Executive Summary

Bath & North East Somerset (B&NES) Council commissioned The River Regeneration Trust (TRRT) to undertake a detailed scoping study into the employment opportunities in the Broadmead Peninsula, focussing particularly on the creation of green jobs, which will be used as part of the evidence base for the Placemaking Plan for Keynsham. This report shows that a Circular Economy approach to development will create hundreds of new jobs, will significantly add value to the area and reinforce the economic ambitions of B&NES to create a broad range of employment opportunities for local people. It would also create sustainable markets for their recyclates and ensure that their approach to jobs and housing is sustainable and compliant with National Planning Policy Framework.

Deliverability and viability of employment floorspace and housing are central to the scoping study, but in a way that complements existing industry, agriculture and leisure that are trading and employing on the site. These include Wessex Water, Broadmead Industries (collection of businesses and multiple starter units), Avon Valley Adventure & Wildlife Park, Avon Valley Farm (including 30 businesses and starter units), Bendalls Farm, and DS Smith Recycling Recycling (formerly Severnside Recycling). Our three Outline Proposals incorporate options for all these sites to ensure deliverability of employment floorspace and housing is undertaken though a phased, strategic and equalised Action Plan that can deliver a new HGV-compliant access and two-way over-bridge.

Our three Outline Proposals (Options A-C) generated by CityCAD software, were cross-referenced with employment floorspace and housing in the Core Strategy, the ambitions of landowners and the requirements of a Circular Economy Environment Park. The estimated number and types of new, permanent jobs (in addition to construction/seasonal jobs) and housing for Options A-C are:

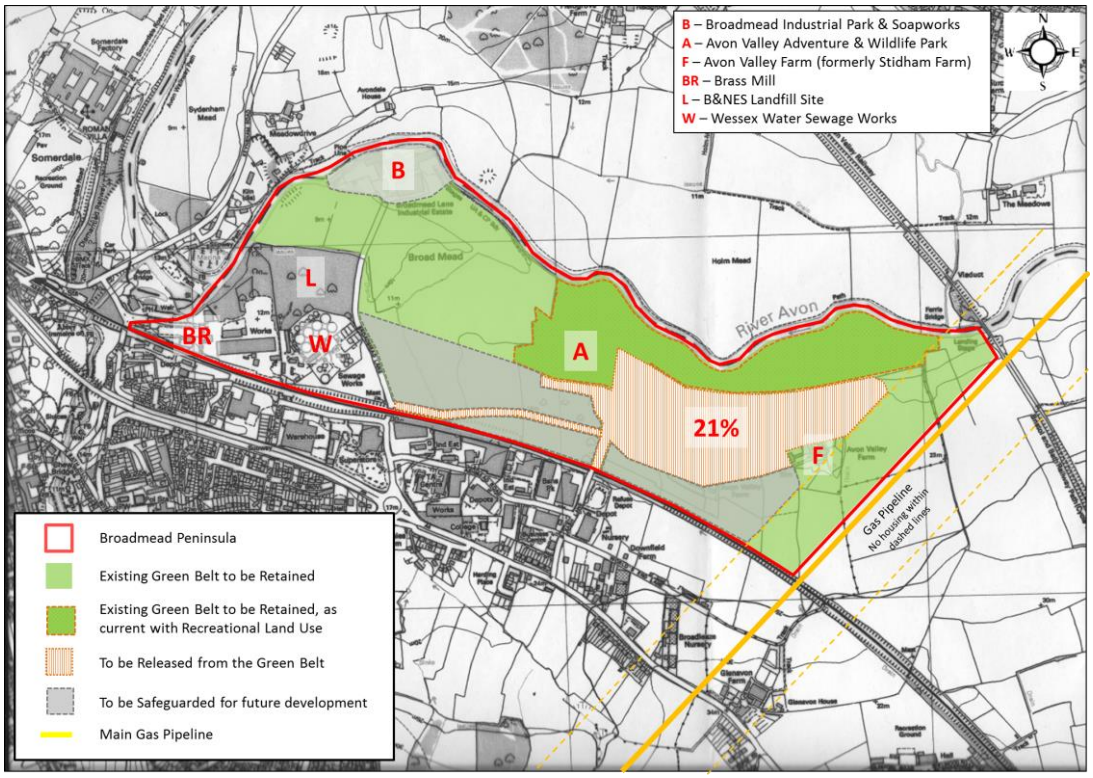
Broadmead Peninsula 2013-2029	**New Green Jobs**		
Land Use Type	**Option A**	**Option B**	**Option C**
Housing (C3)	4	4	4
Offices (B1)	189	189	149
Industry (B2 & B8)	312	312	268
Shops & Hotels	22	48	22
Health & Education	20	20	20
Leisure	17	17	17
Open Space, Marina & Wetland	8	8	8
Rail Sidings	0	18	10
Waste Facilities	0	12	8
TOTAL	**572**	**628**	**506**

Broadmead Peninsula 2013-2029	**Number of Houses**		
Housing Type	**Option A**	**Option B**	**Option C**
Semi-detached or Detached	390	400	430
1-bed Flats	63	95	45
2-bed Flats	198	139	144
Houseboats	80	80	80
TOTAL	**731**	**714**	**699**

Our transport and movement strategy for Broadmead Peninsula provides access in a phased manner ensuring a deliverable and viable approach for each of Options A-C. Minor highway improvements as part of Phase 1 can release a significant quantum of development (circa 1/3rd)before a high capacity primary route from Keynsham Road from the west is delivered. Longer term a new high capacity link over the rail-line is proposed. Although current bus routes can be accessed within a short walk, new services penetrating Broadmead Peninsula are planned. Opportunities to move people/goods on the River Avon are central to our vision, alongside a high quality network of walking and cycling linkages. These include to/from Keynsham rail station, onto National Cycle Route 4 and via rail under-passes linking into the nearby Keynsham town centre. Our initial highway capacity assessment shows that:

- Pixash Lane over-bridge would be able to support Phase 1 of the development in each of Options A-C with a significant level of spare capacity.
- The A4/Pixash Lane junction will operate within capacity with Phase 1 of development traffic in 2018, in each of Options A-C.

In terms of flood and environment, Broadmead Peninsula is well screened from many wider views and has established habitats, hedgerows, tree lines and some noted species around existing employment space and recreational facilities. Whilst it is currently mainly rural in character, there is scope for development within the heart of the site, outside the flood plain, with minimum release of Green Belt (21% of Broadmead Peninsula) and strategically chosen safeguarded land. This will retain the general openness of the Green Belt in relation to the gap between Keynsham and Saltford and the link north across the river to South Gloucestershire. As shown below, Green Belt can be retained along the river corridor with recreational use, a marina, wetland and reuse of existing buildings taking place within appropriate development for the Green Belt. It creates a transition from general development north of the railway line, becoming less dense and urban fringe to the river.



We do not agree with the Green Belt Phase2 Study in that the site is a high negative impact, nor the Sustainability Assessment that stated an impact across to South Gloucestershire. In any event the landscape impact has to be 'balanced' with other factors of sustainability. For example, economic growth from green jobs, environmental enhancement from new parkland/wetland/woodland, and social benefits of affordable homes, public access, cycle-ways, a nature trail and heritage trail. Development here would in fact retain a greater gap between Keynsham and Saltford along the A4 (the key element in this location) that doesn't harm the five national purposes of Green Belt or the additional local purpose. Broadmead Peninsula is a better solution in Green Belt terms than closing and narrowing the gap between Keynsham and Saltford south of the railway line, along the A4 and south of the A4. A new Community Forest is planned either side of the national gas pipeline, that will mask any visual impact of the Broadmead Peninsula from the East and prevent merging with Saltford. This is an ideal location for removing land from Green Belt without risking encroachment.

In summary, Broadmead Peninsula should be promoted as a strategic location in the Core Strategy with minimum release of Green Belt and some safeguarded land for employment floorspace and housing in East Keynsham. It will establish a national pathfinder Environment Park for the Circular Economy, create hundreds of new permanent jobs, give access to truly affordable housing for key workers and first time buyers and integrate recreation and leisure space alongside the River Avon.

5. Transport Requirements

Research has shown that transport is the number one issue in planning applications / regeneration schemes in the UK, regardless of development type or geography. Concerns over traffic levels, site servicing and general access issues can typically dominate discussions and lock-up opportunities. Our team have invested considerable time and expertise early on in the regeneration process to find opportunities and solutions which will save time and money going forwards. Our vision, in line with B&NES aspirations is to create a sustainable community – providing travel choice for all journeys to / from the site regardless of trip purpose is key to the promotion of Broadmead Peninsula as an integrated development; as is providing complementary land uses that reduce the need to travel at all. Focus has been centred on both internal site movements, and external trips.

Our transport approach is for delivery of housing and employment in the short term with an eye for the wider vision of the Peninsula, future-proofing the development towards a longer term sustainable community. In terms of viability, which is essential to give the scheme credibility and to put forward confidence in deliverability, we have set out a phased strategy in transport planning terms. The regeneration will take a stepped approach in transport infrastructure provision allowing sustainable access to the Broadmead Peninsula in a viable manner. However, phasing is important, not just for viability but over engineering and creating excessive capacity before it is required, can have a damaging effect including attracting more trips (including suppressed traffic) onto the highway network. The timeline for delivery will be based on providing the appropriate transport capacity as development comes forward. Our team will work closely with the Local Highway Authority and other key transport providers in progressing our scheme.

Our master-plan looks at complementary land uses – many of which reduce the need to travel. Creating jobs will also reduce the need for Keynsham residents to “out-migrate” in the morning peak, returning in the evening peak – this creating a release of some local highway capacity. Additional residents and people visiting leisure land uses (largely off-peak travel) will generate local economic stimulus and enhance the viability of shops and services in the town, including the high street. This multiplier effect will in-turn allow Keynsham to further invest in its infrastructure and services, providing a more sustainable community and in turn reducing the need to travel (particularly by vehicular modes).

Furthermore our plans centre on the “circular economy” – for example utilising the waste and materials industrial usages on the Peninsula and using these products to build boats and homes. We will also be promoting use of the River Avon, with an aim of moving freight (and people) on this asset – this will reduce the movements of Heavy Goods Vehicles (HGVs) to and from the area.

Current infrastructure and access to the Broadmead Peninsula can be utilised and managed to support a certain quantum of development coming forward in the short term. The longer term vision can be realised by carefully planned infrastructure provision and travel planning. The following paragraphs centre on the phased approach to access the regeneration opportunity.

Phase 1 – Making best use of existing infrastructure

We appreciate that current highway capacity into the Peninsula is limited. However, there are some access points and opportunities to develop a sustainable transport strategy. The following sections describe current transport infrastructure and services and set out a strategy to deliver homes and jobs in the short term to meet policy aspirations, whilst not compromising our ambitious longer term regeneration plans. Phase 1 concentrates on low cost interventions to mobilise development in the first five years of the vision.

Highway access

Avon Mill Lane - road access from Avon Mill Lane via a road spur to service the industrial activities to the west of the site – this route has space for two passing HGVs leading into the DS Smith Recycling land. Avon Mill Lane is a two-way road which routes under the rail line to the south of the site, then joining the B3116 Bath Hill / Bath Road. To the north, Avon Mill Lane links in with the A4175 Station Road / Keynsham Road (this road routes from Keynsham town centre to Bitton, and onto Bristol and Bath).

Broadmead access from Avon Mill Lane

Broadmead Lane - heading east, Broadmead Lane feeds off the A4 / B3116 roundabout by the Co-operative supermarket. This link utilises a low capacity (single lane of traffic) under the railway line and then routes towards the Broadmead Lane Industrial Estate, located alongside the river. Almost immediately north of after the railway line, Stidham Lane is accessed off Broadmead Lane and runs in an eastwards direction to Pixash lane. Broadmead Lane (south of the rail line) also joins Unity Road which forms another low capacity highway route under the railway – this link offers potential for a walking / cycle link to Keynsham as it also feeds into an under-pass of the A4. In Phase 1 of the transport strategy, these routes under the rail line can also act as emergency access points.

Pixash Lane – this route joins the A4 via a priority junction (Pixash Lane being the minor arm). This junction benefits from right hand turn stacking into Pixash Lane and there is highway land available if capacity improvements are required. Pixash Lane is a two way road providing access to a number of industrial units to the south of the railway; it then bridges over the rail-line – allowing single file traffic and then accesses Avon Valley Park and farm buildings. Pixash Lane can link in with Broadmead Lane to the north of the rail line, via Stidham Lane.

Figure 5.1 - A4 / Pixash Lane junction

Local rail network - the development is in close proximity to Keynsham rail station (situated to the north of Keynsham town centre on Keynsham Road) – services run between Bath and Bristol Temple Meads (and beyond) and although frequent at peak times, are irregular at off-peak times with main high speed services not calling at the station. The journey times into Bath Spa or Bristol Temple Meads are around 10 minutes. The station car park is low capacity and station facilities are limited – these include a small sheltered area, help point and manned ticket booth which operates at peak times only. The rail line forms a boundary to the south of Broadmead Peninsula.

Figure 5.2 - Keynsham railway station

The regeneration also allows opportunities for the movement of freight by rail, removing HGV traffic off the highway network. Our team are continuing discussions with Network Rail to explore the possibility to provide rail sidings to service the industrial land uses on the Broadmead site.

Bus services - areas of Broadmead Peninsula can access the A4 Bath Road bus services via a relatively short walk or cycle. Regular bus services route along the A4 between Bath and Bristol and to other local centres. Journey times are approximately 20 minutes into the centre of Bath and a similar duration into Bristol city centre. Accessibility mapping is shown in Figure YYYY.

Cycle links - the well-used and high quality segregated National Cycle Route 4 (NCR4) routes between Bath and Bristol (and beyond) and runs via the north-east of the site crossing the river at Ferris Bridge. The A4 also provides a cycle corridor and includes a number of segregated sections via Saltford and Keynsham (and linking into Bath and Bristol).

River Avon - the site offers direct frontage onto the River Avon. Our wider vision for the regeneration of the River Avon includes the promotion of river boats, potentially for leisure and commuter travel. There are the obvious advantages of providing leisure / tourist river trips; the business case for generating a commuter business for journeys into Bristol or Bath is more complex as this relies on an attractive journey generalised cost compared to other modes, with the value of time for a commuter being high. We also see the river playing a lead role in the movement of freight to the industrial sites in the locality and may be able to transfer materials during the construction process. Each barge can take a significant numbers of HGVs off the road network. We propose a boat landing station as part of the scheme and a number of access points onto the river.

Local accessibility – Figures 5.aa and 5.bb map out accessibility from the Broadmead Peninsula to Keynsham town centre and local public transport nodes. Industry guidance in PPG13 and re-iterated by the CIHT recommend that distances of 2kms and 5kms respectively represent maximum walking and cycling distances to land uses. Guidance on distance to transport nodes (such as bus stops and rail stations) varies to some extent – however in London the Public Transport Accessibility Level (PTAL) suggests a distance threshold of 960 metres to a rail node.

The vast majority of the Broadmead Peninsula lies within 2 km of Keynsham town centre and also within this distance to Saltford. Areas of the Peninsula are within 400 meters of the nearest bus stop, with the vast majority of the site falling within 800 metres. Almost the whole of Broadmead is within 2 km of the rail station.

Figure 5.3 - Unity Road tunnel under the railway and walking / cycle link under the A4

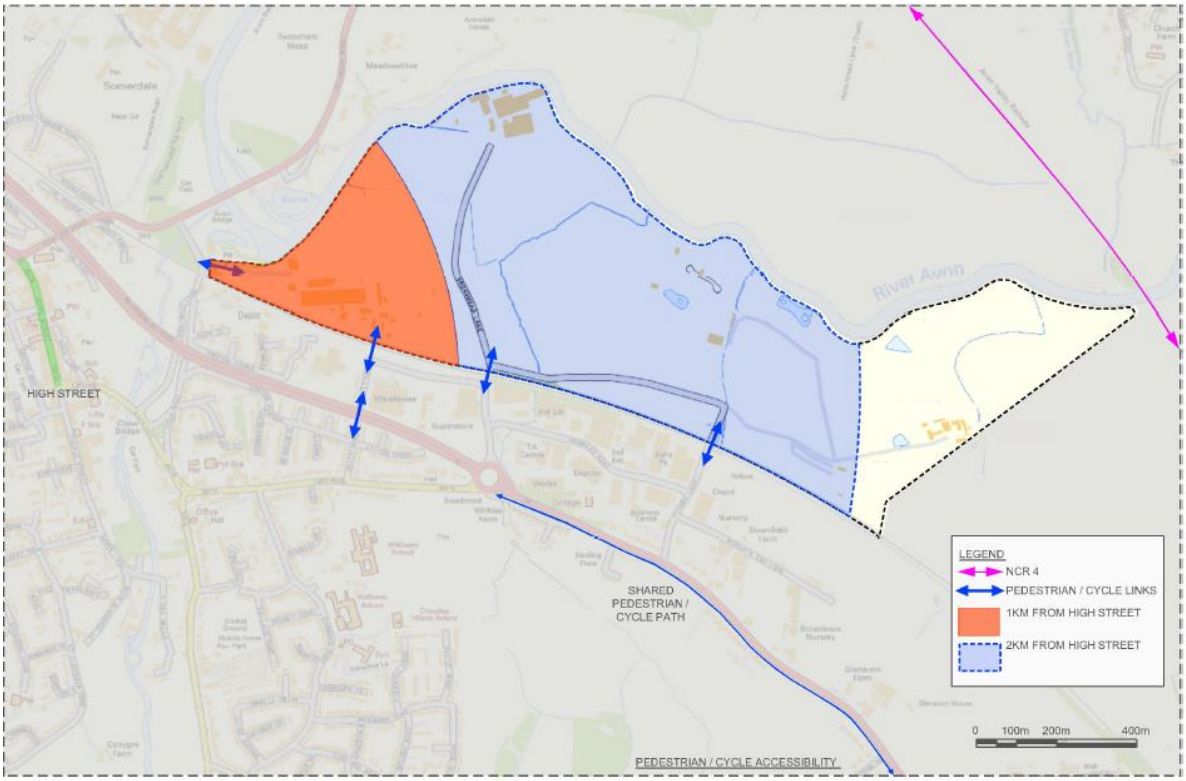


Figure 5.4 - Pedestrian / cycle linkages and distances to Keynsham High Street

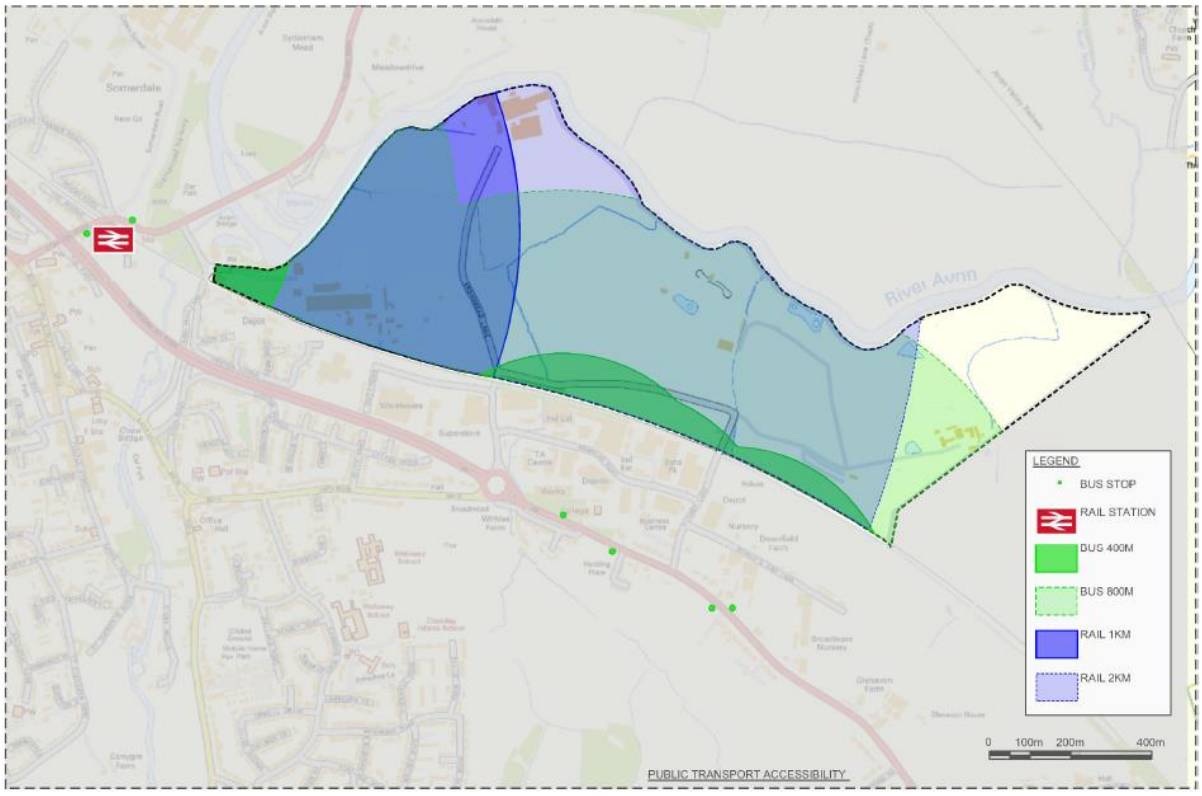


Figure 5.5 – Distances to public transport nodes

There are a variety of land uses – largely business / industrial, agricultural and leisure that are currently being accessed via the existing infrastructure. Our vision encompasses a master-plan that will deliver complementary activities which will reduce the need to travel – for example a strong mix of affordable and market led housing supply, jobs, industrial usage and leisure activities. Funds for new infrastructure will be realized from the selling of homes and other development. Initially traffic capacity can be met by existing infrastructure – Pixash Lane road bridge allows a link into the Peninsula along with under rail tunnels. Some of these rail tunnel linkages can be promoted as pedestrian / cycle access. Currently Pixash Lane provides (primarily) access to the Avon Valley Park - largely a generator of off-peak vehicle access. Housing and employment uses will generate more peak time travel – however, a small quantum of development can be delivered without major infrastructure investment. There are local high frequency bus services running along the A4 Bath Road and opportunities for cyclists to link in with both NCR4 and the improved (with areas of segregated cycle lanes) route into Bath along the A4.

Figure 5.6 - A4 Bath Road bus services and segregated cycle-way

A planned approach to managing the current transport infrastructure in the short term will give confidence in scheme viability and deliverability and allow an element of development to progress quickly without creating a significant negative impact in traffic terms. The preliminary cost / viability of this approach is set out in section 6.

Figure 5.7 - Broadmead Lane – road link to Pixash Lane; local retail facilities

Phase 1 Highway Improvements

Phase 1 will see an upgrade to Stidham Lane (route linking Broadmead Lane to Pixash Lane. This will offer an alternative to Pixash Lane and provide additional highway capacity into the site. This route will be an option to cyclists, who can then link into Unity Road and the underpass towards Keynsham town centre. Stidham Lane will be upgraded to a two-way secondary route and include a shared foot / cycle-way. Stidham Lane onto the rail underpass (at Broadmead Lane) can also act as a secondary and emergency access in Phase 1. The junction from Broadmead Lane, under the railway can be changed in terms of priorities and road markings if required going forwards.

Highway Capacity

In order to give decision-makers confidence that Phase 1 is deliverable with minimal works to the highways network, therefore making up the shortfall in five year housing, we have undertaken an assessment of highways capacity.

Traffic Generation

We have undertaken some initial TRICS (industry standard database for calculating traffic generation by a range of land uses) trip rate assessments for the residential and industrial employment land uses proposed for Phase 1. This is based on 250 new homes and 24,500 m^2 Gross Floor Area (GFA) of employment. The homes represent a mix of privately owned dwellings and give an indication of trip generation – this will be firmed up once we develop the master planning and have a more definite approach to house size, make up of affordable homes etc.

Employment and residential development generate tidal trip patterns. Residential development generates higher levels of departures in the AM peak and higher levels of arrivals in the PM peak. The opposite is true for industrial employment, with the highest inbound flow in the AM peak, and highest outbound flow in the PM peak. Thus these land uses complement each other and result in a balanced trip generation profile. This balanced trip generation profile facilitates a greater level of development to be achieved in Phase 1 rather than would occur with a more tidal flow profile. This generates revenue from the site which can be used to invest in the infrastructure required to deliver the long-term vision for the site. Furthermore, there is significant potential for people to both live and work on the Broadmead Peninsula, limiting the level of external trips generated.

The results are set out in Tables 5.1 and Table 5.2, with 5.3 showing total traffic generation for Phase 1. We have concentrated on the traditional network weekday peak hour periods, as this is of the key concern for the Local Highway Authority.

Time Period	In	Out	Total Trips
0800 – 0900	28	95	123
1700 - 1800	79	37	116

Table 5.1 – Trip generation from 250 new homes

Time Period	In	Out	Total Trips
0800 – 0900	131	25	157
1700 - 1800	12	105	117

Table 5.2 – Trip generation from 24,500 sqm of industrial employment

Time Period	In	Out	Total Trips
0800 – 0900	159	121	280
1700 - 1800	91	142	233

Table 5.3 – Total trip generation for Phase 1

The results show that the development has the potential to generate 280 **two-way** trips in the AM peak, and 233 **two-way** trips in the PM peak. In terms of the biggest volumes of traffic in any one direction, Phase 1 will generate 159 vehicle arrivals in the AM peak, and 142 vehicle departures in the PM peak - this equates to between two and three vehicle movements per minute into the site in the morning, and out of the site in the evening. The flows out of the development in the morning and into the Peninsula in the evening will be less.

Whilst the AM peak generates slightly more traffic, it is considered that the traffic impact of Phase 1 of the development will be greater in the PM peak. This is because the PM peak has the highest level of outbound traffic, which will need to join the A4, opposed by the heavy traffic flows. The local highway network is therefore more sensitive to increases in outbound traffic than inbound. For this reason, the PM peak has been chosen for assessment.

Traffic Distribution

Given that the housing land use will be complemented by a significant level of employment, we have taken a conservative approach that 10% of the jobs will be staffed by people living in the new Broadmead Peninsula homes. We have also made the conservative estimate that only 40% of the traffic will route via Stidham Lane and Broadmead Lane to the A4, despite the Stidham Lane improvements and higher capacity of the Broadmead Lane approach to the A4. The remaining 50% of traffic will therefore use Pixash Lane. Trip generation along Broadmead Lane and Pixash Lane, using these assumptions, is presented in Table 5.4.

Access	In	Out	Total Trips
Broadmead Lane	36	57	93
Pixash Lane	46	71	117

Table 5.4 – PM peak Phase 1 traffic generation by access

In order to determine traffic distribution, we have utilised data from *Appendix E of the "B&NES Background Evidence to the Schedule of Proposed Changes to the Core Strategy",* dated April 2013 – "Distribution of Car Trips from Keynsham East Ward". In summary the traffic to / from the proposed development will route as shown in Table 5.5.

Direction	Percentage of Trips	Number of Trips (IN)	Number of Trips (OUT)
West (Bristol / Keynsham etc)	78%	64	99
East (Bath etc)	22%	18	29

Table 5.5 – Trip distribution from Broadmead Phase 1

Background Traffic Flows

In order to properly assess the traffic impact of the development we have undertaken a PM peak hour (1700-1800) traffic survey at the A4/Pixash Lane junction on Tuesday 22nd October 2013. This has enabled us to determine the link flow along the A4, as well as turning movements for assessing the capacity of the junction itself. For the purpose of a robust assessment, we have applied a compound traffic growth rate of 1% per annum to through traffic on the A4, to account for economic growth and other development, up to an assessment year of 2018. 2018 represents the target for delivering the five year housing allocation.

Traffic Impact and Capacity Assessment

The percentage impact of the development on A4 link flows can be seen in table 5.6.

Link	Eastbound	Westbound
A4 (west of Pixash Lane)	+3.6%	+5.4%
A4 (east of Pixash Lane)	+2.1%	+1.6%

Table 5.6 - Percentage impact of Phase 1 on A4 link flows in 2018

Phase 1 of the Broadmead development will have a minimal impact on the A4, with the highest percentage impact being a 5.4% increase on the westbound flow to the west of Pixash Lane. All other increases in link flow will be less than 5%.

The capacity of Pixash Lane is constrained by the single file traffic crossing the railway line. Given the nature of slow moving traffic and the need to give-way if required, the capacity of this link is estimated at around 500 / 600 vehicles per hour (a standard two-way link would offer circa 1,100 vehicles per hour in each direction). Baseline traffic flow on the Pixash Lane bridge is currently very low. At peak periods, Pixash Lane only experiences minimal trips to / from the Avon Valley Park and to the agricultural buildings.

Phase 1 of the Broadmead development will increase the level of traffic using the Pixash Lane bridge. The highest time period for trip generation from Phase 1 proposals will be 280 two-way trips in the AM peak - however, many of these trips will route via Stidham Lane / Broadmead Lane (and not use Pixash Lane over-bridge). It is therefore considered that the Pixash Lane bridge will remain within link capacity with Phase 1 in place. However, it would be beneficial to traffic flow to reduce conflicts.

One traffic management option for the bridge would be the implementation of traffic signals at either end, with green time being allocated on a demand responsive basis. A LinSig (Industry Best Practice software for assessing the capacity of signalised junctions) model has been developed for this scenario. It is good practice to design junctions to operate below 90% saturation to account for fluctuations in traffic flow. We have worked backwards from this point to analyse the practical capacity of a signalised Pixash Lane bridge. It was found that the bridge could accommodate 1,050 vehicles per hour, and therefore **Pixash Lane over-bridge would be able to support Phase 1 of the development with a significant level of spare capacity.**

The bridge currently has verges on both sides – we suggest that these are cleared to provide highway and a walk-way on one side. The junction capacity of the A4/Pixash lane junction in its current format has been analysed with the addition of Phase 1 development traffic in 2018. This has been assessed using PICADY software (Industry Best Practice software for priority junctions). Geometric parameters such as road widths and visibility have been measured on site. The results can be seen in Table 5.7.

Movement	Maximum Ratio of Flow to Capacity	Maximum Queue
Pixash Lane Left	0.884	4.0
Pixash Lane Right	0.869	4.4
A4 (E) Right into Pixash Lane	0.052	0.1

Table 5.7 - A4/Pixash Lane 2018 plus Phase 1 PM Peak Traffic Capacity Results

Junctions operating within an RFC lower than 0.9 are considered to be operating within practical capacity, with spare capacity built in to accommodate fluctuations in traffic flow. The assessment shows that **the A4 / Pixash Lane junction will operate within capacity with Phase 1 development traffic in 2018** with all RFCs below 0.9 – development traffic includes the documented 250 new homes and 24,500 m^2 of employment as part of Phase 1 of the Broadmead development.

Conclusion

The traffic impact assessment exercise carried out above should give decision-makers the confidence that, with limited investment in terms of new supporting infrastructure, 250 homes can be delivered in line with the five year supply target. Furthermore, a balanced development mix can be achieved such that these homes will not be delivered in isolation but can be built as part of a sustainable community incorporating employment and other ancillary uses. The results show that this can be accommodated with the limited level of investment assessed, without unacceptable impacts on the local highway network.

Phase 2 – Road link from west of site and sustainable linkages

Additional homes, industrial / employment space / education and leisure uses can be delivered through more significant investment in transport infrastructure. An upgraded route (suitable for HGV use) linking with Avon Mill Lane / Keynsham Road to the west of the Peninsula will provide a step change in traffic capacity to the area. This aligns with Council policy in providing suitable HGV access from Avon Mill Lane and the upgraded road link will penetrate the wider site with tertiary roads providing access off this main primary link. This primary road link will also provide a segregated footpath and cycle-way along the route of the road but set-back in order to develop an attractive corridor; and the link will be sympathetically landscaped. We acknowledge current capacity constraints at the Avon Mill Lane junction (particularly heading southwards via the rail tunnel into Keynsham) and at the Avon Mill Lane / Keynsham Road priority junction. There is potential in highway land to re-configure the Avon Mill Lane junction with our proposed site entrance including primary road into the development, and it may be appropriate to provide signals to improve traffic flow via the railway tunnel. There is scope to increase the capacity at the Avon Mill Lane / Keynsham Road junction by some widening and having some right hand turn stacking. Outcome from junction capacity modelling may also cite traffic lights as a potential solution.

Capacity modelling work will provide detail on junction type and scale. The primary route will be a standard two-way route with a 7.3 metre carriageway. There will be a 2 metre pavement on one side, and a 3 metre pavement / cycle-way on the other. Along the route, there will be intersections with secondary routes including Broadmead Lane and Pixash lane – these will either form priority

junctions (with the primary site road being the major arm) or small roundabouts. The primary road will also potentially allow buses to run close to the development areas as this primary site access road links in with Pixash Lane.

Figure 5.8 - Avon Mill Lane / Broadmead Peninsula junction; Avon Mill Lane / Keynsham Road

Secondary routes will typically be between 5.5 metres and 7.3 metres in width and where possible include pavements. Other tertiary routes servicing housing and other land parcels and likely to be in the order of 5.5 metres wide and the streets may function as shared space with on-road cyclists. Minor routes could be narrower at 4.8 metres in width. Secondary / tertiary roads and shared space will be part of the overall development strategy and costs will be consumed as parcels of build-out are realised.

This Phase will also allow for a more formal approach to walking and cycling routes via the rail underpasses – providing direct desire lines to the A4 cycle corridor, the A4 bus stops and into the centre of Keynsham. The cycle strategy will also allow for a continuous link from the west of the Peninsula (and to the rail station) alongside the primary site road and then onto NCR4. The link will also tie in with the Somerdale cycle infrastructure, and onto Hanham; and to cycle linkages to the south of the development. During this Phase we will also promote an off-road cycle link running close to the River Avon and offering an attractive leisure route for cyclists. The route will be lit and will run from the west of the Broadmead Peninsula (linking in with the current rail station) and onto NCR4, to the east of the site. Cycle linkages via the rail tunnels will become more attractive as vehicles will primarily route on the newer higher capacity road link offering improved journey times.

Figure 5.9 - Potential bridge design for cycle / pedestrian route over River Chew

In order to economically provide a third lane across the existing Avon Mill Lane road bridge over the river Chew, it is intended to remove the footpaths on either side and widen the road to use the full extent of the bridge. This will provide for a right turn out onto the Keynsham Road. The footpaths and cycle ways can then be combined in a new lightweight bridge which can then be designed to be

an iconic structure at the gateway into Broadmead. This will take cyclists and pedestrians to the west bank of the Chew where they can link into existing riverside walkways at the lower level and the existing footpath adjacent to the Station car park at the higher level. This bridge will herald the beginning of a safe and secure cycle network which extends throughout the peninsula satisfying the needs of cyclists of all ages and abilities. This bridge also avoids the need to create additional capacity through the railway arches for cyclists and pedestrians it is intended to provide a dedicated bridge across the River Chew. This bridge will thread through the existing trees with minimal damage as this is a protected landscape area. Its secondary purpose is to encourage greater use of the bike by creating an exciting and attractive access route to Broadmead from the town centre. Although more expensive than a typical footbridge, the special nature of its design and function should allow it to attract additional community based funds to facilitate its construction. This could even extend to the creation of naming rights. We also plan to create linkages between the development areas and NCR4 in this Phase, and create linkages to river ferry taxi pods.

Figure 5.10 - Proposed cycle crossing at Avon Mill Lane / Potential solution for Avon Mill Lane – A4175 junction

One proposed option in Phase 2 is to create a one-way road system from Broadmead Lane via Unity Road rail under-bridge, along a new road to the Broadmead Lane / Stidham Lane junction and back through Broadmead Lane rail under-bridge – traffic moving in a clockwise direction. In order to implement this scheme without creating a detrimental impact on pedestrians and cyclist, we propose punching a footway / cycle-way through the Unity Road under-bridge, thereby keeping the pedestrian cycle desire line from the central area of the Peninsula through to Keynsham.

We have identified the land owners along the route of this proposed primary route and have set up Memorandums' of Understanding with each landowner. These landowners are namely B&NES, Wessex Water, DS Smith Recycling, John Lawrence, John Douglas and Bendells. We will engage in continuous dialogue and equalisation measures will be put in place in order to compensate the landowners appropriately. The land owners will also realise benefit from their enhanced transport linkages. Although industrial and employment land uses are central to our proposals, HGV movements will be minimised as the regeneration will benefit from the circular economy approach. Waste and materials will be used to build boats and homes and some construction materials will be moved by river, rather than road.

Phase 3 – Road over rail bridge and bus loop

As cash-flow and development magnitude increases, there will be the need for additional transport capacity for the Peninsula - this can be achieved by building a higher capacity road bridge crossing over the railway (over and above the capacity provided by the current Pixash Lane bridge), towards the east of the Peninsula. Either an upgrade of Pixash Lane, or a new bridge would be options. The approach for a new bridge would require upgrading World's End Lane with a junction onto Pixash Lane, the provision of a primary route with footway / cycle-way and linking into the Phase 2 built

section of the primary road to the north of the rail line. This new route over the rail-line will also meet Council aspirations in providing a link between the A4 Bath Road and onto the A4175 Keynsham Road providing a step chance in local highway capacity provision. This route will allow for further bus penetration throughout the site - we will also be looking at a new bus loop through the site, providing a route from the A4 / Pixash lane, over the rail line, through the development and onto Avon Mill Lane. The detail will be worked up during the feasibility study, but the route could potentially also enhance the accessibility of the Somerdale site. We understand that improvement to the Pixash Lane / A4 junction will also need to be delivered at this point in time, with potentially the need for traffic signals.

There is also the possibility of relocating Keynsham rail station to provide a better located facility with room for expansion. This could be tied into the electrification works and also into the delivery of the new rail over bridge. **However the regeneration is not dependent on this new infrastructure coming forwards.** This opportunity provides the ability to increase parking capacity at the station and provide enhanced passenger facilities. A new station located to the east of its current positions would allow platform length for the High Speed (8-car) Trains. Pedestrian, cycle and bus access to the station would be central to the planning of this station and the on-way traffic arrangement as set out in "Phase 2" can be utilised.

The benefit of the site being located close to the rail network also provides the substantial incentive of a third line to benefit both passenger services and rail freight activities – allowing for passing trains and usage as a freight route.

Phasing Summary

A summary of the proposed Phasing strategy is contained in Table 5.8

Phase	**Transport Strategy**
Phase 1	Make best use of existing infrastructure • Traffic management on Pixash Lane road bridge over the rail line • Upgrade to Stidham Lane • Implement complementary land uses • Formalise walking and cycle routes
Phase 2	New road link (suitable for HGVs) from Avon Mill Lane; and develop sustainable linkages • Build primary route with suitable pavements and segregated cycle lane • Secondary road network to connect with primary road • Re-configure Avon Mill Lane / site access junction; and Avon Mill Lane / A4175 to create additional capacity • Implement leisure cycle route from west of site through to NCR4 running close to River Avon • Formalise walking / cycle linkages along Unity Road from Peninsula, into Keynsham • Allow for bus penetration of site • Potential one-way road system from Broadmead Lane / Unity Road / Stidham Lane

	• Linkages to River Avon
Phase 3	New road over rail line and bus loop • Provide additional highway capacity over the rail line through delivering a new bridge with supporting highway network; or widening Pixash Lane bridge • Re-configure Pixash Lane / A4 junction to provide additional capacity • Formalise bus route (loop) through the Peninsula • Potential to deliver a new rail station

Table 5.8 – Phasing Strategy Summary

Delivering high quality access arrangements

We will work closely to ensure highways, segregated walking and cycle routes, and distances to bus stops will all be planned to meet Council standards / be located within a short walk or cycle journey. Although B&NES does not have an official highway design guide, we are well versed with working to Manual for Streets 2 and DMRB approaches.

In order to give confidence that the appropriate scale and type of highway junctions are being planned, in order to meet forecast capacity, a technical process needs to be carried out. Traffic survey data at the A4 / Pixash Lane junction and the Avon Mill Lane / A4175 junction will be collected. Other locations may be required – this will be formally agreed through dialogue with the Local Highway authority. We will assess trip generation from the mix of land uses at key points of the project lifecycle, utilising the industry standard TRICS software and by reference to census and journey to work data, we will look at the distribution of these journeys. Validated junction assessment models for the current year will be developed and growth factors applied to represent planning and economic factors into the future, along with the trip generation from the site's proposals. This will inform the decision on junction type and scale with respect to the Avon Mill Lane access, and any mitigation required at the A4 / Pixash Lane priority junction.

This modelling can also be used to determine the scale of development that can come forward before interventions or capacity enhancements are required. Detailed design work including formalisation of highways, walking and cycle routes, and Road Safety Audits will take place at the appropriate time. Our team has all the skills, expertise and resource to provide these inputs which will be central to creating this sustainable community.

Addressing Core Strategy objectives

Our strategy centres on meeting Core Strategy objectives. Although many of the objectives relate indirectly to transport, this report focuses on the key headlines referring to transport and accessibility criteria. These are set out in Table 5.9.

Core Strategy Objective	Key Factors	Commentary
Objective 1: improve accessibility to community facilities and local services.	Help everyone access basic services easily, safely and affordably. Increase access to and participation in community and cultural facilities activities.	Well located to encourage travel by public transport services along the A4. Keynsham rail station is walkable and adjacent to the western end of the site. Keynsham and Saltford town centres are also walkable and master-planning will use desire lines (via current rail and road bridges and underpasses). NCR4 runs to the north east of

		the area and site infrastructure will link into this route. A mix of housing, employment and leisure activities as part of the regeneration will reduce the need to travel. Retail land uses are accessible both in the town centre but also adjacent to the southern edge of the site (such as the Co-operative supermarket off Broadmead lane). Potential to redevelop and enhance Keynsham rail station through site-wide master-planning. Major opportunity to provide travel choice to all – vehicular travel, buses, rail, walking and cycling and river transport.
Objective 2: improve the health and well-being of all	Improve health. Reduce health inequalities Promote healthy lifestyles, especially routine daily exercise	Strong mix of leisure land uses planned for the site including access to the river. A4 is identified in policy as a cycle route, as is NCR4 – master-planning will promote connections with these linkages. Strong pedestrian links through the site and connecting with existing external desire lines such as Unity Road. New primary road will offer off highway pedestrian and cycle links. Proposed new leisure cycle route through the Peninsula running close to the River Avon and connecting with Avon Mill Lane to the west, and NCR4 to the east of the site. Mix of complementary land uses will encourage sustainable travel to work, beneficial to health and well being.
Objective 4: promote stronger more vibrant and cohesive communities	Promote stronger more cohesive communities.	Potential to contribute to strengthening the existing communities in adjacent areas including viability of Keynsham town centre, Somerdale, industrial and housing areas to the south of the rail line. Potential to enhance linkages with NCR4 and other cycle routes and access with the river. Encourage movement of freight by rail and river.
Objective 7: ensure communities have access to a wide range of employment opportunities, paid or unpaid.	Give everyone in the region access to satisfying work opportunities, paid or unpaid. Reduce poverty and income inequality. Provide a diverse range of employment opportunities in a variety of sectors.	Good access to Keynsham and Saltford town centres. Good access to employment areas to the south of the site and north of the A4. Opportunity to meet housing need and provide employment including a boost to the circular economy. Strong connections to the centres of Bath and Bristol through car, bus, rail and cycle modes. Opportunity to provide affordable homes and house boats.
Objective 10: ensure everyone has access to high quality and affordable public	Make public transport, cycling and walking easier and more attractive.	Good access to existing bus services routing along the A4 offering connections with Keynsham, Saltford, Bath and Bristol. Opportunity to further develop the local cycle

transport and promote cycling and walking	Promote sustainable transport to reduce the need for major transport infrastructure.	network with links to NCR4 and the A4 cycle corridor. Proposed new leisure cycle route running close to the River and linking with Keynsham rail station and NCR4. Opportunities to improve walk links from the Peninsula to Keynsham and Saltford. Excellent access to rail station with services to Bath / Bristol and direct links further afield including Cardiff, Southampton, Salisbury, Weymouth and Portsmouth. Potential to promote river transport.
Objective 11: reduce the need and desire to travel by car	Reduce the need / desire to travel by car.	Key opportunity to promote travel choice for all. Site well served by cycle, bus and train links. Promotion of water based transport. Complementary land uses will reduce need to travel and the regeneration will provide stimulus to the town centres and reduce Keynsham out commuting. Focus on transport of freight by rail and water and concentration of circular economy – reducing on road HGVs, giving de-congestion benefits and improvement to air quality and reduction in noise and vibration. Opportunity to relocate rail station, driving the ability to improve passenger facilities. Potential to provide 3rd line thereby enhancing service reliability and creation of siding to service industrial land uses.

Table 5.9 – Meeting Core Strategy Objectives

Green Belt

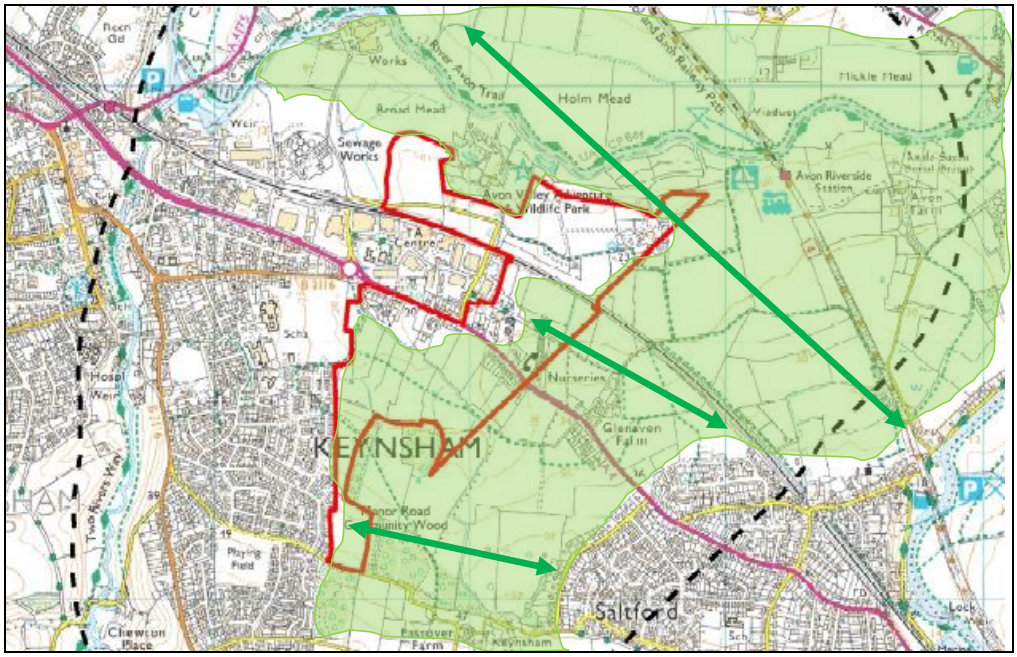
In terms of the emerging Core Strategy, the Council is required to provide for strategic housing growth, which is proving highly problematic in terms of the significant constraints of the BANES area in relation to green belt; historic designations; topography and proximity to other main towns and cities and the needs of the West of England. The Council has taken a position that requires the removal of the Green belt designation in order to meet the overall demand. 250 units are agreed for Keynsham East in relation to existing capacity (particularly transportation access and links)

There are three key areas to the east of Keynsham that could come forward as an expansion of the town 'bolting on' to existing services and infrastructure, but clearly there are wider place making objectives that need to be assessed in relation to maintaining a strategic gap between Keynsham and Saltford; delivering a complimentary amount of employment and jobs; bringing forward new services and facilities; and dealing with existing environmental problems. The issue of 'rolling back' the Green Belt has been assessed by Arup in relation to the five national purposes and an additional local issue of the strategic gap between Keynsham and Saltford. Our view in terms of the sustainability appraisal in relation to relaxation of Green Belt at Broadmead peninsula is:

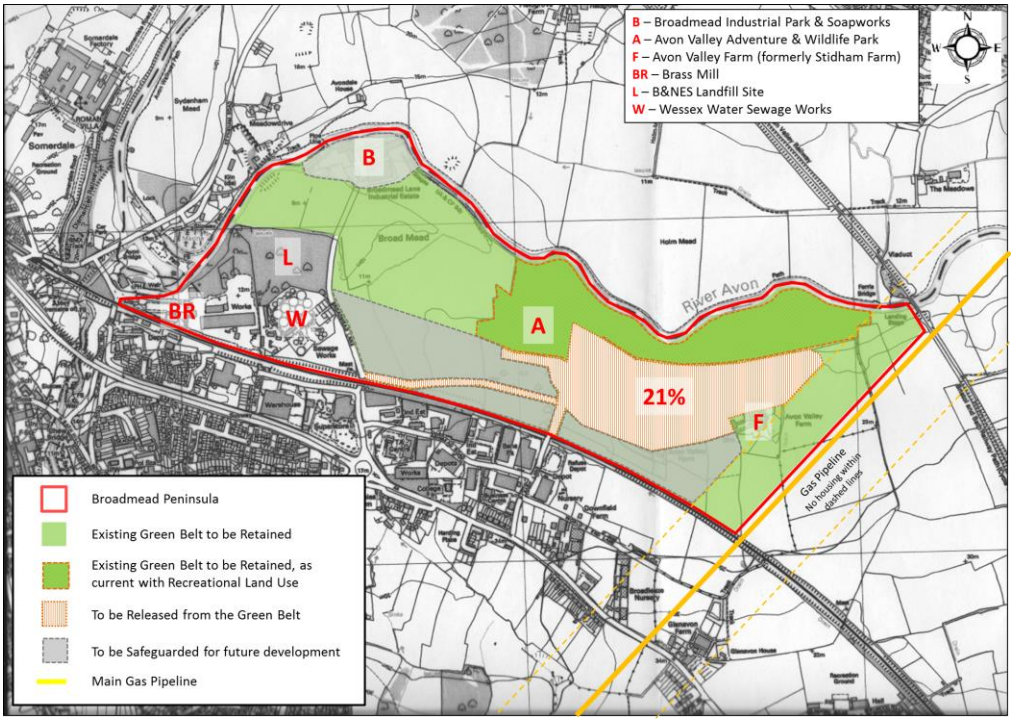
- The site is within 400-800 metres of existing services of Keynsham.
- There are existing linkages with highway capacity in phase 1 which can accommodate 250 houses.
- There are significant areas outside of flood risk where development can take place
- The site can link the river asset back to the town.
- There are existing businesses and homes within the peninsula.
- There is opportunity to create a master plan and vision for the area that can deliver a more comprehensive development for 700 houses, jobs and services and importantly can deliver river transport, environmental upgrading, water treatment improvements, and deliver new marina development.
- Phase 1 can start delivery of the environment park development
- There are opportunities for infrastructure delivery in phase 2 to provide a new link road through the area from Avon Hill and a new bridge to cross the railway line (Pixash Lane or other).
- Existing recreational uses can be maintained
- A new community woodland can be expanded to preserve the strategic gap between Keynsham and Saltford.
- A site for Travellers could be included within the development.
- Development would not compromise the attractive rural setting of both the river and openness towards Saltford and South Gloucestershire.

In terms of the Green Belt much of the river corridor can remain and accommodate recreational uses, and this will importantly link the gap with Saltford to the land over the river in South Gloucestershire. A strategic release of Green belt at the Broadmead peninsula will allow an urban extension of Keynsham to take place reconnecting the river with the town. The site can be designed with a green infrastructure network, which provides SUDS / surface water infiltration / rainwater interception, habitats and recreation functions. A wider vision for Broadmead can offer significant benefits over smaller scale developments in respect of local energy sources and micro heat grid infrastructure, and as such offer greater sustainability benefits in this respect.

Another benefit of an urban extension at Keynsham is that it will allow a comprehensive community to be created, which is well planned, with adequate infrastructure, and benefiting the surrounding neighbourhoods. A suggested altered Green Belt boundary would be:



We have set out a proposed new boundary to remove the Green belt from parts of the peninsula but retain it to maximum affect along the river and as part of an urban fringe transition. The figure below shows the extent of existing Green Belt that will be retained, Green Belt to be released for the development of Phase 1 of Options A-C, and Green Belt to be safeguarded for future development. Only 21% (22 hectares, 54 acres) of Broadmead Peninsula (105 hectares, 260 acres) would need to be release from Green Belt. In these regards, Broadmead Peninsula is a better solution in Green Belt terms than closing and narrowing the gap between Keynsham and Saltford south of the railway line, along the A4 and south of the A4.



The development of Broadmead peninsula would not prejudice the Green Belt purposes in relation to Keynsham:

- Purpose 1: to check the unrestricted sprawl of Bath and Bristol
- Purpose 2: to prevent the merging of Bristol, Keynsham, Saltford and Bath
- Purpose 3: to assist in safeguarding the countryside from encroachment
- Purpose 6: to preserve the individual character, identity and setting of Keynsham and the villages and hamlets within the Green Belt

The proposed Broadmead peninsula development would not comprise the five Green Belt purposes set out in NPPF paragraph 80:

- It will still restrict sprawl from large built up areas to the river and beyond
- It will prevent Keynsham and Saltford merging with a significant gap retained
- It will not damage the surrounding countryside from encroachment
- It will not affect the special a character of historic towns or elements in Keynsham or Bath
- It will include elements of regeneration and recycling and treatment of derelict or spoiled land in the peninsula

And lastly the sixth local criterion to preserve the gap again of Keynsham / Saltford and any smaller local countryside villages are not affected.

Circular Economy – Major Employment through Processing, Manufacturing, Storage & Distribution

The three Outline Proposals Options A-C centre on the creation of hundreds of permanent jobs that are linked to the Circular Economy. These will be via processing of material by-products and wastes, manufacturing of new products, use of products to manufacture construction elements and the building of some homes using these products. In terms of sustainability, localism and creating a local skills base for the 21st Century, our proposals embed these activities and new businesses into the regeneration of the Peninsula.

Broadmead Peninsula project will demonstrate how we make better use of materials that are already in landfill or destined for landfill through proven fibre polymer composite processes to make a product range of sheets, insulation panels, boards, beams and blocks. The manufacture of these innovative products will partially replace existing supplies used for manufacturing, construction and marina developments with limited risk to existing markets through an initial market penetration of only 1% - 5%. In this way we not only mitigate the depletion of resources and materials security concerns, we also contribute to the 'low carbon economy' through better management of embodied carbon, natural resources and discarded waste. The associated processing, manufacturing, storage and distribution will demonstrate that returning waste materials to productive use in higher-grade applications is innovative, adds value, is precisely targeted at currently unmet needs and helps developers procure responsibly sourced local materials. With increasing demand to procure materials with higher recycled content and minimise global environmental impact, our products provide integrated solutions for waste, process, manufacturing and construction supply chains that is economically sound and creates a broad range of local, green jobs.

There are a number of social, economic and environmental benefits that will accrue both inside and outside the project, not least a spatial economic model of how resource efficiency across the supply chain can 'step and repeat' in other locations at the regional, national and international levels. Broadmead Peninsula will demonstrate that there are better, more sustainable and productive methods of dealing with our 'difficult wastes' that can have multiple lifecycles rather than one lifecycle followed by landfill or incineration – this is the Circular Economy advocated by central governments. The Prototype Development Centre will show that the choice of location and critical selection of supply chain partners and their individual industrial and academic skills can add great value, create green jobs, up-cycle societal by-products and establish behavioural models that make best use of resources and minimise our impact on the environment. It will also show that a commercial, integrated approach to capitalisation of existing resources and commercialisation of materials destined for landfill into higher grade applications will provide sustainable businesses and emerging markets for higher recycled content and responsibly sourced materials. Locally it will help sustain Keynsham with skilled and 21st Century green jobs following the closure of Somerdale.

The Feasibility Study to follow this Scoping Study will provide a clear analysis of the economics of establishing materials processing plant and associated production, manufacturing, distribution and sales of the products, houseboats and pre-fabricated homes to the domestic market. The analysis will assume a Base Case scenario (the expected cost and estimated service lives) for the production of 45,000/m3 of product (10,000 tonnes of feedstock) per annum, alongside two other sized scenarios yet to be decided. The analysis will take into account the following which is not conclusive:

- Investment costs including initial capital costs and capital replacement costs
- Operating costs
- Sensitivity analysis (one at a time sensitivity and a probabilistic Monte Carlo Simulation)
- Analysis of economies of Savings to Investment by increasing the size of the plant

- Investigation of different scenarios varying the price earned from the products and manufactured units as well as size and capacity of the production and manufacturing plant

Similarly, the investment costs considered at the feasibility stage will consist of:

- Purchase of land for best-fit siting of buildings, storage and distribution
- Construction of buildings, factories, wharf and storage space
- Materials processing and product preparation machinery
- Transportation engineering, infrastructure and wharf
- Electro-technology, laboratory and prototype development and testing
- Engineering and infrastructure works
- Pre-fabrication, assembly and distribution
- Office, design, marketing, sales and distribution services and support units
- Evaluation + 1 year exclusively negotiation option
- Various (tools, plant, furniture, vehicles, etc.)

Our proposed mix of employment floorspace includes, but is not limited to:

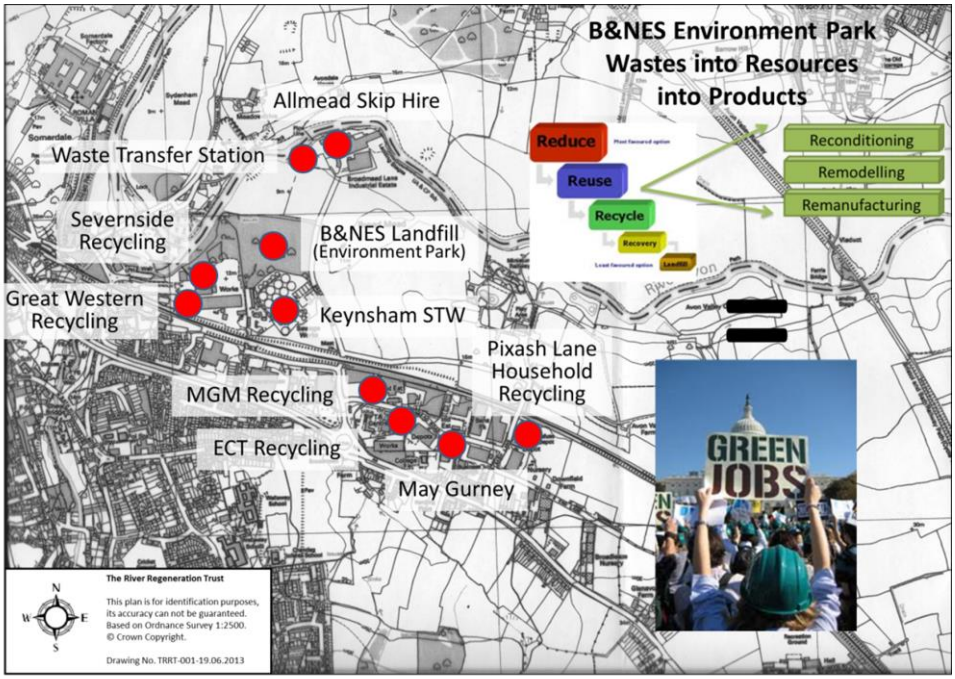
- Factory for materials management, processing and manufacturing
- Warehouse and open air areas for storage and distribution
- Factory for manufacturing products, houseboats and pre-fabricated homes
- Offices for product design, administration and sales
- Offices and laboratory for product design, high tech applications and educational purposes
- Business units for installation, servicing, maintenance and repair of products, houseboats and pre-fabricated homes
- Wharf for intake/ distribution of materials, products, houseboats and pre-fabricated homes
- Materials processing facility for manufacturing sheets, boards and beams
- Boatyard, boat storage, boat maintenance, sales and distribution
- marina chandlery, café and ancillary buildings for servicing the moorings

- Micro-business units
- Live-work units
- Early learning aquatic centre
- Farm produce distribution and sales
- Materials Recovery Facility (if Broadmead is allocated by B&NES)

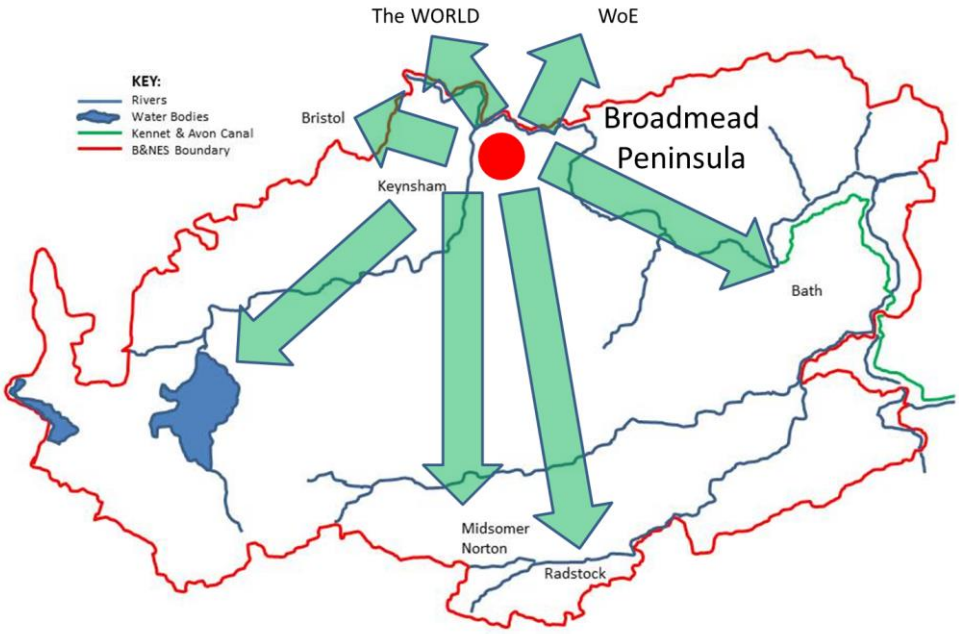
Material Recovery Facility, Industrial & Manufacturing Units

In determining the type, capacity, viability and fit of the Material Recovery Facility, industrial buildings, manufacturing plant and distribution /storage units, a number of key criteria will be assessed during their selection and design. This will be completed during the Feasibility stage and incorporate the following criteria used by the Waste & Resources Action Programme (WRAP) in their assessment and selection process for allocation of recycling capacity grants:

- Value for money (for all criteria)
- Financial robustness
- Quality of facility design
- Quality of arrangements for marketing and use of facility outputs
- Quality of arrangements for sourcing input materials
- Robustness of Planning, Waste Management Licence (WML) & Site Tenure
- Corporate environmental commitment & overall environmental impact of the new facility
- Corporate commitment to Safety, Health and Environment (SHE)
- Facility overview and five year tonnage projections
- Input material sourcing and output end markets
- Facility design, planning and licensing
- Milestones, project plan, project team and track record
- Capital cost breakdown, viability of investment and project financing



The location of Broadmead Peninsula and its direct ties to locally established businesses that are already engaged with materials and waste trading and markets, is clearly shown above. Similarly, the distribution of Broadmead Peninsula products will be at first local and regional, but will then begin to trade nationally and internationally to replicate that of brass, soap and chocolate of the past – clearly shown in the diagram below.



Pre-fabricated Houses and Houseboats

A range of materials and products could be developed using a 'Duratrust' (refer to Kings Lynne) type process and manufacturing units that will include Houseboats, Pontoons, Sheet Materials, Boards, I-

Beams, Blocks, Posts, Panels and Pallets. This will also demonstrate the application of the B&NES Procurement Strategy 2013, which encourages an 'Think Local, Procure Local, Invest Local, Employ Local' approach to sustainable procurement.