

**Ironbridge Railway Trust**

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**Ironbridge Gorge World Heritage Site to Bridgnorth Corridor  
Demand Forecasts for Rail Services**

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**A report by**

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## **Authors**

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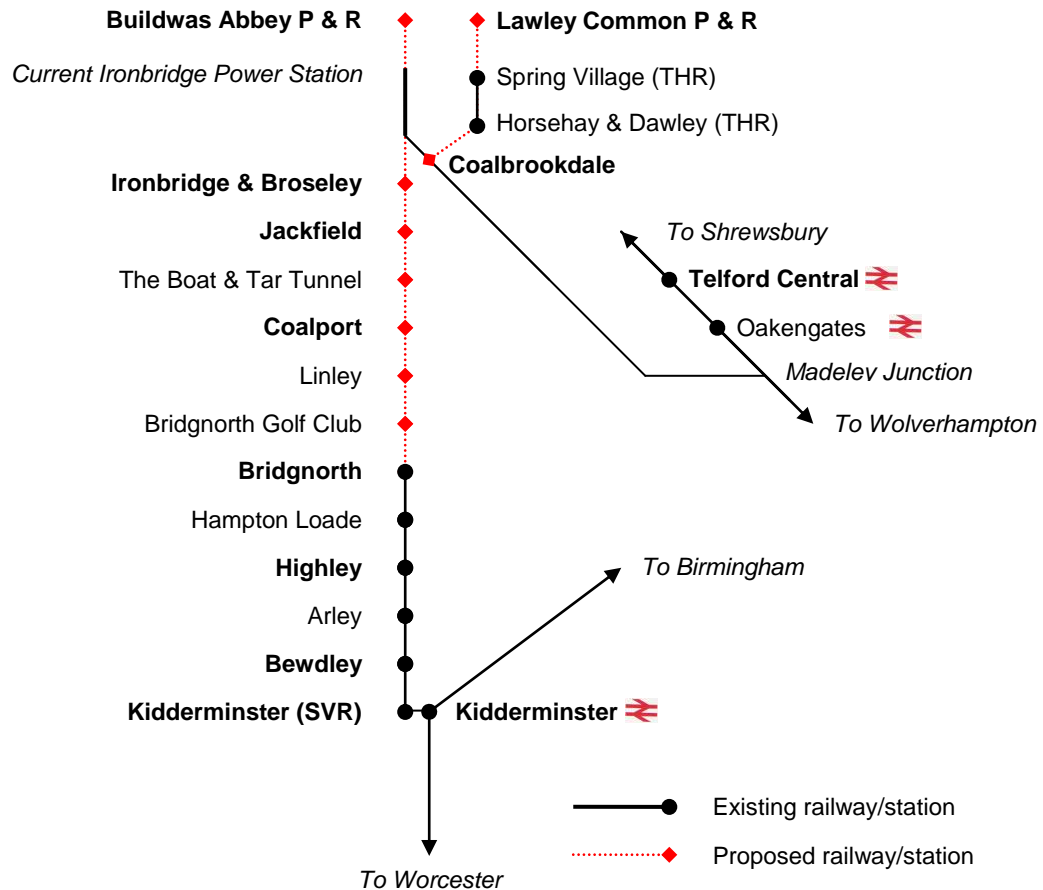
## **Executive Summary**

1. The Ironbridge Railway Trust has prepared a rail demand model for the former railway corridor between Bridgnorth, the Ironbridge World Heritage Site and Buildwas.
2. The results of the first iteration of the model are provided to Telford and Wrekin Council for the purpose of assisting its ERDF-funded study into sustainable public transport options for the Ironbridge Gorge World Heritage Site
3. The model assumes : -
  - a 500-space Park & Ride facility at Buildwas Abbey, a 15-minute frequency shuttle service between the Park and Ride, Ironbridge and Coalport, an hourly service between Buildwas Abbey, Bridgnorth and Kidderminster, integrated with the existing Severn Valley Railway
  - 723,000 visitors per annum to the Ironbridge Gorge World Heritage Site, 240,000 visitors per annum to the Severn Valley Railway, and a local catchment population between Buildwas and Bridgnorth of 28,000
  - Operation on 150 days per annum, as per the Severn Valley Railway, and reflecting key demand periods for the Ironbridge Gorge World Heritage Site
4. An annual total of 246,000 return journeys, wholly new to rail in the corridor, are predicted by the model.
5. Based on cautious assumptions for each market, this is made up of : -
  - A net increase of 25,000 return journeys to the current Severn Valley Railway tourist market, involving some redistribution of existing Kidderminster-Bridgnorth trips to the Bridgnorth-Buildwas portion
  - 115,000 new trips representing Park & Ride access to the World Heritage Site
  - 90,000 new trips on all or part of the Kidderminster-Ironbridge-Buildwas route by existing Ironbridge World Heritage Site visitors
  - 16,000 new trips generated from the local population in immediate proximity to the Bridgnorth-Buildwas route
6. 300 return vehicular movements per day into and out of the Ironbridge Gorge World Heritage Site would be diverted to Buildwas Abbey Park & Ride, representing a 16% modal shift from the current 1900 such movements.
7. Revenue, wholly new to rail, including Park and Ride Car Park charges, would be £1.896 million

## 1. Introduction and assumptions

- 1.1 This paper assesses the potential demand for rail passenger services on a corridor serving the Ironbridge World Heritage Site from a Park and Ride site at Buildwas Abbey adjacent to the A4169, through Ironbridge and Coalport, to the current northern terminus of the heritage Severn Valley Railway at Bridgnorth.

**Figure 1 – Existing and proposed railways to Ironbridge**



- 1.2 An 'Ironbridge Rail Demand Model' has been constructed to assess this potential demand. This paper sets out the first iteration of this model, and is presented in this paper to Telford and Wrekin Council for the purpose of assisting its ERDF-funded study into sustainable public transport options for the Ironbridge Gorge World Heritage Site being undertaken by the Council's consultants, Jacobs.
- 1.3 The Ironbridge Rail Demand Model assumes provision of new railway infrastructure between Buildwas and Bridgnorth with 7 stations, as shown at Figure 1, at : -

- **Buildwas Abbey Park & Ride** (joint with Telford & Horsehay Railway) - with a 500 space car park approximately 3 miles from M54 Junction 6
- **Ironbridge & Broseley** – immediately adjacent to the Iron Bridge
- **Jackfield** (for Tile Museums/Maws Craft Centre)
- **The Boat & Tar Tunnel** (for Boat Inn and Jackfield Footbridge for Tar Tunnel and Blists Hill Museum)
- **Coalport** (for China Museum and Feathers Inn)
- **Linley** (for Apley Park)
- **Bridgnorth Golf Club**

**Bridgnorth SVR Station** - the new service would share use of the Severn Valley Railway's Bridgnorth Station, and thence operate a joint service south to the Severn Valley Railway's Kidderminster Town terminus adjacent to Kidderminster Network Rail station.

In the Ironbridge Gorge World Heritage Site the railway would be within 400m of 7 existing museums or attractions, including being immediately adjacent to the Iron Bridge and the Buildwas Abbey English Heritage site.

- 1.4 The model assumes a service timetable based upon 2 core components : -
- i) 4 trains per hour based upon a 15 minute frequency shuttle between Buildwas Abbey Park & Ride and Coalport i.e. *within* the Ironbridge Gorge World Heritage Site
  - ii) 1 train per hour between Buildwas Abbey Park & Ride and Kidderminster via Bridgnorth and the existing Severn Valley Railway (SVR), potentially increasing to a 45 minute frequency, integrated within the 15 minute shuttle within the World Heritage site

An outline timetable is shown at Appendix 1.

- 1.5 Whilst it is recognised that the existing Severn Valley Railway functions principally as a tourist attraction rather than a public transport provider, the proposed services noted above assume both the Ironbridge portion and the Severn Valley Railway take on dual functions as both.

- 1.6 The model does not include the proposed Telford and Horsehay Railway extensions which would provide a through service from its proposed 100-space Park & Ride Station at Lawley Common to the site of Ironbridge Power Station, and thence an onward bus service into the Gorge. The Ironbridge Railway Trust's assumption, however, is that its own proposed Buildwas Abbey Park & Ride Station would provide interchange facilities for any service from Lawley Common.

- 1.7 Source information is as follows : -

- i) Severn Valley Railway passenger numbers
- ii) Severn Valley Railway fares
- iii) Ironbridge Gorge Museums and World Heritage Site visitor numbers
- iv) 2001 Census data for parishes adjacent to the route

- 1.8 There are 4 markets considered in this paper : -

- i) Severn Valley Railway – growth and redistribution of the existing tourist and leisure market generated by the addition of the Bridgnorth to Buildwas portion
- ii) Park and Ride – from Buildwas Abbey into the Ironbridge World Heritage Site
- iii) Ironbridge leisure and tourism visitors – day or longer – who use the railway to visit sites within the World Heritage Site or Bridgnorth and/or the Severn Valley Railway
- iv) On-line traffic generation from those resident in the immediate catchment areas of the route – Ironbridge, West Telford and Bridgnorth

- 1.9 These forecasts are driven by data on seasonal visitor numbers to the Severn Valley Railway and Ironbridge Gorge Museums. The Severn Valley Railway operates a daily service from May to September each year, each weekend and during all school

holidays, but as with the Museums is focused on summer holiday and weekend leisure usage. The forecasts thus differ from conventional rail demand assessments which look principally at Monday-Friday travel over a full 52-week year.

- 1.10 Given the Severn Valley Railway principally issues returns or rover tickets these are all assumed to be return journeys, and hence all output figures for the Ironbridge model in this paper are expressed as return journeys.

## 2. **Input data**

### 2.1 **Severn Valley Railway - passenger numbers**

These are shown at Table 1.

**Table 1 – Severn Valley Railway Passenger Numbers 2001-2008**

Year	Numbers	Comment
2001	230500	Foot and Mouth Disease
2002	236700	
2003	248900	
2004	242300	
2005	252100	
2006	246000	
2007	224000 (E)	Adjusted for railway closure after June 2007 floods
2008	232000 (E)	Anticipated full figure 232,000 March-December 2008 after SVR re-opening; adjusted for 12 months would = 278,000

Source : Severn Valley Railway Newsletter (2002/2008)

240,000 passengers are thus assumed as a cautious but realistic base demand.

### 2.2 **Severn Valley Railway Fares**

2008 fares are : -

£13.00 - Adult return

£34.00 - Family return for 2 adults and 2 children

For the purposes of this model £10 is assumed as the average fare per return passenger across the totality of the route, and £6 for intermediate return journeys.

### 2.3 **Ironbridge Gorge Museums Visitor Numbers**

In 2008 Ironbridge Gorge Museums report visitors to be circa 300,000 per annum with 60,000 of these being organised school parties.

60% originate from outside the West Midlands Region, with 25% from London & the south east.

Publicly available figures for 1983-2005 are shown at Table 2 (over) , which average 285,000 per annum.

**Table 2 – Ironbridge Gorge Museums – Visitor Numbers 1983-2005**

Year	Numbers	Year	Numbers	Year	Numbers	Year	Numbers
1983	225,000	1989	350,310	1995	297,359	2001	225,445
1984	247,107	1990	330,376	1996	275,927	2002	244,271
1985	276,598	1991	315,601	1997	279,854	2003	294,302
1986	277,000	1992	311,322	1998	256,196	2004	290,624
1987	296,000	1993	304,911	1999	262,821	2005	265,620
1988	404,226	1994	281,220	2000	230,742		

Source – Ironbridge Gorge Museums Trust

## 2.4 World Heritage Site Visitor Numbers

The Ironbridge Gorge World Heritage Site Management Plan, published in 2001, estimated total visitors to the site, *including visitors to Ironbridge Gorge Museums*, to be 600,000 per annum, out of a total 2.6 million visitors to Telford & Wrekin (1998/99).

This figure is, similarly, that assumed in the Telford & Wrekin Council Core Strategy (December 2001).

In 2006, David de Hann, Program Director, Ironbridge Institute, University of Birmingham and Director of Learning, Ironbridge Gorge Museum Trust argued that overall visitors to the Gorge were 3 times higher than ticket sales figures (European Route of Industrial Heritage (ERIH) Conference - Holland, September 2006) and published figures for 1997-2005 on that basis.

These are shown at Table 3, with an average of 723,000 visitors per annum. This figure is thus assumed as a reasonable base demand for use in the Ironbridge Rail Demand Model.

(It may be noted that Severn Valley Railway demand figures apply to only 150 days per annum. It is assumed that, Ironbridge Gorge visitors similarly arrive during the same period of operations – i.e. all weekends, school holidays and all days between April and September.)

**Table 3 – Overall visitor numbers to Ironbridge Gorge – 1997-2005**

Year	Museum visitors	Gorge visitors	Total
1997	279,854	559,708	839,562
1998	256,196	539,392	795,588
1999	262,821	525,642	788,463
2000	230,742	461,484	692,226
2001	225,445	450,890	676,335
2002	244,271	638,542	882,813
2003	294,302	588,604	882,906
2004	290,624	581,248	871,872
2005	265,620	531,240	796,860

Source – David de Haan – Ironbridge Institute, University of Birmingham (2006)

## 2.4 2001 Census Data

Whilst the focus of the Ironbridge Rail Demand Model is upon tourism and leisure journeys, the provision of a through rail service at the frequency proposed is anticipated to offer opportunities for some employment purposes, especially in the tourism and leisure industry upon which the Ironbridge Gorge economy depends.

Utilising 2001 Census data and the base parameters of the UK rail industry's 'Passenger Demand Forecasting Handbook' (PDFH) this paper has thus assessed potential generated demand from the relevant estimated catchment populations within 2km and 800m of the proposed railway in Ironbridge, West Telford and Bridgnorth (Table 4 ).

**Table 4 – Catchment Populations**

Parish	Total population.	Population 800m - 2km	Population <800m
<b>Telford &amp; Wrekin</b>			
Ironbridge Gorge	2417	1209	1209
Woodside	7061	3531	
Madeley	5279	2640	
Cuckoo Oak	5648	2542	282
<b>Bridgnorth</b>			
Castle	2877	2158	719
Morfe	3007	2255	752
East	2882	2162	721
West	2976	2232	744
Morville	1498	75	
Broseley East	2804	2243	140
Broseley West	2744	2195	137
<b>TOTAL</b>	<b>39193</b>	<b>23240</b>	<b>4704</b>

Source – UK Office of National Statistics

## 3. Outputs

### 3.1 Severn Valley Railway and new through route Kidderminster/Buildwas

- i) **Existing demand** - of the Severn Valley Railway's existing demand of 240,000 passengers between Kidderminster and Bridgnorth 20,000 or circa 15% are assumed to be abstracted away to use the Bridgnorth – Ironbridge – Buildwas Abbey Park & Ride section as an alternative tourist attraction in its own right.
- ii) **New through route demand – Kidderminster to Buildwas Abbey Park & Ride** - given the high percentage of visitors to the Ironbridge Gorge from outside of the West Midlands region - 60% of the average 723,000 per annum equates to 434,000 - an additional 45,000 passengers or circa 10% of these are assumed to use the full through route between Kidderminster and Buildwas Abbey Park & Ride as a tourist attraction in its own right.

### 3.2 Park and Ride into Ironbridge Gorge World Heritage Site

Park and Ride capture has used a standard modal choice and Generalised Journey Time approach, assuming : -



- i) Use of the Buildwas Abbey Park & Ride Station car park
- ii) Purpose of travel being to access the Ironbridge Gorge World Heritage Site (i.e. NOT further south to Bridgnorth or Kidderminster)
- iii) A car park charge of £3.00
- iv) A shuttle fare of £1.50 (clearly a conservative approach)
- v) 2.5 occupants per vehicle
- vi) Value of time according to WebTAG figures

Based upon the 723,000 per annum visitor figure this generates 115,000 return journeys into the World Heritage Site per annum, or if adjusted to 150 days operation, 767 per day. Assuming car park occupancy as noted this equates to the removal of 306 return vehicular movements into and out of the Ironbridge Gorge World Heritage Site per day.

On the same basis 723,000 visitors generate 1928 return vehicular movements. Removal of 306 represents a 15.9% modal shift.

### 3.3 Ironbridge Gorge World Heritage Site visitors using route during day or longer visits

10% of day visitors and 20% of longer stay visitors are assumed to use the Buildwas Abbey Park and Ride to Kidderminster route as an associated part of their visit.

This equates to 90,375 return trips per annum.

### 3.4 Local generated demand for rail-based public transport service

Passenger demand Forecasting Handbook (PDFH) trip rates per day are 25 per thousand for populations within 800 metres and 4 per thousand for those between 800m and 2 kilometres.

These were cautiously adjusted to 50% of the normal outputs given the proposed route's role as both a tourism/leisure and Park & Ride/public transport facility i.e. sharing some characteristics with routes on the National Rail network from which PDFH assumptions are drawn e.g. Central Wales Line, Cambrian route Machynlleth to Pwllheli etc., functioning as a potential form of access for seasonal leisure and tourism employees, but being very different from key commuter routes such as Kidderminster to Birmingham or Shrewsbury to Birmingham.

150 days per annum were also assumed to align with Severn Valley Railway visitor numbers.

A total of 15750 return trips per annum were thus included i.e. that half of the resident population will make 1 return journey per annum on the Bridgnorth – Buildwas Abbey Park and Ride section.

Catchment and PDFH trip rate	Population	Journeys @ PDFH rates	50% adjustment	Per annum 150 days
800m - 2km / 4-1000	23240	93	46	6900
< 800m / 25-1000	4704	118	59	8850
Total	27944	210	105	15750

3.5 This is the first iteration of the Ironbridge Rail Demand Model; further analysis will be required to address any risk of double counting between the markets described.

3.6 The Model is shown at Appendix 2.

## Appendix 1 – outline service timetable

### Table A – Through service Kidderminster – Buildwas Abbey Park & Ride

Set		6	1	2	3	4	5	6	1	2	3	4
Kidderminster			09:55	10:30	11:15	12:00	12:45	13:30	14:15	15:00	15:45	16:30
Bridgnorth	a		11:00	11:45	12:30	13:14	13:59	14:44	15:29	16:14	16:59	17:44
	d	10:18	11:03	11:48	12:33	13:18	14:03	14:48	15:33	16:18	17:03	17:48
Coalport	a	10:31	11:16	12:01	12:46	13:31	14:16	15:01	15:46	16:31	17:16	18:01
	d	10:33	11:18	12:03	12:48	13:33	14:18	15:03	15:48	16:33	17:18	18:03
Ironbridge	a	10:39	11:24	12:09	12:54	13:39	14:24	15:09	15:54	16:39	17:24	18:09
	d	10:41	11:26	12:11	12:56	13:41	14:26	15:11	15:56	16:41	17:26	18:11
Buildwas	a	10:46	11:31	12:16	13:01	13:46	14:31	15:16	16:01	16:46	17:31	18:16
Set		5	6	1	2	3	4	5	6	1	2	3
Buildwas	d	10:34	11:19	12:04	12:49	13:34	14:19	15:04	15:49	16:34	17:19	18:04
Ironbridge	a	10:39	11:24	12:09	12:54	13:39	14:24	15:09	15:54	16:39	17:24	18:09
	d	10:41	11:26	12:11	12:56	13:41	14:26	15:11	15:56	16:41	17:26	18:11
Coalport	a	10:47	11:32	12:17	13:02	13:47	14:32	15:17	16:02	16:47	17:32	18:17
	d	10:49	11:34	12:19	13:04	13:49	14:34	15:19	16:04	16:49	17:34	18:19
Bridgnorth	a	11:02	11:47	12:32	13:17	14:02	14:47	15:32	16:17	17:02	17:47	18:32
	d	11:05	11:50	12:35	13:20	14:05	14:50	15:35	16:20	17:05	17:50	
Kidderminster	a	12:22	13:07	13:52	14:37	15:22	16:07	16:52	17:37	18:18	18:56	

### Table B – Shuttle service – Buildwas Abbey Park & Ride – Coalport

Option 1 - Shuttle			1	KID	2	3	1	KID
Coalport	d		10:22	10:33	10:37	10:52	11:07	11:18
The Boat Halt			10:25		10:40	10:55	11:10	
Jackfield Halt			10:27		10:42	10:57	11:12	
Ironbridge	a		10:30	10:39	10:45	11:00	11:15	11:24
	d		10:32	10:41	10:47	11:02	11:17	11:26
Buildwas	a		10:37	10:46	10:52	11:07	11:22	11:31
			3	1	2	3		
Buildwas	d		10:28	10:34	10:43	10:58	11:13	11:19
Ironbridge	a		10:33	10:39	10:48	11:03	11:18	11:24
	d		10:35	10:41	10:50	11:05	11:20	11:26
Jackfield Halt			10:38		10:53	11:08	11:23	
The Boat Halt			10:40		10:55	11:10	11:25	
Coalport	a		10:43	10:47	10:58	11:13	11:28	11:32
				KID			KID	

## Appendix 2 – Ironbridge Rail Demand Model (1)

### Market sources and Severn Valley Railway & new through route demand

Market Sources	
1. Existing SVR Visitors Making The Longer Journey ( Redistribution of Journeys) 2. Ironbridge Gorge Visitors Using PnR 3. Ironbridge Gorge Visitors Travelling to Bridgnorth/Kidderminster 4. Census data 2001 and simple PDFH demand @ 800m/2km adjusted for limited days of operation  Green cells = input data	
1. Existing SVR Visitors	
<b>Existing Demand Matrix</b>	
Kidderminster-Bridgnorth	115,000
Bridgnorth-Kidderminster	95,000
Other flows	30,000
Total	240,000
<b>Existing Average Fares</b>	
Kidderminster-Bridgnorth	£10.00
Bridgnorth-Kidderminster	£10.00
Other flows	£6.00
<b>Existing Revenue</b>	
Kidderminster-Bridgnorth	£1,150,000
Bridgnorth-Kidderminster	£950,000
Other flows	£180,000
Existing Revenue Total	£2,280,000
<b>New Demand Matrix</b>	
Kidderminster-Bridgnorth	105,000
Kidderminster-Coalport/Ironbridge/Buildwas P&R	25,000
Bridgnorth-Kidderminster	85,000
Bridgnorth-Coalport/Ironbridge/Buildwas P&R	20,000
Other flows	30,000
Total	265,000
<b>New Average Fares</b>	
Kidderminster-Bridgnorth	£10.00
Kidderminster-Coalport/Ironbridge/Buildwas P&R	£15.00
Bridgnorth-Kidderminster	£10.00
Bridgnorth-Coalport/Ironbridge/Buildwas P&R	£10.00
Other flows	£6.00
<b>New Revenue</b>	
Kidderminster-Bridgnorth	£1,050,000
Kidderminster-Coalport/Ironbridge/Buildwas P&R	£375,000
Bridgnorth-Kidderminster	£850,000
Bridgnorth-Coalport/Ironbridge/Buildwas P&R	£200,000
Other flows	£180,000
New Revenue Total	£2,655,000
Net Revenue Change	£375,000

## Appendix 2 – Ironbridge Rail Demand Model (2)

### Park & Ride; Ironbridge Visitors using new route & SVR; Generated Trips

2. Ironbridge Gorge PnR		
<b>Parameters</b>		
Visitors to Ironbridge	723,000	
Proportion Day Visitors	75%	
Proportion Day Visitors By Car	90%	
Value of time (p/min)	£0.10	Source: WebTAG
Fuel cost/km	£0.10	
Car occupancy	2.5	
<b>Car generalised cost (cost per car)</b>		
Journey time (mins)	80	assume average 1hr
Journey distance (km)	80	
Fuel cost/km	£0.10	
Parking cost	£3.00	
Total GC	190	
<b>Car plus PnR Shuttle (car party)</b>		
Journey time (mins)	55	average 1hr less final leg
Journey distance (km)	75	
Fuel cost/km	£0.10	
Shuttle cost	£1.50	
Mode swap penalty (mins)	15	
Shuttle journey time	15	
Shuttle frequency (mins)	15	Assume wait time is half freq but weighted double - therefore equal to frequency
Total GC	213	
<b>Capture &amp; Revenue</b>		
Dispersal parameter	-0.048	Source: Atkins : Yeovil Public Transport Study (2004)
Modal Constant	20	minutes
Shuttle Capture	23.6%	
Shuttle Demand	115,063	
Revenue	£172,594	
<b>Car Park Revenue</b>		
Shuttle Demand	115,063	
Car park revenue @ £2.50	£287,657	
Total P&R Revenue	£460,251	

3. Ironbridge Visitors Using SVR		
Proportion Day Visitors	75%	
Proportion Long Stay	25%	
Take-up Day Visitors	10%	Needs to be considered in conjunction with the PnR capture
Take-up Long Stay Visitors	20%	How many of them already use SVR?
Average fare	£10.00	
SVR Demand	90,375	
Revenue	£903,750	

4. Generated Trips PDFH		
<b>Parameters</b>		
Catchment population 800m-2km	20600	
Catchment population < 800m	4700	
Day return trips @ 4/1000	93	
Day return trips @ 25/1000	118	
TOTAL trips/day PDFH	211	
50% adjustment	105	
Annual trips @ 150 days operation (SVR)	15788	
Revenue @ average Bridgnorth-Ironbridge £10 fare	£157,875	

## Appendix 2 – Ironbridge Rail Demand Model (3)

### Net change in revenue and demand

<b>Total Net Change In Revenue and Demand</b>		
	<b>£</b>	<b>Return Passenger Journeys</b>
Existing SVR Market	£375,000	25,000
Park and Ride - Buildwas Abbey	£172,594	115,063
Park & Ride - Car Park Revenue	£287,657	
Ironbridge SVR	£903,750	90,375
PDFH Generated trips	£157,875	15,788
<b>Total</b>	<b>£1,896,876</b>	<b>246,225</b>