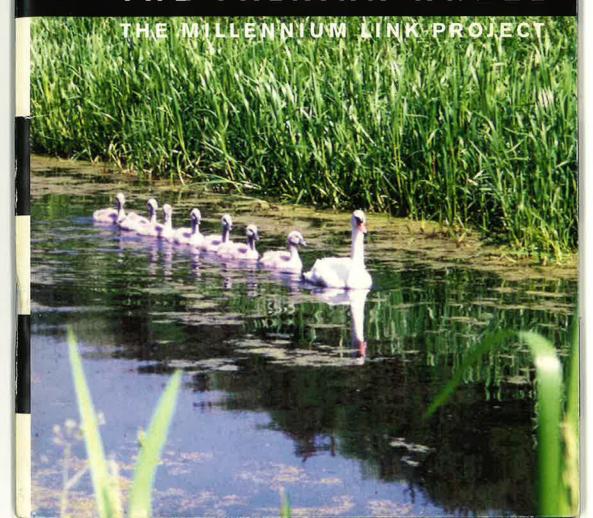


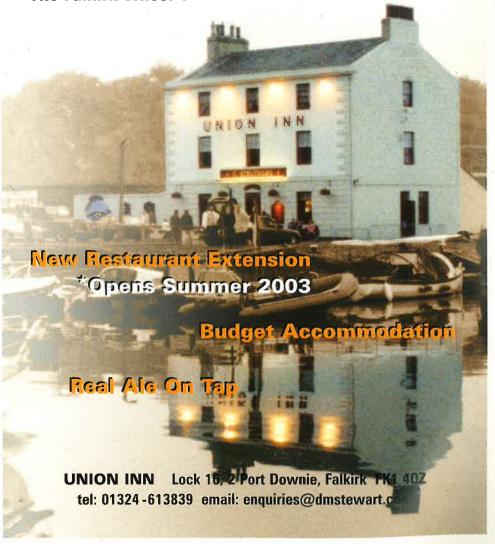
THE FORTH & CLYDE CANAL THE UNION CANAL AND THE FALKIRK WHEEL

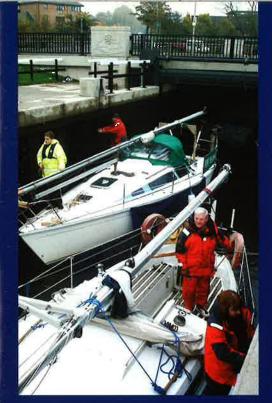


UNION INN

@ LOCK 16

Historic Canal Side Inn at the original junction of the Forth & Clyde and Union Canals. 1 mile from "The Falkirk Wheel".







Lowland Canals Office, Rosebank House, Camelon, FK1 4DS Tel: 01324 671217 Email: enquiries.lowlands@britishwaterways.co.uk



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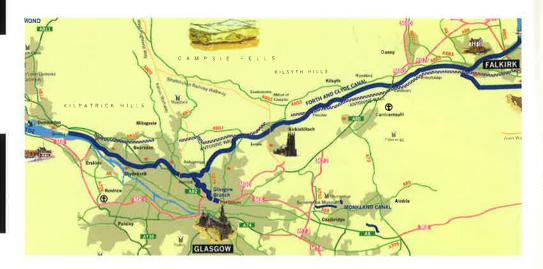
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GENERAL MAP

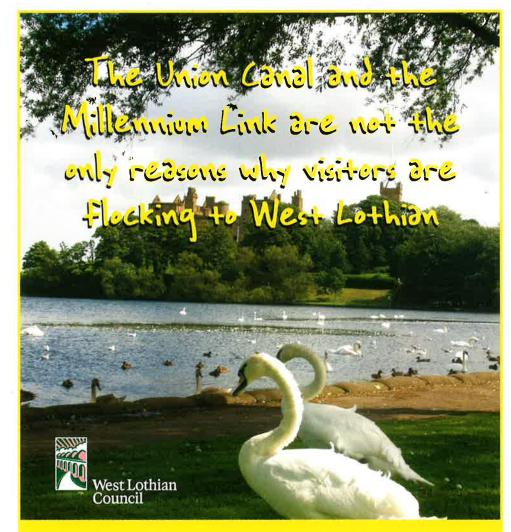












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For year round tourist/visitor information call **0131 473 3800** or visit www.westlothian.gov.uk/visiting or visit Linlithgow Tourist Information Centre, April to September, Telephone **01506 844600**.

West Lothian Council – Economic Development - Town Centres Management



INTRODUCTION

It is my great pleasure to welcome you to Scotland's Lowland Canals.

Rich in engineering history and seafaring tradition, it is just a few short years since these canals were nearly lost to all of us forever as they lay derelict, with over 30 major obstructions, some stretches filled in with rubble, others were built over by structures such as the M8 motorway.

Only a handful of people - real canal enthusiasts and engineers - fully understood just how much these 200 year old inland waterways could contribute to the country's social and economic regeneration and just how accessible they could be to everyone for boating, walking, cycling, angling, wildlife spotting or simply just for great days out.

With more than 7 million towpath visits to the Forth & Clyde and Union over the last year, I am immensely proud of what has been achieved so far and hope you will explore and enjoy the canal experience too. Always

remember the SAFE message - Stay Away From the Edge. Your safety always comes first with British Waterways Scotland.

There are some great places to stop along the canals already, but what really excites me, as the person responsible for the canals, are all our fantastic plans for the future of these wonderful waterways. Boats for hire, boat sales, events on towpaths and on the water. refreshment and clean-up facilities, more moorings, new marinas and shops, bicycle hire. luxury holiday hire boats the list just goes on and on. And all of this before we even mention the incredible Falkirk Wheel which is, of course, a truly awesome day out in itself.

Everyone at British Waterways Scotland; all the Local Authorities and Enterprise companies; all the businesses, canal volunteers in local communities and the canal Societies are doing everything possible to make Scotland's canals an asset for the future, but we still need your help and support.

We value your views on your canal experience and have Visitor Comment cards which you can complete and return FREEPOST to us. There are staff along the canal who will be only too pleased to answer your questions and pass your comments on. And, the Lowland Canals office can also be contacted if you have any suggestions and ideas for ways in which we can improve your visitor experience.

These are YOUR canals - please care for them well and we will all be able to enjoy them for at least another 200 years!

RICHARD MILLAR

WATERWAY MANAGER

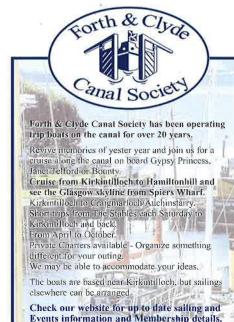


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THE WATERWAYS CODE

Britsh Waterways has developed this code to ensure that canals are safe for all their users and that their environment is safeguarded for future generations.

EVERYONE

- Protect the waterway environment keep noise to a minimum and don't damage the vegetation or banks.
- Take home everything that you brought with you, and leave the site as you found it.
- Never dump rubbish, sewage or oily bilge water into the water or onto the bank.
- Clean up after your dog and keep it under control.
- Don't light fires.
- Things can go wrong on canals. If you see something dangerous such as serious damage to structures or water escaping, please dial 0800 4799947

- Report pollution, fly tipping or fish in distress to the Scottish Environment Protection Agency (SEPA) on 0800 807060.
- Report birds in distress to SPCA on 0131 3390111.
- Seek permission from the Lowland Canals waterway office to organise a special event or educational visit.

BOATERS

- Avoid creating a breaking wash and don't run your propeller whilst moored.
- Don't obstruct locks, bridges, water points or turning points.
- Slow down when passing moored or unpowered boats.
- You and your crew must understand how to operate your boat and navigate locks and bridges.
- Children and nonswimmers should wear a life jacket or buoyancy aid.

UNPOWERED CRAFT

- Make sure your craft is suitable for the waterway you are using and that you are competent to use it.
- Larger craft need deeper water and room to manoeuvre so keep to the side of the channel where the helmsman can see you.
- Lock weirs and sluices are dangerous.
 Don't stay aboard your craft in a filling or emptying lock - carry it around or if it is too heavy, use lines to keep control.

A more detailed booklet called 'The Waterway Code for Boaters' is available from British Waterways Central Office: British Waterways, Willow Grange, Church Road, Watford WD1 30A



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Scotland's Canals and The Falkirk Wheel





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FORTH & CLYDE CANAL

WESTERN REACH

The section of the Forth & Clyde canal linking Glasgow with the Clyde estuary was the last part of the waterway to be completed, in 1790.

Bowling Basin remained open throughout the canal closure between 1963 and 2000, and was used as a harbour for privately owned small craft.

It is overlooked by the handsome Custom House, which dates from the early days of the canal when Glasgow's trade with the west was conducted via the canal, as the River Clyde had not been deepened.

The Bascule Bridge which spans the canal between the two lower basins is an original structure; it is dwarfed by the disused railway swing bridge, which carried one of the competing railways to the Clyde coast.

The sea lock facing across the river is the original (No 39), but it was discontinued when a new sealock (No 40) was built giving direct access to and from Bowling Harbour.

The towpath from Bowling to Clydebank is part of the Glasgow to Loch Lomond Cycle path, and as you travel eastwards you pass Ferrydyke Bridge, another restored original bascule bridge, a lock keeper's cottage, and the western end of the Antonine Wall.



The Erskine Bridge towers over Lock 37 at Old Kilpatrick, and the Saltings Ecology Park lies just to the east, close to Ferry Road swing bridge which gave access to the former Erskine Ferry.

After passing Dalmuir West bascule bridge, you are approaching the outskirts of Clydebank. Dalmuir Bridge and 'Drop Lock' is a major new feature of the Millennium Link works. It enables boats to pass beneath the road by lowering them in a lock chamber, and then raising them again to canal level, and it is the first lock of this kind in Britain.

Just around the corner is Trafalgar footbridge, and after crossing the Glasgow to Helensburgh railway line the canal skirts around the southern perimeter of the former Singer Sewing Machine factory, now a modern industrial estate.

After slipping under the newly raised Kilbowie Road Bridge, Clydebank Shopping centre appears, complete with its two pedestrian bridges, which are lifted one at a time so as not to interrupt pedestrian traffic. Here too is Macmonagle's 'Sail-thru' fish and chip takeaway which has become a famous canal port of call for both sailors and landlubbers.

The canal now winds its way from Clydebank to the western suburbs of Glasgow, and you will in turn pass Linnvale Footbridge and the new Duntreath Avenue road bridge before arriving at the Boghouse lock flight (Nos 36-33).

Lock 36 has been re-instated, Duntreath Road and Great Western Road bridges are both new, and the canal section on to Lock 32 is new. The path follows the original canal line, the canal now curves out to the west.



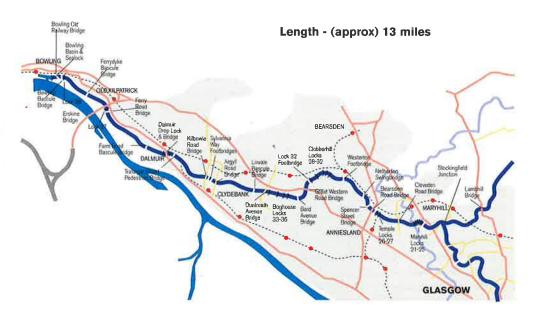
After Cloberhill Locks (Nos 32-28) the canal is crossed by footbridges at Netherton and near Temple, and has a secluded, almost rural atmosphere. That all changes on arrival at busy Bearsden Road, which crosses the waterway at Temple Bridge (rebuilt 1932) and locks 27 and 26. The 'Lock 27' pub is in the former lock keeper's house, and on the south side is 'The Canal' – a pub, restaurant and micro brewery.



Govan Cottage Bridge is a little further east, and then the famous Kelvin Aqueduct, the largest structure in Britain when it was built, takes the canal across the River Kelvin to the Maryhill Lock Flight (Nos 25-21), which raise the waterway through 15m (50ft).

On the north bank is Kelvin Dock, almost as old as the canal itself, where 'puffers' were built until the 1920s.

You are now on Summit Reach. Maryhill Road (rebuilt) and Lochburn Road (original) aqueducts are the last features before arriving at Stockingfield Junction, which in 1775 was the terminus of the new canal from Grangemouth.





GLASGOW & GLASGOW BRANCH

From Stockingfield Junction you can walk, cycle or sail along the lock-free Glasgow Branch to British Waterways' headquarters, or on to Shields Wharf. Port Dundas is no longer navigable from the canal system – it was the Glasgow terminus of the Forth & Clyde, and once the junction with the Monklands Canal.

The first bridge after Stockingfield is at Ruchill Street, and this was re-constructed some 15 years ago at its present height. Nearby is Ruchill Church, which was designed by Charles Rennie Mackintosh. The canal now crosses Bilsland Drive. This aqueduct, like those at Maryhill Road and Possil Road, was rebuilt on a grander scale in the late 1800s to accommodate the new Glasgow tramway system.

To the north of the next sweeping bend is Murano Street Village, which is student accommodation for Glasgow University. From here on, as the land to the south falls away, there are spectacular views of the city and Gilmourhill, upon which Glasgow University is built, is prominent on the skyline.

Firhill Bridge is also known as the Nolly Brig, and overlooks the Partick Thistle football stadium. Firhill Basin was part of a large complex of timber pounds, in which timber was stored and seasoned – afloat. It is now used

for water activities, and is something of a nature preserve as well. The nearby Stop Lock (a single set of gates) was one of many built during World War II to contain the canal waters in the event of bomb damage.

By 1777 the canal had reached a new terminus at Hamiltonhill Old Basin, now overlooked by the modern BW Scotland HQ building. The older buildings nearby date from the earliest days of the canal.

Rockvilla restored Bascule Bridge is just outside the BW office, and then the waterway crosses Possil Road aqueduct, below which the original structure of 1790 is still visible.

The warehouses at Spiers Wharf are now residential flats, and the magnificent Georgian Canal House, now occupied by a firm of architects, was once the canal office. These are fine monuments to the 18th Century vision and endeavour that built this waterway. The warehouses were built as grain mills and a sugar refinery, and later used as bonded stores.

This section affords spectacular views across the city towards Kelvingrove, Glasgow Science Centre and Glasgow University, and is close to the city centre and the M8 Motorway. A short walk away are Glasgow's shops, galleries, theatres and restaurants.



If you cross the main road you will find Port Dundas. Now a backwater, this former harbour complex has an important history, as it was the main port of Glasgow until the River Clyde was deepened for navigation. You can still see a railway swing bridge and a bascule bridge, and there are many other relics of the old port. The large iron scow that sits high and dry beside the basin is a typical Forth & Clyde working boat.

Here too was the link with Monklands canal, and although that waterway is buried beneath the M8, a piped water supply to the Forth & Clyde still flows along the former route.









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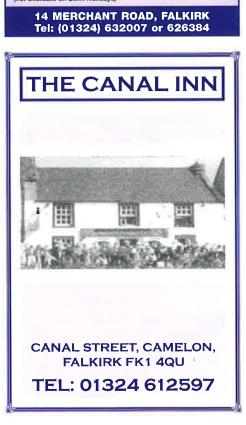
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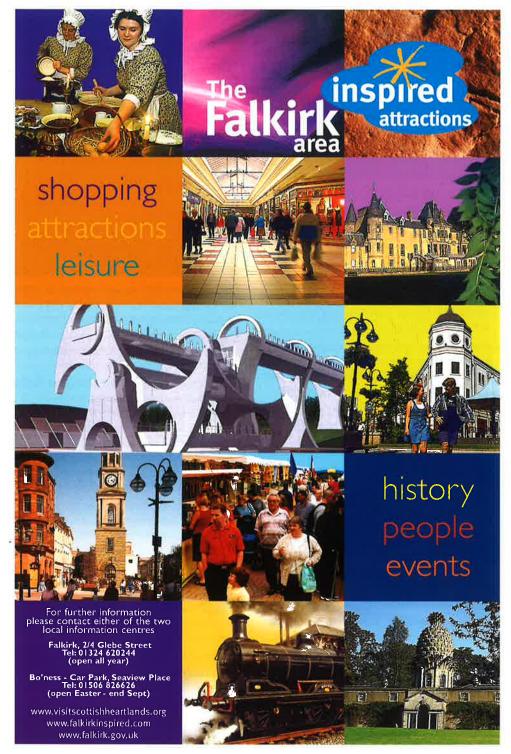
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STOCKINGFIELD TO WYNDFORD

The summit reach of the Forth & Clyde Canal is a tranquil sixteen mile stretch of rural waterway, with superb views to the hills to the north. Kirkintilloch lies approximately midway along this stretch, and is the self styled 'Canal Capital of Scotland' as the canal passes right through all the amenities of a busy town centre. The Roman built Antonine Wall crosses the canal four times on this stretch.

From Stockingfield you head eastward past Hillend Bridge, a railway aqueduct, and Lambhill Park towards Lambhill Bridge. Here, at the very fringe of the city, is one of the former stable blocks where horses pulling the fast passenger boats, the swift boats, were changed.

On the north side of the canal is Possil Loch, which is not only a canal reservoir, but also a SSSI (Site of Special Scientific Interest).

Midway along the straight stretch between Possil Loch and Bishopbriggs is the Glasgow City Boundary, overlooked by Wilderness Plantation on the hilltop to the north. The outskirts of Bishopbriggs are to the south, accessible via Farm Road Bridge, from where there is a path on both sides of the canal as far as Cadder Bridge.

Cadder is one of the more interesting places on this stretch of waterway. An old mill is diagonally across the bridge from the former keeper's cottage, and the canal crosses the line of the Antonine Wall at the sharp bend, with the site of a Roman fort located on the bluff to the south.



Hungryside Bridge carries the road to Torrance across the canal, from where it is just a short distance to Glasgow Road Bridge, and the possibility of refreshment at the Stables Inn, which as its name suggests, was another horse change point along this route.

Just to the west of Kirkintilloch is the Seagull Trust boathouse, and the former site of J&J Hay, who built and operated 'puffers' on the canal. If you want to know more about the history of the town and the canal, you can visit Kirkintilloch's Auld Kirk Museum and William Patrick Library at the north end of the Cowgate, a few minutes walk away.

Townhead Bridge was built as part of The Millennium Link project, and is symbolic of the canal's renovation. Further west is the Nicolson Bridge and the Luggie Aqueduct, the former a new Link? structure, the latter built in 1774 to cross the Luggie Water, a tributary of the River Kelvin to the north. Later, the Campsie Railway used the same arch, which is commemorated by a simulated track pattern in the restored pavement.

A former Basin just west of Hillhead Bridge was the very first canal terminus: known as Hillhead Harbour, this was as far as the canal had been extended by 1773.



From here to Lock 16 at Camelon the canal runs close to the line of the Antonine Wall, and the stretch from Shirva to Auchinstarry is considered by many to be the prettiest stretch of the canal.

Shirva is at the end of a three mile bridge-free length, and interesting features here include some ruined stables, and the original aqueduct over Broad Burn, which is well worth a closer look.

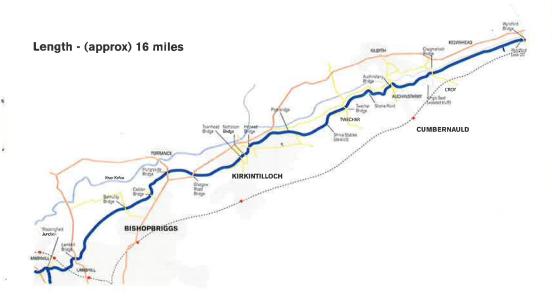
Twechar lies just south of the canal, and from it you can access Bar Hill Roman Fort and enjoy a stroll around Bar Hill. The new hydraulic opening bridge was built in 2000 for the Millennium Link.



Auchinstarry Basin, a few miles east of Kirkintilloch, is a good overnight stopping place for boaters. The new road and bridge by-pass the original bridge location, which can be seen just to the west. A marina is planned for the basin, and at present there is a slipway and some amenities. The small town of Kilsyth is a short walk to the north.

The final reaches to Lock 16 pass Craigmarloch, one time destination of the 'Queen' pleasure steamers: gone, sadly, are the tea rooms, putting green and other amenities! To the south is Croy Hill, site of a Roman Fort on the Antonine Wall.

Wyndford Lock (No 20) marks the end of the summit reach.











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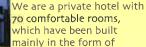


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www.lucs.org.uk

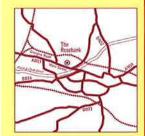
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WYNDFORD TO LOCK 16

Not far from Wyndford Lock and Wyndford Bridge is Castlecary, where, in 1963, the need to upgrade the A80 bridge was the cause of the canal closing. £160,000 was saved by not building a new opening bridge, but it cost £2m to build a new fixed bridge in 2000! By this time many other obstacles to navigation had been created.

Castlecary Locks (Nos 19-18) lie a short way to the east of Castlecary Bridge, and another few hundred yards further is Underwood Lock (No 17) where another set of former stables is now a pub/restaurant.

Two miles away a new lifting bridge has been built at Bonnybridge, but the curious can still see the original canal crossing, an aqueduct that was the town's access underpass when the canal was built. It is a little to the east of the present bridge.

It is another two miles to Carmuirs railway aqueduct, where the main Glasgow to Inverness low level line passes under the waterway. The other line, to Edinburgh, climbs behind The Falkirk Wheel and follows the Union canal route much of the way to the capital.

The Falkirk Wheel is without doubt the Lowland Canals' most striking landmark. It is not only visible from miles around, but is also cutting edge waterway engineering.



Here boaters can tie up in the Forth & Clyde, or transit the Jubilee Lock into New Port Downie, the spacious lower basin at the Wheel.

New facilities for boats and boaters at The Falkirk Wheel include new toilet and shower blocks, and a marine diesel refuelling point. LP Gas is also available.

All canal users, whether on foot, cycle, or aboard a boat, have access to The Falkirk Wheel Visitor Centre, which has an information centre, a shop, and a café-bar.

If you want to take your boat into New Port Downie, or through The Falkirk Wheel, please check dimensions by telephoning 01324 619888.

Lock 16 is the top lock of the flight through Camelon and Falkirk to Grangemouth, and is also the site of the original Port Downie, where until 1933 the Union Canal joined the Forth & Clyde. The modern road curving uphill from the roundabout beside Lock 16 is built on top of the old lock flight, which raised canal boats through 110ft (33.5m). This lock sequence took many hours — a transfer now achieved in a fraction of the time by The Falkirk Wheel.

The Union Inn, a fine Georgian building, was strategically positioned as a hostelry for travellers on both waterways, and has now carefully revived its image as a canal-side tayern and restaurant.



Canal Dimensions

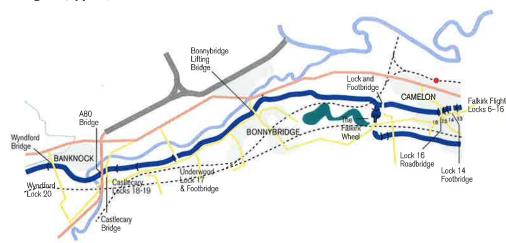
Forth & Clyde Canal max dimensions:

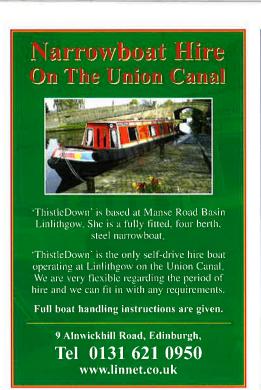
Lock length 20.12m (66ft); Minimum Channel Width 5.78m (19ft); Depth 1.83m (6ft); Height above Water Level 3.0m (9ft 8). Add 10cm (4 inchès) to your normal salt water draught to compensate for reduced buoyancy in fresh water and allow for the weight of any extra equipment which may increase the draught of your vessel. Always allow a safety margin for overhead and underkeel clearance.

The Falkirk Wheel and Union Canal max dimensions:

Lock length 21.33m (70ft); Minimum Channel Width 3.81m (12ft 6); Depth (Union) 1.066m (3ft 6); Depth (Jubilee Lock from F&C to basin) 1.5m (5ft); Height above water 2.7m (8ft 10).

Length - (approx) 4.5 miles







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Falkirk Tourist Information Centre 2/4 Glebe Street.

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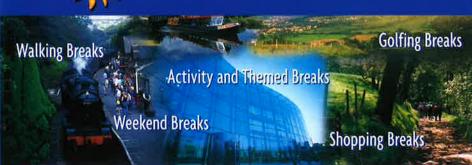
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LOCK 16 TO THE FIRTH OF FORTH

This section of the canal offers something of a cross section of Falkirk's history, as well as a useful short cut for the walker or cyclist.

Just below the new bridge at Lock 16 is the Canal Inn, which predates the Union Inn, and with a tradition of over 200 years, may well be the oldest canalside pub in Scotland.

Four more locks are passed before reaching British Waterways Scotland's Lowland Canals' offices and the Beefeater Restaurant, which are located in a former bonded warehouse beside the rebuilt Camelon Bridge and the new Lock 11. The original Lock 11 can still be seen a little downstream. Camelon Bridge carries the main road between Falkirk and the west, and the new design allows the towpath to underpass the busy road.

The former Rosebank Distillery is almost opposite – it is now owned by British Waterways and will be redeveloped, but not as a distillery!

You may wonder why some locks on this flight had to be repositioned. Originally, many of the roads crossed over the lock chambers on lifting or swing bridges, a convenient dual use of the lock walls as bridge abutments. Now, in order to create sufficient headroom under the new fixed bridges, the bridges either had to be elevated or moved downstream of the locks, or,



the locks had to move upstream. In most cases it was easier to move the lock than re-route or raise the road, which is why complete new locks were built at Lock 11 and Lock 5.

Look out for the original lock-keeper's cottages, a quaint reminder of times past, at old lock 11, and at Lock 9.

From Lock 10 to Lock 5 the canal plunges through the old industrial heart of Falkirk, once a centre of the iron castings industry. As you descend past Lock 9 the railway bridge crosses overhead, followed by Merer's Bridge and two more locks (Nos 7 & 6) before Bainsford Bridge, where once again the lock (No 5) was moved upstream. There was an ironworks on the north bank near the original Lock 5.

As you emerge from the town heading towards Lock 4 you will begin to see Grangemouth on the skyline. Lock 4, the last original canal lock before reaching the sea, was buried beneath a road from 1980 until 2000.

The last bridge is the new A9 bridge, which was built for the Falkirk Distributor Road using part of the structure of a former railway bridge. This is near where the waterway was closed off in the '60s, and from here to the sea the canal is a newly created structure which first turns to the west, through a new Lock 3, and then joins the sea at the River Carron through the new sea-lock, Lock 2.

If you are entering or leaving the canal to navigate on the River Carron, you must ensure that there is enough depth in the river and sufficient clearance under the bridges between the canal and the sea.



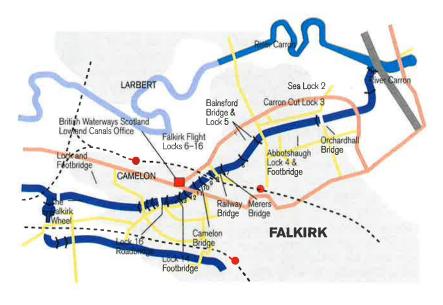
To follow the line of the original canal, which has of course been filled in and built over by roads and buildings, you should go to a point opposite the end of Dalgrain Road, just beside the M9 slip road. The avenue of trees between the A905 and the motorway embankment mark the former banks. The canal line then "continues" eastwards beneath Dalgrain road, and the next evidence is of the former sealock entrance, which forms the basin used by Grangemouth Yacht Club.



In former years, the canal terminated in Grangemouth Docks, which in turn joined the sea through a sea-lock situated a few hundred yards downstream of the Yacht Club.

British Waterways publishes a detailed Skipper's Guide which covers all aspects of the canal passage, including the all-important transit of the River Carron, and a set of Tidal Predictions giving High Water times and heights for Grangemouth and Bowling, and detailed notes on timing the Carron passage. The Skipper's Guide can also be downloaded from www.scottishcanals.co.uk

Length - (approx) 3 miles





THE FALKIRK WHEEL

The Falkirk Wheel has become synonymous with the inauguration, in May 2002, of The Millennium Link project which successfully re-opened the Forth & Clyde and Union Canals., The Falkirk Wheel is already considered to be one of the wonders of the canal world.

Here suitable sized craft can transfer the 35m change in level from the Forth & Clyde Canal to the Union Canal, and vice versa.

All vessels using the Union Canal can moor near The Falkirk Wheel and their crew can visit this engineering masterpiece and the adjacent Visitor Centre.

The Visitor Centre contains an exhibition area, shop and café and ticket office, and is open 9:00am to 6:00pm most days. Toilets are situated in and adjacent to the Visitor Centre.

A picnic area and children's play park is located approximately 60 metres west of the Golden Jubilee Lock Which takes boats between The Falkirk Wheel Basin and the Forth and Clyde Canal.

The Falkirk Wheel Interchange as it is known comprises the Wheel itself which carries boats in Gondolas between the two levels; and three locks, the Golden Jubilee Lock (No 3) at the

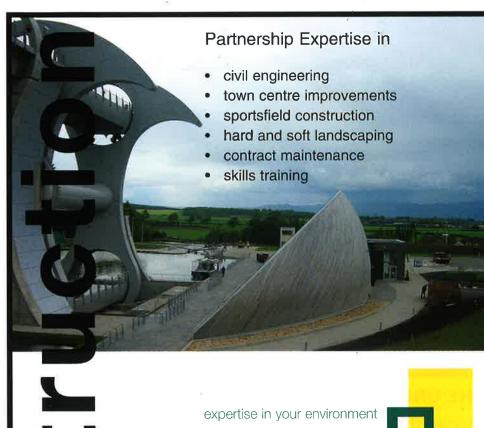
Forth & Clyde and Nos 1 & 2 on the Union Canal.

The lower level forms a large basin known as New Port Downie while the upper level comprises an impressive aqueduct and a tunnel (Roughcastle Tunnel) with winding holes (turning basins) at either end.

Normal Union Canal draft and headroom restrictions apply throughout the Interchange. If you are planning to transit The Falkirk Wheel by boat, please ensure that you have contacted The Falkirk Wheel Visitor Centre to book your trip time allocation. Please also advise the the Basin Controller on your arrival. You should also consult your Skipper's Guide for other practical information.

The aqueduct from the wheel to the south first passes Rough Castle Tunnel, which takes the waterway under both the Antonine Wall near the site of the former Rough Castle Fort, and also under the main Glasgow - Edinburgh rail line.

Once through the tunnel, the South Basin provides turning space for the trip boats operated by the Wheel, and for mooring whilst waiting to transit Locks 1 and 2, which are now the only locks on the Union Canal, in contrast to the original flight of eleven which this remarkable structure replaces.



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FALKIRK TO AVON AQUEDUCT

From Lock 1 the Union Canal runs at a constant level of 240ft (43m) above sea level to Edinburgh. It is technically a Contour Canal as it follows a constant level. When it was built it was nicknamed "the Mathematical River".

After passing the first bridge you come to the aqueduct carrying the canal over Greenbank Road, and just east of this was Port Maxwell. This facility, a 550 yard extension built in 1823, shortened the distance passengers transferring between the two canals had to walk.

The junction where the eleven lock flight joined the Union Canal is now rather difficult to spot; lock 6 was under the railway bridge, and locks 7-11 were in the area between the railway and the canal.

The Seagull Trust provides access to the water in boats specially modified for people with disabilities. The Trust's boathouse can be seen on the south bank, and although the railway

obscures the view to the north, the town centre of Falkirk is not far away, and can be reached through the next bridge under the railway, as can Falkirk High train station.

Things to see and do around Falkirk include a visit to Callendar House, which apart from being an award winning museum and art gallery, gives a fascinating insight into many aspects of life down the centuries. The grounds are extensive, and the Georgian Garden recreates the ambiance of the olden times when the Union Canal was being built.

Callendar House, through the wishes of its owner, William Forbes, had a major influence on the construction of the Union Canal – he would not allow the canal to pass through his grounds, forcing the construction of the 633 metre Falkirk Tunnel, which you enter next.

After the tunnel is Glen Bridge (No 61), known as the Laughin' and Greetin' Bridge, which is Scottish for the happy and miserable faces carved on either keystone, thought to represent the feelings of the contractors as they faced their differing tasks.



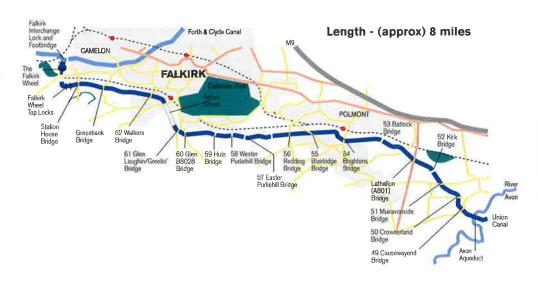
The canal meanders onward through the suburbs and villages of Falkirk, passing Almond Castle, and then just before Bridge 49 you come to Causewayend, where the railway from Glasgow via the Slamannan coalfield, 8 miles to the west, was completed in 1840. It brought both passengers and coal to be shipped to Edinburgh. This was also the site of the Almond Ironworks, and the now dismantled railway formerly continued to the north.

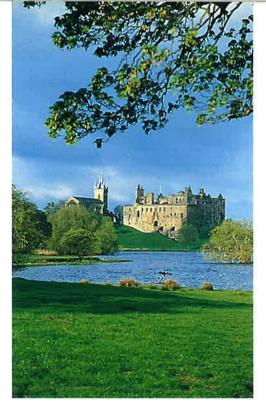
It is difficult to imagine that this now overgrown location once played an important part in Scotland's early transport and industrial development.

Muiravonside Country Park is just a little way up the B825 from Bridge 49, and it covers 170 acres of woodland, parkland and gardens.

The park offers a wide variety of amenities including nature trails, picnic sites, camping areas, walks and a visitor centre. The park's restored farm buildings house ponies, pigs and goats, and there is a duck pond and chicken runs. A Ranger Service provides talks and guided walks.

Round the next bend is the elegant Avon Aqueduct. Its twelve arches span the River Avon 86 ft (26.2m) below, and at 810 ft (247m) from end to end, it is the second longest structure of its kind in Britain. It was designed by Hugh Baird, with advice from the great Thomas Telford, and they incorporated, in all the Union Canal aqueducts, a new method of forming the water channel of cast iron, a much lighter and more reliable system than masonry and clay.





AVON AQUEDUCT TO ALMOND AQUEDUCT INCLUDING LINLITHGOW

Woodcockdale Stables are between Bridges 47 and 48, and large quantities of building material and road stone were shipped to Edinburgh from this area during the last quarter of the 19th century. It must have seemed at times as though the whole of Central Scotland was being dug up as coal, iron ore, oil shale, building stone, lime and anything else of use were extracted wherever they were found.

Linlithgow is an historic town, its main claim to fame being the birthplace of Mary Queen of Scots in the early 15th Century Linlithgow Palace. St Michael's 13th Century church is another impressive building, and is a fine example of Gothic architecture. Its tower is crowned with an unusual aluminium structure, added in 1960 – easier to see than describe.

Linlithgow Union Canal Centre is located in the former stables at Manse Road Basin, and is operated by the Linlithgow Union Canal



Society, which deserves great credit for helping to keep the canal available for recreational use during the years of closure. The Society's canal boat trips, canal museum, tea room and souvenir shop all contribute to a pleasant atmosphere and are well worth crossing the waterway to visit. The Society operates two boats, and you can either cruise to the Avon Aqueduct, or enjoy a shorter trip. Both run from Manse Road Basin.

Students of canal structures will be intrigued by the via-aqueduct at Philpstoun. The aqueduct carries the canal over a minor road, which in turn is built on a viaduct over Haugh Burn. Craigton Bridge (No 35) is just a mile or so further east, and you can see the Hopetoun monogram carved on it. The road that crosses here leads to magnificent and historical Hopetoun House and grounds.

The canal now curves to the south, and at Bridge No 30 it is guarded by Niddry Castle. The castle was, however, important long before the canal was built, and it is famous for having sheltered Mary Queen of Scots before her final capture and removal for eventual execution in England. Her first and last days in Scotland were just 6 miles apart!

The Lothians have many prominent landmarks, and the Shale Bings compete strongly with the nearby Forth Bridges and the Avon rail viaduct. The red bings (the word is a corruption of ben, meaning mountain) are the accumulated spoil from oil shale extraction, which was used to produce paraffin at nearby Broxburn: The bings are now scheduled monuments.



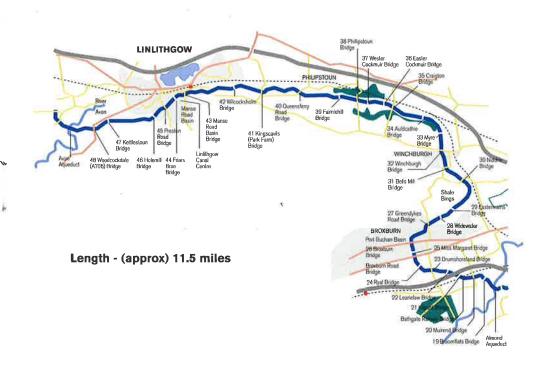
If you are travelling by boat the new bridge at Greendykes Road has created a very awkward bend, so consult your British Waterways Skipper's Guide and proceed with caution. In Broxburn boating facilities include Port Buchan Basin north of Bridge 26 (A899), and the nearby British Waterways' yard and slipway. Fundamental to the restoration of the Union Capal was the realignment of the capal where

Fundamental to the restoration of the Union Canal was the realignment of the canal where it had been blocked by the construction of the M8. Fortunately, the motorway climbs slightly to the west, so by moving the canal a short

way in that direction the necessary clearance was created, albeit at considerable cost!

Almondell & Calderwood Country Park is about a mile to the south west. The nearest access is from Bridge 20, or moor between the Almond Aqueduct and Bridge 18 and walk up the footpath beside the Avon. A major point of interest, apart from riverside walks, is the feeder lade supplying the Union Canal. This runs like a canal in miniature for three miles through tunnels and across aqueducts, and is the main water supply for the canal.

The Almond Aqueduct is the smallest of the Union Canal's major structures. It is 75ft high, with five arches spanning 420ft (128m) — compared to the Avon Aqueduct's twelve and the Slateford Aqueduct's eight. Interestingly, the designers' appear to have used a modular approach to all three aqueducts, which have a common span of 50ft, appeared to have used the same elegant arch pattern and pier design, and presumably all used the same iron trough casting.



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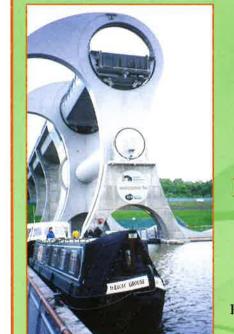
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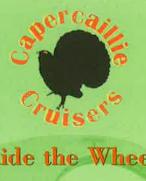


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THE FALKIRK WHEEL The One. The Only. The Wheel.



The impressive lowland canals – the Forth & Clyde and the Union – meet here at The Falkirk Wheel.

The Falkirk Wheel is the result of a spectacular feat of engineering and incredible ingenuity to re-open the waterways between Edinburgh & Glasgow.

Once you've seen The Wheel, you'll understand what a simply ingenious design it is. Basically, it's a rotating arm with gondolas at either end. The Wheel turns and carries boats from one level to another, joining the two lowland canals.

You don't have to have a boat to experience The Falkirk Wheel. At the visitor centre boats leave every 30 minutes, to take you on your very own unique 45-minute journey. You will travel from the Visitor Centre to The Wheel and on to the Union Canal 115ft above. Sailing out to The Wheel you will be transported through Roughcastle Tunnel before your return descent on The Wheel back to the Visitor Centre below.

At The Falkirk Wheel Visitor Centre you will find out all about the facts, stories and engineering triumphs behind The Wheel and its connecting waterways at our state of the art interactive exhibition wall. And after your trip by canal boat on The Wheel you can relax in the Café with a coffee or a bite to eat. Then round off your trip with some souvenir shopping from a great range of mementoes and gifts at The Falkirk Wheel shop.

Did you know?

- The Falkirk Wheel's dramatic shape is the result of a brainstorm between a team of 20 designers, engineers and architects.
- In total, the two gondolas lift 600 tonnes – that's the weight of around 100 African elephants.
- The Wheel is designed to last at least 120 years – plenty of time to make another visit!

Don't miss the boat. For up to the minute information on The Falkirk Wheel, boat trip times, charges and events call The Falkirk Wheel booking line on **08700 500 208!**Advance bookings are highly recommended.

Here's what's been said about The Falkirk Wheel:

"It ranks beside The Forth Road Bridge as a civil engineering wonder of the world, something of which Scotland should be noisily proud. It's also a great day out. Go soon"

Scottish Daily Express

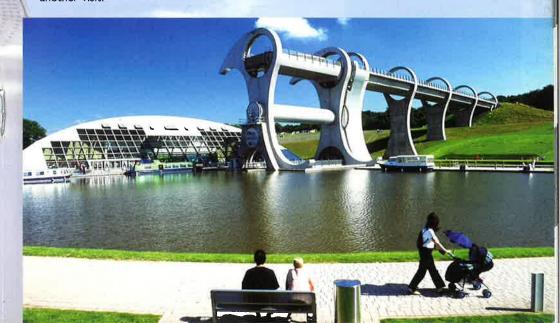
"The Wheel is the showstopper"
The independent

"It really is well worth a visit"

David Bull, presenter,

Tomorrows World July 2002

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SUPPORTING THE UNION CANAL

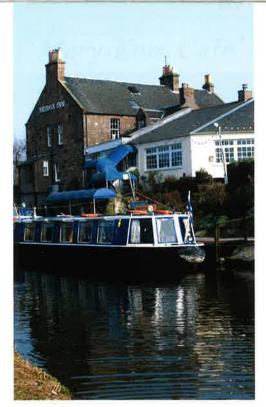
The City of Edinburgh Council provides a range of services and support activities which assist users to maximise their enjoyment of the canal in Edinburgh, including;

- Recreation and Leisure Access and facilities
 - Local Economic Development
- Environmental Improvement Community Development and Planning

Contact City Development for assistance or further details.

For development issues and activities phone: 0131 529 3730 For access and environmental issues phone: 0131 469 3751

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ALMOND AQUEDUCT TO EDINBURGH INCLUDING RATHO

Wilkies Basin is less than a mile east of the Almond, and here the canal is cheek-by-jowl with the M8, the motorway that almost saw the canal's permanent demise! This basin was mainly used for loading stone from the nearby quarries, one of which is home to the Scottish National Climbing Centre.

Ratho is home to another centre – the Edinburgh Canal Centre – which remained a re-juvenation hotspot during the years of closure. The centre is based at Bridge Inn, from where Ronnie Rusack MBE, a tireless canal campaigner, runs two restaurant boats and a passenger boat. It is also base to two Seagull Trust boats. Thanks to many years of boating activity at this location, boating facilities are, at present, the best on the waterway and the Bridge Inn is a pleasant and popular hostlery.

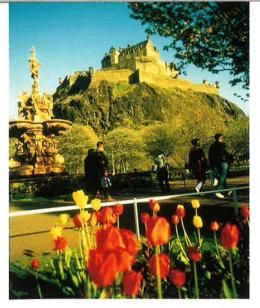
As the canal wanders eastward towards the outskirts of Edinburgh its pastoral setting is steadily usurped by increasing numbers of roads and bridges, and after passing



Hermiston, it crosses the Edinburgh City bypass on the Scott Russell Aqueduct. This was the site of another vital battle won by the waterway campaigners, who succeeded in getting an aqueduct built instead of the canal being summarily truncated. It is named after the Victorian scientist John Scott Russell who observed the 'solitary wave' phenomenen on the Union Canal.

The infilling of one mile of canal at Wester Hailes, a large, post-war housing scheme, might have seemed an insuperable obstacle to canal reconstruction, but it was restored as part of the Millennium Link programme, and is now a vital artery bringing a focus to the town. Slateford Aqueduct is also known locally as Prince Charlie Aqueduct, and its vital statistics are 65ft (20m) in height and 600ft (183m) in length.

You are getting close to the city centre now; sports fields and rowing clubs are in evidence, and the frequency of bridges increases. The last fixed bridge is Viewforth Bridge (No 1), which appropriately has Edinburgh & Glasgow symbols carved above its keystones.



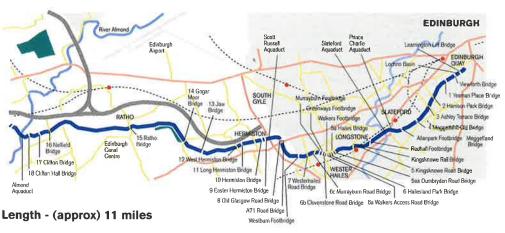
Leamington Lift Bridge is an unusual structure. It is a hydraulically powered vertical lift bridge which was originally located at Fountainbridge. When Port Hamilton and Port Hopetoun, the two original terminus basins, were filled in and re-developed in the 1920s, the bridge was moved to where it stands today.

Since then, the canal terminus has been Lochrin Basin, just a few minutes walk from Edinburgh's world famous castle. At present, the whole Lochrin Basin area is under development by Edinburgh Quay Ltd who are building apartments, offices and restaurants around the Basin, creating a smart new city setting for the next century of the Union Canal.



Zazou Narrowboat Restaurant: Cruise and Dine. Moored year round in the picturesque setting of Harrison Park, just minutes from Edinburgh city centre, this elegant 55ft narrowboat specialises in hospitable, custom made occasions for groups of between six and twelve people. Children's parties, dinner parties, study groups, corporate clients, clubs and societies all enjoy the exclusive use of the boat and enjoy cruising through the changing seasons-from the snowbound icy canal reaches of winter to the glorious overhanging blossoms of spring, abundant summer wildlife and autumn glories. Catering can be anything from light lunches and afternoon teas through to lavish buffets and three course candlelit dinners. A unique and memorable event is guaranteed.

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WALKS AND CYCLE ROUTES

The walks listed below are all different in character, and where they are off-towpath stout shoes are advisable. Only the towpath sections of these walks are suitable for wheelchair users.

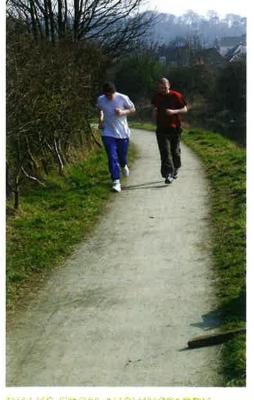
FORTH & CLYDE CANAL WALKS

Kelvin Walkway

The Kelvin Walkway passes beneath the eastern arch of the historic Kelvin Aqueduct at the foot of the Maryhill Lock flight. The link from the towpath to the walkway involves a steep descent by way of steps or an uneven and narrow path, although there are plans to upgrade this access point at a future date.

The Kelvin Walkway at this point is a good quality asphalt surfaced path as far as Maryhill Road to the north, where it leads on to Milngavie and the start of the West Highland Way, approximately 9 km from the Canal.

Heading south, the path is well surfaced into Kelvingrove Park, from where it leads (approximately 6km) to the Clyde Walkway, which heads eastwards along the north bank of the River Clyde. The path passes though a pleasant tree lined valley and points of interest which may be reached from it include Glasgow Botanic Gardens, Kelvingrove Museum and Art Gallery, and via the Clyde Walkway, the Scottish Exhibition and Conference Centre, Bell's Bridge, and the Glasgow Science Centre.



WALKS FROM AUCHINSTARRY

Bar Hill and Twechar

This circular walk of 5m / 8.5km starts and finishes at Auchinstarry car park. Cross the bridge to the towpath, and then walk west for 1.5m to Twechar Bridge, and then a further 0.75m to Shirva Farm and disused stables, where you pass under the canal using the aqueduct, or pend. Follow the footpath SE to Twechar, a former mining community, where the two churches are good landmarks. Car parking is also available at Twechar.

For the last section of the walk, which climbs to Bar Hill Roman Fort and then follows the line of the Antonine Wall to Auchinstarry, walk through Twechar towards the canal, and then take the lane on the right.

Heading north at Auchinstarry leads to Kilsyth (shops, pubs etc) where walks into Kilsyth Hills can be launched. There are also woodland walks around Colzium House (Map ref: 729787).

Croy Hill and Craigmarloch

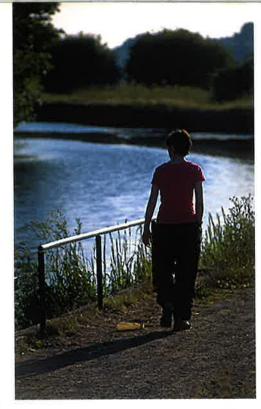
This is a circular walk of 3.5m / 5.3km, starting and finishing at the car park at Auchinstarry. Park and begin as above, but turn east at the bridge to follow the towpath 1.25m to Craigmarloch, one time destination of the 'Queen' trip boats. Cross the canal again, walk a few hundred yards SE towards Dullatur, and take the first lane to the right, which leads to the Antonine Wall. Follow this, via Croy Hill Fort, back to Auchinstarry.

Wyndford Lock

There are paths to Banknock, which contains local shops, pub etc. The vacant site just to the north east of Wyndford Bridge was the site of the Bankier Distillery which operated from 1828 for 100 years after which it operated as a maltings until 1971. The site has lain derelict for nearly 20 years. The remains of the wharf walls can be seen on the edge of the towpath at this location.

Length - (approx) 7.5 miles





WALKS AROUND BONNYBRIDGE

Use car parks near Castlecary, Underwood or Rough Castle, or moor your boat at one of the landing stages. To reach Rough Castle Roman Fort and the Antonine Wall follow the signs in Bonnybridge on the south side of the canal. Midway along the towpath between Bonnybridge and Underwood you can reach Seabegs Wood, passing under the canal through the pend beneath (Map ref: 816794)



Glasgow to Loch Lomond Cycleway

The Forth and Clyde towpath forms part of the Glasgow to Loch Lomond Cycleway which in turn forms part of National Cycle Route 7.

It joins the towpath at Clydebank and leaves it at Lock 38, just east of Bowling Harbour. The route is signposted across Dumbarton Road and continues on through Dumbarton, arriving at Loch Lomond at Balloch. Cycle hire is available at Bowling from Magic Cycles, located in the railway arches adjacent to Lock 38.

Length - (approx) 3 miles





UNION CANAL WALKS

Bantaskine Park, Falkirk

This canalside park lies south of the Union canal not far from Falkirk High Station, and may be accessed from the towpath by way of which is the most westerly of the masonry arch bridges on the Union Canal, close to the Seagull Trust boathouse.

Walk through Bantaskine Park westwards to Greenbank Road. This point is the historic western termination of the Union Canal, and the Battle of Falkirk Monument may be reached by turning left for approximately 1km up Greenbank Road.

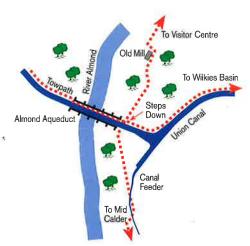
Do not try to return along the towpath here as it is cut by the Union Canal extension to The Falkirk Wheel after a couple of hundred metres. Instead, continue northwards down Greenbank Road beneath the new Canal aqueduct and turn right onto the track immediately before the railway arch. This track follows the line of the original lock flight linking the Union and Forth & Clyde Canals.

On reaching the towpath continue eastwards for 1.25km to the starting point at Bridge 62.



Callendar Wood, Park and House

The park may be accessed by taking the path off towpath west of Bridge 59 at 894782, or parking near the entrance off Callendar Road. From the canal go underneath the railway arch over the Glen Burn and across the small footbridge over the burn. On reaching Glenburn Road, Callendar Park may be reached by taking the paths (stepped in places) through the Hallglen housing estate. Steps can be avoided by taking the alternative route via Glenburn and New Hallglen Roads. Callendar House lies at the opposite (north) side of the park.



Almondell Park access from Almond Aqueduct

Muiravonside Country Park

The park may be accessed by steps (part of River Avon Heritage Trail) leading down immediately to west of Avon Aqueduct at map ref 966759. This link was recently constructed by the Central Scotland Forest Trust and opened by HRH The Princess Royal in July 2002. The steep flight of timber steps and ramps lead down to a new footbridge and then into Muiravonside Country Park which is managed by Falkirk Council. There are various paths through the park as well as a farm and visitor centre with café.

Just north of the park entrance is the Causewayend canal basin, which is also owned by the Council. This is where the railway from Slamannan terminated, and was a transfer point for cargo and passengers in the early years of the Union Canal.

Linlithgow

This Royal Burgh, with its shops, restaurants and pubs, as well as Linlithgow Palace and Loch, is most easily accessed by boaters from Manse Road Basin (Map ref: NT 004769). The basin is also home to the Linlithgow Union Canal Society, which operates a museum and shop, and boat trips to the Avon Aqueduct.

Walking along the towpath gives excellent views across the town, and the 2.3 mile walk



Muiravonside Park access from Avon Aqueduct



around the Loch, with its abundant wildlife and fine views of the palace and the church, is one of the best in the area.

Almondell & Calderwood Country Park

The park is tucked into the valley of the river Almond, and stretches from the Almond Aqueduct upstream to the outskirts of Livingston. It may be accessed from the Union Canal via the canal feeder footpath, or of course from its four car parks. The main vehicle entrance, which accesses the visitor centre, is off the A89 between Broxburn and Newbridge.

From the canal towpath take the steps leading down from the towpath on the east side of the Avon Aqueduct (map ref: 106706), passing south beneath the aqueduct and following the path near the east bank of the river. This will lead you to Mid Calder and the Oakbank section of the park.

To reach the visitor centre, go north from the aqueduct and the centre, which offers light refreshments, is on the west bank.

Ratho

There is an interesting circular walk between Wilkie's Basin (120711) and Ratho. Either moor at Ratho, or park in the village. The towpath at Ratho has a number of interpretative features specifically designed for people with varied abilities such as resting perches and touch orientated interpretative panels.

Follow the towpath west from Ratho Bridge for just over a mile to Wilkies Basin, which is close to the M8 motorway, and near Bonnington Aqueduct. The path leaves the towpath at Wilkies Basin, and the start point in Ratho is again just over a mile to the east.

The path back to Bairds Road in Ratho follows close to the M8 extension into Edinburgh. Badger paths and tunnels can be seen, built to take badgers beneath the road which crossed their ancient tracks. The track also skirts around the northern edge of the Ratho Quarry which is being developed as the National Rock Climbing Centre. back along the towpath.

Water of Leith Walkway

This is accessed by steps down on east side of Slateford Aqueduct. (map ref: 221708). Northwards towards Murrayfield Roseburn and Leith the path is suitable generally for both cycle and foot traffic, although there are some main roads to be crossed. Southwards and westwards, the walkway is picked up across Slateford Road to the east of the Tickled Trout Pub. It follows the line of Old Balerno Branch



Railway and in this section leads into Colinton Dell whose steep sides have acted as a natural protection against development and contain high quality ancient or long established woodland, rich in flora and fauna.

National Cycle Route 75 (Forth to Clyde) -

The cycle route joins the towpath at Redhall footbridge (map ref: 215704). Heading south across bridge leads to Water of Leith Walkway (Balerno – Leith) at 217700. Westwards the route continues across Scotland to Gourock by way of Livingston, Airdrie, Glasgow and Paisley. Eastwards it follows the towpath to the terminus of the Union Canal at Edinburgh Quay.

Additional information on the Water of Leith Walkway can be obtained from the Visitor Centre, situated at the foot of the steps down from Slateford Aqueduct, or from their web site (www.waterofleith.edin.org).

Length - (approx) 2 miles





HISTORY

Roads in mid-eighteenth century Scotland were dreadful, but with most communities of any size on the coasts, estuaries or navigable rivers, the bulk of the country's commerce was moved by ships. The Forth & Clyde Canal extended these coastal shipping routes by making the east and west coasts more accessible to each other and allowing the west of Scotland to trade more easily with northern Europe. It did the same for Ireland and the British east coast.

The canal, as approved by parliament, ran to the Clyde from the Carron River, a navigable tributary of the Forth. A branch canal to Glasgow was also planned. The principal engineer was the highly regarded John Smeaton, but he was based in Yorkshire and so a no-nonsense Scot, Robert Mackell, supervised the work on the ground. Construction began at the eastern sea-lock on 10 June 1768. There was no town there, but as the canal developed, the new port of Grangemouth grew up around it.

The engineers pushed the canal up past Falkirk to its summit at Wyndford Lock, Lock 20, They encountered serious difficulties crossing the Dullatur Bog, but managed to complete the canal to Kirkintilloch by 1773,



and Stockingfield, on the edge of Glasgow, by 1775. There work stopped because the money had run out, but Glasgow's merchants raised the finance to have the branch canal to Hamilton Hill made by 1777. Funding to finish the main line, however, did not become available until 1785, by which time Mackell had died and Smeaton was old, so a new engineer, Robert Whitworth, was appointed. By 1790 he completed the canal to Bowling - including construction of the great Kelvin Aqueduct - and at the same time extended the Glasgow Branch to a new terminal, Port Dundas.

Port Dundas grew rapidly, trading mainly with east coast and European ports. The canal acted as a magnet for industry, commerce and innovation: the world's first practical steamboat, Charlotte Dundas, was tried out between Lock 20 and Port Dundas in 1803, and in 1819 Scotland's first iron boat, the Vulcan, started service as a passenger boat.



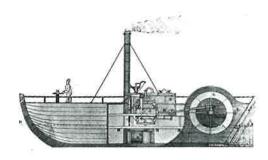
Passenger services operated from the outset, but declined rapidly in the 1840s after the advent of railways. Some boats clung on, the last being a little steamer, Rockvilla Castle. She stopped in 1880, but in 1893 her former owner's son, James Aitken, put Fairy Queen, the first of a popular fleet of pleasure steamers, on the canal. She was followed by Fairy Queen (2), May Queen and in 1905, Gipsy Queen, which cruised on after the withdrawal of her smaller sisters, until 1939.

The Forth & Clyde was a big canal and its size helped cargo carriers to withstand railway competition. The development of screw propulsion allied to steam power helped too. After the successful adaptation of a canal lighter in 1856 many others were built at canalside boatyards. These steam lighters, or puffers as they were better known, were popularised in Neil Munro's stories about the Vital Spark and her roguish skipper Para Handy.

During World War 1 the Admiralty closed the upper Forth ports, including Grangemouth, which stifled the canal's trade. After the war,

motor traffic increased, the bridges became traffic bottlenecks and many were replaced by steel swing or lifting bridges. In 1962 parliament decided to save construction costs on the A80 Denny by-pass road by closing the canal. The culvert built for the road at Castlecary was the first of many that chopped the canal into small sections.

Decay and decline set in, but in the early 1970s people started to campaign for restoration. They held clean-ups and rallies, and refloated old boats to give trips on the canal. Local authorities took notice and drew up a set of planning guidelines for the canal. This Forth & Clyde Canal Local (Subject) Plan led to towpath and navigational improvements, while encouraging housing and commercial developments. Bridges were rebuilt as part of projects based around Glasgow and Clydebank. But the Local Plan made another huge contribution. It established a partnership of public authorities and the voluntary sector, working together to improve the canal environment. It was the basis for the scheme that ultimately achieved full restoration: The Millennium Link.

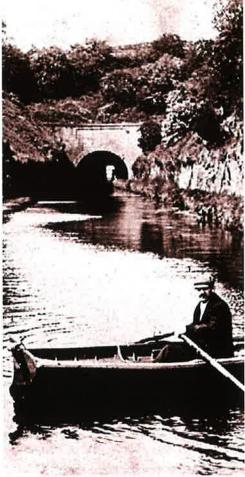


UNION CANAL

Edinburgh was in an odd position in the late 18th century. It sat next to a huge coalfield and yet faced fuel shortages and high costs. The coal owners operated a cartel to keep prices high and export most of their output at a fat profit. Coal carters were also noted for dishonesty and giving short measure. These difficulties contrasted with Glasgow where canals had opened up new coalfields and reduced fuel prices.

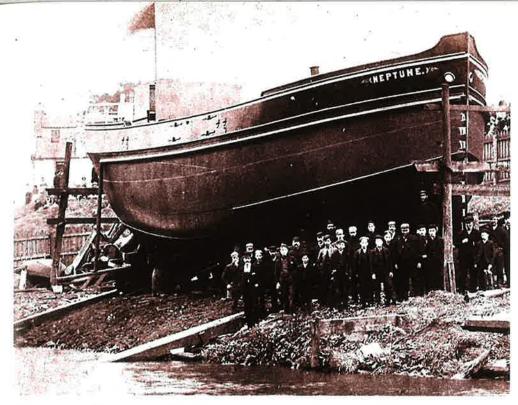
Various schemes were advanced for a canal from Leith to the Clyde, but construction costs and concerns over long-term viability deterred investors, and they finally lost interest when war started with Napoleon. However, the dreadful winter that destroyed Napoleon's Grand Army as it retreated from Moscow also affected fuel-starved Edinburgh and prompted more canal schemes. The one that broke the deadlock went from Fountainbridge to Falkirk where a flight of locks was planned to take the canal down the Forth & Clyde. People were suspicious; its designer, Hugh Baird, was resident engineer for the Forth & Clyde, raising fears that Grangemouth would be promoted at the expense of Leith. But the opposition was wrong-footed when the great Scottish engineer Thomas Telford was asked to comment on the route; he described it as 'the most perfect . . . between Edinburgh and Glasgow'.

Telford also advised on the construction of three great aqueducts, over the Almond and Avon Rivers, and the Water of Leith. The engineers also had to make a tunnel under Prospect Hill, Falkirk, to avoid the grounds of



Callendar House, and build a three-mile-long lade to run water from the Almond River to the canal. But perhaps their greatest achievement was making the waterway itself, running on one level for over 31 miles through cuttings and over embankments, with numerous underpasses and overbridges.

Work started at the Edinburgh terminal basin, Port Hopetoun, in 1818. On Hogmanay 1821 the first passage boat, Flora Maclvor, was launched and in January she sailed, with the committee of management on board, from Edinburgh to the tunnel where cutting through the 690 yards of rock was proving harder than expected.



The tunnel was finished in May and a boat made the first passage of the canal, carrying flagstones from Denny. Coal, however, was always going to be the main cargo and collieries near Polmont were soon sending boatloads to the capital. Coal from the Monklands was also reaching the city by way of the Forth & Clyde Canal, the cartels were broken, and prices tumbled. A second city basin, needed to deal with the volume of trade, was named Port Hamilton in recognition of the contribution made by the Duke of Hamilton and his collieries at Redding.

Two former canal navvies, William Burke and William Hare, also achieved some fame - as serial murderers! Less well known, but more significant, was engineer, John Scott Russell. He noticed that when a boat near Hermiston stopped suddenly, the bow wave kept going. He followed it on horseback until it dissipated on canal bends, but he concluded that this wave, if harnessed, could assist ship propulsion. What he couldn't know was that similar bell-shaped waves, electronically generated, would challenge 21st century fibre-optic technology.

Conscious of looming railway competition, the Union Canal Company linked up with a line from Glasgow to Causewayend, but it was unsuccessful and in 1842, when the Edinburgh and Glasgow Railway opened, the canal lost most of its trade. The railway bought the ailing canal in 1847 and by Act of Parliament was bound to maintain it in operational condition - a boon for later generations, but a burden for 19th century shareholders.

The Edinburgh terminal basins were closed in 1922 and the disused Falkirk locks were infilled in 1933, but otherwise the canal remained intact until closure in 1965. Culverts were then installed to improve roads, including the M8 motorway, and a mile of canal was piped and infilled to make way for the Wester Hailes housing scheme. But campaigners stopped plans for another culvert on the proposed Edinburgh by-pass road which was instead spanned by a new aqueduct. As activity grew, principally at Ratho and Linlithgow, it was bolstered by canalside improvements setting the stage for full restoration.



MONKLAND CANAL

The Monkland Canal was made to open up new coalfields and break the power of Glasgow's price-fixing coal owners. The first, short, cheaply-made section from Coatdyke to Germiston, was engineered between 1770 and 1773 by James Watt, of steam engine fame. It was not successful and was extended in 1780 and again in 1790. This last extension, east to Calderbank and west to Port Dundas, was made in collaboration with the Forth & Clyde Canal which obtained a feed of water along the Monkland. This was taken from the North Calder Water; the huge Hillend Reservoir at Caldercruix was made to replenish the river for other water users, like mills.

The link to Port Dundas generated an increase in coal shipments, but real success was just around the corner. The development of hot blast iron smelting, used in conjunction with locally abundant Blackband ironstone, revolutionised the iron industry. The great Gartsherrie ironworks, set up in 1830, was quickly followed by others. Their fires lit up

Coatbridge at night; their smoke darkened it by day and the canal steamed from the number of works using its water for cooling. Barge movements of coal and ironstone grew to such a volume that the lock-flight at Blackhill had to be doubled in 1841, and augmented in 1850 by a remarkable inclined plane, designed by Glasgow engineer James Leslie.

Decline, when it came, was rapid. By the 1880s the inclined plane was redundant and in the 1930s the canal was disused. It remained open through World War 2, in case it was needed, but was abandoned in 1950. The section through Coatbridge was piped and infilled in the 1960s. The same happened between Easterhouse and Port Dundas in the 1970s, to provide a route for the M8 motorway; the road's every bend and overbridge replicating those on the old canal. Sections of canal survive, between Calderbank and Sikeside, at Drumpellier Country Park and in Coatbridge where the Gartsherrie Branch is still there beside the Summerlee Industrial Museum.

And water still flows through the pipelines to the

Forth & Clyde Canal at Port Dundas.





WILDLIFE ON THE LOWLAND CANALS

In the two centuries since the Forth & Clyde, Union and Monkland Canals were carved through the farmed and wooded landscape of the central belt of Scotland, these man-made structures have attracted wildlife throughout their length. Some of the plants and animals have found their way naturally into the waterway and others have been 'helped in' by Man's activities. Read on if you would like to find out more about the wildlife that you might come across during a visit to the canal network. Whatever the season or time of day, city or countryside, you will be sure to see life along the canal. In fact, with a potential wildlife safari always on your doorstep, why not take a look?

LOOKING FOR WILDLIFE

No specialist equipment is required to see wildlife on the canal but a pair of binoculars, a hand lens, a pond net and a tray will ensure that the microscopic and the distant get a closer look. If you are keen to name what you see, there are many excellent wildlife guidebooks on the market or in your local library. Whatever you do, please remember to dress for the weather and take care when near the water and lock chambers.

NO PLACE LIKE HOME: THE HABITATS OF PLANTS AND ANIMALS ON THE CANAL

The lowland canal network provides a host of places for animals and plants to inhabit, including the channel and banks, the towpath,



woodland and canal structures. In reality, many of these habitats (homes) merge with each other and animal species move between them. The diagram shows a cross section through a typical canal channel showing habitats, so bear in mind that there are local variations.

- A: Hedgerow
- B: Towpath and grassed towpath verges
- C: Waterway banks with emergent fringe and retaining wall
- D: Canal channel

THE WET CHANNEL

The Lowland Canals cross the catchments of the Rivers Forth, Clyde, Almond and Avon and animals and plants which might otherwise would be geographically separated have come into contact with each other. This, coupled with nearly two centuries of natural colonisation, boat traffic and uncontrolled 'introductions', has contributed to a living "melting pot" and biologically unique waters in Scottish terms.

AQUATIC PLANTS

The canal channels provide ideal growing conditions (light, nutrients, places to grow) for truly aquatic plants. Vegetation surveys along the canals have recorded an impressive 33 species of aquatic plants, making the canals extremely important water bodies for aquatic plant diversity in Scotland.

Rooted in the sediment, yellow water lilies, which occur along half the length of the canal, are easy to spot with their large oval leaves, and prominent yellow flowers in summer. Along with many other pondweed species, the Forth & Clyde canal contains an extremely rare hybrid pondweed, Bennett's Pondweed, of particular interest because the canal area is the only location in the world where it is known to occur.

AQUATIC INVERTEBRATES

With the range of aquatic plants, and other potential habitats such as bottom sediment, water column and surface, the animal life in the channel is very diverse. Fifteen species of mollusc, including the greater ramshorn and the great pond snails, have been recorded from the canal, a clear indication of its mineral rich waters. In amongst the weeds, you may see caddis fly larvae with protective cases of vegetation, shells or stones, beetles, leeches, flatworms, damselfly and dragonfly larvae, water boatmen and the curious water scorpion, whose long tail is actually a breathing tube.

Deserving of special mention are the freshwater sponges. These unusual filter feeding animals take two forms in the canal, either yellow and encrusting or growing like long, green fingers. Old branches, discarded bicycles, and submerged structures are often adorned with sponges.

FISH

With the wealth of plant and invertebrate life, the canals also support good coarse fish populations. The most commonly-seen fish in the canals are pike, perch, roach, tench and eels. Nineteen species have been recorded including the carp, bream, 3-spined stickleback, minnow, ruffe and brown trout. Some fish, like the silver-bodied roach, feed in shoals on weed and small invertebrates. Others, like pike and perch, are carnivorous creatures, feeding almost exclusively on invertebrates, other fish and the occasional duckling!

OTHER VERTEBRATES

The most obvious wildlife on the canal is the wildfowl. On the water, you are most likely to see mute swans, mallard, coot and moorhen, with little grebe and tufted duck less common. The swans often make huge nests out of vegetation and discarded household items. Herons are often seen stalking for fish or frogs in the canal shallows.

Frogs, toads and newts breed in the canal, and massive shoals of tadpoles can be seen in the shallows in early summer. When fully grown, these animals leave the water and forage



amongst the bankside vegetation for invertebrates. Otters have been sighted on the canal, and are most active at night. Pipistrelle and Daubenton's bats are also seen flying over and along the canal at night, searching for an insect meal. On summer days, swallows, swifts and sand martins also take advantage of this aerial insect larder.

WATERWAY BANKS

Waterway banks at the edge of the canal provide some of the greatest diversity of plant and animal life on the canal. The fringing vegetation is dominated by emergent plants whose roots are permanently below the water line, and plants which prefer to root themselves in damp ground above the water line.

Twenty-three species of emergent plants have been recorded along the canals. Reed-sweet-grass with its characteristic glossy, green leaves with boat shaped tips, is the most common, occurring throughout the entire length of the canal channel, along with iris, with its distinctive 'fleur-de-lis' yellow flower. The nationally scarce tufted loosestrife, easily recognised by its paired leaves and stalked yellow flowers, is also common at the waters edge.

Emergent plants provide cover and nesting areas for water birds, food for water voles, a home and hunting ground for amphibians and stems for aquatic insects to emerge and overwinter. Water vole numbers have declined significantly over the last 20 years across the UK. The canal provides suitable food plants for voles but predation pressure from mink appears to keep the numbers down.



GRASSED TOWPATH VERGES

Grasslands along the towpath only exist as a result of management to prevent the invasion of scrub vegetation. A twice-yearly cut (spring and autumn) by British Waterways maintains this habitat, maximises wildlife benefit and allows people relatively easy passage along the towpath. In summer, this grassland supports a wonderful array of plants, many of which provided herbal remedies in the days before the National Health Service. Of these, the pink flowered valerian is known for its stress-relieving properties, and sweet cicely as a cure for flatulence. Meadowsweet was used as an air freshener and cold remedy and was the plant from which the active ingredient for aspirin was first isolated in the early 19th century.

HEDGEROWS AND OTHER FIELD MARGINS

Hedgerows were established when the canal was built to define the boundary of the canal company land. Today, along with canal-side trees, they form an important landscape feature, offering nesting sites and perching posts for birds, including grasshopper warbler, whitethoat, grey partridge, yellowhammer, linnet, bullfinch, blackbird, robin and chaffinch. Hedgehogs, bank voles, shrews and wood mice all use the canal hedgerow habitats for shelter and food.



SCRUB AND WOODLAND

The undisturbed offside bank in some sections of the canal has developed into scrub and woodland. Ash and sycamore woodland, alder and downy birch woodland and willow woodland are all frequent along the canals. These areas can support good numbers of woodland birds, such as tree sparrow, blackcap and whinchat. Dead trees can also provide roosting sites for bats and perfect conditions for fungi.

BRIDGES, LOCKS AND BUILDINGS

Canal structures are perhaps less obvious wildlife habitats. On closer inspection, you may be surprised by the wide range of mosses, liverworts and lichens on canal-side walls, buildings and bridges. Some of the lichens grow very slowly, and may be as old as the canal itself. Ferns also favour old structures and many grow out of the old wooden piling along the canal edge or stone abutments of bridges.

CANAL WILDLIFE SAFARI DO'S AND DON'TS

Do take pictures

Do take your litter home

Do take care near the waters edge

Do keep to the towpath

Do enjoy your visit

Do not disturb nesting birds

Do not overfeed the waterfowl



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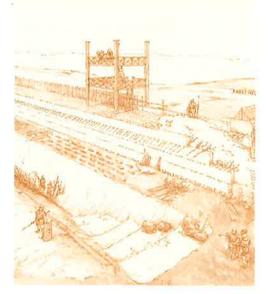
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THE ANTONINE WALL

The Antonine Wall is Scotland's premier Roman monument. It was one of several complex frontier systems that defended the Roman Empire from the barbarian hordes. The soldiers stationed on these frontiers were on the edge of civilisation as they knew it. Perhaps the best known of the frontier works is Hadrian's Wall, which has been designated a "World Heritage Site". Now there is a proposal to give the Antonine Wall and the German frontier the same status.

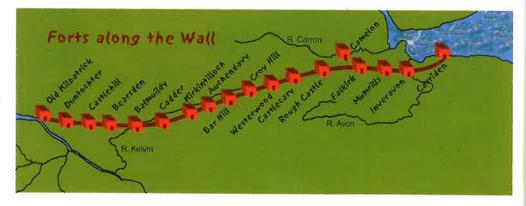
The Antonine Wall was built around 142 AD at the successful completion of a campaign in southern Scotland that was undertaken by order of the emperor Antoninus Pius. He was probably motivated by a need for military prestige to strengthen his position as the new emperor of the Roman empire. The Wall, like its predecessor built under the reign of Hadrian, would have been intended to divide the island in two. The area to the south was to be fully integrated into the Roman culture. However, following the death of Antoninus the Roman army withdrew from central Scotland after an occupation of only a little over 20 years.

As the Antonine Wall was only occupied for such a short time its remains are those of a fossilised mid second century frontier and represent the ideal at that time. By contrast, Hadrian's Wall was built in the 120s AD and was then modified for the next two and a half centuries as tactics and warfare changed. There, it is difficult to untangle what belongs to which period.

So what was the Antonine Wall? It was a frontier system consisting of a number of interrelated components, just as found on modern defensive lines such as the Berlin Wall or the Maginot Line.

security fence rampart
barbed wire upcast mound & ditch
mine field lilia
watch & machine gun posts
check points fortlets
searchlights expansions
barracks forts

annexes



ordnance depots

The Antonine Wall was a 38 mile (61 km) long barrier built across the narrowest part of central Scotland, from Carriden on the Forth to Old Kilpatrick on the Clyde. The main obstruction was a turf and earthen rampart standing 3.5 m high on a stone foundation 4.3m wide, surmounted by a wooden palisade or obstacle. Even today parts of the rampart survive to a height of over 2m at Rough castle, Bonnybridge. Some 6 m to the north of this lay a massive V-shaped ditch, averaging 12 m wide and 4.2 m deep. It still appears as a spectacular feature at Watling Lodge, just to the east of The Falkirk Wheel. Between the rampart and the ditch was a Roman minefield small pits with sharpened wooden stakes protruding from them. Caesar describes such pits that he used in France and calls them lilia after their resemblance to the lily with protruding stamens.

Attached to the south side of the rampart were a series of forts to provide accommodation for the garrison whose task it was to control movement across the frontier. At first there were only six of these, spaced at approximately 8 mile intervals as had been the case on Hadrian's Wall. The milecastles of that earlier wall were again used on the Antonine Wall, where they are known as fortlets, placed between the forts at intervals of around a mile. A good example of a fortlet lies in Kinneil Park near Bo'ness, with an interpretation centre nearby. The forts and fortlets were linked by a gravelled road known as the Military Way. This permitted men and supplies to move rapidly along the Wall. For some reason this original blue-print was changed part way through the Wall's construction and the 17 forts we know today were built instead.

Rough Castle, not far from The Falkirk Wheel, is the best preserved of these forts. Here the defensive ditches and ramparts are still formidable obstacles. Some of the lilia discovered in 1903 have been left open. At Bar Hill the visitor can see parts of the stone walls of fort buildings, including the headquarters' building, the bathhouse and the latrine block. A well-preserved bathhouse and



latrine can also be viewed at Bearsden in the suburbs of Glasgow. This building had an under floor heating system or hypocaust. The hot air then passed through cavities in the walls, heating them too!

Roman objects from the Wall are displayed and interpreted at several museums along its line. These include Kinneil Museum, Callendar House and Kirkintilloch Museum. They can also be seen in the Museum of Scotland in Edinburgh, and the Hunterian Museum at Glasgow University

MILLENNIUM LINK

A British Waterways led project to regenerate the Forth & Clyde and Union Canals of Lowland Scotland.

BACKGROUND

In 1994 the Millennium Commission published it's 'Criteria for Millennium Projects'.

Two key areas of the criteria required to be demonstrated by any submission:-

- Enjoy full public support
- It must make a substantial contribution to the life of the community it is designed to serve.

The Commission further required projects which would support the following:-

- Looked back over the Millennium or forward into the new one
- Include partnership contributions to demonstrate the real support of the local community
- Would be seen by future generations as making a significant moment in national or local history
- Are of architectural design and environmental quality.
- Would not be possible without Millennium Commission funding
- Would not normally be supportable from public funds nor fall within the scope of another lottery distributor.

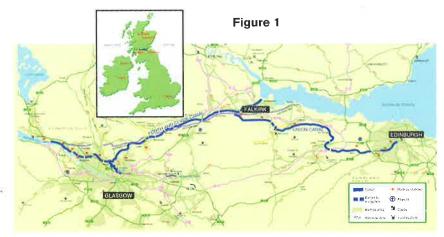
Reality soon struck the many community groups, local and National organisations and canal enthusiast's that a real opportunity to restore the redundant Lowland Canals of Scotland was within their grasp. Dubbed the 'Peoples Project' and driven by the vision of coast to coast, city to city navigation, one by one the published criteria were met. Real belief began to take hold that history was once again in the making.

British Waterways would play a key and active role in the securing of funding, building of partnerships and the final delivery of the project.

Figure 1 Shows the line of the 110km corridor

CONCEPT

Much had to be done to submit a robust submission to the Commission. Like many projects in the early stages the Millennium Link project suffered teething problems. As partnerships continued to grow and special disciplines were employed the mists of uncertainty were cleared. The shear magnitude of the project over 110km had to be addressed. The building of new structures to allow navigation had to sit in harmony with old original structures. Each and every obstruction to navigation had to be evaluated and a design solution agreed. Some would be relatively simple and repetitive, some would cause many a sleepless night!. The protection and enhancement of the canal environment and the full restoration of many of the existing structures was also critical All had to be achieved for a successful outcome.



Many meetings took place to shape the weird and wonderful ideas, which emerged as potential solutions to restore navigation. Some would become reality!

The Millennium Commission gave the green light to a refined submission on the second offering. Much time had passed between consideration of the first and second submissions. In reality the luxury of a 5-year construction programme had now been compressed to 3 years. Construction works finally got underway when the former First Minister Donald Dewar performed a sod cutting ceremony at Blairdardie in Glasgow on 12th March 1999

With the brakes released the project gathered huge momentum on the ground. As confidence began to grow multiple site working became the way forward. Obstructions were being removed simultaneously on the Forth & Clyde Canal in the West and the Union Canal in the East. As problems were encountered and solved knowledge and experience was shared. The project was growing in stature by the day.

PROJECT STATISTICS

What has been achieved?

- 5.2km of new canal
- 28 new road bridges
- 4 new opening bridges
- 9 opening bridges re-commissioned
- 10 new footbridges
- 9 new locks
- 32 locks- refurbished
- 35 pairs of new lock gates
- 38 masonry arch bridges, aqueducts & weirs refurbished
- 2 new aqueducts
- 1 new tunnel
- 300,00t, dredgings
- 92km towpath upgraded

The total project value on completion was \$84.5 Million.

HIGHLIGHTS

- The opening of the Forth & Clyde Canal on 26th & 27th May 2001.
- The opening of Wester Hailes, Edinburgh (Union Canal) On 25th August 2001
- The opening of the Millennium Link by Her Majesty the Queen on 24th May 2002.

VISION IN DESIGN - DALMUIR DROP LOCK

One such unique idea was born out of road geometry constraints. Dalmuir on the outskirts of Clydebank in Glasgow required a special solution to allow the safe passage of craft under a main highway. The highway serviced a major hospital and contained a busy junction over looked by flats occupied by elderly people. The alteration or moving of the existing highway was not considered an option. The proposal of a 'Drop lock' was deemed as the best means of satisfying all constraints. The 'Drop Lock' would become a first on any canal system.

A bold step in the name of navigation the 'Drop Lock' required to pass boats under the existing highway by lowering the canal level within the confines of the Lock by approximately 2.8 metres This allowed boats to pass under the road at the reduced canal level. Raising the canal level back up once the boat's had safely passed completed the process. The mechanism for transfer relied on conventional lock gate design and construction, as seen through out the canals of Great Britain. Where conventional top and bottom gates face in the same direction, the Drop Lock gates being of the same size, face in the opposite directions. A gravity drain lowers the level between the gates to allow boats to pass. Gravity feed through the lock gate sluices refills the section between the gates from the existing canal on either side, this raises the water level and boats. Safety systems aid the transfer process.

Figure 2 Shows the drop lock process.

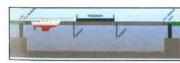






Figure 2 (A)



Figure 2 (C)



COMMUNITY SPIRIT

Some sections of original canal channel were infilled for different reasons in the early years of closing to navigation, both the Forth & Clyde and Union canals suffered

The sections infilled tended to be in urban areas. The support of the communities would be needed for a successful reconnection. People would wake and go to bed by the sound of construction. However their vision was one and the same with ours. The disruption caused by construction quickly became a living-breathing waterway full of life and activity.

The Engineering and Environmental challenges lay in sympathetic re-connection relying on modern construction techniques and materials. Time would not permit the traditional laying of puddle clay and compacting by human and sheep's foot to form a new watertight channel. Large mechanical plant would now fulfil this role. 'Rolls' of synthetic clay overlaid by soil would retain the water. Concrete would replace



masonry in the building of new structures and walls. The moving, renewal and resiting of the many utilities that were to be encountered would require military precision and timing.

Wester Hailes was officially opened on the 25th August 2001. The dream had become reality. Boats could once again navigate uninterrupted into the heart of Edinburgh, Indeed Edinburgh to Glasgow.

Figure 3 Shows the opening through Wester Hailes

NEW BRIDGES

Many new concrete bridges had to be built to allow navigation to take place. A theme was conceived and agreed. This would ensure new bridges in both East and West over the 110 km would be readily identifiable as 'Millennium Link project' bridges. Where old original bascule (timber decked lifting bridges) were located on the Forth & Clyde Canal, and a new concrete bridge was required at the same location, the new concrete fixed bridges would adopted the hand crank, lifting mechanism features in the wing walls as a mark of respect and reference to these old historic bridges.

Figure 4 shows typical new concrete bridge



RESTORING THE OLD FABRIC

Many of the old existing structures- Locks, bridges, aqueducts, culverts etc required to be restored to provide the functions they were designed to do. Detailed understanding of existing materials and their behaviour was required. Specialist advice was enlisted to aid this process. New timber lock gates were constructed to fit the existing locks.

Figure 5 Shows typical lock restoration works. Sympathetic 'Like for Like' repairs were carried out using old traditional techniques.

Stonemasons were encouraged and permitted to leave their marks as the original masons would have done. Lock 16 on the Forth & Clyde Canal shows good examples of new mason's marks. Many of the old locks show original masons marks still clearly visible.

Many of the old, original towpath milestones had gone missing along the length of the Union Canal between Edinburgh and Falkirk. In their day they would be the equivalent of today's motorway signage advising of



distances between two locations. Twenty-four milestones were identified from the old ordnance survey maps, by Historic Scotland, as missing. Historic Scotland offered to enlist the help of their young apprentice stonemasons to construct new stones this would be embodied as part of their training curriculum Rubbings were taken of legible existing stones to match the font type exactly. Armed with all the necessary information the apprentices set to work at Historic Scotland's training centre in Elgin. They quickly produced the missing milestones, to the highest quality. These new stones proudly sit along side the canal towpath rubbing shoulders with the new concrete structures.

Figure 6 Shows the proud Historic Scotland Apprentices

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Difficult access to one masonry arch bridge on the Union Canal in Falkirk was overcome by enlisting the help of a small helicopter, which imported concrete. This was a good example of 20th Century technology assisting the repair of a Scheduled Ancient Monument.

See figure 7

MAKING THE CONNECTION - THE FALKIRK WHEEL

At an approximate cost of \$ 19 million the Falkirk Interchange, which includes The Falkirk Wheel, is arguably the jewel in the crown. The Falkirk Wheel the world's first rotating boat lift is an impressive 35 metres high, (equivalent to eight double decker buses stacked on top of each other) and will raise a total of 1000 tonnes (including 600t of water in the two gondolas) - the approximate weight of 100 adult African elephants.

The Falkirk Wheel is a must do experience for young and old alike. Although visually stimulating the primary function is to transfer boats from one canal to the other overcoming.



the difference in height .The Union Canal being at a higher level than the Forth & Clyde.

The Millennium Link was officially opened by Her Majesty the Queen on the 24th May 2002 at The Falkirk Wheel.

THE FUTURE

With the end of construction comes the dawning of a new chapter for the Lowland Canals. Without sustainable development, community involvement and partnerships, all that has been achieved to date will fail. In regenerating and re-opening Scotland's Lowland Canals we have created, for future generations, a corridor of new opportunity for business, leisure, environmental protection, tourism and much more.

Welcome to Scotland's Lowland Canals, yours to enjoy and explore.





BRITISH WATERWAYS SCOTLAND

Responsibility for inland waterways in Scotland is a devolved matter, with funding for British Waterways' Scotlish activities coming from the Scotlish Executive. In Scotland the 137-mile (220km) canal network includes the Caledonian, Crinan, Forth & Clyde, Union and Monkland canals.

British Waterways Scotland works in partnerships with local authorities, voluntary groups, private companies and other government agencies to protect and enhance the waterways and benefit the communities through which they run.

The organisation balances the conservation of the country's heritage and environment with developing commercial opportunities to generate income to reinvest in the waterways for further sustainable regeneration.







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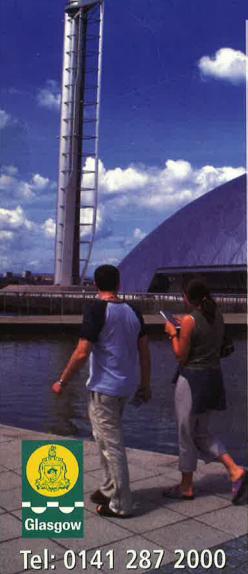
GLASGOW

Canal users will find it well worth their while berthing in Glasgow where there is something for everyone.

For the cultural tourist, Glasgow is home to a number of world-class attractions including Kelvingrove Museum and Art Gallery, the Burrell Collection, the Glasgow Science Centre, the Tall Ship and Glasgow Cathedral.

As a retail centre, Glasgow is second only to London in the UK. It has over 500,000 sq. ft of retail floorspace including Buchanan Galleries, Prince's Square and St Enoch Centre, not to mention the wide variety of shops in the city's main shopping thoroughfares, Buchanan Street, Sauchiehall Street and Argyle Street.

There is also a year-round calendar of events which features Celtic Connections, the Glasgow International Comedy Festival, the West End Festival, Bard in the Botanics and the World Pipe Band Championships. To cap it all, Glasgow was recently voted the top regional city for the choice and quality of restaurants, cafes, bars and clubs. And, with over 60 hotels to choose from, it makes the perfect short break destination.



www.glasgow.gov.uk