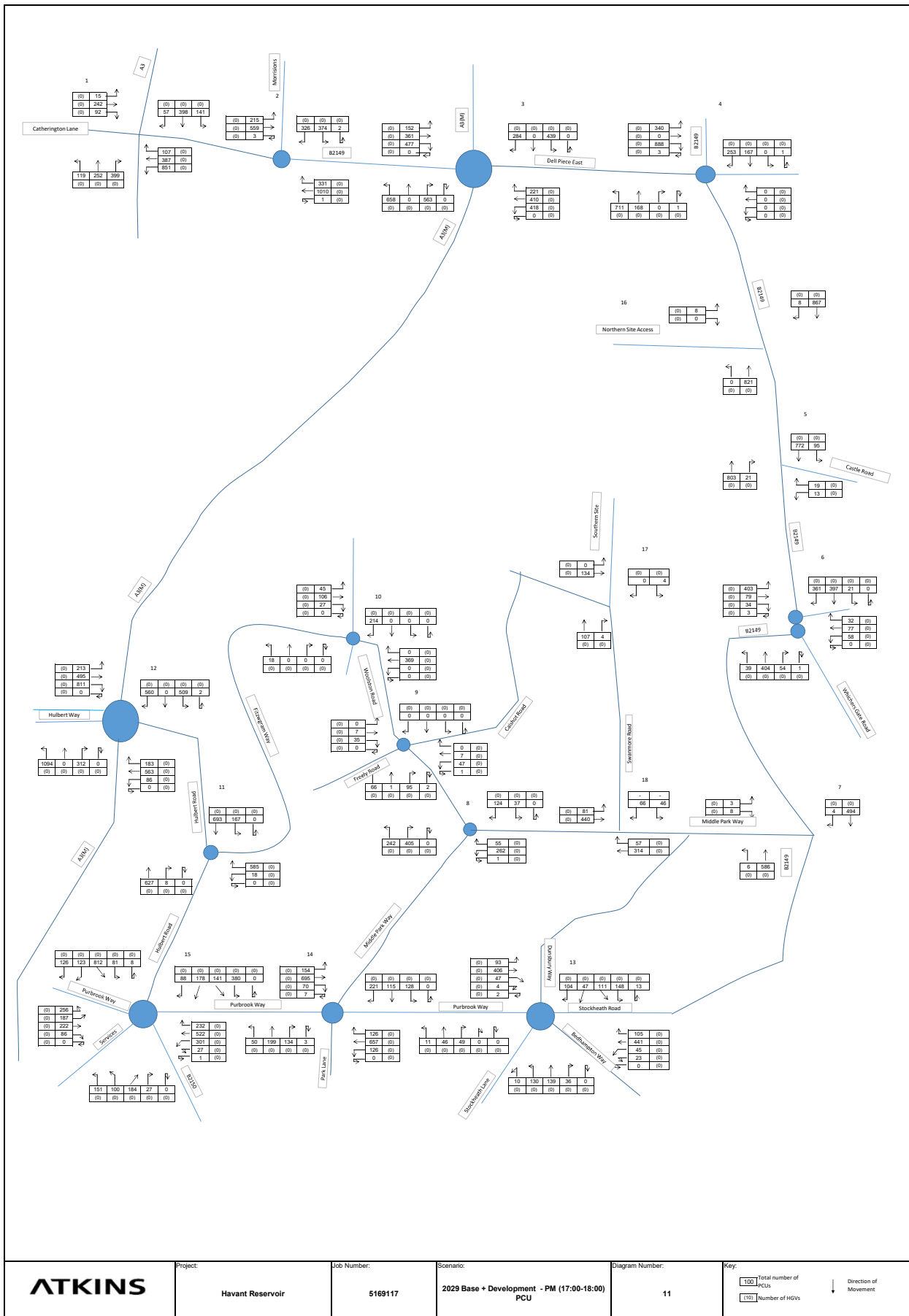


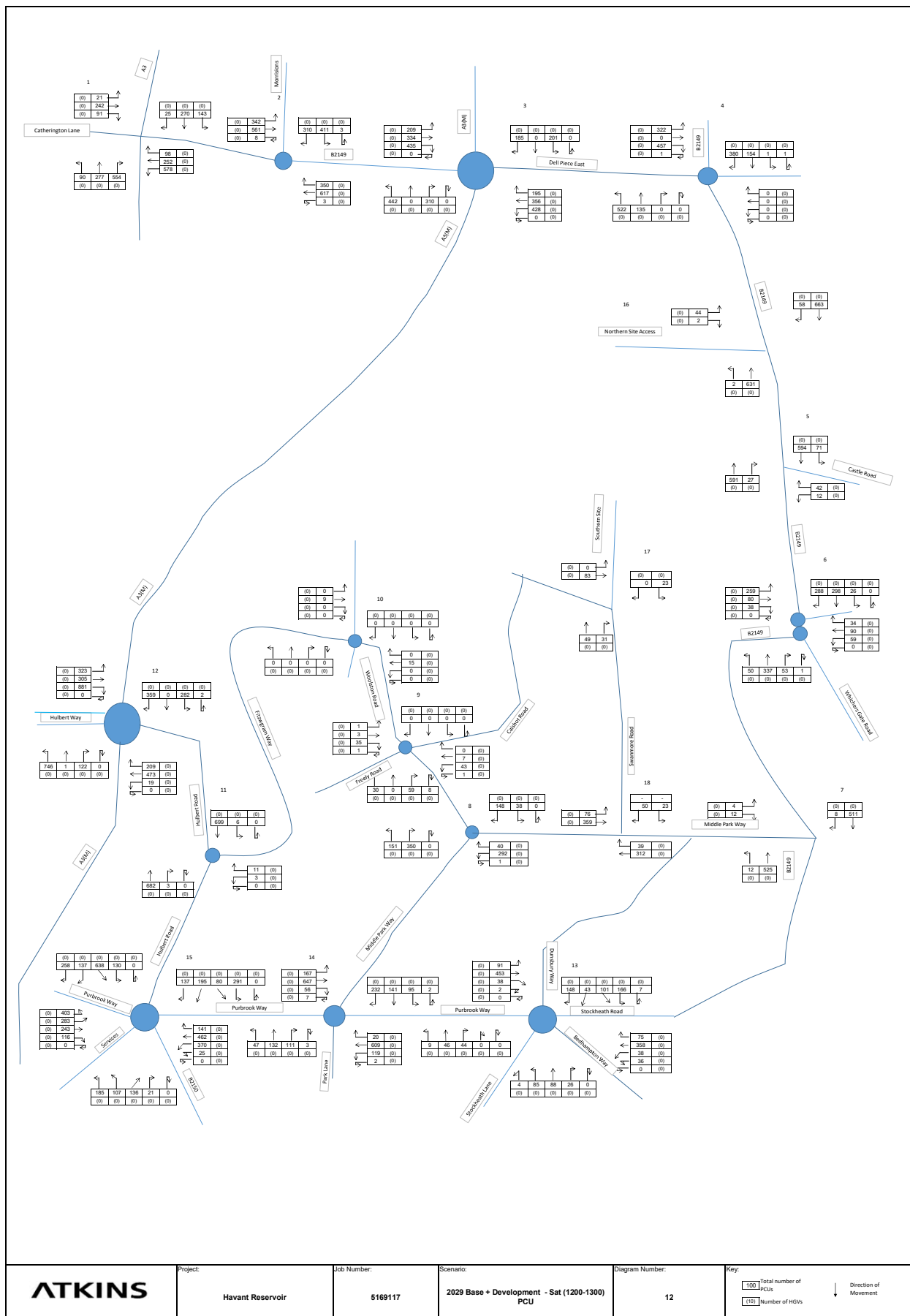












Appendix F. Junctions 9 Output

Junctions 9				
PICADY 9 - Priority Intersection Module				
Version: 9.5.0.6896 © Copyright TRL Limited, 2018				
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Filename: Northern Site Access.B2419v2.j9

Path: P:\GBCFA\TP\KU\Projects\Development Planning\5169117 - Havant Reservoir - WILL6024\33_Analysis\Junction Analysis

Report generation date: 18/08/2020 11:50:23

»2029 Base + Dev, AM

»2029 Base + Dev, PM

»2029 Base + Dev, Sat

Summary of junction performance

	AM			PM			Sat		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2029 Base + Dev									
Stream B-C	0.0	0.00	0.00	0.0	7.03	0.02	0.1	6.77	0.08
Stream B-A	0.0	0.00	0.00	0.0	0.00	0.00	0.0	17.46	0.01
Stream C-AB	0.0	7.72	0.01	0.0	7.89	0.02	0.1	7.91	0.12

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	
Location	
Site number	
Date	09/06/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	WSATKINS\VAUG2614
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D7	2029 Base + Dev	AM	ONE HOUR	07:45	09:15	15
D8	2029 Base + Dev	PM	ONE HOUR	16:45	18:15	15
D9	2029 Base + Dev	Sat	ONE HOUR	11:45	13:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2029 Base + Dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Southern Site Access/Swanmore Rd	T-Junction	Two-way		0.01	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	B2149 S		Major
B	Site Access		Minor
C	B2149 N		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Width for right turn (m)	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C - B2149 N	7.00		✓	3.00	120.0	✓	4.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B - Site Access	One lane plus flare	6.00	6.00	4.00	3.50	3.50	✓	1.00	120	120

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	578	0.101	0.255	0.160	0.364
1	B-C	699	0.103	0.259	-	-
1	C-B	699	0.259	0.259	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D7	2029 Base + Dev	AM	ONE HOUR	07:45	09:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - B2149 S		✓	805	100.000
B - Site Access		✓	1	100.000
C - B2149 N		✓	898	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - B2149 S	B - Site Access	C - B2149 N
	From			
	A - B2149 S	0	0	805
	B - Site Access	0	0	1
	C - B2149 N	895	3	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - B2149 S	B - Site Access	C - B2149 N
	From			
	A - B2149 S	0	0	0
	B - Site Access	0	0	0
	C - B2149 N	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.00	0.00	0.0	A
B-A	0.00	0.00	0.0	A
C-AB	0.01	7.72	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	0	542	0.000	0	0.0	0.000	A
B-A	0	315	0.000	0	0.0	0.000	A
C-AB	2	542	0.004	2	0.0	6.664	A
C-A	674			674			
A-B	0			0			
A-C	606			606			

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	0	512	0.000	0	0.0	0.000	A
B-A	0	264	0.000	0	0.0	0.000	A
C-AB	3	512	0.005	3	0.0	7.069	A
C-A	805			805			
A-B	0			0			
A-C	724			724			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	0	470	0.000	0	0.0	0.000	A
B-A	0	193	0.000	0	0.0	0.000	A
C-AB	3	470	0.007	3	0.0	7.718	A
C-A	985			985			
A-B	0			0			
A-C	886			886			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	0	470	0.000	0	0.0	0.000	A
B-A	0	193	0.000	0	0.0	0.000	A
C-AB	3	470	0.007	3	0.0	7.718	A
C-A	985			985			
A-B	0			0			
A-C	886			886			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	0	512	0.000	0	0.0	0.000	A
B-A	0	264	0.000	0	0.0	0.000	A
C-AB	3	512	0.005	3	0.0	7.072	A
C-A	805			805			
A-B	0			0			
A-C	724			724			

09:00 - 09:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	0	542	0.000	0	0.0	0.000	A
B-A	0	315	0.000	0	0.0	0.000	A
C-AB	2	542	0.004	2	0.0	6.667	A
C-A	674			674			
A-B	0			0			
A-C	606			606			

2029 Base + Dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Southern Site Access/Swanmore Rd	T-Junction	Two-way		0.07	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D8	2029 Base + Dev	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - B2149 S		✓	821	100.000
B - Site Access		✓	8	100.000
C - B2149 N		✓	875	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - B2149 S	B - Site Access	C - B2149 N
From	A - B2149 S	0	0	821
	B - Site Access	0	0	8
	C - B2149 N	867	8	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - B2149 S	B - Site Access	C - B2149 N
From	A - B2149 S	0	0	0
	B - Site Access	0	0	0
	C - B2149 N	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.02	7.03	0.0	A
B-A	0.00	0.00	0.0	A
C-AB	0.02	7.89	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	6	604	0.010	6	0.0	6.019	A
B-A	0	251	0.000	0	0.0	0.000	A
C-AB	6	539	0.011	6	0.0	6.750	A
C-A	653			653			
A-B	0			0			
A-C	618			618			

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	7	569	0.013	7	0.0	6.404	A
B-A	0	210	0.000	0	0.0	0.000	A
C-AB	7	508	0.014	7	0.0	7.185	A
C-A	779			779			
A-B	0			0			
A-C	738			738			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	9	521	0.017	9	0.0	7.027	A
B-A	0	153	0.000	0	0.0	0.000	A
C-AB	9	465	0.019	9	0.0	7.888	A
C-A	955			955			
A-B	0			0			
A-C	904			904			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	9	521	0.017	9	0.0	7.027	A
B-A	0	153	0.000	0	0.0	0.000	A
C-AB	9	465	0.019	9	0.0	7.888	A
C-A	955			955			
A-B	0			0			
A-C	904			904			

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	7	569	0.013	7	0.0	6.407	A
B-A	0	210	0.000	0	0.0	0.000	A
C-AB	7	508	0.014	7	0.0	7.185	A
C-A	779			779			
A-B	0			0			
A-C	738			738			

18:00 - 18:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	6	604	0.010	6	0.0	6.021	A
B-A	0	251	0.000	0	0.0	0.000	A
C-AB	6	539	0.011	6	0.0	6.753	A
C-A	653			653			
A-B	0			0			
A-C	618			618			

2029 Base + Dev, Sat

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Southern Site Access/Swanmore Rd	T-Junction	Two-way		0.57	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D9	2029 Base + Dev	Sat	ONE HOUR	11:45	13:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - B2149 S		✓	633	100.000
B - Site Access		✓	46	100.000
C - B2149 N		✓	721	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - B2149 S	B - Site Access	C - B2149 N
From	A - B2149 S	0	2	631
	B - Site Access	2	0	44
	C - B2149 N	663	58	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - B2149 S	B - Site Access	C - B2149 N
From	A - B2149 S	0	0	0
	B - Site Access	0	0	0
	C - B2149 N	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-C	0.08	6.77	0.1	A
B-A	0.01	17.46	0.0	C
C-AB	0.12	7.91	0.1	A
C-A				
A-B				
A-C				

Main Results for each time segment

11:45 - 12:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	33	645	0.051	33	0.1	5.884	A
B-A	2	289	0.005	1	0.0	12.528	B
C-AB	44	576	0.076	43	0.1	6.754	A
C-A	499			499			
A-B	2			2			
A-C	475			475			

12:00 - 12:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	40	617	0.064	39	0.1	6.228	A
B-A	2	255	0.007	2	0.0	14.214	B
C-AB	52	552	0.094	52	0.1	7.200	A
C-A	596			596			
A-B	2			2			
A-C	567			567			

12:15 - 12:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	48	580	0.084	48	0.1	6.772	A
B-A	2	208	0.011	2	0.0	17.455	C
C-AB	64	519	0.123	64	0.1	7.905	A
C-A	730			730			
A-B	2			2			
A-C	695			695			

12:30 - 12:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	48	580	0.084	48	0.1	6.772	A
B-A	2	208	0.011	2	0.0	17.460	C
C-AB	64	519	0.123	64	0.1	7.910	A
C-A	730			730			
A-B	2			2			
A-C	695			695			

12:45 - 13:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	40	617	0.064	40	0.1	6.230	A
B-A	2	255	0.007	2	0.0	14.219	B
C-AB	52	552	0.094	52	0.1	7.207	A
C-A	596			596			
A-B	2			2			
A-C	567			567			

13:00 - 13:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-C	33	645	0.051	33	0.1	5.890	A
B-A	2	289	0.005	2	0.0	12.536	B
C-AB	44	576	0.076	44	0.1	6.767	A
C-A	499			499			
A-B	2			2			
A-C	475			475			

Junctions 9				
PICADY 9 - Priority Intersection Module				
Version: 9.5.0.6896				
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Filename: Southern Site Access.Swanmore Rdv2.j9

Path: P:\GBCFA\TP\KU\Projects\Development Planning\5169117 - Havant Reservoir - WILL6024\33_Analysis\Junction Analysis

Report generation date: 18/08/2020 15:17:54

»2029 Base + Dev, AM

»2029 Base + Dev, PM

»2029 Base + Dev, Sat

Summary of junction performance

	AM			PM			Sat		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2029 Base + Dev									
Stream B-AC	0.0	0.00	0.00	0.0	5.48	0.01	0.0	5.53	0.03
Stream C-AB	0.0	5.60	0.00	0.0	5.40	0.01	0.1	5.89	0.05

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	
Location	
Site number	
Date	09/06/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	WSATKINS\VAUG2614
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D7	2029 Base + Dev	AM	FLAT	08:00	09:00	60	15
D8	2029 Base + Dev	PM	FLAT	17:00	18:00	60	15
D9	2029 Base + Dev	Sat	FLAT	12:00	13:00	60	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2029 Base + Dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Southern Site Access/Swanmore Rd	T-Junction	Two-way		0.05	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Swanmore Rd W		Major
B	Site Access		Minor
C	Swanmore Rd E		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C - Swanmore Rd E	7.00			100.0	✓	0.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B - Site Access	One lane	3.50	60	60

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	553	0.096	0.244	0.153	0.348
1	B-C	695	0.102	0.258	-	-
1	C-B	632	0.234	0.234	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D7	2029 Base + Dev	AM	FLAT	08:00	09:00	60	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Swanmore Rd W		✓	176	100.000
B - Site Access		✓	0	100.000
C - Swanmore Rd E		✓	84	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Swanmore Rd W	B - Site Access	C - Swanmore Rd E
From	A - Swanmore Rd W	0	0	176
	B - Site Access	0	0	0
	C - Swanmore Rd E	82	2	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Swanmore Rd W	B - Site Access	C - Swanmore Rd E
From	A - Swanmore Rd W	0	0	0
	B - Site Access	0	0	0
	C - Swanmore Rd E	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-AC	0.00	0.00	0.0	A
C-AB	0.00	5.60	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

08:00 - 08:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	0	563	0.000	0	0.0	0.000	A
C-AB	2	646	0.004	2	0.0	5.594	A
C-A	82			82			
A-B	0			0			
A-C	176			176			

08:15 - 08:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	0	563	0.000	0	0.0	0.000	A
C-AB	2	646	0.004	2	0.0	5.596	A
C-A	82			82			
A-B	0			0			
A-C	176			176			

08:30 - 08:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	0	563	0.000	0	0.0	0.000	A
C-AB	2	646	0.004	2	0.0	5.596	A
C-A	82			82			
A-B	0			0			
A-C	176			176			

08:45 - 09:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	0	563	0.000	0	0.0	0.000	A
C-AB	2	646	0.004	2	0.0	5.596	A
C-A	82			82			
A-B	0			0			
A-C	176			176			

2029 Base + Dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Southern Site Access/Swanmore Rd	T-Junction	Two-way		0.19	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D8	2029 Base + Dev	PM	FLAT	17:00	18:00	60	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Swanmore Rd W		✓	134	100.000
B - Site Access		✓	4	100.000
C - Swanmore Rd E		✓	111	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Swanmore Rd W	B - Site Access	C - Swanmore Rd E
From	A - Swanmore Rd W	0	0	134
	B - Site Access	0	0	4
	C - Swanmore Rd E	107	4	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Swanmore Rd W	B - Site Access	C - Swanmore Rd E
From	A - Swanmore Rd W	0	0	0
	B - Site Access	0	0	0
	C - Swanmore Rd E	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-AC	0.01	5.48	0.0	A
C-AB	0.01	5.40	0.0	A
C-A				
A-B				
A-C				

Main Results for each time segment

17:00 - 17:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	4	660	0.006	4	0.0	5.484	A
C-AB	5	672	0.007	5	0.0	5.396	A
C-A	106			106			
A-B	0			0			
A-C	134			134			

17:15 - 17:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	4	660	0.006	4	0.0	5.484	A
C-AB	5	672	0.007	5	0.0	5.396	A
C-A	106			106			
A-B	0			0			
A-C	134			134			

17:30 - 17:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	4	660	0.006	4	0.0	5.484	A
C-AB	5	672	0.007	5	0.0	5.396	A
C-A	106			106			
A-B	0			0			
A-C	134			134			

17:45 - 18:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	4	660	0.006	4	0.0	5.484	A
C-AB	5	672	0.007	5	0.0	5.398	A
C-A	106			106			
A-B	0			0			
A-C	134			134			

2029 Base + Dev, Sat

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Southern Site Access/Swanmore Rd	T-Junction	Two-way		1.75	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D9	2029 Base + Dev	Sat	FLAT	12:00	13:00	60	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Swanmore Rd W		✓	83	100.000
B - Site Access		✓	23	100.000
C - Swanmore Rd E		✓	80	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Swanmore Rd W	B - Site Access	C - Swanmore Rd E
From	A - Swanmore Rd W	0	0	83
	B - Site Access	0	0	23
	C - Swanmore Rd E	49	31	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Swanmore Rd W	B - Site Access	C - Swanmore Rd E
From	A - Swanmore Rd W	0	0	0
	B - Site Access	0	0	0
	C - Swanmore Rd E	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
B-AC	0.03	5.53	0.0	A
C-AB	0.05	5.89	0.1	A
C-A				
A-B				
A-C				

Main Results for each time segment

12:00 - 12:15

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	23	673	0.034	23	0.0	5.531	A
C-AB	34	645	0.052	33	0.1	5.886	A
C-A	46			46			
A-B	0			0			
A-C	83			83			

12:15 - 12:30

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	23	673	0.034	23	0.0	5.533	A
C-AB	34	645	0.052	34	0.1	5.889	A
C-A	46			46			
A-B	0			0			
A-C	83			83			

12:30 - 12:45

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	23	673	0.034	23	0.0	5.533	A
C-AB	34	645	0.052	34	0.1	5.889	A
C-A	46			46			
A-B	0			0			
A-C	83			83			

12:45 - 13:00

Stream	Total Demand (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
B-AC	23	673	0.034	23	0.0	5.533	A
C-AB	34	645	0.052	34	0.1	5.892	A
C-A	46			46			
A-B	0			0			
A-C	83			83			

Junctions 9		
ARCADY 9 - Roundabout Module		
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Filename: Dell Piece East.B2419 Improved Horndean.j9

Path: P:\GBCFA\TP\KU\Projects\Development Planning\5169117 - Havant Reservoir - WILL6024\33_Analysis\Junction Analysis

Report generation date: 18/08/2020 15:35:11

«2020, AM

- »Junction Network
- »Arms
- »Traffic Demand
- »Origin-Destination Data
- »Vehicle Mix
- »Results

Summary of junction performance

	AM			PM			Sat		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2020									
1 - B2419	0.7	4.47	0.41	0.4	3.66	0.27	0.5	3.53	0.32
2 - Church Access	0.0	8.46	0.04	0.0	0.00	0.00	0.0	0.00	0.00
3 - B2419	0.6	3.30	0.36	0.5	3.02	0.34	0.4	2.93	0.31
4 - Hordean Employment Access	0.0	0.00	0.00	0.0	0.00	0.00	0.0	0.00	0.00
5 - Dell Piece East	0.5	2.68	0.35	0.7	2.95	0.41	0.4	2.48	0.31
2029 Base									
1 - B2419	1.2	6.28	0.53	0.6	5.07	0.37	0.6	3.89	0.37
2 - Church Access	0.1	13.31	0.08	0.0	0.00	0.00	0.0	0.00	0.00
3 - B2419	1.5	5.41	0.60	0.9	3.84	0.48	0.5	3.17	0.35
4 - Hordean Employment Access	0.0	4.99	0.01	0.0	4.14	0.03	0.0	0.00	0.00
5 - Dell Piece East	0.9	3.32	0.47	1.5	4.39	0.60	0.5	2.64	0.34
2029 Base + Dev									
1 - B2419	1.1	6.19	0.53	0.6	5.02	0.37	0.6	4.03	0.38
2 - Church Access	0.1	13.38	0.08	0.0	0.00	0.00	0.0	0.00	0.00
3 - B2419	1.5	5.28	0.60	0.9	3.77	0.48	0.6	3.27	0.37
4 - Hordean Employment Access	0.0	5.01	0.02	0.0	4.07	0.03	0.0	0.00	0.00
5 - Dell Piece East	0.9	3.28	0.47	1.5	4.36	0.60	0.6	2.74	0.37

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	
Location	
Site number	
Date	17/06/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	WSATKINS\AUG2614
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D1	2020	AM	FLAT	08:00	09:00	60	15

2020, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	5 - Dell Piece East - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Dell Piece East/B2419	Standard Roundabout		1, 2, 3, 4, 5	3.47	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	B2419	
2	Church Access	
3	B2419	
4	Hordean Employment Access	
5	Dell Piece East	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - B2419	3.10	8.26	23.6	15.9	52.0	37.5	
2 - Church Access	2.82	5.01	2.8	12.0	52.0	33.2	
3 - B2419	3.65	8.01	25.5	28.6	52.0	26.6	
4 - Hordean Employment Access	3.65	8.00	7.1	21.0	52.0	25.9	
5 - Dell Piece East	3.65	8.00	52.3	24.7	52.0	27.1	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - B2419	0.605	1787
2 - Church Access	0.456	999
3 - B2419	0.665	2012
4 - Hordean Employment Access	0.581	1577
5 - Dell Piece East	0.696	2189

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - B2419		✓	579	100.000
2 - Church Access		✓	19	100.000
3 - B2419		✓	642	100.000
4 - Hordean Employment Access		✓	0	100.000
5 - Dell Piece East		✓	722	100.000

Origin-Destination Data

Demand (PCU/hr)

	To					
		1 - B2419	2 - Church Access	3 - B2419	4 - Hordean Employment Access	5 - Dell Piece East
From	1 - B2419	0	1	218	0	360
	2 - Church Access	3	0	0	0	16
	3 - B2419	0	0	141	0	501
	4 - Hordean Employment Access	0	0	0	0	0
	5 - Dell Piece East	221	5	496	0	0

Vehicle Mix

Heavy Vehicle Percentages

	To					
		1 - B2419	2 - Church Access	3 - B2419	4 - Hordean Employment Access	5 - Dell Piece East
From	1 - B2419	0	0	2	0	2
	2 - Church Access	0	0	0	0	0
	3 - B2419	0	0	2	0	3
	4 - Hordean Employment Access	0	0	2	0	3
	5 - Dell Piece East	0	0	2	0	3

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - B2419	0.41	4.47	0.7	A
2 - Church Access	0.04	8.46	0.0	A
3 - B2419	0.36	3.30	0.6	A
4 - Hordean Employment Access	0.00	0.00	0.0	A
5 - Dell Piece East	0.35	2.68	0.5	A

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B2419	579	640	1400	0.413	576	0.7	4.431	A
2 - Church Access	19	1210	447	0.043	19	0.0	8.413	A
3 - B2419	642	377	1761	0.365	640	0.6	3.283	A
4 - Hordean Employment Access	0	1017	986	0.000	0	0.0	0.000	A
5 - Dell Piece East	722	143	2089	0.346	720	0.5	2.671	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B2419	579	642	1399	0.414	579	0.7	4.467	A
2 - Church Access	19	1215	444	0.043	19	0.0	8.463	A
3 - B2419	642	379	1760	0.365	642	0.6	3.300	A
4 - Hordean Employment Access	0	1021	984	0.000	0	0.0	0.000	A
5 - Dell Piece East	722	144	2088	0.346	722	0.5	2.678	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B2419	579	642	1399	0.414	579	0.7	4.467	A
2 - Church Access	19	1215	444	0.043	19	0.0	8.463	A
3 - B2419	642	379	1760	0.365	642	0.6	3.300	A
4 - Hordean Employment Access	0	1021	984	0.000	0	0.0	0.000	A
5 - Dell Piece East	722	144	2088	0.346	722	0.5	2.678	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - B2419	579	642	1399	0.414	579	0.7	4.467	A
2 - Church Access	19	1215	444	0.043	19	0.0	8.463	A
3 - B2419	642	379	1760	0.365	642	0.6	3.300	A
4 - Hordean Employment Access	0	1021	984	0.000	0	0.0	0.000	A
5 - Dell Piece East	722	144	2088	0.346	722	0.5	2.678	A

Junctions 9		
ARCADY 9 - Roundabout Module		
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Filename: Middle Park Way.Woolston Roadv2.j9

Path: P:\GBCFA\TP\KU\Projects\Development Planning\5169117 - Havant Reservoir - WILL6024\33_Analysis\Junction Analysis

Report generation date: 18/08/2020 15:21:15

«2020 Base, AM

- »Junction Network
- »Arms
- »Traffic Demand
- »Origin-Destination Data
- »Vehicle Mix
- »Results

Summary of junction performance

	AM			PM			Sat		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2020 Base									
1 - Woolston Road	0.6	7.02	0.37	0.3	6.24	0.21	0.3	5.91	0.23
2 - Middle Park Way E	0.7	6.84	0.41	0.5	5.37	0.31	0.4	5.29	0.31
3 - Middle Park Way W	0.6	4.93	0.37	1.2	6.59	0.53	0.6	4.88	0.39
2029 Base									
1 - Woolston Road	0.7	7.70	0.42	0.3	6.74	0.25	0.4	6.40	0.27
2 - Middle Park Way E	0.9	7.46	0.47	0.5	5.57	0.35	0.5	5.70	0.35
3 - Middle Park Way W	0.7	5.18	0.41	1.5	7.53	0.60	0.8	5.31	0.43
2029 Base + Dev									
1 - Woolston Road	0.7	7.73	0.42	0.3	6.78	0.25	0.4	6.64	0.27
2 - Middle Park Way E	0.9	7.47	0.47	0.5	5.61	0.35	0.6	5.92	0.38
3 - Middle Park Way W	0.7	5.20	0.42	1.5	7.60	0.60	0.9	5.58	0.46

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	
Location	
Site number	
Date	19/06/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	WSATKINSVAUG2614
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Mini-roundabout model	Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
JUNCTIONS 9			0.85	36.00	20.00

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2020 Base	AM	ONE HOUR	07:45	09:15	15

2020 Base, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Middle Park Way/Woolston Road	Mini-roundabout		1, 2, 3	6.14	A

Junction Network Options

Driving side	Lighting	Road surface	In London
Left	Normal/unknown	Normal/unknown	

Arms

Arms

Arm	Name	Description
1	Woolston Road	
2	Middle Park Way E	
3	Middle Park Way W	

Mini Roundabout Geometry

Arm	Approach road half-width (m)	Minimum approach road half-width (m)	Entry width (m)	Effective flare length (m)	Distance to next arm (m)	Entry corner kerb line distance (m)	Gradient over 50m (%)	Kerbed central island
1 - Woolston Road	3.81	3.81	5.67	0.6	8.58	5.42	0.0	
2 - Middle Park Way E	3.34	3.34	4.06	27.1	11.03	13.65	0.0	
3 - Middle Park Way W	3.72	3.72	5.30	15.4	9.39	6.06	0.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Woolston Road	0.628	989
2 - Middle Park Way E	0.641	1079
3 - Middle Park Way W	0.663	1227

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Woolston Road		✓	274	100.000
2 - Middle Park Way E		✓	347	100.000
3 - Middle Park Way W		✓	399	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		1 - Woolston Road	2 - Middle Park Way E	3 - Middle Park Way W
From	1 - Woolston Road	0	62	212
	2 - Middle Park Way E	49	0	298
	3 - Middle Park Way W	162	237	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		1 - Woolston Road	2 - Middle Park Way E	3 - Middle Park Way W
From	1 - Woolston Road	0	4	2
	2 - Middle Park Way E	2	0	4
	3 - Middle Park Way W	2	3	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Woolston Road	0.37	7.02	0.6	A
2 - Middle Park Way E	0.41	6.84	0.7	A
3 - Middle Park Way W	0.37	4.93	0.6	A

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Woolston Road	206	178	878	0.235	205	0.3	5.454	A
2 - Middle Park Way E	261	159	977	0.267	260	0.4	5.206	A
3 - Middle Park Way W	300	37	1202	0.250	299	0.3	4.093	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Woolston Road	246	213	856	0.288	246	0.4	6.024	A
2 - Middle Park Way E	312	190	957	0.326	311	0.5	5.795	A
3 - Middle Park Way W	359	44	1198	0.300	358	0.4	4.410	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Woolston Road	302	261	826	0.365	301	0.6	6.997	A
2 - Middle Park Way E	382	233	930	0.411	381	0.7	6.812	A
3 - Middle Park Way W	439	54	1191	0.369	439	0.6	4.917	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Woolston Road	302	261	825	0.366	302	0.6	7.017	A
2 - Middle Park Way E	382	233	929	0.411	382	0.7	6.838	A
3 - Middle Park Way W	439	54	1191	0.369	439	0.6	4.925	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Woolston Road	246	213	855	0.288	247	0.4	6.049	A
2 - Middle Park Way E	312	191	956	0.326	313	0.5	5.824	A
3 - Middle Park Way W	359	44	1198	0.300	359	0.4	4.421	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Woolston Road	206	179	877	0.235	207	0.3	5.487	A
2 - Middle Park Way E	261	160	976	0.268	262	0.4	5.240	A
3 - Middle Park Way W	300	37	1202	0.250	301	0.3	4.109	A

Junctions 9		
ARCADY 9 - Roundabout Module		
Version: 9.5.0.6896 © Copyright TRL Limited, 2018		
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Filename: Purbrook Way Middle Park Wayv2.j9

Path: P:\GBCFA\TP\KU\Projects\Development Planning\5169117 - Havant Reservoir - WILL6024\33_Analysis\Junction Analysis

Report generation date: 18/08/2020 15:26:48

- »2020 Base, AM
- »2020 Base, PM
- »2020 Base , Sat
- »2029 Base, AM
- »2029 Base, PM
- »2029 Base, Sat
- »2029 Base + Dev, AM
- »2029 Base + Dev, PM
- »2029 Base + Dev, Sat

Summary of junction performance

	AM			PM			Sat		
	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC	Queue (PCU)	Delay (s)	RFC
2020 Base									
1 - Middle Park Way	1.3	8.25	0.56	0.9	7.03	0.47	0.8	6.22	0.43
2 - Purbrook Way E	4.5	22.35	0.82	8.6	37.17	0.91	3.0	14.98	0.75
3 - Park Lane	0.7	8.51	0.40	1.2	11.95	0.56	0.6	7.59	0.38
4 - Purbrook Way W	2.5	10.64	0.71	4.0	16.43	0.81	2.1	9.16	0.68
2029 Base									
1 - Middle Park Way	2.0	11.47	0.67	1.2	8.94	0.55	1.0	7.65	0.51
2 - Purbrook Way E	15.0	68.92	0.95	35.7	121.36	1.04	5.9	27.18	0.87
3 - Park Lane	1.0	10.70	0.49	1.9	16.31	0.66	0.8	9.23	0.45
4 - Purbrook Way W	4.3	16.61	0.81	9.5	35.98	0.92	3.3	12.98	0.77
2029 Base + Dev									
1 - Middle Park Way	2.0	11.51	0.67	1.3	9.03	0.56	1.1	8.06	0.54
2 - Purbrook Way E	15.2	69.39	0.95	36.4	123.77	1.05	6.4	29.57	0.88
3 - Park Lane	1.0	10.71	0.49	1.9	16.42	0.66	0.8	9.52	0.46
4 - Purbrook Way W	4.4	16.76	0.81	9.9	37.21	0.93	3.8	14.69	0.80

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	
Location	
Site number	
Date	19/06/2020
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	WSATKINSIVAUG2614
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D1	2020 Base	AM	FLAT	08:00	09:00	60	15
D2	2020 Base	PM	ONE HOUR	16:45	18:15		15
D3	2020 Base	Sat	ONE HOUR	11:45	13:15		15
D4	2029 Base	AM	FLAT	08:00	09:00	60	15
D5	2029 Base	PM	ONE HOUR	16:45	18:15		15
D6	2029 Base	Sat	ONE HOUR	11:45	13:15		15
D7	2029 Base + Dev	AM	FLAT	08:00	09:00	60	15
D8	2029 Base + Dev	PM	ONE HOUR	16:45	18:15		15
D9	2029 Base + Dev	Sat	ONE HOUR	11:45	13:15		15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2020 Base, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Middle Park Way/Purbrook Way	Standard Roundabout		1, 2, 3, 4	13.38	B

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Middle Park Way	
2	Purbrook Way E	
3	Park Lane	
4	Purbrook Way W	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Middle Park Way	4.95	4.95	0.0	19.9	50.0	35.0	
2 - Purbrook Way E	3.46	4.19	28.0	16.2	50.0	43.0	
3 - Park Lane	3.86	4.24	1.0	25.3	50.0	43.0	
4 - Purbrook Way W	3.93	4.78	27.3	25.0	50.0	44.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Middle Park Way	0.561	1473
2 - Purbrook Way E	0.494	1182
3 - Park Lane	0.500	1180
4 - Purbrook Way W	0.535	1370

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D1	2020 Base	AM	FLAT	08:00	09:00	60	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Middle Park Way		✓	567	100.000
2 - Purbrook Way E		✓	742	100.000
3 - Park Lane		✓	290	100.000
4 - Purbrook Way W		✓	854	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	2	100	184	281
	2 - Purbrook Way E	81	4	116	541
	3 - Park Lane	126	105	1	58
	4 - Purbrook Way W	141	623	83	7

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	50	1	1	3
	2 - Purbrook Way E	2	0	2	3
	3 - Park Lane	2	3	0	0
	4 - Purbrook Way W	6	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Middle Park Way	0.56	8.25	1.3	A
2 - Purbrook Way E	0.82	22.35	4.5	C
3 - Park Lane	0.40	8.51	0.7	A
4 - Purbrook Way W	0.71	10.64	2.5	B

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	567	814	1017	0.557	562	1.3	7.983	A
2 - Purbrook Way E	742	553	908	0.817	726	4.1	18.813	C
3 - Park Lane	290	900	730	0.397	287	0.7	8.254	A
4 - Purbrook Way W	854	315	1201	0.711	844	2.4	10.047	B

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	567	823	1012	0.560	567	1.3	8.246	A
2 - Purbrook Way E	742	558	906	0.819	741	4.3	22.037	C
3 - Park Lane	290	915	722	0.402	290	0.7	8.496	A
4 - Purbrook Way W	854	319	1199	0.712	854	2.5	10.622	B

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	567	823	1012	0.560	567	1.3	8.251	A
2 - Purbrook Way E	742	558	906	0.819	742	4.4	22.264	C
3 - Park Lane	290	916	722	0.402	290	0.7	8.507	A
4 - Purbrook Way W	854	319	1199	0.712	854	2.5	10.638	B

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	567	823	1012	0.560	567	1.3	8.253	A
2 - Purbrook Way E	742	558	906	0.819	742	4.5	22.348	C
3 - Park Lane	290	916	722	0.402	290	0.7	8.508	A
4 - Purbrook Way W	854	319	1199	0.712	854	2.5	10.643	B

2020 Base, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Middle Park Way/Purbrook Way	Standard Roundabout		1, 2, 3, 4	21.21	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2020 Base	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Middle Park Way		✓	411	100.000
2 - Purbrook Way E		✓	813	100.000
3 - Park Lane		✓	346	100.000
4 - Purbrook Way W		✓	824	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	0	114	103	194
	2 - Purbrook Way E	113	0	113	587
	3 - Park Lane	178	120	3	45
	4 - Purbrook Way W	134	621	63	6

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	0	1	1	2
	2 - Purbrook Way E	0	0	2	1
	3 - Park Lane	1	3	33	0
	4 - Purbrook Way W	0	1	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Middle Park Way	0.47	7.03	0.9	A
2 - Purbrook Way E	0.91	37.17	8.6	E
3 - Park Lane	0.56	11.95	1.2	B
4 - Purbrook Way W	0.81	16.43	4.0	C

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	309	608	1133	0.273	308	0.4	4.420	A
2 - Purbrook Way E	612	276	1045	0.586	606	1.4	8.207	A
3 - Park Lane	260	672	844	0.309	259	0.4	6.219	A
4 - Purbrook Way W	620	309	1204	0.515	616	1.1	6.144	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	369	728	1065	0.347	369	0.5	5.241	A
2 - Purbrook Way E	731	331	1018	0.718	727	2.5	12.320	B
3 - Park Lane	311	805	777	0.400	310	0.7	7.799	A
4 - Purbrook Way W	741	371	1171	0.632	738	1.7	8.352	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	453	887	976	0.464	451	0.9	6.942	A
2 - Purbrook Way E	895	405	982	0.912	875	7.6	29.557	D
3 - Park Lane	381	973	693	0.549	379	1.2	11.521	B
4 - Purbrook Way W	907	451	1128	0.804	899	3.8	15.302	C

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	453	894	972	0.466	452	0.9	7.030	A
2 - Purbrook Way E	895	406	981	0.913	891	8.6	37.172	E
3 - Park Lane	381	987	686	0.555	381	1.2	11.951	B
4 - Purbrook Way W	907	455	1126	0.806	907	4.0	16.433	C

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	369	739	1059	0.349	371	0.5	5.317	A
2 - Purbrook Way E	731	333	1017	0.719	755	2.7	15.014	C
3 - Park Lane	311	830	765	0.407	313	0.7	8.122	A
4 - Purbrook Way W	741	377	1168	0.634	750	1.8	8.876	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	309	615	1129	0.274	310	0.4	4.465	A
2 - Purbrook Way E	612	279	1044	0.586	617	1.5	8.633	A
3 - Park Lane	260	682	839	0.311	261	0.5	6.332	A
4 - Purbrook Way W	620	313	1202	0.516	623	1.1	6.315	A

2020 Base , Sat

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Middle Park Way/Purbrook Way	Standard Roundabout		1, 2, 3, 4	10.27	B

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D3	2020 Base	Sat	ONE HOUR	11:45	13:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Middle Park Way		✓	400	100.000
2 - Purbrook Way E		✓	669	100.000
3 - Park Lane		✓	262	100.000
4 - Purbrook Way W		✓	755	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	2	85	126	187
	2 - Purbrook Way E	18	2	106	543
	3 - Park Lane	118	99	3	42
	4 - Purbrook Way W	122	577	50	6

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	0	0	0	0
	2 - Purbrook Way E	1	0	2	1
	3 - Park Lane	0	0	0	0
	4 - Purbrook Way W	0	1	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Middle Park Way	0.43	6.22	0.8	A
2 - Purbrook Way E	0.75	14.98	3.0	B
3 - Park Lane	0.38	7.59	0.6	A
4 - Purbrook Way W	0.68	9.16	2.1	A

Main Results for each time segment

11:45 - 12:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	301	552	1164	0.259	300	0.3	4.158	A
2 - Purbrook Way E	504	280	1043	0.483	500	0.9	6.653	A
3 - Park Lane	197	567	896	0.220	196	0.3	5.133	A
4 - Purbrook Way W	568	181	1273	0.447	565	0.8	5.110	A

12:00 - 12:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	360	661	1103	0.326	359	0.5	4.837	A
2 - Purbrook Way E	601	336	1016	0.592	599	1.4	8.694	A
3 - Park Lane	236	679	840	0.280	235	0.4	5.948	A
4 - Purbrook Way W	679	217	1254	0.541	677	1.2	6.284	A

12:15 - 12:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	440	808	1020	0.432	439	0.8	6.184	A
2 - Purbrook Way E	737	411	979	0.753	731	2.9	14.338	B
3 - Park Lane	288	829	765	0.377	288	0.6	7.524	A
4 - Purbrook Way W	831	266	1228	0.677	828	2.1	8.998	A

12:30 - 12:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	440	811	1019	0.432	440	0.8	6.225	A
2 - Purbrook Way E	737	412	978	0.753	736	3.0	14.979	B
3 - Park Lane	288	834	763	0.378	288	0.6	7.592	A
4 - Purbrook Way W	831	266	1227	0.677	831	2.1	9.160	A

12:45 - 13:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	360	666	1100	0.327	361	0.5	4.874	A
2 - Purbrook Way E	601	337	1015	0.593	607	1.5	9.051	A
3 - Park Lane	236	687	836	0.282	236	0.4	6.011	A
4 - Purbrook Way W	679	218	1253	0.542	682	1.2	6.403	A

13:00 - 13:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	301	556	1162	0.259	302	0.4	4.188	A
2 - Purbrook Way E	504	282	1042	0.483	506	1.0	6.812	A
3 - Park Lane	197	573	893	0.221	198	0.3	5.177	A
4 - Purbrook Way W	568	183	1272	0.447	570	0.8	5.183	A

2029 Base, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Middle Park Way/Purbrook Way	Standard Roundabout		1, 2, 3, 4	30.54	D

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D4	2029 Base	AM	FLAT	08:00	09:00	60	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Middle Park Way		✓	636	100.000
2 - Purbrook Way E		✓	832	100.000
3 - Park Lane		✓	325	100.000
4 - Purbrook Way W		✓	958	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	2	112	207	315
	2 - Purbrook Way E	91	4	130	607
	3 - Park Lane	141	118	1	65
	4 - Purbrook Way W	158	699	93	8

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	50	1	1	3
	2 - Purbrook Way E	2	0	2	3
	3 - Park Lane	2	3	0	0
	4 - Purbrook Way W	6	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Middle Park Way	0.67	11.47	2.0	B
2 - Purbrook Way E	0.95	68.92	15.0	F
3 - Park Lane	0.49	10.70	1.0	B
4 - Purbrook Way W	0.81	16.61	4.3	C

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	636	908	964	0.660	628	1.9	10.710	B
2 - Purbrook Way E	832	618	876	0.949	793	9.8	35.295	E
3 - Park Lane	325	990	685	0.475	321	0.9	10.008	B
4 - Purbrook Way W	958	350	1183	0.810	942	4.0	14.486	B

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	636	922	956	0.665	636	2.0	11.438	B
2 - Purbrook Way E	832	626	872	0.954	821	12.5	57.093	F
3 - Park Lane	325	1018	671	0.484	325	0.9	10.600	B
4 - Purbrook Way W	958	356	1179	0.812	957	4.2	16.440	C

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	636	923	956	0.665	636	2.0	11.466	B
2 - Purbrook Way E	832	626	872	0.954	826	14.0	64.447	F
3 - Park Lane	325	1022	669	0.486	325	1.0	10.669	B
4 - Purbrook Way W	958	356	1179	0.812	958	4.3	16.568	C

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	636	923	956	0.665	636	2.0	11.473	B
2 - Purbrook Way E	832	626	872	0.954	828	15.0	68.920	F
3 - Park Lane	325	1023	668	0.487	325	1.0	10.698	B
4 - Purbrook Way W	958	357	1179	0.813	958	4.3	16.609	C

2029 Base, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Middle Park Way/Purbrook Way	Standard Roundabout		1, 2, 3, 4	57.49	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D5	2029 Base	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Middle Park Way		✓	460	100.000
2 - Purbrook Way E		✓	909	100.000
3 - Park Lane		✓	386	100.000
4 - Purbrook Way W		✓	922	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	0	128	115	217
	2 - Purbrook Way E	126	0	126	657
	3 - Park Lane	199	134	3	50
	4 - Purbrook Way W	150	695	70	7

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	0	1	1	2
	2 - Purbrook Way E	0	0	2	1
	3 - Park Lane	1	3	33	0
	4 - Purbrook Way W	0	1	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Middle Park Way	0.55	8.94	1.2	A
2 - Purbrook Way E	1.04	121.36	35.7	F
3 - Park Lane	0.66	16.31	1.9	C
4 - Purbrook Way W	0.92	35.98	9.5	E

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	346	679	1093	0.317	344	0.5	4.869	A
2 - Purbrook Way E	684	308	1029	0.665	677	1.9	10.101	B
3 - Park Lane	291	751	804	0.361	288	0.6	7.066	A
4 - Purbrook Way W	694	345	1185	0.586	689	1.4	7.246	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	414	813	1018	0.406	413	0.7	6.029	A
2 - Purbrook Way E	817	369	999	0.818	809	4.1	18.275	C
3 - Park Lane	347	897	731	0.475	346	0.9	9.472	A
4 - Purbrook Way W	829	413	1149	0.722	824	2.5	11.045	B

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	506	980	924	0.548	504	1.2	8.667	A
2 - Purbrook Way E	1001	450	959	1.043	928	22.3	64.964	F
3 - Park Lane	425	1045	657	0.647	421	1.8	15.311	C
4 - Purbrook Way W	1015	496	1105	0.919	992	8.2	27.951	D

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	506	996	915	0.554	506	1.2	8.937	A
2 - Purbrook Way E	1001	453	958	1.045	947	35.7	121.361	F
3 - Park Lane	425	1063	648	0.655	425	1.9	16.312	C
4 - Purbrook Way W	1015	501	1102	0.921	1010	9.5	35.983	E

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	414	841	1002	0.413	416	0.7	6.247	A
2 - Purbrook Way E	817	374	997	0.820	937	5.7	73.620	F
3 - Park Lane	347	1010	675	0.514	350	1.1	11.380	B
4 - Purbrook Way W	829	435	1137	0.729	855	2.8	13.985	B

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	346	690	1087	0.319	347	0.5	4.947	A
2 - Purbrook Way E	684	311	1028	0.666	699	2.1	11.510	B
3 - Park Lane	291	771	794	0.366	293	0.6	7.334	A
4 - Purbrook Way W	694	352	1182	0.587	700	1.5	7.622	A

2029 Base, Sat

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Middle Park Way/Purbrook Way	Standard Roundabout		1, 2, 3, 4	16.05	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D6	2029 Base	Sat	ONE HOUR	11:45	13:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Middle Park Way		✓	448	100.000
2 - Purbrook Way E		✓	750	100.000
3 - Park Lane		✓	293	100.000
4 - Purbrook Way W		✓	847	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	2	95	141	210
	2 - Purbrook Way E	20	2	119	609
	3 - Park Lane	132	111	3	47
	4 - Purbrook Way W	137	647	56	7

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	0	0	0	0
	2 - Purbrook Way E	1	0	2	1
	3 - Park Lane	0	0	0	0
	4 - Purbrook Way W	0	1	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Middle Park Way	0.51	7.65	1.0	A
2 - Purbrook Way E	0.87	27.18	5.9	D
3 - Park Lane	0.45	9.23	0.8	A
4 - Purbrook Way W	0.77	12.98	3.3	B

Main Results for each time segment

11:45 - 12:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	337	618	1127	0.299	336	0.4	4.540	A
2 - Purbrook Way E	565	314	1027	0.550	560	1.2	7.723	A
3 - Park Lane	221	635	862	0.256	219	0.3	5.588	A
4 - Purbrook Way W	638	202	1262	0.505	634	1.0	5.743	A

12:00 - 12:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	403	740	1058	0.381	402	0.6	5.479	A
2 - Purbrook Way E	674	376	996	0.677	671	2.0	11.088	B
3 - Park Lane	263	761	799	0.330	263	0.5	6.704	A
4 - Purbrook Way W	761	242	1240	0.614	759	1.6	7.513	A

12:15 - 12:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	493	904	967	0.510	492	1.0	7.548	A
2 - Purbrook Way E	826	460	955	0.865	812	5.4	23.586	C
3 - Park Lane	323	924	718	0.449	321	0.8	9.049	A
4 - Purbrook Way W	933	296	1211	0.770	926	3.2	12.442	B

12:30 - 12:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	493	909	964	0.512	493	1.0	7.646	A
2 - Purbrook Way E	826	461	954	0.866	824	5.9	27.184	D
3 - Park Lane	323	934	713	0.453	323	0.8	9.228	A
4 - Purbrook Way W	933	297	1211	0.770	932	3.3	12.984	B

12:45 - 13:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	403	749	1054	0.382	404	0.6	5.556	A
2 - Purbrook Way E	674	378	995	0.678	689	2.2	12.442	B
3 - Park Lane	263	777	791	0.333	265	0.5	6.854	A
4 - Purbrook Way W	761	244	1239	0.615	768	1.6	7.808	A

13:00 - 13:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	337	624	1124	0.300	338	0.4	4.588	A
2 - Purbrook Way E	565	316	1025	0.551	568	1.3	8.034	A
3 - Park Lane	221	643	858	0.257	221	0.3	5.658	A
4 - Purbrook Way W	638	204	1261	0.506	640	1.0	5.873	A

2029 Base + Dev, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Middle Park Way/Purbrook Way	Standard Roundabout		1, 2, 3, 4	30.73	D

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)
D7	2029 Base + Dev	AM	FLAT	08:00	09:00	60	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Middle Park Way		✓	637	100.000
2 - Purbrook Way E		✓	832	100.000
3 - Park Lane		✓	325	100.000
4 - Purbrook Way W		✓	960	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	2	112	207	316
	2 - Purbrook Way E	91	4	130	607
	3 - Park Lane	141	118	1	65
	4 - Purbrook Way W	160	699	93	8

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	50	1	1	3
	2 - Purbrook Way E	2	0	2	3
	3 - Park Lane	2	3	0	0
	4 - Purbrook Way W	6	2	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Middle Park Way	0.67	11.51	2.0	B
2 - Purbrook Way E	0.95	69.39	15.2	F
3 - Park Lane	0.49	10.71	1.0	B
4 - Purbrook Way W	0.81	16.76	4.4	C

Main Results for each time segment

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	637	908	964	0.661	629	1.9	10.737	B
2 - Purbrook Way E	832	619	876	0.950	793	9.8	35.399	E
3 - Park Lane	325	991	684	0.475	321	0.9	10.020	B
4 - Purbrook Way W	960	350	1183	0.812	944	4.0	14.586	B

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	637	922	956	0.666	637	2.0	11.471	B
2 - Purbrook Way E	832	627	872	0.954	821	12.5	57.371	F
3 - Park Lane	325	1019	670	0.485	325	0.9	10.613	B
4 - Purbrook Way W	960	356	1179	0.814	959	4.3	16.584	C

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	637	923	956	0.666	637	2.0	11.502	B
2 - Purbrook Way E	832	627	872	0.954	826	14.1	64.831	F
3 - Park Lane	325	1023	668	0.486	325	1.0	10.683	B
4 - Purbrook Way W	960	356	1179	0.814	960	4.3	16.712	C

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	637	923	956	0.666	637	2.0	11.509	B
2 - Purbrook Way E	832	627	872	0.954	828	15.2	69.386	F
3 - Park Lane	325	1024	667	0.487	325	1.0	10.713	B
4 - Purbrook Way W	960	357	1179	0.814	960	4.4	16.760	C

2029 Base + Dev, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Middle Park Way/Purbrook Way	Standard Roundabout		1, 2, 3, 4	58.66	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D8	2029 Base + Dev	PM	ONE HOUR	16:45	18:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Middle Park Way		✓	464	100.000
2 - Purbrook Way E		✓	909	100.000
3 - Park Lane		✓	386	100.000
4 - Purbrook Way W		✓	926	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	0	128	115	221
	2 - Purbrook Way E	126	0	126	657
	3 - Park Lane	199	134	3	50
	4 - Purbrook Way W	154	695	70	7

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	0	1	1	2
	2 - Purbrook Way E	0	0	2	1
	3 - Park Lane	1	3	33	0
	4 - Purbrook Way W	0	1	2	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Middle Park Way	0.56	9.03	1.3	A
2 - Purbrook Way E	1.05	123.77	36.4	F
3 - Park Lane	0.66	16.42	1.9	C
4 - Purbrook Way W	0.93	37.21	9.9	E

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	349	679	1093	0.320	347	0.5	4.889	A
2 - Purbrook Way E	684	311	1028	0.666	677	1.9	10.140	B
3 - Park Lane	291	753	803	0.362	288	0.6	7.086	A
4 - Purbrook Way W	697	345	1185	0.588	691	1.4	7.277	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	417	813	1018	0.410	416	0.7	6.065	A
2 - Purbrook Way E	817	373	997	0.819	808	4.1	18.420	C
3 - Park Lane	347	901	729	0.476	346	0.9	9.514	A
4 - Purbrook Way W	832	413	1149	0.725	828	2.5	11.161	B

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	511	980	924	0.553	509	1.2	8.748	A
2 - Purbrook Way E	1001	454	957	1.046	927	22.7	65.872	F
3 - Park Lane	425	1048	656	0.648	421	1.8	15.409	C
4 - Purbrook Way W	1020	495	1105	0.923	996	8.5	28.605	D

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	511	996	915	0.558	511	1.3	9.029	A
2 - Purbrook Way E	1001	457	956	1.047	946	36.4	123.771	F
3 - Park Lane	425	1066	647	0.657	425	1.9	16.419	C
4 - Purbrook Way W	1020	501	1102	0.925	1014	9.9	37.212	E

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	417	841	1002	0.416	419	0.7	6.293	A
2 - Purbrook Way E	817	378	995	0.821	940	5.9	76.601	F
3 - Park Lane	347	1015	672	0.516	350	1.1	11.486	B
4 - Purbrook Way W	832	435	1137	0.732	860	2.9	14.313	B

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	349	690	1087	0.321	350	0.5	4.968	A
2 - Purbrook Way E	684	314	1026	0.667	699	2.1	11.601	B
3 - Park Lane	291	775	792	0.367	293	0.6	7.358	A
4 - Purbrook Way W	697	352	1182	0.590	703	1.5	7.673	A

2029 Base + Dev, Sat

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Middle Park Way/Purbrook Way	Standard Roundabout		1, 2, 3, 4	17.42	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D9	2029 Base + Dev	Sat	ONE HOUR	11:45	13:15	15

Vehicle mix source	PCU Factor for a HV (PCU)
HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Middle Park Way		✓	470	100.000
2 - Purbrook Way E		✓	750	100.000
3 - Park Lane		✓	293	100.000
4 - Purbrook Way W		✓	877	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	2	95	141	232
	2 - Purbrook Way E	20	2	119	609
	3 - Park Lane	132	111	3	47
	4 - Purbrook Way W	167	647	56	7

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Middle Park Way	2 - Purbrook Way E	3 - Park Lane	4 - Purbrook Way W
	1 - Middle Park Way	0	0	0	0
	2 - Purbrook Way E	1	0	2	1
	3 - Park Lane	0	0	0	0
	4 - Purbrook Way W	0	1	1	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Middle Park Way	0.54	8.06	1.1	A
2 - Purbrook Way E	0.88	29.57	6.4	D
3 - Park Lane	0.46	9.52	0.8	A
4 - Purbrook Way W	0.80	14.69	3.8	B

Main Results for each time segment

11:45 - 12:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	354	618	1127	0.314	352	0.5	4.635	A
2 - Purbrook Way E	565	330	1018	0.554	560	1.2	7.855	A
3 - Park Lane	221	651	854	0.258	219	0.3	5.658	A
4 - Purbrook Way W	660	202	1262	0.523	656	1.1	5.948	A

12:00 - 12:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	423	740	1058	0.399	422	0.7	5.647	A
2 - Purbrook Way E	674	396	986	0.684	671	2.1	11.415	B
3 - Park Lane	263	781	789	0.334	263	0.5	6.829	A
4 - Purbrook Way W	788	242	1240	0.636	786	1.7	7.942	A

12:15 - 12:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	517	903	967	0.535	516	1.1	7.933	A
2 - Purbrook Way E	826	483	943	0.876	811	5.8	25.157	D
3 - Park Lane	323	947	706	0.457	321	0.8	9.314	A
4 - Purbrook Way W	966	296	1211	0.797	958	3.7	13.879	B

12:30 - 12:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	517	909	964	0.537	517	1.1	8.061	A
2 - Purbrook Way E	826	485	942	0.877	824	6.4	29.574	D
3 - Park Lane	323	958	701	0.460	323	0.8	9.519	A
4 - Purbrook Way W	966	297	1211	0.798	965	3.8	14.686	B

12:45 - 13:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	423	750	1053	0.401	424	0.7	5.743	A
2 - Purbrook Way E	674	399	985	0.685	691	2.3	13.015	B
3 - Park Lane	263	799	780	0.338	265	0.5	7.001	A
4 - Purbrook Way W	788	244	1239	0.636	796	1.8	8.344	A

13:00 - 13:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Middle Park Way	354	624	1123	0.315	355	0.5	4.687	A
2 - Purbrook Way E	565	333	1017	0.555	569	1.3	8.190	A
3 - Park Lane	221	660	850	0.260	221	0.4	5.734	A
4 - Purbrook Way W	660	204	1261	0.524	663	1.1	6.101	A



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