MILNGAVIE RESERVOIRS

Conservation and Recreation Management Plan

Final Draft Report
prepared for
Scottish Water

by

Land Use Consultants

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FOREWORD

I am pleased to present the draft Conservation and Recreation Plan for the Milngavie Reservoirs. The site is of tremendous importance for a number of reasons. Not only it is the main source of drinking water for the city of Glasgow but the site contains areas of considerable archaeological, cultural and recreational significance. The purpose of this plan is to demonstrate the wide range of interests that the site has, and also the range of development, recreation and conservation opportunities that are possible. The delivery of the plan requires careful consideration of potential management structures and funding mechanisms and the plan presents options for taking this forward.

This Conservation and Recreation Plan has been produced in partnership with the community and interested parties through a steering group that has informed its development at each stage. This has been independently chaired on behalf of the community by Councillor Duncan Cumming. I would like to take this opportunity to thank the councillor and all those steering group members for their considerable effort over the past 3 years and for ensuring that the range of interests in the site has been well represented.

Geoff Aitkenhead
Asset Management Director
Scottish Water

This marvellous Victorian legacy must be preserved for future generations, since I believe that we are but caretakers of our heritage.

I have been privileged to have been the Convener of the Steering Group, whose wide ranging interests have meant that the Community has been well represented. The group's knowledge, enthusiasm and expertise has enriched the quality, content and detail of this plan, which is now a real working document.

I am now looking forward to an open and transparent consultation period in which members of the general public will have a genuine opportunity to influence the finalised version of the Conservation and Recreation Plan.

In conclusion, I am most grateful to the individual members of the Steering Group who have given unstintingly of their time during the preparation of this document.

Cllr Duncan Cumming
East Dunbartonshire Council

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1. INTRODUCTION

1.1. Victorians considered the supply of clean water to be the cornerstone of a civilised society. Glasgow and other major cities in the UK suffered major outbreaks Cholera in the middle of the 19th century, which were attributed to polluted water supplies. In 1848 a Public Health Act was passed by Parliament to promote the supply of clean water. At this time schemes were being prepared to provide clean water supplies to all major conurbations throughout the British Isles.

1.2. Located on the outskirts of Glasgow, the Milngavie Reservoirs represent an outstanding example of Victorian municipal engineering and, as with many feats of engineering from this time, the adventurism, innovation, and quality of workmanship, are outstanding. The legacy of industrial architecture in masonry and iron-work is exceptional, and the civic pride demonstrated by the treatment of the landscape is equally impressive. The engineering design and construction skills employed to supply Glasgow with clean water from Loch Katrine are awe-inspiring.

1.3. The eminent engineer John Frederic Bateman selected Loch Katrine as an appropriate source of water for Glasgow, and led a team of engineers who translated the scheme into reality by raising the water height at Loch Katrine and constructing a 26 mile long aqueduct terminating at the Mugdock (storage) Reservoir, completed in 1859 and opened by Queen Victoria. Later that century, chief engineer James Gale deemed that the storage capacity of Loch Katrine should be increased and that a second line of aqueducts and another storage reservoir should be constructed at Craigmaddie above Milngavie.

1.4. The ongoing 'Katrine Water Project' represents the continuation of water supply developments on the site. These developments will replace the existing water treatment facilities and involve substantial construction works adjacent to Barrachan Farm and to the east of Strathblane Road. These works are due to be completed by December 2007. The provision of new, improved and secure treatment facilities could present opportunities for new uses for the redundant buildings and may allow an increased range of recreational activities within the site.

1.5. Condition 55 of the planning consent granted by East Dunbartonshire Council Planning Board in February 2003 states:

> *"That prior to the completion of the construction works Scottish Water and their successors shall produce an integrated Recreational and Conservation Management Plan for the area under their ownership and management at Mugdock Reservoirs to include all natural heritage interests and access/recreation for approval of the planning authority in consultation with Scottish Natural Heritage (SNH). Part of this plan shall be an access plan to include:*
>
> - *access opportunities for all abilities;*
> - *community consultation;*
> - *consideration of opportunities to develop access opportunities within the site and the adjacent area in accordance with the 'Access Strategy for East Dunbartonshire."*

1.6. For the past three years, Scottish Water has been actively engaging with the community of Milngavie in the development of the Conservation and Recreation Management Plan. A key part of the consultation process has been the formation of the MRCARP steering group. The group represents the range of interests in the reservoir site, including walking, cycling, archaeological and historical interests, biodiversity interests and those who are seeking to conserve the amenity value provided by the site. The members of the group have given their free time extensively to help shape and develop the plan over the past three years, and Scottish Water wishes to express its thanks to the group for their efforts. In addition, the group also encompasses Local authority and SNH and HS representatives.

1.7. The Milngavie Reservoirs Conservation and Recreation Plan Steering Group has consequently assisted and guided Scottish Water in the development of the plan. A workshop was held in April 2004 to identify the major issues, opportunities and concerns in relation to development of the plan. This resulted in the formation of five working groups:

- Biodiversity and Landscape;
- Built Heritage;
- Access and Recreation;
- Education and Interpretation;
- Funds and Planning.

1.8. The working groups defined guiding principles of equal importance against which all management objectives and actions should be measured:

- *"Improve the site whilst preserving its character and ambience;*
- *Ensure the long term management of Milngavie Reservoirs by the community and relevant stakeholders;*
- *Respect the original purposes of the reservoirs, i.e. to maintain the quality of water and avoid contamination of the water."*

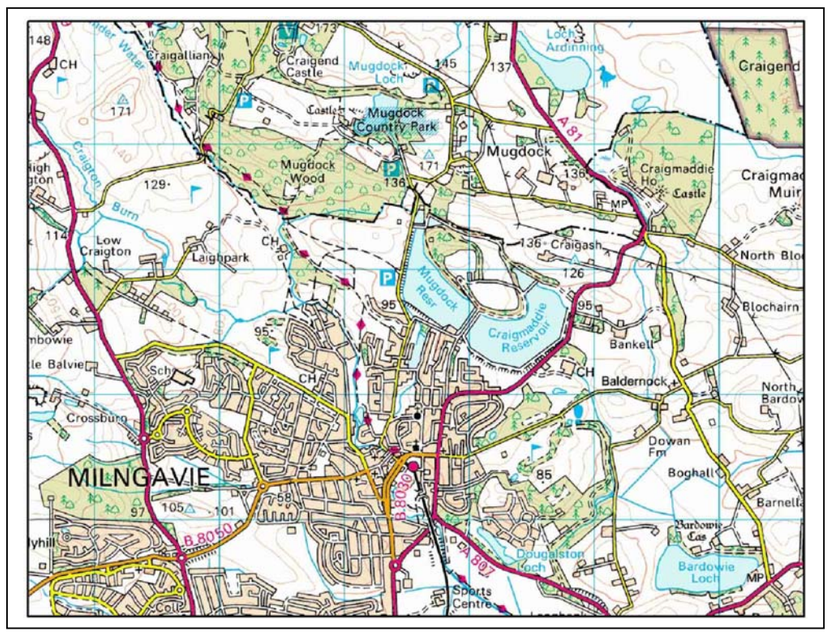
1.9. The steering group identified the tranquil beauty of the reservoirs as an important characteristic and summarised the key conservation aim as: "enhanced status quo". This study is, therefore, intended to respond to the above objectives by prescribing a conservation framework within which appropriate landscape management, recreational and educational proposals can be developed for the outstanding designed landscape of the Milngavie Reservoirs. The brief recognises the opportunities for the landscape to accommodate a wider range of recreational activities after completion of the new Water Treatment Works, but requires these to be respectful of the heritage and fitting to the character and ambience of the place.

1.10. The above principles and objective were contained within the project brief which subject to competitive tendering in March 2005. As a result, Land Use Consultants (LUC) was commissioned by Scottish Water to prepare a 'Conservation and Recreation Management Plan' for the Milngavie Reservoir site.

1.11. Scottish Water is a regulated business, with financial regulation provided by the Water Industry Commission for Scotland, on behalf of the Scottish Water customers. The regulator sets financial constraints on expenditure and in tandem with the Executive agrees the scope of activities for funding. In consequence Scottish Water must focus on its principal remit as a water and sewerage provider. Activities that are not part of the core business of providing water and wastewater services cannot be funded, to ensure customer bills are minimised. Assets that Scottish Water no longer requires for the operation of the core business must be disposed of according to specific rules identified under the Scottish Public Finance Manual (SPFM). The requirements of the manual are further discussed in Section 6.

1.12. The production of this plan in consultation with the community satisfies part of the planning condition placed on the development of the Milngavie treatment works. Funding the implementation of the plan will not be provided by Scottish Water, but Scottish Water will be a member of any future management structure that is set up to oversee the development of the site. Scottish Water will continue to carry out the level of maintenance appropriate to satisfy the operational and Health and Safety requirements of the site.

1.13. This report, when finalised and adopted, is intended to guide the future conservation, management and development of the reservoirs' site over the next 50 years and beyond. It will identify essential conservation and protection measures required to safeguard the heritage and will determine the management resources required to reverse the decline of the last 20years. The plan will be subject to endorsement by the local communities and key stakeholders and will include a broad range of proposals including options for the future management of the site, particularly in view of Scottish Water financial constraints. Many of the management and development options will require further investigation once appropriate funding routes have been established. This allows for future evolution and responsive development over time. Initially the plan will also form the basis for an application to the Heritage Lottery Fund (HLF) under the Public Parks Programme. The consultants' brief consequently reflects the criteria of the HLF and the requirements of Scottish Water, together with the Milngavie Reservoir Conservation and Recreation Management Plan Steering group.



OUTLINE METHODOLOGY

1.14. The preparation of the Milngavie Reservoirs Conservation and Recreation Plan has involved a combination of desk research, field surveys, consultations and community liaison as defined in Land Use Consultants' tender submission.

1.15. The development of the plan has also involved regular steering group meetings with representatives of the Friends of Milngavie Reservoirs, East Dunbartonshire Council and Scottish Water.

SCOPE OF WORK

1.16. The findings of the study are set out in eleven chapters which in summary, address the following subjects:

- **Chapter 2: History of Milngavie Reservoirs:** an outline of the historic development of the landscape within and around the reservoirs' site and extending from the Iron Age to the present day;
- **Chapter 3: Visual Analysis:** discusses the visual characteristics of the site and its contribution to the surrounding landscape;
- **Chapter 4: Audit of Landscape Components:** describes the nature, condition and conservation needs of each component of the reservoirs' landscape;
- **Chapter 5: Cultural Significance and Conservation Philosophy:** defines the cultural significance of the site and sets the corresponding conservation philosophy;
- **Chapter 6: Assessment of Access and Recreation Development Opportunities:** provides an audit of current access and recreation and examines opportunities and options for new access and recreational developments;
- **Chapter 7: Biodiversity Development Opportunities:** examines opportunities and makes recommendations for the management and development of the site's biodiversity;
- **Chapter 8: Educational Development Opportunities:** examines the current role of the Milngavie Reservoirs and Mugdock Country Park in education provision and opportunities for educational developments and delivery mechanisms for the site;
- **Chapter 9: Conservation and Recreation Management Plan:** defines the cultural significance of the Milngavie Reservoirs' landscape and determines the conservation philosophy for the site. In response to this philosophy, conservation policies and proposals for each landscape compartment are made. The proposals include all aspects of landscape management, restoration, recreation and education provision within an all-embracing conservation framework;
- **Chapter 10: Management Review:** examines the current maintenance organisation and resources and makes recommendations for future management and maintenance mechanisms;
- **Chapter 11: Cost Plan:** provides a capital and revenue cost plan for the full range of proposals and explores potential sources of funding;
- **Chapter 12: Action Plan:** identifies priorities and sets a target phasing/timescale for the works.

2. HISTORY OF MILNGAVIE RESERVOIRS

EARLY HISTORY- ROMAN OCCUPATION

2.1. The Roman army occupied this part of Scotland in about 85AD under Agricola, and built a number of forts and watch-towers; the nearest of which is near Drymen. During the reign of Antoninus Pius (around 142 AD) the Governor, Lollius Urbicus, built the defensive Antonine Wall between Bo'ness on the Firth of Forth and Old Kilpatrick on the Firth of Clyde. This was the northernmost outpost of the Roman Empire. Along much of its length the wall is intact, a broad ditch with a military road running alongside, with forts a day's march apart constructed along its length. At nearby Bearsden, there is the site of a Roman Bathhouse.

2.2. The reservoirs' site is to the north of the Antonine Wall suggesting it was outside the immediate influence of Roman developments. These drumlin hills would have been more extensively wooded at this time with small pockets of agricultural development on the better ground. Settlement on the commanding Barrachan Hill is likely although there have been no archaeological discoveries to confirm this.

EARLY MUGDOCK

2.3. One of the earliest references to 'Mugdock' is the historic account of a leader of the Picts who was killed at the battle of Mugdock when fighting the Britons of Strathclyde in about 750AD.

FEUDAL LORDS OF THE MEDIEVAL PERIOD

2.4. From 1066, much of Britain passed to Norman control and a feudal administration system, based upon land ownership, was introduced. When David I became King of Scotland in 1124, he reformed the justice system, founded monasteries, developed trade and encouraged commercial activities. He appointed a baron from Northumberland, the Earl of Lennox, to oversee the lands on the north banks of the Clyde, which he administered from Dumbarton Castle. The Earl of Lennox built several castles and mottes throughout the area including Balloch and Mugdock. During the 13th century, the Barony of Mugdock was granted by the Fourth Earl of Lennox to David Graham. The Barony included Strathblane and Milngavie. In 1388, the ownership of the old Lennox area, including Milngavie, transferred to Stirlingshire.

18TH AND 19TH CENTURY DEVELOPMENT

2.5. In around 1790, a new turnpike road was constructed between Glasgow and Balfron and passed through Milngavie and Strathblane. Tolls were collected at Allander Toll, Craigton, Auldmurrach and Canniesburn. In Richardson's map of about 1795, the Strathblane road is shown as under construction.

2.6. A gazetteer from 1842 describes Milngavie as follows:

> *"Milngavie, popularly Millguy, is a prosperous manufacturing village on the Allander water. At the village there are extensive works for calico-printing and cotton spinning; and in its vicinity are bleachfields, a distillery and other public works. The place has good shops, maintains daily communication by a stage coach with Glasgow, and makes stout demonstrations of speedily becoming a seat of extensive population and traffic. The present population is about 1,500. Here are a Relief meeting house, a library, infant school, and a neat extension church."*

2.7. In about 1830, houses were built on the Strathblane road to house workers at the calico printworks. In his book 'Rambles around Glasgow' Hugh MacDonald describes a visit to Milngavie in around 1854 as follows:

> *"The village of Milngavie has an irregular and somewhat straggling appearance. The houses are for the most part plain two storied edifices, in many instances tastefully whitewashed, and consequently wearing an agreeable air of tidiness. In and around the village, on the banks of the Allander, are a number of public works, the most extensive of which are the calico-printing and cotton-spinning establishments of Messrs. John Black & Co. in which a considerable proportion of the population, both adult and juvenile are employed… The spirit and prosperity of Milngavie, indeed, are abundantly evinced by the number of respectable looking shops which it contains in proportion to its size."*

2.8. Maps from this period indicate that the landscape around Mugdock and to the east was largely pastoral with subdivisions by hedgerows, dykes and woodland belts. Barrachan Farm was also surrounded by small fields, but the low-lying area, now occupied by the reservoirs, was mostly boggy heath. This extended to the west where it merged with the extensive Mugdock Wood.

DEVELOPMENT OF MUGDOCK RESERVOIR

2.9. In addition to the wells of Milngavie, only some thirty private and public wells provided for the rapidly increasing population in the city of Glasgow. Following two devastating outbreaks of cholera in 1838 and in 1848, when thousands died, the city fathers agreed that the water supply should be brought under municipal control. The outbreaks of cholera were markedly worse in the north of the city, in areas not supplied by pure water. At that time, the south of the city was already supplied with a pure water supply. In December 1852, the Glasgow Corporation commissioned civil engineer John Fredrick La Trobe Bateman (1810-1889) to investigate solutions for improving the water supply to the city.

2.10. John Bateman was born on the 30th May 1810 at Lower Wyke, Halifax, Yorkshire. He was the eldest son of John Bateman and Mary Agnes La Trobe; Bateman took his mother's maiden name by royal licence in 1883. His mother was the daughter of a Moravian missionary and John was educated at the Moravian schools of Ockbrook and Fairfield. At the age of 15, he became an apprentice to Mr. Dunn, local surveyor, mining and civil engineer in Oldham.

2.11. In 1834, John Bateman set up in business as a civil engineer and land surveyor in Manchester. In 1841, he married Anne Fairburn, together they had three sons and four daughters.

2.12. Bateman received a commission from the Manchester and Salford Waterworks Company to propose new ways for supplying a clean water supply to Manchester and surrounding conurbations. Bateman submitted his plans to obtain water from the Longdendale Valley, the scheme was known as the 'Longdendale Reservoirs Project'. On the 9th July 1847, the Manchester Corporation Waterworks Act came into force. Between 1848 and 1877, he designed and constructed the five principal reservoirs in Longdendale, these are: Woodhead; Tonside and Rhodeswood for a clean drinking water supply and Vale House and Bottom

Reservoirs as compensation reservoirs to the River Etherow. At the time, these reservoirs were the largest to have been constructed in the world and they represented Europe's first major water conservation scheme.

2.13. In 1851, Bateman prepared a scheme to supply clean water to the mill town of Halifax. His proposals were to construct a series of reservoirs on the moors above the town and utilise a gravity system to feed water to the town.

2.14. John Bateman was elected a Fellow of the Royal Society of Engineers and was the Society's representative at the official opening of the Suez Canal in 1869. Bateman's portfolio of work also includes the provision of clean water supply to Belfast and Dublin. John Bateman died on the 10th June 1889. An English Heritage Blue Plaque honouring Bateman has been erected on the Mottram Tunnel, part of the Longdendale Reservoirs Project.

2.15. John Bateman presented a report to the Glasgow City fathers in September 1853 outlining options for Loch Katrine, the Endrick Water, the Duchray, the Allander, the Avon and the Clyde, as well as an extension to the existing Gorbals waterworks. Of these options, he recommended the Loch Katrine scheme as being the only suitable candidate to meet Glasgow's pure water needs. In 1853, Glasgow Town Council resolved to promote a Bill in the ensuing session of Parliament for new works to commence at Barrachan, Milngavie.

2.16. However, Bateman's recommendations met with opposition from the House of Commons, who in 1854 expressed their concerns over *"the smoothness and softness"* of the water, that it was thought would damage lead pipes and cause a health hazard. Bateman's recommendations then came under opposition from the Admiralty, who were concerned that the re-routing of water from Loch Katrine would reduce water feeding into the Firth of Forth. They warned that the lack of water would adversely affect the Forth's navigational capabilities. Unperturbed, the City fathers fought on, and through the support of the Lord Provost Robert Stewart of Murdostoun, the Committee of the Commons passed a Bill in April 1855 authorising the proposals.

2.17. Bateman's ambitious and far-sighted proposals included raising the water levels in Loch Katrine and Loch Venachar through the construction of masonry dams. The project also included the construction of a 26mile long aqueduct to carry a clean supply of water to the Mugdock (storage) Reservoir outside Milngavie. At Loch Katrine, the water enters two cast-iron aqueduct pipes, measuring 25¾ miles (41.5km) in length and falling at the imperceptibly shallow gradient of 1in 6,300. At both ends of the aqueduct are headwalls and arches in precision masonry. The aqueducts are capable of conveying 40 million gallons of water per day between Loch Katrine and Mugdock Reservoir. Bateman's proposals relied upon a gravity-fed system of water distribution. Such an approach avoided the requirements for mechanical pumping, therefore, minimised any maintenance and resulted in both an energy and cost efficient system.

2.18. In addition to the main reservoir and aqueduct structures the project also involved the construction of extensive perimeter walls, gateways and the development of the realigned Mugdock Road. The Mugdock/Commissioners' Cottage, adjacent (west) Straining Well and Commissioners' Walk were also constructed during this phase of work. Complementary soft landscape works were also undertaken with particular emphasis on the Gauge Basin, the Mugdock Road perimeter and the Commissioners' Walk areas.

2.19. Works commenced on the 20th May 1856 with the scheme completed 30 months later. This incredible achievement involved extensive rock cutting, excavations, earth dam and masonry construction, pipe laying and jointing; all undertaken with relatively limited machinery by today's standards. A temporary village was sited at Loch Chon to accommodate the 3,000 strong workforce, mostly miners, employed on the tunnel construction.

2.20. On the 14th October 1859, the Loch Katrine-Mugdock waterworks were opened by Queen Victoria at an opening ceremony at the Commissioners' Cottage. A clean water supply flowed into the north of Glasgow by 1860. Bateman had fulfilled his obligations to the City fathers in just six years. At the opening of the Mugdock Reservoir, he stated:

> *"It is a work indeed which surpasses the greatest of the nine famous aqueducts which fed the city of Rome, and amongst the work's ornament or usefulness for which your city is now distinguished and will hereafter become famous, I venture to say none will be committed more creditable to your wisdom, more worthy of your liberality, or more beneficial in its results than the Loch Katrine Water Works."*

2.21. The construction cost was approximately £920,000. The Mugdock Reservoir was capable of distributing 50 million gallons of water a day, and a holding capacity of 500 million gallons, at the time enough for 10 days supply.

2.22. At the banquet held to honour his achievements on the 23rd October 1859, John Bateman stated:

> *"I leave you a work which I believe will, with very slight attention, remain perfect for ages, which for the greater part of it, is as indestructible as the hills through which it has been carried. A truly Roman work, not executed, like the colossal monuments of the East, by forced labor, at the command of an arbitrary sovereign, but by the free will and contributions of a highly civilised and enlightened city."*

STEWART MEMORIAL FOUNTAIN

2.23. The Stewart Memorial Fountain commemorates the achievement of Glasgow Provost, Robert Stewart of Murdostoun (1811-1866), who during his term in office (1851-1866) was instrumental in getting the Bill through Parliament to bring a supply of drinking water from Loch Katrine. He also oversaw the opening of Kelvingrove Park, and at that time the city's first public park since Glasgow Green.

2.24. The Stewart Memorial Fountain is centrally located within Kelvingrove Park and was a collaborative design led by architect James Sellars and incorporating the carvings of James Young and the bronze figure relief of John Mossman, HRSA (1817-1890). Their collaboration resulted in a riotous mixture of wildlife, aquatic plants, signs of the zodiac in mosaic and mythical beasts as gargoyles. The standing figure surmounting the fountain takes cue from Walter Scott's poem of 1811, 'The Lady of the Lake'.

2.25. The memorial fountain was inaugurated at an opening ceremony in 1872 to commemorate one of the greatest civic achievements in the history of 19th century Glasgow, the establishment of the Loch Katrine water supply.

2.26. The inscription on the fountain reads:

> *"To commemorate the public services of Robert Stewart of Murdstoun Lord Provost of the City of Glasgow from November 1851 till November 1854. To whose unwearied exertions the citizens are mainly indebted for the abundant water supply from Loch Katrine. This fountain was erected in 1872."*

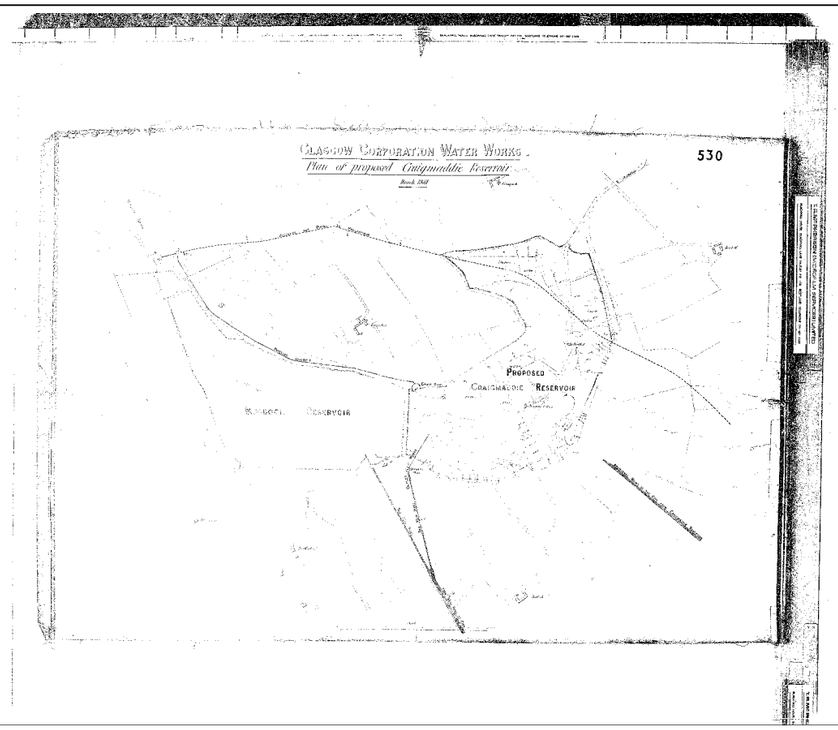
THE MAKINGS OF A BURGH

2.27. In 1875, a petition was presented to Stirling Sheriff Court requesting that the *"District of Milngavie and Neighbourhood declared a populace place, and have its boundaries defined."* At that time, the population was about 2,814 and increasing rapidly. The petition called for the local provision and control of policing in the district, in addition to autonomous lighting, cleansing, paving, drainage, water supply and public health.

RAILWAY LINK WITH GLASGOW

2.28. The railway linking Milngavie and Glasgow via Westerton was authorised under the Glasgow and Milngavie Junction Railway Act of 1861 and was operational by 1863. The track was subsequently upgraded from a single to a double track during the 1890s. With the advent of the railway link, Milngavie became a popular destination for day outings by Glaswegians. At the turn of the century and for many subsequent decades, thousands of Glaswegians would visit reservoirs site. As described by John Shearer 'In and Around Milngavie' published in the Milngavie and Bearsden Herald dated 1908:

> *"Perhaps the most popular resort in the neighbourhood is the Corporation Waterworks, situated on the uplands at Mugdock and Craigmaddie. This in the summertime is the venue of numerous excursion parties from the City of Glasgow and elsewhere, and the resort of the residents of the district when out for a stroll. In point of natural beauty, it is safe to add that St. Mungo does not possess, with the exception of Rouken Glen and the estate of Ardkinglass, a finer sylvan retreat than that of the waterworks. An extensive view of the surrounding country can be had from Barrachan, while some fine walks are afforded round the extensive reservoirs."*



Historic plans for Craigmaddie Reservoir

DEVELOPMENT OF CRAIGMADDIE RESERVOIR

2.29. Owing to the rapid expansion of Glasgow during the mid nineteenth century, it became apparent to the City Fathers that the storage capacity of Mugdock Reservoir was insufficient to meet with contemporary supply demands. Civil Engineer James Gale was entrusted with the task of increasing the capacity of the reservoirs to meet Glasgow's water needs.

2.30. Gale proposed to duplicate the success of his predecessor Bateman's proposals, in harnessing water from Loch Katrine and increasing the storage capacity at the Milngavie site. Gale advised that due to Glasgow's expansion, the storage reserve in Loch Katrine represented only four and a half months supply, instead of the intended provision for nine months. On the advice of Gale, the water corporation deemed that the storage capacity of Loch Katrine should be increased through raising the water level an additional 5 feet, drawing additional water from Loch Arklet. Gale proposed that a second aqueduct running roughly parallel to the Mugdock Reservoir aqueducts should be constructed and that a second storage reservoir, (Craigmaddie Reservoir) should be constructed adjacent to the Mugdock Reservoir.

2.31. In 1882, an Act of Parliament was passed authorising the Glasgow Corporation Water Commissioners to construct and maintain an additional service reservoir within the Stirlingshire policies of New Kilpatrick and Baldernock. The Craigmaddie Reservoir, translated in Gaelic as 'Rock of God', was to hold a capacity of 700 million gallons of water. The 1882 Act also permitted diverting the Strathblane turnpike road.

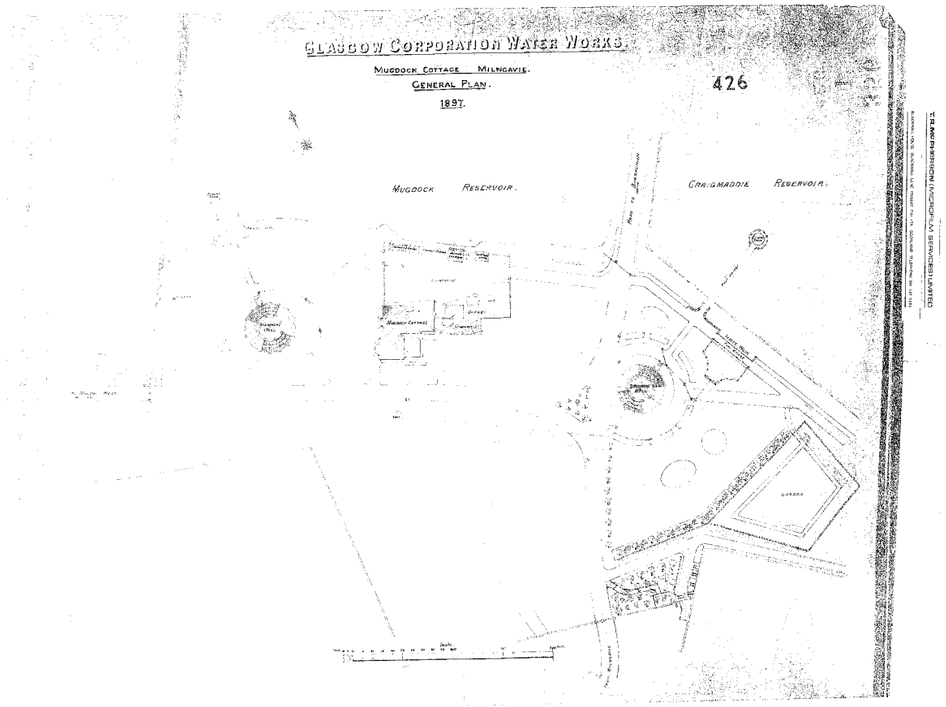
2.32. Work began on the Craigmaddie Reservoir in 1885 with the project completed 11 years later by 1896. The original cost estimate of £140,000 pounds sterling was greatly exceeded when it was discovered that the foundation rock underlying the reservoir site was so badly fissured, that it was necessary to cut out this substandard rock. At the reservoir's north embankment, the substandard sandstone had to be excavated down to depths ranging between 130 to 193 feet to reach a suitable bedding rock. Throughout the contract, excavation trenches were submerged in ground water, which required half a million gallons of water to be pumped out each day. Due to these unforeseen complications to the reservoir's construction, two contractors withdrew after only 18 months and Glasgow Corporation had no other option than to oversee the completion of the works themselves. The eventual build cost amounted to £337,000.00.

2.33. On the 11th June 1896, Craigmaddie Reservoir began to fill with a gravitational water supply fed from Loch Katrine via a 23½mile (37.5 kilometre) long aqueduct, with a fall of 1 in 5,500 over its length. It was on this day that the official opening ceremony attended by the Lord Provost of Glasgow, dignitaries and the Water Committee took place. However, it was several months later on the 1st January 1897 that the water supply was commissioned.

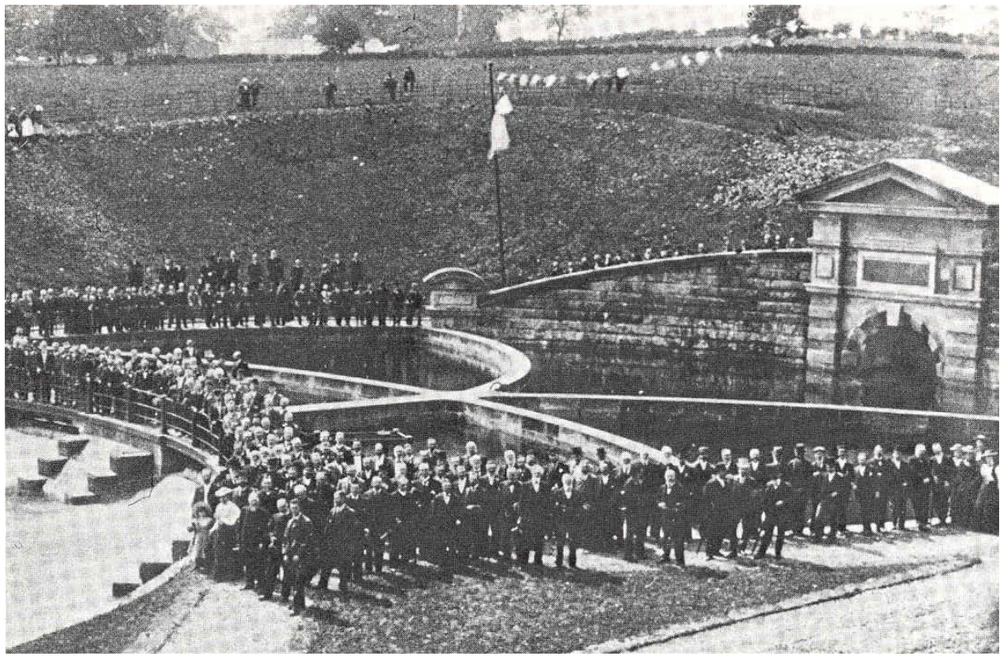
2.34. On completion of Craigmaddie Reservoir, an additional 36 inch cast iron mains distributor pipes had been laid between Milngavie and Glasgow. Due to improvements in stone extraction through the use of pneumatic drills and gelignite, the Craigmaddie aqueduct was able to take a more direct route between Loch Katrine and Craigmaddie. Gale prescribed a headwall chamber with an arched roof: 12 feet in width and between 9 and 10 feet in height. The reservoir covers an area of approximately 88 acres with maximum depth of 50 feet. It has a storage capacity of 700 million gallons. The combined volumes of the two reservoirs were capable of storing 1,250 million gallons, which equated at the time to 14 days supply of water to the city, on a consumption basis of 90 million gallons per day.

2.35. The Craigmaddie Reservoir Project also involved several other developments and alterations to existing structures. These included:

- the realignment of Strathblane Road complete with perimeter walls on both sides and avenue tree planting;
- construction of Craigmaddie Lodge and associated gateway;
- additions to the Mugdock/Commissioners' Cottage and adjacent Conservatory;
- development of the east Straining Well and surrounding gardens;
- Barrachan Farm building conversion and new buildings (Barrachan Cottage and Hall);
- addition of second gauge basin to the Mugdock Reservoir;
- development of Barrachan access drives, gardens and ornamental planting;
- woodland and footpath development around Barrachan.



Old Water Works Plan



Craigmaddie Reservoir opening

2.36. The opening ceremony was conducted on the 12th June 1896, whereby a luncheon attended by 400 guests was served in a marquee erected at Barrachan overlooking the reservoirs site.

2.37. Gale wrote a paper on the addition to the Loch Katrine Waterworks dated 20th March 1883, which is contained in volume twenty-six of 'The Transactions of Engineers and Shipbuilders in Scotland'.

20TH CENTURY DEVELOPMENTS

2.38. The Milngavie Reservoirs' landscape remained relatively unchanged during the 20th century but more stringent demands for water treatment have resulted in the development of buildings in the vicinity of the Commissioners' Cottage. These contain additional water treatment equipment and chlorine and lime storage. They have been developed in former garden areas and have caused the removal of the conservatory (the associated back-wall/ potting shed building remains as part of the water treatment complex).

2.39. The increase in car ownership and dependency over the 20th century has since increased numbers of visitors to the Reservoirs arriving by car and in response the Drumclog car park has been developed on the western side of the site. This has involved the localised alteration of perimeter walls to provide access and to improve visibility.

2.40. A review of historic photographs demonstrates that the landscape has matured and tree growth has notably changed aspects of visibility. Some older trees have also been lost.

2.41. Landscape maintenance resources have clearly reduced during the 20th century and all high maintenance horticultural features have been abandoned or replaced by more basic treatments.

Milngavie Reservoirs prior to Katrine Water Project

21ST CENTURY DEVELOPMENTS

2.42. The most significant development since 1896 is ongoing within and just outside the Milngavie Reservoirs site. This is the 'Katrine Water Project'. This project is the largest water treatment investment programme in Scotland and has an estimated value of £100 million. Loch Katrine, which feeds the Milngavie Reservoirs, has efficiently supplied Scottish Water's customers in Glasgow and neighbouring areas with drinking water for more that 140 years. However, there is now a need to upgrade the treatment of water to meet UK and European quality standards, in particular for micro-organisms (bacteria and cryptosporidium parasites) and disinfectant by-products. From the outset, Scottish Water appreciated that developing the new works within this highly sensitive area would require very careful consideration.

2.43. Scottish Water set in motion the largest research and development project ever undertaken in the Scottish water industry. The process involved more than 100 experts from 25 different disciplines. More than 100,000 hours were spent examining the engineering, environmental and financial issues. 17 potential development areas were included. Since the middle of 2000, Scottish Water and its consultants actively sought the views of statutory and non-statutory consultees, and the community at large.

2.44. A wide range of issues was considered when making the final selection, including impact on people, impact on heritage and amenity, energy consumption, connection to the existing water supply infrastructure and access roads. The selected option at Milngavie Reservoirs was considered to be the best balance of all the issues assessed.

2.45. The project involves the construction of new water treatment facilities on two principal sites:

- to the east of Barrachan; and
- to the east of Strathblane Road (south of Bankell House).

2.46. The development at Barrachan has a significant impact on the Reservoirs' landscape as it occupies a large central area into which public access will be denied. This development replaces the former fields and severs the eastern access route to Barrachan. It incorporates the new water treatment works in the northern part of the site, and the Clearwater tank in the southern part. These buildings are cut into the hill and partially buried. This has involved significant earthworks resulting in the reshaping of Barrachan Hill. The Barrachan developments are serviced by a new designated access road, which enters the site from the north via the valley to the north of Craigash Farm. To comply with planning condition, this access road will be returned to a single track road and due to security/ operational reasons, will only serve the new Water Treatment Works, therefore, public (vehicular) access will be not be possible.

2.47. The development proposals at Barrachan seek to minimise the visual impact of the treatment works through the use of earthworks, by retaining peripheral planting, and by introducing new screen planting. However, the development has necessitated the removal of some mature trees and has caused some temporary damage to roads and footpaths used as haulage/plant access routes. This will be rectified in compliance with the associated planning conditions.

2.48. The development outside the site is located to the south of Bankell House and Farm. It is a large development, which incorporates the Service Reservoir. This is a rectangular tank (approximately 115m x 240m) which is partially buried by peripheral mounding. This development is serviced from Strathblane Road by internal access roads which run to the north and south of the Service Reservoir. The remaining peripheral areas of the site are informally mounded and planted to help screen/ integrate the reservoir and associated infrastructure. The woodland belts associated with Bankell House also provide some visual enclosure but nevertheless, this development is clearly visible from the elevated vantage points along the eastern side of Craigmaddie Reservoir.

2.49. In recent years, the existing treatment works have been enclosed within security fencing following direction from the Home Office. This includes 3m steel palisade and electrified fencing which is particularly obtrusive and oppressive in such a high profile area.

2.50. The Barrachan complex of buildings is now disused after the discontinuation of office/storage activities in the Hall and the residential tenure of the cottages. The buildings now stand empty but secure and the surrounding fields are fallow or used for soil mounds.

2.51. Completion of the new water treatment facilities due December 2007 will leave the old water treatment works redundant and due for decommissioning. This importantly includes the buildings and structures adjacent to the Commissioners' Cottage to the south of the reservoirs. Several of these structures are included within the group listing for the site, e.g. Commissioners' Cottage, Straining Wells, Drawdown Towers and associated walls and iron-work structures. The relatively unsympathetic developments from the 1960s and 70s will also become redundant. These are not listed. Scottish Water has stated that following completion of the new treatment facility, the following essential activities will need to take place at the old treatment works:

- removal of power supply to the existing buildings;
- removal of existing chemicals i.e. chlorine, lime, and ortophpsphoric acid;
- removal of existing chemical dosing pipework and associated equipment;
- removal of standby generator building and associated equipment;
- removal of diesel storage tank;
- demolition and reinstatement of existing chlorination building;
- decommissioning and part removal of control equipment within the existing control room;
- make safe and restrict access within the existing buildings – Keeper's House (Commissioners' Cottage) and adjoining buildings;
- remove water and sewerage facilities within all existing buildings.

2.52. The decommissioning process will, therefore, require that positive new long-term uses and means to protect the listed structures are found, whilst offering opportunities to remove unsightly developments from the 1960s and 2000s (security fences). The presence of serviced buildings in good condition is an asset, which may offer exciting possibilities for new public uses, in which case it may be possible to take advantage of the existing electricity, water supply, sewerage and other utility connections.

2.53. The redundancy of buildings at the old water treatment works and at Barrachan also raises the potential prospect of disposal/sale by Scottish Water as required by the SPFM. This could deny public access or prevent new uses which could achieve conservation and public benefits. These issues are discussed further in Chapter 5.

2.54. The development of the new Katrine Water Project was preceded by a design and planning process which involved the production of an Environmental Impact Assessment and a subsequent Public Hearing. The development was ultimately granted planning consent with numerous conditions. These are included within the appendix and cover a wide range of environmental issues; but those with particular relevance to the landscape include:

- production of the Conservation and Recreation Management Plan;
- provision of a new car park and public toilet facilities to serve the Reservoirs;
- reduction in width (down to 3.7m with passing places) of the new access road off the A81 Strathblane Road;
- production of a Biodiversity Development and Management Plan incorporating species rich grasslands at Barrachan and around the Bankell reservoir with also ponds and wetlands at Bankell- to be completed within one year of commissioning of the KWP;
- provision of details for the upgrading and future maintenance of existing footpaths and provision of supplementary paths- works to be completed before commissioning of the KWP;
- undertaking a tree survey and replacement planting programme for unavoidable tree losses during the works.

3. VISUAL ANALYSIS

VIEWS AND VIEWPOINTS

3.1. Since the construction of the Milngavie Reservoirs, they have been popular attractions for the residents of Glasgow and the local towns. Their proximity to the city with access by the railway to Milngavie has allowed the site to develop as a 'country park' and its fine architecture, combined with the allure of water and comprehensive landscape modifications, have been the subject of photographic records, postcards and illustrations since the mid 19th century.

3.2. Historically, popular views included both panoramas and local views of key features (**Figure 1**). The latter included the following most 'captured' features:

- Mugdock Reservoir Gauge Basin;
- Craigmaddie Reservoir Gauge Basin;
- Commissioners' Cottage and adjacent gardens;
- Commissioners' Walk.

3.3. Panoramic views from within the site were commonly taken across Mugdock Reservoir towards the north-west. This provided the backcloth of the Kilpatrick Hills and the associated agricultural landscape. Views to the north and north-east also had the dramatic backcloth of the Campsie Fells, more distant but nevertheless a positive contribution to the site. The enclosure of the older reservoir by topography gave the impression of a more natural loch and consequently, this view was and is important for its scenic qualities. The Kilpatrick Hills, outside the Reservoir's site boundary, became an essential part of the reservoirs' 'borrowed landscape' and consequently, any developments within this area (zone of visual influence) will impact on the experience of the reservoirs.

3.4. The development of the dams to both Mugdock reservoir and Craigmaddie reservoir provided excellent elevated vantage points from which to view Milngavie and the agricultural landscape to the south-west. Views from the main footpaths around the rim of the reservoirs are, therefore, the source of many captured views. The causeway between the two reservoirs is also an important vantage point.

3.5. Arguably, the most attractive but less accessible views within the site, are from the high ground around Barrachan. The drive and minor paths leading to the Barrachan complex and the associated garden areas, provide a range of vantage points which offer views over the lower ground which encompass the reservoirs and the landscape/townscape beyond. Some of these views are expansive panoramas, others are slot views between trees. On clear days, the city of Glasgow is visible and individual buildings are recognisable.

3.6. The landscape of the reservoirs and its constituent features make important contributions to the character and visual amenity of the local area. The peripheral roads (Mugdock Road and Strathblane Road A81) define the boundaries of the site and they are lined by masonry walls and tree avenues and have numerous gateway features. These features make a significant impression on all who travel on these roads and signify that something special lies within the finely crafted perimeter. Views from the roads are partially obstructed by the walls and trees, but glimpses of the water can be gained from Mugdock Road to the south of the site, and from Strathblane Road (at the north gate). The massive earth dam of Craigmaddie reservoir becomes a prominent feature further south, and from the axis of Mugdock Road to the south of the site, the earth dam of Mugdock reservoir represents an intermediate visual horizon.

3.7. The condition of the perimeter structures and the management of the soft landscape areas adjacent to the boundaries, therefore, contribute significantly to the image of the local landscape. Deterioration of any kind (e.g. tree losses, wall failures, rusting railings, dilapidated signs) has, therefore, a negative impact on the character of the landscape.

3.8. From greater distances, the visual contribution of the reservoirs is more subtle due to the effective screening of Barrachan Hill from the north and the absence of elevated viewpoints to the south. In addition, the tree lines and woodland belts, which are part of the reservoirs' landscape, effectively contain the site and help it to integrate with the surrounding agricultural and estate landscapes.

3.9. A major exception is the viewpoint above Mugdock Reservoir on the Mugdock Road. This vantage point, although not well accommodated on the narrow road, offers a fine panoramic view over the reservoir and Milngavie towards Glasgow in the distance.

3.10. Further to the east, a narrow road runs along the top of an escarpment. This is not heavily trafficked, but offers dramatic views over the dry valley to the north of the reservoirs. The reservoirs are screened by the ridges of Barrachan and Craigash Farm, the tree belts along the northern perimeter are distinctive features. The ongoing construction of the Katrine Water Project is currently a major feature from this viewpoint, but it is expected that its impact will reduce significantly as the works are completed. Clearance of tree belts (or parts thereof) within this area will, however, have a long lasting effect.

MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Then and Now Series Viewpoints**

  Scale 1/7000

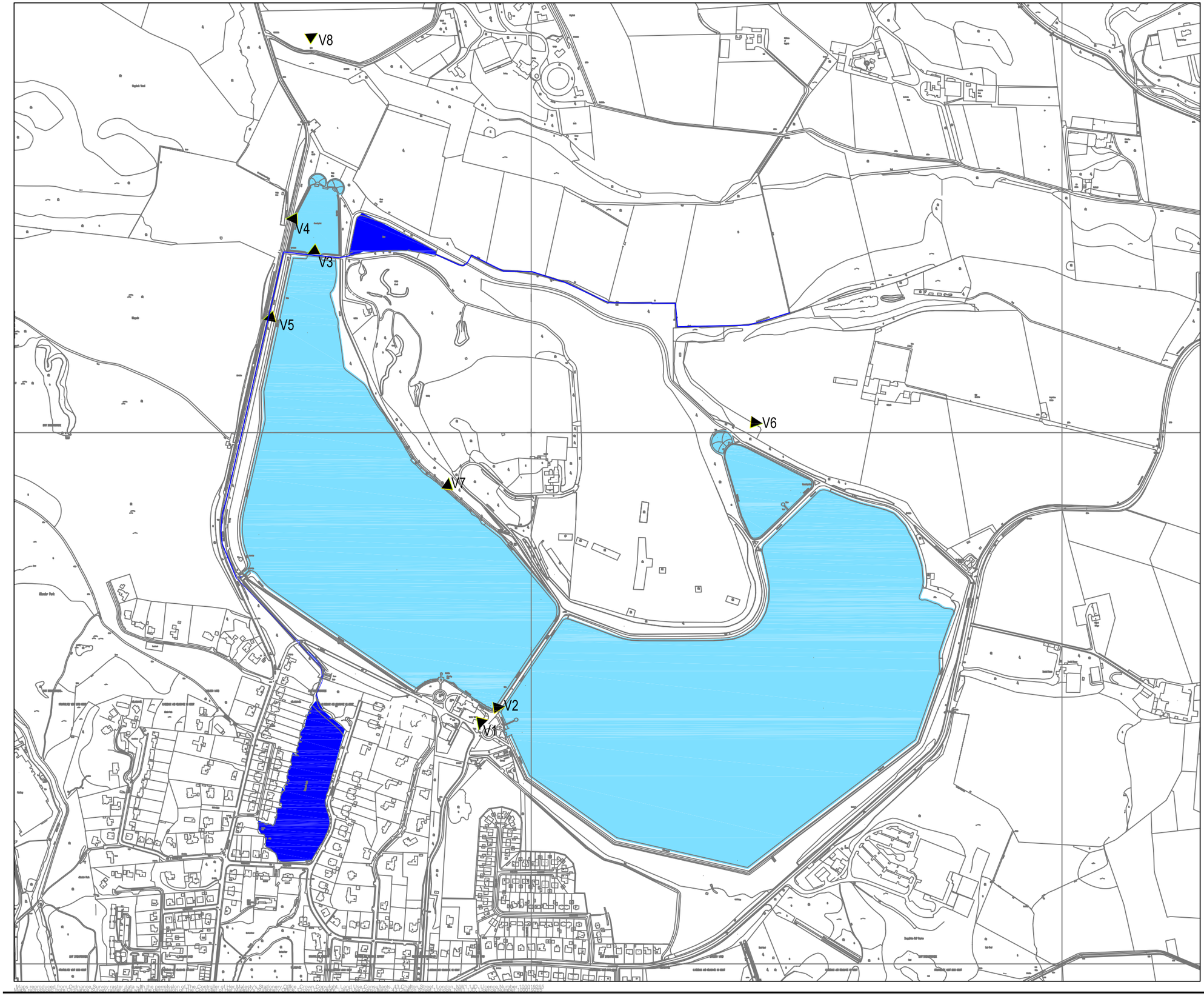
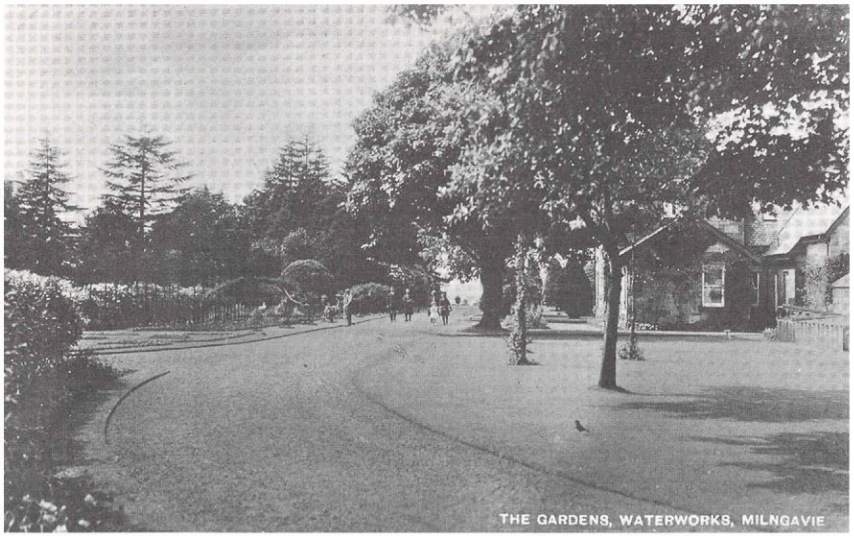
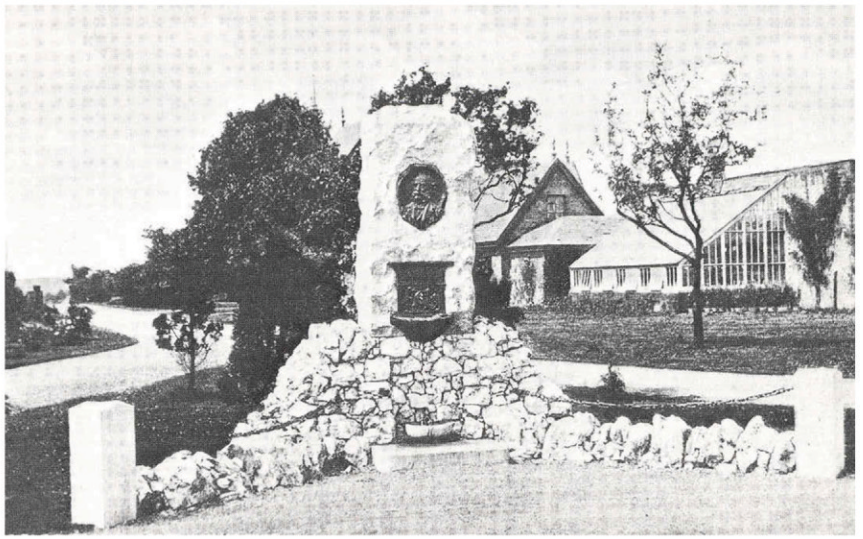


Figure 1

LAND USE CONSULTANTS



Commissioners' Cottage, circa 1900's. Old Postcards Vol. 2.

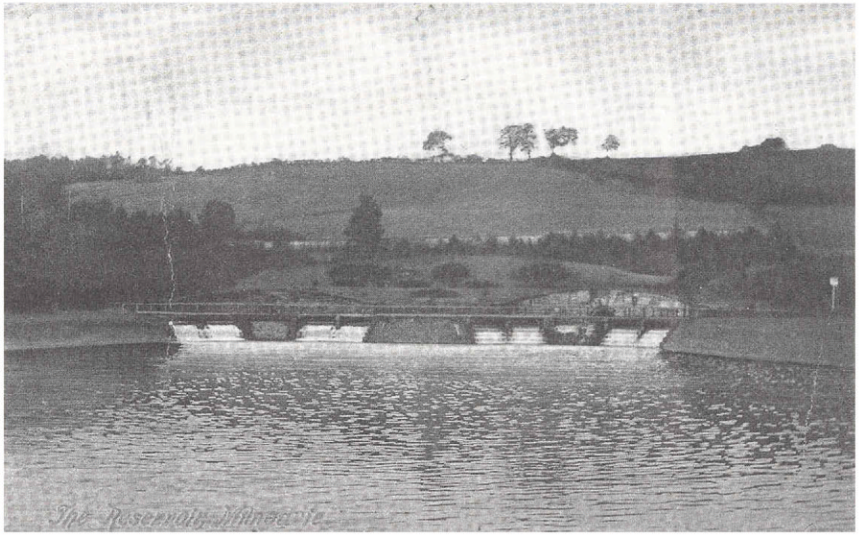


Gale's Monument, 1904. Old Postcards Vol. 1.

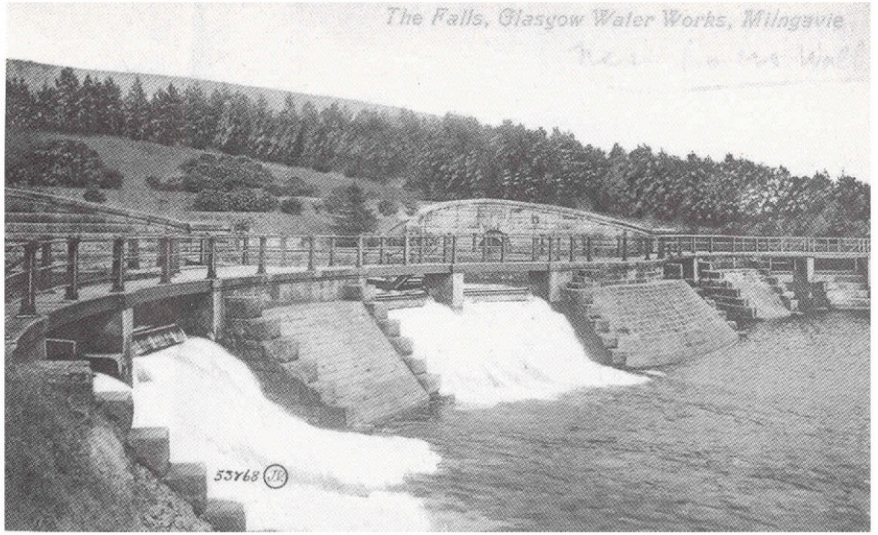
View 1

View 2

Historic Picture Postcard Series:Then and Now



Mugdock Measuring Pond from Causeway, 1908. Old Postcards Vol. 2

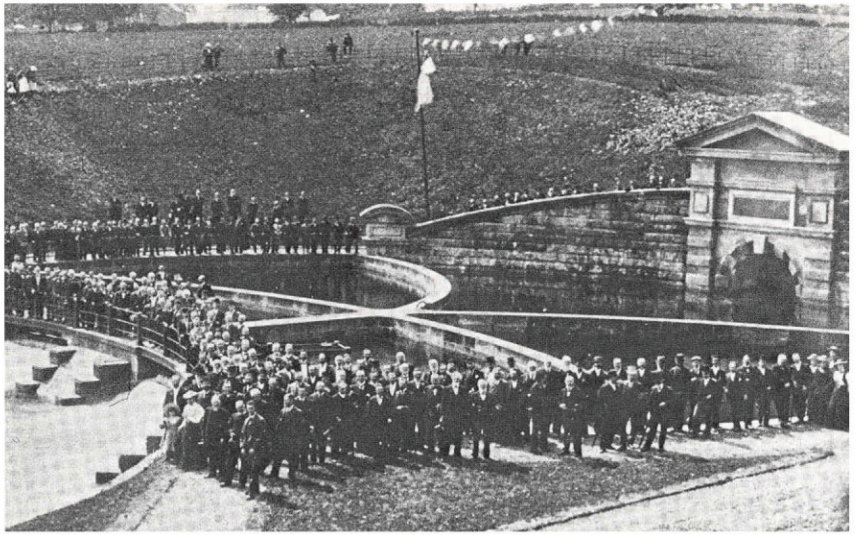


Mugdock Reservoir Gauge Basin, 1910. Old Postcards Vol. 2

View 3

View 4

Mugdock Reservoir Perimeter Path, circa 1950's. Old Postcards Vol. 2

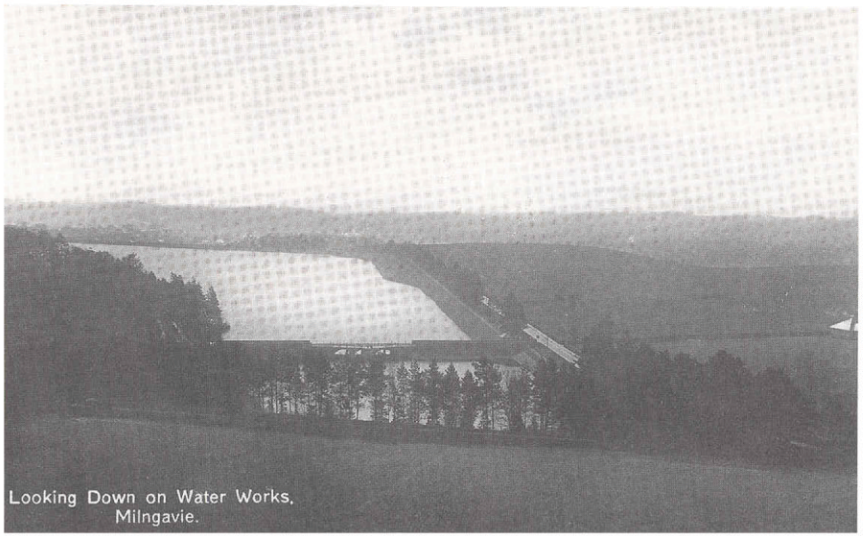


Craigmaddie Gauge Basin, 11th June 1896. Old Postcards Vol. 1

View 5

View 6

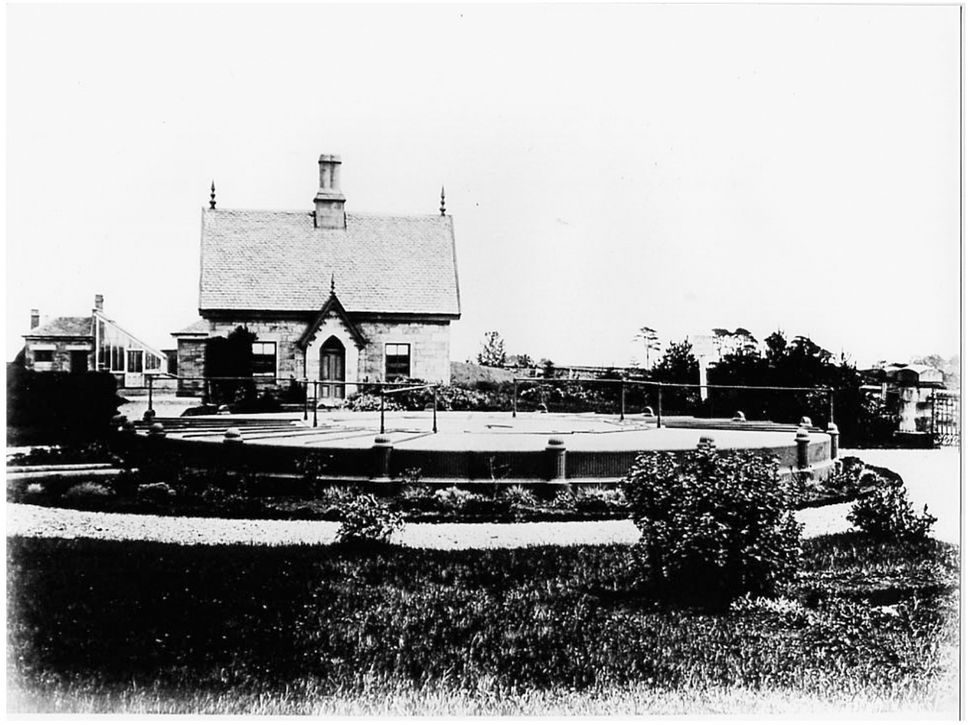
Mugdock Reservoir, Lovers' Walk, 1908 . Old Postcards Vol. 2



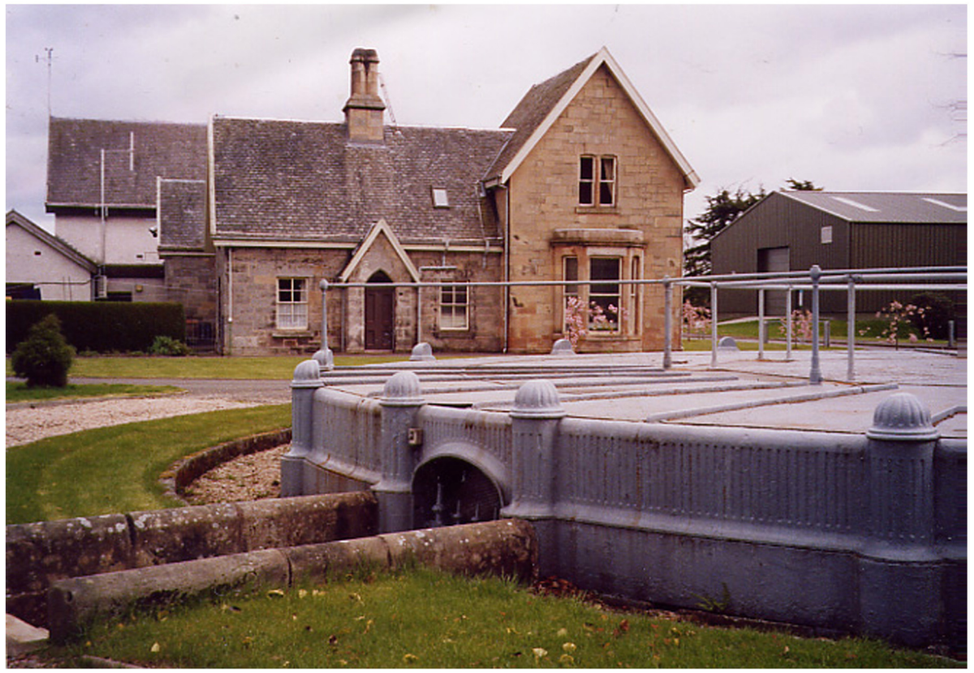
Vantage Point Overlooking Mugdock Reservoir, 1903. Old Postcards Vol. 1

View 7

View 8



Commissioners' Cottage circa 1870



View 9

VIEWS

Panoramic view from Barrachan Hill

View to south-east

View over Tannoch Loch

(high vantage for views over Milngavie)

View to the west (Kilpatrick Hills)

field network formerly associated with Barrachan Farm and is defined by a random rubble stone wall and by a metal strap estate fence line.

3.20. This compartment contains a large proportion of Barrachan Hill which has strong irregular topography sloping steeply to the north and south and including a number of small redundant quarries which have left artificial cliffs and depressions amongst the natural knolls and ridges. The woodland covers this hill creating an attractive sylvan landscape laced with informal footpaths and through which glimpses of the reservoirs can be obtained from high vantage points and through gaps in the trees. The predominance of beech determines that the understorey vegetation is limited and this allows views under the tree canopy.

3.21. The enclosure provided by the woodland coupled with the irregular topography determines that the area is well screened from vantage points outside the wood. This reduces the visibility of visitors moving within the compartment and determines that this compartment may have some capacity to absorb new activities or small- scale developments without significant visual impact. The latter would however rely on the continuation of tree cover on Barrachan Hill, which requires indefinite positive woodland management. The current level of management is insufficient to perpetuate the health of the woodland and therefore this compartment is particularly sensitive to tree losses, which may expose previously hidden areas or may make the woodland more vulnerable to wind damage. The recent exposure of the Craigholm Cottage area has revealed unsightly sheds demonstrating the need for stricter statutory protection measures, but also the potential visual sensitivities associated with vegetation clearance or losses. The informality and solitude currently offered by the Barrachan Wood could be compromised by developments which urbanise the landscape for example, the footpaths are currently narrow and irregular in order to fit the topography, attempts to make them more formal could be detrimental to the character of the compartment.

Compartment 3: Barrachan Farm

3.22. This compartment includes the former Barrachan Farm complex, the associated field network, shelterbelt plantings and entrance drive. The farm complex is an attractive grouping of masonry buildings of domestic scale but in a location, which commands panoramic views over the reservoirs and the Clyde Valley. The arrangement of buildings set within a level terrace defines a number of small garden spaces and courtyards. The approach to the buildings from the south is via a winding ramp, which is framed by lawns containing specimen conifers and Rhododendrons, and by metal fences. This modest designed landscape engenders a distinctive character for this compartment. The field and walled (former) orchard/vegetable garden area, to the north of the buildings, evoke the character of the original farm. With the loss of fields to the Katrine Water Project, the remaining Barrachan fields represent important grassland areas within the reservoir site.

3.23. The Barrachan Farm complex is screened from many viewpoints by the topography and the surrounding tree belts. Its hilltop location also determines that it is somewhat isolated from the lower lying areas of the site. This gives it a secluded character now enjoyed only by those who make the effort and are capable of climbing the ramping paths. This seclusion may provide some capacity for development without significant visual impacts but any developments or new activities should be respectful of the Barrachan architecture, which is part of the group listing. Parts of the hilltop field and the Barrachan Cottage are visible from the lower ground, with specific vantage points along the south side of the reservoirs, which allow views through the trees. These are sensitive viewpoints which would require detailed assessment if any developments were proposed at Barrachan. The integrity of the tree belts and of the exotic plantings around Barrachan is also important as these features create visual enclosure and shape the character of this compartment; this area would therefore be sensitive to any losses or breaches in the peripheral plantings.

Compartment 4: KWP Water Treatment Complex

3.24. This compartment contains Scottish Water's Katrine Water Project treatment works, due for completion in December 2006. At the time of writing, this area was still under development and its peripheral areas were disturbed by construction work. As part of the Environmental Impact Assessment for the KWP, a landscape and visual impact assessment was undertaken which produced photomontage visualisations of the completed development. These demonstrate that little of the new buildings should be visible from the perimeter footpaths of the reservoirs due to the sunken nature of the development and the preservation/reinforcement of planting around the development site.

Compartment 5: Craigmaddie Reservoir

3.25. This compartment comprises the main visible components designed by James Gale and completed in 1896. These are the open water and peripheral landscape associated with Craigmaddie Reservoir, including the gauge basin, measuring pond and associated causeway. The compartment also includes Craigmaddie Lodge to the north-east and the fields immediately below the earth dam which retains the reservoir. The north boundary is defined by the perimeter stone wall, the woodland belt to the south of Barrachan Farm Zone, and the open pasture farmland associated with Craigash Farm. The eastern boundary includes the A81 Strathblane Road and includes the stone wall and tree planting which aligns the road corridor. The south boundary is defined by the gardens to the residential properties, which represent the northern extent of Milngavie. The western boundary is defined by the main causeway, which separates Mugdock and Craigmaddie Reservoirs.

3.26. Craigmaddie Reservoir does not have the same degree of topographic enclosure as Mugdock Reservoir and relies on the extensive high earth dam to retain the water on its south and eastern sides. Consequently this compartment appears more 'artificial' than Mugdock Reservoir and it feels more physically and visually exposed. These qualities allow extensive panoramic views from the rim of the reservoir, which are an essential part of the visitor experience. Conversely the eastern perimeter walls, trees, the dam and people on the dam are highly visible from Strathblane Road. This high level of visual exposure from within and outwith the site makes the compartment extremely sensitive to developments and to the decline of perimeter features which define the character of the site to passers by.

Compartment 6: Entrance and Old Treatment Works

3.27. The entrance and old treatment works compartment comprises the tree lined Commissioners' Walk and main entrance gates off Strathblane Road. It extends to include Mugdock Cottage and the 2 nr. straining wells, draw-off towers, water treatment infrastructure and Gale Monument; features that pertain to both the 1859 and 1896 reservoir developments.

3.28. Commissioners' Walk provides a distinctive approach to the reservoirs and creates a strong visual link between Milngavie and the heart of the site. The gateway on axis with the A81 draws the eye up the hill and the lime tree avenue reinforces the route. The Walk is partly in cutting and creates visual enclosure for part of the route; this enclosure is supplemented by the mature trees, which line the corridor.

3.29. The Mugdock Cottage and associated water treatment works area represents the 'arrival hub' for the site and commands access onto all routes around and across the reservoirs. It is therefore a focus of activity and a visually sensitive area. Nevertheless it has been subject to a number of unsympathetic developments, which are detrimental to the setting of the 19th century structures and buildings. The presence of buildings, both new and old, provides some capacity for new development and for redevelopment, which could be undertaken without negative visual impacts if it was able to mitigate/ remove the existing unsympathetic components. The area formerly contained ornamental gardens and retains distinctive specimen trees. The integrity of these garden areas has however been compromised by parking bays, footpaths and hardstandings.

Compartment 7: Craigash Farm

3.30. This compartment comprises the open pasture field network of field boundaries and shelterbelts associated with Craigash Farm. The north boundary is defined by the bluff slope. The east boundary is defined by Strathblane Road (A81), and to the south boundary by the perimeter wall to the Craigmaddie Reservoir complex. This compartment is outwith the reservoir area but defines the visual horizon to the north of Craigmaddie Reservoir. . It is highly visible from the within the reservoirs site and from Strathblane Road, making it visually sensitive. This determines that any developments or landuse changes on the south flank of Craigash Hill would impact on the setting of the reservoirs.

Compartment 8: Mugdock Bank

3.31. This compartment comprises the former open pasture field network and the wooded bluff slope known as Mugdock Bank below the minor public road to Mugdock village. The west boundary extends to include a former area of woodland outwith the reservoir complex immediately to the north of the Dirty Dam open waterbody. This compartment contains the temporary site complex and the permanent entrance road into the Katrine Water Treatment Works located in Zone 4. This compartment is also outside the reservoirs' site but from viewpoints on Barrachan Hill it represents the northern horizon. In this context the integrity of this agricultural area and its distinctive tree belts is important to the setting of the Milngavie Reservoirs.

Compartment 9: KWP Bankell Site

3.32. This compartment is the site of the Katrine Water Project development, containing the new Service Reservoir. The site has been largely altered by the development, but it has some visual containment from the adjacent woodland of Bankell Farm and the perimeter of the Esporta Leisure Club. Nevertheless, it can be viewed from the elevated vantage points along the Craigmaddie Reservoir perimeter and consequently the landscape treatment within the site and particularly at the Strathblane Road perimeter will be essential to mitigate the visual impact of the Service Reservoir and its infrastructure components.

DISCORDANT FEATURES

3.33. There are a small number of discordant features which require note within the visual analysis which detract from the reservoirs site, these are as follows and illustrated on **Plate 7**:

(i) the 2.8m high metal security fencing installed at the request of the MoD in 2002. In particular, the lengths of fencing running alongside the Mugdock Reservoir walkway adjacent to Mugdock Road, and the double fence line along the causeway between the measuring pond and reservoir are both visually intrusive and detract greatly from the setting of the causeway/Gauge Basin architecture. Their effectiveness and the necessity of their retention in the future warrants consideration;

(ii) there are a number of redundant pump house structures located around Mugdock Reservoir. Typically, these comprise of a brick base course and harled finish, some have intact roofs. Their disused semi derelict state creates a negative impression and, therefore, positive new uses should be explored or their demolition considered;

(iii) security measures prescribed by the MoD in 2002 have resulted in the erection of a number of CCTV cameras mounted on mast with associated aerials and electrical housing boxes in strategic, often highly prominent locations; these are, consequently, intrusive. More discreet locations may be possible without compromising their efficiency and subject to agreement by the Home Office;

(iv) a monitoring station contained within a metal box and associated aerial mounted on a mast has been located immediately to the rear of the inscribed pediment stone to the Craigmaddie Reservoir gauge basin. The location of the station jars with the curtilage of the high architectural ashlar masonry structure and the aerial is incongruous to the setting;

(v) Scottish Water signs alerting the presence of 24 hour video surveillance at the Mugdock Reservoir causeway entrance on Mugdock Road have been secured directly onto the gate pillar and pillar cap, detracting from the appearance of this popular gateway. There are also many other signs at reservoir entrances which appear temporary and obtrusive.

CONCLUSION

3.34. The findings of the visual analysis will be used to inform the conservation management and development proposals. The landscape compartments will form the framework for developing policies and proposals. These will seek to respect and restore important views and spatial qualities. Proposals to mitigate or remove discordant features and to preserve the sense of place will also be explored.

LANDSCAPE CHARACTER ASSESEMENT

3.11. The Landscape Character Assessment (LCA) of Glasgow and the Clyde Valley was undertaken for Scottish Natural Heritage in 1998. It defines the area of the Milngavie reservoirs as being within the 'Drumlin Foothills' landscape character type, which extends to both the east and west of the reservoirs. The LCA identifies the key characteristics of this landscape as being:

- *"distinctive undulating landform created by glacial deposition, subsequently modified by glacial erosion;*
- *area of transition from lowland areas to the Rugged Moorland Hills (landscape type);*
- *dominance of pastoral farming in lower parts of the hills, giving way to areas of moorland vegetation in more elevated and exposed areas;*
- *combination of semi-natural woodland along incised burns, farm woodlands, small conifer plantations and along the northern edge of the hills, more extensive areas of mixed and coniferous woodland."*

3.12. The LCA identifies a number of forces for change in this landscape type which can be summarised as follows:

- decline and incremental loss of farm woodlands and shelterbelts;
- urban fringe decline of agricultural land and changes in land use from agricultural to recreational uses, e.g. golf courses and horse keeping;
- mineral extraction, particularly sands and gravels;
- development pressures on the urban edge, particularly for residential expansion and infrastructure.

3.13. In recent years, these forces for change have manifested themselves in the development of the Esporta Leisure Complex, the Katrine Water Project and the most recent release of urban fringe land for housing on the north-eastern edge of Milngavie. These developments have, or will, impact on the views from the Milngavie reservoirs, particularly from the outer rim of Craigmaddie.

3.14. If the visual amenity of the Reservoirs' landscape (and its collective listed status) is to be protected, then careful consideration will have to be given in the future to the visual impact of new developments within the Zone of Visual Influence of the Reservoirs' key viewpoints. The integrity of existing woodland belts and tree lines will be an important factor in providing visual containment; but the scale, location relative to topography, layout and detailed design (colours, materials, etc.) will also affect how future developments change the urban fringe landscape. **Figure 2** indicates areas of particular visual sensitivity in which development could impact negatively on the setting of the Reservoirs. It also identifies key visual boundary elements, which should ideally be maintained or reinforced.

LANDSCAPE COMPARTMENTS

3.15. At a local scale, it is possible to subdivide the Milngavie Reservoirs' landscape into a set of Landscape Compartments which will be used as the framework for developing conservation-management policies. Eight compartments have been defined as illustrated on **Figure 3**; these are described below.

Compartment 1: Mugdock Reservoir

3.16. This compartment comprises the open water and peripheral landscape of Mugdock Reservoir, which includes two Gauge Basins, the Measuring Pond and Aqueduct Outlets. It also includes the ornamental planting areas immediately to the north and east of the Measuring Pond. The west boundary extends to include the enclosed field within Scottish Water ownership to the west of the Mugdock Road. The north and east boundaries are defined by the rubble stone wall, adjacent to the 'Lovers' Walk' and the central causeway respectively. The south boundary of this compartment extends to include the open waterbody of Tannoch Loch, which is outside Scottish Water ownership but visually linked to Mugdock Reservoir.

3.17. Mugdock Reservoir was the first of the two main waterbodies to be constructed; it fits more naturally into the topography than Craigmaddie Reservoir and consequently has more enclosure and intimacy than its neighbour. The steep wooded banks of Barrachan Hill to the north provide a particularly attractive backcloth while the trees and walls along Mugdock Road also help to frame the reservoir. These features create interesting reflections in the water and help to create a more 'natural' character, despite the obvious influence of the reservoir structures and ornamental planting. The masonry structures at the head of the reservoir are particularly fine and represent key landmarks (arguably the climax) of any circuit of the reservoir. The designed relationship of reservoir architecture and its associated planting is a fundamentally important characteristic of this and other central compartments. The dam of the reservoir affords commanding views over Tannoch Loch and the surrounding residential area (Tannoch Conservation Area). Conversely the dam and associated structures are essential elements in views from within the Tannoch area.

3.18. The high numbers of visitors to this area and its high visibility from Mugdock Road and the Tannoch Loch area determine that this compartment is highly sensitive to development or change. The loss or introduction of planting around its perimeter would have a significant impact on views and intervisibility with adjacent areas. Any decline in the condition of masonry structures including boundary walls would have a major negative impact on the compartment's character and visual quality. There is consequently very limited capacity for new development, although well sited and designed furniture (benches) and signs in restricted numbers could be accommodated. Any adjustments to the Mugdock Road car park could impact on the visual amenity of this compartment e.g. if parked cars become more visible or urbanising features such as lights and road signs are introduced then these could impact negatively. Developments within the residential area below the dam could also have a negative impact if not well designed and integrated within the conservation area. The Scottish Water owned field to the west of Mugdock Road has some topographic enclosure and its separation from the reservoir site determines that it is less visible and less visited. This may provide capacity for sensitive land use changes which do not alter its rural green character e.g. introduction of woodland or footpaths, grazing/meadow management etc. However, building development would be highly intrusive and could affect views from the south-east over Mugdock Reservoir.

Compartment 2: Barrachan Wood

3.19. This compartment comprises of the old and ancient woodland of plantation origin and includes the Dirty Dam open waterbody. The north boundary is defined by the continuous perimeter wall which defines the historic extent of the Reservoir complex and Scottish Water ownership. It includes the open swale, channelling intercepted surface water run-off and water emanating from underground springs. The west boundary is demarcated by the perimeter wall which aligns 'Lovers' Walk' on the north-east bank of Mugdock Reservoir. The east boundary extends to the

MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Visual Sensitivity**

Scale 1/7000

Extreme

Moderate

Visual Horizion

Figure 2

LAND USE CONSULTANTS

MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Landscape Compartments**

Scale 1/7000

Compartment 1: Mugdock Reservoir
Compartment 2: Barrachan Wood
Compartment 3: Barrachan Farm
Compartment 4: Katrine Water Project
Compartment 5: Craigmaddie Reservoir
Compartment 6: Water Works
Compartment 7: Craigash Farm
Compartment 8: Mugdock Bank
Compartment 9: KWP Bankelle Site

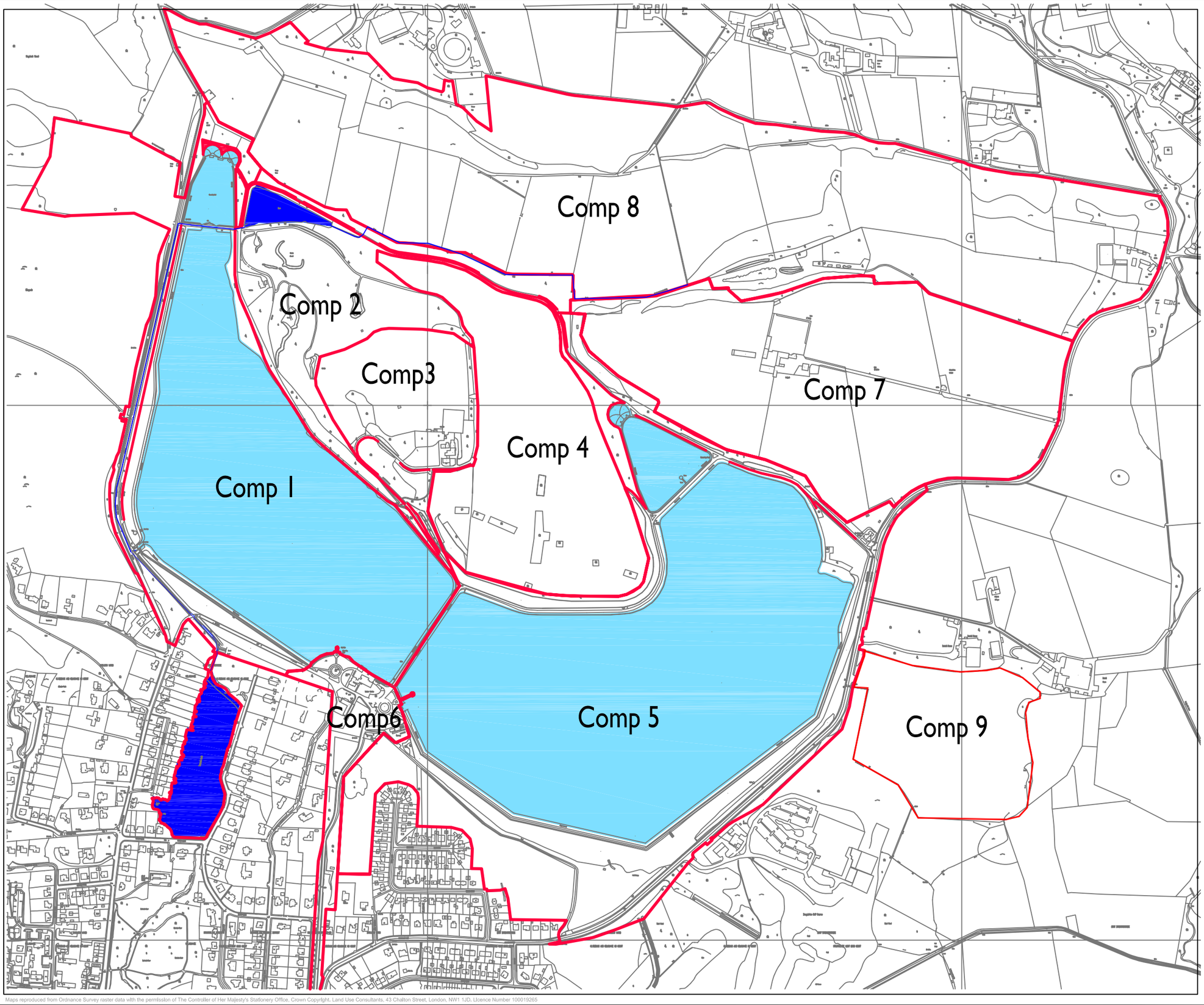


Figure 3

LAND USE CONSULTANTS

4. AUDIT OF LANDSCAPE COMPONENTS

4.1. This chapter seeks to describe the nature and condition of the reservoirs site by its physical attributes and component parts. This audit provides the basis for an assessment of the conservation requirements and recreational opportunities. The audit includes the following:

(i) Geology, Topography and Hydrology;

(ii) Archaeology;

(iii) Buildings, Monuments and Reservoir Structures;

(iv) Landscape Structures;

(v) Access Routes and Hard Surfaces;

(vi) Recreation Facilities;

(vii) Trees and Woodlands;

(viii) Horticultural Interest;

(ix) Ecological Interest.

GEOLOGY, TOPOGRAPHY AND HYDROLOGY

4.2. The site is located within the 'Midland Valley' of Scotland. The underlying geology is principally sedimentary, comprising carboniferous limestones and gritstones. The area also has igneous intrusions in the form of basaltic plugs, dykes and sills. In several locations, these resistant rocks form distinctive topographical features including outcrops on knolls and ridges. The scarp cliffs of the Campsie Fells are a dramatic example.

4.3. Locally, the Milngavie Sill, a horizontal layer of Basalt with a high soda content (Mugearite) intruded into the sedimentary rocks formed in the Carboniferous Era. The Milngavie Sill underlies the causeway between the Mugdock and Craigmaddie Reservoirs. It once yielded the springs of clean fresh water, known as the Wells of Milngavie.

4.4. Glacial activity around 50,000 years ago shaped much of the topography of the area. Characteristic features of this undulating glaciated landscape are drumlins, distinctive hog-backed ridges created by deposition under the ice and elongated by the movement of the ice sheets. Several of the drumlin hills in the Milngavie area have formed around pre-existing resistant hills, several of which are igneous features.

4.5. The hills at Barrachan and at Craigash are such features where the proximity of hard rocks close to the surface is visible as small cliffs and has facilitated quarrying for building stone. Much of the extensive walling and revetment pitching was consequently constructed of locally quarried basalt (whinstone).

4.6. The reservoirs site occupies high ground above the settlement of Milngavie. The lowest area of the site, c.80m AOD, is at the foot of Commissioners' Drive entrance on Strathblane Road. The highest point, c.140m AOD, can be found along the field boundary between Barrachan Wood and the field to the north of Barrachan. When full, the water level in Mugdock Reservoir sits at approximately 100m AOD, Craigmaddie Reservoir sits slightly lower at 98m AOD (**Figure 4**).

4.7. The site's natural topography was substantially altered, firstly during the construction of the Mugdock Reservoir, in particular the gauge basin and measuring pond constructed in cut, and the formation of the clay embankment above Tannoch Loch. Secondly, when a clay embankment measuring 1 kilometre in length was formed to retain the water stored in the Craigmaddie Reservoir.

4.8. The site's natural hydrology was substantially modified by Bateman in order to segregate surface water run off from the Loch Katrine clean water supply in 1856-59 (**Figure 5**).

4.9. Bateman's proposals collected the surface water run-off from the bluff slope known as the 'Mugdock Bank' in an open swale running parallel with the north boundary perimeter wall. His proposals brought the water into the site and feeds into the Dirty Dam open waterbody. From here, the water enters into a pipe located below the causeway separating the measuring pond and the reservoir waterbody, passes beneath Drumclog Road and is discharged into an open swale, 400 metres long, which runs parallel with Drumclog Road along its west side. The rubble lined open swale is then culverted beneath Drumclog Road, where it re-enters into the reservoir site where it continues as an open swale for approximately 120 metres, where a juncture between the Mugdock reservoir overflow the open swale enters an ashlar masonry channel and discharges into the Tannoch Loch, which feeds the Tannoch Burn, prior to entering the Allander Water course, itself a tributary of the River Clyde.

4.10. A fresh water spring, known as the Barrachan Well, is situated within a shelterbelt to the north of Barrachan. The location of where the spring emanates has been formalised.

ARCHAEOLOGY

4.11. There are no records of significant archaeological features within the reservoirs' site although it is possible that given its commanding location, detailed investigation in the less disturbed areas of Barrachan Hill may reveal some archaeological interest related to land uses which pre-date the construction of the reservoirs. Historic elements of the earlier farm landscape remain, most notably the ruined dry stone walls, ditches and the small well on the north drive approach to Barrachan. The historic structures of the reservoirs, including earthworks, are not considered to be 'archaeology' at this point in time despite their industrial heritage importance. This is because they remain in use as intended. Within the vicinity of the reservoirs site, but outwith Scottish Water's ownership, are the following known archaeological sites: situated on the brow of the 'Bank of Mugdock' is St. Patrick's Well, which according to an account from 1886 consisted of a rock pool of clear water fed by a small spring which used to be a sacred well visited by many pilgrims until the beginning of the 19th century; standing stones and cists at Middleton, now lost; formerly, a row of standing stones, the largest of which was a huge block of freestone, known locally as the 'Law Stone of Mugdock', the stones were broken up for use as building stone.

MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Topography**

  Scale 1/7000

  5m contours

Figure 4

LAND USE CONSULTANTS

MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Hydrology**

Scale 1/7000

Open Reservoir waterbody

Water supply pipelines

Intercepted Water Bodies

Intercepted run off channels and culverts

Figure 5

LAND USE CONSULTANTS

Archaeology: Conservation Needs

4.12. In the absence of any definitive records on archaeological interest within the Milngavie Reservoirs site, it is not possible to prescribe any specific conservation requirements. However, given that urns were excavated at Hillend, it would be prudent to undertake archaeological investigations in any areas subject to new developments or earthworks in the future. As part of the conservation programme it would also be important to preserve the remains of old farm walls, and other structures which pre-date the reservoirs.

BUILDINGS, MONUMENTS AND RESERVOIR STRUCTURES

4.13. The Milngavie Reservoirs site, which includes the Mugdock and Craigmaddie open waterbodies, together with all associated masonry structures, is Category B listed. Category B status reflects that the reservoirs site is *"of regional or more than local importance, or (represents) major examples of some particular period, style or building type which may have been altered."* The reservoirs' listed status was awarded by Historic Scotland on the 14th May 1971.

4.14. The listing description reads *"Mugdock reservoir ready 1855 and the Loch Katrine scheme leading to it completed 1859. Craigmaddie reservoir opened 1896. Tunnel entrances, retaining walls and bridge present a good example of engineering architecture."*

4.15. The buildings component of this section addresses the following and is referenced on **Figure 6**:

- B1 Commissioners' House (Mugdock Cottage)
- B2 Modern Water Treatment Buildings
- B3 Barrachan Cottage
- B4 Barrachan Barn
- B5 Barrachan Hall
- B6 Craigholm Cottage
- B7 Craigmaddie Lodge
- B8 Public Conveniences
- B9 Pump Houses

4.16. The monuments component of this section addresses the following:

- M1 Gale's Monument

4.17. The reservoirs structures component of this section addresses the following:

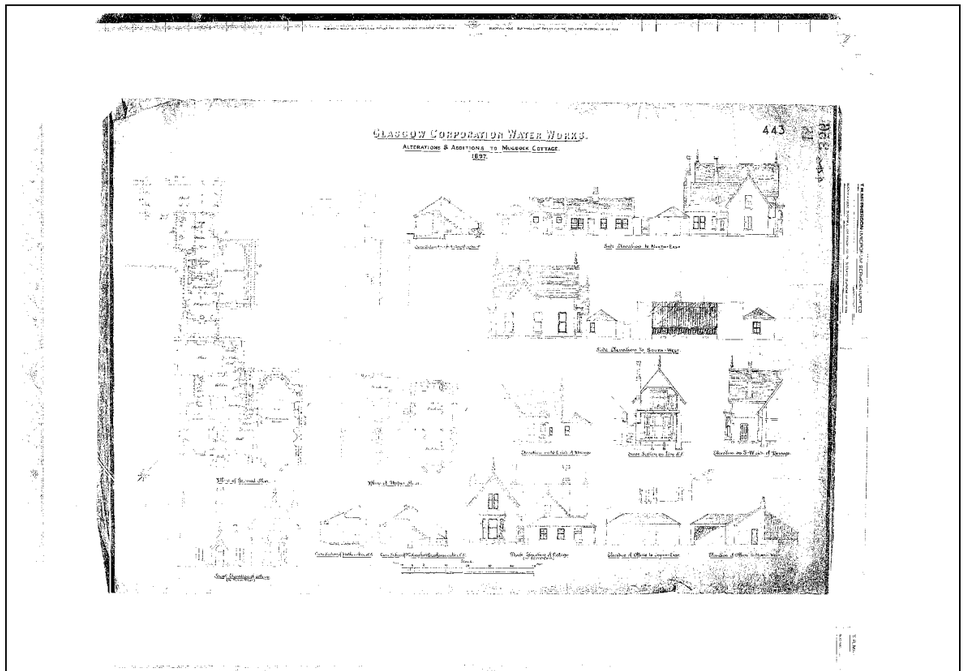
- R1 Mugdock Reservoir Gauge Basins
- R2 Mugdock Measuring Pond
- R3 Mugdock Causeway
- R4 Mugdock Causeway entrance gateways
- R5 Mugdock Causeway, East Pedestrian Gate Pillars
- R6 Mugdock Reservoir revetments
- R7 Mugdock Reservoir overflow
- R8 Mugdock masonry rill
- R9 Mugdock Reservoir Draw Down Tower
- R10 Mugdock Reservoir Straining Well
- R11 Mugdock Masonry Header Walls
- R12 Craigmaddie Gauge Basin
- R13 Craigmaddie Measuring Pond
- R14 Craigmaddie Causeway
- R15 Craigmaddie Reservoir revetments
- R16 Craigmaddie Reservoir Draw Down Tower
- R17 Dam
- R18 Criagmaddie Reservoir overflow channels
- R19 Dirty Dam feeder swale
- R20 Dirty Dam Outfall
- R21 Dirty Dam swale

Buildings

Commissioners' Cottage (B1)

4.18. Commissioners' Cottage, also known as Mugdock Cottage, is a one and two storey structure constructed in blonde sandstone with a slate pitched roof. Originally, Commissioners' Cottage was an elegant, single storey dwelling with a symmetrical west elevation centred on the entrance porch with sash and casement windows on either side. Ornamental carved barge-boards were a particular feature of this building. In 1888, Commissioners' Cottage was substantially modified and extended. A two storey wing was added to the southern end of the cottage and the main doorway was relocated to the position of an original window. This maintained a central location within the modified west elevation. Glasgow Corporation Water Works plans dated 22nd July 1888, signed by Chief Engineer James M. Gale, reveal the extent of the additions. Later Glasgow Corporation plans dated 1897 reveal further additions including outbuildings. The general layout plan dated 1897 reveals the surrounding context of Commissioners' Cottage at that time. A 'D' shaped drive is centred upon the principal elevation, reflecting that the entrance of the cottage was originally aligned with the adjacent straining well.

4.19. To the east of Mugdock Cottage was a conservatory with adjoining building. The lean-to glasshouse has been lost but the adjoining building remains as part of the Water Treatment Works.



Commissioners' Cottage

Modern Water Treatment Buildings (B2)

4.20. In the latter part of the 20th century, the water treatment process was improved and a number of additional buildings were developed in the immediate vicinity of Commissioners' Cottage and the Straining Wells. The former conservatory was removed and the associated masonry lean-to building and adjacent garage were incorporated within a complex of water treatment buildings which include the control room, lime silos, canteen, chlorine storage building and garage. The 'new' buildings have been given pitched slate roofs (except for flat roofed infill sections) but are easily distinguishable from the original stone buildings by their white rendered walls and functional appearance, e.g. absence of windows. The arrangement of buildings to the rear of Commissioners' Cottage creates a courtyard adjacent to the Mugdock Reservoir which is accessed via gates.

4.21. To the south of Commissioners' Cottage is another modern building which contains chlorination plant. It is a large flat roofed single storey building which appears incongruous and unsympathetic in such close proximity to the Cottage.

Barrachan Cottage (B3)

4.22. Barrachan Cottage is a simple, two storey building in blonde sandstone with a slate roof and chimney stacks on each gable. The principal elevation faces south over the reservoirs. It has an elevated front door in the centre, framed by twin sash and case windows with stone mullions. The upper floor has an asymmetrical arrangement of windows: two single and one twin. The latter has a dormer and is surmounted by a stone relief shield (no decoration). The rear elevation has two centrally located doorways and five windows including two twin windows to the stairwell and the kitchen.

4.23. Barrachan Cottage was developed as two residential flats by Glasgow Corporation Water Works and this entailed the segregation of access, with the upper flat only being accessible from the rear entrance.

Barrachan 'Barn' (B4)

4.24. The former 'Barn' at Barrachan Farm was converted into a residential property by Glasgow Corporation Water Works. In this case, the building was developed as semi-detached houses. Each house had a parlour, kitchen (with bed alcove) and entrance hall on the ground floor and two bedrooms and a closet on the upper floor. All rooms had fireplaces, hence chimney stacks at each gable and in the centre of the building. The Barn had lean-to coal sheds on its rear elevation.

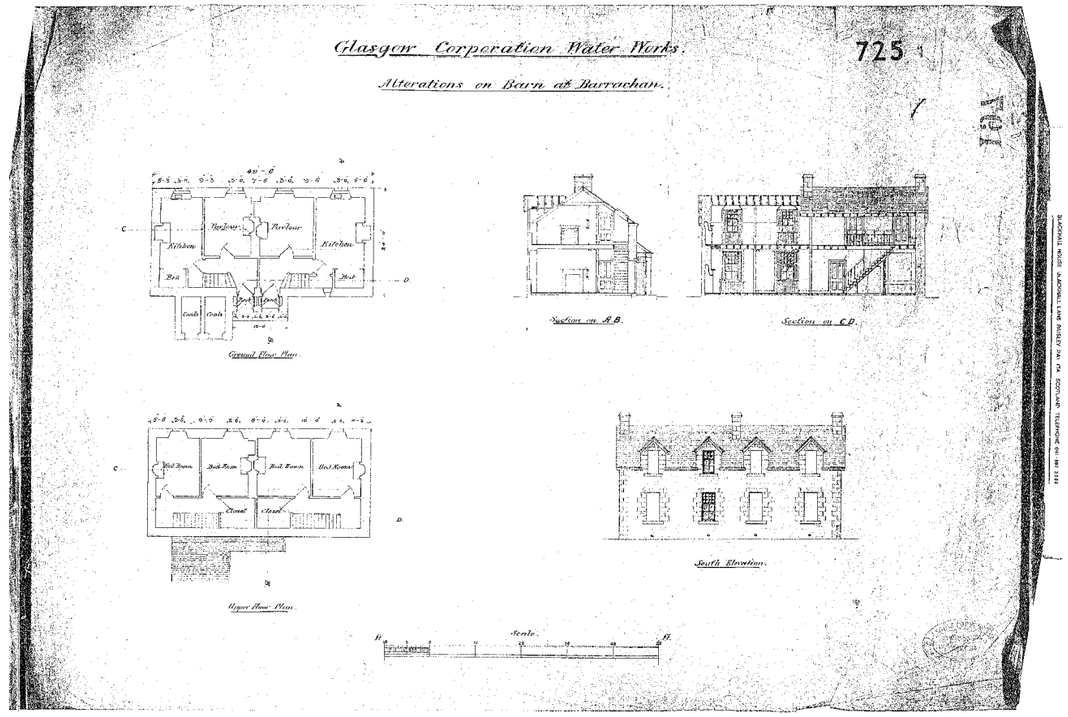
4.25. The 'Barn' is also constructed of blonde masonry, but it has weathered to a warm grey which appears distinctly different to the Cottage. The building has a slate pitched roof with four full dormer windows which enable the accommodation of bedrooms within the 1½ storey height of the building.

4.26. Both the Barrachan 'Barn' and Cottage are now disused, but were occupied until fairly recently. The preliminary inspection by Conservation Engineer revealed that the Barrachan buildings were in a stable, sound condition with no evidence of significant structural problems. Minor settlement possibly associated with drainage defects was identified and the need for roof repairs was noted as a priority item in order to prevent the onset of rot. Despite the water ingress to the Cottage over recent months, the roof structure appeared sound with no tell-tale evidence of deflections in the roofline or ceilings. Nevertheless, a full timber survey would be needed as part of future feasibility work. It was concluded that these residential buildings are readily repairable and adaptable without major structural repairs.

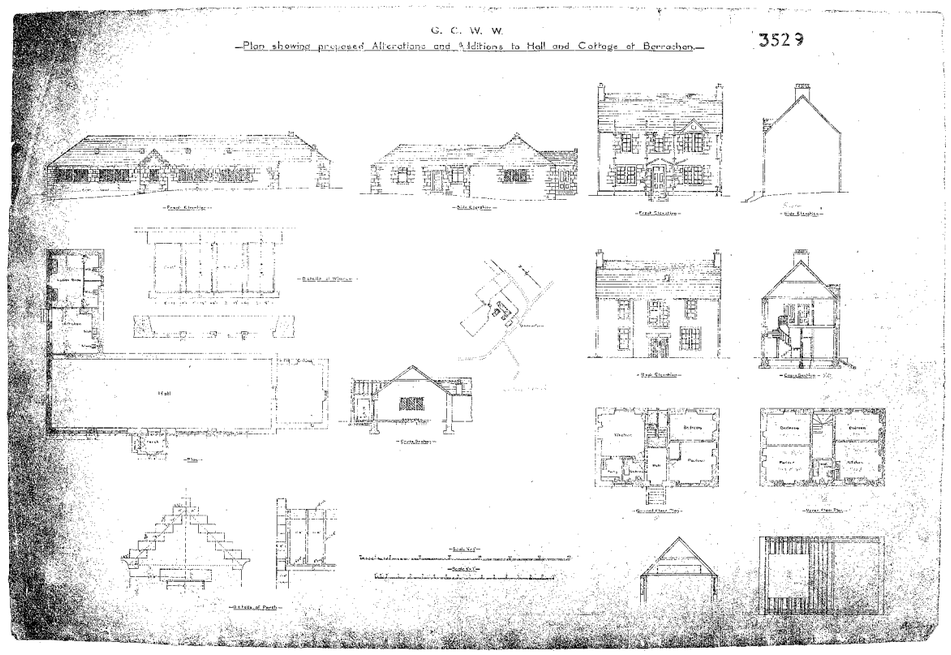
Barrachan Hall (B5)

4.27. Barrachan Hall is a sizeable single storey building of blonde sandstone with a slate roof. It has an 'L' shaped layout which originally contained a large open-plan hall with a service wing containing a 'Ladies Room' and a kitchen on its western side. At the north end of the hall is a separate chamber (formerly connected by a doorway) the original use of which is unknown.

4.28. The principal elevation of the Hall is on its eastern side and this has four sets of four windows and an entrance porch with a crow-step gable. To the east of the Hall is a hardstanding area framed by rubble walls. In recent years, the Hall has been internally modified to provide storage rooms and office space. These alterations were not completed by Scottish Water, but the Hall remains subdivided.



Barrachan Barn



Historic Plans for Barrachan Cottage and Hall

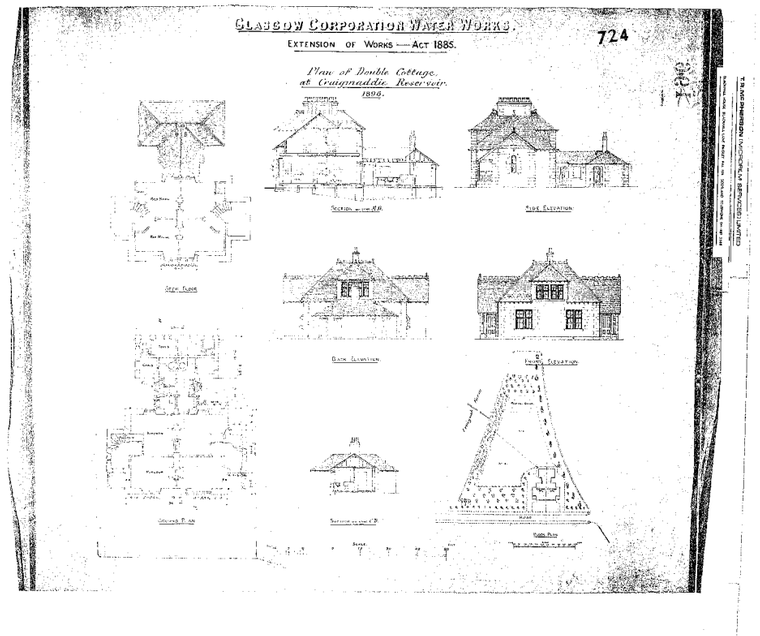
Craigholm Cottage (B6)

4.29. Craigholm Cottage is located on the north bank of Mugdock Reservoir, close to the Gauge Basin. It was constructed in the mid 19th century but extended in 1885 as indicated in the Glasgow Corporation Water Works drawings, which form part of the 1885 Extension of Works Act. The resultant Craigholm Cottage is a two storey domestic dwelling constructed in coursed ashlar masonry with a slate roof. The principal symmetrical façade incorporates a full height central projection which incorporates the front entrance. The doorway is framed by a pair of double sash and casement windows with stone mullions. The upper floor has three single sash and casement windows. All windows have raised ashlar margins. The dwelling has three chimney stacks to the roof line, two to the gable ends and a higher centrally located stack. To the rear of Craigholm Cottage is a single storey extension which connects with an 'outhouse' which originally contained toilets and coal cellars. A number of unsightly sheds are also present within the cottage grounds; these have become visible since the recent clearance of trees and sheds.

4.30. Craigholm Cottage is currently owner occupied as a private residence. It is, therefore, outside the responsibility of Scottish Water.

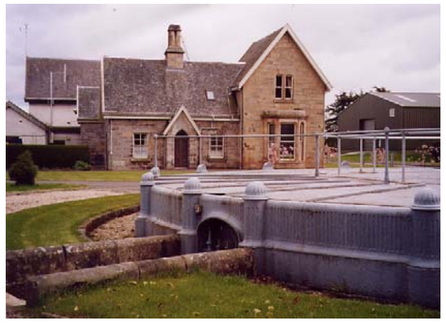
Craigmaddie Lodge (B7)

4.31. Craigmaddie Lodge is located adjacent to the gateway on Strathblane Road on the north eastern side of Craigmaddie Reservoir. Glasgow Corporation Water Works drawings, which form part of the 1885 Extension of Works Act, illustrate the original design proposals for Craigmaddie Lodge. The two storey symmetrical building is in fact divided into two dwellings, each with separate back garden areas. Water Department plans dated 1947 and 1948 reveal proposals for the addition of a hot water supply, water closets, and a septic tank to service the dwellings.



Historic Plans for Craigmaddie Lodge

BUILDINGS



Commissioners' Cottage & Straining Well

Commissioner's Cottage& Water Treatment Works additions

Barrachan Cottage

Barrachan 'Barn'

Barrachan rear elevations

Barrachan Hall

Toilet

Craigholm

Craigmaddie Lodge

Redundant small buildings

MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Monuments and Reservoir Structures**

Scale 1/7000

Water works buildings

Owner occupied Dwelling

Figure 6

LAND USE CONSULTANTS

MILNGAVIE RESERVOIRS

SCOTTISH WATER

Landscape Structures and Boundary Features

Scale 1/7000

- Metal Strap Fence
- Stone Walls
- Ruined wall
- Cast Iron Post and Strap Fence
- Stone pitched revetment
- Ashlar Masonry
- 2.8m Metal Mesh Fence
- Gate Pillars

Figure 7

LAND USE CONSULTANTS

Public Conveniences (B8)

4.32. The Public Conveniences are located at the top of Commissioners' Walk adjacent to the boundary wall. This small grouping of single storey buildings was constructed in 1885 under the Extension of Works Act. The buildings are constructed of ashlar masonry of random sizes and brought to courses. The roof is slate. The main building is rectangular and has an entrance door with a projecting timber porch and a sash and casement window within the gable end. This building has a sympathetic extension which respects the proportions of the masonry structure. It is rendered with a rough textured harling and has a slate roof of the same profile as the original.

4.33. To the rear of the main building is a small annex which was added to provide extra toilets. It was built onto the acute angle of intersecting walls and has consequently a wedge shaped footprint. The annex has a separate entrance with screen wall.

Public Conveniences: Conservation Needs

4.34. The Public Conveniences buildings are disused but intact. The toilets are in a poor condition and no longer suitable for public use. Internal refurbishment or conversion will be required to allow these buildings to be brought back into use. A detailed survey and feasibility study is required to assess conversion options as discussed in Chapter 5.

Pump Houses (B9)

4.35. There are 6 nr. pump house structures in total, located both within and outwith the reservoirs site. Typically, they are constructed on a concrete plinth, with an exposed lower base course of imperial size engineering bricks. Above the plinth, the walls are white rendered. The roofs are of timber construction and were originally covered in slate with cast iron rainwater goods.

Pump Houses: Conservation Needs

4.36. All 6 nr. pump houses are in a dilapidated and dangerous condition. Some have lost their roofs and the majority have lost windows and doors. Some pump houses in remoter outlying locations still contain machinery. The dilapidated nature of these structures would allude that they have served no functional purpose for some time, therefore, the removal of these unsafe, unsightly and discordant structures should be undertaken, the concrete plinth broken out and the landscape reinstated.

Monuments

Gale's Monument (M1)

4.37. Gale's Monument was erected by colleagues at the Glasgow Corporation Water Department to the memory of James Morris Gale (1852-1902) MInstCE, Chief Engineer of the Craigmaddie Reservoir and associated works. Mr. Gale was responsible for supervising the entire engineering staff under his control, and his duties included maintaining the works in perfect repair. The inscription reads *"This monument was erected by the employees as a token of respect and esteem."*

4.38. It is rather an unusual monument, which would not look out of place in a Victorian grotto. It dates from 1904, a time when the Art Nouveau movement was influential. The cast bronze drinking bowl, complete with folds, resembles an unfurling leaf or flower and has been exquisitely executed and cast. The wall-mounted plate has in inscription in upper case letters in Art Nouveau style. The bronze relief bust panel of Gale is mounted comfortably within a rough-hewn granite block. The monolithic granite block surmounts an assemblage of smaller quartz boulders, which have been haphazardly arranged. The rugged character of the monument is complemented by the Alpine plants, which grow from the crevices of the quartz boulders. 2 nr. square granite bollards frame the base of the monument.

Gale's Monument: Conservation Needs

4.39. As can be gleaned from the then and now comparison, the ground level surrounding the monument has been raised by circa 100mm. This has resulted in the loss of the plinth base containing the drainage grating, as well as the lower 100mm of the quartz boulders and granite bollards. Restoration of the original ground level around the monument would allow its full appreciation.

4.40. The water outlet at the centre of the bronze plaque has been cut off and a blanking plate fitted to cover the aperture. A crude tap has been fitted below the bronze drinking bowl to provide a water supply to the lower stone drinking bowl. The drinking cups and chains, along with the bollard chains, are lost. With the exception of the above lost features, the Gale's Monument is in very good repair and is structurally sound. Given the prominence and context of the drinking fountain, its full restoration would be desirable so that Gale's Monument can once again fulfil its dual role as a drinking fountain.

Reservoir Structures

Mugdock Reservoir Gauge Basins (R1)

4.41. Originally, there was a single gauge basin, the westernmost basin, feeding a clean water supply into Mugdock Reservoir. This is illustrated in historical photographs and accounts for the asymmetrical relationship on plan between the two gauge basins. Although a later addition, the detailing of the masonry associated with the second gauge basin is indistinguishable from the first. The individual gauge basins consist of curved masonry header walls with centrally located Florentine arch apertures which discharge water from the Loch Katrine aqueducts. The walls are surmounted by a continuous ashlar stone saddle cope, which accommodates the radius as well as the change in level. The wall ends in two fine ashlar pillars. The radius header wall comprises squared ashlar blocks brought to courses. The curved masonry walls which segregate the gauge basins into three compartments are also constructed in ashlar, with rectangular apertures to allow the passage of water between compartments. The curved perimeter retaining masonry walls of the gauge basins mirror the internal compartment walls in construction and are surmounted with cast iron posts and wrought iron rails. The weir bridges comprise iron beams infilled with concrete. These originally had timber decks.

4.42. The hollow cast iron posts which measure 37½ inches high (952.5mm) are mounted onto circular base plates 12 inches diameter (305mm) secured by 4 no. threaded dowels and square nuts. The shaft of the post measures $5^{1/8}$ inches square (130mm) at the base and 4¼ inches at the top. The capping piece to the posts are $6^{1/8}$ inches square (155mm). The balustrade consists of 3 nr. solid square bars on edge. The top bar measures 1 inch square, while the middle and lower bars measure $^{7/8}$ inch square. An intermediate 'L' shaped 1½ inch flat bar is fixed to the lower bar and secured onto the stone cope midway between posts.

4.43. Located to the north of the gauge basins are three formal staircase entrances to access the aqueduct tunnels. These entrances typically consist of ashlar masonry structures with a cast iron balustrade with rounded top, middle and bottom rails.

4.44. A dished stone drainage channel is located around the outer edge of the perimeter path to the gauge basins. It consists of both radius and straight lengths of stone and terminates in a dished rectangular end stone, which would have originally housed a cast iron grate.

RESERVOIR STRUCTURES

Mugdock Reservoir Gauge Basin headwalls

Mugdock Reservoir Gauge Basin weirs

Graigmaddie Gauge Basin headwall

Mugdock Gauge Basin walls

Drawdown Tower (Craigmaddie)

Ironwork Structures

Culvert access

Mugdock Weir & bridge

Intercepted water channel

Masonry Tower - Craigmaddie

Main Causeway Revetment

Mugdock Reservoir Gauge Basins: Conservation Needs

4.45. The exemplary condition of these masonry structures is a testimony to both the detailing of the masonry structures and to the standard of workmanship. They endorse Bateman's convictions that the water works would *'with very slight attention, remain perfect for ages, which for the greater part of it, is as indestructible as the hills through which it has been carried."*

4.46. Recommended remedial action includes the removal of vegetation, typically mosses and ferns, growing in the joints of the masonry structures.

4.47. The cast iron posts are structurally sound, however, the paint finish is failing. Recommended remedial measures include the removal of the numerous coats of paint, and a paint scrape and analysis to determine the original paint colour. The horizontal rails have more extensive signs of rust and should be stripped back to sound metal and repainted. It is possible that replacement rails will be required and these should ideally receive a robust anti-rust treatment. It would be desirable to match the original metalwork colour. The bridge structures were originally decked with timber beams, which were replaced by concrete. Consideration should be given to reinstating the original timber beams.

4.48. The entrances into the aqueducts are structurally intact, however the treads to the stone steps are slippery and should be cleaned. The metalwork is intact and should receive the same paint finish as the surrounding metalwork.

4.49. Vegetation typically grass should be removed from the dished channels and the missing grate reinstated into the end stone.

Mugdock Measuring Pond (R2)

4.50. The perimeter revetments to Mugdock measuring pond are constructed in random rubble at a gradient of approximately 1:2. The top section of the revetment, above the water line, has been colonised by grasses and self-seeded tree saplings. The causeway which discharges into the measuring pond, known as 'Mugdock Falls' consists of 4 nr. stepped weirs separated by raking ashlar masonry retaining structures jointed with Lime mortar. The subtle curvature and structural integrity of the causeway is pleasing to the eye. The large masonry blocks, which comprise the steps are robust and functional. A metal strap fence defines the perimeter of the measuring pond. It has 'I' section posts and horizontal rails: 3 nr. flat bars and a square solid steel bar on edge as the top rail. Early photographs of Mugdock Reservoir show that this fence was not an original feature, but added later as a safety measure.

Mugdock Measuring Pond: Conservation Needs

4.51. As is the instance with the gauge basin, vegetation should be removed from the joints of the masonry structures. The stone revetments are largely sound, however, some stones have worked free and should be reinserted into their original locations. The colonisation of the upper revetment by grasses does not appear problematic, however, the self-seeded Hawthorn and Birch saplings are potentially damaging to the structure and should be removed. As with the metalwork to the gauge basin, the paint coating has failed in places to expose the metalwork to corrosion. Ideally, the existing coats of paint should be removed, defective lengths of corroded metalwork replaced and repainted to match the original colour. The metal strap fence line has deflected along its length and should be realigned to line and level.

Mugdock Causeway (R3)

4.52. The causeway separating the measuring pond from the reservoir body is a masonry structure with a central viaduct section comprising three arches which regulate the passage of water between the two open waterbodies. The causeway measures 3 metres in width and is flanked on either side by splayed masonry walls which measure 1 metre in height on the inner face. The masonry walls are topped by a saddle cope stone 450mm in width, with a 35mm overhang on both sides. The cope lengths vary, but average 800mm in length. The masonry walls are built off a plinth course and are constructed from rough hewn squared stone which has been brought to 4 nr. courses. The walls are omitted over the viaduct, where the cast iron post and rail fence detail is used. The latter maximised the visitor's enjoyment by permitting views across the reservoir and the gauge basin. However, the recent (2003) introduction of the continuous wire mesh fencelines to either side of the causeway greatly detracts from this vantage point.

Mugdock Causeway: Conservation Needs

4.53. Generally the masonry walls require the repointing of lime mortar to the joints between the saddle cope stones and some minor repointing to the joints between the stone courses. The first cope to the south east wall is displaced and requires to be realigned. There are a number of self-seeded tree saplings which have become established in the joints along the length of the south west wall which must be removed to prevent localised displacement of the structure.

Mugdock Causeway, Road Entrance Gateway sand West Side Gates (R4)

4.54. The causeway entrance from Mugdock Road is defined by masonry gate pillars with a pair of wrought iron gates. The stone gate pillars, including the capping piece, consist of rough-hewn squared sandstone brought to courses. The pillars measure 620mm square, the capping piece measures 250mm in height and 750mm square. The pillars stand 1.8 metres above ground level. The perimeter wall splays to accommodate the entrance, which is set back from the road. The gates were commissioned in 1919 and have an Art Nouveau character. This design was used in several locations across the site. They are constructed from solid iron bars, in both square and flat sections. The central panel of each gate has a thistle-like motif and two curved lengths of flat bar which add visual interest. Each gate has a single hinge and was originally supported on a base plate. They were secured by a lock and drop bolt. The causeway gates are now in poor condition as are the gates on Mugdock Road at the south-west corner of the reservoir.

4.55. Just inside the Mugdock Road Entrance are side gates to the perimeter footpath. These entrances on the east and west sides of the measuring pond causeway were originally designed to be symmetrical: each footpath accessed between stone pillars with curved stone caps. These are hewn from single pieces of stone into a tapering pillar which measures 450mm square at the top and 550mm around the base. The pillar has an overall height of 1.65m above ground level. The south-west gate pillars were however removed in c.1970 and the north-west gateway was widened in 2002-3 by the removal of a gate pillar and over 1m of adjoining wall (on the western side of the perimeter path). These modifications have ruined the architectural symmetry of Bateman's design in this high profile area. In addition to masonry removals, original 'Art Nouveau' gates have been replaced by crude wider facsimiles. It is understood that this work did not receive listed building consent and that some of the original components are being held by Scottish Water for future reinstatement.

Mugdock Causeway, Mugdock Road Entrance Gates: Conservation Needs

4.56. The original symmetry of the Mugdock Reservoir measuring pond causeway side gates should be restored, ideally reinstating the lost pillars (if in a suitable condition) or newly constructing masonry pillars and walling to the quality of the original structures. The existing masonry gate pillars are intact and do not require any remedial work. However, the gates are in poor repair and require refurbishment. The northernmost gate has been unsympathetically re-hung, the base plate sits elevated and should be reset flush with the surrounding ground level. The southernmost gate has become embedded into the path surface during path surfacing works rendering the gates inoperable. The pedestrian gates at the south-west corner of the reservoir are badly corroded and although not currently used, they require refurbishment. Ideally, these sets of gates should be removed off-site, sandblasted to remove the existing coats of paint and to enable defective sections to be repaired. The gates should be repainted with primer and topcoats to the original colour scheme. They should then be re-hung and returned to their original working order.

Mugdock Causeway, East Pedestrian Gate Pillars (R5)

4.57. Two pairs of monolithic sandstone gate pillars close the perimeter path network at the east end of the causeway. Again, these pillars have been hewn from single pieces of sandstone, they are tapered with a curved top profile and display a fine picked chiselled finish. Both pairs of stones have hanging brackets and cast iron stopping plates embedded into the pillars to receive the lost gates.

Mugdock Causeway, East Pedestrian Gate Pillars: Conservation Needs

4.58. The pairs of gate pillars are structurally intact, but there is a need to reinstate the 2 nr. 'lost' metal pedestrian gates, based upon historical evidence or to replicate existing gates elsewhere on site.

Mugdock Reservoir Revetments (R6)

4.59. The revetments to the reservoir match those of the measuring pond, however, they are substantially larger in scale, measuring between 15-18 metres in height. They are constructed of rough hewn whinstone blocks laid at an even gradient of approximately 1 in 2.

Mugdock Reservoir Revetments: Conservation Needs

4.60. Whilst structurally intact, the revetments are in need of localised repair. The current draw-down of the water level allows the full scale of repair requirements to be easily quantified. Generally, stones have become loosened or plucked from the revetment face. These require to be reset.

Mugdock Reservoir Overflow (R7)

4.61. The open water body has an overflow outlet which is located along the south west bank. The floor of the overflow measures 10 metres wide and 20 metres in length, (200m^2) and is constructed in ashlar masonry with simple manual sluice gates. The reservoir overflow ties into the adjacent masonry rill which carries the diverted dirty water course, eventually feeding into Tannoch Loch. The perimeter path crosses the overflow via a bridge span of 10 metres comprising iron beams on masonry piers with iron post and guard rails, replicating the structures of the gauge basins.

Mugdock Reservoir Overflow: Conservation Needs

4.62. Whilst structurally sound, the masonry floor of the overflow is compromised by a thin cover of vegetation which should ideally be removed to allow the repointing of defective joints with lime mortar. A capping piece to the hollow cast bollard to the bridge parapet is broken and a replacement bollard should be cast in ductile iron to replace the bollard. As elsewhere, the colour finish should be confirmed and reinstated.

Mugdock Masonry Rill (R8)

4.63. A U-shaped masonry-lined channel runs along the base of the dam carrying 'dirty' water into Tannoch Loch. The channel runs at a continuous fall along its 200 metre length. The sides and base of the rill are constructed in ashlar masonry with a fine picked chiselled finish, the capping stones are squared, in various lengths with a rough hewn finish.

Mugdock Masonry Rill: Conservation Needs

4.64. Despite the peripheral location of this structure, to enable its efficient function and full aesthetic quality to be appreciated, the surrounding vegetation should be removed and defective joints to the capping stones filled.

Mugdock Reservoir Draw Down Tower (R9)

4.65. The draw down tower is located in the open water body at a distance of 35 metres from the straining well. It comprises a round tower constructed in squared masonry with a rough hewn finish. The capping layer is constructed from dressed ashlar masonry and is surmounted by cast iron bollards with horizontal rails. The bridge section spanning between the tower and the bank is constructed from iron beams with a lattice parapet, handrail and parallel swan necks to give structural stability.

Mugdock Reservoir Draw Down Tower: Conservation Needs

4.66. Due to access restrictions imposed by Scottish Water, it was not possible to gain access onto the draw down tower to assess its conservation needs.

Mugdock Reservoir Straining Well (R10)

4.67. The Straining Wells are part of the original water cleansing process. Only the roof is visible above ground. This is constructed from interlocking cast iron panels. The well measures 15 metres in diameter and is 50 metres deep. The walls were filled with sand and used to filter out deposits as water passed down the well. This principle removed impurities from Glasgow's water supply for 150 years. A matching Straining Well also cleans water from Craigmaddie Reservoir.

Mugdock Reservoir Straining Well: Conservation Needs

4.68. Due to access restrictions, it was not possible to inspect the roof of the straining well up close, however, the refurbishment of the visible structure should be undertaken to treat corroded elements and a paint analysis carried out to enable the original colour finish to be reinstated. Due to the listed status of the structures, the Straining Wells are to remain in situ and Scottish Water has an obligation to preserve their integrity.

Mugdock Masonry Header Walls (R11)

4.69. There are two masonry retaining structures associated with the piped outfalls from the straining wells which run parallel with the south boundary and feed into Tannoch Loch. The first is a three sided structure at the foot of an embankment. The walls are constructed in ashlar masonry with concrete cope stones. The second has two apertures which allow water to flow into the masonry swales. This structure is constructed of squared masonry blocks, rough hewn with a smooth margin, brought to six courses including the capping stone. The large aperture arch is complete with a key stone.

Mugdock Masonry Header Walls: Conservation Needs

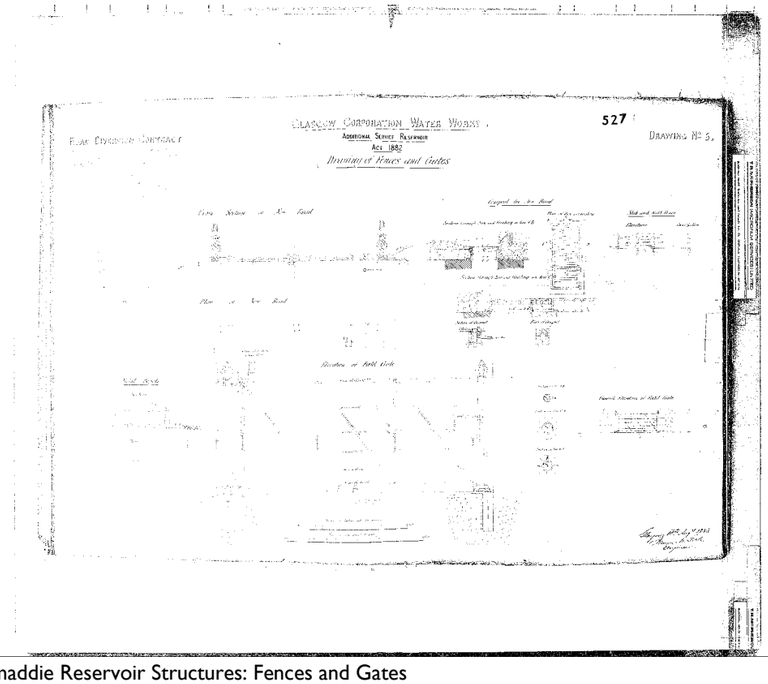
4.70. Neither structure requires any obvious remedial works.

Craigmaddie Gauge Basin (R12)

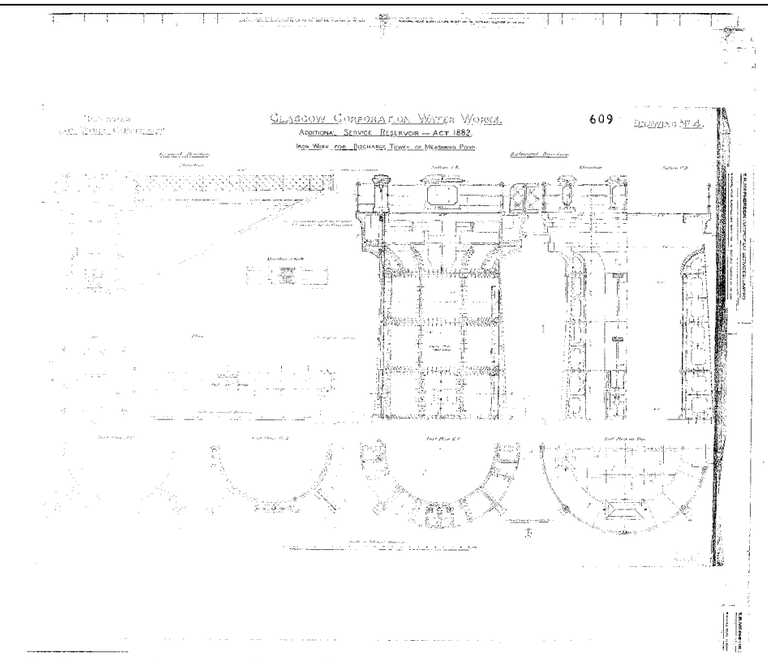
4.71. Whilst the Craigmaddie Gauge Basin is similar in plan to the Mugdock Gauge Basin, it has more ornamentation than its sister. Craigmaddie Reservoir was constructed as an additional service reservoir to Mugdock between 1885 and 1896. The Gauge Basin has a curved header wall constructed in ashlar blocks brought to courses and dressed with a rough hewn finish. The header wall is dominated by the centrally located ornamental panel, complete with triangular pediment. The pediment crowns the aperture and houses a granite panel inscribed with the names of four Lord Provosts, two Chairmen of the Water Board and James M. Gale, Engineer. The keystone of the aperture has a relief carving of a fish. The quoins to the aperture are embellished with six roll mouldings. The pillars which frame the central section of the header wall have alternate vermiculated stones. The ends of the header walls terminate in massive ashlar pillars, which also display vermiculated dressing. The surface area of the gauge basin measures 1,110m^2, considerably larger than the Mugdock Gauge Basins which have a total surface water area of 485m^2. The Craigmaddie Basin is subdivided by curved ashlar masonry walls. These are essentially horizontal arches designed to withstand the water pressure. The perimeter is enclosed by cast iron post and guard railings, which reflect the detail of the Mugdock Reservoir.

Craigmaddie Gauge Basin: Conservation Needs

4.72. As with the Mugdock Gauge Basin, the sound condition of these masonry structures act as a testimony to the quality of their design and construction. Recommended remedial action includes the removal of vegetation, typically ferns growing in the joints of the structure. Consideration should be given to reapplying the gold leaf inlay to pick out the inscription within the granite panel. As at Mugdock Reservoir, the metalwork is structurally sound, but there is evidence of corrosion beneath the paint. Where the paint finish is failing, it should ideally be removed and the original colour finish reinstated.



Craigmaddie Reservoir Structures: Fences and Gates



Craigmaddie Reservoir Structures: Ironwork

Craigmaddie Measuring Pond (R13)

4.73. The Craigmaddie Measuring Pond has a surface area of 1,575m^2 and is enclosed by stone revetments. These were never intended to be visible as they are located below the water level. They have been constructed from rough-hewn, locally quarried stone of random sizes. An iron guard rail with 4 nr. horizontal flat bars encloses the Measuring Pond.

Craigmaddie Measuring Pond: Conservation Needs

4.74. The robust nature of the construction, determines that these engineering structures are intact with little evidence of localised failure. However, at times when the water level is drawn down, these revetment structures should be inspected and any necessary repairs, such as securing loose stones, undertaken. It is also prudent to remove any self-seeded tree saplings from above the water line to prevent tree roots from displacing individual stones and ultimately compromising the integrity of the revetment.

4.75. Although the metal strap fenceline has deflected along its length, it is not in obvious need of extensive remedial work and only localised repair is required to short lengths of defective and corroded sections.

Craigmaddie Causeway (R14)

4.76. The causeway separating the measuring pond from the reservoir has a metalled road and footway including concrete kerb upstand flanked on both sides by splayed masonry walls, approximately 8 metres apart. Unlike Mugdock, the water is piped between the two waterbodies via an outfall tower. The random rubble masonry walls are topped by a half-round with tooled finish cope. The western end of the south wall is terminated by three oversized ashlar stones with tooled margins. The second stone contains a benchmark ordnance survey datum 99.02 metres above sea level.

Craigmaddie Causeway: Conservation Needs

4.77. The random rubble masonry walls are structurally sound and only minor repairs to reinstate defective joints between individual cope stones are required.

Craigmaddie Reservoir Revetments

4.78. The stone revetments to the Craigmaddie Reservoir vary but are up to 25 metres in width. They also have a consistent gradient of approximately 1 in 2.

Craigmaddie Reservoir Revetments: Conservation Needs

4.79. Due to the water level in the reservoir, it was not possible to inspect the revetment structures in their entirety. However, the portion of the revetments above the water line was visible the following conservation needs were identified. Whilst the presence of grass over the top of the revetment is not problematic, the prevalence of self-seeded tree saplings, notably Ash, *Fraxinus excelsior*, along the north-west shore line is of concern. Without appropriate management these will quickly establish, causing displacement of revetment stones and the loss of views over the water from the perimeter. It is our recommendation that the tree saplings including the roots are removed. This procedure must be carried out annually to prevent self-seeded trees gaining a foothold.

Landscape Structures and Barriers

4.80. The Milngavie Reservoirs site has many structures, which represent important characteristic features (**Figure 7**). These are principally stone walls in random rubble, mostly of whinstone with half-round copes. These walls are extensive and define perimeters, footpaths and roads. They vary in height from 1m to 1.5m and have a tapering (battered) cross section (generally 600mm wide at the base and 300mm wide at the cope). These walls commonly have large boulder 'through stones' which protrude on their back face. Common problems include:

- self-seeded vegetation growth;
- localised subsidence;
- inappropriate cement pointing;
- damage from fallen branches;
- some old field walls are unmortared and have been abandoned, but the majority of mortared walls are in sound condition:

L1 Perimeter rubble wall
L2 Mugdock Road rubble walls
L3 Lovers Walk rubble wall
L4 Barrachan field rubble wall
L5 Strathblane Road rubble walls
L6 Mugdock rubble wall
L7 Commissioners' Walk rubble walls
L8 Commissioners 'Walk entrance gates
L9 Tannoch Loch rubble wall
L10 Craigmaddie Lodge entrance gates
L11 Mugdock Road entrance gates

4.81. In addition to walls, the landscape compartments of the site were also enclosed by metal strap 'estate' fences. These defined the boundaries of fields and woodland at Barrachan. They had distinctive cast iron gate posts and strainers some of which remain. However sections of metal strap fencing have been removed recently to the east of the Mugdock Measuring Pond, where inappropriate timber fencing has been installed. Lengths of metal fence have also been damaged where the KWP haulage access has been driven across the north Barrachan access track. In this area cast iron posts can be seen lying in the field.

Landscape Structures Conservation Needs

4.82. With the exception of the old field walls at Barrachan the majority of the masonry walls are intact. They have suffered, however, from localised damage, have loose/missing stones, vegetation growth or are locally subsiding. Cement pointing has been applied extensively in the past and this has been detrimental to the appearance and performance of the walls. There is a need to positively maintain these walls by embarking on a comprehensive programme of remedial work which should systematically remove invasive vegetation, repair damaged and unstable sections of wall and universally remove cement pointing to allow repointing with lime mortar. As discussed above any missing gate pillars should be reinstated to the original design and quality.

4.83. Similarly metal strap fencing and associated cast iron posts and metal field gates should be reinstated where lost. This is especially important where the fences define the edges of public access routes and are of a high profile.

WALLS, GATES & RAILINGS

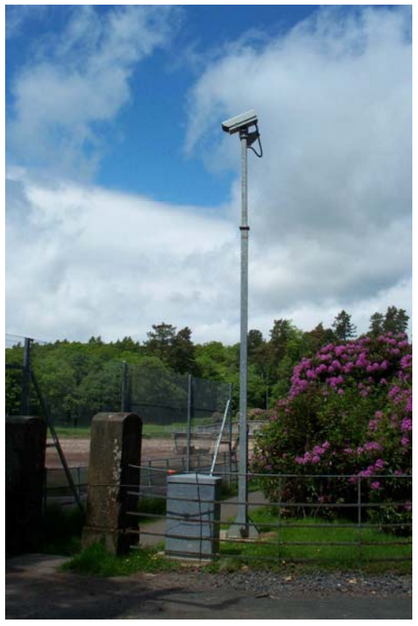
Railings at Water Works

Iron rails & posts around basins and causeways

Defective cement pointing in rubble walls

Perimeter walls (Mugdock Road)

Mortared walls with half round copes



Metal strap fencing & security clutter

Masonry Walls – Craigmaddie Measuring Pond Causeway

Recent security fencing

Original Art Nouveau Gates

Detail of original Art Nouveau gates

Recent facsimile

ENTRANCES, ACCESS ROUTES, PARKING, HARD SURFACES AND FURNITURE

4.84. **Figure 8** illustrates the network of present (and lost) access routes, access into the site and indicates the types of hard surfaces present within the reservoirs site.

Entrances

4.85. The reservoirs site is serviced by the following formal pedestrian entrances:

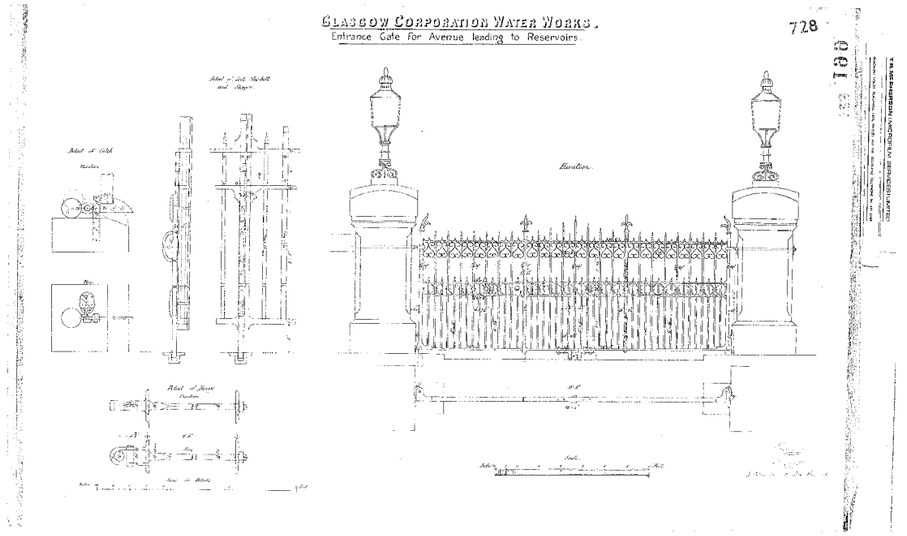
- Mugdock Road, opposite Drumclog Car Park;
- Mugdock Road, Mugdock Causeway;
- Mugdock Road, Water Works ramp;
- Tannoch Drive;
- Strathblane Road, Craigmaddie Lodge entrance;
- Strathblane Road, Commissioners' Walk entrance gates (closed).

4.86. The reservoirs site is serviced by the following formal vehicular entrances which are subject to restricted access arrangements, in keeping with the site's use:

- Mugdock Road Causeway (access to Craigholm);
- Mugdock Road, Mugdock overflow;
- Mugdock Road, Water Works ramp (access to Water Works);
- Strathblane Road, Commissioners' Walk;
- Strathblane Road, opposite Marchmont;
- Strathblane Road, Craigmaddie Lodge entrance (access to Craigmaddie Lodge).

Entrances: Conservation Needs

4.87. We would strongly recommend that the pedestrian gate within the main gated entrance at the foot of Commissioners' Walk, once again functions as a pedestrian entrance to improve visitor experience and bring back into use the principal site entrance. We would recommend that the pedestrian road crossing from Drumclog Car Park on Mugdock Road is modified to a tabletop crossing, together with appropriate 'Pedestrian Crossing' road signs. Consideration should be given to installing a formal pedestrian crossing with traffic lights, however, this would further urbanise this boundary.



Entrance Gates

4.88. The principal and most recognisable and historically the most significant access into the reservoirs site, is through the main entrance gates off Strathblane Road and along Commissioners' Walk, which leads the visitor into the Fulcrum of the site. Commissioners' Walk comprises a metalled road 3.7m wide bounded by a rubble wall on one side and a 1.7m wide pavement including 100mm concrete kerb upstand on the other. There is a 4.3m clear opening between the main gate pillars. The road surface incorporates speed mitigation measures in the form of 'sleeping policemen' road humps. There is a weight limit of 3 tonnes placed upon Commissioners' Walk due to the presence of cast iron supply mains beneath the course of the road. Currently, the single vehicular entrance gate and pedestrian gate are padlocked shut. A popular pedestrian entrance access exists from Tannoch Drive onto Commissioners' Walk.

4.89. The most recent access provision is the pedestrian entrance from Drumclog Car Park on Mugdock Road. This has proved to be a popular entrance for visitors who have arrived by vehicle and is much used by joggers. A designated crossing place has been provided and signage (pedestrians walking) together with a change in surfacing and road markings serve to demarcate the crossing place to this public road within a 30mph speed zone. However, the straight length of road, whilst ideal for visibility, is prone to recklessly driven fast moving vehicles. Recent intervention in the form of 'No Parking' and associated road markings, have been introduced further north along Mugdock Road to dissuade drivers parking up on the road verge and entering the reservoirs site at Mugdock Causeway. However, these measures have not prevented vehicles parking at this location. Measures were also recently taken on Strathblane Road in the form of an increased road kerb height to mitigate parking along this boundary, again with limited success.

MILNGAVIE RESERVOIRS

SCOTTISH WATER

Access Routes and Surfaces

Scale 1/7000

- Tarmac
- Unmetalled Drives
- Main paths- unmetalled
- Informal Paths
- Lost Routes
- Pedestrian Entrance
- Restricted Vehicular Entrance

Figure 8

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MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Furniture**

  - Bench
  - Litter bin

Figure 9

LAND USE CONSULTANTS

Parking

4.90. Drumclog Car Park provides 45 nr. car parking spaces. The entrance to the car park has a height restriction and ground mounted metal plates to enable managed access and egress. The car park is located on land under the ownership of Mugdock Country Park and is managed by MCP. Opening times of the Drumclog Car Park are commensurate with the opening times of the Country Park.

4.91. The Water Works site provides 20 nr. parking spaces in two bays.

Surfaces

4.92. The perimeter path to the south and west boundary of Milngavie Reservoir consists of a compacted whin dust path 1.5m wide, timber edge on both sides. The perimeter path to the north boundary, Lover's Walk, consists of a compacted whin dust path 1.5m wide, timber edged on one side. The perimeter path to the south and east of Craigmaddie Reservoir consists of a 40mm clean stone compacted surface, 2m wide and unedged. The north and west boundary consists of a metalled unedged drive. The dam consists of a metalled road surface 4.5m wide with a single pavement 1m wide incorporating a road kerb upstand. The entrance drive to Barrachan Farm consists of an unmetalled and unedged drive which has become degraded during the course of the Katrine Water Treatment Works. The north drive linking the reservoirs gauge basins consists of an unmetalled and unedged drive, again this route has become degraded during the course of the construction works. A network of compacted unedged whin dust paths have recently been constructed within Barrachan Wood to formalise the existing path network. There is a network of earth paths, which complement the formalised paths within Barrachan Wood.

Surfaces: Conservation Needs

4.93. We would recommend that the loose gravel surfaced paths within the Water Works site are replaced with a bound gravel path surface. We would recommend that the existing unmetalled drives, including drainage, currently utilised by construction site traffic, are reinstated on completion of the works.

Furniture

4.94. There are a number of modern bench seats located around the perimeter of the reservoirs, some of which display commemorative plaques. The majority of benches have a pedestal bin located next to them. (**Figure 9**).

Furniture: Conservation Needs

4.95. Replace existing modern furniture with cast iron bench seats and bins. This process should be undertaken incrementally with respect for any commemorative benches which should only be replaced after discussion with the donors. Future donations should use a consistent type of bench of an agreed design type. Simple benches without backs would be less obtrusive and would allow views in two directions. Additional benches strategically placed should be installed to take advantage of views but also to fit site conditions.

TREES AND WOODLANDS

Spatial Distribution

4.96. The spatial distribution of woodlands and tree cover is graphically illustrated on the Trees and Woodlands Plan (**Figure 10**). The largest concentration of woodland is Barrachan Wood, which forms a substantial and contiguous block of long established woodland which pre-dates the Mugdock Reservoir. Elsewhere, almost without exception, the woodland belts, tree lines and tree groups are commensurate with the construction of the reservoirs and therefore date from circa 1855 and circa 1895. Often, they have been under planted with an ornamental shrub layer.

4.97. The woodlands and trees have been categorised as follows:

- woodland;
- woodland belts and tree groups;
- tree lines;
- individual tree specimens.

Woodlands

4.98. Woodland constitutes a substantial area of tree cover with an obvious woodland character. A woodland will have canopy closure and contain venerable tree specimens.

Woodland Belts and Tree Groups

4.99. The study differentiates between 'woodlands', 'woodland belts' and 'tree groups' as these were planted as a constituent part of the reservoir landscape. They were, therefore, not present prior to the construction of the reservoirs. These have also been recorded by landscape zone followed by a numeral.

Tree Lines

4.100. Tree lines and avenues were also planted at the time of the reservoirs' construction. These tree lines and avenues were either planted as single tree species, or as multiple species planted in rhythmical sequences. These have been recorded by landscape zone followed by a unique letter.

Individual Trees

4.101. All prominent specimen trees have been individually recorded where they form an important feature of the landscape. They are either mature veteran trees or large in size and stature, making them readily identifiable as landmark features. These have been recorded by a numeral regardless of which landscape zone they occupy.

MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Trees and Woodlands**
  Scale 1/7000

Woodlands

Woodland Belts and Tree Groups

Individaul Trees

Tree Lines

Horticultural Interest

WB1
H2
H5
H3
H4
WB2
W1
TL1
WB4
TL2
H6
T1
H1
H10
H7
T1
WB6
H8
T1
WB5
WB + TG
TL7
WB3
T2
TL5
H9
TL6
WB8
WB9
TL3
TL4

Figure 10

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TREES & WOODLAND

Loss of Specimen Trees

Lime Avenue Commissioners' Walk

Woodland of Barrachan Hill

Pines on Mugdock Road Perimeter

Strathblane Road Tree Avenue

Woodland

W1: Barrachan Woodland

4.102. Barrachan Woodland constitutes an substantial area 7.5 hectares of mixed tree cover, containing venerable Beech, *Fagus sylvatica*, and impressive specimens including Scots pine, *Pinus sylvestris*, Larch, *Larix spp*., Oriental spruce, *Picea orientalis*, and Noble firs, *Abies procera*. Within the woodland there are stands of single species including Beech, *Fagus* sylvatica, Larch, *Larix spp*., Scots pine, *Pinus sylvestris*, and Downy birch, *Betula pubescens,* each displaying a unique understorey. In places tree roots have latched onto the sandstone rock outcrops. Importantly, trees within the woodland are self regenerating, young tree saplings are found adjacent to the parent tree. Elsewhere, dead trees provide valuable pecking posts. In 2004, a large number of mature conifers were removed by Scottish Water. This has reduced the impact of conifer specimens in the woodland.

W1: Barrachan Woodland: Conservation Needs

4.103. Management proposals should assist in the natural regeneration of selected tree species including Beech, *Fagus sylvatica*, Larch, *Larix spp*., and Scots pine, *Pinus sylvestris*, and continue to remove invasive understorey shrub species including *Rhododendron ponticum*, which would out-compete tree saplings for light. The dead trees should be retained, although dead trees adjacent to pathways must be felled and log piled at source.

Woodland Belts and Tree Groups

WB1: Mugdock Gauge Basin

4.104. This group of trees is an evenly aged mixed plantation of fine specimens planted as a backcloth to the masonry header walls of the Mugdock gauge basins and are, therefore, circa 150 years old. The species composition comprises of: 25% Austrian pine, *Pinus nigra*, 2.15m trunk girth at a height of 1.5m; 30% Common Lime, *Tilia x europaea*, also with 2.15m trunk girths; 15% Sessile Oak, *Quercus petraea*, 2.0m girth; 15% Scots pine, *Pinus sylvestris*, 1.9m girth; 10% Horse Chestnut, *Aesculus hippocastanum*, 2.85m girth at a height of 1.5m; and 5% Sycamore, *Acer psuedoplatanus*. The height of the plantation varies between 30 and 35 metres.

WB1: Mugdock Gauge Basin: Conservation Needs

4.105. These trees comprise a significant landscape feature of historical importance. Conservation needs include the removal of any hanging trees and dead wood, limb removal, to remove dead or crossed branches. The removal of the majority of self-seeded trees, typically Sycamore, *Acer psuedoplatanus*, is also needed, followed by the replanting and protection of a small number of trees from the above stated species in accordance with the original composition into clearings to perpetuate tree cover in the future.

WB2: Woodland Walk

4.106. This woodland group is an evenly aged mixed plantation established to define the north boundary of the Mugdock Reservoir site, which today provides an important link between the Mugdock and Craigmaddie Gauge Basins. It comprises mature trees of circa 150 years old. The general composition includes Scots pine, *Pinus sylvestris*, Common lime, *Tilia x europaea*, and Horse Chestnut, *Aesculus hippocastanum*; in addition, there are the following species: notably the Red Horse Chestnut, *Aesculus x carnea*, Sessile Oak, *Quercus petrea* and Noble Fir, *Abies procera*. The height of the plantation varies between 30 and 35 metres.

WB2: Woodland Walk: Conservation Needs

4.107. The trees comprise an important and original feature of the landscaping associated with the Mugdock Reservoir. The general condition of the Woodland Walk could be improved by the removal of any hanging trees, dead wood and crossed limbs. The majority of self-seeded trees, typically Sycamore, *Acer pseudoplatanus*, should be removed to allow the regeneration or replanting of the original species composition.

WB3: Mugdock Road Entrance Woodland

4.108. The Second Edition OS Plan dated 1899 indicates the existence of this perimeter belt of woodland, which has become dominated over time with pioneer tree species. Historically, the perimeter belt comprised 60% Scots pine, *Pinus sylvestris*, 30% Norway Maple, *Acer platanoides* and 10% Noble Fir, *Abies procera*. It is likely to have been planted at the time of the Mugdock Reservoir's construction and is, therefore, circa 150 years old. The woodland core consists of pioneer tree species such as Willow, *Salix spp.,* and Sycamore, *Acer pseudoplatanus*.

WB3: Mugdock Road Entrance Woodland: Conservation Needs

4.109. An opportunity is presented to fell some of the self-seeded species to create clearings into which Scots pine, *Pinus sylvestris*, Norway Maple, *Acer platanoides* and Noble Fir, *Abies procera* could be planted as future replacements. Small clearings should also be retained to promote ground flora and understorey growth. The Willow in particular provides a valuable habitat for invertebrates and should be partially coppiced to promote multi-stemmed regrowth. There is also an opportunity to introduce understorey species to further increase the habitat potential of the woodland, including Holly, *Ilex aquifolium,* Hazel, *Hamamelis spp.,* and Hawthorn, *Crataegus spp*.

WB4: Barrachan Farm Shelterbelt

4.110. The shelterbelt linking Barrachan Wood with Barrachan Farm represents an evenly aged mixed plantation which is approximately 150 years old. The species composition includes Common lime, *Tilia x europaea,* Sycamore, *Acer pseudoplatanus,* Scots pine, *Pinus sylvestris,* and small numbers of English elm, *Ulmus procera,* Horse Chestnut, *Aesculus hippocastanum* and Common beech, *Fagus sylvatica*. The trees are generally in good condition. The shelterbelt measures 220 metres in length and averages 10 metres wide and approximately 25 metres high. It is an important feature of the reservoirs landscape.

WB4: Barrachan Farm Shelterbelt: Conservation Needs

4.111. The shelterbelt is mature and in good condition. Management aims include, therefore, the retention of continuous tree cover through silvicultural management and a replanting programme.

WB5: Barrachan Farm Field Boundaries

4.112. In the former Barrachan Farm area, there are some venerable individual tree species which demarcate the historic field boundaries. Some 20 nr. over mature and senescent tree specimens remain. These include Ash, *Fraxinus excelsior*, and Oak, *Quercus petrea*. These trees pre-date the reservoir site and are upwards of 200 years old.

WB5: Barrachan Farm Field Boundaries: Conservation Needs

4.113. These old trees are interesting features and provide valuable habitats for invertebrates and birds. They should ideally be retained where they do not represent a safety risk. Some tree surgery to increase their longevity would be beneficial. Where trees have been lost, replanting would help to recognise the historic land use patterns.

WB6: Barrachan Entrance Drive

4.114. Some fine individual tree specimens surrounding the entrance drive to the Barrachan Farm complex including Common beech, *Fagus sylvatica,* Common larch, *Larix decidua,* Sycamore, *Acer pseudoplatanus*, and Lawson cypress, *Chamaecyparis lawsoniana*.

WB6: Barrachan Entrance Drive: Conservation Needs

4.115. These specimens should be allowed to develop into mature, characterful trees and this should be assisted by tree surgery to remove dead wood, crossing, branches, etc. Ultimately, replacement specimens should be established in adjacent suitable spaces.

WB7: Craigmaddie Reservoir Plantation

4.116. The Craigmaddie Reservoir Plantation is an evenly aged mixed plantation established on the embankment on the north side of Craigmaddie Reservoir. It was planted as a backcloth to the open waterbody and is circa 110 years old. The species composition comprises of 45% Scots pine, *Pinus sylvestris,* 15% Beech, *Fagus sylvatica,* 15% Horse Chestnut, *Aesculus hippocastanum,* 10% Downy birch, *Betula pubescens* and small numbers of Sycamore, *Acer pseudoplatanus,* Sessile Oak*, Quercus petraea,* Hawthorn, *Crataegus*, Holly, *Ilex aquifolium*, Norway Maple, *Acer platanoides*, Larch, *Larix spp.* And Wych Elm, *Ulmus glabra*. The height of the plantation varies between 20 and 25 metres, this lower height is attributed to the exposed location.

WB7: Craigmaddie Reservoir Plantation: Conservation Needs

4.117. In addition to the plantation's inherent landscape value as a backcloth to the open waterbody, the plantation now serves to reduce the visual impact of the Katrine Water Project treatment works on the reservoirs site. Good silvicultural practice to perpetuate the existing tree cover and provide successional tree cover is required. This may be achieved through a combination of replanting and regeneration. The original species composition with a high percentage of Scots pines, *Pinus sylvestris*, in the mix should be retained.

WB8: Old Water Treatment Works

4.118. A group of trees predominantly Scots Pine, *Pinus sylvestris*, at the head of the ramped drive. The woodland group also contains small numbers of Noble Fir, *Abies procera* and Horse Chestnut, *Aesculus hippocastanum*. It provides a valuable visual barrier to screen the Water Works site from the surrounding dwellings and visa versa. Further, the group of trees is valuable in containing the Water Works site. The trees are of a uniform age, circa 100 years and have an ornamental shrub and grass understorey.

WB8: Old Water Treatment Works: Conservation Needs

4.119. Management should include good silvicultural practice to perpetuate the trees.

WB9: Commissioners' Walk

4.120. The belt of trees to Commissioners' Walk provide a valuable backcloth to further accentuate the single row of Lime, *Tilia spp.* trees. Further, they serve to contain the Water Works site and demarcate one's arrival at the heart of the site. The trees which comprise the belt comprise 50% Common Lime, *Tilia x europaea,* 20% Scots Pine, *Pinus sylvestris*, 20% Horse Chestnut, *Aesculus hippocastanum*, and 10% Sycamore, *Acer pseudoplatanus*. In addition, the belt returning along the boundary of the Water Works site includes Noble Fir, *Abies procera* and Larch, *Larix spp*. the height of the woodland belt is up to 25 metres and is circa 100 years in age. The understorey is long grass.

WB9: Commissioners' Walk: Conservation Needs

4.121. Immediate management issues include the removal of dead, leggy and overcrowded tree specimens. There are a number of gaps which should be planted up to reflect the original species composition. Future management aims include good silvicultural practice to retain and perpetuate the existing long lived tree species.

Tree Lines

TL1: Austrian Pine

4.122. A single row of evenly and closely spaced Austrian pine, *Pinus nigra,* form a distinctive boundary feature along Mugdock Road. Originally introduced into the UK in 1835 and suited to most soil types, the Austrian pine was often used for coastal shelterbelt plantings, or as individual specimen planting in parklands. The original row comprised circa. 55 nr. mature Austrian pines, planted at 7-10m centres, around 150 years old. The girth of the trunks at a height of 1.5m varies between 2.5m and 3m and the height varies between 30m and 35m. Some trees have suffered wind damage resulting in broken branches. Today only some 20 nr. pines remain. The Austrian pines have been underplanted with a continuous belt of Rhododendron.

TL1: Austrian Pine: Conservation Needs

4.123. The row of mature Austrian pine, *Pinus nigra,* is a prominent linear feature of the Mugdock reservoir site, which is highly visible from both Mugdock Road and the perimeter footpath. The trees are sizeable specimens which require tree surgery to remove/tidy broken branches and to prevent disease. Management aims, therefore, include: to perpetuate these 22 nr. trees through silvicultural management; to replant tree losses (30 nr.); to remove inappropriate Scots pine, *Pinus sylvestris,* replacements (10 nr.) and replace with Austrian pines, *Pinus nigra*.

TL2: Common Lime

4.124. A single row of evenly and closely spaced Common lime, *Tilia x europaea,* form a distinct linear feature along the track to the north of the Craigmaddie Reservoir gauge basin. The use of a single row of Common lime, *Tilia x europaea*, is repeated elsewhere within the reservoirs site, most notably along Commissioners' Walk. This row comprises15 nr. Common lime, *Tilia x europaea, p*lanted at 7m centres. They are around 100 years old and have a girth of 2.5m at a height of 1.5m, and a height of 25m. The Common limes, *Tilia x europaea,* have been underplanted with a continuous line of Rhododendron, *Rhododendron spp.*

TL2: Common Lime: Conservation Needs

4.125. Management aims include the retention of these long lived trees through silvicultural management to enable these trees to mature and develop. They should be capable of reaching 250-350 years old if well maintained. Replacement planting should be undertaken as required.

TL3: Strathblane Road Tree Avenue

4.126. A striking avenue of the following tree species: Common lime, *Tilia x europaea*, Horse Chestnut, *Aesculus hippocastanum,* and Sycamore, *Acer pseudoplatanus,* arranged in a recurring rhythmical pattern over a continuous 1.2km length along the Strathblane Road (A81). The 215nr. trees which today comprise the avenue were planted at 5m centres, and are around 100 years old. The height varies between 20m and 25m. The understorey is rough grass.

TL3: Strathblane Road Tree Avenue: Conservation Needs

4.127. This mature mixed tree avenue along Strathblane Road is a striking and prominent feature of the landscape associated with Craigmaddie Reservoir. The visitor's experience is further enhanced by the presence of the reservoir's earth dam which rises above the horizon line. Management issues include: to retain and perpetuate these trees through silvicultural management; and to replant the numerous tree losses, approximately 215 nr., conforming with the established planting pattern.

4.128. Individual and groups of trees along the length of Strathblane Road are subject to a permanent Tree Preservation Order (TPO Nr. D23) dated December 1990 under sections 58 and 59 of the Town and Country Planning (Scotland) Act which identifies 5 nr. specimen trees, and 3 nr. groups of trees which are included within the TPO, these are as follows. 4 nr. specimen Sycamore trees ref. T1, T2, T3 and T4 which are located within a field to the south of Strathblane Road known as Marchmont. These are out with Scottish Waters ownership boundary. However, tree ref. T5 applies to a specimen Lime, *Tilia spp.,* located within the front garden of Craigmaddie Lodge. Of the 4 nr. groups of trees which fall within Scottish Water's ownership boundary, group G1 applies to a small group of Lime, *Tilia spp.,* and Chestnut, *Aesculus spp.,* trees within the rear garden of Craigmaddie Lodge. Group G2 applies to all trees within the reservoir site along the north side of Strathblane Road which form part of the continuous tree avenue. Group G3 applies to the continuous group of trees along the south side of Strathblane Road between Bankell House to the north and the Esportia entrance to the south. Group G4 applies to the continuous group of trees along the south side of Strathblane Road between the Esportia entrance to the north and Milngavie to the south.

TL4: Commissioners' Walk

4.129. A single row of evenly and closely spaced Common lime, *Tilia x europaea* form the most dominant and distinctive tree line within the reservoirs site. The row comprises 40 nr. Common lime, *Tilia x europaea,* planted at 5m centres and are around 110 years old. The girth of the trunks at a height of 1.5m varies between 1.0m and 1.5m and the trees have attained a height of 20m. The understorey is rough grass.

TL 4: Commissioners' Walk: Conservation Needs

4.130. Management aims include to retain and perpetuate these long lived tree species through silvicultural management and to replant tree losses (5 nr) as they occur. The Common limes, *Tilia x europaea,* lining Commissioners' Walk are subject to a permanent Tree Preservation Order (TPO Nr. D24) dated 04.04.1994 under sections 58 and 59 of the Town and Country Planning (Scotland) Act which defines two groups of trees: G1: from Tannoch Drive pedestrian entrance northwards along Commissioners' walk, consists of 17 nr. Lime, *Tilia spp.,* trees; G2: south of the pedestrian entrance adjacent to the west boundary, consists of 23 nr. Lime, *Tilia spp.,* trees.

TL5: Horse Chestnut

4.131. A single row of evenly and closely spaced Horse Chestnut, *Aesculus hippocastanum,* is a boundary feature at the head of Commissioners' Walk. The row comprises of 8 nr. Horse Chestnut, *Aesculus hippocastanum,* planted at 7m centres, which are around 150 years old. The girth of the trunks measures 2.0m at a height of 1.5m and the trees have attained a height of 25m. The understorey is rough grass.

TL5: Horse Chestnut: Conservation Needs

4.132. Management aims should include the replacement of the 4 nr. losses within the row and to retain and perpetuate these long lived trees through silvicultural management.

TL6: Cedars

4.133. A single mixed row of Cedar species, *Cedrus spp.,* including *Cedrus deodara* and Atlas Cedar, *Cedrus atlantica*, planted at 5m centres, form a distinct boundary feature defining the treatment works area. The row of Cedars has become diminished through tree losses and today only 5 nr. of an original 12 nr. remain. These trees are around 110 years old, with amenity grass beneath.

TL6: Cedars: Conservation Needs

4.134. Management aims include the replacement of the 12 nr. lost specimens within the row and to retain and perpetuate the remaining Cedars, *Cedrus spp.,* through silvicultural management. Inappropriate commemorative tree planting has introduced flowering tree species within the Water Works area generally. We would recommend that the relations are contacted and these trees are translocated to a more appropriate location.

TL7: Masonry Rill Row

4.135. A mixed row comprising of 9 nr. evenly and closely spaced trees of the following tree species: Norway Maple, *Acer platanoides,* Noble Fir, *Abies procera*; Sycamore, *Acer pseudoplatanus*, arranged in a recurring rhythmical pattern. The row has been planted at 7m centres and is around 110 years old. The understorey is rough grass.

TL7: Masonry Rill Row: Conservation Needs

4.136. These trees are in sound condition with no indication of imminent problems. Management aims include the retainment of these trees through silvicultural management.

Individual Trees

T1: Noble Firs

4.137. 2 nr. Noble Firs, *Abies procera,* were planted circa 1895 as sentinel trees to either side of the Craigmaddie measuring pond. A third specimen stands next to the Craigmaddie Gauge Basin. Noble Firs, *Abies procera,* originate from North America where they grow to a height of 45-60 metres. These three specimens are circa 110 years old and they have attained heights of between 30-35 metres.

T1: Noble Firs: Conservation Needs

4.138. These specimen trees show clear signs of distress and they will become dangerous if retained. There is consequently a need to fell and remove the stumps of these trees to allow replacement planting. After removal, the existing soil should be replaced with approved topsoil generously ameliorated with compost to provide the replacement saplings with the optimum growing conditions. Planting pit drainage should also be investigated prior to selection of the replacement trees. It will be necessary to protect the trees from browsing by deer and rabbits. This could be achieved by a metal fence enclosure.

T2: Sentinel Irish Yews

4.139. 2 nr. Irish or Fastigiate Yews, *Taxus baccata 'Fastigiata',* stand as sentinels at the head of the ramp entrance into the Water Works complex. Originating in Ireland and recorded from 1780, this species is commonly found planted in graveyards and parks.

T2: Sentinel Irish Yews: Conservation Needs

4.140. Yew are long lived species but the fastigiate form requires maintenance to assist these trees retain their vertical shape, which is prone to wayward limbs and dieback from the crown. Remove the smooth leaved Holly, *Ilex x altaclarensis* which has out-competed the southernmost Yew, *Taxus baccata 'Fastigiata'*.

HORTICULTURAL INTEREST

4.141. As with Woodland Belts, Tree Groups and Tree Lines, ornamental planting formed an essential characteristic feature of the reservoir landscape which complements the architecture and tree arrangements within the site.

4.142. As was the case with certain tree lines, selected shrub species have been arranged to form rhythmical planting patterns. There is a relatively small selection of ornamental ericaceous (acid loving) shrubs which were planted within the reservoirs site, these are as follows:

4.143. Rhododendron luteum, *Rhododendron luteum, syn. Azalea pontica.* This is a common fragrant yellow flowering azalea. It forms a medium sized deciduous shrub occasionally growing up to 3.5 metres in height and width. The autumn foliage is a delightful display of rich warm colours ranging from crimson, purple and orange. The funnel shaped yellow and richly scented flowers are borne in late spring. It looks particularly striking in late spring when underplanted with bluebells.

4.144. Rhododendron ponticum, *Rhododendron ponticum.* The most common and most extensively planted rhododendron within the reservoirs site. It forms a large evergreen shrub with lilac-pink flowers in late spring. *Rhododendron ponticum* is an invasive shrub which quickly establishes a woodland understorey. It, therefore, requires constant control to avoid the loss and suppression of other species and habitats. In certain locations, it forms useful 'structure' planting which can be an effective screen and windbreak. It is, therefore, an understandable if somewhat monotonous choice of flowering shrub for lining drives and walks throughout the reservoirs site.

4.145. *Prunus laurocerasus*, Cherry laurel or Common laurel. A rigorous and wide spreading, evergreen shrub which grows to 6 metres in height and width. The leaves are a large, glossy green. Cherry laurel is mostly planted for its screening qualities, its white flowers and dark rounded fruit are often overlooked. It successfully regenerates when cut hard back to ground level.

4.146. Portugal laurel, *Prunus lusitanica*. Again, a large evergreen shrub often planted for its screening qualities. It develops into a small to medium sized tree and has a beautiful form when allowed to develop naturally. It has smaller ovate leaves than the Cherry laurel, *Prunus laurocerasus,* with red stalks. The small white scented flowers are borne in long racemes in early summer. Again, these are often overlooked. The fruits are small and ripen from red to purple. It is considered to be hardier than the Cherry laurel, *Prunus laurocerasus*.

4.147. The horticultural components can readily be grouped in accordance with their location as follows:

a) Mugdock Road;
b) Mugdock Reservoir Gauge Basins;
c) Mugdock Reservoir Measuring Pond;
d) North Walk;
e) Dirty Dam;
f) Craigmaddie Reservoir Gauge Basin;
g) Craigmaddie Measuring Pond;
h) Craigmaddie Lodge Drive;
i) Old Water Treatment Works;
j) Barrachan Entrance Drive.

Horticultural Components

H1: Mugdock Road, Rhododendron

4.148. An unbroken band of *Rhododendron ponticum* over a distance of 600 metres underplanted to the Austrian pine, *Pinus nigra,* tree line.

H1: Mugdock Road, Rhododendron: Conservation Needs

4.149. The majority of these Rhododendrons have reverted back to their wild state, *ponticum*. They are generally 4-5m in height, fully clothed in leaves and forming a strong boundary feature. Some specimen Rhododendrons remain within this belt. A proportion of these Rhododendron will have to be removed to facilitate the interplanting of Austrian pine, *Pinus nigra*, trees to perpetuate tree cover along this boundary. Good husbandry requires the annual mulching of Rhododendron with a thick layer of decaying leaves or organic matter placed around the base of the shrub. The removal of selected oversized and leggy specimens should be undertaken and consideration given to replanting with principally pink, blue and purple flowering varieties to add additional flower and foliage interest.

4.150. Rhododendron varieties should include:

Rhododendron augustinii:	large small leaved evergreen with blue flowers;
Rhododendron augustinii 'Electra':	large small leaved evergreen with clusters of violet-blue flowers;
Rhododendron ciliatum:	medium sized dome shaped with peeling bark and fragrant bell-shaped pink flowers;
Rhododendron davidsonianum:	medium sized to large evergreen with soft pink through to purple flowers in prolific clusters;
Rhododendron fulvum:	large evergreen with large polished leaves, pink bell-shaped flowers borne in early spring;
Rhododendron niveum:	large evergreen which requires shade. Large leaved, with blue to rich purple flowers borne in tight, globular flower heads.

There are also many hybrid Rhododendrons which could be recommended, however, this list would be lengthy. As a general rule and regardless of the choice of species, the rhythmical planting approach must be adhered to. When replanting into rows, replace every fourth or fifth plant within the row with the same variety of Rhododendron. Repeat this process at a intervals (say 5-10 years) with another variety of Rhododendron, and so on until the existing shrubs are replaced. When undertaking the replanting of an avenue, apply the same approach, remove existing shrubs which are directly opposite each other, repeating the process until the entire avenue is incrementally replaced over a 25 year period.

H2: Mugdock Reservoir Gauge Basins

4.151. A group of mixed flowering shrubs were planted as an ornamental backcloth to the Gauge Basins. The original planting bed layout is clearly illustrated in a historical photograph circa 1900, which reveals 3 nr. large circular beds, over 4 nr. linear beds and a central bed, symmetrically aligned on the embankment above the gauge basins. Today, these distinct planting beds have merged to form one homogenous mass of shrubs comprising of *Rhododendron luteum, Rhododendron ponticum, Prunus laurocerasus* and *Prunus lusitanica*.

H2: Mugdock Reservoir Gauge Basin: Conservation Needs

4.152. Over time, *Rhododendron ponticum* has become the dominant species. Our recommendations are for the removal of any oversized and leggy *Rhododendrons* and replacing with *Prunus lusitanica* to perpetuate the backcloth to the gauge basins and provide useful screening of the entrances to the aqueducts.

H3: Mugdock Reservoir Measuring Pond

4.153. This comprises the ornamental shrub planting at a wedge shaped area of ground to the east of the measuring pond. The original planting layout, which consisted of a continuous planted perimeter and 3 nr. circular beds of decreasing size, is illustrated on a historical photograph taken from the Mugdock Road elevated viewpoint above the reservoir, circa 1900. The species mix is principally *Rhododendron ponticum* with some *Prunus laurocerasus*.

H3: Mugdock Measuring Pond: Conservation Needs

4.154. The spatial composition of this simple formal planting arrangement has become less clear as the shrubs have matured. Today, this central area feels rather overcrowded, due to the size of the shrubs which have attained 5 metres in height and spread close to the perimeter. Conservation needs include the removal and replacement of up to 20% of the existing shrubs with like-for-like species every 5 years for the next 25 years. Consideration should be given to replanting *Rhododendron ponticum* with other blue and purple flowering varieties to add interest.

H4: North Walk

4.155. The drive linking the gauge basins of the two reservoirs was planted out with a continuous avenue of *Rhododendron ponticum*, lining the route over a length of 750 metres.

H4: North Walk: Conservation Needs

4.156. This ponticum avenue is a strong feature but lacks horticultural/ecological interest. The integrity of the avenue should be retained by infilling gaps. Consider the introduction of additional varieties of Rhododendron to increase the flower and foliage interest.

H5: Dirty Dam

4.157. The north and west banks of Dirty Dam were planted out with ornamental shrubs, principally *Rhododendron ponticum*.

H5: Dirty Dam: Conservation Needs

4.158. The presence of ornamental shrubs appears incongruous next to the Dirty Dam waterbody. However, the effective screen reduces conflicts between path users and wildlife. The retention of a planting screen is, therefore, desirable but replacement with native shrubs/understorey species would assist in the development of nature conservation interests.

H6: Craigmaddie Reservoir Gauge Basin

4.159. As with the Mugdock Gauge Basins, a group of mixed flowering evergreen shrub species were planted as an ornamental backcloth to the masonry header wall structure. Also, a variety of evergreen shrubs have been planted around the base of the mature Noble Fir, *Abies Procera*, which is located to the east of the gauge basin.

H6: Craigmaddie Reservoir Gauge Basin: Conservation Needs

4.160. The existing varieties of flowering shrubs include *Prunus lusitanica, Prunus laurocerasus* and *Rhododendron ponticum*. There is a gap within the existing planting to the gauge basin which should be infilled to respect the existing planting arrangement of *Rhododendron ponticum, Prunus lusitanica, Rhododendron ponticum*, followed by *Prunus laurocerasus, Rhododendron ponticum,* repeating. The composition of shrubs around the base of the Noble Fir, *Abies procera* is: *Prunus laurocerasus* and *Rhododendron ponticum*, repeating. The incremental replanting of the existing shrubs with like for like species should be commenced.

H7: Craigmaddie Measuring Pond

4.161. There is an attractive rhythmical pattern of planting along the east bank of the measuring pond which consists of Cherry laurel, *Prunus laurocerasus, Rhododendron ponticum*, Portugal laurel, *Prunus lusitanica, Rhododendron ponticum* and Cherry laurel, *Prunus laurocerasus,* repeating over a distance of 150 metres. Some localised damage has occurred by Katrine Water Project haulage vehicles/temporary road widening works.

H7: Craigmaddie Measuring Pond: Conservation Needs

4.162. Initially, the replanting of gaps within the row should be undertaken. In the future, at a frequency of every 15 years, replace all *Rhododendron ponticum*, followed by *Prunus lusitanica*, followed by *Prunus laurocerasus*, until all existing shrubs have been replaced. The adjacent drive should be restored to its original width, i.e. not encroaching on the shrubs.

H8: Craigmaddie Lodge Drive

4.163. There is a similar rhythmical planting pattern to the south of the drive over a distance of 100 metres with alternating Cherry laurel, *Prunus laurocerasus* and Portugal laurel, *Prunus lusitanica*. Some inappropriate replacement shrubs have been introduced along this line.

H8: Craigmaddie Lodge Drive: Conservation Needs

4.164. Firstly, replace inappropriate replacement planting with the appropriate species to match the rhythm. In approximately 15 years time, consider the replacement of all *Prunus lusitanica*; in 30 years time, consider the replacement of all *Prunus laurocerasus*. Both varieties of *Prunus spp.* respond well to hard pruning, whereby the large stems are cut back to above ground level to promote new growth. This approach should be trialled and if it proves successful, adopted throughout the reservoirs site for *Prunus laurocerasus* and *Prunus lusitanica*.

H9: Old Water Treatment Works

4.165. Historical photographs reveal the high horticultural interest of the Water Works' site, specifically to the cartilage of the straining walls and to Commissioners' Cottage garden. From historic photographs, it is possible to glean the following: Mugdock Straining Well was enclosed by a planting bed which included heathers, beyond which was a loose gravel path, then shrub planting within amenity grass to encircle the straining well; Craigmaddie Straining Well was enclosed by a planting bed into which display bedding was planted. This was enclosed by rectangular beds into which bedding roses were planted. Three circular planting beds were laid out in the grass area in front of the row of Cedar. The path link to Craigmaddie Reservoir was lined with shrubs; most significant was the area to the south of Commissioners' Cottage which today accommodates the Chlorination Plant and concrete plant. These areas were once planted out as a rose garden and a heather rockery. Today, nothing remains of these high interest horticultural gardens. What is apparent from the historical photographs is the intense labour necessary to maintain this area to such a high standard.

H9: Old Water Treatment Works: Conservation Needs

4.166. Explore the potential to reintroduce a horticultural interest element within the water works site and removal of the concrete plat and the decommissioning of the Chlorination Plant.

H10: Barrachan Entrance Drive

4.167. A row of ornamental shrub planting lines the entrance drive to Barrachan. The lower section heading up from the dam consists of Scotch laburnum, *Laburnum alpinum*, Portugal laurel, *Prunus* lusitanica, and Cherry laurel, *Prunus laurocerassus* and *Rhododendron ponticum*. The middle section of the driveway consists of individual specimens of *Rhododendron ponticum* and *Rhododendron luteum* clustered around the bend. The top section consists of *Rhododendron ponticum*.

H10: Barrachan Entrance Drive: Conservation Needs

4.168. Through a combination of management and planting, regenerate and replant to respect the original planting composition.

ECOLOGICAL INTEREST

Introduction

4.169. This part of the study provides an audit of the current biodiversity interest at the Milngavie reservoirs. The assessment focuses on the reservoirs and their surrounding habitats and provides a description of current plant and animal populations on the site. The audit has been based on the collation of existing data, rather than on new habitat or species survey data. Therefore, consideration has been made of the requirement for further specialist surveys data prior to the confirmation of possible management proposals presented in the Biodiversity Development Plan.

Sites Designated for Nature Conservation

4.170. Statutory and non-statutory nature conservation designations in the vicinity of the Milngavie Reservoirs are shown on **Figures 11** and **12**. These data demonstrate the importance of the reservoirs site in landscape ecology terms, as they provide habitat connectivity between designated sites to the north west and south east.

Statutory Designations

4.171. There are three national statutory sites for nature conservation within 2 km of the reservoirs. Adjoining the site's western boundary is Mugdock Wood Site of Special Scientific Interest (SSSI). This site was originally designated in 1973 and covers an area of 170.8 ha, of which two-thirds fall within Stirling Council, and the other third within East Dunbartonshire . Mugdock Wood is an unusually large area of relatively undisturbed ancient deciduous woodland. A variety of woodland types are represented here from dry acidic oakwood to wet alderwood. The woodland plant communities are of a southern type and distinct from the other woodlands in Central Region. An unusually large number of vascular plants occur here including several which are rare or local in their distribution, for example, skull-cap *Scutellaria galericulata* and smooth-stalked sedge *Carex laevigata* (SNH, date unknown)[1].

4.172. An unusual feature of this site is the extensive mosaic of semi-natural habitats associated with the woodland, including mire, heathlands, grasslands and open water. This includes a 67 hectare area of heathland called Drumclog Moor. The main types of vegetation here are heather-dominated dry heath, birch woodland, and grassland with extensive areas of bracken. A number of Nationally Scarce[2] plant species occur here, including small cow-wheat *Melampyrum sylvaticum*. Mugdock Loch, a small 4.2 ha area of open water, lies to the north of the SSSI. The Nationally Scarce least water-lily *Nuphar pumila* grows in abundance on the loch.

4.173. Immediately adjacent to the western edge of Mugdock Wood SSSI is a small strip of land along the Allander Water which was designated as Craigallian Marshes SSSI in 1986. The site covers an area of 8.17 ha and is a relatively extensive area of poor-fen vegetation growing on peatland habitat adjoining the Allander Water, dominated by tall herb species. Plant communities of this type are uncommon throughout Central Region. An unusually large number of species are found here, including several which are rare throughout the Region, notably wood club-rush *Scirpus sylvaticus* and lesser pond-sedge *Carex acutiformis*.

[1] SNH (date unknown). Mugdock Wood SSSI Management Statement. SNH, Stirling.
[2] Nationally Scarce plant species are those occurring in not more than 100 different 10 x 10 km grid-squares in the British Isles (there are 3500 of these grid squares in total).

MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Statutory Nature Conservation Designations**

Site boundary

SSSI

1 km from site boundary

2 km from site boundary

Drumbroch Loch Meadows SSSI

Craigallian Marshes SSSI

Mugdock Wood SSSI

Manse Burn SSSI

EAST

Figure 11

Scale 1 : 25 000

LAND USE CONSULTANTS

MILNGAVIE RESERVOIRS

SCOTTISH WATER

Non-Statutory Nature Conservation Designations

- Site boundary

Ancient Woodland

- Ancient (of semi-natural origin)
- Long-Established (of plantation origin)
- Other (on Roy map)

- SINCs
- 1 km from site boundary
- 2 km from site boundary

Figure 12

Scale 1 : 25 000

LAND USE CONSULTANTS

MILNGAVIE RESERVOIRS

SCOTTISH WATER

Phase 1 Habitat Map

Site boundary

Habitats:

- broad-leaved semi-natural woodland
- broad-leaved plantation woodland
- dense scrub
- coniferous plantation woodland
- mixed plantation woodland
- improved grassland
- introduced shrubs
- swamp
- open water
- not classified
- target notes

Habitat survey carried out
27 July 2000 by Scottish Wildlife Trust for West of Scotland Water

Figure 13

Scale 1 : 7 000

LAND USE CONSULTANTS

4.174. 1.5 km to the north-west of the site lies Dumbreck Loch Meadows SSSI. The site covers 27.6 ha and was designated because it contains the largest area of unimproved herb-rich lowland grassland in the Central Region. An exceptionally large number of grassland plant communities and plant species are found here, including globeflower *Trollius europaeus* and tawny sedge *Carex hostiana* which are indicative of ancient meadows, and several of which are locally rare such as mountain everlasting *Antennaria dioica* and field gentian *Gentianella campestris*. An exceptionally high number of orchid species and their hybrids occur here including frog orchid *Coeloglossum viride*, common twayblade *Listera ovata* and greater butterfly orchid *Platanthera chlorantha*. The site also supports a number of other wildlife habitats, including open water, birchwood, alder carr, floating bog and wet and dry heathland. The rich invertebrate fauna includes small pearl-bordered fritillary *Boloria selene*, a species which is on the decline elsewhere.

Non-Statutory Designations

4.175. Several non-statutory areas have been designated in and around the study site. At a Council level, the Craigmaddie and Mugdock Reservoirs themselves are a Site of Interest for Nature Conservation (SINC) area. Immediately to the south of the site is the Tannoch Loch SINC and to the south-east are Dougalston Estate and Loch SINC, and the Bardowie Loch and wetland SINC. The southernmost area of Mugdock Woods SSSI (see above) is also designated as Mugdock Wood and Drumclog SINC.

4.176. SNH's Ancient Woodland Inventory shows that within the study area, around Barrachan, there is an area of long-established woodland of plantation origin covering around 4 ha. Mugdock Wood (to the north-west of the site) is also listed as ancient woodland within this inventory.

Habitats

Existing Data

4.177. A Phase I Habitat Survey[3] was carried out by the Scottish Wildlife Trust (SWT) in July 2000 as part of the organisation's site survey programme. The habitats mapped as a result of this survey, and the target notes, were transferred to a digital map base by LUC as part of this audit report (**Figure 13**).

4.178. As the purpose of this earlier Phase I Habitat Survey was to establish whether the Milngavie reservoirs site was suitable as a candidate SWT Wildlife Site, it was broad-brush and limited in its detail. It is possible that in the intervening period of time that extent and composition of habitats have changed.

Walkover Assessment

4.179. A walkover assessment of the site was carried out on 3 June 2005 by a botanist and a zoologist from LUC. Notes were made of habitat or species of interest, and more detail added to the SWT Phase I Habitat Survey where appropriate. The results of the Phase I Habitat Survey and the walkover assessment were collated to provide more detail regarding the site's current and potential ecological value.

Results

4.180. The majority of woodland on the site was classified by the SWT Survey as either broad-leaved plantation woodland or coniferous plantation woodland. The large block of plantation around Craigholm is dominated by Scots pine *Pinus sylvestris* and Larch *Larix* sp. with occasional broad-leaved trees, mainly sycamore *Acer pseudoplatanus* and horse chestnut *Aesculus hippocastanum*. The ground flora in this area is poor, with broad-buckler-fern *Dryopteris dilatata*, wavy hair-grass *Deschampsia flexuosa*, wood sorrel *Oxalis acetosella* and rhododendron *Rhododendron ponticum*. To the east and south of the Craigholm plantation are smaller stands of beech with similarly poor ground flora. There is a stand of mixed exotic conifers near Barrachan and further exotic pines along the west edge of the site.

4.181. The majority of other woodlands within the site area are thin strips around Craigmaddie Reservoir/measuring pond and along the northern edge of the site and the eastern edge of Barrachan. These areas are dominated by horse chestnut, sycamore and lime *Tilia x vulgaris.* Rhododendron is frequent, especially around the two measuring ponds (located to the north of each reservoir) and the ground flora is generally poor and dominated by broad buckler-fern, bramble *Rubus fruticosus agg.*, ivy *Hedera helix* and grasses (including cocksfoot *Dactylis glomerata* and common bent *Agrostis capillaris*). Wood dock *Rumex sanguineus* was also found around the Craigmaddie measuring pond.

4.182. There is a small strip of coniferous plantation woodland along the north-eastern edge of Mugdock Reservoir which is composed of pine *Pinus sp.*, larch *Larix sp.* and downy birch *Betula pubescens*. Bristle club rush was found here beside the path (at NS 55990 75770).

4.183. Further along the north-eastern edge of Mugdock reservoir is a small strip of broad-leaved semi-natural woodland, mainly composed of downy birch and willow *Salix* sp., although Scots pine, beech and gorse *Ulex europaeus* are also present. There is a steep bank by the path in this area with ericaceous vegetation (heather *Calluna vulgaris*, bell heather *Erica cinerea*), bilberry *Vaccinium myrtillus*, scattered hard fern *Blechnum spicant*, bracken *Pteridium aquilinum* patches, rowan *Sorbus aucuparia*, goldenrod *Solidago* sp. and wood sage *Teucrium scorodonia*. The old wall leading through this area to Craigholm has ivy-leaved toadflax *Cymbalaria muralis*, New Zealand willowherb *Epilobium brunnescens*, herb robert *Geranium robertianum*, hart's-tongue fern *Asplenium scolopendrium*, maidenhair spleenwort Asplenium *trichomanes*, remote sedge *Carex remota*, wild strawberry *Fragaria vesca*, lady fern *Athyrium filix-femina*, ivy and various mosses and liverworts.

4.184. The thin strip of dense continuous scrub along the western edge of Mugdock Reservoir bordering Mugdock Road is dominated by willow.

4.185. The grasslands in the centre of the site are improved in character and as a result are species-poor, with white clover *Trifolium repens*, scattered creeping thistle *Cirsium arvense*, common nettle *Urtica dioica*. Grasses include crested dog's tail *Cynosurus cristata*, Yorkshire fog *Holcus lanatus*, and sweet vernal grass *Anthoxanthum odoratum*, with soft rush *Juncus effuses* being found in marshy grassland patches, although these units were not big enough to map. Much of the central area of grassland mapped in the SWT survey is now under development.

4.186. There is a single pond in the swampy area to the north of the site which is unconnected to the reservoirs. This is known locally as the 'Dirty Dam'. Vegetation growing in this area includes water horsetail *Equisetum fluviatile,* marsh marigold *Caltha palustris*, meadowsweet *Filipendula ulmaria*, water forget-me-not *Myosotis scorpioides*, water mint *Mentha aquatica*, reed canary-grass *Phalaris arundinacea*. Broad-leaved pondweed *Potamogeton natans* grows within the open water. Woodland also grows around this swampy area, comprised of grey willow *Salix cinerea*, sycamore, rhododendron, laburnum *Laburnum* sp., wood dock *Rumex sanguineus*, lady fern, male fern *Dryopteris felix-mas* and nettle. One common spotted orchid *Dactylorhiza fuchsii* plant was found by the path to the north of the swamp area.

[3] JNCC (1993). *A handbook for Phase 1 Habitat Survey – a technique for environmental audit*. JNCC, Peterborough.

4.187. The grassy margins around the reservoirs are currently mown very short and are very species-poor. The reservoirs themselves are devoid of vegetation, with the exception of willow moss *Fontinalis antipyretica* growing on the shallow concrete where water enters the reservoir. Sparse vegetation grows along the drop-down zone, with species including lady fern, field horsetail *Equisetum arvense*, rose-bay willow-herb *Chamerion angustifolium*, Yorkshire fog, ribwort plantain *Plantago lanceolata*, ragwort *Senecio jacobaea*, and dog violet *Viola riviniana*. Occasional patches of relatively species-rich vegetation occur here, particularly along the plantation edge to the north of Craigmaddie reservoir, with heather, abundant mouse-ear hawkweed *Hieracium* agg., eyebright *Euphrasia officinalis agg.*, common mouse-ear *Cerastium fontanum*, fairy flax *Linum catharticum*, bird's-foot trefoil *Lotus corniculatus*, ox-eye daisy *Leucanthemum vulgare*, and grasses including Yorkshire fog and silvery hair grass *Aira caryophyllea*, and bryophytes including *Hypnum* and *Polytrichum*. Very young ash *Fraxinus sp.* seedlings occur here rarely also.

4.188. The site was not judged by the SWT survey to support sufficient botanical interest to warrant SWT Wildlife Site status.

4.189. Tannoch Loch SINC and its marginal woodland immediately below Mugdock Reservoir is also noteworthy for its (albeit small) woodland, wetland and open water habitats, in addition to its scenic value within the conservation area. Tannoch Loch has been the subject of a separate management plan prepared by the local community.

Species

Badger

4.190. The badger is legally protected in the UK by the Protection of Badgers Act 1992, and is a species of conservation concern in the East Dunbartonshire Local Biodiversity Action Plan (LBAP).

4.191. Historical records for badger setts within the Milngavie Reservoirs area were requested, included existing records held by the Lanarkshire Badger Group, information provided by the Scottish Water on-site warden and East Dunbartonshire's Local Biodiversity Action Plan Officer. A full badger survey was carried out in August 2003 by ECOS Countryside Services, following the methodologies outlined in Harris *et al.* (1989)[4].

4.192. There are no historical records for the presence of badger setts around the Milngavie Reservoirs area, and during the ECOS survey, no badger sightings were made, nor were there any signs of activity in any of the areas checked. It would appear that, despite the presence of some very suitable habitat, badger were absent from the survey area.

4.193. However, the 2003 survey was not carried out during a period of high badger activity (early spring or late winter), and the area of greatest potential habitat around Barrachan could not be exhaustively searched due to dense impenetrable rhododendron and bracken undergrowth.

4.194. The 2005 walkover survey also noted good potential habitat for badger, although no specific search for setts was carried out. There were occasional signs of 'snuffling' on the woodland floor, which is typical of locations where badgers rootle out worms and other invertebrates. Given the constraints noted above, it is possible that badger have been overlooked in previous surveys. However, there has historically been persecution of badger in the area, which may have eradicated previously active colonies.

[4] Harris S., Cresswell P., Jeffries D. (1989). *Surveying Badgers*. Mammal Society, London.

Water Vole and Otter

4.195. The water vole is protected by the Wildlife and Countryside Act (1981, as amended) and the Nature Conservation (Scotland) Act (2004). It is considered to be one of the UK's fasted declining mammal species. Two-thirds of all UK populations were lost by 1990, and a later national survey in 1996-98 revealed that the decline was continuing. Populations losses are usually attributed to detrimental habitat management (drainage, over-grazing, bank maintenance etc.), and the prevalence of feral mink which preferentially predates on water voles.

4.196. The otter is protected by both the Wildlife and Countryside Act (1981, as amended), the Nature Conservation (Scotland) Act (2004) and the Conservation (Natural Habitats etc.) Regulations 1994.

4.197. Both otter and water vole are national UK BAP priority species. The former species is a priority species for conservation action in the Stirling LBAP and selected as a species of conservation concern in the East Dunbartonshire LBAP, and the latter is a species selected as a priority for conservation action within both East Dunbartonshire and Stirling LBAPs.

4.198. A full simultaneous survey for otter and water vole was carried out in August 2003 by ECOS Countryside Services[5], following the methodologies outlined in Strachan (1998)[6] and Ward *et al.*(1994)[7]. All water courses within and around the site area (namely Tinkers Burn to the south east of the site – start NS 566753 and end NS 571746, and an un-named burn to the north – NGR start NS 557764 and end NS 568764), and associated banks were searched for signs of otter and water vole.

4.199. Neither otter nor water vole were recorded within or around the site boundary, despite the optimal timing of the survey for both species and the lack of brown rat or mink activity. Although the banks of both burns had areas suitable for short-term resting by commuting otters, the burn itself is not considered to be suitable for use in the longer term by either species for the following reasons:

- both burns are very narrow and with low water levels, typically less than 75mm deep and less than 1m wide;
- water levels fluctuate considerably;
- there were few areas of suitable exposed earth bank for water vole, and one area of the un-named burn is canalised with a concrete solum and banks;
- both burns, particularly the un-named burn, have long sections in woodland and without any bankside vegetation due to heavy shading;
- only tiny trout and minnow were recorded in either burn suggesting poor prey populations for otter.

4.200. However, otters are known to be well distributed along the River Kelvin and Blane Water catchments but the last national otter survey in 1994 did not record them at the Milngavie reservoirs. Nationally, the otters' distribution has extended since that time, and some level of activity might be expected in the area (Jim Green, pers. comm.).

[5] Environmental Resources Management (2003). *Mammal Surveys – Katrine Water Catchment Survey*. ERM, Glasgow.
[6] Strachan R. (1998). *Water Vole Conservation Handbook*. English Nature, Environment Agency and Wildlife Conservation Research Unit, Oxford.
[7] Ward D., Holmes N., Jose P. (1994). *The New Rivers and Wildlife Handbook*. RSPB, Sandy.

4.201. The OS grid square NS57 which covers the site was one of only a few Central Belt squares which recorded water vole presence in both the 1989-90 and 1996-98 national surveys (Jim Green, pers. comm.), but there are no records for the reservoirs. The nearest recent record for water vole within those national surveys is on the Dougalston Loch outflow at NS564732. There are also at least two other water vole sites in this square further into the Glasgow suburbs.

4.202. Although mink were not recorded during the 2003 survey, signs of this species were found in the area by Carter Ecological Ltd. (on behalf of ERM) during 2001/02, on the un-named burn to the north of the study site.

Red Squirrel

4.203. Although the Milngavie area is within the geographical range for red squirrel and the species is selected as a priority species in the Stirling LBAP, no records have been made during baseline surveys within the site boundary and the East Dunbartonshire region has not been selected as an area of potential red squirrel conservation in Scotland due to the presence of grey squirrel in close proximity (Scottish Squirrel Group 2004)[8].

Bats

4.204. All bats and their roosts are fully protected under Schedule 5 of the Wildlife and Countryside Act (1981, and later amendments), the Nature Conservation (Scotland) Act (2004), Annex IV of the Habitats Directive, and Schedule 2 of the Conservation (Natural Habitats, etc.) Regulations 1997.

4.205. Brown-long-eared, Daubenton's and Natterer's bats are of conservation concern at UK BAP level and are species selected as a priority for conservation action within East Dunbartonshire. Pipistrelle bat is also a UK BAP species and a priority species in the Stirling LBAP and of conservation concern in the East Dunbartonshire LBAP.

4.206. Foraging pipistrelle bats (the 55 kHz sub-species) were identified within the site boundary, foraging along woodland edges next to grass fields to the south of the Barrachan site and around Barrachan Cottages. Although several trees were identified as potentially suitable for roosting bats during the baseline survey carried out by ERM in 2001/02, a follow-up survey conducted by Nocturne Environmental Surveyors during May 2003[9] using the colony count method outlined by the Bat Conservation Trust's National Bat Monitoring Programme recorded no bat roosts in trees.

4.207. A Daubenton's bat was recorded foraging over the Craigmaddie measuring pond during ERM's 2001/02 survey.

Deer

4.208. No formal deer survey data were available. However, deer hoof prints were observed around the edges of the swampy pond and extensive deer activity has been reported within neighbouring Mugdock Country Park.

[8] Scottish Squirrel Group. (2004). *Scottish Strategy for Red Squirrel Conservation*. SNH, Edinburgh.
[9] Nocture Environmental Surveyors (2003) *Katrine Water Project, Glasgow – Bat Survey.* A report for Environmental Resources Management (ERM).

Birds

4.209. An ornithological survey of the site and its surrounding areas (Bankell Farm to the east and an access/pipeline route to the north) was carried out between May 2001 and October 2002 by ERM as part of the *Katrine Water Project Baseline Ecology Report* for Scottish Water (2002). Data was mapped using the British Trust for Ornithology's (BTO) Common Bird Census methodology[10], to enable an assessment of the status and distribution of each bird species within the areas of study.

4.210. One of the features for which the Craigmaddie and Mugdock Reservoirs SINC was designated is the number of wintering bird species the site supports, including significant populations of mallard and tufted duck, and smaller numbers of wigeon, shoveller, teal and mute swan and large flocks of black-headed and herring gull. More recent Clyde Bird Reports do not record significant numbers of waterfowl on the reservoirs, although a recent report includes roost counts of 2000 black-headed gulls, 130 lesser black-backed gulls and 800 herring gulls (Gibson, 2001)[11]. This may be because Scottish Water has historically initiated a gull control programme on the reservoirs to prevent contamination of the raw water supply.

4.211. The summer surveys conducted by ERM recorded great crested grebe, coot, black-headed, common, lesser black-backed and herring gulls and a pair of mute swan on the actual reservoirs. Grey heron and common sandpiper were occasionally sighted and a pair of oystercatcher was recorded around the reservoir. Birds recorded on the surrounding grasslands included carrion crow, jackdaw, kestrel, wood pigeon, song thrush, pied wagtail, swallow, house martin and meadow pipit. Birds recorded in or adjacent to woodland habitats included buzzard, wood pigeon, tawny owl, green and great-spotted woodpecker, wren, robin, black bird, song thrush, spotted flycatcher, grey wagtail, siskin, chaffinch, coal tit, goldcrest and pheasant.

4.212. In addition to more common breeding and wintering birds, six bird species of conservation importance were also identified in the area, namely skylark, song thrush, spotted flycatcher, bullfinch, starling, and yellowhammer: all six are on the Red List[12] of Birds of Conservation Concern[13] and the former four species are priority species within the UK BAP and the Stirling LBAP. Yellowhammer and skylark are priority species within the East Dunbartonshire LBAP, with the remainder being of conservation concern.

4.213. Other priority species within both relevant LBAPs which may occur within the geographical area and habitat types found on the site are linnet, reed bunting and tree sparrow. East Dunbartonshire also includes barn owl and kingfisher as priority LBAP species .

4.214. A flock of ten non-breeding crossbill were recorded moving between shelterbelt and woodlands around the Barrachan area of the site.

[10] Gilbert G, Gibbins DW, Evans J (1998) *Bird Monitoring* Methods. RSPB, Sandy.

[11] Gibson, I.P. (Ed.) (2001). *Clyde Bird Report 1999.* Scottish Ornithologists Club.
[12] Red List species are those bird species that are Globally Threatened according to IUCN criteria: those whose population or range has declined rapidly in recent years; and those that have declined historically and not shown a substantial recent recovery.
[13] Gregory, R.D., Wilkinson, N.I., Noble, D.G., Robinson, J.A., Brown, A.F., Hughes, J., Procter, D.A., Gibbons, D.W. and Galbraith, C.A. (2002). The population status of birds in the United Kingdom, Channel Islands and Isle of Man: an analysis of conservation concern 2002-2007. *British Birds* **95** 410-450.

4.215. The site does not appear to be of importance for wintering geese. This is likely to be due to the level of disturbance around the reservoirs and lack of foraging opportunity. Wintering greylag (and, to a lesser extent pink-footed) geese are often seen loafing and foraging on more suitable arable fields in the wider area around Milngavie and Bearsden (Lynsey Robinson (LUC), *pers. obs.*). A flock of resident greylags were recorded flying over the reservoirs during the ERM summer surveys, although they did not land.

Amphibians

4.216. Craigmaddie measuring pond was surveyed for great crested newt in 2001, 2002, and 2003[14]. None of the reservoirs on the site are considered suitable for great crested newt in their current state, and this was confirmed during the 2005 walkover assessment.

4.217. Aside from the reservoirs, the only area of standing water is a swamp that lies approximately 100 m to the west of the Barrachan site, at the northern end of the Mugdock Reservoir. It is a former silt trap pond known locally as the 'Dirty Dam'. It has become silted up and shaded at the edges as it is surrounded by mixed plantation woodland with a dense waterside fringe of rhododendron. Some open water remains, but the pond is mostly mud, or shallow water with species-poor stands of wetland plants including water horsetail, marsh marigold, meadowsweet and water mint.

4.218. Surveys here for amphibians in both 2001 and 2002 recorded only tadpoles of common frog with large numbers of young perch recorded during netting. Given that fish are a major predator of newts, and that the pond is heavily shaded, it is considered unlikely that the pond is favoured by species such as great crested newt.

Reptiles

4.219. No formal reptile survey has been carried out within the study area, although the walkover assessment judged a number of areas to be potential habitat for slow worm or common lizard.

Valuing Ecological Resources

4.220. Ecological receptors are normally valued according to specific 'biodiversity benefits' that they provide to the environment, people or wider society[15]. These benefits can include the conservation of genetic diversity, people's enjoyment or understanding of biodiversity, or the health benefits of biodiversity. A summary of an approach to valuing ecological receptors in Scotland can be found in table below. The table shows how ecological value can be ascertained using a combination of statutory measures (legally protected sites and species) and non-statutory but widely accepted measures, such as the presence of notable habitats and species listed in Biodiversity Action Plans. Use can also be made of the Ratcliffe assessment criteria for the selection of sites with nature conservation value (see Ratcliffe, 1977)[16]. All these criteria can vary at different geographical scales.

An Approach to valuing Ecological Receptors in Scotland

Level of Value	Examples
International	An internationally designated site or candidate site (SPA, pSPA, SAC, cSAC, pSAC, Ramsar site, Biogenetic Reserve) or an area which Scottish Natural Heritage has determined meets the published selection criteria for such designations, irrespective of whether or not it has yet been notified. A viable area of a habitat type listed in Annex 1 of the Habitats Directive, or smaller areas of such habitat that are essential to maintain the viability of that ecological resource. Any regularly occurring population of an internationally important species, i.e. those listed in Annex 1, 2 or 4 of the Habitats Directive.
National	A nationally designated site (SSSI, NNR, Marine Nature Reserve) or a discrete area which Scottish Natural Heritage has determined meets the published selection criteria for national designation irrespective of whether or not it has yet been notified. A viable area of a Priority Habitat identified in the UK BAP, of smaller areas of such habitat which are essential to maintain the viability of that ecological resource. A regularly occurring population of a nationally important species i.e. a priority species listed in the UK BAP and/or Schedules 1, 5 (S9 (1, 4a, 4b)) or 8 of the Wildlife and Countryside Act. A regularly occurring and viable population of a UK Red Data Book species.
Council	Viable areas of key habitat identified in Council BAPs and/or the Natural Heritage Zone profile or smaller areas of such habitats that are essential to maintain the viability of that ecological resource. Any regularly occurring, locally significant population of a species listed as being nationally scarce (occurring in 16-100 10km squares in the UK) or in a relevant Council BAP or Natural Heritage Zone profile on account of its rarity or localisation. Non-statutory designated wildlife sites (e.g. SNCIs, SINCs, WHSs and BHSs), including semi-natural ancient woodland greater than 0.25ha. Network of species-rich hedgerows.
District	District sites and other sites which the designating authority has determined meet the published ecological selection criteria for designation, e.g. Local Nature Reserves. Semi-natural ancient woodland smaller than 0.25ha. Sites/features that are scarce within the district or which appreciably enrich the district habitat resource.
Neighbourhood	Commonplace and widespread semi-natural habitats e.g. scrub, poor semi-improved grassland, coniferous plantation woodland, intensive arable farmland etc.
Less than Neighbourhood	Habitats of little or no ecological value e.g. amenity grassland or hard standing.

4.221. A summary of the ecological value of the biodiversity resource at Milngavie reservoirs is provided in the table below. It highlights those areas where the potential biodiversity value of the site is not currently being optimised. These issues will be developed further in the Biodiversity Development Plan.

[14] ECOS Countryside Services. (2003). *Katrine Water Catchment Study – Great Crested Newt Survey*. A report to ERM.
[15] The Nature Conservation (Scotland) Act 2004 has recently come into force. Section 1 states that '*…it is the duty of every public body and office-holder, in exercising any functions, to further the conservation of biodiversity so far as is consistent with the proper exercise of those functions.*'
[16] Ratcliffe, D.A. (1997). *A Nature Conservation Review*. Volumes I and II. Cambridge University Press, Cambridge.

Summary of Ecological Receptors within the Study Area, and their perceived Ecological Value

Ecological receptor	Resource description	Ecological value	Value of site for receptor
Designated sites	Site itself is an SINC and contains ancient woodland. Part of network of SSSIs, SINCs and Ancient Woodland.	Council	Important in terms of its size, potential ecological value and position in the ecological mosaic.
Woodland	Coniferous and broad-leaved plantation woodlands	Council	Important for its diversity, typicalness, potential value, intrinsic appeal and position in the ecological mosaic.
Grasslands	Predominantly mown verges and amenity grassland areas	Neighbourhood	A common and widespread habitat of limited ecological value, but important for its intrinsic appeal and potential ecological value.
Open water	Large open water reservoirs	District	Important for its size, potential ecological value and position in the ecological mosaic.
Swamp	Small area	District	Important for its diversity, fragility, typicalness, position in the ecological mosaic, and its potential value.
Badger	Potential to be present	Council	A nationally protected species listed on Council LBAP.
Water vole	Not present	National	A nationally protected species, but limited potential for species to be present on site.
Otter	Not present	International	A European protected species that may be encouraged onto the site as it is known to be present nearby.
Red squirrel	Not present	National	A UK protected species that is unlikely to be encouraged onto the site.
Bats	Likely to be foraging, socialising or commuting over the site. No conclusive evidence for roosts.	International	European protected species that may be encouraged to become resident on the site.
Deer	Likely to be present on the site.	District	Deer browsing and trampling can quickly become a significant impediment to conservation priorities if not appropriately managed.
Birds	Range of species breeding or over wintering on the site.	National (some red-listed species) Council (some LBAP listed species)	A range of species reflecting the range of habitats present.
Amphibians	Frog tadpoles recorded.	International (GCN) Neighbourhood (frog)	Great crested newt is an European protected species. It and other newt species could be encouraged to colonise the site.
Reptiles	No records.	National	UK protected species that may be present on the site, and could certainly be encouraged.

REQUIREMENTS FOR FURTHER SURVEY

4.222. The collation of existing data has provided a good overview of the current ecological resource at Milngavie. However, detailed management prescriptions, as outlined in the Biodiversity Development Plan would require more up to date, and in some areas, more detailed survey data. To this end, it is recommended that once funding has been identified the following surveys are commissioned by a future management group(SNH consider the surveys marked * to be of greatest importance):

- Detailed Phase 1 Habitat Survey at 1:5000, with NVC mapping of habitats of particular interest;
- Badger survey* (preferably carried out in early spring);
- Comprehensive bat survey*;
- Invertebrate survey (woodland and aquatic habitats);
- Deer survey (potentially in conjunction with Mugdock CP);
- Reptile survey.

5. CULTURAL SIGNIFICANCE AND CONSERVATION PHILOSOPHY

STATEMENT OF CULTURAL SIGNIFICANCE

Summary Overview

5.1. Like many feats of engineering undertaken in the Victorian period, the supply of drinking water to Glasgow involved tremendous ingenuity and technical competence, combined with aesthetic design skills of the highest order. The relatively limited technology available makes the achievements even more remarkable and the evident robustness of the engineering and architectural structures is a testament to the exceptional skills of the stonemasons, metalworkers and other craftsmen involved. The legacy of this work is a functional industrial landscape, which is also beautiful. It has been a major recreational resource for the population of the Greater Glasgow area since its completion and remains a popular visitor destination, valued for its tranquil beauty, its views, the qualities of light on water, architecture and wildlife as well as its extensive footpath network which is suitable for all abilities.

5.2. In seeking to define the Cultural Significance of the Milngavie Reservoirs, it is not possible to consider the reservoirs in isolation from the works at Loch Katrine and the massive undertakings of pipeline construction between Loch Katrine, Milngavie and Glasgow. The Milngavie Reservoirs are, therefore, an important part of a larger project which in itself is representative of several other major water supply projects developed throughout the UK within a similar timeframe, and involving some of the same engineers (and construction teams).

5.3. The cultural significance is, therefore, hard to define succinctly, but applying the significance criteria used within the 'Inventory of Gardens and Designed Landscapes in Scotland', it is clear that the Milngavie Reservoirs' landscape is of national heritage importance. Its cultural significance stems from many aspects as outlined below. These include:

- the rich social history associated with the water industry and the outstanding quality of the archive material held by Scottish Water;
- the quality of architecture /engineering design and its role both functional and aesthetic in the reservoir landscape;
- the design composition and inter-relationships between structures, landforms, paths, planting and water which create an industrial landscape which is also a work of art;
- the strength and distinctiveness of tree plantings and ornamental shrub planting which frame the landscape and shape its character;
- the variety of existing habitats within a 'managed' landscape and the importance of the site in providing connectivity with the adjoining wildlife corridors;
- the highly valued scenic qualities of the landscape, both for the views possible from the site and the contribution to the local landscape quality and character;
- the industrial heritage importance of the reservoirs' infrastructure and archaeological potential of the Barrachan area;
- the huge recreational significance of the site, which stems from the mid 19th century and continues today with high visitor numbers enjoying the landscape in many different ways.

The following paragraphs seek to describe the nature of the site's significance in greater detail.

Historical Significance

5.4. The construction of the Milngavie Reservoirs in two phases and the associated Loch Katrine Water Supply Project for the Glasgow Conurbation is an achievement of huge social importance which improved the health and living conditions of Glasgow's burgeoning population in the 19th and early 20th centuries. It was, therefore, an essential part of the city's infrastructure when Glasgow was the second city of the British Empire. The scale and difficulty of all the construction work makes it an engineering achievement of exceptional historical significance and the fact that the greater part of Glasgow's population is still served by the original Victorian structures is a testament to the quality of the engineers and the workforce of the time.

5.5. The dramatic success of the Loch Katrine Water supply scheme in improving public health enabled the civic authorities to justify expenditure on other forms of public provision: refuse removal; street lighting; slum clearance and their replacement with parks and new housing; hospitals, etc. Thus, the Loch Katrine scheme is internationally recognised as having inspired an historic movement in which civic intervention mitigated the worst effects of the industrial revolution.

5.6. The Loch Katrine Water Supply Project was conceived by the eminent engineer John Frederick La Trobe Batemen (1810-1889), who was also responsible for the water supply projects for Manchester, Belfast and Dublin. He was, therefore, an influential engineer of national importance although little known relative to his contemporaries involved in the more glamorous railway /transportation engineering projects such as Brunel, Stephenson and Locke.

5.7. Scottish Water holds an extensive archive of the construction drawings for the Loch Katrine Water Supply Project in both phases. This comprises detailed drawings of all components and is possibly unparalleled as an engineering archive. The existence of this archive, its comprehensive nature and its integrity makes it a national asset, which deserves to be held (at least in duplicate) by the Royal Commission on Ancient and Historical Monuments in Scotland.

Architectural Significance

5.8. The Milngavie Reservoirs are covered by a group listing Category B which encompasses all structures within the site. This listing recognises the national significance of the reservoir structures and buildings as part of an integrated complex dedicated to water supply. It covers numerous buildings, the fine masonry structures associated with the reservoirs and extensive walls with gateways, railings, etc. The group listing does not perhaps fully recognise the individual merits of certain structures. The Gauge Basins and associated headwalls, separating walls and weirs are of particular architectural merit, which exemplify how engineering functions can be accommodated in a sculptural manner. The scale of the reservoir structures and their important contribution to the local landscape also underlines the architectural significance of the Reservoirs site.

Work of Art

5.9. The Milngavie Reservoirs are first and foremost an industrial landscape, which fulfils the vital function of retaining and treating water for consumption by the Glasgow conurbation. The design of the Reservoirs' landscape and of its individual components responds to the functional demands in a creative way which is mindful of aesthetic and spatial possibilities, and of visitor demands. The landscape, therefore, provides a parkland experience with extensive access routes, horticultural features and water works structures, which act as focal attractions within the landscape. This combination of functionalism and aesthetic design provides a unique 'country park' which has been a popular visitor destination since the late 19th century.

Horticultural Significance

5.10. The Milngavie Reservoirs landscape contains a number of horticultural and scenic qualities of the area. These include distinctive tree belts and avenues, mixed woodland on Barrachan Hill and corridors/localised areas of ornamental shrub planting. The site has lost some of its original ornamental gardens in the vicinity of Mugdock Cottage. Most of the planting dates from the mid – late 19th century, although the Barrachan Hill also has a number of more venerable trees which predate the reservoirs.

Nature Conservation Significance

5.11. The network of statutory and non-statutory nature conservation designations within the study site and surrounding area demonstrates the importance of the reservoirs site in landscape ecology terms, as they provide habitat connectivity between designated sites to the north-west and south east. There is an area of long-established woodland of plantation origin within the study area and Mugdock Wood to the north-west of the site is also listed as ancient woodland.

5.12. The majority of woodland on the site broad-leaved plantation woodland or coniferous plantation woodland, although there are some smaller semi-natural woodland and scrub areas. A large part of the terrestrial site area is comprised of grassland and grassy margins, although much of this is now under development, species poor and heavily managed.

5.13. The two main habitat sensitivities on the site are the woodland and swamp areas. The main species sensitivities are birds and bats. There are potential opportunities to enhance the existing ecological resource as part of a site biodiversity development strategy, including targeted management of wood, swamp, grassland and reservoir areas.

Scenic Significance

5.14. The Milngavie Reservoirs contribute positively to the character and quality of the landscape on the urban fringe of Milngavie. The reservoir walls, gateways, tree belts and avenues are highly visible features from the main roads and they signify the limits of the reservoir landscape in a positive manner. Views of the reservoirs are possible from a number of vantage points and whether glimpses or panoramas, these add to the scenic diversity of the area. From a distance, the framework of tree belts and woodland become integral parts of the local farmland and estate landscapes, helping to create an intimate and settled character below the less managed and more rugged moorlands of the Kilpatrick Hills. The scenic qualities of the reservoirs themselves are highly valued by the local population and by the visitors from the wider area.

Archaeological Significance

5.15. The majority of the reservoirs site has been disturbed by the construction of dams, aqueducts, engineering structures and associated roads and footpaths. Substantial areas of the reservoirs' beds have also been excavated and disturbed by pipeline construction prior to being submerged. Only Barrachan Hill retains areas of the earlier landscape, but there have been no archaeological discoveries in this area. It must consequently be concluded that the site has little archaeological significance in relation to early historic and pre-historic features. The site is undoubtedly important for its industrial heritage but as the reservoir structures and infrastructure are still in use they are not considered to be 'archaeology'.

Recreational Significance

5.16. The Milngavie Reservoirs are a popular visitor attraction and a local amenity for the residents of Milngavie and Mugdock. The West of Scotland Water Survey of 2002 estimated that the site receives between 150,000 and 170,000 visitors per annum. The adjacent Mugdock Regional Country Park attracts approximately 525,000 visitors per annum and the close proximity of the two parks provides opportunities for linkages.

5.17. The Milngavie Reservoirs' site is used regularly by local residents for walking, jogging and passive recreation. Its proximity to Milngavie facilitates pedestrian access (i.e. without the need for cars). The site is also within 1km of the West Highland Way and this encourages excursions by visiting walkers.

5.18. The Reservoirs also attract large numbers of visitors from the Greater Glasgow area and other parts of Scotland. The site offers a readily accessible escape from the city. The range of recreational opportunities is limited (and currently restricted by the Byelaws) but the tranquil beauty of the reservoirs is a major resource for more passive types of recreation.

5.19. The circular nature of the main footpaths around the reservoirs, and their level nature, facilitates circulation by the less mobile but also by parents with prams and cyclists. The recreational value of the reservoirs has been recognised in several publications over the last 100 years; these include local history books, travel guides and newspaper articles.

Inventory of Gardens and Designed Landscapes in Scotland

5.20. The Milngavie Reservoirs landscape is not listed within the original 'Inventory of Gardens and Designed Landscapes in Scotland' but over recent years, Historic Scotland and Scottish Natural Heritage have been assessing additional 'candidate' sites throughout Scotland and consequently the 'Inventory' is being extended by supplementary editions. East Dunbartonshire Council is currently assessing designed landscapes within its administrative area. This assessment includes the Milngavie Reservoirs and as a result, it is likely that the Reservoirs Landscape will be put forward as a candidate for Inventory inclusion.

Threats to the Heritage

5.21. The legacy of the Loch Katrine Water Supply Project is a landscape and complex of structures, which is relatively robust and has consequently remained intact over the last 150 years. Nevertheless, decline has taken place with the incremental loss of trees, removal of garden features, disuse of the Barrachan buildings, loss of field boundaries, degradation of perimeter walls and corrosion of ironwork structures. The 20th century addition of utilitarian buildings at the old water treatment works has compromised the setting of listed buildings and structures in prominent locations. This has been compounded latterly by the erection of security fencing around the treatment works and at the Mugdock Reservoir measuring basin. Finally the development of the Katrine Water Project at Barrachan and Bankell has denied public access to a significant area in the core of the site and has resulted in a negative impact on visual amenity, recreational and nature conservation potential in this area. The KWP has also caused the loss of mature trees, severance of an historic access route and damage to existing access routes by haulage vehicles. Views from the reservoirs have also been compromised by the development of the Bankell site, formerly a greenfield area.

5.22. The KWP will result in the decommissioning of several old buildings including the Barrachan complex and components of the old water treatment works. While this could present an opportunity to remove recent unsightly developments and to restore elements of the landscape, it also represents a potential threat if the buildings are sold and if public access is denied in the future. Scottish Water is currently obliged to dispose of redundant assets and this disposal process could prevent or restrict options for new positive public uses for the redundant buildings. In the meantime buildings will be left empty bringing the risk of vandalism, water ingress, fire etc. These could be major threats to the heritage i.e. in the worst case the destruction of the buildings.

5.23. The reservoir landscape was formerly tended by a full-time squad of groundsmen, who maintained the site to a high standard. Landscape maintenance has diminished steadily over the last 30 years and it is now at a minimal level, which is insufficient to prevent continued, albeit slow decline. Without proactive conservation measures and ongoing maintenance of all landscape components, the heritage and cultural significance of the site will be under threat. This is particularly important for the site's extensive walls and iron fences which if denied regular and constant upkeep will become a huge liability, necessitating very significant capital sums to achieve their conservation.

5.24. The reservoir complex currently has a group listing grade B. This is provides some statutory protection for structures/buildings within the site but it may be insufficient to safeguard against determined developer interests. Group listing grade 'A' would provide a more fitting level of protection, which recognises the national importance of the site in architectural, engineering and landscape design terms.

5.25. Similarly the current lack of inclusion within the 'Inventory of Gardens and Designed Landscapes in Scotland' and its lack of 'Conservation Area' status undermines the cultural significance of the site and reduces the level of statutory protection. In addition to statutory protection the above designations could help to secure grant funding in the future from Historic Scotland, Heritage Lottery Fund and Scottish Natural Heritage.

CONSERVATION PHILOSOPHY FOR MILNGAVIE RESERVOIRS

5.26. The Milngavie Reservoirs are essentially the product of Victorian enterprise undertaken in two seamless phases in 1859 and 1896. The second phase enlarged and carefully integrated new components with the first phase, employing the same methods and quality of engineering construction. It is considered therefore that the reservoir landscape reached its climax in 1896 and the years that followed in the early part of the 20th century. Subsequent developments, although necessary to meet operational demands, had a negative impact on the architectural and landscape design qualities of the site. This determines that the main conservation emphasis should be the protection, restoration and enhancement of the landscape and its structures in a way that is sympathetic to the conditions prevalent in 1896-1900. This does not mean slavish restoration of conditions in that period as this would be clearly impractical and could not respond to the contemporary demands of society or the operational constraints of Scottish Water. Furthermore the future conservation process must also respond to the individual characteristics and history of each compartment described in Chapter 3.

5.27. The influence of the Victorian engineers is all-pervasive within the walled boundaries of the site, but it is possible to identify areas and features which pre-date the reservoirs and retain some of their original agricultural characteristics. These are located in the Barrachan Hill area. The conservation process must therefore respect these characteristics as well as those which solely to the reservoirs' construction era.

5.28. Conservation Plan methodologies, as initiated by James Semple Kerr, require conservation objectives and priorities to respond to the cultural significance of individual features and their context, and to address, as far as possible, the identified threats to the heritage. Implicit in this process is the potential need for new developments, which can help to make the heritage more meaningful and accessible in contemporary society. New development can also secure the future upkeep of historic buildings and landscapes, and if well designed, will become a positive addition to the heritage in future years. Conversely the conservation process also provides an important opportunity to 'undo' mistakes of the past and to remove inappropriate developments. These evolutionary principles allow heritage sites to remain dynamic, albeit within carefully controlled parameters.

5.29. The consultation process, which preceded this study, identified the deep affection held for the reservoirs' landscape by the local community. This was translated into their aspiration for the protection of the site's special tranquil character, the conservation of its heritage features and the long-term enhancement of its maintenance. These aspirations, summarised as: " an enhanced status-quo", reflect serious concern over the decline in the condition of the site over recent years, but also express their desire to see only limited and carefully controlled change i.e. that does not impact negatively on the character of the site.

5.30. The above aspirations are common to all conservation projects but in this case there are specific concerns over the evident impacts of minimal landscape maintenance and the future integrity of the landscape due to Scottish Water's current policy of asset disposal. Secondly there are concerns that new activities and developments could cause negative changes to the quiet, contemplative nature and scenic beauty of the reservoirs.

5.31. In summary therefore, the conservation philosophy for the Milngavie Reservoirs, landscape as expressed by the Milngavie Reservoirs Conservation and Recreation Management Plan Steering Group, can be translated into the following key aims:

- ***to conserve the landscape and its component features in a manner that, first and foremost, respects and preserves the integrity of the Victorian design undertaken in two complementary phases by John Bateman and James Gale;***
- ***to conserve the individual positive characteristics of the landscape compartments described in Chapter 3;***
- ***to respond to the threats to the heritage as defined above, in a prioritised manner, tailored to budget and resource availability;***
- ***to seek positive and sensitive new uses for buildings soon to be made redundant;***
- ***to remove or mitigate the effects of insensitive developments from the period 1960 to 2005;***
- ***to introduce new activities and developments only where they can complement or help to preserve the heritage of the site, and ideally make the reservoir landscape more publicly accessible in both physical and intellectual terms;***
- ***to secure long term commitments from stakeholders towards the maintenance of the landscape and its integrity as a public heritage and recreational asset within East Dunbartonshire.***

5.32. These aims guide the review of development opportunities and options set out in the following chapters (6,7 and 8) and are translated into policy objectives and proposals within the 'Conservation and Recreation Management Plan' (Chapter 9).

6. ASSESSMENT OF ACCESS AND RECREATION DEVELOPMENT OPPORTUNITIES

CONTEXT

National Level Demand

6.1. A study undertaken on behalf of SNH in 2001[17] shows that 59% of Scottish adults had undertaken an outdoor activity in the two months prior to the survey at the end of July 2000. Of these people, the most common activity undertaken was walking for up to two miles – 51%. Second most popular was walking over two miles – 39%. Cycling on road was third (7%) and cycling off road (4%) was fourth most popular.

6.2. The locations in which countryside visits took place are wide ranging. The break down of locations is as follows:

	Respondents (%)
Coastal beach/cliff top	29
Forestry/wood	24
On paths or tracks	22
River/riverbank or loch/loch shore	21
Farmland	16
Mountains/moorland	15
Country park/other managed site	12
Other	1

6.3. This wide range is not surprising given the huge variety of landscapes, which are present in Scotland. These figures demonstrate that outdoor recreation and in particular outdoor access are hugely popular activities amongst the population of Scotland.

Land Reform Act & Access Legislation

6.4. The Land Reform (Scotland) Act 2003 has for the first time created a right of responsible access in Scotland. It is now a legal right for people to undertake non-motorised access across land and inland waterways if they deem that access to be 'responsible'. The new rights of responsible access covers most land and inland water including open spaces in towns and cities. However, the right of access does not apply to all areas, the curtilage of homes and construction sites for example.

6.5. Responsibility is the key aspect of the legislation – people that use their right of access must do so responsibly. In order to help people evaluate what is and isn't responsible behaviour, SNH have published the Scottish Outdoor Access Code. This provides the guidance which people exercising their access rights must adhere to.

6.6. The Act also sets out the obligations for land owners. It states in Section 3 that:

It is the duty of every owner of land in respect of which access rights are exercisable-

a) to use and manage the land; and

b) otherwise to conduct the ownership of it,

in a way which, as respects those rights, is responsible.

6.7. The rights and responsibilities that the Act are combined with a number of conditions placed on Local Authorities. Each authority has to form at least one Local Access Forum and identify through public consultation a 'Core Path Network' for their area.

East Dunbartonshire Access Strategy

6.8. The East Dunbartonshire Access Strategy was developed in 2001. It provides the strategic framework in which access developments in the area are made. The strategy has an overall vision for access in East Dunbartonshire:

'A better coordinated, more proactively promoted and well maintained network of routes for recreational and everyday use. The network will aim to meet the needs and aspirations of both the local community and visitors to the area.'

6.9. The strategy also sets out a number of aims for access in East Dunbartonshire. Many of these aims are relevant to the Milngavie Reservoir site:

- *To ensure that local people, users, land managers and partner agencies each play a role in developing the network;*
- *To proactively promote the range of existing routes within East Dunbartonshire focusing on their suitability for different types of user;*
- *To improve links between urban and rural areas, and between settlements within the area;*
- *To increase visitor interest in the area – raising the profile of the area through a co-ordinated programme of interpretation and promotion;*
- *To develop local networks within the strategic framework provided by the area's key routes, in partnership with the community, users and land managers.*

6.10. The Milngavie Reservoir site is noted as a key resource in the Bearsden and Milngavie area. It particularly notes the role the reservoirs play in providing an area accessible for all types of users. Their flat, level surfaces make them an ideal location for wheelchair users to enjoy.

[17] NFO System Three (2001) Survey of behaviour associated with access and informal recreation. *SNH Commissioned Report F99AC08*

Reservoir Byelaws

6.11. The Milngavie Reservoirs are currently covered by byelaws, which were devised to prevent contamination of the (drinking) water and to ensure visitor safety. The byelaws are being renewed at present but currently they forbid:

- swimming in the reservoirs;
- fishing;
- cycling;
- boating;
- a range of anti-social activities.

6.12. The completion of the Katrine Water Project will provide more stringent and secure water treatment processes, which will potentially allow the above restrictions to be relaxed, in particular the restrictions on water-based activities. Recent access legislation allows 'responsible' cyclist access and therefore this element of the byelaws may be open to challenge at present.

Visitors to the Milngavie Reservoirs

6.13. The Milngavie Reservoirs are an important recreational resource for a large number of people. It is well used by the population of Milngavie (12,795 including Mugdock at the 2001 Census) and is located close enough to Bearsden and Glasgow to attract visitors from slightly further afield.

6.14. The number of people using the reservoirs as a recreational resource has not been fully evaluated, although a visitor survey was undertaken as part of the Environmental Impact Assessment for the Katrine Water Project. This survey was undertaken on four days during August 2001 and showed the following pattern of use:

Day	No. of Visitors
Thursday	349
Saturday	477
Sunday	685
Tuesday	348

6.15. These figures provide data for a very short period of time and with limited survey stations. It does not account for seasonal or the full range of diurnal patterns (e.g. the high reported levels of use in the summer evenings and early mornings and winter usage. It is therefore not a robust source of visitor information on which to project annual usage at the site.

6.16. However, these figures have been used to provide the published figure of between 150,000 and 170,000 users per year. As noted above, this figure is derived from a limited baseline and should therefore be considered as indicative. It will be essential to have more robust visitor information in the future in order to inform assessments of financial viability for development options and to gauge general visitor aspirations / responses to management changes.

Historic cartoon postcard

6.17. From site survey work and consultations undertaken for this study it is apparent that the reservoir landscape is used for a range of recreational activities, generally of an informal nature. It is a popular area for rambling, dog walking, jogging, picnicking and nature-watching. This generally involves individuals, family groups, couples and occasional visits by special interest groups. Fishing from the banks and cycling around the reservoirs also occurs, although these activities are currently contrary to the Reservoir Byelaws.

6.18. The most heavily used areas are the footpaths around the perimeters of the reservoirs. These provide level access free of obstructions, which is particularly beneficial for the disabled and less mobile visitors, including families with small children and prams. The footpath network is ideal for circuits and these are used by joggers and by recuperating patients to gauge levels of fitness and rates of recovery. In summer months jogging and dog walking occurs both early in the morning and late at night. The reservoirs are also popular at night for watching sunsets over the water, star-gazing and experiencing the nightscape of Glasgow.

6.19. The hilly terrain of Barrachan provides an environment for exploration and solitude in the woods, but access is more difficult, which deters the less mobile visitors. A proportion of visitors on foot and on cycles pass through the reservoir site en route to and from Mugdock Country Park, West Highland Way, Milngavie and Bardowie/ Baldernock in the east.

Mugdock Country Park

6.20. Mugdock Country Park is one of the most popular visitor destinations in the Glasgow and Clyde Valley area. In 2003 approximately 505,224 people visited the park[18]. Mugdock Country Park has a visitor centre, café and restaurant close to Craigend Castle. These provide the main focus for visitors. It also provides the starting point for a number of promoted walks including the five mile *'Water Way'* which incorporates a loop around Mugdock Reservoir and part of the West Highland Way.

[18] www.scotexchange.net

6.21. The Drumclog car park located to the west of the Mugdock Reservoir serves users of both the reservoirs site and Mugdock Country Park.

West Highland Way

6.22. The West Highland Way is the most famous long distance routes in Scotland and although it does not pass through the Milngavie reservoirs site, it is located close to the area. Therefore, it is an important consideration in developing an understanding of the current access resource at the site.

6.23. The most recent visitor survey undertaken for the West Highland Way was undertaken in 1994 (there are plans to undertake a new survey in the near future). The findings of the survey are wide ranging and provide a detailed analysis of the numbers and types of user on the WHW. The study shows that approximately 50,000 people use the WHW annually but only around 15,000 walk the whole route. The closest counter to the Milngavie Reservoirs was located at Dumgoyach. 16,813 people triggered the counter at this point in 1994.

6.24. The user survey shows that 15% of people travelled to the West Highland Way from Milngavie on the day of their walk and 10% from Glasgow. Although there is no differentiation between people that live in Glasgow or Milngavie and visitors, the high proportion of people starting their journey from the local area suggests there is a potential market for accommodation providers.

6.25. The user survey also shows that camping/hostel type accommodation is amongst the most popular for users of the WHW. The types of accommodation used included:

Type of Accommodation	Percentage
Youth Hostel	13
Organised camping site	15
Wild camping sites	20
Bunkhouse	3

6.26. This also demonstrates the potential market for accommodation associated with the West Highland Way.

VEHICULAR ACCESS AND PARKING: CURRENT SITUATION

6.27. Vehicular access to the reservoirs for visitors is currently restricted, although a small number of parking spaces (20 No.) are provided adjacent to the Mugdock Cottage/ Chlorination plant complex. These are primarily for the use of Scottish Water personnel or by arrangement for other visitors.

6.28. Vehicular access to the above facilities is obtained from Mugdock Road via the wall-lined ramp on the south face of the Mugdock Reservoir dam. The poor sightline at the junction determines that this access involves a dangerous right-turn manoeuvre into the site from Mugdock Road (northbound). The ramp is narrow (4.5m) and only allows a single line of traffic at one time. The presence of walls prevents the creation of 'passing places' and, therefore, vehicles entering and exiting the site must currently 'give way'. The infrequency of vehicular access at present determines that this arrangement is not particularly problematic, although it would not be workable with larger volumes of traffic.

6.29. The Commissioners' Walk provides an alternative road route to the Mugdock Cottage facilities, but this route is not used due to potential impacts on the main water supply pipes, which run underneath this road. Scottish Water reports that the depth of cover under Commissioners' Drive is less than average and this gives cause for concern regarding the potential damage caused by vibrations from passing traffic, particularly large vehicles. As a precautionary measure, regular traffic is, therefore, excluded from Commissioners' Drive.

6.30. Vehicular access around the reservoirs and to other parts of the site's road network is currently restricted to Scottish Water vehicles for security, pedestrian safety and maintenance reasons. Visitor traffic is, therefore, not permitted to enter the reservoir site via the Craigmaddie Lodge gateway or by the Gauge Basin gateway off Mugdock Road. Access by the residents of properties within the site is, however, permitted.

6.31. Vehicular access to the Barrachan complex of buildings can only be achieved at present via the site's internal roads, crossing the Causeway or following the north side of Craigmaddie Reservoir before climbing the hairpin ramp to the front of Barrachan. The former drive to the north of Barrachan is partially accessible as a footpath, but vehicular passage to Barrachan is not possible without significant remedial work. The ongoing Katrine Water Project development occupies the area to the east of Barrachan and the former drive through this area has consequently been lost.

6.32. Visitor access by vehicle is, therefore, generally excluded from the Reservoir site at present and vehicular access is served primarily by the Drumclog car park on the west side of the site. For many years, visitors have also parked along the verges of Strathblane Road, close to the Craigmaddie Lodge gateway on the east side of the site. On-road parking also occurs on Mugdock Road close to the Gauge Basin gateway, although this is now deterred by road markings.

6.33. The Drumclog car park has 45 no. parking spaces and a height restricted access gate. It requires visitors to cross Mugdock Road and the wall heights have been locally lowered to improve sightlines for pedestrians and to achieve some intervisibility between the car park and the reservoirs for security reasons. The latter has increased the visual impact of the parked cars from within the reservoirs' site and is detrimental to the visitor experience (particularly for those taking access by foot or by cycle).

6.34. There has been a high incidence of car break-ins and vandalism on Mugdock Road and security issues will, therefore, have to be addressed in any new parking options.

PUBLIC TRANSPORT

Trains

6.35. Milngavie is well served by the public transport network, there are regular train services between it and Glasgow and a wide range of bus services.

6.36. There are four trains per hour from various stations in Glasgow (except on Sundays and in the evenings when there are two) with a 10-20 minute journey time depending on the station of origin. The reservoir site is around 1km from the station and should be easily accessible for most people.

Buses

6.37. There are a number of bus services that already provide connections to the reservoir site. The 8, 10, 11a and 310 services each run along Strathblane Road on the eastern side of the site. There are bus stops in both directions close to the Commissioners' Walk entrance to the site that could be promoted as the 'entrance' to the Milngavie reservoirs.

6.38. There may be scope to introduce additional stops further north on Strathblane Road near Craigmaddie Lodge. This would provide a public transport link to another entrance to the site.

6.39. During summer months there is a bus service between Milngavie Station and Mugdock Country Park. This service provides easy access to the country park but it is still greatly underutilised and requires heavy subsidy. There may be scope to add a stop at the reservoir site but it is unlikely that this would increase the levels of use of the service.

6.40. The Mugdock service would require significant levels of advertising to if it is to become better used. This could be assisted by information on-site at the Reservoirs e.g. at site gateway signboards, car parks and at strategic visitor congregation points.

PEDESTRIAN ACCESS AND CIRCULATION

6.41. There are various entrance points to the Milngavie Reservoirs site that are used by pedestrians. Although the site is in an elevated position, the paths around both Mugdock and Craigmaddie Reservoirs are flat and level. The route around the reservoirs provides an ideal resource for most users because of the lack of gradient and the opportunities for circular walks.

6.42. There are four main access points to the site for pedestrians. These are:

- Mugdock Road (at Drumclog car park);
- Mugdock Road (at the Gauge Basin)
- Mugdock Road vehicular entrance and ramp;
- Craigmaddie Lodge;
- (Commissioners' Walk occasionally locked).

6.43. These entrance points are not dispersed evenly across the site. Three are found on the western side of the reservoirs and the other on the east. The Commissioners' Walk would provide an access point to the south of the site but it is currently inaccessible for motorised traffic and restricted for pedestrians.

6.44. The whole site is accessible from each of the entrance points, so pedestrian circulation varies greatly. There are numerous potential routes from each entrance making it difficult to define what the circulation around the site is. One of the strengths of the reservoir site is the large variety of potential routes that it contains.

The Surrounding Area

6.45. Access from Milngavie to the reservoirs site is taken from either Mugdock Road or Strathblane Road. The site is a relatively short distance from the station (approximately 10 minutes walk) on roadside pavements.

6.46. The site is also accessible from the town centre by a variety of routes. A suggested Tannoch Trail would follow the Tannoch Burn through Barloch Moor past the Preaching Braes, then northwards in Buchanan Street to Tannoch Drive then to the ramp access to Mugdock Reservoir.

6.47. The site has close connections with Mugdock Country Park. One of its promoted routes, *The Water Way*, incorporates the reservoirs site as part of a five mile walk. It links to the Mugdock Road vehicular entrance and incorporates the eastern side of the Mugdock Reservoir.

6.48. The Drumclog car park also provides an access route between Mugdock Country Park and the reservoirs site. There are a number of paths in the Country Park adjacent to the Drumclog car park (including a right of way), which are popular with local people. The recent upgrading of the car park to 45 hardstanding spaces demonstrates the demand for easily accessible access resources. It is not possible to know the proportion of people who park at Drumclog and visit the reservoirs compared to Mugdock, but the popularity of the car park demonstrates the quality of the overall resource in the area.

6.49. Another right of way is located to the east of the site at Bankell House, just south of the entrance at Craigmaddie Lodge. There may be potential to improve the link to this right of way through the installation of signage. Connecting with this route would help to provide a link towards Baldernock Linn.

The Reservoirs Site

6.50. The character of the access network around the site also varies greatly. The path surface around the two reservoirs is flat and firm, providing an ideal walking surface for most users. The path around Craigmaddie Reservoir is approximately 2584m and the route around Mugdock Reservoir is approximately 2331m (excluding the measuring ponds).

6.51. The route around Craigmaddie has an open aspect, which permits views around the reservoir and its surrounds. Much of the route around Mugdock is more enclosed, particularly on its eastern side, so there are fewer views across the site and beyond. The variation in the character of the routes is another major strength of the area (particularly as the path surface remains consistent around its full length).

6.52. Barrachan Woods, to the east of Mugdock Reservoir, provides another type of access resource. An access track provides another potential pedestrian route between the Mugdock and Craigmaddie Gauge Basins. At present this route is crossed by the access track to the new Water treatment works. The route is used for vehicular access and as such has a different character to the smooth and flat surface, which is found around the reservoirs. In places it is muddy and uneven but it is still a practical route for most walkers and cyclists.

6.53. Barrachan Wood contains a range of paths both historical and contemporary. A number of routes through the area have been recently upgraded to provide a surface, which should be suitable for use in all conditions. These include a new 'core' route from the Mugdock Measuring Pond towards Barrachan, a new link to the access track between the gauge basins and an upgraded link to one of the quarries in the woodlands. These paths have not been constructed sympathetically, although they provide a firm walking surface, they are not in keeping with the character of the woods.

6.54. There is also a range of other routes contained within the woods, less formal in character. Some of these are marked on OS plans, such as the path between the Barrachan access road and the southern-most quarry. This route provides a typical woodland walk, the path is unsurfaced and has not been maintained for a number of years. This type of path 'fits' the character of the area.

6.55. There is a range of other routes, which are not marked on OS plans. Some of these are modern desire lines but others appear to be historic routes which have become overgrown and, in some cases, almost impossible to use. Again, these paths 'fit' the character of the area but require sensitive restoration to permit access.

6.56. Many of the paths in Barrachan Wood are not suitable for all types of user; some are narrow, uneven and have steep gradients. As such it is unlikely that they are used as much as the main routes around the reservoirs. However, the presence of desire lines and the well-used appearance of some of the paths suggest that the area is a well-used access resource.

6.57. The formalisation of some of these routes could be problematic - some routes are narrow and have steep drops along their edges. Undertaking the physical improvements necessary to improve the routes may be prohibitively expensive, and could easily compromise their character.

Running

6.58. The reservoirs are an ideal location for running. The flat, even surface and potential for circular routes make them a popular site for runners of all abilities. The distance around the reservoirs (approximately 5km) also makes the area an ideal site for training and time trials.

CYCLIST ACCESS AND CIRCULATION

6.59. The current byelaws prohibit cycling, fishing and swimming. Notices around the reservoirs site advertise these restrictions. However, cycling around the site does take place. The flat nature of the routes around the reservoirs would makes them ideal for young people learning to cycle or building their confidence.

6.60. There is little at the site to interest competitive cyclists, the area is too small and having to share the area with pedestrians is likely to cause conflicts.

6.61. Consultation and site survey work has shown that mountain biking takes place in Barrachan Woods. However, given the small size of the site and lack of routes, this activity is likely to take place at a relatively small scale.

RECREATIONAL DEVELOPMENT OPPORTUNITIES

Walking and Running

6.62. Recreation has always been an important component of the activities, which take place at the Milngavie Reservoirs. In particular walking has been a hugely popular activity since the site was opened in the 19th century. There seems little reason to suggest that the popularity of this activity is going to decrease. Indeed it is likely to grow in popularity as the population becomes increasingly aware of the benefits of low impact exercise.

6.63. It has been noted that in the past cardiac rehabilitation patients would meet at the site on the recommendation of their physiotherapists in order to exercise (and socialize). Consultation and site work undertaken during this study has also demonstrated that running is a highly popular activity around the reservoirs.

6.64. There is potential to improve the area as a resource for walking by making a few minor introductions. The installation of more benches at regular intervals around the site would be beneficial for many users, particularly the elderly and infirm. The site currently has numerous benches of differing styles and quality (the result of donations over many years) ideally the reservoir benches should co-ordinated and perhaps purpose designed for the site.

6.65. It would also be beneficial to introduce distance markers around the site. These could be placed at 1km intervals to allow walkers and cyclists to measure distances. These markers should be unobtrusive and could be as simple as a coloured stone at the side of the path.

6.66. The site could be further enhanced by the introduction of 'Trim Trail' equipment. 'Trim Trails' are facilities, which provide the opportunity for people to use exercise equipment in the outdoors as part of a walk or run. It can range from very simple pieces such as wooden blocks to act as steps to more complicated, multipurpose equipment.

6.67. Trim Trails have been shown to be successful in a wide variety of locations across Britain. If correctly located and maintained they can become invaluable additions for the training regimes of both serious athletes and people exercising for fun. Conversely they may become vandalism targets and in such cases can be expensive to maintain. This potentiality must be considered in the placement and construction of the trim-tail equipment. Another consideration is the visual impact of the equipment; larger free-standing structures could be intrusive unless integrated amongst vegetation, landforms or structures. In this respect the Barrachan area would provide greater scope for visual integration, while the reservoir perimeters, being more exposed, would demand discreet siting with greater use of low-level equipment. Design of the trim-trail components to complement reservoir structures would also help to achieve visual integration, e.g. metalwork structures using muted (reservoir) colours or colour matched with the benches.

6.68. There are a variety of locations where trim trail equipment could be located around the reservoirs without intrusion. Ideally the trim trail components, benches and signs would be designed as a coordinated suite of equipment spaced strategically around the reservoir footpaths. Single pieces of low-level equipment could be unobtrusively accommodated in the verge area at regular intervals. More than one piece of equipment might be located at key sites to provide small outdoor gyms. These sites should be distanced from the listed buildings and masonry structures to avoid any detraction from these heritage features. A progressive approach would be prudent whereby a small number of simple installations are first introduced and thereafter supplemented if there is a proven demand.

6.69. The Esporta Club on Strathblane Road already has changing facilities close to the site. There may be scope to encourage the use of the site for sporting activities through the club. The promotion of the site as an 'outdoor-gym' would be particularly useful in helping to develop this link.

Cycling

6.70. There is little potential to develop the site for any specific types of cycling, but several of the main footpaths have capacity to accommodate both pedestrians and cyclists if the latter act responsibly. The site is too small for mountain biking and within the Barrachan area (i.e. the most interesting terrain) the scale of paths would create unacceptable conflicts with other users. This determines that the site is most appropriate for sedate cyclist recreation. However, if the reservoirs are considered in their wider context, there is potential to develop them as a 'destination' for cyclists or as a section of a long route/circuit.

6.71. The Kelvin Walkway (also a cycle route) links Glasgow with Milngavie with only a short distance to the reservoir site. If the area was developed as a cycle friendly destination (e.g. with cycle storage facilities, toilet and café or shop selling basic provisions) it could become a small hub for cyclists within or passing through the area. Cycle parking facilities and local information on cycle routes could also be incorporated at car parks and at strategic entrances to the reservoir site.

Link to Mugdock CP access network

Potential link for Equestrians

Link to WHW

Link to Baldernock (RoW)

Potential future link to Dougalston Loch access network

MILNGAVIE RESERVOIRS

SCOTTISH WATER

Non-motorised Access Routes

Type

- Main Cross Link
- Pedestrian
- Pedestrian/Cycle
- Potential New Link
- A Car Parks
- Potential equestrian route

Figure 14

LAND USE CONSULTANTS

6.72. The reservoirs are also located close to a number of cycle routes in East Dunbartonshire. Mugdock Road is a cycle route connecting to Mugdock Country Park and there is also a cycle route designated by East Dunbartonshire Council that connects to the Forth and Clyde Canal at Cadder. This route passes through Mugdock village and could easily be connected to the reservoir site. There is also a link between Mugdock Road and the West Highland Way, which is used by cyclists and pedestrians. Similarly the rights of way / access network from Baldernock and Bardowie has the potential for development as linkages to the reservoirs from the east. In this case a cyclist through-route could be promoted inside the north boundary of the reservoir site (Craigmaddie Lodge- North Drive- Mugdock Road). This route would avoid 'Lovers' Walk' which is too narrow for shared used. (See **Figure 14**).

6.73. Mugdock Road is currently promoted as a cycle route but traffic speeds and the necessity to cross the road (from reservoirs to Mugdock CP) make this potentially dangerous to cyclists and pedestrians. The development of a parallel off-road route connecting the two sites would improve these conditions. Additional measures to assist the road crossing are also needed. The latter should however avoid urbanising the road corridor; for instance by extending roadside footpaths to give clear sightlines rather than introducing a clutter of signs and road markings.

6.74. Improving these short links is likely to encourage cycling in the area but should not impact on the enjoyment of the site by other users.

Equestrians

6.75. The Mugdock area has a high number of equestrians and many of the fields to the north of the reservoirs are grazed by horses. There is a desire on the behalf of equestrians to see improved linkages to Mugdock CP particularly along the north side of the reservoirs. A review of the site's access network determines that it would not be possible to accommodate equestrians on the main reservoir perimeter paths or on the informal paths of Barrachan Hill, however the North Drive could be developed as a link route to Mugdock CP without creating health and safety problems or restricting pedestrian access. The use of the North Drive in this way would require the formation of an external link to the fields in the north, with the landowner's consent and assistance.

Canoeing and Sailing

6.76. The new water treatment works may permit an increased level of use on the water at the reservoirs. Non-motorised activities may be permitted on one or both of the reservoirs. This would allow a wide range of new activities to take place in the area and may help to attract a new audience to the site.

6.77. Most obviously, canoeing, non-competitive rowing and sailing (small craft such as dinghies or windsurfers) could take place. These quiet and sustainable forms of recreation should have minimal impact on the water quality and if well managed should not detract from the tranquil character of the reservoirs. The introduction of water-based activities would greatly enhance the recreational value of the site. The characteristics of the two reservoirs suggest that recreational rowing and fishing from boats would be suited to Mugdock Reservoir while canoeing and wind-surfing, would be suited to the more exposed Craigmaddie Reservoir. The relatively calm and safe conditions suggest that the reservoirs have great potential for beginners' lessons and training.

6.78. However, given the sensitivity of the site, any water borne activities should be controlled to meet Scottish Water conditions. Support facilities and structures would have to be well designed and managed. A powered safety boat would be needed and controls over the timing / numbers of boats, health& safety issues and club activities would have to be incorporated within the new management structure for the site. In this regard it would also be important to seek the active involvement of local clubs or societies such as the Glasgow Kayak Club.

6.79. A carefully managed system, which involved a local club would have the benefit of providing added value to the site and also ensuring the use of the reservoirs is well managed. Potentially a system run through the local authority or Mugdock CP could allow a wide section of the community to gain access to facilities that are currently not offered by East Dunbartonshire Council. Management options are discussed further in Chapter 10.

6.80. Water borne activities such as canoeing or sailing would require high quality on-land facilities to allow them to be undertaken successfully. Access structures e.g. pontoons and gantries would be required to accommodate the fluctuating water levels. Changing facilities with showers would be desirable along with secure storage and possibly a café/shop. To allow club use it may also be necessary to provide a small on-site car park i.e. for mini-bus use by arrangement. The placement, layout and detailed design of these facilities would have to address potential visual and heritage impacts.

Triathlon

6.81. The relaxation of the restrictions on recreational use of the water at the reservoirs could allow periodic events such as a triathlon to take place on the site. However, there would be a number of problems for users. Firstly, there is limited space for a bike/run transition point close to a water access/egress point. Secondly the new water draw-down arrangements could be potentially dangerous to swimmers.

6.82. This combined with the current lack of facilities (changing, toilets, catering and parking), could be a constraint. This suggests that further examination into this option is required. If feasible, even as an occasional event, it would provide an interesting dynamic to the site.

Angling

6.83. Fishing is not permitted under the current byelaws associated with the reservoirs but there may be scope to relax these restrictions when the new water treatment works are operational.

6.84. Although fishing is not legal on the site at the moment, it does take place. If fishing was allowed, a system of permits would need to be put in place. It may also be necessary to designate sections of the site for fishing to try and minimise any conflicts between users.

6.85. There is little information on the fish stock within the reservoirs at present but anecdotal evidence suggests that they contain a healthy population of Brown Trout (pers. com. Alan Fraser: Scottish Water), which is fished illicitly. Commercially managed angling based on Brown Trout (with restocking) could avoid contamination of the water and may be a possibility following completion of the Katrine Water Project. Such an enterprise would require angling from rowing boats rather than from the banks and safety barriers/markers would need to be introduced around sensitive or potentially dangerous areas of the reservoirs. Commercially managed angling (and other forms of water-based recreation) occur on drinking water supply reservoirs elsewhere and have been supported by Scottish Water in the past e.g. Carron Valley Reservoir. This subject warrants further feasibility testing, but it is considered that low-key angling on the reservoirs would be suited to the character of the site and would not be an intrusive development.

DEVELOPMENT OPTIONS

CONSERVATION OBJECTIVES AND PLANNING CONSIDERATIONS

6.86. In accordance with the Conservation Philosophy set out in Chapter 5, development opportunities at the (old) water works, at Barrachan and elsewhere must be carefully considered to ensure that proposals are not detrimental to the architectural heritage or scenic values of the site. The existing planning designations also represent a general presumption against development, i.e. the site is part of the Greenbelt identified in the Bearsden and Milngavie Local Plan and is also defined as 'Existing Recreational Land and Amenity Open Space' under Policy LR1 of the same plan. Planning and Listed Building Consent will be required for any new developments or redevelopment/conversions of existing buildings. These will require a demonstration of sensitivity to the sense of place and understanding of cultural significance. Architectural interventions, if required, will, therefore, have to be of the highest quality, and opportunities to remove or improve the insensitive modern structures will be beneficial.

SCOTTISH WATER REGULATORY FRAMEWORK

6.87. Under the Scottish Public Finance Manual, surplus assets must be offered for sale on the open market. As a sponsored body established by statute, Scottish Water has a duty to follow the Scottish Public Finance Manual (SPFM) on handling of public funds. The SPFM is mainly designed to ensure compliance with statutory and parliamentary requirements, promote value for money and high standards of propriety, and secure effective accountability and good systems of internal control.

6.88. The Key points under this guidance are:

- holdings of assets should be kept under constant review with a view to disposing of surplus assets as quickly as possible;
- holdings of land and buildings should be limited to the minimum needed to meet present and planned future requirements;
- assets sold on the open market should normally be disposed of at market value. Assets transferred under the Guidelines for the Transfer of Property within the Scottish Public Sector should be disposed of at market value as defined by the compulsory purchase code;
- the Water Industry Commissioner requires Scottish Water to pass on the benefits of any proceeds raised from disposal of assets to its customers.

6.89. There is also, however, a protocol in place, known as the "trawl notice procedure" whereby public bodies are required to inform the Executive of forthcoming proposed disposals. Other public sector groups then have 14 days to register an interest in any of the sites and following this, a direct sale can be negotiated between the two organisations using the services of the District Valuer's office to establish the market value.

6.90. The development options outlined would be subject to the identification of funding outwith Scottish Water current budget. Future possible management and funding issues are discussed in more detail in sections 10, 11 and 12.

OLD WATER WORKS DEVELOPMENT OPTIONS

6.91. Completion of the Katrine Water Project will render the existing Water Works buildings redundant, with the exception of Commissioners' Cottage, which has a private residence on the upper floor. The Water Works complex of buildings is readily accessible from Milngavie via the existing road network. It also occupies a strategic location overlooking the Mugdock Reservoir and adjacent to the causeway. These characteristics make the Water Works complex an ideal subject for accommodating new facilities, which can fulfil public services and make positive use of redundant space.

6.92. The footprint of the potentially available Water Works buildings is approximately 410m^2. The toilet block, including adjoining buildings, measures 58m^2. In addition, the former nursery compound contains several glasshouses in a ruinous condition. The modern chlorination building to the south of the access road will also become redundant allowing the removal of an eyesore from this important area. Clearance of this building presents opportunities for landscape restoration and the rationalisation of parking areas to allow restoration of the garden areas around Commissioners' Cottage.

6.93. The redundant water works buildings include both 19th century listed structures and modern extensions some of which are unsympathetic. The latter may be more readily converted to new uses without detriment to the heritage. Alternatively, it may be beneficial to remove, or partially remove, the modern buildings in order to improve the setting and understanding of the listed buildings. This provides versatility for any new development of these buildings.

6.94. At this stage, it is difficult to determine precisely the scale and type of facilities needed to meet public requirements and which would be financially viable, however, given the space available the following range of accommodation /uses could be fitted within the buildings' footprint:

- toilets (70m^2);
- café/restaurant (120m^2);
- shop/ticket office for rowing/fishing (20m^2);
- interpretation centre (60m^2);
- education/meeting room (40m^2);
- ranger office space (20m^2);
- boathouse (60m^2);
- utility/storage (20m^2).

The available footprint of the Water Works buildings is 410m^2.

6.95. The above uses represent the potential full utilisation of the buildings, excluding the large chlorination building. Access to the Water Works buildings has not been possible during the study and, therefore, these proposals are indicative. This would, nevertheless, be a significant and expensive development project, which would first require to be justified by a detailed feasibility study. The latter would ideally examine a number of development scenarios of different scales relative to the visitor demands, management resources, capital funding resources, potential revenue income and expenditure. It should also address heritage impacts of the architectural changes to the buildings. Given that a range of visitor facilities are present within Mugdock CP it would be important to also examine whether new facilities at the reservoirs would result in any significant competitive impacts. Ideally visitor facilities at the reservoirs should be complementary even though some level of duplication would be unavoidable to adequately service the site.

MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Water Works Development Options**

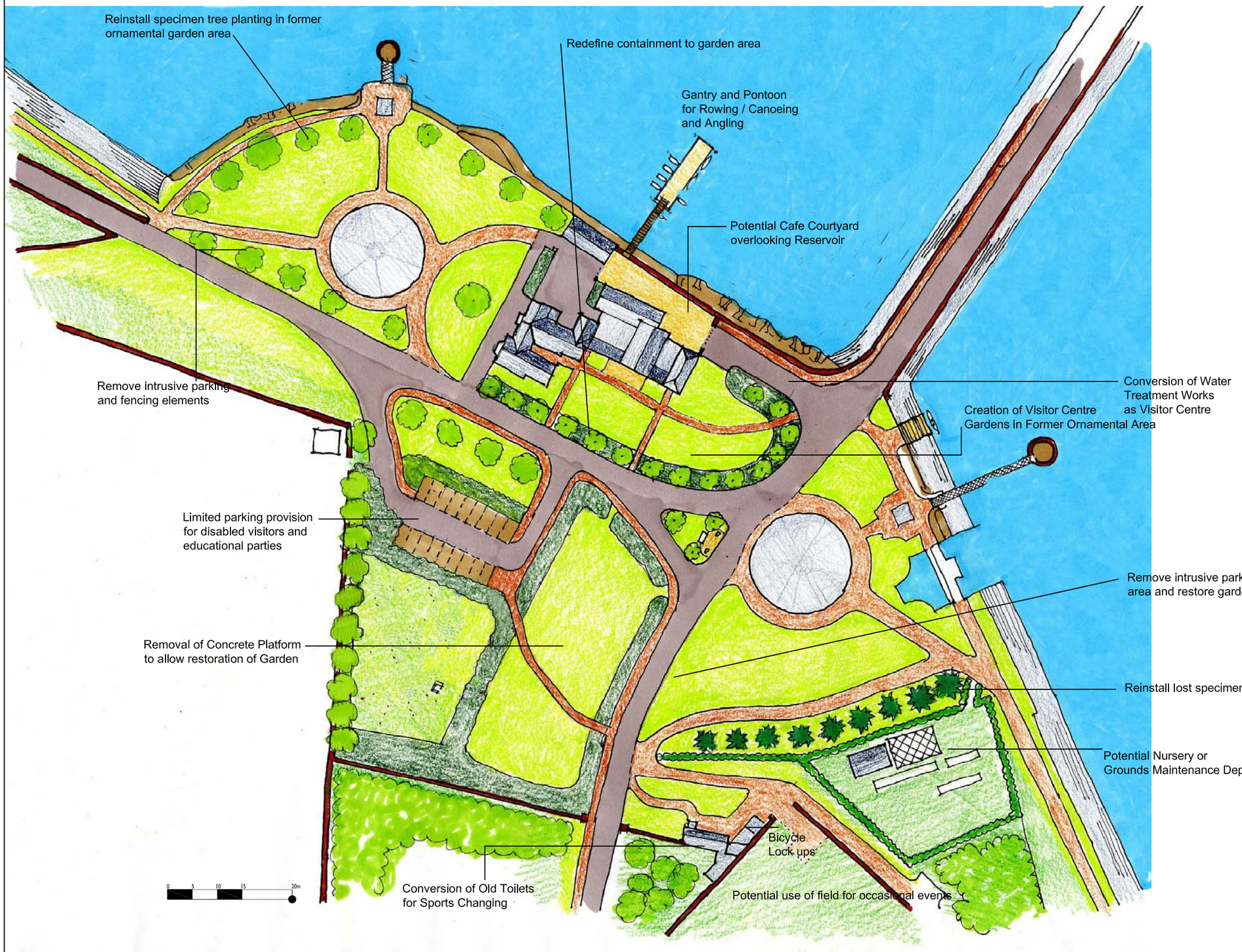

Figure 15

LAND USE CONSULTANTS

6.96. The buildings are currently in sound condition and it may be possible to develop the public visitor facilities in phases thereby reducing financial risks. **Figure 15** indicates in outline how the whole water works area could be developed and conserved to accommodate new uses without detriment to the heritage of the buildings or landscape. These proposals show how removal of the existing chlorination building and the adjacent concrete hardstanding would allow restoration of the former soft landscape areas. This would create a new grass picnic area or garden on the site of the lost heather garden. It would also allow the existing car parking spaces to be more discreetly sited and framed by soft landscape within the former chlorination building area. Removal of the existing intrusive parking areas would allow the historic integrity of the gardens and access routes to be restored, with significant benefits for the Commissioners' Cottage and Straining Wells areas.

6.97. The outline proposals also indicate how the Commissioners' Cottage could be set within its own high quality garden area, evoking the historic situation when its curtilage was defined by a garden wall and when a south- facing glasshouse dominated the garden. In this proposal the garden would once again become part of the visitor focus of the site and would add to the attraction of the visitor facilities within the buildings. On the north side of the building complex is a courtyard enclosed by both modern and old buildings. This area overlooks Mugdock Reservoir and the Causeway and has gates to enable its closure and security. This area is consequently suggested as the potential access to boating facilities on Mugdock Reservoir via gantry and pontoon, allowing the existing chlorine storage building to be converted to a small boathouse. The courtyard could be overlooked and accessed from the adjacent modern buildings, which could be architecturally modified to improve their appearance and relationship to the older buildings. This is considered to be an exciting opportunity to improve the architecture while creating a very attractive vantage point for visitors e.g. a café or education centre overlooking the reservoir. The paucity of heritage merit within the modern buildings determines that they could be modified without detriment to the heritage or appearance of the old Water Works complex.

6.98. The above proposals would allow the mooring of rowing boats and provide access for visitors to the boating activities. This location for the pontoon would enable it to be closely monitored and kept within a secure compound at night-time. Pedestrian access to the pontoon would potentially require a breach in the masonry parapet wall and the pontoon /access gantry would be visible from the Causeway and sections of the Mugdock Reservoir perimeter footpaths. The visual and heritage impacts of these and other developments would have to be addressed by the planning and listed building consent applications. Sensitive design of these structures could serve to mitigate any impacts.

6.99. Stepped access to Craigmaddie Reservoir already exists at the south end of the causeway. This is a narrow flight of steps, but it would suffice for access for canoeing and windsurfing (or triathlon training if viable).

6.100. The old Toilet Block (currently disused) is somewhat isolated from the other Water Works buildings and is not immediately accessible from the main footpaths. It is nevertheless an attractive building with potential for new uses. It could be converted to a stand-alone changing facility and locker room for sporting facilities. This building has a series of low walled compartments in ruins; these could potentially restored and converted to secure cycle stores or equipment lockers for other sporting uses. Alternatively, this building could be restored as a toilet block, although it would be preferable from a management point of view to provide public toilets as an integral part of a visitor facility complex.

6.101. The former nursery retains a large glasshouse and brick utility building set within a healthy hedged boundary. It has a history of garden / grounds maintenance use which determines that a horticultural function would be most appropriate in conservation terms. The area is highly visible from the Craigmaddie Reservoir footpath making it visually sensitive for all development options. It has the potential to be developed as a small commercial garden centre operated privately by lease arrangement. There is however a private garden centre at Mugdock CP and there is consequently a possibility of competition /duplication. The restricted parking facilities at the reservoirs could also limit the commercial potential of this development option. Alternatively this discrete garden enclosure could be used as part of the new maintenance facilities. It also has exciting potential as an educational or play garden area but these could potentially be resource-heavy solutions with no commercial return towards revenue expenditure.

Katrine Water Project: Planning Conditions

6.102. Planning conditions relating to the Katrine Water Project require the development of toilet and parking facilities for the Milngavie Reservoirs. The above proposals (6.74 – 6.81) depend on the availability of the redundant Water Treatment buildings and could only be progressed after decommissioning (2008) and subject to more detailed feasibility testing. The provision of toilet facilities as part of a visitor centre is prudent but does not resolve the current planning obligations. The restoration of the old toilet block is a possibility but it may in the long term be put to more positive uses for recreational activities, in which case a temporary toilet may be the best solution until decommissioning and further feasibility work has been concluded.

6.103. Similarly, the relocation of car parking spaces to the site of the unattractive Chlorination Building would be a discreet and convenient solution but could not happen until the building has been decommissioned and the site cleared. In this case, it is considered that the planning conditions relating to the provision of a new car park should directed to sites outside the boundary of the Reservoir site as discussed later.

BARRACHAN DEVELOPMENT OPTIONS

6.104. The Barrachan Complex contains three main buildings and a number of ancillary structures. The main buildings are:

- Barrachan Cottage (formerly 2 residential units, footprint: 104m^2);
- Barrachan 'Barn' Conversion (formerly 2 residential units, footprint 121m^2 including coal sheds);
- Barrachan Hall (footprint 303m^2 including kitchen/toilets);
- the ancillary buildings include coal sheds, garages/stores, garden shed sheds.

6.105. The Barrachan Complex although disused is in sound condition as discussed in Chapter 4 and would provide an attractive development opportunity. This has been confirmed by Scottish Water who have reported significant developer interest in the buildings. Access and infrastructure provision are, however, problematic and may be expensive to resolve. Notwithstanding these potential constraints, the study has reviewed potential development scenarios which would be suited to site and the buildings available. This has been undertaken in the context of the steering group's view that public access should be retained through the Barrachan site and that development options should all preserve the heritage of the site whilst ideally incorporating some public benefits for education and recreation.

Development Scenario 1: Hostel and Education Centre

6.106. The nature of the buildings, their discreet location and the presence of versatile outdoor spaces would make their conversion to a hostel and education centre both possible and fitting: the Hall would convert relatively easily into a 'bunkhouse' while the two residential properties could provide family accommodation, meeting spaces, small conference/education facilities. The adjacent field (to the north) could accommodate camping with facilities (showers, toilets, shop, etc.) contained within the Barrachan ancillary buildings.

6.107. Such a scenario would allow public access to the Barrachan Complex to be retained and the accommodation provided could be complementary to the visitor facilities developed at the Old Water Works. Theoretically, a Barrachan Hostel could accommodate walkers starting or finishing the West Highland Way as well as organised groups, education parties and tourists.

Accommodation associated with the West Highland Way

6.108. The 1994 West Highland Way User Survey showed that there was a large variation in the types of accommodation used by people walking the West Highland Way. The most popular accommodation type was organised camp sites – 29% of respondents used them during their visit along the Way. 14% of respondents stayed in youth hostels or bunkhouses.

6.109. The report also states that only 7% of users of the route use stay in Milngavie whilst using the route. This is most likely to be because people travel to Milngavie to start their journey rather than staying in the area.

6.110. There is a campsite located close to the reservoirs site at Bankell Farm. The campsite is open all year round and currently takes around 200 camping pitches per year (along with 1400 caravan pitches). Some of these are users of the West Highland Way but the exact number is not known. However, many of the people that stay at the site use the reservoirs for recreational purposes and it certainly adds value to the site.

6.111. A feasibility study has been commissioned by the management committee of Mugdock Country Park which will examine the potential of Craigend Castle to be developed as an outdoor education/recreation centre, with overnight accommodation associated with the West Highland Way. The results of the project are expected in Spring 2006.

6.112. The core buildings at Mugdock Country Park have been developed to provide catering and conference facilities and these have recently been upgraded.

Development Scenario 1: Conclusion

6.113. Taking into account the local provision (existing and planned) of accommodation and educational facilities associated with the West Highland Way, it would appear that the development of similar facilities at Barrachan could represent duplication, which may not be sustainable. The results of the Craigend Castle feasibility study will help to inform the assessment of options for Barrachan but if such a development is commercially unsustainable, then a less ambitious development scenario should be considered potentially as outlined below.

Development Scenario 2: Residential Development and Camping Facility

6.114. The residential buildings at Barrachan could be readily converted to single dwellings or restored as separate apartments which, given the high amenity of the site and desirability of the Milngavie/ Mugdock area, should be marketable as high quality leased properties or private properties. A variation of this option could be development as holiday lets in the manner of the Landmark Trust or National Trust.

6.115. The Hall, whilst a less obvious candidate for a residential conversion, could be modified to provide a third residential property. Alternatively, the Hall may be retained as a visitor facility building, which could service camping in the adjacent field. Such a facility could be self-contained and not 'interfere' with the residential 'houses'. It may also be run from either Barrachan Cottage or Barrachan 'Barn'.

6.116. Camping facilities at Barrachan could be run independently or possibly as an extension of the facilities at Bankell Farm by lease agreement.

6.117. The development of Barrachan wholly or partially as private residential properties would potentially deny public access to this attractive part of the site, which would be a negative impact. However, finding a secure use for the buildings is essential if they are to be conserved. Lease conditions for residential conversions should preserve public access through the Barrachan site, but this may be a deterrent to potential lessees.

Development Scenario 3: Sale for Private Residential Development

6.118. The developer interest to date confirms that the Barrachan Complex would make an extremely desirable development project, which could result in an exclusive residential property overlooking the reservoirs.

6.119. The marketing of the Barrachan Complex and an appropriate area of land could be undertaken by the issuing of a development prospectus with carefully devised conditions. These conditions should ideally preserve public access over Barrachan Hill utilising the historic driveway and footpath routes. The buildings and landscape should also be protected from urbanisation, inappropriate adaptations and extensions, which would compromise the existing buildings. The listing and any subsequent improvement of statutory protection measures would assist in reinforcing the need for a conservation-led development. The sale of Barrachan if pursued, should ideally provide an endowment towards the future conservation and management of the reservoirs landscape without removing Scottish Water's responsibilities towards general site maintenance. Speculatively, the endowment sum may be of sufficient size to realise annual interest payments, which could pay towards revenue costs.

6.120. The private sale of Barrachan will potentially result in some restrictions to public access. Strict conditions, which preserve public access rights through the Barrachan site, may conversely be a deterrent to developers, which could reduce the value of the properties. This subject requires further consideration and consultation.

Commercial Options

6.121. It is considered that the development of Barrachan to a major commercial facility would be inappropriate for the following reasons:

- the individual buildings are of modest scale and there would probably be a need to introduce significant new development which would change the character of the site and potentially prejudice the listed status of the existing buildings;
- access to Barrachan is difficult and not suited to frequent traffic movements. The latter would cause disturbance in the heart of the site or in Barrachan Wood and may require destructive road widening/new access construction;
- a major commercial facility could compromise the tranquillity of the Barrachan area/northern side of the reservoirs which is highly valued by the local community;

- infrastructure developments to serve a major commercial facility may be difficult to provide without significant site disturbance;
- pedestrian access to Barrachan from the south involves steep gradients and is not suited to the less mobile and disabled.

Barrachan Development Options: Conclusions

6.122. The remoteness and technical issues relating to infrastructure and access make the development of Barrachan a difficult proposition, particularly if public uses are sought for the buildings and landscape. The private sale or lease of the buildings may therefore prove to be the most viable means of ensuring their conservation in the long term. If the Barrachan complex is to be marketed then it should be under strict conditions, which require the following:

- preservation of public access along the historic drives and footpaths over Barrachan Hill and in front of Barrachan Cottage from which panoramic views can be obtained;
- conservation of dry stone field walls and metal boundary fences;
- management of specimen trees and historic shrub planting along the driveway;
- EDC/ Historic Scotland approval of external landscape changes/garden developments;
- EDC/ Historic Scotland approval of architectural changes to the buildings;
- management of fields as meadows to preserve their agricultural character and to promote biodiversity.

6.123. Under Scottish Public Finance Manual rules, it will not be possible for any capital receipt from the sale of the Barrachan complex to be reinvested in the future development and conservation of the site. This could be a constraint to future partnership funding arrangements.

VEHICULAR ACCESS AND PARKING DEVELOPMENT OPTIONS

6.124. Previous community consultation and the steering group discussions have stressed the desire to maintain the tranquillity of the Mugdock Reservoirs and to avoid the introduction of new developments or activities, which could be damaging to its character. The issue of vehicular access and parking in this context has required careful and sensitive consideration with much debate amongst steering group members. In the process of this study the following issues and options have been considered.

6.125. Completion of the Katrine Water Project will provide opportunities for new recreational developments, which may include a concentration of visitor facilities in the Old Water Works area and/or at Barrachan. Vehicular access for servicing will be required and there will also be demands for some parking provision, particularly for disabled visitors, for Scottish Water operations and for certain organisations. The potential inclusion of commercially run facilities within the available buildings will inevitably seek some local parking provision in order to achieve commercial sustainability. The examination of vehicular access and parking options must, therefore, seek to reconcile probable demands for parking with the environmental capacity of the site and surrounding areas to accommodate vehicles. The following paragraphs, therefore, review the vehicular access and parking options and conclude with recommendations.

Old Water Works Access and Parking: Option 1

6.126. **Figure 16** illustrates access and parking options considered for the Old Water Works. Option 1 utilises the existing road infrastructure, namely Commissioners' Walk and the Mugdock Reservoirs access ramp. To take account of the restricted road width, the principal route of visitor approach and the sightline conditions on Mugdock Road, this option incorporates a one-way system with site entry from the A81 (Strathblane Road) and exit onto Mugdock Road.

6.127. This route allows visitors to experience the historic designed approach to the reservoirs, which is lined by a Lime tree avenue, walls and rock cuttings. Vehicles can pass through the Old Water Works area without approaching the edge of the reservoirs. The one-way system would avoid the necessity for passing places and associated alterations to historic walls and gateways. Use of the existing roads would have historic integrity and would remove the need for new road construction potentially at considerable cost and environmental impact. However, major water supply pipes run underneath Commissioners' Walk and Scottish Water have stated that in order to protect the integrity of these pipelines, this option would not be permitted. Protection measures over the pipes are also deemed to be prohibitively expensive and unviable.

6.128. Parking facilities associated with this access option are proposed in the area of the existing Chlorination building to the south of Mugdock Cottage and the access road. Once this Chlorination building is made redundant, its removal will provide an opportunity to create a small well-integrated and visually discreet car park. The conservation philosophy requires protection of the site's tranquil character and therefore the scale of parking considered in this option is only small; compensating for the removal of the two existing insensitively located parking areas. The car park would therefore accommodate 20 vehicles although the area of the former chlorination building platform is capable of accommodating more. A car park in this area would be within 40m of the remaining Water Works buildings, which if converted to visitor uses, would be readily accessible by disabled visitors. It is envisaged that a car park of this size would only serve disabled visitors, organisations/school groups by arrangement and Scottish Water staff.

6.129. In the event that the car park within this option is full, then the one-way system provides the opportunity to close the Commissioners' Walk entrance gates and thereby prevent the fruitless circulation of vehicles seeking parking spaces or illicit parking along the road verge or footway. Such controls would, however, require on-site management during busy periods.

6.130. The potential of providing an overflow parking facility for special events was also examined within this option. The field adjacent to the nursery and old toilet block was identified as a potential site for such a facility. This area could be retained as grass, with appropriate drainage improvements. An access track already runs past the nursery and a short road spur from this track could be used to connect the 'overflow' area to Commissioners' Walk. If required, further visual containment could be achieved by tree planting around the overflow area. The proximity of the old toilet block and the nursery area allows this site to utilise these two facilities. The development of an overflow car park was considered to be contrary to the conservation objectives for the site and therefore this component has not been taken forward.

6.131. The potential one-way exit onto Mugdock Road from the base of the Mugdock Reservoir ramp could be improved to facilitate right (north) turn manoeuvres. The repositioning of the telegraph pole and local modifications to the perimeter wall radius would simply improve the turning area. The sightlines are excellent for exiting traffic and this should, therefore, allow traffic to exit from the site in both directions.

MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Old Water Works**
  Option 1 and 2
  Scale 1/2000

Option 1
- ACCESS FROM STRATHBLANE ROAD
- ONE WAY SYSTEM
- ENTRY VIA COMMISSIONERS WALK
- EXIT ONTO MUGDOCK ROAD
- CARPARK ON FORMER CHLORINATION PLANT SITE
- POTENTIAL OVERFLOW PARKING IN FIELD

Option 2
- ACCESS FROM STRATHBLANE ROAD
- ONE WAY SYSTEM
- NEW ROAD 600m LONG BENEATH CRAIGMADDIE DAM
- CAR PARK ON FORMER CHLORINATION PLANT SITE
- POTENTIAL OVERFLOW PARKING IN FIELD ADJACENT TO OLD TOILET BLOCK

Figure 16

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Old Water Works Vehicular Access and Parking: Option 2

6.132. The second option considered for the Water Works involves the construction of a new road between Strathblane Road and the Water Works as defined on **Figure 16**. This would be approximately 600m in length and if single-track would be 3 – 4 m wide. This new road would closely follow the line of the existing boundary wall below the Craigmaddie dam. In order to prevent vehicular access up the sloping face of the dam, it would be necessary for the road to run along the south side of the wall, i.e. within the field. A one-way system would once again be required to avoid congestion on the Mugdock reservoir ramp.

6.133. This access option would pass the former nursery and the old toilet block. It would also allow more direct access to the potential 'overflow' parking area discussed above. This could be brought into operation during special events.

6.134. Turning movements off Strathblane Road will require careful consideration to ensure sightlines are achieved. Potentially, this may necessitate the removal of mature trees and walls from within the sightline splays, which would be detrimental to the character of Strathblane Road and the setting of the Reservoirs. The potential impact of such developments could be mitigated by the creation of a well-designed gateway which is generous in scale and which involves the sympathetic realignment and design of the perimeter wall as part of the gateway recess. It is likely that mitigation measures would also be required within the field to screen the line of the new road from the housing area to the south.

Craigmaddie Reservoir Pipestore Car Park

6.135. A variation on the above option is the development of a new peripheral car park within the former 'pipestore' area below the Craigmaddie Reservoir dam. This would require access from Strathblane Road as described above, i.e. necessitating the creation of a new gateway with removal of trees and part of the boundary wall. A car park in this location would allow pedestrian access into the Old Water Works area without the need to cross public roads. This site would, however, be highly visible from the perimeter of Craigmaddie Reservoir.

Old Water Works and Craigmaddie Reservoir Access and Parking: Conclusions

6.136. It is concluded that in order to maintain the character and tranquillity of the Milngavie Reservoirs, vehicular access to the core of the site will be strictly limited to disabled visitors, residents of the reservoir site, special parties by arrangement and Scottish Water operatives. General vehicular access will be dissuaded and parking provision will be limited and discreetly sited. This determines that vehicular access to the old water works could continue to use the Mugdock access ramp and the main visitor parking facilities for the site will have to be located outside its boundaries. Any commercial facilities developed within the available buildings will have to operate within these constraints.

6.137. Restricted vehicular access to a new car park in the former pipestore area would avoid generating traffic in the core of the site, but would have a negative visual impact due to the visual sensitivity of this area overlooked from the dam. It would also require significant alterations to the boundary.

Barrachan Access and Parking Development: Option 1

6.138. While the road network within the site provides access from the south side of the Barrachan complex, this approach is not suitable for frequent visitor traffic or service vehicles due to a number of reasons, principally:

- unrestricted vehicular access for visitors may constitute an unacceptable security risk for Scottish Water;
- frequent vehicular access over the causeway and into areas along the north banks of the reservoirs would severely compromise pedestrian safety and enjoyment of the site;
- vehicular access north of the causeway may require the introduction of traffic management devices and signs which would be intrusive in the reservoir landscape.

6.139. For the above reasons, vehicular access to Barrachan from the north side of Barrachan Hill has been investigated. Option 1, illustrated on **Figure 17** defines a potential access route, which uses the historic drive. This route involves passage over the Mugdock Reservoir Gauge Basin causeway (i.e. the route used by the residents of Craigholm). The historic drive is partially surfaced in crushed stone and used as a footway. This route would, therefore, require significant upgrading to allow it to serve for vehicular access.

6.140. This access option would accommodate two-way traffic through the introduction of passing places. It is envisaged that traffic would be light and that the upgraded drive would be shared with pedestrians and cyclists. Vehicular access via this route would terminate at the Barrachan building complex, i.e. not allowing access to the south.

6.141. The area of hardstanding to the east of the Barrachan Hall would provide an ideal site for a small car park (capable of accommodating up to 20 no. cars). This site would allow the garden and courtyard areas to be kept car-free and thereby minimise the visual impact of parked vehicles.

Barrachan Access and Parking Development: Option 2

6.142. A variation of the above access option considered for Barrachan is similar to Option 1 but avoids passage over the Gauge Basin Causeway (**Figure 17**). In order to achieve this, access from Mugdock Road is suggested to the north of the Gauge Basin. A new section of road would be required and this would link with the track on the north side of the 'Dirty Dam'. A further link to the Barrachan North Drive would rise steeply and may require excavations to achieve a ramp with acceptable gradients. Beyond this link, the route would follow the historic drive as in Option 1. Parking would also be provided as in the first option.

6.143. Both options for access to Barrachan would require an approach from Mugdock Road and access through the site would be separate from access to the Old Water Works. This arrangement would allow the Barrachan complex to operate independently and would retain the core of the reservoirs' site as a car-free zone. Vehicular access on the north side of Barrachan Hill will impact on pedestrian activities in this area, but it may be possible to compensate for any lost amenity by the development of a more extensive footpath network through Barrachan Woods. In any case, the small number of vehicular movements should allow the access route to be shared.

Barrachan Access and Parking Development: Option 3

6.144. In a situation where Barrachan is developed as a private residential complex with no requirement for visitor or service access, then vehicular access could be considered from the south via the Causeway and the hairpin drive (**Figure 17**). This would require private residents to have special access arrangements at the gateways and at the Causeway, i.e. control devices/keys to allow passage beyond detractable bollards and locked gates. In this scenario, the small number of vehicular movements would not impact significantly on pedestrian activities, however, speed and access restrictions would need to apply.

MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Barrachan Access**
  Options 1, 2 and 3
  Scale 1/2000

Option 1
- ACCESS FROM MUGDOCK ROAD
- FOLLOWS HISTORIC DRIVE
- PASSING PLACES REQUIRED
- SUBSTANTIAL ENGINEERING WORKS
- CAR PARK ON EXISTING HARDSTANDING

Option 2
- ACCESS FROM MUGDOCK ROAD
- REQUIRES NEW LINK TO HISTORIC DRIVE
- PASSING PLACES REQUIRED
- SUBSTANTIAL ENGINEERING WORKS
- CAR PARK ON EXISTING HARDSTANDING

Option 3
- ACCESS FROM COMMISSIONERS WALK
- ACCESS ACROSS CAUSEWAY REQUIRES CONTROL MEASURES
- BARRACHAN DRIVE REQUIRES UPGRADING TO METALLED ROAD
- EGRESS VIA MUGDOCK ROAD

Figure 17

LAND USE CONSULTANTS

Barrachan Access and Parking Development Options: Conclusions

6.145. It is considered that the level of physical disruption and traffic disturbance thereafter would make access options 1 & 2 damaging to the character and potentially to the integrity of both the woodlands and historic structures along the access route. The southern approach has an intact road route but an increase in traffic could be intrusive and disruptive to pedestrian activities. Option 3 therefore could preserve the character of Barrachan Wood but to the detriment of the core area of the site unless traffic levels are controlled to a low level. The latter has implications for the development potential of the Barrachan buildings, which if served by Option 3 may most appropriately be low key residential /mixed developments.

External Car Park Options: Drumclog Car Park Expansion

6.146. The existing car park on the west side of Mugdock Road has capacity for 45 cars. This capacity could be increased by developing the adjacent areas (**Figure 18**), but the area is outside Scottish Water's control and it is close to a SINC and drainage channels leading from the reservoir site. If these issues could be resolved then this option would be able to utilise the existing access points and crossing on Mugdock Road and would consolidate an established facility. Ideally, such a development would include a footpath link to Mugdock Country Park and to the West Highland Way. This would facilitate movement between the two 'parks' and provide a strategic access point to/from the West Highland Way. Such a development would justify the reinforcement of traffic calming measures on Mugdock Road in order to improve the safety of pedestrians and cyclists. This may warrant the development of a pedestrian 'table' across the road and the introduction of a signalised pedestrian crossing. An extension to the Drumclog car park should be designed to avoid any additional visual impacts and ideally future management systems should involve some monitoring of car parks by site staff to improve security.

KWP New Water Works Car Park at Craigmaddie

6.147. The ongoing Katrine Water Project has developed a new access road with a traffic-signalised junction onto Strathblane Road. This new road follows the valley to the north of Craigash Farm and terminates close to the Gauge Basin of Craigmaddie Reservoir. This new road consequently provides a potential new vehicular access route to the north side of the site, which could have a direct pedestrian link to the public footpath along the northern perimeter of the Reservoirs site.

6.148. The option of establishing a visitor car park at the end of this access route has been rejected on the following grounds:

- it would be contrary to the planning conditions for the Katrine Water Project;
- it would be contrary to Scottish Water's operational and security requirements for this road;
- it would bring a concentration of vehicular and visitor activities to the quiet, rural and previously undeveloped side of the reservoirs.

KWP Service Reservoir Car Park at Bankell

6.149. A review of access and parking options by Scottish Water in conjunction with East Dunbartonshire Council has identified that it would be possible to develop a new visitor car park within the Scottish Water site of the Service Reservoir at Bankell to the east of Strathblane Road. This is currently a construction site and has direct vehicular access from Strathblane Road. This site would potentially provide a parking facility on the east side of the Reservoirs without the need for significant road works, alterations to walls or removal of mature trees. The long standing on-road parking problems close to the Craigmaddie Lodge entrance could therefore resolved by a facility in this location without significant impacts to the landscape of Milngavie Reservoirs. However it is likely that a car park in this location would be visible from the perimeter footpath of Craigmaddie Reservoir and careful landscape screening would be required to mitigate this impact.

6.150. Pedestrian access from a car park on this site would follow Strathblane Road northwards before entering the site at the Craigmaddie Gateway. A controlled crossing on Strathblane Road would facilitate safe access and would reinforce traffic calming measures along this stretch of road. It would also be beneficial if pedestrian/cyclist links to the east (Bardowie and Baldernock) could be developed through the Bankell site thus enabling the car park to serve a wider access network and to provide strategic information for the area.

External Car Park Options: Conclusions

6.151. In conclusion it is considered that the KWP Bankell site offers a useful strategic site for a new external visitor car park. It would complement the Drumclog car park in the west without causing the disturbance of greenspace or the creation of an intrusive facility within the boundaries of the Milngavie Reservoirs. It would not require the removal or alteration of heritage structures, e.g. boundary walls or of established tree lines. This car park could also be developed by Scottish Water in fulfilment of the planning conditions for the KWP. The site is, however, remote from the core of the reservoir landscape necessitating a long approach suitable for only for the more mobile visitor. Visitors would also have to cross the busy Strathblane Road and this has inherent safety risks, although these could be reduced by the provision of a pedestrian crossing. The inconvenience of a remote car park may encourage some visitors to continue to park at the Craigmaddie gateway or within the disabled spaces at the old Water Works. These aspects will require monitoring and on-site management.

MILNGAVIE RESERVOIRS

SCOTTISH WATER

- **Perimeter Car Park Options**

Scale 1/7000

CP — Potential New Perimeter Car parks
1 Drumdog Car Park Expansion
2 'Pipestone' Car Park
3 Bankell Car Park (KWP)

Pedestrian routes into site

CP1

CP2

CP3

Figure 18

LAND USE CONSULTANTS

7. BIODIVERSITY DEVELOPMENT OPPORTUNITIES

INTRODUCTION

7.1. The biodiversity audit has shown that although the quality of the ecological resource at the Milngavie reservoirs is currently comparatively high, there are a number of current ecological sensitivities within the area, and potential opportunities to enhance that resource as part of a site biodiversity development strategy. Ideally, these would be executed through a site management plan, which would seek to reconcile nature conservation objectives with the recreational, educational and landscape proposals on the site. This would ensure the long-term sustainability of any proposed development.

ECOLOGICAL SENSITIVITIES

7.2. The current ecological sensitivities within the Milngavie reservoirs site are primarily driven by the need to maintain the landscape ecology of the area through appropriate management of the current designated sites. This includes the non-statutory designations as well as the statutory designations. Management of these areas should look at least to maintain the current status of the cited interest features, and to enhance these wherever possible. The habitat connectivity presented by such an extensive network of designations needs to be protected, and current barriers to species movement identified and rectified where possible. This process should also consider how increased visitor access and recreation could be managed to ensure these activities do not damage existing habitats or preclude new opportunities.

7.3. The two main habitat sensitivities on the site are the woodland areas and the small swamp. Both of these are important features, which need to be maintained, due to the range of biodiversity features that they support, and which they could support through appropriate management. The main species sensitivities are birds and bats. Other species interests are considered in the ecological opportunities section below.

ECOLOGICAL OPPORTUNITIES

7.4. The main opportunities for improving biodiversity within the site are described below.

Woodland Management

7.5. Although much of the woodland resource at Milngavie is of plantation origin, the maturity of the trees and the woodland ground flora that has developed has the feel of a semi-natural woodland. This could be optimised to ensure that there is a constant renewal of young tree stock (preferably native species rather than the sycamore that dominates at present), and to prevent rhododendron out-competing the more 'natural' shrub layer. A long-term programme of rhododendron clearance in specified areas should be established, although this might need to be carried out recognising the limitations of historic badger surveys, and the importance of not disturbing previously undiscovered setts during these works. The bat survey work should be repeated to identify current hotspots of commuting and foraging activity, bat boxes could be erected in strategic locations to encourage bats to roost on the site. Dead wood should be left to rot *in situ* which will encourage interesting invertebrate populations.

7.6. A strategic programme aimed at creating small glades within the wooded areas will also significantly improve the biodiversity resource. More specifically, it should be targeted at encouraging habitat suitable for small pearl-bordered fritillary, and the violets that this species requires for food plants.

Suggested Specific Prescriptions

Wood 1: establish long-term management plan for woodland to ensure continual renewal of native tree species;

Wood 2: establish programme of non-native scrub removal;

Wood 3: erect bat boxes in appropriate locations and monitor their usage;

Wood 4: establish practice of dead wood piles;

Wood 5: identify areas for small glade creation, and monitor ground flora and usage by butterflies;

Wood 6: carry out deer management if this is deemed to be necessary following further investigation.

Pond/Swamp Management

7.7. Linked to the woodland management could be the designation of a 'quiet conservation' area around the 'Dirty Dam' and the western slopes of Barrachan Hill. In this part of the site, the priority will be nature conservation, and dogs would need to be kept on a lead to avoid extraneous habitat and/or species disturbance.

7.8. The fish should be removed from the pond and the habitat improved to facilitate the water and vegetation conditions suitable for breeding amphibians, in an attempt to encourage newt species to use the pond. Trees should be cleared from one of the pond's sunny edges to reduce the shading.

Suggested Specific Prescriptions

Pond 1: establish quiet conservation area and appropriate interpretative material;

Pond 2: remove fish from pond;

Pond 3: create more appropriate conditions for newts and other amphibians (desilting; encouraging marginal and floating vegetation for egg-laying, etc.);

Pond 4: fell trees at pond's edge where appropriate.

Grassland Management

7.9. Much of the grassland at Milngavie is mown for operational reasons. However, relaxation of this mowing regime in specified areas could have benefits for a range of species, including invertebrates (particularly butterflies and bees), birds and reptiles.

MILNGAVIE RESERVOIRS

SCOTTISH WATER

Maintenance Regime

Scale 1/7000

- 16 cuts to amenity grass areas
- 6 cuts to long grass areas
- 2 cuts to rough/ meadow grass areas

Figure 19

LAND USE CONSULTANTS

7.10. Specifically, it is suggested that the south-west facing slope just south of the 'Dirty Dam' is not cut between April and late July, and that after this time, a typical late summer hay cut is made, and the arisings removed. This area could be incorporated into the quiet conservation area suggested above, as reptiles such as slow-worm would be likely to be encouraged by this management. The species diversity of this meadow area could be enhanced through the application of a standard hay meadow seed mix. **Figure 19** indicates how grass maintenance regimes could be modified to achieve both biodiversity and amenity benefits by increasing cutting frequency in high profile areas while adopting meadow and long grass regimes in other areas.

Suggested Specific Prescriptions

Grass1: relax mowing regime in specified locations, and remove arisings after all mowings;

Grass2: establish hay meadow area – reseed if necessary/desired;

Grass 3: monitor usage by reptiles and invertebrates.

Reservoir Management

7.11. The removal of the need to carry out regular gull-scaring may be sufficient on its own to encourage wildfowl populations to the reservoirs. The areas around the reservoirs and the reservoirs themselves offer limited long-term opportunities for nesting and wintering wildfowl due to high exposure levels, fluctuating water levels, human activity (including dog walkers), proximity of footpaths around the waters edge and a lack of marginal vegetation. It is likely that management solutions for these issues are beyond the scope of the current project.

MONITORING

7.12. The success of management proposals requires regular monitoring in order to assess the continued appropriateness of the management aims and activities. Clear targets must be set against which the effectiveness of the management plan can be assessed.

8. EDUCATIONAL DEVELOPMENT OPPORTUNITIES

EDUCATION BASELINE

8.1. The history and character of the Milngavie Reservoirs provide a huge scope for its development as an educational resource. However, the term 'education' should be considered in its widest sense – there is scope to provide a range of interesting, educational materials and programmes which will add value to the site for visitors of all ages.

8.2. Since the museum at the site closed in 1998 there has been little onsite educational or interpretive material. The lack of educational material at the site means that the reservoirs are starting at a very low base. There is an obvious need to increase the amount of interpretive and educational material at the reservoirs that would appeal to all ages.

8.3. Local organisations, groups and individuals have a wealth of information that could be utilised to develop educational materials at the site.

Schools

8.4. As part of the development of the Conservation Management Plan a survey of local schools that are involved in the 'Eco-schools' scheme[19]. The head teachers of the 15 schools in East Dunbartonshire that are currently running eco-schools projects were sent a questionnaire. They were asked which elements of the eco-schools programme they felt may be relevant to the Milngavie Reservoirs; if the site had been used as an educational resource in the past; if they thought the site has potential to be used as an educational resource; and if they would like to be kept informed about future developments.

8.5. Six schools responded to the questionnaire (a response rate of 40%). A range of topics relating to the school programme were identified by the head teachers. These included:

- nature conservation;
- water management;
- stewardship of the local environment; and
- Victorian history.

8.6. The range of interest shown by the schools again demonstrates the significant potential that the site has for the education of all ages.

Local Groups

8.7. There are a range of local groups and organisations that could be involved in the development of interpretive and educational materials for the reservoirs. The Friends of Milngavie Reservoirs have a range of knowledge and experiences relating to the site which could be utilised to provide a well rounded educational resource.

8.8. There are also other groups and organisations that could be involved in the development of a comprehensive interpretive and educational package. Local organisations that could be involved include:

- the Bearsden and Milngavie Local History Study Group;
- Milngavie CE Centre Local History Group;
- Milngavie Family History Society; and
- Milngavie Civic Trust.

8.9. It is important that any educational plan is wide ranging enough to engage all age groups. Therefore, it would be beneficial to involve groups such as those outlined above to provide a comprehensive interpretation of the site.

EDUCATIONAL THEMES

8.10. The Milngavie Reservoirs provide considerable potential for education and there are several subjects that could be addressed within an education/interpretation programme. It is considered however that two main themes should be developed, these are:

- Katrine Water Project: 1858, 1896, 2007;
- Milngavie Reservoirs' Landscape and local area.

These can be divided into several sub-themes as described below.

Katrine Water Project: 1858, 1896, 2007

8.11. Clearly a major theme worthy of interpretation is the construction of the reservoirs in two phases and the associated engineering, social history context and the changing requirements for water supply and treatment up to this day. This can be translated into the following sub-themes:

- 19th century social conditions and demands for clean water supplies in growing cities throughout the UK with specific reference to Glasgow's water supply requirements during the 19th century, cholera epidemics, etc.
- options considered for water supply in the 19th century and selection of the Loch Katrine – Mugdock solution;
- water engineering context: how did the Katrine Water Project relate/compare to contemporary engineering projects during the 19th century;
- the life and works of the engineers responsible for the two phases of the Katrine Water Project: John Frederick Bateman and James Gale;
- the workforce and technologies involved in constructing the reservoirs and associated aqueducts;

[19] http://www.eco-schools.org.uk/

- the architecture of the Katrine Water Project utilising he exceptional archive drawings held by Scottish Water;
- modern water treatment and the ongoing Katrine Water Project.

8.12. It is acknowledged that interpretative material covering the Loch Katrine Water Project exists at Loch Katrine. However, there is scope to both duplicate and complement this information at the Milngavie Reservoirs. The Scottish Water archive is a valuable resource and it currently fails to realise its potential as an educational resource. The above theme provides an ideal opportunity for the archive to be utilised for public benefit.

Milngavie Reservoirs' Landscape and local area

8.13. The second major theme relates to the landscape of the reservoirs and the surrounding area. It allows natural heritage themes to be interpreted within the following suggested topics:

- history of the area: local geology/geomorphology, land use and settlement history from pre-history to the present day;
- local town and village histories with links to local interpretation sources;
- landscape design of the reservoirs' site: design characteristics, planting patterns, viewpoints, access routes, etc.;
- nature conservation interests; birdlife/wildlife present on the site, local nature conservation interests within the surrounding landscape;
- horticultural interests, e.g. tree names, shrub and bedding displays.
- Local trails and access network including guidance on responsible access

Interpretation Mechanisms

8.14. The above subjects would ideally be interpreted by a number of means employing a range of media dependent on capital and revenue resources. The following mechanisms are worthy of consideration.

Visitor Centre

8.15. The establishment of a visitor centre within one of the redundant water treatment buildings would provide a convenient and accessible focus for education in the site and a strategic venue for indoor displays. The latter could convey a broad range of information using a combination of exhibition boards, plans, models, and audio-visual equipment (budget dependent). The treatment works themselves would be incorporated within the interpretative story. The volume of material and complexity of subject matter would require the services of an interpretation consultant/designer to ensure the material is attractive and accessible to a broad range of ages and interest groups.

8.16. The development of a visitor centre should ideally be part of a larger complex, which might also incorporate toilets, catering facilities, meeting/office space and potentially a small shop. The centre would thereby achieve efficiency and be more easily managed by a small staff complement. The inclusion of catering facilities and shop could bring a commercial revenue but the implications for the facilities at Mugdock CP would have to be considered as discussed earlier.

8.17. The visitor centre could usefully serve educational groups or local school parties and could be integrated within the local educational curricula. The centre would be able to provide educational leaflets and be a base for a countryside ranger.

Ranger Service

8.18. There would be advantages to extending the operations of the Ranger Service to cover Milngavie Reservoirs. This would allow 'hands-on' education provision and coordination of educational activities between Mugdock Country Park and Milngavie Reservoirs. The Ranger Service could operate from the visitor centre and could host educational groups giving guided tours, and potentially coordinating volunteer activities for conservation work. The presence of a Ranger Service would also have security benefits. The Ranger Service operating at Mugdock would require significant additional resources if it was to provide this service at the Milngavie Reservoirs.

Interpretative Literature and Leaflets

8.19. As discussed above, there is a significant volume of material, which could be translated into interpretative literature for sale or for free distribution.

8.20. A booklet on the Milngavie Reservoirs or the whole Katrine Water Project could be published for sale in the visitor centres at Loch Katrine and Milngavie Reservoirs and more widely in Glasgow and other towns. This could provide a detailed account of the water supply project's development, aqueduct route and plans of the reservoirs along with information on the personalities involved.

8.21. In addition to a booklet, a series of leaflets could be produced for free or inexpensive distribution. These could cover specific subject areas or be tailored for use by school children. The establishment of educational trails within the site (and possibly incorporating Mugdock Country Park) would be well suited to leaflets with maps, information and questions about different features or subject areas. Potential leaflet subjects would be:

(i) general site plan and simple guide to the reservoir landscape and its main features. This would include key routes and linkages to other areas;

(ii) trail guides suggesting routes around the site giving distances/circuit lengths and gradients. Features on the trails could also be described, e.g. tree trail, architecture trail. Designated routes for cyclists and equestrians and links to other areas;

(iii) educational quiz/worksheets for different themes suited to school curriculum requirements.

Site Signs

8.22. It is considered that the introduction of numerous signs and waymarkers throughout the site would be intrusive. It is proposed, therefore, that only a small number of strategic information signs are provided at the car parks, gateways and at the visitor centre. These signs would be carefully located to ensure accessibility without compromising the local features. The signs would primarily provide a site plan which indicates key features, facilities and viewpoints. In addition, the site trails would be indicated with information on distances and any restrictions.

Cast Iron Marker Plates

8.23. At key features, it is proposed to use a discreet form of interpretative signage, which is appropriate to the industrial heritage of the site. These would be cast iron plates with relief text set into the ground or mounted on existing walls. These marker plates would provide essential information about the feature. They would be unobtrusive yet effective and resilient devices. They could be designed as part of a trail to be discovered by children (and others).

8.24. The above markers would be appropriate adjacent to the following features:

- the Straining Well(s);
- the Draw Down Towers;
- the Gauge Basins;
- the Causeway;
- Commissioners' Cottage;
- Craigmaddie Lodge;
- Barrachan Cottage.

Waymarkers and Distance Markers

8.25. Waymarkers could be used to define trails, particularly in Barrachan Wood where it is possible to become disoriented. Generally, the waymarkers should be visible but not obtrusive. Mounting on existing structures would be preferable to separate posts. These will be required at footpath junctions. As discussed earlier, distance markers could also be introduced for joggers on the main footpath circuit.

Tree Name Plates

8.26. There are several fine mature trees within the site and a selection of these could be interpreted as a tree trail. This would require a name-plate (or number plate) giving the common and Latin names, date of planting, origin, etc. These plates could be referenced in trail literature, which could give more information about the trees including their timber, cultural significance and their value as a wildlife habitat.

External Road Signs

8.27. There is scope to improve external signage for Milngavie Reservoirs, which would be useful in directing vehicular traffic to the car parking facilities. 'Brown' signs at eh Milngavie roundabout and main junctions may be appropriate in the future (i.e. after completion of developments). Information at public transport nodes would also assist in directing visitors to the site, promoting public transport links to the site or providing guidance on the local access network.

9. CONSERVATION AND RECREATION MANAGEMENT PLAN

CONSERVATION AND DEVELOPMENT PROPOSALS

Introduction

9.1. This section of the report outlines the steering group's vision for the Milngavie Reservoirs site and states the aims and objectives for its conservation and development. These proposals reflect the 'Conservation Needs' as defined in Chapter 4. The proposals aim to reconcile the need to protect this highly significant site, whilst introducing new components and activities to maximise the use of the open waterbodies and define future uses for the buildings and structures associated with the Victorian water treatment works.

9.2. The proposals have been defined on a compartmental basis; for each compartment a policy statement and a set of proposals have been determined. These are described below.

Compartment 1: Mugdock Reservoir

Policy

9.3. To conserve and restore the Mugdock Reservoir landscape in a way that respects the design intentions of both John Bateman and James Gale. This compartment contains the oldest components of the reservoir complex and therefore they are likely to be in slightly greater need of attention than those at Craigmaddie . Means of interpreting the combination of both 1859 and 1896 phases of work would also help visitors to appreciate the scale and skill of the work involved. This compartment is readily accessible, has a high profile and is heavily used by visitors it should, therefore, be conserved and maintained to a high amenity standard. New recreational activities should be carefully managed and of a type that does not compromise the quiet reflective qualities of the reservoir.

Proposals

9.4. The above policy would be achieved by the following actions:

1A: minor repairs including the removal of vegetation to the header wall masonry structures to the gauge basins;

1B: refurbish the perimeter metalwork associated with the gauge basins; investigate and reinstate original paint colour finish;

1C: remove vegetation from dished stone channel and reinstate lost cast iron grate;

1D: minor repairs to the stone revetments to the measuring pond including the removal of self-seeded tree saplings;

1E: renew perished sections of the perimeter strap fence, realign and reinstate original paint colour finish;

1F: remove vegetation, typically grasses to path surfaces and hardstanding areas, infill hollows and top dress existing path surfaces with a crushed stone surface capable of self binding;

1G: remove intrusive 2.8m security fence subject to MoD approval;

1H: replace existing bench seat with a cast iron bench seat and install 4 additional benches along the perimeter path using backless benches in exposed areas to reduce visual impact;

1I: carry out silvicultural husbandry within woodland group; remove self-seeded Sycamore saplings and introduce new tree planting;

1J: replanting of ornamental shrub planting;

1K: repointing of the random rubble walls to the causeway including the removal of vegetation;

1L: reinstate lost side gate pillars and walling to causeway; refurbish and re-hang steel vehicular entrance gates and minor repairs to existing masonry gate pillars;

1M: demolish 2 nr. redundant Pump House structures and reinstate soft landscaping;

1N: rake out the cementitious joints to random rubble wall boundary to Mugdock Road and repoint with lime mortar; carry out any necessary repairs;

1O: eradicate area of Japanese Knotweed growing along the rill adjacent to the entrance into Drumclog car park;

1P: examine the feasibility of expanding the existing Drumclog car park southwards to increase car parking capacity from 45 nr. to 90 nr. This should carefully address the potential visual and environmental impacts and should also consider means to replace urbanising features/signs with more sympathetic components;

1Q: interplant existing row of Austrian pine, *Pinus nigra*, and replace incremental tree losses including inappropriate Scots pine, *Pinus sylvestris*, trees;

1R: minor repairs including the removal of vegetation to the masonry reservoir outlet and bridge structure and replace broken cast iron post and reinstate original paint finish;

1S: refurbish/repair and re-hang steel vehicular gates to Mugdock Road;

1T: refurbish and re-hang steel vehicular entrance gates to Mugdock Reservoir ramped entrance;

1U: rake out cementitious joints to the random rubble walls to the entrance ramp and repoint with lime mortar; carry out any necessary repairs;

1V: reinstate metal strap and wire uprights to the capping stones of the random rubble wall perimeter to Tannoch Loch;

1W: remove vegetation from masonry-lined channel, repair any damage and repoint joints of cope stones with lime mortar;

1X: install information signs at the 3 nr. Mugdock Road entrances;

1Y: adopt new grass cutting maintenance regime to promote long grass areas;

1Z: remove portions of existing bankside vegetation to enable views to the Mugdock Falls;

1AA: install cast iron marker plates at the Gauge Basin and Dam;

1AB: install waymarkers and distance markers;

1AC: discreetly install trim-trail equipment against perimeter planting avoiding exposed dam areas;

1AD: stakeholders/EDC should ensure that the Scottish Water owned fields to the west of Mugdock Road are preserved from development by statutory protection measures. This area, while separated from site by the public road, is of extremely high visual sensitivity, forming the backcloth to views over Mugdock Reservoir towards the Kilpatrick Hills.

Compartment 2: Barrachan Wood

Policy

9.5. To retain and perpetuate the woodland cover of Barrachan Hill, preserving its informal rugged character while accommodating distinctive pockets of ornamental plantings and nature conservation themes according to the local characteristics. To extend the existing network of paths, while preserving their informal character.

Proposals

9.6. The above policy would be achieved by the following actions:

2A: establish long term management plan for the woodland to ensure renewal of native tree species in areas where native species are predominant, and mixed planting to preserve local characteristics (Wood 1);

2B: through silvicultural management practices, carry out annual removal of dead, dying and crossed branches to existing mature trees;

2C: remove self-seeded and invasive tree saplings such as Sycamore, *Acer pseudoplatanus* (Wood 2);

2D: remove self-seeded, on-native and invasive understorey shrubs such as *Rhododendron ponticum* (proposed Wood 2);

2E: interplant existing woodland belts to reflect existing species composition;

2F: plant up gaps in existing ornamental shrub bed lining the North Drive;

2G: repair and reinstate metal fences and gate posts/ gates around woodland boundaries ;

2H: remove existing vegetation to allow views to Mugdock Falls;

2I: Restore historic footpaths through Barrachan Woodland;

2J: erect bat boxes in appropriate locations and monitor their usage (Wood 3);

2K: establish practice of dead woodpiles (Wood 4);

2L: identify areas for small glade creation and enlargement, monitor groundlfora and usage by butterflies (Wood 5);

2M: carry out deer management to protect woodland regeneration (Wood 6);

2N: install tree name plates;

2O: install waymarkers.

Compartment 3: Barrachan Farm

Policy

9.7. To retain and find new sustainable uses for the Barrachan Farm buildings including Barrachan Hall. To restore public access through the Barrachan site and to conserve the landscape associated with the buildings, including both the ornamental and former farm landscape features. To monitor and assess the reinstatement of the earthworks spoil heap.

Proposals

9.8. The above policy would be achieved by the following actions:

3A: repair and repoint stone walls;

3B: restore overgrown and lost footpaths;

3C: repair Entrance Drive;

3D: replacement tree planting and tree surgery;

3E: install waymarkers at path junctions;

3F: install tree name plates on specimen trees.

3G: restore metal fences and gateways around fields and along access routes;

3H: reinstate and install new benches to take advantage of the panoramic views from Barrachan Hill.

Compartment 4: Katrine Water Treatment

Policy

9.9. This area of land is effectively outside the scope of this study and public access will not be permitted in the future. However, landscape mitigation measures are proposed as a condition of planning permission and it is important that these are implemented and prove successful. This compartment has a strong visual presence on the reservoirs site, therefore, it is particularly important that the integrity of its peripheral tree belt is maintained.

Proposals

9.10. The above policy will be addressed by the conditions of planning placed on the Katrine Water Project by East Dunbartonshire Council and does not have specific proposals within this plan. However, it is important that the landscape area excluded from public access in the future is adequately maintained and the character of new planting respects the historic patterns/species mixes within the site.

Compartment 5: Craigmaddie Reservoir

Policy

9.11. To conserve the landscape of the Craigmaddie Reservoir in a way that respects the design intentions of James Gale in 1896 and to accommodate new recreational activities in a sensitive manner avoiding negative impacts on heritage features.

Proposals

9.12. The above policy would be achieved by the following actions:

5A: minor repairs including the removal of vegetation to the masonry header wall to the gauge basin;

5B: refurbish the perimeter metalwork consisting of a cast iron post and rail fence associated with the gauge basins. Investigate and reinstate the original paint finish;

5C: undertake the minor repairs to the stone revetments to the measuring pond, including the removal of self-seeded tree saplings and shrubs;

5D: renew perished sections of the perimeter strap fence line and reinstate the original paint finish;

5E: remove vegetation, typically grasses to the path surfaces and hardstanding areas, top dress existing path surfaces with loose gravel and infill hollows;

5F: carry out silvicultural husbandry to the row of Lime, *Tilia spp.* trees TL2;

5G: fell and replant 3 nr. Noble firs, *Abies procera*;

5H: carry out silvicultural husbandry within woodland group WB7; interplant the existing woodland belt to reflect the existing species composition;

5I: plant up gaps in existing ornamental shrub beds to the perimeter of Craigmaddie measuring pond;

5J: remove invasive and self-seeded Ash, *Fraxinus excelsior*, tree saplings to the north east perimeter of Craigmaddie reservoir;

5K: plant up gaps in existing attenuating shrub line, including replanting inappropriate species to Craigmaddie Lodge Drive;

5L: refurbish and re-hang the set of vehicular gates and single pedestrian gated entrance to Craigmaddie Lodge, reinstate the original paint finish;

5M: refurbish railings to the Craigmaddie Lodge entrance;

5N: replant tree losses along the Strathblane Road tree avenue, respect the rhythmical planting patterns;

5O: replant Austrian pine, *Pinus nigra*, tree losses in front of Craigmaddie Lodge;

5P: refurbish the metalwork associated with the Craigmaddie reservoir draw down tower, reinstate original paint finish;

5Q: adopt new grass cutting regime to promote long grass areas to the foot of the embankment;

5R: introduce non-powered water sports to Craigmaddie Reservoir with associated improvement to access and safety measures;

5S: introduce additional benches in a coordinated, high quality format around the perimeter of the reservoir; only backless benches should be used on the exposed eastern and southern sides of the reservoir;

5T: install an Information Sign at the Craigmaddie Lodge entrance;

5U: install cast iron information plates at the Gauge Basin;

5V: install distance markers around perimeter;

5W: introduce trim trail equipment coordinated with other furniture items, carefully sited;

5X: install tree name plates to key specimens.

Compartment 6: Water Works

Policy

9.13. To use the opportunity provided by the Katrine Water Project to remove redundant, insensitive developments allowing restoration of the gardenesque setting to the old water works, evoking the spatial layout of 1896 as closely as possible but incorporating essential new elements. To find new visitor-related uses for the redundant water treatment buildings. This is the focus of the site and should consequently be the hub of recreational and educational activities. It should be maintained to the highest order and include the restoration of the lost horticultural interest/excellence once synonymous with the site.

Proposals

9.14. The above policy would be achieved by the following actions:

6A: refurbish and re-hang the set of steel vehicular gates and single pedestrian gate to the principal entrance at the foot of Commissioners' Walk. Promote the re-use of the pedestrian entrance gate. Reinstate original colour paint finish;

6B: reinstate the 'lost' ornamental cast iron lanterns to the entrance gate pillars;

6C: rake out the cementitious joints to random rubble walls lining Commissioners' Walk and repoint with lime mortar. Carry out all necessary repairs;

6D: undertake silvicultural husbandry to the Lime, *Tilia*, trees bounding Commissioners' Walk including the removal of deadwood and crossed limbs, the removal of epicormic growth and crown lifting to 5 metres above ground level;

6E: refurbish metalwork and reinstate original colour finish to short lengths of round bar railings to Commissioners' Walk;

6F: install cast iron information plates at the Straining Wells and Draw-down Towers;

6G: explore the potential to utilise the former nursery as an educational garden or small private nursery; undertake site clearance and refurbishment in the first place

6H: remove and relocate parking areas to the site of the existing Chlorination Plant following its decommissioning,, restore garden areas after removal of parking spaces and create landscape framework to new parking area;

6I: break out the large temporary concrete platform and reinstate garden area for picnicking /passive recreation;

6J: reinstate lost Cedar, *Cedrus spp.,* trees;

6K: install site information boards at the Water Works and at the Commissioners' Walk entrance;

6L: explore with Scottish Water the early removal of the intrusive security fencing enclosing the straining wells, Chlorination Plan and Commissioners' Cottage;

6M: refurbish Gales Monument including the reinstatement of a drinking water supply;

6N: remove lengths of loose gravel pathways and reinstate with a bound gravel surfaced path;

6O: reinstate trees around the curtilage of Commissioners' Cottage and Water Works site;

6P: reinstate lost architectural details to Commissioners' Cottage;

6Q: refurbish metalwork associated with the draw down towers to Mugdock and Craigmaddie reservoirs.

6R: explore the potential for a new visitor/interpretation and cafe facility with a water-side aspect and pontoon access into the open waterbody;

6S: explore options for bringing back into use the existing public conveniences at the head of Commissioners' Walk; these options should include sports changing/storage facilities or are-establishment of the toilet block (subject to other visitor facility considerations)

Compartment 7: Craigash Farm

Policy

9.15. This area of land is outside the scope of this study, however, it overlooks the site and forms the backcloth to views over Craigmaddie Reservoir. It therefore has a strong visual relationship with it which should be protected from inappropriate developments. It is important, therefore, that the rural character and integrity of landscape features are maintained and potentially enhanced through statutory protection measures.

Proposal

9.16. The above policy would be achieved by the following actions:

7A: encourage/ support the landowner to maintain field boundary walls and hedge lines.

7B: stakeholders/ EDC should ensure that this sensitive area of the greenbelt is preserved from development by statutory protection measures

Compartment 8: Mugdock Bank

Policy

9.17. This area of land is also outside the study boundary, however, it overlooks the site and has a strong visual relationship with it. It is important, therefore, that the rural character and integrity of landscape features are maintained and potentially enhanced through statutory protection measures.

Proposals

8A: encourage/support the conservation of rural features;

8B: to explore the potential for developing equestrian access links to the North Drive and Mugdock Road.

Compartment 9: KWP Bankell site

Policy

9.18. This area of land is also outside the scope of the study but is owned by Scottish Water as part of the Katrine Water Project. It is currently under development as the Service Reservoir site. It will be landscaped following completion of the Service Reservoir but it is unlikely that this will do much to mitigate the rectangular profile of the large partly submerged structure. In relation to this compartment it will therefore be important to preserve the historic landscape features surrounding the site, in particular Bankell Wood to the north and the Strathblane Road perimeter wall and tree lines. The potential location of a visitor car park in this compartment makes positive use of a disturbed area.

Proposals

9A: stakeholders to encourage/assist the positive management of Bankell Wood by the landowner ensure its long term integrity

9B: Scottish Water to maintain, replace and reinforce as necessary the tree line and woodland belt along the Strathblane Road perimeter in order to screen the Service Reservoir from Craigmaddie.

9C: Scottish Water should consider the development of a remote visitor car park for the Milngavie Reservoirs within the Bankell site; this should also include the associated footpath links to the Craigmaddie Lodge entrance together with traffic control measures at pedestrian crossing(s). This car park should be carefully integrated and landscaped to minimise the impact of parked vehicles which may otherwise be visible from the perimeter of Craigmaddie Reservoir.

10. MANAGEMENT REVIEW

CURRENT MANAGEMENT ARRANGEMENTS

10.1. The Milngavie Reservoirs site and its component parts are managed and maintained by Scottish Water. The emphasis is in fulfilling Scottish Water's obligations to supply and treat water rather than 'estate management'. Landscape maintenance works are, therefore, not intensive but relate to essential operational and safety issues.

10.2. Routine grass cutting is undertaken by contract on behalf of Scottish Water and involves six grass cuts per annum. Tree and woodland management is undertaken sporadically by individual contracts. This generally addresses the removal of dead trees (e.g. Elms), tree surgery to improve pedestrian safety on footpaths and drives. Footpaths and drives are repaired to maintain safe access, as and when required. Damage to walls is similarly addressed on an ad hoc basis or in response to potential safety concerns.

10.3. Scottish Water monitors the integrity of the dams on a regular basis with formal inspections on a yearly and 10 yearly basis. Survey stations are installed on the earth dams to assist in the detection of bulges or subsidence. The external faces of the dams are consequently maintained as mown grass and tree growth prohibited. The internal revetments are stone pitched and self-seeded scrub vegetation growing on these slopes is removed periodically by hand.

10.4. Scottish Water estimates that the grass cutting and contract tree work costs between £12,000 – £25,000 per annum. It is believed that landscape maintenance costs overall rarely exceed £25,000 and are usually much less. Note: extensive road resurfacing has not been undertaken for many years and this will clearly require substantial expenditure when it becomes necessary.

10.5. The current management arrangements do not include for the maintenance of ornamental horticultural displays or 'high amenity' treatments as displayed in the historic photographs of the site (i.e. particularly in the Water Treatment Works and Gauge Basin areas). Specimen Rhododendrons and associated evergreen shrub planting remain but have received minimal attention. *Rhododendron ponticum* has become invasive and several ornamental varieties have reverted to their *ponticum* form. Litter accumulation is not a major problem at present and is currently addressed during grass cuts and routine inspections. However, increased visitor activities may result in the need for more regular litter collections.

10.6. The Milngavie Reservoirs site, excluding the new water treatment works area and the west field, measures 113 hectare, of which 60 hectare is the reservoir water area. This determines that the land (and buildings) area to be maintained measures 53 hectare (530,000m^2).

MAINTENANCE COSTS

10.7. Taking an indicative annual maintenance cost of £20,000 then, this equates to £0.038 per square metre. This is a low cost compared with 'country parks' within the UK with a similar mix of maintenance requirements. UK comparators generally involve the following orders of revenue expenditure:

- urban parks and gardens: £0.7-£1.5/m^2
- large urban parks: £0.5-£0.7/m^2
- country park: £0.1-£0.5/m^2

10.8. The revenue expenditure on the Milngavie Reservoirs landscape is, therefore, considered to be of a low order. Even taking into account the relative simplicity of the landscape and its current lack of facilities, an annual cost in the order of £0.1/m^2 to £0.2/m2 (£53,000 to £79,500) would be expected. This would be equivalent to a minimum of 3 to 4 full time equivalent (FTE) maintenance staff excluding machinery and overhead costs. (note the Reservoirs' landscape used to be tended by a complement of up to 10 groundsmen)

10.9. From the above analysis, borne out by the landscape audit, the Milngavie Reservoirs landscape maintenance works are under-resourced at present and this is reflected in the slow decline in condition of many landscape features. The status quo is not being maintained and this will in the longer term compromise the heritage and amenity values of the site. There is currently no capacity to upgrade the landscape on a year by year basis or to conserve key features.

10.10. Of a major concern is the potential lack of resources to tackle major infrastructure repairs and maintenance, i.e. particularly to masonry structures, ironwork and roads/footpaths. Whilst their decline may be slow, repairs or restoration of the appropriate high quality will be expensive when needed. The roads/footpaths may, for instance, require resurfacing every 20-30 years and furniture/signage may require renewal every 10-15 years. Even if comprehensive restoration of the landscape could be achieved by a short term capital programme (possibly with funding assistance from HLF and partnership organisations), there would still be a requirement to ensure that there is sufficient capital to address future infrastructure renewal works in years to come.

FUTURE MAINTENANCE REQUIREMENTS

10.11. The proposals contained within Chapter 9, if all undertaken, will increase the complexity of the maintenance operations and necessitate additional resources over the long term to sustain the improved condition of landscape. As the maintenance of the reservoirs site to this high standard is not part of Scottish Water core business, alternative funding sources would have to be found outwith Scottish Water's budget. It is considered that the following revenue resource allocations will be required:

(i)	maintenance of amenity grass areas ($6,000m^2$ x £0.50):	£ 3,000
(ii)	maintenance of lawn areas ($1,700m^2$ x £1.20):	£ 2,040
(iii)	maintenance of meadow grass areas: ($7,000m^2$ x £0.05):	£ 350
(iv)	maintenance of garden beds/high horticultural areas ($700m^2$ x £3.00):	£ 2,100
(v)	maintenance of hedges ($600m^2$ x £1.20):	£ 720
(vi)	maintenance of shrubberies ($15,000m^2$ x £0.60):	£ 9,000
(vii)	maintenance of woodlands and trees ($110,000m^2$ x £0.20):	£ 22,000
(viii)	maintenance of unmetalled paths and drives ($5,800m^2$ x £1.50):	£ 8,700
(ix)	control of invasive vegetation growth on revetments and in drainage channels:	£ 1,500
(x)	collection and removal of litter:	£ 2,000
(xi)	maintenance of furniture and signs:	£ 1,200
(xii)	maintenance of Dirty Dam:	£ 800
(xiii)	annual maintenance/repairs of masonry structures:	£ 5,000
(xiv)	annual refurbishment/repairs of metalwork structures/fences:	£ 5,000
(xv)	Sub Total:	£ 63,410
(xvi)	Capital reserve for future infrastructure repairs/renewal 10%:	£ 6,341
Projected Annual Maintenance Costs:		**£69,751**

10.12. The above total equates to an annual maintenance cost of £0.13/m^2 which more closely resembles expenditure within country parks in the UK. This reflects the inclusion of maintenance allowances for all the main landscape components including the new development proposals. The above figure represents a routine maintenance allowance, inevitably the early years of any maintenance upgrade will have to tackle a backlog of work and consequently the first three years of a new regime could require up to £75,000 per annum.

10.13. Throughout the UK there is a general recognition that site-based maintenance teams can be more effective in addressing maintenance problems as they occur and in providing security for park users. At the Milngavie Reservoirs, however, there are few security issues within the site at present and the current maintenance operations are suited to attention by roving maintenance contractors. Future enhancements to the landscape, especially the restoration of high amenity/horticultural areas at the old Water Works, may warrant the reintroduction of site-based grounds staff (at least one) although it would be appropriate to retain maintenance by roving squads for certain operations e.g. grass cutting. It would be advantageous if maintenance by contract could continue, and if the scope of the contract works could be increased significantly to incorporate additional regimes and specification enhancements. The addition of site-based staff should also be examined. Such a contract should ideally be on a fixed term (say 3 years), after which time the contract would be re-tendered or renegotiated, incorporating amendments as required. This would be subject to the identification of additional funding.

10.14. Scottish Water's existing maintenance contract is inadequate to conserve the heritage features of the site or achieve improvements to its amenity. Scottish Water confirms, however, that it is not possible to increase maintenance expenditure at this time.

10.15. The use of contract maintenance should be controlled and monitored by the management organisation (of which Scottish Water will be an important part) responsible for the Milngavie Reservoirs landscape. This subject is discussed below.

FUTURE MANAGEMENT STRUCTURE

10.16. Scottish Water's obligations to concentrate on water supply and treatment determine that the positive management of the reservoir landscape for heritage, education or recreation is not within their remit, i.e. non-core business. However, the study recognises the importance of Scottish Water's ongoing commitment to the site for essential maintenance of all infrastructure components including the path network, masonry and metalwork structures, trees, woodland, grassland and shrubbery areas. There is a concern amongst the steering group that Scottish Water is seeking to abdicate from these responsibilities rather than commit to a long term support for the conservation of the reservoir landscape. The study brief therefore recognises that in order to achieve positive management for heritage and recreation, a different management structure, but one in which Scottish Water will have an important role to play, will be required. Potential management structure options are considered below.

10.17. There is considerable local interest in and 'ownership' of the site by the Friends of Milngavie Reservoirs' and by other residents of Milngavie and Mugdock in particular. East Dunbartonshire Council, SNH and Historic Scotland are also supportive of improved management mechanisms. This provides a positive basis for considering potential new management structures. Alternative structures have been briefly reviewed and include:

- continued management by Scottish Water;
- Milngavie Reservoirs Trust;
- management by Mugdock Country Park.

CONTINUED MANAGEMENT BY SCOTTISH WATER

10.18. Scottish Water has confirmed that 'estate management' is outside their core business activities and as such it is not funded, but they are committed to the essential maintenance of the reservoir landscape and its listed structures.

10.19. As demonstrated above, there is considerable scope (and need) to improve the maintenance if heritage interests are to be protected and if the site is to be seen as an amenity resource in addition to its primary function of drinking water storage body. This determines that continued management of the landscape by Scottish Water would not provide a suitable framework for directing conservation works and for proactively developing the site for new activities.

10.20. Scottish Water must, however, retain their responsibility for the operation of the reservoirs, the associated supply pipes and treatment works. In this respect, Scottish Water will be essential partners in any new management structure.

MILNGAVIE RESERVOIRS TRUST

10.21. Consultations during the study have identified the formation of a charitable/not for profit company or 'Trust' as a potential management structure for the Milngavie Reservoirs' landscape.

10.22. In such a model, the 'Trust' would become the management organisation responsible for funding and directing landscape management and development works (i.e. excluding those strictly relating to water supply and treatment operations).

10.23. The Trustees of such a model would ideally represent Scottish Water (as landowners), East Dunbartonshire Council, Friends of Milngavie Reservoirs/community representatives and potentially Scottish Natural Heritage and Historic Scotland. These Trustees would, therefore, have both public accountability and represent local community interests. Trustees would require to be elected and a system of rotational representation agreed including the appointment of Chairperson.

10.24. It would be essential for the Trust to employ a 'Project Officer' who would have the full time professional responsibility to deliver the conservation and development proposals ratified by the Trust and to oversee the ongoing maintenance operations.

10.25. At a managerial level, it is suggested that a Project Officer undertakes the following duties:

- prepares maintenance plans and commissions maintenance contracts; monitoring maintenance operations;
- negotiates commercial contracts and leases relating to visitor activities and facility provision (e.g. café, boating);
- prepares business plans taking into account revenue income from commercial activities and expenditure; reporting regularly to Trustees;
- fund raising with assistance from the Trustees;
- liaison with community groups and representatives;
- liaison with East Dunbartonshire Council Ranger Service and with Mugdock Country Park;
- organisation of specific one-off contracts for repairs/ replacements;
- liaison with the police regarding security issues.

10.26. A Trust structure would allow some autonomy and would enable funds from different sources to be held on its own account, free form financial year constraints. Funds received from private sources, donations, grants, etc. could also be accumulated within a Trust fund.

10.27. A Trust may nominally lease the landscape and redundant buildings of Milngavie Reservoirs from Scottish Water. The terms of this lease could ensure that Scottish Water's operational interests are protected.

10.28. A Trust could apply for and administer Heritage Lottery Fund grants providing its constitution and expertise are endorsed by HLF.

MANAGEMENT BY JOINT MANAGEMENT COMMITTEE

10.29. The adjacent Mugdock Country Park is managed by a joint management committee (East Dunbartonshire Council and Stirling Council) but administered by East Dunbartonshire Council with joint funding and support from Scottish Natural Heritage towards the Ranger Service. It provides a range of visitor facilities including education, catering, play, access and parking. The Country Park also has a Ranger Service, which is supported by Scottish Natural Heritage.

10.30. The Milngavie Reservoirs site and Mugdock Country Park are almost contiguous and could be linked both physically and administratively to allow them to operate as complementary facilities. The joint management's experience in managing Mugdock Country Park could be applied to the reservoirs' landscape and the two areas could be managed by an expanded management team, headed by a General Manager for the two sites.

10.31. The management team would have responsibility for organising maintenance operations, controlling/negotiating commercial activities, strategic planning of events, controlling ranger service operations and liaising with local community representatives/interest groups including the Friends of Milngavie Reservoirs.

10.32. The Ranger Service operates throughout EDC and within Mugdock CP on behalf of the management committee. This service is fully committed and would need to be expanded to cover the Milngavie Reservoirs and to provide educational facilities/activities in this area.

10.33. In order to allow the participation of local community representatives and other interest groups, the establishment of a 'forum' would be appropriate. The forum would be chaired by the Manager and would be held at regular intervals (say every three months). The forum would allow any local concerns to be discussed and the management team to explain progress or proposals relating to management, conservation and development works. The existing steering group would constitute the basis of the forum attendees, but this could be expanded or modified over time.

10.34. If the Mugdock Country Park joint management committee was to take over the management of Milngavie Reservoirs, then a management agreement with Scottish Water would be required. Stirling Council's support would also be required (i.e. for a site outside its administrative boundary). In this management model there may be advantages in extending the maintenance contracts to cover both areas. This may involve increased inputs by EDC Direct Works and would allow the management team to draw on specialist conservation advice (trees, buildings, biodiversity) held within the Councils.

CONCLUSION

10.35. Both the 'Trust' and joint management committee models have positive attributes. The Trust would provide a semi-autonomous management group with strong community representation and fiscal controls. The joint management committee structure would provide the strategic advantages of potentially linking Milngavie Reservoirs to Mugdock Country Park, thereby creating a large integrated and complementary Country Park, which is connected directly to the urban area. In the joint management committee model, the combined resources of two councils and SNH would bring a range of expertise and the potential to utilise council services. The joint committee model may not, however, be able to secure the support of Stirling Council as the Reservoirs are wholly outside the Council boundary and resources are limited.

10.36. It is concluded, therefore, that either of the above management models would serve the Milngavie Reservoirs positively, but that a Management Trust may be more readily established. However, further discussions between Stirling Council, East Dunbartonshire Council and SNH should be initiated to establish how the Mugdock Country Park expertise could be translated to the Milngavie Reservoirs.

11. COST PLAN

11.1. This chapter provides an assessment of outline costs for the proposals described in Chapters 6, 7, 8 and 9. The capital costs are based on contractual rates for 2005. The revenue costs described in Chapter 10 are also summarised within this chapter.

11.2. The latter part of the chapter outlines potential funding sources and the possible structure of a funding application to the Heritage Lottery Fund.

11.3. The following tables define the capital costs associated with the proposals described in the earlier chapters. The conservation-management proposals are listed by zone. The Access and Recreation, Biodiversity Development and Education Plan proposals are listed by subject.

CONSERVATION-MANAGEMENT COSTS

Compartment 1: Mugdock Reservoir

Ref.	Summary	Capital Cost	Priority	Comments
1A	Minor repairs to gauge basins masonry.	£2,500.00	H	
1B	Refurbish gauge basins metalwork	£10,000.00	H	
1C	Remove stone channel vegetation & reinstate grate.	£2,000	M	Initial cost to be followed by annual maintenance allowances.
1D	Minor repairs to measuring pond.	£2,500.00	M	
1E	Renew perimeter strap fence and paint.	£30,000.00	H	250 @ £120/m.
1F	Remove vegetation to path and hardstanding areas.	£2,000.00	H	Initial cost to be followed by annual maintenance allowances.
1G	Remove security fencing.	£1,000.00	H	Consultation with MOD.
1H	Replace bench with cast iron bench.	£800.00	M	
1I	Silvicultural husbandry within woodland group.	£3,500.00	M	Initial cost to be followed by periodic maintenance thereafter.
1J	Replace shrub planting.	£1,000.00	M	Every 5 years.
1K	Repointing causeway rubble walls.	£6,000.00	M	200 @ £30/m.
1L	Reinstate lost side gate pillars and re-hang entrance gates.	£15,000.00	H	
1M	Demolish 2 pump house & landscape.	£2,000.00	H	
1N	Rake & repair wall boundary joints to Mugdock Road.	£40,000.00	L	2,000 @ £20/m.
1O	Eradicate Japanese Knotweed at Drumclog car park.	£2,000.00	H	
1P	Expand Drumclog car park.		M	Included in Access & Recreation Development Plan
1Q	Interplant Austrian pine and replace losses.	£6,000.00	H	Allowance for 30 nr.
1R	Repair and remove vegetation at reservoir outlet and bridge.	£500.00	H	To be repeated every 5 years.
1S	Re-hang Mugdock Road gates.	£1,000.00	H	
1T	Re-hang Mugdock Reservoir ramped entrance gates.	£1,000.00	H	
1U	Rake, repair & repoint rubble wall joints at entrance ramp.	£18,000.00	M	600 @ £30/m.
1V	Reinstate metal strap & wire uprights of coping stones on rubble wall at Tannoch Loch.	£1,500.00	M	
1W	Remove vegetation from masonry rill & repoint.	£2,500.00	H	To be repeated every 5 years.
1X	Remedial works to footpaths including removal of grasses to perimeter path surfaces, dressing and infilling hollows.	£26,500.00	H	1,250m @ £2/m.
1Y	Replace bench with cast iron bench and install 4 along perimeter path adjacent to embankment.	£3,200.00	M	
1Z	Install 3 nr. information signs.	£6,000.00	M	
1AA	Grass cutting maintenance regime.	-	-	Reflected in Revenue Costs.
1AB	Remove portions of bankside vegetation to enable views of Mugdock Falls.	£1,000.00	H	Every 5 years.
1AC	Install cast iron marker plates.	£4,000.00	M	
1AD	Install waymarker and distance markers.	£1,500.00	M	
1AE	Install elements of trim track equipment.	£20,000.00	L	
1AF	Stakeholders/EDC should ensure that the Scottish Water owned fields to the west of Mugdock Road are preserved from development by statutory protection measures.	-	H	
Compartment 1	**Sub Total:**	**£233,000.00**	Excluding Revenue Items.	

Compartment 2: Barrachan Wood

Ref.	Summary	Capital Cost	Priority	Comments
2A	Establish long term management plan.	£10,000.00	H	Additional detailed survey required.
2B	Silvicultural management to remove dead branches.	£5,000.00	H	Initial cost to be followed by annual maintenance allowances.
2C	Remove Self-seeded & invasive tree saplings.	£2,500.00	H	Initial cost to be followed by annual maintenance allowances.
2D	Remove self-seeded & invasive understorey shrubs.	£2,500.00	H	Initial cost to be followed by annual maintenance allowances.
2E	Interplant woodland belts to reflect species composition.	£2,500.00	H	Initial cost to be followed by annual maintenance allowances.
2F	Plant up gaps in shrub bed at North Drive.	£2,500.00	M	To be repeated every 5 years.
2G	Repair/ reinstate metal fences and gateways.	£5,000.00	L	Further study.
2H	Remove vegetation to allow views of Mugdock Falls.	£5,000.00	H	To be repeated every 5 years.
2I	Restore historic footpaths through Barrachan Woodland.	£26,000.00		
2J	Erect bat boxes.	£1,000.00	M	
2K	Establish dead wood piles.	*	M	* periodic actions – revenue programme could start now.
2L	Glade creation and monitoring.	*	M	* in revenue costs for woodland management: start now.
2M	Deer management.	*	M	* in revenue costs for woodland management: start now.
2N	Install tree trail name plates.	£2,500.00	L	Requires supporting interpretation.
20	Install waymarkers.	£1,000.00	M	
2P	Install trim trail equipment.	£10,000.00	L	
2Q	Dirty Dam enhancements for biodiversity.	£4,800.00	H	
Compartment 2	**Sub Total:**	**£80,300.00**	Excluding Revenue Items.	

Compartment 3: Barrachan Farm

Ref.	Summary	Capital Cost	Priority	Comments
3A	Repair and repoint stone walls.	£20,000.00	H	
3B	Restore overgrown and lost footpaths.	£8,000.00	H	
3C	Repair Entrance Drive.	£18,000.00	H	
3D	Replacement tree planting and tree surgery.	£6,000.00	M	
3E	Install waymarkers.	£400.00	M	Requires supporting interpretation.
3F	Install tree name plates.	£500.00	L	Requires supporting interpretation.
3G	Repair /reinstate metal fences and gates	£5000.00		
3H	Reinstate & install new benches to take advantage of the panoramic views from Barrachan Hill.	£2,400		
Compartment 3	**Sub Total:**	**£60,300.00**		

Compartment 4: Katrine Water Treatment

Ref.	Summary	Capital Cost	Priority	Comments
	No specific cost proposals.	-		Future management to be monitored.
Compartment 4	**Sub Total:**	**£0.00**		

Compartment 5: Craigmaddie Reservoir

Ref.	Summary	Capital Cost	Priority	Comments
5A	Repair & remove vegetation to gauge basin wall.	£2,500.00	H	
5B	Refurbish gauge basin perimeter metalwork post and fence.	£15,000.00	H	
5C	Repairs to measuring pond stone revetments.	£5,000.00	H	
5D	Renew and reinstate sections of perimeter fence line.	£14,400.00		360 @ £40/m.
5E	Remedial works to footpaths and hardstandings.	£24,000.00	H	
5F	Silvicultural husbandry to Lime trees.	£1,000.00	M	Initial cost to be followed by annual maintenance allowances.
5G	Fell and replant 3 Noble firs.	£1,500.00	H	£500 each tree.
5H	Carry out silvicultural husbandry within woodland group WB7.	£2,000.00	M	Initial cost to be followed by annual maintenance allowances.
5I	Plant up gaps of Craigmaddie measuring pond shrub beds.	£1,000.00	H	To be repeated every 5 years.
5J	Remove invasive self-seeded Ash to north east perimeter of Craigmaddie Reservoir.	£1,000.00	H	
5K	Plant up gaps at attenuating shrub line and replanting at Craigmaddie Lodge Drive.	£1,000.00	M	To be repeated very 5 years.
5L	Re-hang gates at pedestrian entrance to Barrachan Lodge.	£1,000.00	H	
5M	Refurbish Craigmaddie Lodge entrance railings.	£7,500.00	M	
5N	Replant tree losses along Strathblane Road.	£10,000.00	H	Allowance for 100 nr.
5O	Replant Austrian pine in front of Barrachan Lodge.	£1,600.00	M	Allowance for 8 nr.
5P	Refurbish metalwork at Craigmaddie Reservoir draw down tower.	£5,000.00	M	
5Q	Adopt new grass cutting regime at foot of embankment to establish meadows.	-	H	Modifications to grass maintenance.
5R	Introduce water sports with access and safety measures.	£5,000.00	M	In Access & Recreation Development Plan.
5S	Introduce additional benches (4 nr.).	£3,200.00	L	
5T	Install information sign.	£2,500.00	M	
5U	Install cast iron information plates.	£4,000.00	L	
5V	Install distance markers/waymarkers.	£2,300.00	M	
5W	Introduce trim trail equipment.	£20,000.00	L	
5X	Install tree name plates.	£2,000.00		
Zone 5	**Sub Total:**	**£132,500.00**	Excluding Revenue Items.	

Compartment 6: Water Works

Ref.	Summary	Capital Cost	Priority	Comments
6A	Re-hang gates at Commissioners' Walk entrance.	£2,500.00	H	
6B	Reinstate lost lanterns to entrance gate pillars.	£6,000.00	H	
6C	Repoint Commissioners' Walk walls in lime mortar.	£19,500.00	H	650 @ £30/m.
6D	Silvicultural husbandry to trees bounding Commissioners' Walk.	£2,000.00	H	£100 each tree.
6E	Refurbish metalwork of Commissioners' Walk railings.	£12,500.00	H	
6F	Install cast iron information plates.	£4,000.00	H	
6G	Site clearance and refurbishment of nursery site and explore the potential to utilise the former nursery as a commercial small private nursery.	£6,000.00	M	
6H	Remove existing parking areas and relocate to site of Chlorination Plant following decommissioning.	£48,000.00	M	
6I	Break out concrete plat and reinstate garden area.	£15,000.00	H	500m2 @ £15/m2.
6J	Reinstate lost Cedar and trees.	£2,000.00	H	8 nr. @ £250 each.
6K	Install site information boards.	£4,000.00	H	
6L	Explore removal of security fencing at straining wells, Chlorination Plant and Commissioners' Cottage.	n/a	H	Consultation with Scottish Water/MoD.
6M	Refurbish Gales Monument and reinstate drinking water supply.	£10,000.00	H	
6N	Remove loose gravel pathways and reinstate path.	£9,000.00	M	300m2 @ £30/m2.
6O	Reinstate trees at Commissioners' Cottage and Water Works site.	£3,000.00	H	£150 each tree.
6P	Reinstate lost architectural details to Commissioners' Cottage.	£12,500.00	M	
6Q	Refurbish metalwork with draw down towers to Mugdock and Craigmaddie Reservoirs.	£5,000.00	H	
6R	Explore potential for new visitor facility and garden area.	-	H	Feasibility study required.
6S	Explore potential of old toilet block.	-	H	Feasibility study required.
6T	Install tree name plates.	£2,000.00	L	Requires supporting interpretation.
Compartment 6	**Sub Total:**	**£163,000.00**		

Compartment 7: Craigash Farm

Ref.	Summary	Capital Cost	Priority	Comments
7A	Maintain field boundary walls and hedge lines.	-	2	Outwith Scottish Water's ownership.
Compartment 7	**Sub Total:**	**£0.00**		

Compartment 8: Mugdock Bank

Ref.	Summary	Capital Cost	Priority	Comments
8A	Perpetuate landscape character.	-	M	Outwith Scottish Water's ownership.
8B	Explore potential for equestrian links.	-	M	Requires landowner agreement/feasibility.
Compartment 8	**Sub Total:**	**£0.00**		

Compartment 9: KWP Bankell Site

Ref.	Summary	Capital Cost	Priority	Comments
9A	Support Bankell Wood management.	-	H	Requires landowner agreement.
9B	Reinforce screening to Bankell site by Scottish Water.	-		Scottish Water
9C	Scottish Water to develop visitor car park and access links.	-		
Compartment 9	**Sub Total:**	**£0.00**		

Compartments 1to 9: Sub Totals

Compartment	Title	Total
1	Mugdock Reservoir	£233,000.00
2	Barrachan Wood	£ 80,300.00
3	Barrachan Farm	£ 60,300.00
4	Katrine Water Treatment	-
5	Craigmaddie Reservoir	£132,500.00
6	Water Works	£163,000.00
7	Craigash Farm	-
8	Mugdock Bank	-
9	Bankell Site	
Grand Total:		**£669,100.00**

INDICATIVE DEVELOPMENT COSTS

Development	Totals
Old Water Works Conversion to Visitor Centre.	£350,000 - £750,000
Conversion of Chlorine Store to Boathouse.	£20,000 - £30,000
Conversion of old toilet to changing facilities/storage.	£50,000 - £60,000
Gantry and pontoon for boating on Mugdock Reservoir.	£40,000 - £50,000

11.4. The total capital cost of the Milngavie Reservoirs Conservation and Recreation Management Proposals is estimated as **£ 669,100** excluding professional fees and VAT.

11.5. The cost of building developments and conversions of redundant structures requires to be assessed in more detailed within feasibility studies, which address visitor demands and architectural options, respecting the heritage of the buildings and their surrounding landscape. Indicative figures for these developments are however included above and they total between **£460,000** and **£890,000** including professional fees and VAT.

Professional Fees

11.6. As a single comprehensive conservation- management and recreation development project with a value of approximately £670,000, a multi disciplinary team of construction professionals would be required. This team would include landscape architects, civil/structural engineers, quantity surveyors and planning supervisors. Specialist assistance from surveyors and conservation experts (e.g. for ironwork and masonry) and from interpretation designers would also be required. In total, it is anticipated that a combined professional fee of between 16% and 18% could be expected. This would calculate as follows:

Conservation-management and recreation dev. Fee: 18% x £670,000: **£120,600 ex.VAT**

Estimated professional fees re. Development of redundant water works buildings would be between £80,000 and £160,000 ex. VAT.

Revenue Costs

11.7. Chapter 10 defines an appropriate level of revenue expenditure for the maintenance of the site. This amounts to £69,751, which is approximately £50,000 more than the current expenditure by Scottish Water. In addition to these maintenance costs, an additional ranger post and managerial post would be required to provide the recommended management structure. This determines that the additional revenue funding requirement would be as follows:

- additional maintenance expenditure: £ 50,000
- additional ranger: £ 18,000
- additional managerial support/project officer: £ 25,000
- overheads: £ 5,000

Additional Revenue Expenditure (per annum): **£98,000**

11.8. It is possible that the above revenue costs will also be eligible for grant support from the HLF over a finite time period, e.g. 3 years. This assumption is carried forward to the funding structure and the total project costs include an allowance for 3 years revenue costs.

Total Project Costs

11.9. The combined total of works costs, professional fees and revenue costs is estimated as follows:

- Estimated total Works Costs(incl. buildings♦): £ 1,344,000
- Professional Fees: £ 240,000
- Revenue Costs*: £ 294,000

Total Project Costs: **£1,878,000**

* Note: no allowance for revenue income from commercial activities has been made in this figure.

♦Note: estimated value of building developments is £675,000.

Funding

11.10. The project brief indicates the intention to advance the project as an application to the Heritage Lottery Fund for grant support towards the conservation and development proposals. The HLF 'Public Parks Initiative' would be a suitable for this application and would potentially be capable of providing up to 75% grant assistance up to a maximum of £1million. For a lower value project, the level of grant could potentially be as high as 90%, however, this depends on the 'eligibility' of the proposals to receive HLF support. Under HLF's 'What We Will Fund' criteria, the following items require confirmation of eligibility:

(i) the new boating facilities;

(ii) the visitor centre (building conversion works).

11.11. The new car park at Bankell would be provided by Scottish Water in fulfilment of the planning conditions in relation to the ongoing Katrine Water Project. LUC considers the conversion of the existing water treatment buildings (at Commissioners' Cottage) to visitor facility and educational uses to be a positive development, which will help to consolidate the core of the site.

11.12. It is estimated that the following value of work should be eligible for HLF support:

Capital Works and Professional Fees value:
£1,584,000 x 75% = £1,188,000

Revenue Costs over 3 years: £294,000 x 50%: £147,000

Combined HLF grant support (maximum): £1,335,000

11.13. This determines that partnership funding must make up a deficit of **£543,000** (£1,878,000 – £1,335,000). Potential partnership funding sources will be:

- Scottish Water;
- East Dunbartonshire Council;
- Scottish Natural Heritage;
- Historic Scotland;
- Forestry Commission;
- other sponsors.

11.14. Other sponsors may include charitable funding foundations, grant-giving bodies or other funding schemes. The following may be possible sources of funding:

- Landfill Tax Credit Scheme;
- Esmé Fairbairn Foundation;
- Scottish Enterprise Dunbartonshire.

11.15. The private sector may also be able to assist in the development of visitor facilities as commercial projects. This involvement will require careful management and preceded by business planning and the determination of lease conditions for Scottish Water property.

11.16. In the longer term, it would be hoped that commercial operations on the site could contribute through base charges to offset the revenue costs, at least in part. Potential revenue income could be made from the catering facilities, boating facilities and from the small garden centre. Rent of the associated buildings or ground for the above facilities may realise between £20,000 and £25,000 (estimated rents £15,000 for the visitor centre/café/shop; £5,000 boating facilities; £5,000 from managed fishing/ potential minor income from former nursery if a commercial garden use is viable).

11.17. The above estimates are based on the preliminary assumption that there are 100,000 visitors per annum to the Reservoirs and that the spend pattern is as follows:

- 50,000 visitors to café/shop x average £3 spend per person revenue: income: £150,000
- 10,000 rowing boat trips at £5 each: revenue income: £ 50,000

11.18. These basic estimates are fairly conservative and require more detailed justification by feasibility study/business plans, which should be undertaken following ratification of this study's proposals. It is possible that such feasibility work may be undertaken by the private sector as part of a bidding process for the provision of visitor facilities.

11.19. If £25,000 per annum revenue funding can be raised from commercial activities and Scottish Water is able to maintain its contribution to approximately £20,000* towards grounds maintenance, then the remaining revenue funding requirement would be in the order of £53,000. This may be met by:

- East Dunbartonshire Council;
- Scottish Natural Heritage (towards the Ranger Service).

* Scottish Water has confirmed that it is unable to increase revenue expenditure at present.

12. ACTION PLAN

Katrine Water Project Implications and Community Endorsement

12.1. The ongoing development of the Katrine Water Project is due for completion in December 2007. This determines that decommissioning of the old water treatment works will not occur until after this time. The opportunities for new recreational activities, for removing insensitive redundant buildings/structures and for converting old buildings to new uses will, therefore, not be available until 2008 at the earliest. In the meantime, there is an opportunity to advance a programme of 'early actions' and to pursue funding. In the first instance this management plan will require endorsement by the steering group and the subsequent issue to the adjacent communities of Milngavie, Mugdock, Strathblane, Bardowie, Baldernock and minor settlements in the surrounding area for their information and comment. On conclusion of this process and final ratification of the plan, it should be possible to progress the early actions recommended in the following paragraphs. Community inputs to the implementation process will of course be on-going through the future management structure and through the statutory consultation processes related to planning applications etc.

Increased Statutory Protection

12.2. The integrity of the Milngavie Reservoirs landscape as an asset of national importance, is potentially under threat from the SPFM requirement to sell buildings and land no longer needed by Scottish Water to carry out their core business of water treatment and supply. This could lead to fragmentation of the reservoir estate, which in turn could introduce piecemeal management and pressures for private development.

12.3. In the first instance, therefore, it is recommended that statutory protection for the Milngavie Reservoirs be increased through the following actions:

(i) upgrade group listing of the site to Category A – action by East Dunbartonshire Council and Historic Scotland;

(ii) designate the Milngavie Reservoir area as a Conservation Area. This might be achieved by extending the Tannoch Conservation Area or by designating the Reservoirs as a new Conservation Area – action by East Dunbartonshire Council;

(iii) seek inclusion in the 'Inventory of Gardens and Designed Landscapes in Scotland'. EDC should proposed the Milngavie Reservoirs as a candidate for inclusion in the 'Inventory' – action by East Dunbartonshire Council, Historic Scotland and Scottish Natural Heritage.

Scottish Water Commitments

12.4. Scottish water is a financially regulated business, funded from charge payers to provide a water and sewerage service. Scottish Water's funding is regulated by the Water industry Commission, and is set at a level that will deliver the Minister's objectives for Scottish Water through appropriate capital and operational expenditure. There is no provision within the settlement for non core activities, and it cannot subsidise such activities from its customer charges.

12.5. A great deal of local anxiety relates to uncertainty over Scottish Water's long term ability to maintaining the integrity and condition of Milngavie Reservoirs as a heritage landscape. This is particularly so as the emphasis is in fulfilling Scottish Water's obligations to supply and treat water rather than 'estate management'. Landscape maintenance works are, therefore, not intensive but relate to essential operational and safety issues. This could be addressed by the following actions:

(i) commitment from Scottish Water should be sought for the removal of redundant insensitive developments following decommissioning, e.g. security fencing, and Chlorination Building;

(ii) this Conservation and Recreation Management Plan has been prepared in fulfilment of a Katrine Water Project planning condition. Henceforth, Scottish Water's commitment towards the delivery of the plan is required through its involvement and participation in the future management structure and associated actions to establish this structure;

(iii) fulfilment of KWP Planning Conditions: the numerous planning conditions relating to the KWP require both protection measures and remedial work for any damage caused during the construction period. The effectiveness and quality of remedial work will require careful consideration by East Dunbartonshire Council and Scottish Water, e.g. the reconstruction of masonry features will require to be undertaken in accordance with conservation practice and it would be desirable for metalwork to achieve precise restoration rather than simple steel facsimiles.

Establishment of New Management Structure

12.6. The establishment of a new management structure should ideally be completed before the completion of the Katrine Water Project. This will allow the decommissioning process and subsequent transitions to be overseen. It will also provide a framework for pursuing funding from individual 'partners' and from outside funding sources such as the Heritage Lottery Fund. The latter will require the management structure to be robust, reliable and capable of project delivery without financial risks. It is essential, therefore, that early discussions between the stakeholders be held to establish the most effective management structure for the future and to determine partnership funding arrangements.

Feasibility Studies

12.7. The Conservation and Recreation Management Plan has identified the need for detailed feasibility studies and survey work to inform the development options. The key requirements in this regard are as follows:

(i) visitor survey: the existing visitor survey information is inadequate to inform development proposals. Ideally, a more comprehensive survey should be undertaken which determines more precisely the numbers of visitors to the Reservoirs, but also the types of visitors, duration of visit, means of access, activities undertaken, their views on the site and their requirements/aspirations for new facilities and landscape improvements. This should address all seasons;

(ii) old water works feasibility study: access to the old water works and survey information has not been possible within this project. Assessment of development options must be based on a detailed survey and appraisal of the buildings including a 'heritage assessment' which determines how future developments could most effectively protect the historic fabric of the buildings; increase understanding of their historic function. The architectural potential of the modern buildings should also be examined, i.e. to see how these could be modified to better complement the historic buildings and serve new uses;

(iii) Barrachan feasibility study: dependent on the agreed disposal strategy for the Barrachan complex, it may require feasibility studies to determine whether the buildings and associated landscape could serve public uses. Alternatively, it should be a requirement of any private sale or lease agreement for the developers to demonstrate how the Barrachan complex will be sensitively developed, how vehicular access will be achieved and public access managed in the future.

Early Action Physical Works

12.8. The ability of Scottish Water or the new management organisation to improve site maintenance and to address the recommendations set out earlier for each compartment will largely depend on the availability of additional resources (financial and staff) and Scottish Water's position in respect of action 12.4(1) will be critical. There may, however, be some potential to extend the maintenance operations or to redeploy resources in a way that addresses neglected issues which are becoming problematic. Key priorities must be maintenance works which safeguard masonry structures and metalwork including:

(i) the removal of self-seeded vegetation from walls, revetments, weirs and stone-lined channels. Left unchecked, vegetation growth could cause significant preventable damage which will be difficult and expensive to rectify. Early action is, therefore, essential;

(ii) the repair of damage to walls, concentrating first on sections close to public access routes where it might otherwise be easily exacerbated and where repairs would have maximum visual impact;

(iii) strategic plan for metalwork repairs and refurbishment. Metalwork refurbishment requires specialist attention which if not possible as a single capital programme, should be tackled progressively in stages. First priority must be metalwork structures, which fulfil a safety function, followed by the reinstatement of lost metalwork features including gates, cast iron gate posts and metal fences;

(iv) salvage original cast iron fence posts and components of gate pillars, etc. and retain for repair and reinstatement.

12.9. Early actions relating to soft landscape elements should equally be focused on preserving the health of existing trees and shrubs. Firstly, by:

(i) tree surgery to remove damaged limbs and deadwood which if unchecked could result in disease or endanger pedestrians;

(ii) removing invasive plants initially where they are encroaching and damaging the health of mature specimens (trees and shrubs);

(iii) pro-active removal of dead trees before they fall and cause damage to adjacent structures, vegetation or the public.

FUND RAISING

12.10. Implementation of the proposals contained in Chapter 9 will require substantial funds. The possibility of increased revenue funding from Scottish Water remains uncertain and in this context it is appropriate to examine alternative funding mechanisms. Funding applications can take significant periods of time and, therefore, it would be prudent to commence applications soon in order to confirm or otherwise the availability of external funding. The brief identifies the Heritage Lottery Fund as a proposed target for a major grant application. The HLF represents an appropriate potential funder capable of providing substantial grant support, providing the subject meets their criteria. The HLF application process is described below.

HLF APPLICATION

12.11. Submission of the Milngavie Reservoirs Project for Heritage Lottery Funding grant support would require compliance with the HLF Public Parks Initiative guidelines to applications. For this project value, a two-stage application would be required. The first stage would determine whether the project is eligible for HLF support. This study should form part of the supporting information.

12.12. Following approval of the Stage 1 Application, the project should advance to a more detailed stage of design as the basis for a 'Stage 2 Application'. This should reach Stage 'E' of the RIBA standard Fee Stages (equivalent to 55% fee stage for the project). This should include statutory consents and incorporate a detailed cost assessment of the project sufficient to give surety to HLF that the budgets and associated grant requirements are realistic and sufficient.

12.13. Compliance with the HLF Stage 2 Application requirements would require expenditure on professional fees to reach design stage 'E'. It would be advisable, therefore, if the Stage 1 Application included for 'Development Funding' towards the professional fees.

12.14. The timescale for the HLF Application Process is likely to be of the following order:

- HLF Assessment of Stage 1 Application following lodgement: 6 months
- Stage 2 Application Design Development and application preparation: 6 months (12 months allowed)
- HLF Assessment of Stage 2 Application following lodgement: 4 months
- HLF Contract Agreement: 1 month
- Detailed Design and Tendering: 4 months
- Project Implementation: 24 months

12.15. The above timescale determines that it would take at least 21 months before the HLF funded programme of works could start following lodgement of the Stage 1 application. Prior to that, partnership funding would have to be agreed in principle, i.e. confirmation that Scottish Water, East Dunbartonshire Council, Scottish Natural Heritage, Historic Scotland, Forestry Commission, etc. could contribute to the project.

12.16. The total application timescale would potentially fit well with the KWP completion date, i.e. the HLF grant might be secured in time for decommissioning which would allow the full programme of works to be undertaken. In the interim period, additional survey work/feasibility studies could be undertaken, the new management structure established and early physical work commenced.

Alternative Funding Applications

12.17. If the Heritage Lottery Fund application is unsuccessful, then alternative means of securing funds will be required. These will potentially involve the partner organisations with specific opportunities for support from the woodland grant scheme and potentially from Historic Scotland. East Dunbartonshire Council reports that their resources are very limited and, therefore, Scottish Water would logically be a key partner in any funding applications. The funds allocated to the visitor car park may be eligible for use as 'partnership funding'.

12.18. If HLF support is not obtained (or not pursued) then the proposals may have to be modified and phased to met reduced budgets spent over a longer period dependent on the levels of partnership support. In this scenario the conservation and development works should be undertaken in a prioritised manner.

CONSULTATION PROCESS

The public consultation process in relation to the Milngavie Reservoirs Conservation and Recreation Management Plan (MRCARP) commenced in 2003 prior to commissioning of this plan. Initially, the MRCARP steering group was formed to assist and guide Scottish Water in the development of the plan. The steering group was formed from representatives of local interest groups, the local authority, Scottish Natural Heritage and Historic Scotland. Local interest groups represented include:

- Milngavie Community Council;
- Friends of Milngavie Reservoirs;
- Strathblane Community Council;
- Baldernock Community Council;
- Mugdock Association;
- Tannoch Loch Company Ltd.
- Milngavie Civic Trust;
- Bearsden & Milngavie Ramblers;
- Go Bike;
- Mugdock Country Park.

Prior to commissioning the MRCARP, the steering group held workshop meetings to define guiding principles and objectives for the plan. These were translated into the brief for the plan as issued to consultants for competitive tender.

Following the study commission, regular steering group meetings were held throughout the study period, i.e. between March 2005 and July 2006. In all, 14 steering group meetings and two steering group site walkrounds were held during this period. Meetings were held monthly between March 2005 and March 2006 followed by later meetings after the public consultation process at draft reporting stage. Steering group meetings were generally held in the evenings (average 7.00pm – 9.30pm) and steering group members gave their free time representing a significant contribution in kind to the project.

The diversity of interests represented by the steering group determined that steering group meetings formed the main mechanism for public consultation during the study. However, additional consultation and information gathering was undertaken through correspondence, e-mail, telephone conversations and meetings with a variety of organisations and individuals including:

- Scottish Water KWP;
- East Dunbartonshire Council – various services;
- Garden History Society;
- local recreation providers;
- Strathclyde Passenger Transport;
- Scottish Canoe Association;
- SportsScotland.

MINUTE OF AGREEMENT

between

THE EAST DUNBARTONSHIRE COUNCIL, constituted under the Local Government etc (Scotland) Act 1994 and having its Principal Office at Tom Johnston House, Civic Way, Kirkintilloch G66 4JT (hereinafter together with its successors referred to as "**the Council**")

and

SCOTTISH WATER, established under the Water Industry (Scotland) Act 2002 and having its Headquarters at Castle House, 6 Castle Drive, Dunfermline KY11 8GG (hereinafter together with its successors referred to as "SW")

In this Agreement the following expressions shall unless the context otherwise requires have the following meanings:

"the Act"	means the Town and Country Planning (Scotland) Act 1997;
"the Application"	means the application for planning permission, under the Council's reference TP/ED/02/1137, made by SW for the Development;
"the Development"	means the construction of water treatment works etc. at the Site more particularly described in the Application;
"Material Operation"	has the meaning given by section 27(4) of the Act;
"the Permission"	means planning permission, subject to the conditions set out in the report to the 25 February 2003 meeting of a Special Planning Board of the Council, for the Development; and
"the Site"	land at Barrachan, Milngavie (North of Craigmaddie Reservoir and the existing Milngavie Treatment Works) and at Bankell Farm, Milngavie (East of the Craigmaddie Reservoir and the A81 Strathblane Road) shown outlined in red on the drawing No. 202043/0002 submitted with the Application.

In the interpretation of this Agreement unless the context otherwise requires or admits:

Words importing one gender shall be considered as importing any other gender.

Words importing the singular shall be considered as importing the plural and *vice versa*.

Any reference to any directive, statute or statutory provision shall include any directive, statute, or statutory provision which amends or replaces or has amended or replaced it and shall include any subordinate legislation made under any directive or statute.

WHEREAS:

1. The Council is the planning authority for the local government area of East Dunbartonshire in terms of Section 1 of the Act.

2. The Application has been lodged with the Council.

3. The Council as planning authority aforesaid, being satisfied that the Development is such as may be approved by it under the Act, has resolved to grant the Permission for the Development subject *inter alia* to the prior completion of an agreement regarding the matters set out in the following clauses of this Agreement.

NOW THEREFORE the Council, in exercise of the powers conferred on it by section 69 of the Local Government (Scotland) Act 1973 and of all other powers enabling it in that behalf, and SW **HAVE AGREED AND DO HEREBY AGREE** as follows:

(FIRST) This Agreement shall not come into effect and be enforceable until the Permission is issued and a Material Operation has been carried out to commence development in implementation of the Permission.

(SECOND) Construction work shall not commence until details of the lorry movements and transport routes to be used to the Site during the construction phase of the Development have been agreed by the Council as planning authority and as roads authority in consultation with Stirling Council as roads authority. SW shall contractually oblige all contractors and require those contractors to oblige any sub-contractors to comply with the agreed lorry movements and transport routes.

(THIRD) SW shall consult with the Council, as planning authority and as roads authority for the aftermentioned roads, regarding the works (including the road traffic management and the road works) specified in this Clause. Thereafter SW (as agents of the Council as roads authority where appropriate) shall within one month, or such longer period agreed by the Council, of undertaking a Material Operation to commence development in implementation of the Permission:

(a) implement, or procure implementation of, a scheme (incorporating widespread publicity and signage) approved by the Council of enhancement of the Drumclog Muir car park to enable temporary access improvements for access to the Milngavie Reservoirs paths;

(b) facilitate implementation of measures approved by the Council as roads authority to control the existing parking arrangements on Strathblane Road and Mugdock Road; and

(c) implement, or procure implementation of, a scheme (incorporating widespread publicity and signage) approved by the Council of road safety arrangements and traffic calming on Mugdock Road, Strathblane Road and Craigmaddie Road.

all to the reasonable satisfaction of the Council as such authorities. The Council shall be responsible for promoting, making, granting, obtaining etc. (as the case may be) all necessary consents, approvals, agreements, orders, permissions etc. (and without prejudice to the forgoing any necessary statutory consents etc. under the Roads (Scotland) Act 1984 and the Road Traffic Regulation Act 1984) to allow those works to be undertaken by, or on behalf of, SW.

(FOURTH) Prior to the completion of commissioning of the water treatment works at the Site SW shall use best endeavours if implementation of any obligation or requirement specified in this Clause depends on the actions of others (including the Council) or otherwise shall:

(a) prepare and complete, or procure the preparation and completion of, a Milngavie Reservoirs Recreation and Conservation Plan in consultation with the

Council as planning authority and other interested persons including interested organisations such as local community councils;

(b) undertake, or procure the undertaking of, a consultation process, including consultation with the Council, to identify a preferred location for the provision and maintenance by SW of a new, safe, all ability access car park with an appropriate number of car and multiple passenger vehicle parking spaces to meet anticipated parking demands and designed and constructed to the standards of the relevant roads authority and, if deemed necessary by the Council, a direct access path from that car park to the top of the Milngavie Reservoirs embankment, and thereafter complete and open to the public, or procure the completion and opening to the public of, that new car park and, if necessary, the said access path with appropriate signage arrangements to the satisfaction of the Council as planning authority in consultation with the Council as roads authority;

(c) form and complete, or procure the formation and completion of, footpath and cycle path connections from the Site to link into the established footpath networks and cycle routes at Drumclog Muir/ Mugdock Country Park, the right of way at Bankell Farm and the footpath network at Esporta Leisure Complex in accordance with any necessary agreements with relevant landowners and subject to and in accordance with any required regulatory approval;

(d) submit a detailed proposal to upgrade the access to the footpath network at Drumclog Muir for approval by the Council as planning authority and thereafter implement the proposal approved by the Council;

(e) submit to the Council as planning authority for approval details of appropriate on-Site and off-Site interpretation facilities of the Milngavie Reservoirs as a visitor destination and for on-Site public toilet facilities (including a scheme of maintenance for the public toilet facilities); thereafter provide, or procure provision of, these facilities within three months of the completion of commissioning of the water treatment works in accordance with the approved details and thereafter maintain those facilities in accordance with approved details; and

(f) submit to the Council for approval a detailed description of services similar to those services currently provided by the Mugdock Country Park Ranger service

which are be to be provided at the Milngavie Reservoirs and which conform generally with the aims set out in paragraph 4.5 of the "Rangers in Scotland: SNH Policy Statement (1997)"; and thereafter provide, or procure, the provision of the approved services in accordance with the approved details or amended details approved by the Council.

(FIFTH) If the Council becomes aware of any breach of any provision of this Agreement, it shall give written notice to SW specifying the breach in question and requiring that breach to be remedied within a reasonable period specified in that notice. SW shall intimate whether there is any dispute regarding the alleged breach and if there is no dispute SW shall notify the Council when that breach has been remedied. If any breach is not remedied timeously, the Council may enforce the provisions of this Agreement by any competent action. The Council and SW hereby agree that Stirling Council may enforce any breach of Clause (SECOND) of this Agreement that occurs within the local government area of Stirling in terms of section 1 of the Act.

(SIXTH) Any notice or document to be served on any person pursuant to the terms of this Agreement shall be in writing and shall be sufficiently served upon that person if left at, or posted by Recorded Delivery post to, the address of that person.

(SEVENTH) The Council and SW hereby agree to review this Agreement not later than the completion of the commissioning of the water treatment works. Without prejudice to that agreement the terms of this Agreement may by consent of the parties be reviewed and, if agreed, varied in writing. That consent shall not be unreasonably withheld.

(EIGHTH) If the Permission is revoked, quashed, or in any way falls, this Agreement shall cease to have effect and be deemed *pro non scripto* and the Council shall within twenty one days of this Agreement ceasing to have effect grant and deliver to SW a Discharge of this Agreement capable of being registered for preservation.

(NINTH) The Council shall if requested grant a full or partial Discharge of the provisions of this Agreement capable of being registered for preservation on being satisfied that the relevant obligations or requirements hereunder have been fully or partially implemented as the case may be.

(TENTH) Any dispute or difference arising between the parties concerning the construction or implementation of this Agreement shall failing agreement be referred to the decision of the sole Arbiter to be appointed jointly between them or in default of agreement by an Arbiter appointed by the Sheriff of North Strathclyde at Dumbarton: the decision of such Arbiter shall be final and binding on all parties hereto in questions of fact but the Arbiter or the parties shall have the power to refer any matter to the Court in accordance with the Administration of Justice (Scotland) Act 1972.

(ELEVENTH) The Council and SW hereby consent to registration of this Agreement for preservation.

(TWELFTH) This Agreement is governed by the Law of Scotland and the parties so far as not subject to the jurisdiction of the Scottish Courts hereby prorogate the jurisdiction of the Scottish Courts: **IN WITNESS WHEREOF** these presents consisting of this and the five preceding pages are executed as follows:- they are subscribed for and on behalf of Scottish Water by Jonathon Watson Hargreaves their Chief Executive and by Thomas James Bernard Axford their Corporate Secretary, at Dunfermline on Thirtieth July, Two thousand and three; and they are sealed with the Common Seal of The East Dunbartonshire Council and subscribed for and on its behalf by Diane Isabelle Campbell, Head of Legal & Administration and Proper Officer of the Council at Kirkintilloch on Twenty first August, Two thousand and three.

Diane Campbell

T.J.B Axford