SEPA and GCVGN Partnership

Ecological networks and River Basin Management Planning: Clyde Pilot Study

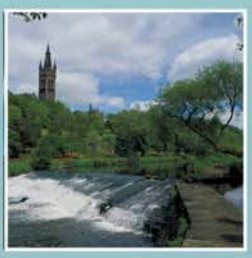
Project report

August 2010







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Executive Summary

This report describes the work undertaken by Entec for SEPA and the Glasgow Clyde Valley Green Network Partnership (GCVGNP) on the project "Ecological Networks and RBMP: Clyde Pilot Study". The project was initiated by SEPA and GCVGN to investigate opportunities for achieving multiple benefits through the River Basin Management Planning (RBMP) process. In particular, the project looks for opportunities to create or enhance areas of habitat and habitat connectivity, whilst also achieving improvements that contribute towards RBMP objectives (for example improvements in water quality or the physical structure of rivers). The approach described in this report offers an opportunity to support effective decision making, inform investment and achieve maximum environmental, social and economic benefits. This type of 'multiple benefits' approach is likely to become increasingly important as funding becomes scarcer.

The river basin management process focuses on the improvement of the water environment. Implementation of the WFD also provides opportunities to improve marginal habitats, particularly in the riparian zone and floodplains, and potentially also habitats in the wider catchment. A number of RBMP measures will result in the creation of new areas of habitat (e.g. during floodplain restoration, installation of buffer strips along rivers, or creation of wetlands for SuDS) and, if suitably located, therefore have the potential to contribute to the enhancement or expansion of ecological networks. Strengthening ecological networks also creates opportunities to make habitats more resilient to the impacts of climate change. In addition to these direct benefits, taking a larger view of the benefits that could be provided to the wider environment and to the community, including habitat creation and improvement, will make projects more widely appealing and beneficial. A combined approach can create new partnerships and open up dialogue between parties who had not previously worked together. This can result in benefits for example of pooled resources, realising multiple benefits, and improving value for money, and has the important effect of ensuring that people working in similar geographical areas are talking to each other and ensuring that individual projects become more joined up. Developing projects with multiple benefits has the potential to open up new areas of funding that may not have been available for projects of more restricted focus.

A screening methodology has been devised to identify areas with the opportunity to achieve multiple benefits in restoration and/or development. The methodology is designed to start at the broad scale and use GIS datasets and data processing to screen for potentially appropriate areas. By combining with other datasets that show areas already identified as being of interest for improvement or development, and increasingly using local knowledge to refine the options, the optimum areas to focus on for improvement can be identified. The methodology has been distilled in to five steps, with Step 1 involving the identification and collation of relevant data, and the remaining steps providing increasingly detailed levels of screening and filtering. The outputs of the screening process are:

- A shapefile showing areas where ecological networks coincide with waterbodies requiring improvement to their status under WFD (Step 2). This identifies where addressing pressures could enhance or expand habitat networks;

- A shapefile showing where those areas coincide with sites already proposed for development or improvement (Step 3). This provides a second level of screening to help cut down the number of options where a large area is being considered, and helps to ensure that the sites selected have a clear driver for restoration. If the study area is only small, it may not be necessary to include this second stage;

- Attributes in the shapefiles relating to waterbody classification and habitat type enable further filtering of sites where necessary (for example focusing on sites that need to be addressed by 2015). This allows a degree of ranking, to allow prioritisation of projects delivering greater gain, with a higher degree of confidence (this is Step 4).

For the Clyde pilot study, maps showing the outputs of each processing step have been produced for each local authority area.

Getting from the point of having a completed GIS layer to having a sensible number of sites with the potential to progress requires the input of local knowledge, which is critical for identifying realistic sites. The approach used in this pilot study illustrates a successful approach to gathering local expert knowledge for a large study area. Depending on the size of area being considered, the party undertaking the study may have enough knowledge internally, or it may be beneficial to hold a workshop to allow input from other local experts (this stage of incorporating local knowledge is referred to as Step 5).

The pilot study area considered in this project is the Clyde Valley. The project has taken advantage of the local knowledge of the Clyde Area Advisory Group and other local experts, and covers the areal extent of the Integrated Habitat Network (IHN) model developed by Forest Research in 2008, which was used in the study. The screening and filtering process for the Clyde pilot area resulted in a large number of potential sites being identified, as a result of the size of the area, the amount of data, and the number of failing waterbodies. To refine the process and provide local input to the site selection, a workshop was held in December 2009, at which participants were invited to suggest sites they thought may be of relevance. These sites were compared to the screening results, and a number of the sites that were highlighted in the screening were given further consideration. The sites were at very different stages of development. Sites including Lochwinnoch RSPB reserve, Pollokshaws urban regeneration area, and the rural Auchlochan Forestry Commission acquisition are already under development. They represent the diversity of the type of benefits that can be achieved, and are excellent examples of where multiple benefits are already being achieved for the water environment and wider ecological networks. For some of the other sites that were suggested, no work is currently being undertaken but there is a recognised potential for improvement. Particular consideration has been given to the Glazert Water in the Kelvin catchment as a case study. There are a number of interested parties and considerable potential for improvement and restoration of parts of the watercourse. Initial suggestions have been made as to the scope of work that could be carried out on the Glazert and the collaborations that should be developed to ensure that all interested parties benefit from improvement works.

A number of recommendations have been made to encourage and assist with taking forward the outputs of the project in the Clyde Valley, and to guide on appropriate application of the methodology to other parts of Scotland. Flexibility in the methodology is encouraged when applying the methodology elsewhere, to allow local priorities (in terms of pressures on waterbodies, or the types of habitats that are of interest) to be taken in to account.

Contents

1. Introduction

1.1 Purpose of this Report

This report describes the work undertaken by Entec for SEPA and the Glasgow Clyde Valley Green Network Partnership (GCVGNP) on "Ecological Networks and River Basin Management Planning (RBMP): Clyde Pilot Study". The project was funded by SEPA and GCVGNP, to investigate opportunities for increasing the benefits that can be achieved through the River Basin Management Planning (RBMP) process. In particular, the project looks for opportunities to create or enhance areas of habitat, where these will increase habitat connectivity and also achieve improvements that contribute towards RBMP objectives (for example improvements to water quality or the physical structure of rivers). Improvements to habitat connectivity are seen as a key mechanism for reversing the effects of fragmentation on biodiversity, improving landscape resilience, and helping species adapt to climate change. The project was initiated to investigate the recognised areas of overlap in RBMP measures and habitat creation works, and the potential for improved collaboration and funding opportunities that could result from combined opportunities.

1.2 Background

1.2.1 The Water Framework Directive and River Basin Management Planning in Scotland

The Water Framework Directive (European Directive 2000/60/EC) is a substantial European directive that is changing the way the water environment is managed across Europe, and has resulted in significant changes to water regulation in Scotland. The Water Framework Directive (WFD) requires the improvement of the ecological quality of waterbodies, with the aim of all waterbodies reaching "Good Ecological Status" by 2015 (although in some cases, due to the cost or technical feasibility, it has been agreed that Good Status must be achieved by the later dates of either 2021 or 2027.)

The achievement of Good Ecological Status is defined by ecological targets, but is also affected by impacts on (for example) flows and morphology. The ecological status of all waterbodies in Scotland has been classified, and is identified in the River Basin Management Plan (RBMP) for the Scotland River Basin District (Scottish Government, December 2009) and RBMP for Solway-Tweed River Basin District (Scottish Government and the Environment Agency, 2009). In cases where Good Ecological Status is not being achieved, the causes of failure (pressures) have been identified. Types of pressures include water abstractions, point source discharges, diffuse pollution, morphological alterations, and flow regulation. Where waterbodies are failing to meet their objective status, 'measures' have been identified to bring the waterbodies towards their objective. These have been identified in the RBMP, although in many cases the details of measures are still being identified. Wherever possible, measures have been assigned to responsible parties, but many waterbodies are affected by historic impacts for

which no-one has clear responsibility. For example this can include the gradual deterioration of a river catchment due to urbanisation and building of structures or flood defences historically that are now not considered an acceptable way of managing the water environment. In these cases SEPA and the Scottish Government has had to consider other methods of funding improvements to water body status, and a Restoration Fund has been set up specifically for this purpose.

Area Advisory Groups (AAG) for each sub-basin district are inputting to, and helping with the implementation of, the RBMPs on a local level, and their involvement in deriving, funding and supporting measures is important both for achieving WFD requirements and providing multi-disciplinary benefits.

1.2.2 Ecological Networks

Ecological networks refer to features or habitats that allow the dispersal of flora and fauna across a geographical area. They may be in the form of contiguous habitats ('corridors') or intermittent non-contiguous patches of habitat ('stepping stones'). Both types essentially provide dispersal opportunities and link up isolated areas. By providing ecological connectivity, the isolation of habitats and species is reduced and the areas of viable habitat suitable for a range of species can be vastly increased. Increasing ecological connectivity prevents flora and fauna becoming trapped in the event that an isolated area of suitable habitat begins to deteriorate, which could occur for example as a result of climate change or by habitat degradation due to increasing levels of anthropogenic disturbance. Ecological networks play a vital role in allowing wildlife to be more flexible and resilient to the demands and impacts of intensive land use, changes in land use practices, development and climate change.

1.2.3 Combining river basin management planning and ecological networks

The river basin management planning process puts in place a statutory plan for environmental improvements that provides an opportunity for delivery of functional ecological networks at the catchment scale. The RBMP process focuses on water dependent habitats and species, which provides an opportunity to address fragmentation of habitats (e.g. by reconnecting rivers with their floodplain), offering opportunities to reduce flood risk, and contributing to the delivery of WFD good ecological status, whilst also benefiting riparian and wetland biodiversity. The WFD also provides opportunities to improve areas of habitat in the wider catchment, particularly in the management of diffuse pollution. Some examples of potentially relevant measures identified in river basin management plans to improve the status of water bodies are included in Table 1.1.

Table 1.1 Examples of ecological network improvements that could be effected through RBMP

RBMP measure	Benefit to habitats and habitat connectivity
Improvement of modified riparian habitat to reduce morphological pressures	Enhancement and expansion of areas of wetland habitat
Change from hard flood defences to provision of floodplain storage to reduce morphological pressures	Creation of new wetland habitats
Addressing urban diffuse pollution and flood risk through SuDS	Creation of habitat networks within urban areas
Addressing rural diffuse pollution through creation of buffer strips along watercourses	Reduces disturbance of riparian habitats. Potential creation of new wetland or woodland habitat.

The examples in Table 1.1 show that there are clear areas of overlap, where measures implemented to improve waterbody status can also enhance or develop ecological networks. However the wider range of benefits that could be achieved through taking a combined approach should also be considered. Due to the time pressures and huge challenge presented by the implementation of the Water Framework Directive, cases could potentially occur where measures will be implemented with the sole aim of achieving the Objectives, even if wider benefits (in particular those that would be perceived by the wider local community) are not readily recognisable. Taking a larger view of the benefits that could be provided to the wider environment and to the community, including habitat creation and improvement, will make projects more widely appealing and beneficial.

A combined approach can create new partnerships and open up dialogue between parties who had not previously worked together. This can result in benefits for example of pooled resources, realising multiple benefits, and improving value for money, and has the important effect of ensuring that people working in similar geographical areas are talking to each other and ensuring that individual projects become more 'joined up'. This is key to effective catchment management. It also helps to ensure that benefits provided by projects carried out by one party are not overridden later by other larger schemes, when a coordinated approach could have provided benefits for both from the start. Developing projects with multiple benefits has the potential to open up new areas of funding that may not have been available for projects of more restricted focus.

1.3 The Clyde Valley Pilot Study

The Clyde advisory group area forms a sub-basin within the Scotland River Basin district, and has its own Area Management Plan, which is supplementary to the RBMP for the Scotland river basin district (SEPA, March 2010). The Clyde advisory group area includes the Clyde Valley and Ayrshire, although this study is focused only on the Clyde Valley itself. The Clyde Valley benefits from being covered by an Integrated Habitat Network (IHN), which was developed by Forest Research for the Glasgow Clyde Valley Green Network Partnership in 2008.

The IHN provides a decision support tool that can be used to identify areas of habitat that are ecological connected. It covers the Clyde Valley and includes separate networks of woodland, grassland and wetland habitats. The IHN was developed in Forest Research's 'BEETLE' model (Biological and Environmental Evaluation Tools for

Landscape Ecology. Watts *et al*., 2005). The model takes in to account the dispersal abilities and habitat requirements of a number of selected species, with different species relevant to each habitat[1]. Two different network extents were modelled from the existing habitat extent, based on 500m and 2km dispersal distances.

This project is a pilot study for the Clyde valley area, taking advantage of the local knowledge of the Area Advisory Group (AAG) and other local experts, and covering the areal extent of the IHN. The project aims to identify and develop relevant case studies in the Clyde valley, but also to develop a framework that can be used elsewhere in Scotland. The purposes of the project can therefore be defined as:

- To develop a methodology for identifying areas of benefit for both RBMP and ecological network enhancement;
- To apply the methodology to the Clyde Valley;
- With the input of local experts, to identify three case studies from the screening that illustrate the achievement of multiple benefits including, but not limited to, RBMP and ecological networks; and
- To disseminate the results of the project in a manner that will allow application of the method in other parts of Scotland, and continued use of the results in the Clyde Valley.

1.4 Report Structure

The rest of this report describes the methodology adopted, its application and recommendations arising, as follows:

- The recommended methodology is discussed (in general terms) in Section 2;
- The application of the methodology to the Clyde Valley is described in Section 3;
- Section 4 describes a number of case studies for the Clyde Valley. Some of these are projects that are already being carried out and show the benefits of the proposed approach, while others are new projects being proposed as a result of this study; and
- Section 5 provides a summary and recommendations. The recommendations cover both taking forward the outcomes of the project in the Clyde area, and the potential for application of the methodology to other areas.

There are a number of appendices to the report, which detail the workshops, methods, and data used in the project. In addition, an accompanying GIS database and spreadsheet tools have been created, to allow querying of the datasets and assist with selection of sites in the future.

[1] It is worth noting that as only selected species are used, the network extent is most relevant to those species and may not comprehensively model all possible linkages.

2. Recommended Methodology

An outline methodology and guidance was produced by SEPA in 2008, and it was proposed that these be used as the basis of this project. The outline methodology has evolved during the project, as the data availability and potential for data processing have been subjected to increased scrutiny (as determined by application to the Clyde Valley pilot study). In particular it was recognised that the application of the methodology is dependent on both the data available, and the desired outcome. Hence, it is important to realise that the methodology should be adapted to take account of the available data as well as the relevant issues in a particular study area, rather than being treated as a strict set of processing steps.

The methodology that is described below should be taken as a framework basis for application elsewhere: it is not expected that it will (or indeed should) be followed to the letter. The methodology has been developed using the Clyde as an example, but this section describes the general approach (not specific to a location) that, as a result of the Clyde pilot, is recommended for application elsewhere. The specifics of the methods as applied to the Clyde are presented in Section 3 and Appendix A.

2.1 Outline Methodology

A staged methodology has been derived that includes the steps outlined in Figures 2.1 and 2.2 and summarised below:

1. *Data collation*. Determine which types of RBMP measures (and hence which pressures) are relevant to habitat creation, taking account of particular interests in the study area. Examples are provided in Section 2.2. Use this to select the relevant combinations of datasets to use in the later screening;

2. *Habitat screening*: using GIS, identify areas where habitat networks and areas of pressures overlap;

3. *Opportunity areas screening*: where necessary (depending on the size of the study area and types of data that are being used), further screen data using appropriate 'opportunity areas' data (as described in Section 2.2). If only a small area or restricted amount of data are being used, this step may not be necessary (i.e. the number of potential sites may already have been cut down sufficiently);

4. *Filtering*: create a filtering framework taking account of relevant information about the waterbodies, IHNs and development/improvement opportunities. This allows prioritisation of potential sites without losing the information about the whole range of sites identified at Step 2. Again, this step may not be necessary for small areas or small amounts of data. This step could be carried out without Step 3 in some cases, for example to refine the waterbodies that are being considered (such as focusing on those that need to reach Good status by 2015) or the types of morphological pressures to be addressed;

5. *Adding local knowledge*: from the filtered selection, ensure that the options derived through steps 1 to 4 can realistically be applied on the ground, using local knowledge and taking account of funding opportunities.

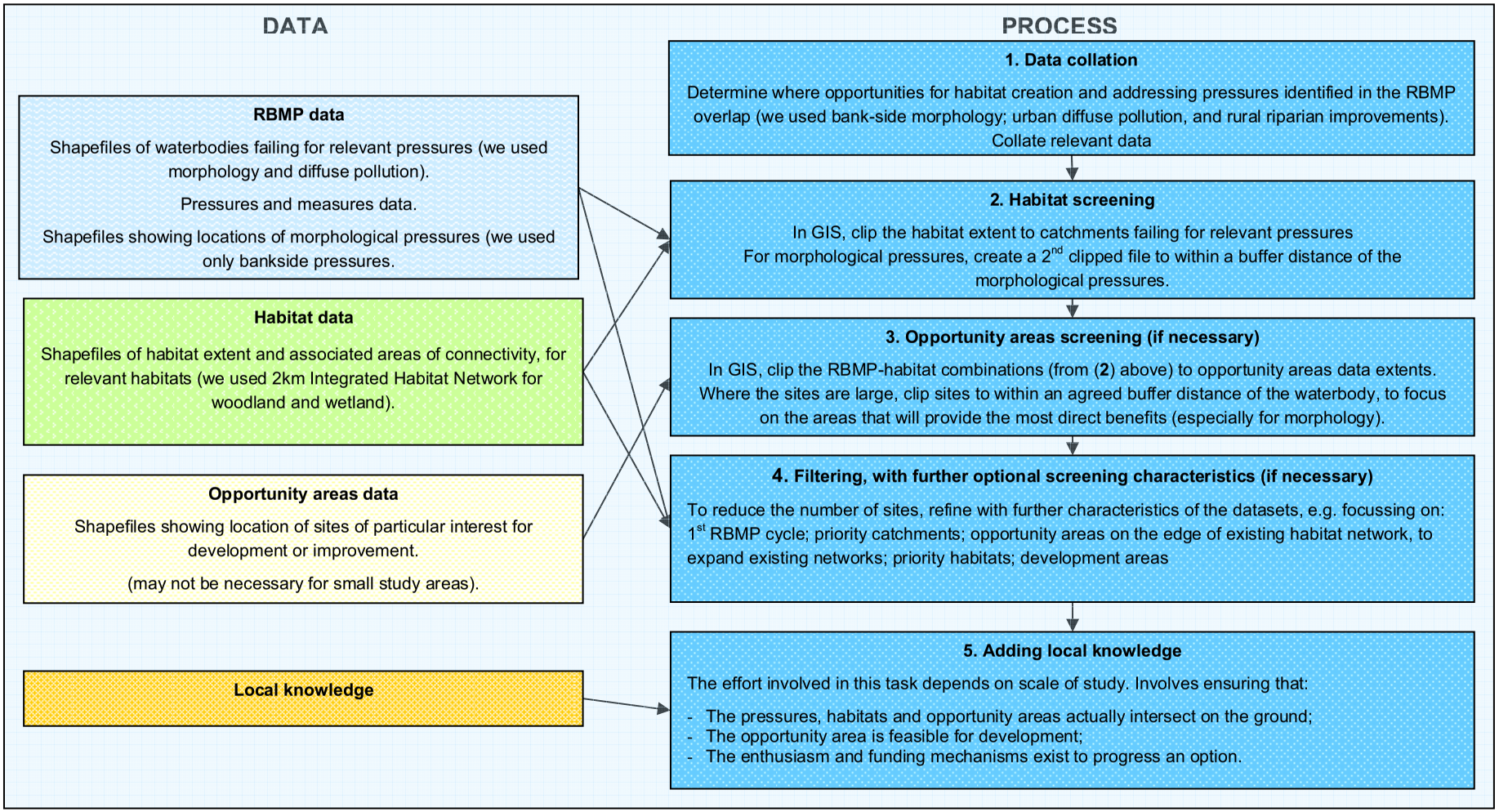
The sections below and the example of the Clyde in Section 3 should be referred to for more detail on the steps involved in applying the method. However it is important to recognise how the details of the methodology may vary depending on priorities, data availability and the extent of the study area. For example:

- The method could be applied specifically to prioritise opportunities for (for example) the Forestry Commission to create new areas of habitat that will also help with morphological pressures, or for local authorities to ensure that new SuDS schemes 'fit' in to habitat networks. In these cases, the data requirements will be much more specific and the screening simpler;

- The types of pressures could vary between areas or depending on the particular interests of those undertaking the study. Although at the outset of the Clyde project it was envisioned that diffuse pollution and morphology pressures would be the most relevant, in some situations other pressures such as point source pollution (e.g. Combined Sewer Overflows, mining and landfill) and Invasive non-native species could also be relevant;

- The types of habitat of interest could vary according to local biodiversity priorities. The habitat considerations can be as broad or specialised as desired, providing the necessary datasets exist.

Figure 2.1 Outline methodology



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2.2 Step 1: Data Collation

2.2.1 Data Screening

Determining which data and combinations of data are relevant, and hence need to be collated, requires some consideration of scope. A summary of the types of data, and the considerations within each type, is included in Table 2.1. The three general categories of data include RBMP data, habitat data and 'Opportunity Areas' data. Examples of the latter type are shown in Table 2.2. The Opportunity Areas category has been included to provide an extra level of screening and prioritisation. However depending on the focus and scale of the study, it may not be appropriate or necessary to use them.

Table 2.1 Suggestions for data to be included

Type of data	Examples of datasets	Considerations
Required data		
RBMP spatial data	Waterbody locations Catchment boundaries Locations of morphological pressures (engineering structures and riparian vegetation databases) Locations of point-source pressures (as relevant, e.g. Combined Sewer Overflows, old landfills)	While pressures such as diffuse pollution may only be identifiable on the water body scale, morphological and other point-source pressures can be identified specifically from SEPA's databases.
Other RBMP data	Waterbody current classification and objective statuses	Include data for all RBMP cycles to allow prioritisation of selected areas
	Pressures and measures assigned to waterbodies	Consider what types of pressures are relevant to the study, depending on: whether they are related to habitat; mechanisms of implementation; scale By avoiding relying on existing/ identified measures, this method can help to identify *new* measures.
Spatial habitat data	Integrated Habitat Network (IHN), or other ecological network extents Other habitat data, e.g. SEPA wetland inventory, NVC and Phase 1 data, SNH woodland inventories	Where an IHN has been developed, this can be used directly. Where there is no IHN, a network extent needs to be estimated by collating existing habitat data and applying a standard buffer

Table 2.1 (continued) Suggestions for data to be included

Type of data	Examples of datasets	Considerations
Optional data		
Spatial 'opportunity areas' data	These are only examples, and represent the types of data collated for the Clyde project. The types of 'opportunity areas' that are relevant will depend on the focus of the study. Further examples can be found in Table 2.2.	
Additional RBMP and hydrological management data (some of which is currently in development)	Additional RBMP-related information may be useful once it becomes available, such as: - Flood risk management measures - Priority catchment locations, and work on prioritisation within those catchments - Use of additional morphological tools such as the outputs of WFD94 - Further classification of areas of rural diffuse pollution control Morphological ratings data, which identifies the percentage contribution of a morphological pressure to the overall waterbody hydromorphological status, are also useful	

Table 2.2 Examples of 'Opportunity Areas' data types

Potentially relevant datasets	Discussion
Planning allocation sites/areas, e.g. Community Growth Areas, or known areas of Vacant and Derelict land	Identifies development sites where improvements to RBMP and habitats could be incorporated
Local nature designations such as Sites of Importance for Nature Conservation (SINCs)	While statutory designated sites may also be relevant, local sites may benefit the most through being identified in this process because there are fewer drivers and funding sources for improvement. Highlighting a site through this method may help to progress works that would not otherwise have been undertaken. National and international drivers already exist with respect to SSSIs and other statutory designated sites so this may not be so necessary
SWT and RSPB reserves	Similar to the locally designated sites above, highlighting these types of sites may assist with obtaining funding for habitat improvement works
Former mining and waste sites	Both types of sites require restoration after use. Consideration of surrounding habitat networks, and any pressures on waterbodies, may help to develop a long-term sustainable restoration strategy

Once all datasets have been collated, they need to be combined to contain the relevant information within a limited number of shapefiles and/or geodatabases. Ideally, there should be a single file for each data type:

- The relevant waterbody types should be combined in to a single layer for ease of processing, linked to their classification, objectives, pressures and measures data. This may require converting river line files in to very narrow polygons, to allow them to be combined with lochs[2];

- If IHN data are available, it should be possible to use the habitat data directly. If there are no IHN data, all habitat data will need to be combined in to a single layer, and a standard width buffer applied, to approximate the network extent. This does not provide the benefits of the IHN in terms of considering the 'penetration' ability[3] of the surrounding area, but allows a best approximation with the available data;

- All opportunity areas data should be combined in to a single layer. Depending on the datasets used, it is possible that there will be overlapping data, in which case a single non-overlapping layer needs to be derived for data processing. Information should be retained to allow the original overlapping sites to be re-identified (this is described further in Appendix B).

This step can be considered a first level of 'screening', as data types that are not considered relevant can be excluded before the GIS processing begins.

2.2.2 Determine Relevant Data Combinations

All the relevant RBMP, habitat and opportunity areas data will have been collated, but do not necessarily need to be used all at the same time. The links between the data types, and the particular concerns in the area, need to be considered. Some measures will only be applicable to certain types of Opportunity Areas. For example, addressing diffuse pollution pressures in urban areas is likely to be most feasibly addressed through introducing SuDS to new developments, and hence the other types of opportunity areas could be excluded if that was the case. Multiple screenings may be necessary, using the appropriate combinations of dataset, to create a number of outputs.

2.3 Step 2: Habitat Screening

For each identified data combination, the following steps should be taken in GIS:

- For each pressure, use GIS to identify the IHN extent coinciding with failing waterbodies. This will give a number of combinations of habitat type and pressure. A new shapefile should be created with the extents of the relevant habitat networks. This could be clipped to a buffer distance from the river, to further limit the selection, depending on the expected distance of influence;

[2] Note that SEPA hold a polgon file of the river network so it may be possible to use this directly.

[3] The IHN develops networks based on a set maximum connectivity (e.g. 500m), but varies the distance across which connectivity can occur depending on the characteristics of the intervening areas (the 'penetration ability'). This is undertaken in the Beetle model developed by Forest Research. See Forest Research (2008) for more details.

- For morphological pressures, constrain the IHN extents further to identify only those that coincide with (or are within a buffer distance of) engineering structures or particular riparian land-uses. This more refined approach could also be applied to other pressures such as the catchment areas of Combined Sewer Overflows.

This is illustrated in Figure 2.2. The outputs of this step will be one or more shapefiles showing the extent of habitat networks that could be expanded or enhanced in conjunction with contributing improvement to the condition of a river or loch. In some cases it may be appropriate to have more than one output shapefile, to reflect the different combinations of habitat type and type of pressure.

2.4 Step 3: Opportunity Areas Screening

In GIS, determine where the outputs of Step 2 coincide with the 'opportunity areas' shapefile, as shown in Figure 2.2. Where there are a large number of options, this enables greater focus on areas where there are also other drivers for work to be undertaken (for example areas of regeneration). This could be undertaken in two ways:

- 'Clip', using the GIS, the outputs of Step 2, i.e. to show where the relevant habitats also coincide with opportunity areas;
- Select (rather than clip) the opportunity areas dataset that overlaps with the outputs of Step 2.

Although this may appear to be a subtle difference, in the latter case it means that the whole of the opportunity area would be identified rather than only a portion. This may be easier to interpret from a planning perspective.

The step of clipping to opportunity areas is optional, and may not be necessary depending on the scale being considered. For example, if a project is looking at a single catchment (e.g. a Priority Catchment (or a sub-catchment to this) where catchment-wide measures are proposed) and identifying the location of morphological pressures within it, the first level of screening may be enough to identify sites of interest. Where Step 2 produces only a few sites, the second level of screening may be possible informally based on local knowledge, rather than requiring GIS processing (i.e. skipping directly to Step 5).

2.5 Step 4: Filtering

By incorporating all of the relevant information in the attribute table of the shapefiles from Step 2 and 3, further filtering can be carried out. This stage is referred to as 'filtering' rather than 'screening', because at the screening stages large areas that are considered irrelevant are completely excluded from the assessment. In contrast, the 'filtering' stage assists with the prioritisation of sites but it is recommended that all information for other sites should be retained: i.e. this is more of a ranking process.

The filtering can either be carried out in GIS, or by exporting the attribute table to excel. A combination of the two may be more convenient: experience suggests it is easier to consider the filtering criteria in excel (since the filtering

function in excel can quickly show for each attribute how much shorter the list of options becomes), but ultimately the selections need to be finalised in GIS to determine their spatial extent.

As discussed above, depending on the size of the area being considered, extra levels of refinement may not be required. However if a large area is being considered, e.g. a whole AAG area, the initial levels of screening are likely to still retain a large number of options, which will require further prioritisation. This step will also help to prioritise the locations of greatest interest and/or potential. The types of criteria that may be of interest for further filtering include:

- Waterbody data: for example, which RBMP cycle each waterbody needs to be addressed by; whether there are also other pressures in the catchment that could be addressed in combination; priority catchments and information on prioritisation work carried out by SEPA within the priority catchments;
- Habitat data: for example, using a smaller buffer on the network extents to ensure they are more robust (i.e. not leaving such large gaps between habitats for species to pass between), or focusing around the edge of networks to allow expansion;
- Opportunity areas: to allow different types of opportunity areas to be prioritised according to which organisation is interested in the data, for example development sites as opposed to wildlife sites.

2.6 Step 5: Adding Local Knowledge

Up until this stage automated processes in GIS have been used. As a result, it is important to include this step of incorporating local knowledge, to ensure that the outcome from the automated process makes sense on the ground. Depending on the size of the area being considered, this step could potentially be significant in scale, requiring consideration of a number of potential sites before a site can actually be selected and progressed for restoration. Employing local knowledge is an important part of the overall approach and could include the following:

- For large study areas, there may still be a relatively large number of sites, even after Step 4, and discussions with local experts may be necessary to identify sites with the strongest drivers for improvement. This could be carried out informally, or where there are a number of stakeholders covering the area, through a workshop. For smaller study areas, the persons carrying out the process may be well enough acquainted with the area to do this themselves;
- Even after sites have been identified, more detailed assessments of maps, aerial photographs and a site visit should be carried out. This is necessary to ensure that the locations of pressures and habitat networks do indeed coincide (or can be brought together) on the ground. As a result of the scale of the GIS mapping, and errors in spatial datasets, it is likely that in some cases the identified benefits will not actually coincide on the ground.

3. Application of Process to the Clyde

This section describes the application of the process to the Clyde. Discussion is included of each step of the screening and filtering, and Appendix A can be referred to for more detail of the exact steps of GIS processing carried out. The purpose of the work described in this section was a. to assist with development and illustration of the methodology, and b. to identify areas of opportunity in the Clyde that could be taken forward for restoration projects.

3.1 Information-Gathering Workshop

A workshop was held at Glasgow Concert Hall on 3rd December 2009, with a range of stakeholders based in the Clyde valley. The purpose of the workshop was to guide the screening process, and to allow stakeholders to suggest potentially suitable locations for case studies.

The workshop was attended by 36 people, including the steering group. A range of suggestions were made regarding the screening process, and a total of 37 sites were suggested in which the stakeholders had an interest. Further information about the workshop, including information on the potential sites, is presented in Appendix B.

3.2 Step 1: Data Screening

All datasets collated during the project are identified in Appendix C.

Due to the size of the study area, collation of data was a time-consuming process involving a considerable number of stakeholders. Each local authority had to be contacted separately, as well as discussions with SEPA, SNH, GCVGNP and other conservation organisations. Additionally, unfortunately, not all datasets available were complete. The data are discussed in more detail below.

3.2.1 RBMP Data

Only baseline waterbodies were considered. Although this meant that many smaller waterbodies (e.g. streams and small lochs) were not included, this was because they do not have objectives in the RBMP. All baseline waterbodies in the Clyde catchment, including those feeding in to the Clyde estuary, were included.

Only rivers and lochs were included in the study. These were considered to be the most relevant in relation to the types of habitats that the IHN covers. Coastal habitats were not included in the IHN and so transitional and coastal waterbodies were excluded from the assessment (however indirect benefits may occur to transitional waterbodies following restoration actions, for example due to water quality improvements upstream). Groundwater also was not included as it was felt that the relevant measures were most likely to be related to regulatory mechanisms of less relevance to the project. Although benefits to surface waterbodies and habitats could occur as a result of

groundwater improvements (most obviously to Groundwater Dependent Terrestrial Ecosystems), these are dealt with directly in the classification of groundwater bodies.

The measures to address certain pressures were more applicable to this study than others. The two main considerations in deciding which pressures were relevant were:

- Is removing the pressure likely to be relevant to the improvement of ecological networks?
- Can a measure be implemented by a mechanism that can realistically be used as part of this project? Measures that are addressed primarily through regulatory mechanisms (such as abstractions and point source discharges) may be less applicable, and the existing mechanisms are adequate. Measures involving development and land use management are the primary interest of the project.

Table 3.1 provides a summary of the pressures likely to be relevant to the project. It should be noted that this only refers to the pressures in terms of being given primary consideration: clearly programmes of work that address multiple pressures would be of particular interest.

Table 3.1 Pressures that were included in the Clyde pilot study

Pressure	Included in Clyde pilot study?	Reasoning for inclusion/non-inclusion in the Clyde pilot	Recommendation for future application
Abstraction	No	Addressed through regulation. In most cases, unlikely to be relevant to terrestrial ecological networks	Both abstraction and flow regulation are relevant to the consideration of overall hydro-morphology (e.g. ensuring there is sufficient flow to drive morphological processes in restored river reaches). Therefore it may be appropriate to consider these as an integral part of a morphological assessment.
Flow regulation	No	Addressed through regulation. In most cases, unlikely to be relevant to terrestrial ecological networks	
Morphology	Yes	Improvements in channel and riparian morphology and habitat are the most obvious link to ecological networks	
Diffuse pollution	Yes	Many diffuse pollution pressures are on a catchment-scale and will be beyond the scope of this project (e.g. catchment-scale farming measures). However some cases may be relevant, e.g. urban runoff or cattle grazing on river banks	
Point source pollution	No	Assessed through regulation. Most measures were considered unlikely to be relevant to terrestrial ecological networks.	Experience through the project showed areas of crossover in whether urban drainage pressures are classified as diffuse or point-source pollution. Pressures classified as point-source including CSOs, mining and landfill could be relevant in future but this was not realised until later on, and they were not included in the screening,
Invasive Non-Native Species	No	Only aquatic INNS have been included in the first-cycle RBMP assessments. No water bodies currently fail for INNS in Clyde pilot area.	It is recognised that as INNS mapping improves, particularly for riparian species, this could be incorporated in the next RBMP cycle as more water bodies are identified.

The calculation of morphological pressure for the RBMP takes account of twelve types of morphological alterations, all of which have been mapped for every baseline waterbody and were available in GIS. Not all of these are directly relevant to addressing terrestrial ecological networks. Table 3.2 specifies the types of morphological alterations, and identifies which were included in the screening. In addition to the morphology database, the riparian vegetation database was also considered: however without site-specific knowledge it was considered difficult to apply this to the screening and it was not included in the process at this time.

Table 3.2 Classification of morphological alterations

Type of morphological alterations*	Morphology database descriptor	Relevance	Used in screening?
1. Set-back embankments	Set_Bank_Embankments	Removal of embankment and creation of alternative flood storage provides good habitat creation opportunities	Y
2. Embankments	Embankments_Bank_Reinforcement Embankments_No_Reinforcement	Removal of embankment and creation of alternative flood storage provides good habitat creation opportunities	Y
3. Riparian vegetation changes or clearance	(separate database)	Restoration of riparian vegetation provides opportunities to expand IHNs. Clearly relevant, but not used due to practical difficulties with incorporating in to screening	N
4. Green bank revetment	Green_Bank_Reinforcement	Use of green bank reinforcement ties in to marginal and terrestrial habitats	Y
5. Other bank revetment	Grey_Bank_Reinforcement Pipe_Box_Culverts	Conversion to green bank would tie in to marginal and terrestrial habitats	Y
6. Sediment removal (<50% of channel)	Dredging Sediment_Removal	Does not directly affect terrestrial habitats (depending on disposal method)	N
7. Sediment removal (>50% of channel)	Dredging Sediment_Removal	Does not directly affect terrestrial habitats (depending on disposal method)	N
8. Artificial bed material	Bed_Reinforcements	Does not directly affect terrestrial habitats	N
9. Flow deflectors	Flow_Deflectors Boatslips	Does not directly affect terrestrial habitats	N
10. Major flow deflectors	Flow_Deflectors	Does not directly affect terrestrial habitats	N
11. Impoundment	Impoundment	Does not directly affect terrestrial habitats	N
12. Resectioning	High_Impact_Realignment Low_Impact_Realignment	Re-creation of meandering channel includes good opportunities for creation of new habitats	Y
Other	Bridges, Causeways, Fords, Intakes_Outfalls, Jetties_Platforms_Marinas, Flood_Bypass_Channels	In-channel or across-channel structures of little relevance to terrestrial habitat creation	N

* Morphology types as defined by Scottish Government, www.scotland.gov.uk/Publications/2007/10/02104453/5.

3.2.2 Habitat/ ecological networks data

For the Clyde Valley it was possible to use the outputs of the Integrated Habitat Networks (IHN) project (Forest Research, 2008). The IHN data are separated in to grassland, woodland and wetland habitat types, and each of these 'generalist' types is also sub-divided in to 'specialist' habitats. For the first phase of screening, only the basic habitat types were considered. At the filtering stage (Step 4, Section 3.5), the type of specialist habitat was included as an additional filtering criterion. Information on each habitat type is included in Table 3.3.

Table 3.3 Integrated Habitat Network categories

IHN type	Discussion
Woodland	This is the most reliable dataset, and is extremely extensive. Includes riparian and other wet woodland (although not distinguished explicitly from non-wet woodland). For filtering, natural and semi-natural broadleaved woodland were highlighted for priority.
Grassland	Understood from discussion with Forest Research (Mike Smith pers comm.) to be an incomplete dataset and of relatively little relevance to this study (assuming wet grassland would be covered in the wetland network). This dataset was not used. However it is understood that the IHN for the Clyde has been updated during the time that this project has been in progress, and it is expected that the grassland dataset should now be more complete
Wetland	Dataset includes peat wetlands and mineral wetlands. However the inclusion of open water in the mineral wetland IHN made it difficult to apply to the project as it did not allow the areas of focus to be reduced significantly through screening. Discussion with Forest Research revealed that they had identified this as a concern, and a "less wet" wetland dataset was subsequently received from FR with the main areas of open water removed.

Other habitat and site data were also collated, to ensure that all areas of existing habitat were covered and for use in the Opportunity Areas database. The datasets are all listed in Appendix B and are discussed further in the 'Opportunity Areas' section where relevant.

3.2.3 Opportunity Areas data

The datasets included as Opportunity Areas in the Clyde assessment are presented in Table 3.4.

Table 3.4 Opportunity Areas Data

Datasets used for Clyde Pilot	Source of data
Community Growth Areas	GCVGN, 2008
Areas of vacant and derelict land	GCVGN, 2008
Sites of Importance for Nature Conservation (SINCs)	Local councils, 2009 (see details of individual datasets in Appendix B)
Local Nature Reserves	SNH, downloaded from sitelink 2009
Country Parks	SNH, downloaded from sitelink 2009
RSPB and SWT nature reserves	RSPB and SWT

In the data collated for the Clyde valley, it was discovered that there were many overlaps in opportunity area data, both between types of data and between different local authorities' datasets. This made the data processing and identification of potential sites difficult. As a result, for the Clyde, all opportunity areas datasets were processed in to a single non-overlapping dataset, which identified in the attribute table which/how many datasets had overlapped at each location, and allowed the screening and filtering process to be undertaken more effectively. However it did also have the effect of losing some of the boundaries of individual Opportunity Areas. This resulted in some limitations for some types of screening, e.g. for urban drainage opportunities, it was not possible to fully distinguish the more relevant development opportunities from other opportunity areas such as SINCs.

3.2.4 Determine Relevant Pressures and Opportunities

Based on the data available, and the likely opportunities for creating areas of habitat while addressing measures, the following types of pressure were used in the screening process for the Clyde pilot:

Screening 1. Morphology (at specific structure locations)

In removing engineering structures or addressing channel realignment, new areas of bankside habitat can be created. Only addressing certain types of morphological pressures will be relevant to creating or enhancing areas of habitat, so only a sub-set of the morphology database was used in the assessment (these mainly include pressures on the banks rather than riverbed, as discussed in Section 3.2.2). The number of options this created was reduced by also considering the Opportunity Areas (i.e. areas already of interest for improvement or development) in relevant locations.

Screening 2. Diffuse pollution (associated with urban development)

Where urban development has been identified as an activity resulting in diffuse pollution in a catchment, the use of SuDS will help to reduce this pressure in future. Incorporating SuDS and new areas of habitat will contribute to this aim. Areas proposed for development, or vacant sites within urban areas, are potentially suitable locations for introducing SuDS. This screening included habitat networks and opportunity areas within entire waterbody

catchments, since no further information was available on the extent of sources of diffuse pollution (however it could be reasonably reliably assumed that all urban areas were relevant)[4].

Screening 3. Rural riparian pressures (diffuse pollution and morphology)

In rural areas, the improvement of riparian habitat can provide multiple benefits for both morphological and diffuse pollution pressures. However these mostly relate to agricultural land, and there is little spatial data available that will clearly indicate 'opportunity areas'[5]. In order to identify potential areas, waterbodies with identified measures to improve riparian/modified habitat were focused on. As for Screening 2, these were catchment-scale measures.

3.3 Step 2: Habitat Screening

For each of the relevant pressures discussed above, failing waterbodies were intersected with the extent of the 2km IHN (wetland and woodland). This resulted in six combinations:

- Morphology: separate shapefiles for woodland and wetland;
- Urban diffuse pollution: separate shapefiles for woodland and wetland;
- Rural diffuse pollution: separate shapefiles for woodland and wetland.

For the diffuse pollution pressures, habitat networks through the whole extent of failing waterbodies were identified. The areas selected in the morphology screening are more focused, as it was possible to use the exact locations of pressures (such as embankments) from SEPA's morphology database.

The extent of these screened areas is shown for each local authority in Figures 3.1 to 3.8. These show the maximum extent of areas that potentially have the opportunity to provide combined benefits. Clearly there are a large number of potential areas across the Clyde Valley, and using these maps alone it may be difficult to proactively identify sites to progress. However it is hoped that these maps will be useful in the future, as development opportunities arise, to compare to this stage of the screening and identify whether there are opportunities for incorporating additional benefits.

[4] Late in the project it was noted that Combined Sewer Overflows (CSOs) are included as point source pollution rather than diffuse, but that using the catchment areas of CSOs may be a solution to refining the areas of focus. This information was not used for the Clyde, but could be applied elsewhere.

[5] More detailed information is becoming available for priority catchments. As there are no priority catchments within the study area, this information has not been used in this particular study, but could be incorporated elsewhere.

3.4 Step 3: Opportunity Areas Screening

In order to provide further screening for the identification of suitable case studies, the Opportunity Areas data were also used, so that sites with an existing interest in development or improvement could be focused on. The habitat areas identified at Step 2 were intersected with the consolidated Opportunity Areas dataset, creating more refined versions of the six datasets listed above. These are shown in the lighter shades in Figures 3.9 to 3.15.

It is anticipated that the maps produced at this Step will be useful in the near term, and can be used to identify sites that should be taken up for restoration work. However in the longer term, as the sites presenting 'opportunities' change, it will be more appropriate to retain and use the Step 2 screening, but reconsider the extent of opportunity areas as necessary.

3.5 Step 4: Filtering

Steps 2 and 3 allowed ALL of the potentially relevant areas in the Clyde Valley to be identified. However, as discussed above, this still left a large number of possibilities, and so in order for sites to be selected for restoration, further criteria needed to be included to prioritise sites.

Table 3.5 shows the additional criteria that were added the attribute tables of the shapefiles created at Steps 2 and 3. These related to the waterbody information and the type of habitat and associated network. Further data regarding Opportunity Areas should also, ideally, have been included, but this was difficult to achieve due to the data processing that was necessary with the Opportunity Areas. Combining the areas in to a single non-overlapping dataset resulted in some loss of information and made it difficult to present in the attribute table (although some information was retained, it did not necessarily relate to exactly the same extent as the original Opportunity Area).

Table 3.5 Clyde filtering options

Filter	Description	Used for final mapping (as in figures 3.9 to 3.15)
Site area	Due to the processing method, including creating unique opportunity areas and separating between catchments, some very small areas are identified. A basic screening removes unfeasibly small sites (e.g. less than 100 m^2)	Only sites > 100 m^2 used
HMWB	Identifies whether or not the waterbody is classified as Heavily Modified	No
Catchment location	This is an approximation of stream order. SEPA's 'nested catchment' dataset was used to identify the number of overlapping catchments on each waterbody. A higher number indicates the site is further up the catchment (closer to the headwaters). This is particularly useful for diffuse pollution, to identify the extent of downstream area that could benefit from an improvement to water quality	For the diffuse pollution screening, only used waterbodies with more than 2 other waterbodies downstream (so that benefit is realised over a greater length of river)

Table 3.5(continued) Clyde filtering options

Filter	Description	Used for final mapping (as in figures 3.9 to 3.15)
Performance against objective status for each RBMP cycle	'Y' or 'N' for each cycle identifies whether the interim and final objectives are being met. This helps prioritise quick wins or identification of long-term objectives	Used waterbodies that require improvement by 2015
Pressures	Identifies whether each pressure is present in the catchment. Due to the screening this step should not be necessary, but was included as a check (due to the method of data processing, some areas may have been left in that were not technically relevant)	Included as a quality check
Measures	The methodology aims to avoid relying on pre-identified measures where possible. However these columns identify whether measure(s) associated with a particular pressure have been identified, without specifying the measures	No
Morphological pressures	Identifies the specific morphological pressures, by structure ID	Used for morphology screening
Morphological rating	The percentage morphological impact. This shows the extent of improvement that is required to achieve Good Status. Could identify where small projects could result in large gains.	No
Priority catchment	Identifies whether the catchment as been identified as a priority catchment, and in which cycle	No
Floodplain	Identifies whether the site lies within SEPA's identified floodplain. A distinction is made between sites wholly and partly within the floodplain.	No
Specialised IHN	Identifies the specialised habitat type (as opposed to the generalised one used for the initial screening)	For woodland, the broadleaved woodland categories were used for focus, being areas most likely to provide diverse habitat
500m IHN	Identifies whether the site lies within the 500m IHN as well as the 2km one. A distinction is made between sites wholly and partly within the 500m IHN	Only sites at least partly within the 500m IHN were included, to ensure a robust network was being developed
2km IHN	Identifies whether the site is wholly or partly within the 2km IHN	No
Opportunity areas	Identifies the types of opportunity area making up the site extent	No
Workshop site	Identifies whether the screened site coincides with a site identified in the stakeholder workshop as being potentially of interest	No, but used in Step 5

All of the filtering criteria discussed in Table 3.5 were included in the attribute table of the screened shapefiles (from Step 3), and were also exported in to an excel spreadsheet for ease of consideration. An example of the spreadsheet is provided in Appendix D. Although the filtering ultimately has to be carried out using the 'selection' tool in GIS, filtering in a spreadsheet is simpler when deciding which criteria to use, and helps to show how much a particular criterion can cut the number of options down.

Through discussion with the project steering group, the criteria were agreed to cut down the number of potential sites. The criteria that were used are included in the right-hand column of Table 3.5. The final selection of filtered

sites is shown in Figure 3.9 to 3.15, in darker colours overlying the Step 3 screening, to show how the options have been further refined. These maps and associated spreadsheets can be used to identify the optimum areas for restoration through the first RBMP cycle.

3.6 Step 5: Adding Local Knowledge - Reality Check

The maps in Figures 3.1 to 3.15 show that the potential areas of focus were cut down considerably by Steps 2 to 4. However due to the large area covered, it was necessary to incorporate a greater level of local knowledge to establish which sites were actually feasible for progressing, and would have the stakeholder interest and impetus to progress. It is hoped that by creating the maps at the local authority level, individual authorities will be able to identify opportunities in their own area.

For the purposes of this project, and to identify opportunities for SEPA to progress, areas that had been highlighted through the screening were compared to the sites suggested at the workshop in December 2009 (referred to as the 'workshop sites'). This allowed the local knowledge and areas of interest of the workshop participants to be capitalised on. A shapefile with the location of all workshop sites was created, and all sites that coincided with the Step 3 screening were selected. This ensured that local knowledge was being used in the site selection, but also that the sites selected were actually relevant and had been picked up in the screening anyway.

Figure 3.16 shows the location of all the workshop sites, with those that intersect with the Step 3 screening highlighted. The people who had suggested the highlighted workshop sites were all contacted with a questionnaire in February 2010, to obtain more information about the site. The questionnaire sought to identify:

- Whether the site location was shown correctly in the mapping (due to the scale of the maps used at the workshop, in some cases the location when transferred in to GIS was not accurate);
- A brief description of the site and its relationship/interaction with the nearby river or loch;
- Details of all stakeholders involved with the site;
- Description of current site management and aspirations for its future use and management;
- Information regarding any existing initiatives or funding sources that the site is eligible for.

In addition to this, maps and aerial photography of each site location, as well as the type of development/site in each case, were considered to determine whether work would be likely to contribute significantly to the desired aims.

Eleven responses were received. The responses to the questionnaires, and subsequent conversations regarding each site, are detailed in Appendix E. In consultation with the steering group, a number of sites were selected for further consideration. These are discussed in Section 4.

4. Case Studies

This section describes case studies where the multiple benefits that have been described through this report are being, or could be, realised. The sites discussed here were identified through the screening and filtering process discussed in Section 3, including the suggestions of participants in the December 2009 workshop.

The original intention of the project was to identify sites and scope restoration proposals at a number of locations. However once the project started it became clear this would not possible to the extent initially envisaged, largely due to time restrictions. As a compromise, sites were selected from the outputs of Chapter 3 (i.e. through a combination of the GIS screening and the workshop), to illustrate the range of situations where this approach could be relevant and beneficial. Some of the sites have projects already underway (Pollokshaws, Lochwinnoch and Auchlochan), which provide excellent examples of the benefits that can be realised. Other sites are locations where stakeholders could see the potential, but no work has yet been undertaken (Capelrig Rd SINC and the Glazert Water). In the latter cases, initial suggestions have been made regarding the potential for improvement works in these areas. Each of these sites is discussed individually below, including identification of where the project has been able to feed in to or influence the case study.

Three of the case studies were presented at the dissemination seminar in May 2010 (the Glazert Water, Pollokshaws and Lochwinnoch). During the workshops and during Step 5, valuable conversations were held with a number of other people who had participated in the workshop in December. All of these communications are summarised in Appendix E, and two sites for which fairly extensive discussions have been held are also discussed below (Capelrig Road SINC and Auchlochan).

4.1 Emerging Ideas: Glazert Water

Background

The Glazert Water, shown in Figure 4.1, is a tributary of the River Kelvin. Information about the Glazert is summarised in Table 4.1. It has its source in the Campsie Fells, and flows through Lennoxtown and Milton of Campsie to reach the Kelvin near Kirkintilloch. The Glazert Water is designated as a Heavily Modified Water Body (HMWB) due to urbanisation. There are flood defences along much of the lower river, including relatively new defences associated with developments in Lennoxtown, and a number of reaches have been realigned.

The IHN shows habitat networks in and around the river corridor, but often these are fragmented by only short distances and connectivity could potentially be improved by only small areas of habitat creation. Wildlife designations include Glazert Wood LNCS (on the banks of the Glazert in Lennoxtown), South Braes SSSI (to the south of the river upstream of Lennoxtown, including fen habitats), and designation of the whole river as a Salmonid fishery.

Table 4.1 Glazert Water site information

Waterbodies	Pressures	Habitats	Opportunity Areas	Stakeholders/ interested parties
Glazert Water Current status: Moderate Ecological Potential[6] Target status: Good Ecological Potential by 2027	Morphology (realignment, embankments and flood defences) HMWB Point source pollution	Woodland Wetland (although not in immediate vicinity of the river)	East Dunbartonshire LNCSs East Dunbartonshire Important Wildlife Corridors Some areas of vacant and derelict land	EDC (Gillian Telfer) Clyde River Foundation (Willie Yeomans) Campsie Fells Angling Association and Wild Trout Trust (Paul Gaskell)

Site selection

Gillian Telfer of East Dunbartonshire Council suggested the river as an area of interest due to her belief that the river is an underused and poorly understood resource. The suggestion encompassed the whole of the Glazert Water, not being specific to a particular reach, which recognises the designation of the river by the Council as an Important Wildlife Corridor.

The river was then picked up in the screening due to the extensive channel modifications included in SEPA's morphology database. These cover the majority of the river from upstream of Lennoxtown to the confluence with the Kelvin. As shown in Figure 4.1, these coincide with intermittent areas of woodland network. In this type of situation, there is clear potential for the extent of riparian woodland and other wetland habitat to be enhanced along the river corridor, in conjunction with reducing the morphological pressures. For example, reversing the extensive realignment in some reaches would enhance the floodplain and allow new areas of wetland habitat to develop.

This site presented a relatively open book with regards to opportunities for restoration, with little work having been undertaken so far, but a number of parties known to have an interest in improving the river. It is with this in mind that initial steps to take forward a restoration plan for the river have been developed here. The rest of section 4.1 presents information collated on the Glazert Water during the project, and resulting ideas for taking forward the site.

Site interests

In relation to the water environment and habitat management, there are a number of relevant previous or existing programmes of work in the catchment, including:

[6] 'Ecological Potential' is used rather than 'Ecological Status' where a waterbody is classified as Heavily Modified.

- A programme of water quality improvement through the closure of Sewage Treatment Works in the Kelvin catchment, including the Glazert (at Kirkintilloch in 1998 and Milton of Campsie in 2000)[7];
- Flood defence works to protect new developments in Lennoxtown from flooding;
- Forestry Commission land acquisition in the Campsie Fells, with associate programme of works. This includes some areas of coniferous forestry but also wider areas of improvement of existing habitat;
- The Clyde River Foundation has mapped the availability of salmonid habitat across the Kelvin, and considers the Glazert to be one of the few reaches with any potential for salmon spawning (Willie Yeomans, Clyde River Foundation, pers. comm.);
- The Campsie Angling Association and Wild Trout Trust have put forward proposals to East Dunbartonshire Council to install local in-stream habitat improvement measures upstream of Lennoxtown (Gaskell, 2010).

Proposed scope of work

As the target status of the Glazert is for Good status to be reached by 2027, the river did not meet all the criteria imposed in Step 4 of the screening (since the initial focus is on sites requiring improvement by 2015). However it will take considerable time to effect improvements in the status in an extensively modified river such as this, and starting earlier will allow a sustainable approach, with more interested parties, to evolve.

The Heavily Modified status of the Glazert indicates that many of the morphological pressures cannot be expected to be removed, because they provide flood defence for urbanisation. As this is expected to be mainly focused around Lennoxtown and Milton of Campsie, the reaches likely to be more suitable for restoration are the more rural stretches. For example, the reaches upstream of Lennoxtown coincide with the area that the Campsie Anglers are interested in improving for trout habitat. A larger-scale approach to habitat creation could potentially be taken, involving restoration of areas of floodplain (e.g. by setting back flood defences), allowing the river more space to move and creating natural in-river habitat niches as well as new riparian habitat.

However before any progress can be made, a walkover survey by a geomorphologist needs to be undertaken, followed by engagement with relevant landowners to establish which reaches have potential for improvement. Based on the subsequent assessment of the possible scope of work, an integrated approach should be developed that encompasses all interests in the river, including:

- Changes in land use (and hence the extent of habitat networks), for example as a result of Forestry Commission works in the Campsie Fells;

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[7] Information sourced from SEPA website in May 2010,

www.sepa.org.uk/science_and_research/data_and_reports/water/idoc.ashx?docid=9305e658-2e9b-432c-831e-07fabaff082a&version=-1 kelvin water quality improvement

- Local angling interests along with wider-scale fishing requirements, particularly considering the Glazert as an integral part of the Kelvin's salmon habitat extent;
- Contributing towards East Dunbartonshire's LBAP targets;
- Access to riverbanks for the local community; and
- Maintaining a sustainable approach to flood risk management.

Considering all interests on the river is critical to ensuring that benefits continue to be realised in the longer term, and that projects undertaken in the near future do not end up being overturned in a few years time by larger schemes. If a co-ordinated approach can be successfully developed, this location provides excellent opportunities for long-term improvements to habitats, the water environment, and community resources.

4.2 Pollokshaws Redevelopment

Background

The Pollokshaws regeneration area is located to the east of Pollok Country Park in Glasgow. The site location is shown in Figure 4.2, and characteristics of the area are summarised in Table 4.2. It is an extensive regeneration programme that will involve the demolition and redesign of the majority of the area. There is a significant focus on water management and SuDS in the scheme, which is being developed by Collective Architecture and AECOM. The site is adjacent to the White Cart Water in a reach that will receive enhanced flood protection from the ongoing White Cart Flood Prevention scheme.

Table 4.2 Pollokshaws site information

Waterbodies	Pressures	Habitats	Opportunity Areas	Stakeholders/ interested parties
White Cart Water Current: Poor EP Target: Moderate by 2015, Good by 2027	Morphology (embankments) Water quality (identified as point source pollution from CSOs)	Woodland	Community Growth Area	GCVGN (Ally Corbett) GCC (Geoff Foord) Collective Architecture AECOM

Site Selection

The area was suggested by Geoff Foord at Glasgow City Council and Ally Corbett at GCVGNP due to its prominence as a large-scale example of water management in Glasgow, the potential to introduce habitats and

habitat/green network in to an urban area, and the introduction of sustainable measures to improve the water quality of the adjacent waterbody.

This area is, in some respects, an example of an area where the screening did not draw full attention to the potentially available opportunities. The area was highlighted in the screening (see Figure 4.2) but this was due to the extensive morphological alterations. Due to its Heavily Modified status, and in fact the increase in modification associated with the ongoing White Cart Flood Prevention scheme, significant reductions in the morphological impacts will not be feasible on this waterbody. What will realistically make a far greater difference to the waterbody is an improvement to the water quality. However the water quality pressures are identified as point source, mainly associated with Combined Sewer Overflows, rather than diffuse pollution. As identified in Sections 2 and 3, this is a 'grey area' of overlap between point source and diffuse source, and as a result these pressures were not picked up in the Clyde screening. This is a good example of how the screening could be improved elsewhere.

This case study is used as an example of the benefits that can be provided to habitats, habitat connectivity, and the water environment in urban areas, based on a large-scale regeneration project that is already underway. The Pollokshaws project provides an illustration of how such benefits could be achieved elsewhere in other urban regeneration or smaller scale developments.

Work being undertaken

The main focuses of improvement for the area[8] are to:

- Create a new green corridor to allow pedestrian movement along the White Cart Water, between Pollok Country Park and the smaller Ainsley Park to the east;
- Reinforce the urban centre of Pollokshaws;
- Connect to the surrounding transport system and improve pedestrian permeability; and
- Reintroduce the urban grid and tenemental form.

Integral within this is the consideration of flood management. The Pollokshaws area lies largely within the floodplain of the White Cart Water, and is included within the extent of the White Cart Water Flood Prevention Scheme. The scheme has been developed over decades, in response to repeat flooding incidents in the area associated with the river. Development is underway of a catchment-management scheme involving a combination of upstream storage and urban defences. The urban defences will cover much of the river through Pollokshaws and will significantly reduce the areas at risk of flooding.

[8] Based on information from Collective Architecture, May 2010.

Although the extent of flood defences will be increased, the project aims to open up the course of the river as a green corridor. Currently there is little access to the riverbanks and views of the river are hidden. The regeneration scheme will introduce greener, open stretches and a new walkway along the length of the White Cart through the Pollokshaws area. A schematic of the proposed scheme is shown in Appendix F (Collective Architecture, 2010).

In order to ensure effective flood management, the disposal of rainfall on to the area also needs to be carefully managed. As a result, a Sustainable Drainage Strategy (SuDS) is an integral part of the Pollokshaws programme, and will assist with the management of flood flows feeding to the area's combined sewer overflows (CSOs). The management of the quantity and quality of flow through CSOs by SuDS will reduce the pressure from point and diffuse source pollution on the White Cart Water. The SuDS scheme will be incorporated in to the green corridor and adjoining areas of habitat, creating areas of wetland habitat. This project illustrates the potential for combining flood risk management and management of diffuse pollution, with creation of connected areas of green space and habitat.

4.3 Lochwinnoch RSPB Reserve

Background

Lochwinnoch RSPB reserve is located in the catchment of the Black Cart Water. The reserve includes parts of Castle Semple Loch and Barr Loch, as well as wetland areas in between the two lochs (in particular at Aird Meadow). Upstream baseline waterbodies include Dubbs Water, Roebank Burn and the River Calder, while the outflow from Castle Semple Loch at the downstream end is to the Black Cart Water.

As shown in Table 4.3, there are multiple pressures on the majority of the waterbodies, and in addition Dubbs Water, Roebank Burn and Barr Loch are all classified as Heavily Modified Waterbodies due to the extent and purpose of modification. Improvement is required to the status of Dubbs Water and Castle Semple Loch by 2021, and of Barr Loch and the Black Cart Water by 2027.

Barr Loch and upstream watercourses have been significantly impacted by historical management. According to SNH descriptions[9], the two lochs originally formed a single, larger loch (Loch Winnoch), which was separated in the 18th century by silt deposition from the River Calder. During the 19th Century, Barr Loch and Aird Meadow were bunded and drained for agricultural purposes. It is presumed that at that time, therefore, the Barr Loch ceased to exist during dry periods, but maintenance of drainage is understood to have declined in the middle of the 20th Century, at which time Barr Loch reverted back to a permanent presence. Drainage of the loch involved the diversion of the three tributaries feeding the loch (Dubbs Water, Roebank Burn and Millbank Burn). The

[9] SNH site management document for Castle Semple and Barr Lochs, accessed 16/6/10 at http://gateway.snh.gov.uk/pls/portal/Sitelink.Show_Site_Document?p_pa_code=346&p_Doc_Type_ID=3

diversions of the upstream watercourses take flow behind bunds along the banks of Barr Loch, and directly in to Castle Semple Loch. These diversions still exist today.

The IHN in Figure 4.3 indicates that wetland network extends around the edge of both of the lochs, and covers Aird Meadow, which is an important part of the RSPB reserve. In addition, the surrounding area has patches of woodland network extent. Castle Semple and Barr Lochs are classified together as a SSSI, which is designated for its breeding bird assemblage and for eutrophic lochs. The lochs are noted in the SSSI citation to support extensive aquatic and semi-aquatic plant communities, with wetland communities extending in to Aird Meadow. The SSSI is currently in unfavourable condition due to the presence of invasive species including *Elodea canadensis* (Canadian waterweed) and *Elodea nuttalli* (Nuttall's waterweed).

Table 4.3 Lochwinnoch site information

Waterbodies	Pressures	Habitats	Opportunity Areas	Stakeholders/ interested parties
Dubbs Water: Current: Poor EP. Objective: Good by 2021 **Roebank Burn**: Current: Good EP **Barr Loch:** Current: Moderate. Objective: Good by 2027 **Castle Semple Loch:** Current: Moderate. Objective: Good by 2021 **Black Cart Water:** Current: Bad EP. Objective: Moderate EP by 2021, Good EP by 2027	**Dubbs Water**: Morphology (embankments and realignment) **Roebank Burn:** point source pollution (mining and quarrying); flow regulation **Barr Loch**: Diffuse pollution (livestock farming) and morphology (embankments and realignment) **Castle Semple Loch**: diffuse pollution (livestock and mixed farming), point pollution (sewage disposal) **Black Cart Water**: diffuse pollution (livestock farming), abstraction (arable farming), point pollution (sewage disposal), flow regulation (water collection), morphology	Wetland Woodland	RSPB reserve	RSPB (Toby Wilson) SNH

Site Selection

This site was suggested at the December workshop by Toby Wilson, RSPB, with respect to a scheme currently being progressed by the RSPB (as described below). The scheme was suggested as being relevant due to its habitat creation focus, along with the removal of significant morphological pressures in support of the WFD.

The site coincided with the areas highlighted in the Step 3 screening (as shown in Figure 4.3), associated with the pressures on the relevant waterbodies and nearby wetland and woodland habitats. The presence of the RSPB reserve highlighted the area as potentially having opportunities to undertake improvement works.

This case study is used as an example of the types of restoration works that could be undertaken through the river basin management planning process, and how those could be tied in with habitat enhancement and the provision of recreation opportunities.

Works being undertaken

The RSPB has put forward proposals for restoration and habitat enhancement works in Lochwinnoch Reserve. This includes work both at the upstream end of Barr Loch, and in between Barr Loch and Castle Semple Loch (with the latter focused on Aird Meadow). A consultation document produced by RSPB can be found in Appendix G. This forms the basis of a scope of works that was successful in receiving £250,000 funding from the WREN[10] Biodiversity Action Fund in July 2010.

The RSPB's proposals will reconnect the upstream burns to Barr Loch. This should have the combined effect of improving the morphological condition of all waterbodies, as well as restoring the functioning of the loch itself. The design for the channel reconnections was scoped with funding from the Restoration Fund in 2009 (£15,000). The reconnections will be achieved by breaching the bunding (or removing structures in the bunding) around the loch, to recreate pathways for flow from upstream in to the loch.

The outflow from Barr Loch is in the northwest corner of the loch, feeding in to the diverted Millbank Burn channel. Both the Millbank Burn and Dubbs Water flow in to the River Calder to the north of the A760, which then flows in to Castle Semple Loch. All the channels are currently separated from Aird Meadow and Aird Meadow Loch by a bund. The second stream of work at Lochwinnoch is focused on Aird Meadow, and will include bringing a channel from the outflow of Barr Loch across the bund in to Aird Meadow. An introduced meander across Aird Meadow will distribute flow across the meadow, before flowing in to the Aird Meadow Loch. Overall, the proposed scheme has the potential to improve the morphological status of the Barr Loch, and make some contributions towards improving Dubbs Water. The scheme will also create and enhance wetland habitats. This is an excellent example of a project achieving multiple benefits for the water and wider environment.

4.4 Capelrig Road SINC, Newton Mearns

Capelrig Road SINC, shown in Figure 4.4, is located in Newton Mearns. Information relating to the site and catchment is presented in Table 4.4. It has the Auldhouse Burn running through it and was previously covered by dense woodland. According to reports from the council, this made it unappealing to visitors and the SINC was little used as a result. The dense woodland has recently been removed and, on higher ground, replanted more sparsely to improve openness. However it is understood that the floodplain is not currently planted. Aspirations within the council to undertake wider improvements of the floodplain, to address both habitat improvement and flood risk pressures, have been indicated but not progressed due to a lack of funding.

[10] Waste Recycling Environmental (WREN) provides funding to eligible projects through the Landfill Communities Fund. The fund can cover work at sites within 10 miles of registered landfill sites in certain parts of the country.

This site was suggested at the December workshop by Petrina Brown of East Renfrewshire Council. The site was not highlighted at the later stages of screening due to Opportunity Areas data for East Renfrewshire not having been received at the time that the analysis was carried out, but the overlap of RBMP pressures and woodland network clearly shows the potential of this area to achieve multiple benefits through a restoration programme.

Auldhouse Burn is classified as being at Poor Ecological Status due to a variety of pressures, and SEPA's morphology database identifies partial realignment along a 1.6km stretch, including the reach passing through the SINC. Undertaking restoration of this reach of river could bring greater amenity and habitat value to the SINC, creating meanders in the river and new areas of floodplain habitat. Such work could potentially provide some contribution towards managing flood flows in the river, complementing the wider White Cart Flood Prevention scheme (since Auldhouse Burn is a tributary of the White Cart, with parts of the scheme being implemented on the burn).

Table 4.4 Capelrig Road site information

Waterbodies	Pressures	Habitats	Opportunity Areas	Stakeholders/ interested parties
Capelrig/ Auldhouse Burn Current: Poor Objective: Good by 2027	Morphology (realignment) Point and diffuse pollution (sewage disposal and urban development)	Woodland	SINC	East Renfrewshire Council (Petrina Brown)

4.5 Auchlochan Forestry Commission Acquisition

Background

An extensive area (totalling 1021 ha) at Auchlochan has been purchased by the Forestry Commission Scotland and is currently being developed. Characteristics of the area are summarised in Table 4.5. The area is shown in Figure 4.5, and a Forestry Commission map of the acquisition is included in Appendix H. The acquisition includes land between the Nethan Water and Poniel Water/ Douglas Water. The majority of the site is to the west of the M75, although there is one sub-compartment (Brocketsbrae) to the east. The ownership includes the majority of Coalburn Moss SSSI, which is in the centre of the acquisition area.

Table 4.5 Auchlochan site information

Waterbodies	Pressures	Habitats	Opportunity Areas	Stakeholders/ interested parties
Nethan Water Current: Poor Objective: Good by 2021 **Poniel Water** Current: Moderate Objective: Good by 2027	**Nethan Water**: diffuse pollution (livestock farming); point pollution (sewage disposal); morphology (weir) **Poniel Water**: Diffuse source pollution (mining and quarrying)	Woodland Wetland	n/a (not used for Screening 3 (rural diffuse pollution), from which this site was identified)	Forestry Commission (Barry Watson)

Site Selection

Auchlochan was suggested at the December workshop by Tommy McGrory from the Forestry Commission Scotland. This was due to the upcoming change in land use from an extensive agricultural area and its potential to influence the water quality of the upper tributaries of the Clyde.

The Nethan Water was highlighted in the screening due to diffuse pollution pressures associated with livestock farming, with "non-urban land management measures" identified in SEPA's measures database. The Poniel Water was not identified in the screening, despite having diffuse source pollution identified in the screening because, for rural areas, the screening utilised existing identified measures relating to rural land management in SEPA's measures database. Mining and quarrying was not picked up in this category, but was identified in Sections 2 and 3 of this report as being a pressure that should be included in future. The Auchlochan site provides an example of how this project can be relevant to restoration projects associated with mining.

The IHN in the area is mainly woodland, including extensive coniferous plantations to the south. There are only very small patches of wetland identified. However the wetland IHN notably excludes Coalburn Moss SSSI and SAC (which is internationally designated for raised bog), and it is therefore considered that the wetland IHN may not be complete in this area.

This case study is included primarily as an illustration of the multiple benefits that a plan of this type (which in this case is already under development by the Forestry Commission) can bring to a rural environment. Discussions with Barrie Watson at the Forestry Commission during the course of the project have allowed this section of text to be developed, and have also provided a mechanism for feeding ideas about benefits to the water environment back in to the Forestry Commission's plans for the site.

Description of Works

The Auchlochan acquisition area was purchased from the Auchlochan Estate, who leased out the land for farming. The majority of farmland has been used as improved grazing (of a total of 964 ha, currently 459 ha is improved

grazing, 153 ha rough grazing, and 74 ha semi-improved grazing). The farm buildings in the area have been sold on by the Forestry Commission, with only small parcels of land potentially retaining their use for grazing. Under the current design plan it is expected that 450 ha of current grazing land will be afforested,, with the result that the pressure on water quality in the Nethan from livestock farming should be significantly reduced in future. The area includes Coalburn Moss SSSI and SAC (224 ha) as well as an area still in the process of restoration from mining, in between Coalburn village and the Poniel Water.

The land use within Coalburn Moss SSSI will not be altered, and this forms a significant proportion of the site. For the remainder of the area, the proposals are predominantly for mixed woodland. Limited coniferous planting is included in the plans, including at Yonderton (set back from the river), Brocketsbrae and Coalburn. Native woodland planting (including W7, W9 and W11) will cover approximately 130 ha, of a total of 467 ha of new woodland. Riparian planting exists already along much of the Nethan Water but will be improved as appropriate. In the areas of restored mine workings, scrub willow will be planted initially, in order to improve the soils.

This scheme is therefore developing the potential to contribute to the aims of the project by:

- Reducing pressures from livestock farming in the Nethan Water catchment through land use change;
- Improving riparian planting in the Nethan Water catchment, which will buffer against diffuse pollution inputs;
- Creating new habitat and improving soil structure on areas of old mine workings, contributing to a reduction in diffuse pollution in the Poniel Water catchment;
- Enhancing the woodland network of the whole area with new mixed woodland planting; and
- Potentially improving the condition of Coalburn Moss SSSI, through changes in land use, which has in the past been affected by coniferous planting (now removed) and livestock grazing.

This case study is an excellent example of management of rural land use and changes in land use patterns bringing benefits to the water environment, within the context of a woodland creation scheme (thereby clearly benefiting both the water environment and habitat enhancement). Including Auchlochan in the case studies provided an opportunity for the Forestry Commission to incorporate the principles of this project in to their design plan.

5. Conclusions and Recommendations

5.1 Summary

This project has looked for opportunities to create or enhance areas of habitat and habitat connectivity, whilst also contributing to meeting the objectives of the River Basin Management Plans (RBMPs). The aim is to recognise the reciprocal benefits: i.e. to deliver river basin planning objectives as part of projects being delivered to meet 'other' drivers, as well as integrating wider biodiversity benefits in to RBMP-led projects. This can help to ensure that projects are appealing and effective for a wider range of stakeholders, and helps to pool resources to achieve a common (or at least similar) aim. It provides opportunities to present such objectives as climate change adaptation, ecological quality, improvements to the water environment, and green networks, together in a cohesive and cost-effective approach.

The project has derived a methodology for identifying areas with the opportunity to achieve multiple benefits in restoration and/or development, and applied it to the Clyde valley as a pilot study. The methodology is designed to start at the broad scale and use GIS datasets and data processing to screen for potentially appropriate areas. By combining with other datasets that show areas already identified as being of interest for improvement or development, and increasingly using local knowledge to refine the options, the optimum areas to focus on for improvement can be identified. The methodology has been distilled in to five steps, with Step 1 involving the identification and collation of relevant data, and the remaining steps providing increasingly detailed levels of screening and filtering. The outputs of the screening process are:

- A shapefile showing areas where ecological networks coincide with waterbodies requiring improvement to their status under WFD (Step 2). This identifies where addressing pressures could enhance or expand habitat networks. For the Clyde, the outputs of this step were presented in Figures 3.1 to 3.8;
- A shapefile showing where those areas coincide with sites already proposed for development or improvement (Step 3). This provides a second level of screening to help cut down the number of options where a large area is being considered, and helps to ensure that the sites selected have a clear driver for restoration. If the study area is only small, it may not be necessary to include this second stage. For the Clyde, the outputs of this step and Step 4 were presented in Figures 3.9 to 3.15;
- Attributes in the shapefiles relating to waterbody classification and habitat type enable further filtering of sites where necessary (for example focusing on sites that need to be addressed by 2015). This allows a degree of ranking, to allow prioritisation of projects delivering greater gain, with a higher degree of confidence (this is Step 4). The outputs of this step were presented in Figures 3.9 to 3.15, and an aid to filtering was produced in the form of an excel spreadsheet.

Getting from the point of having a completed GIS layer to having a sensible number of sites with the potential to progress requires the input of local knowledge, which is critical for identifying realistic sites. Depending on the size of area being considered, the party undertaking the study may have enough knowledge internally, or it may be

beneficial to hold a workshop to allow input from other local experts (this stage of incorporating local knowledge is referred to as Step 5).

The screening and filtering process for the Clyde valley pilot area resulted in a large number of potential sites being identified, as a result of the size of the area, the amount of data, and the number of failing waterbodies. To refine the process and provide local input to the site selection, a workshop was held in December 2009, at which participants were invited to suggest sites they thought may be of relevance. These sites were compared to the screening results, and a number of the sites were given further consideration as 'case studies', to illustrate the range of benefits that could be achieved and types of project that could be relevant. The sites were at very different stages of development. Sites including Lochwinnoch RSPB reserve, Pollokshaws urban regeneration area, and the rural Auchlochan Forestry Commission acquisition are already under development. These projects will result in a range of different type of benefit, and are excellent examples of where multiple benefits are already being achieved for the water environment and wider ecological networks. For some of the other sites that were suggested, and that were highlighted in the screening, no work is currently being undertaken but there is a recognised potential for improvement. Particular consideration was given to the Glazert Water in the Kelvin catchment. There are a number of interested parties and considerable potential for improvement and restoration of parts of the watercourse. Initial suggestions have been made as to the scope of work that could be carried out on the Glazert and the collaborations that should be developed to ensure that all interested parties benefit from improvement works.

5.2 Recommendations for taking forward work on the Clyde

The project has produced a number of outputs that can be taken forward in the Clyde catchment. It is hoped that this will include both the progression of projects in the short term, and the use of project outputs for decision-making and prioritisation of work in the longer term. In particular:

- Recommendations have been made for restoration projects on the Glazert Water and Capelrig Rd SINC. These recommendations should be taken forward, along with the information on other sites obtained from the December workshop, to the Clyde AAG. Funding opportunities for delivering these and other similar projects need to be identified;
- The mapping should be disseminated to local authorities. This may be best achieved alongside dissemination of IHN outputs, to ensure that the purpose and benefits of the outputs can be clearly illustrated and explained;
- In the longer term, the outputs of Steps 3 and 4 are likely to become out of date, as developments are progressed and new areas for development are identified. It is expected that the outputs of Step 2 will continue to be the most useful over the longer term (i.e. greater than a year), and these could be used in an ongoing process to identify opportunities as an when new developments are proposed (i.e. on more of a reactive basis);
- Given the point raised above, the need to update the outputs periodically should be considered. This may become necessary even for Step 2, since it is understood that the IHN is currently being updated.

- To ensure that the project outputs can continue to be used in SEPA, data management provisions will need to be resourced.

5.3 Methodology Recommendations

The methodology applied in this project allowed identification of a range of areas where multiple benefits could be achieved that would contribute towards improvements in waterbody status. During the process of application of the methodology to the Clyde a number of stumbling blocks were encountered which, as they were overcome, allowed the methodology to be improved. Whilst not all of these improvements were demonstrated in the Clyde valley pilot, they have been incorporated in to the outline methodology in Section 2, and are also outlined here:

- The use of multiple, often overlapping, datasets for the Opportunity Areas led to some loss of resolution and information, which made it difficult to distinguish between the most appropriate opportunities for different purposes. For example, ideally the urban diffuse pollution screening would focus on development sites, but in the screening undertaken in this project, other types of areas such as local wildlife sites were also included. It would be preferable to separate out the Opportunity Areas to some extent to allow this distinction to be made. It is anticipated that this would be easier if a smaller area was being modelled, so that fewer datasets were involved;

- Alternatively, in some cases it may not be necessary to use Opportunity Areas at all, for example if the area being modelled is only small and local knowledge is sufficient for identifying realistic opportunities. It is recommended that the outputs of both Steps 2 and 3 should always be retained (in addition to Step 4), to allow both levels of information to be used as appropriate;

- It was agreed at the project outset to consider only morphology and diffuse pollution pressures, since these were likely to have the most relevance to achieving the combined benefits. At a later stage in the project it became apparent that urban diffuse pollution pressures were not being fully represented, as they are often picked up in the RBMP as a point source pressure (CSOs). To ensure that this pressure is fully represented in future, it is recommended that the catchment areas of identified CSOs should be added as an additional layer of screening. In addition, it may be beneficial to obtain more information from Scottish Water about Q&S investment proposals, particularly for retrofitting SuDS;

- Where an Integrated Habitat Network (or similar) is being used, ensure that the wetland network does not include open waterbodies. If baseline rivers and lochs are included in the IHN, this makes it extremely difficult to reduce the extent of areas of interest through screening;

- Where there is no IHN available, alternative habitat data will need to be used, and data availability is likely to vary widely across the country. It is recommended that the dataset should *not* be dominated by designated sites, because this is likely to skew the areas of interest heavily towards those sites: it is far preferable if this approach can benefit wider areas of habitat, where the drivers for improvement are currently more limited. A case-by-case judgement would need to be made about the best data available, but it may include the use of landcover data or existing greenspace datasets. Any dataset should be adapted to take account of the associated network, not just the habitat extent itself. For the first levels of screening, applying a uniform network extent (e.g. 2km) should be sufficient, although the dispersal ability around specific sites would then need to be checked during Step 5, for example using a web tool currently in development by SNH;

- At the workshop in December 2009, the influence of upstream catchments on downstream waterbody status was raised, for example in relation to diffuse pollution and flood risk. For the Clyde, consideration was given to the extent of downstream benefit with respect to diffuse pollution. However there is clearly still scope to give this some wider consideration, for example potentially by using aspects of the SNIFFER restoration project WFD94 (SNIFFER, 2008);

- Some other datasets that are likely to be relevant are still in development, but could be used in future. In particular this includes Priority Catchment work that is currently underway.

5.4 Recommendations for application to other areas

The aim of this pilot study was to illustrate the benefits that could be achieved by this combined approach, and develop a methodology that could be applied elsewhere. The points discussed in Section 5.3 above are relevant to improving the process both in the Clyde and elsewhere. The following recommendations are made for application elsewhere:

- For large areas such as that covered by an Area Advisory Group (AAG), the first stage of screening (Step 2: determining the areas of overlap between habitat networks and RBMP data) should be carried out, and the resulting dataset retained for reference whenever development or funding opportunities arise. This will allow identification of whether a proposed development could contribute to improving ecological networks and also to improving waterbody status, and whether the development proposals could be adapted for greater benefit;

- It is suggested that the level of assessment carried out in the Clyde pilot study may be more appropriately applied over smaller study areas in future (smaller catchment, sub-catchment areas), with a broader level of assessment for areas as large as the Clyde, for example:

  - If the AAG holds a layer of the outputs of Step 2 (as suggested above), smaller extents of this can then be extracted for a variety of other more detailed studies. Suggestions might include: use by the Forestry Commission in a single catchment to create new areas of habitat, or for a local authority to ensure that new SuDS schemes 'fit' in to habitat networks;

  - The method could inform Priority Catchment work, where the catchment (or sub-catchment) has been walked and there is already a level of engagement with landowners. A layer that indicates areas held by (for example) the signed-up landowners could then be used for the Opportunity Areas, along with a refined morphology layer showing pressures that can realistically be addressed. This level of screening could be highly beneficial in prioritising and designing areas of work within the catchment, to maximise the benefits that will be achieved from the work.

The screening process has been designed to be able to be applied elsewhere and in a variety of situations or with different interests. With the considerable amount of work being (and required to be) undertaken for the WFD, it is hoped that the use of this process, and the ideas contained therein, will contribute to a holistic and streamlined approach to achieving WFD objectives across Scotland, with benefit for the wider environment.

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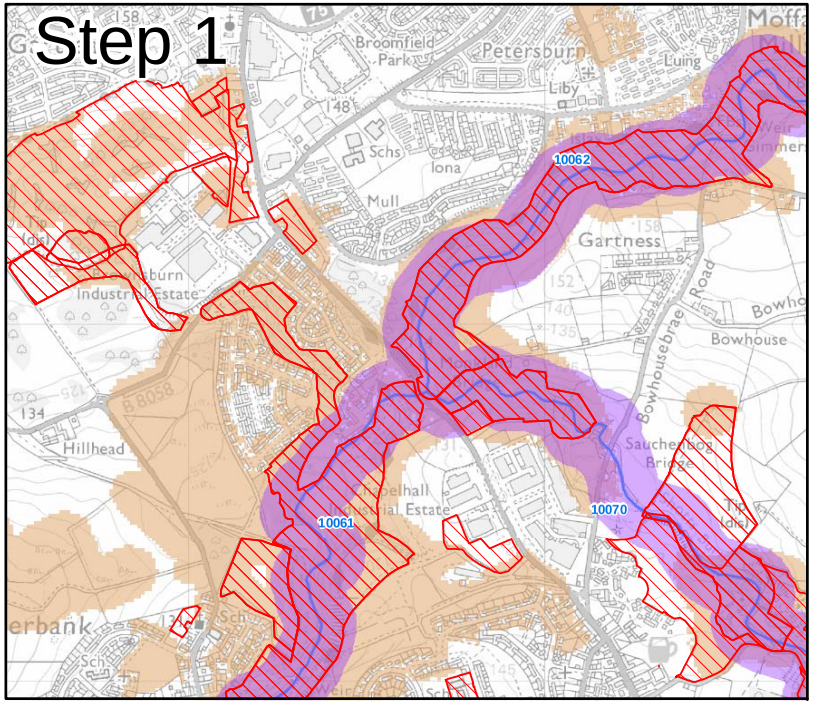

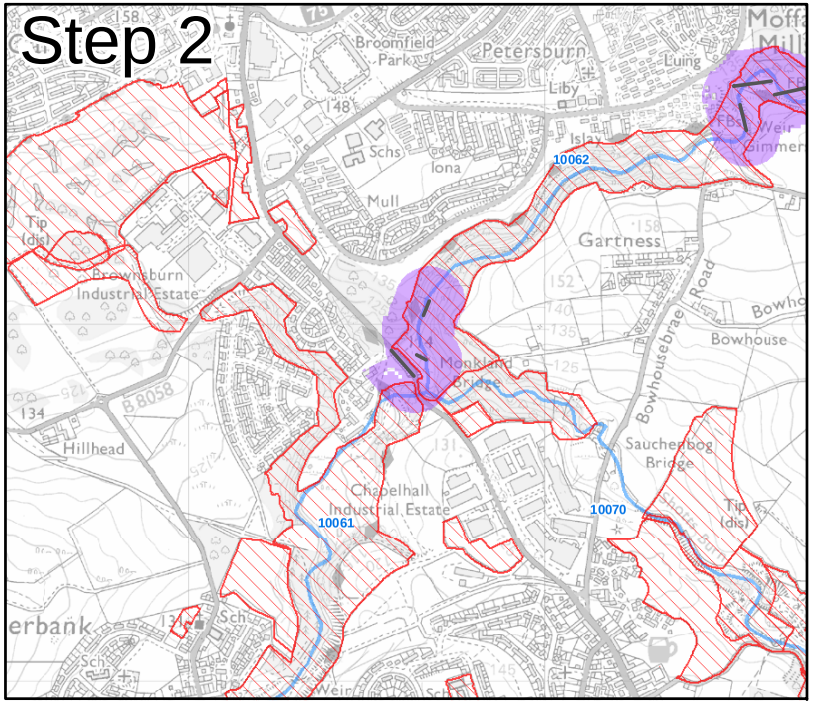

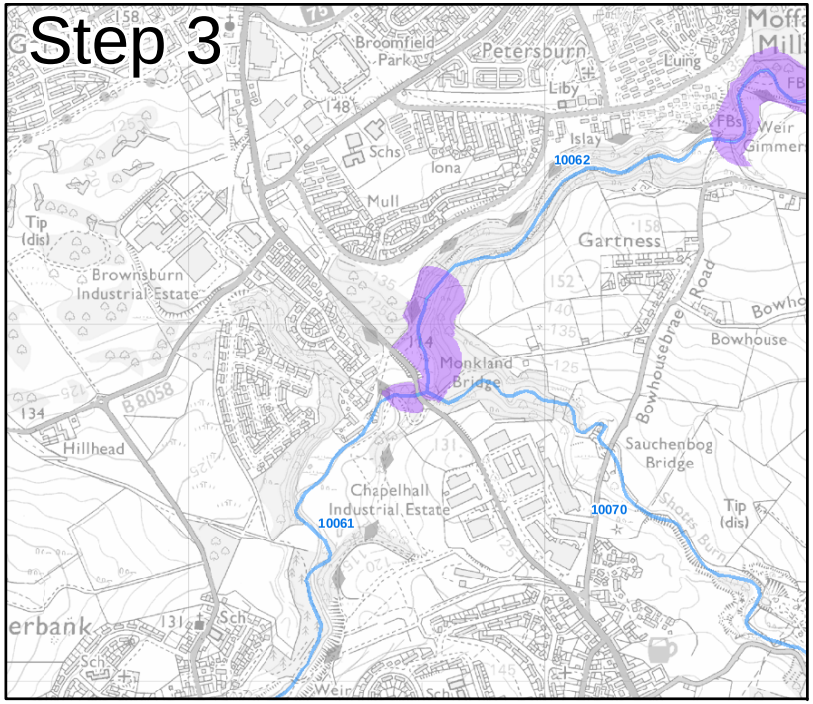

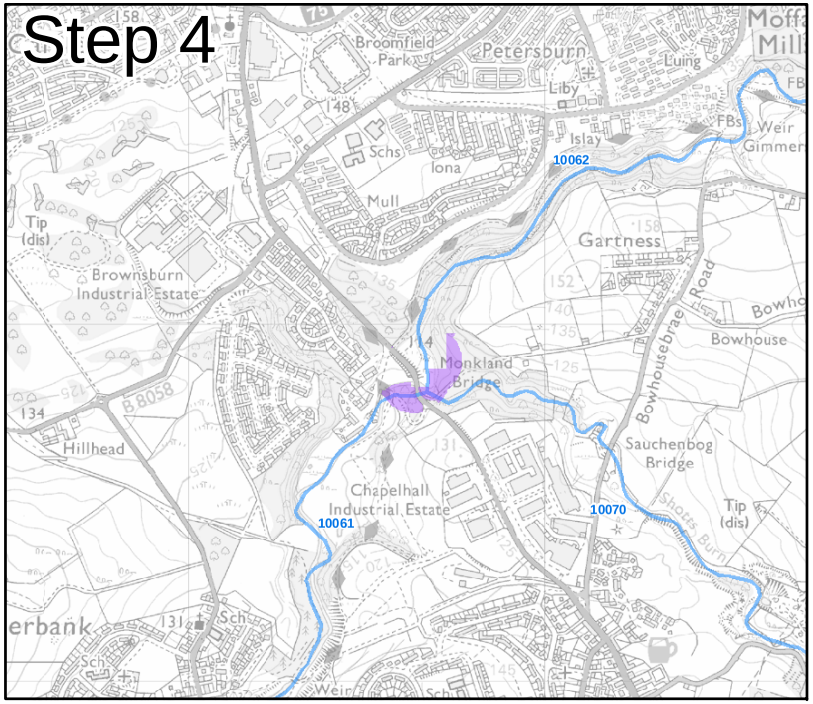

Key

- Clyde boundary
- Opportunity area
- IHN 2km general woodland
- River or loch waterbody
- Woodland morphology screening
- Extra morphology pressure

0 500 Metres

Scale: 1:15,000 @ A3

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Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 2.2
Illustration of Processing

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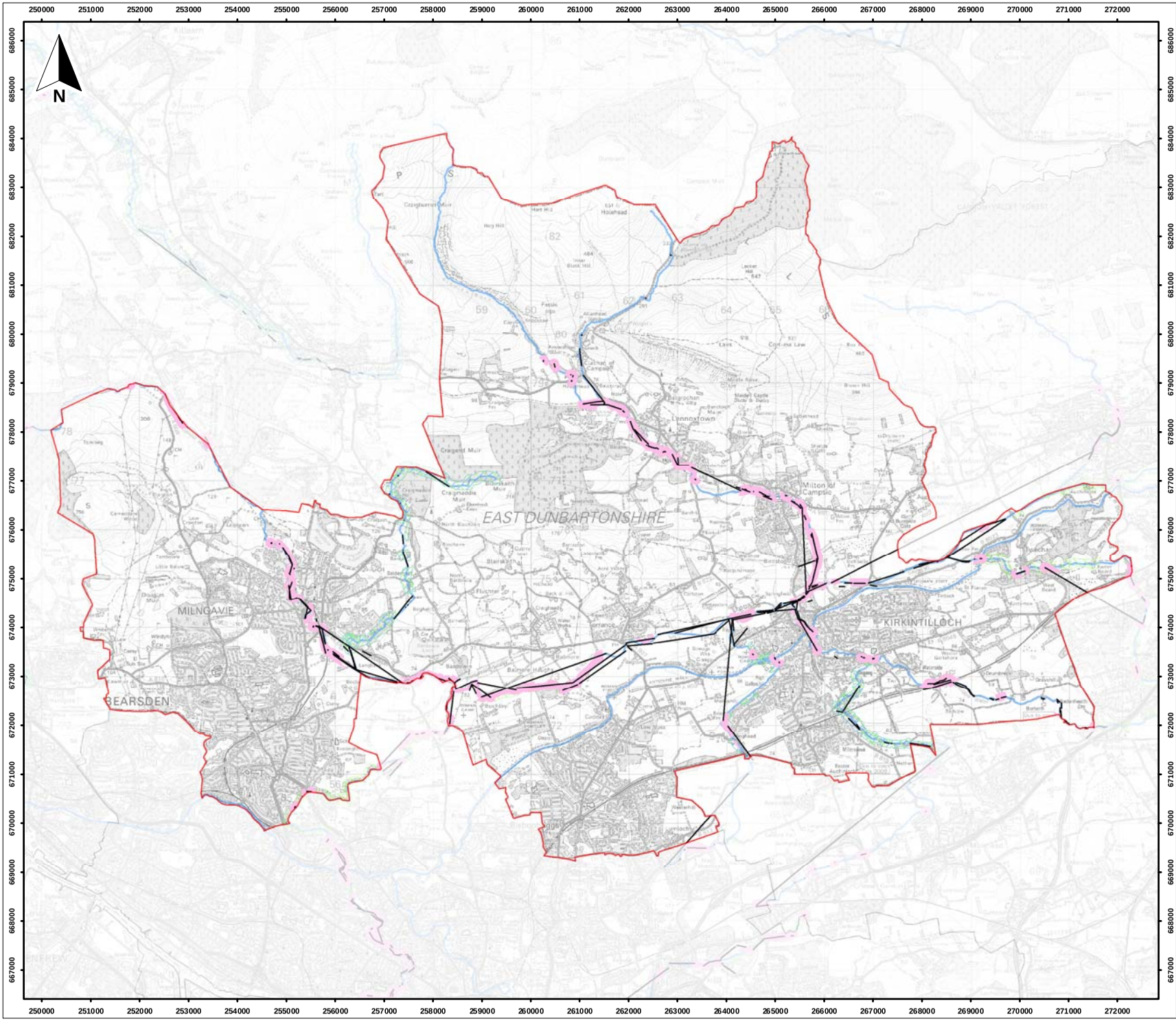

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.1
Screening Step 2:
East Dunbartonshire

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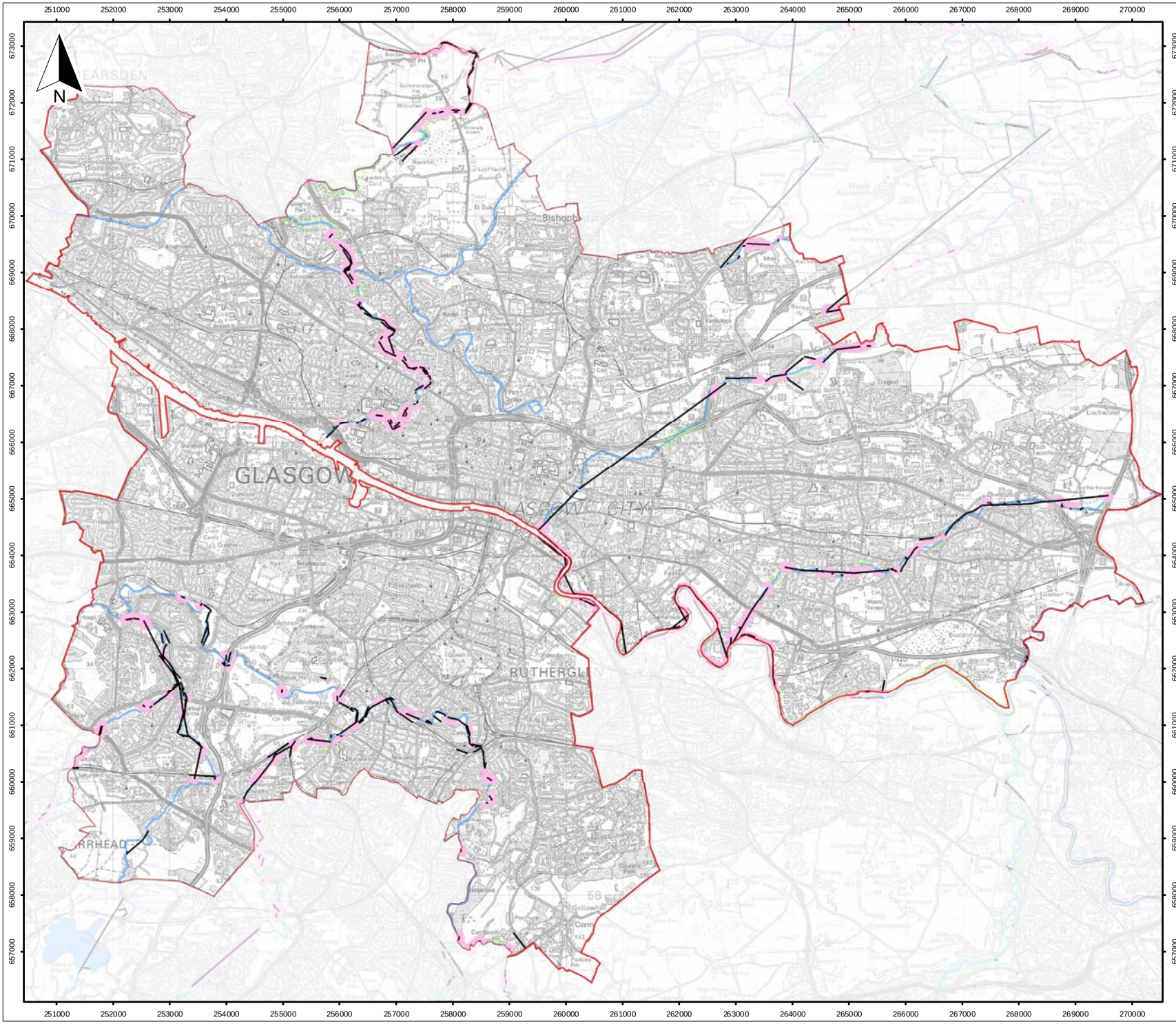

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.2
Screening Step 2:
Glasgow City Council

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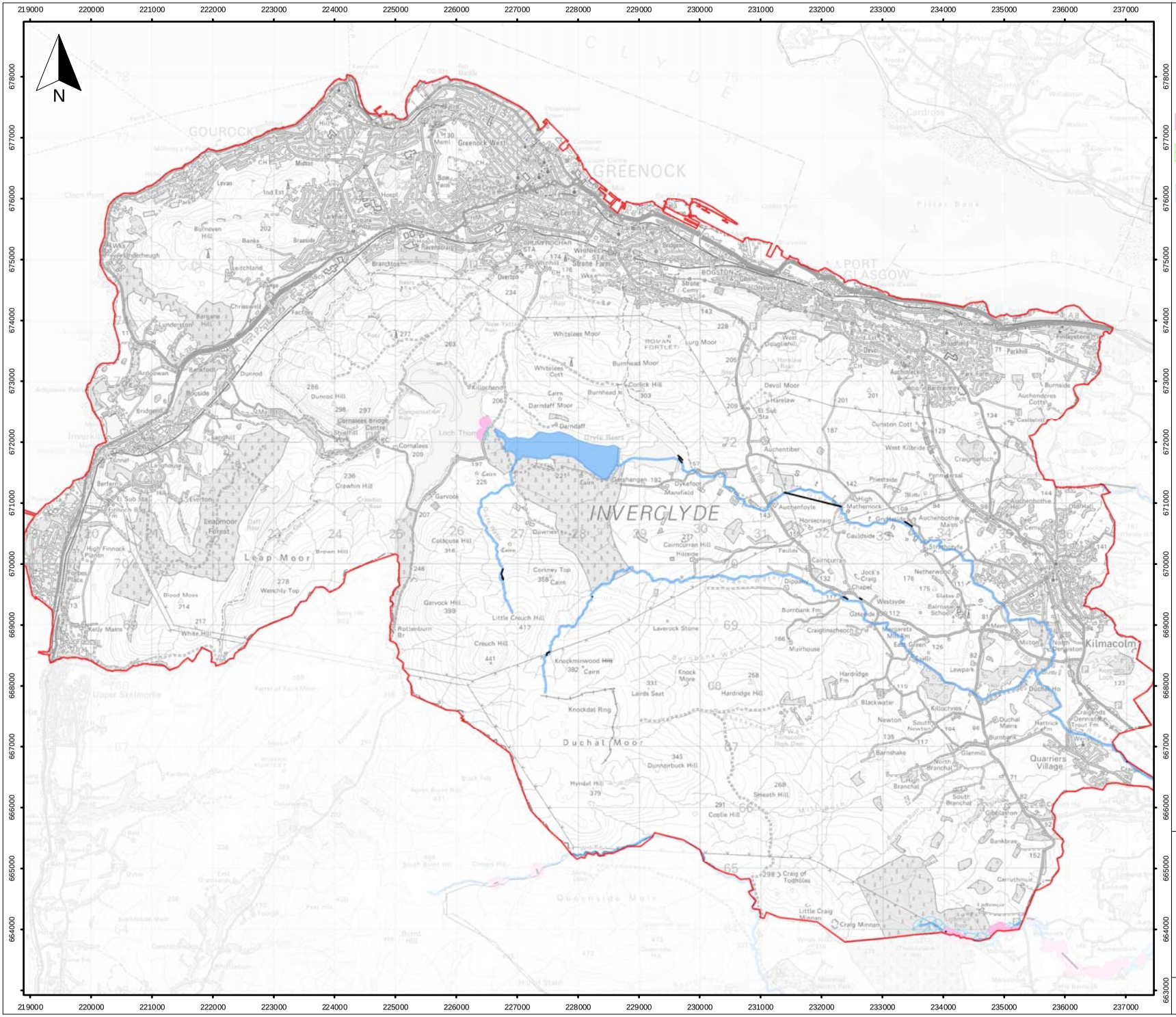

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.3
Screening Step 2:
Inverclyde

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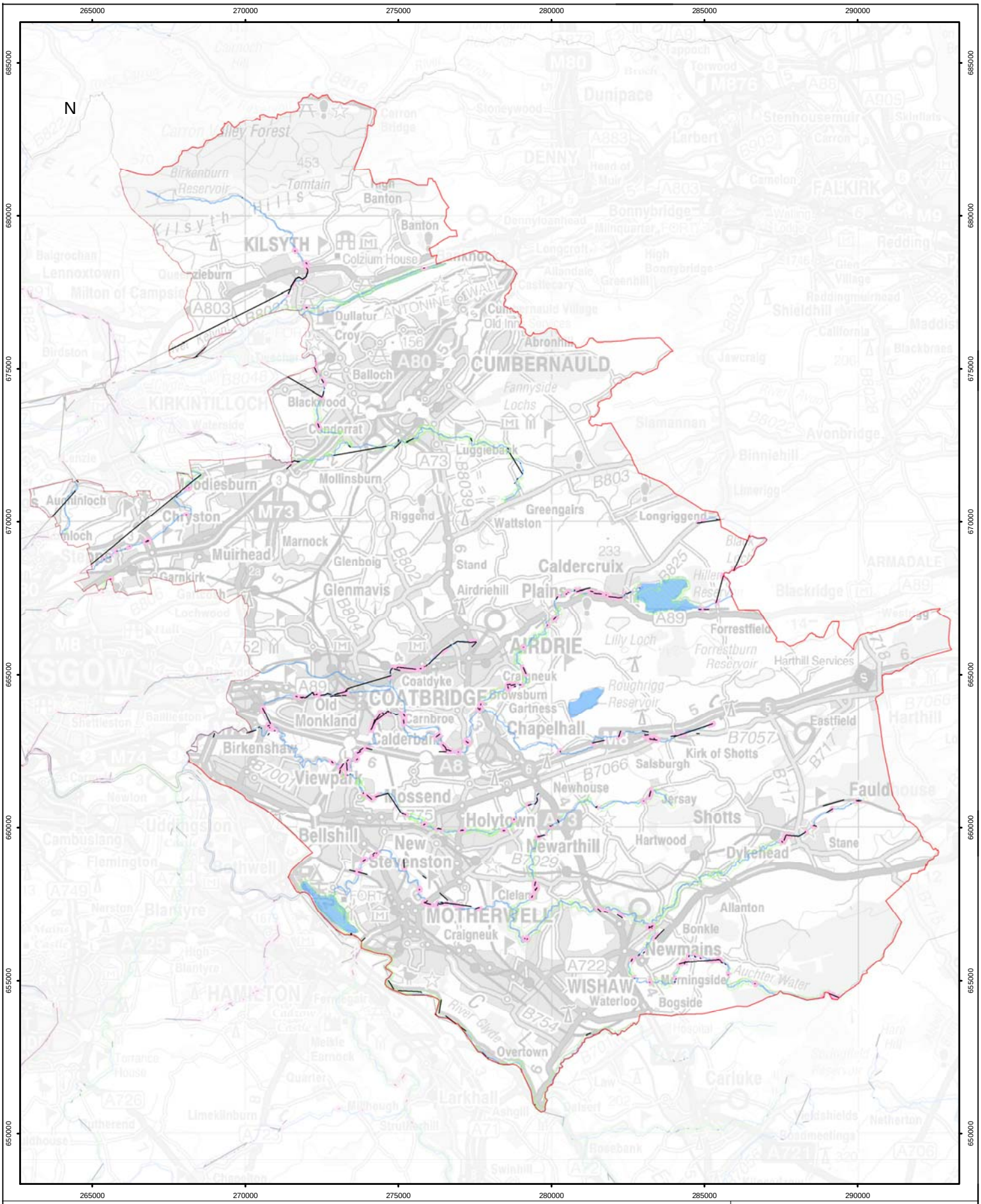

Key:

- Bankside engineering structures
- Rivers

Screened areas, where habitat networks coincide with the following pressures:

- Morphology (Step 2)
- Urban diffuse pollution (Step 2)
- Riparian pressures (diffuse pollution or morphology) (Step 2)

0 1,000 2,000 3,000 4,000 Metres

Scale: 1:115,000 @ A3

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Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.4
Screening Step 2:
North Lanarkshire

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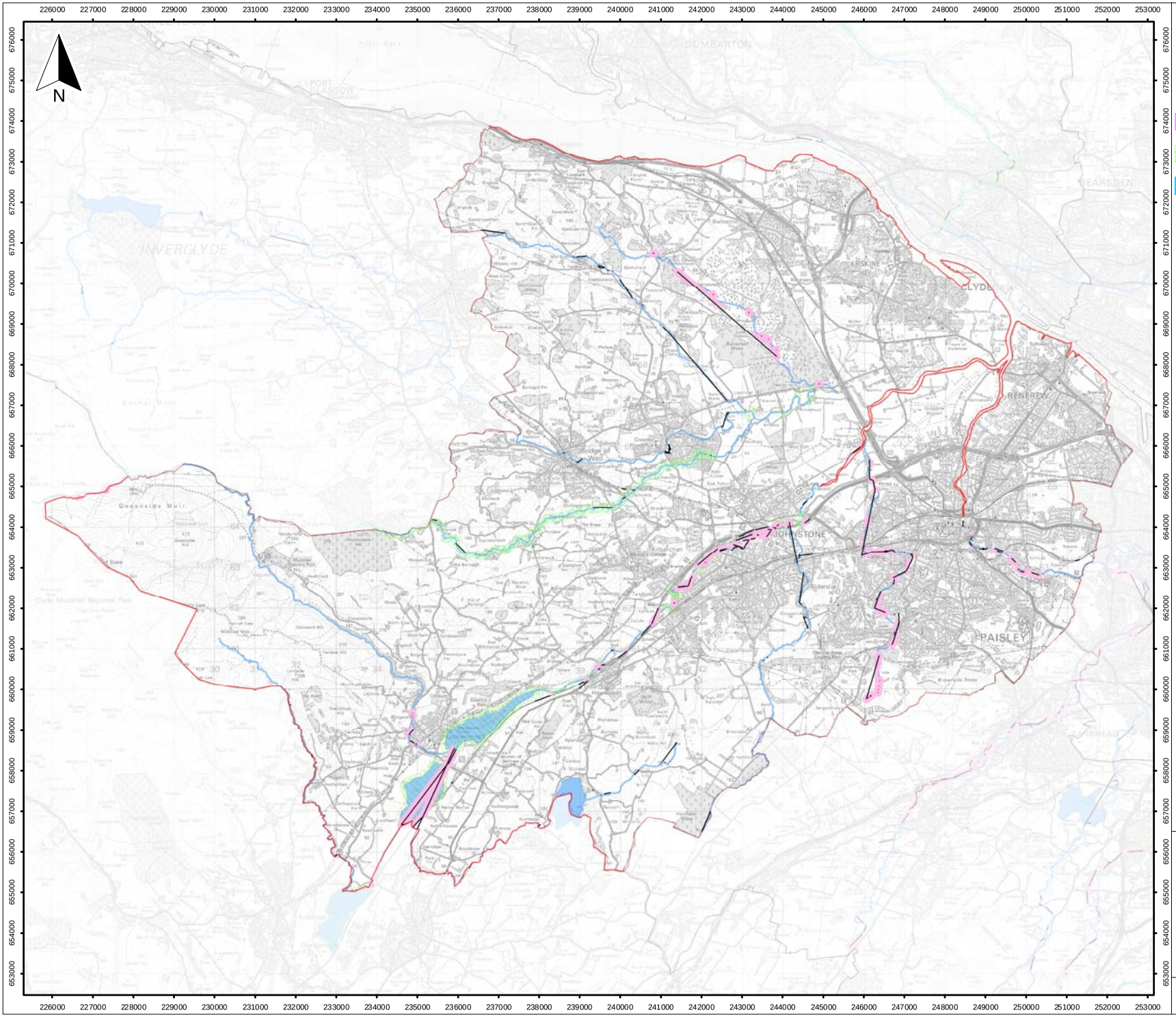


Key:

- Bankside engineering structures
- Rivers

Screened areas, where habitat networks coincide with the following pressures:

- Morphology (Step 2)
- Urban diffuse pollution (Step 2)
- Riparian pressures (diffuse pollution or morphology) (Step 2)

0 500 1,000 1,500 2,000 2,500 3,000 Meters

Scale: 1:90,000 @ A3

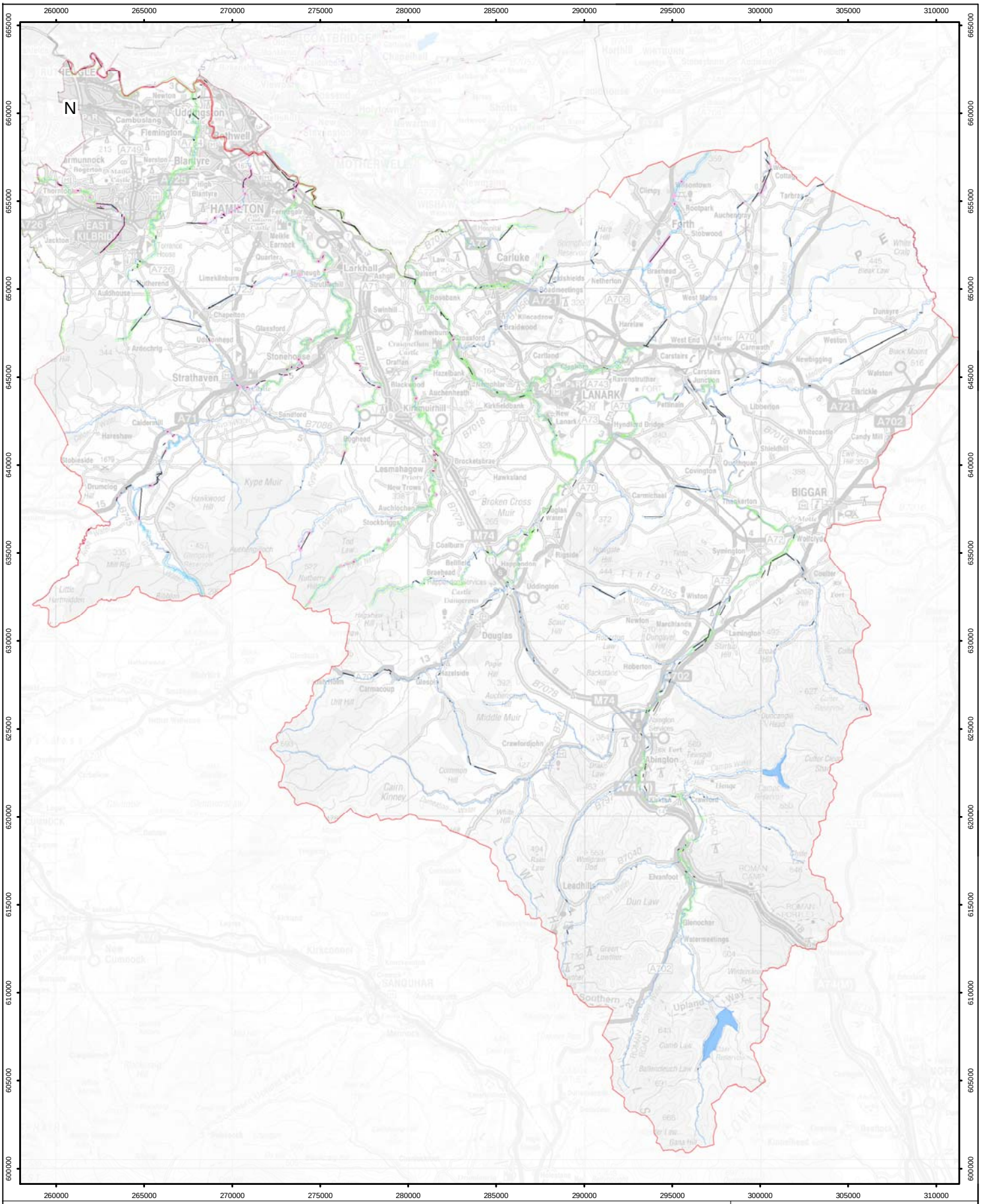
G:\MODEL\PROJECTS\HM-255\25755 Clyde Ecological Networks\ArcGIS\Figures\report figures\S45_Fig3.5 Renfr Step2.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.5
Screening Step 2:
Renfrewshire

June 2010
25755-S45 musgh

Entec



Key:

- Bankside engineering structures
- Rivers

Screened areas, where habitat networks coincide with the following pressures:

- Morphology (Step 2)
- Urban diffuse pollution (Step 2)
- Riparian pressures (diffuse pollution or morphology) (Step 2)

0 2,000 4,000 6,000 8,000 Metres

Scale: 1:200,000 @ A3

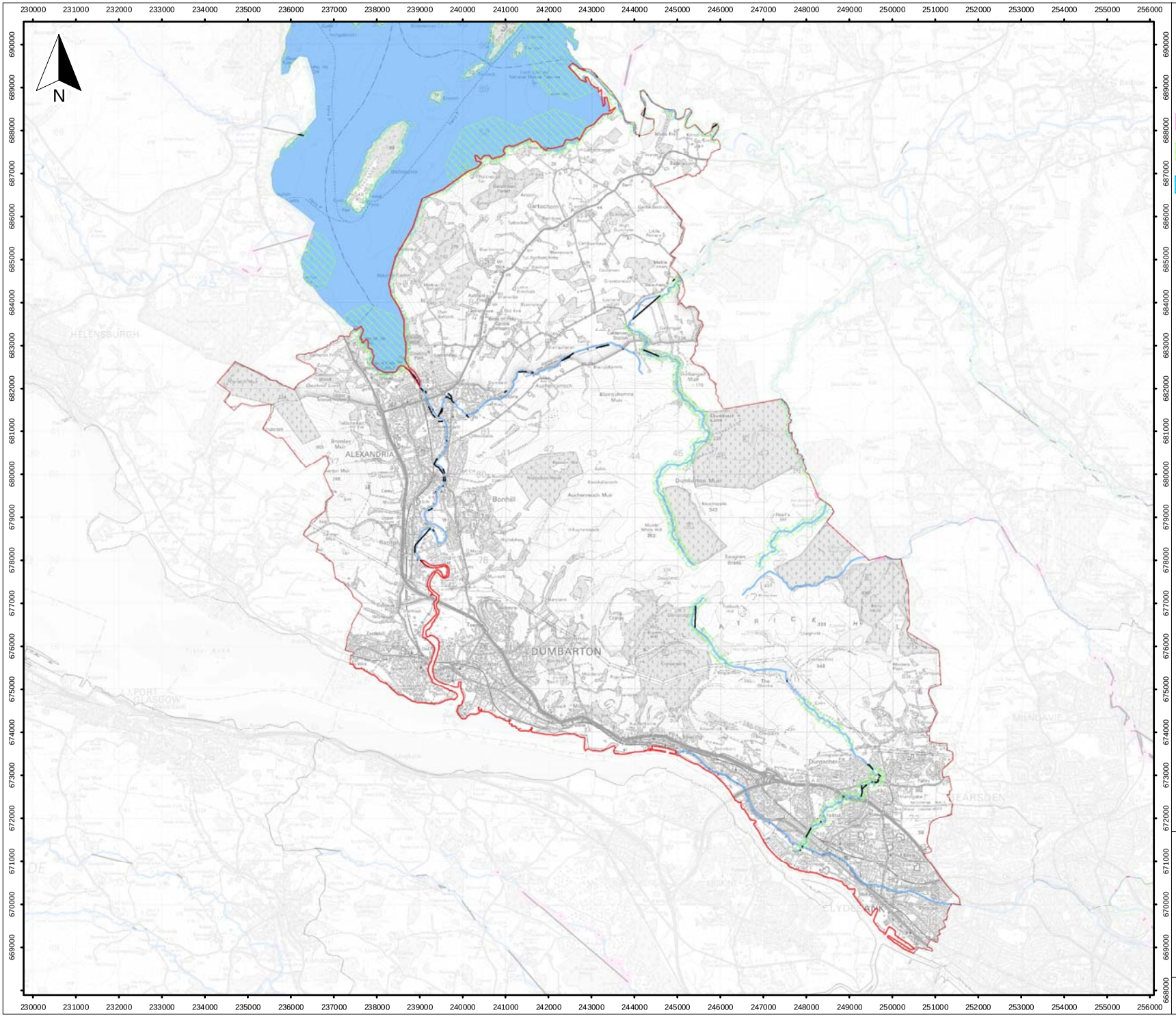
G:\MODEL\PROJECTS\HM-255\25755 Clyde Ecological Networks\ArcGIS\Figures\report figures\S42_Fig3.6 SLan Step2.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.6
Screening Step 2:
South Lanarkshire

June 2010
25755-S42 musgh

Entec



Key:

- Bankside engineering structures
- Rivers

Screened areas, where habitat networks coincide with the following pressures:

- Morphology (Step 2)
- Urban diffuse pollution (Step 2)
- Riparian pressures (diffuse pollution or morphology) (Step 2)

0 500 1,000 1,500 2,000 2,500 3,000 Meters

Scale: 1:85,000 @ A3

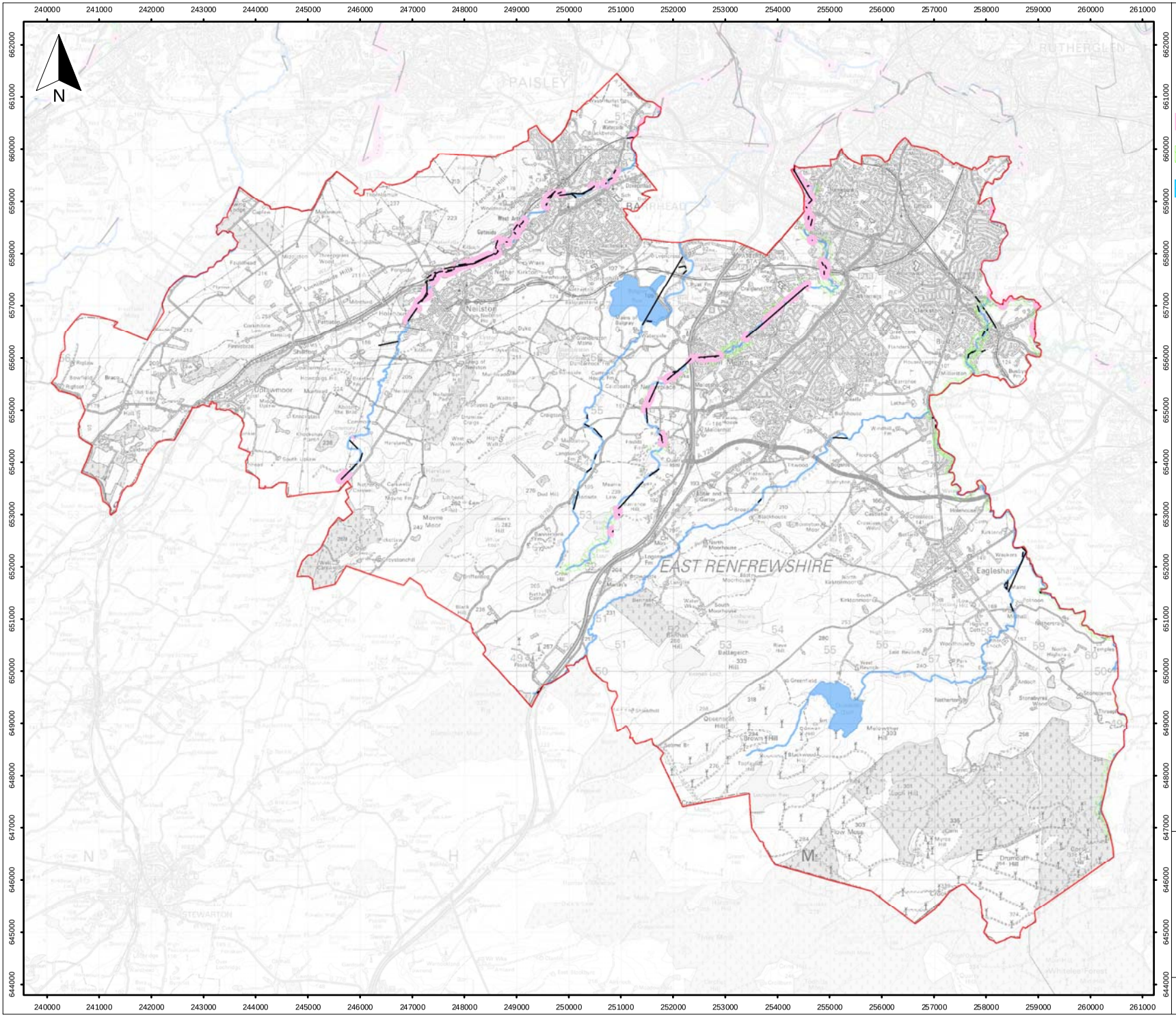
G:\MODEL\PROJECTS\HM-255\25755 Clyde Ecological Networks\ArcGIS\Figures\report figures\S44_Fig3.7 WDunb Step2.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.7
Screening Step 2:
West Dunbartonshire

June 2010
25755-S44 musgh

Entec



Key:

- Bankside engineering structures
- Rivers

Screened areas, where habitat networks coincide with the following pressures:

- Morphology (Step 2)
- Urban diffuse pollution (Step 2)
- Riparian pressures (diffuse pollution or morphology) (Step 2)

0 500 1,000 1,500 2,000 Meters

Scale: 1:70,000 @ A3

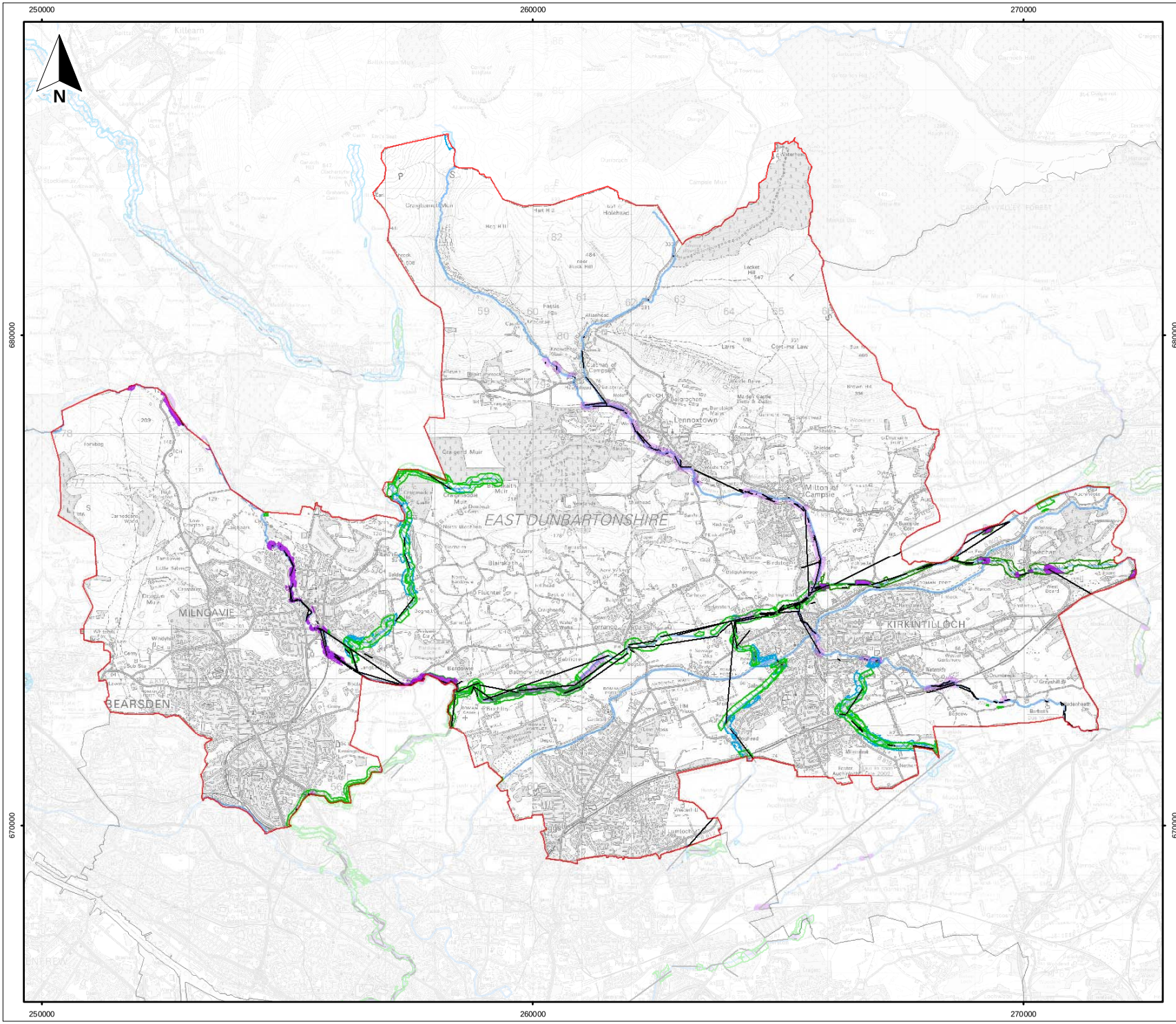
G:\MODEL\PROJECTS\HM-255\25755 Clyde Ecological Networks\ArcGIS\Figures\report figures\S49_Fig3.8 ERenfr Step2.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.8
Screening Step 2:
East Renfrewshire

June 2010
25755-S49 musgh

Entec



Key:

- Bankside engineering structures
- Rivers

Screened areas, where habitat networks coincide with the following pressures:

- Morphology (Step 3)
- Morphology (Step 4)
- Urban diffuse pollution (Step 3)
- Urban diffuse pollution (Step 4)
- Riparian pressures (diffuse pollution or morphology) (Step 3)
- Riparian pressures (diffuse pollution or morphology) (Step 4)

0 2,500 Meters

Scale: 1:75,000 @ A3

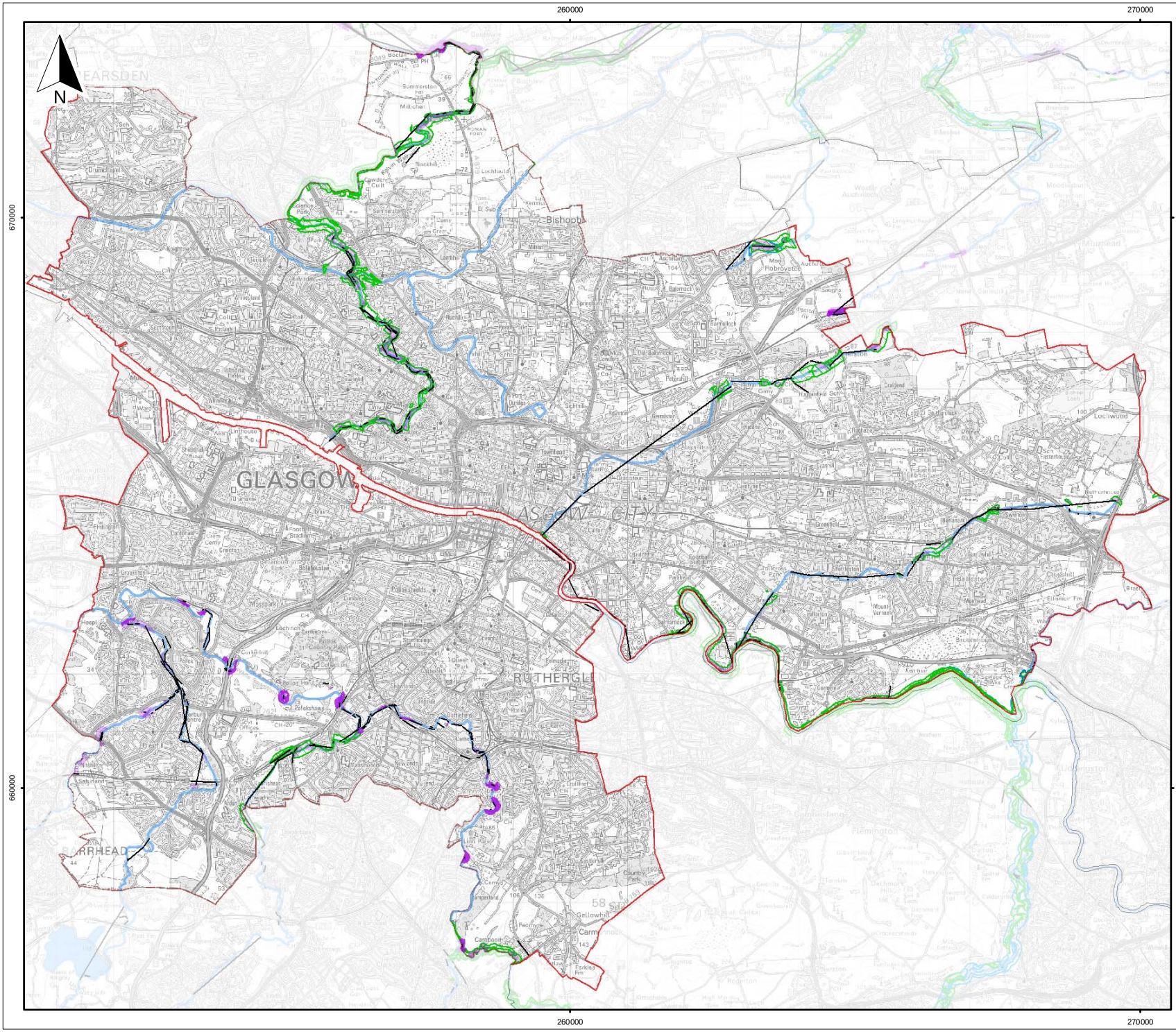
G:\MODEL\PROJECTS\HM-255\25755 Clyde Ecological Networks\ArcGIS\Figures\report figures\S34_Fig3.9 EDunb Steps 3+4.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.9
Screening Steps 3 and 4:
East Dunbartonshire

June 2010
25755-S35 musgh

Entec

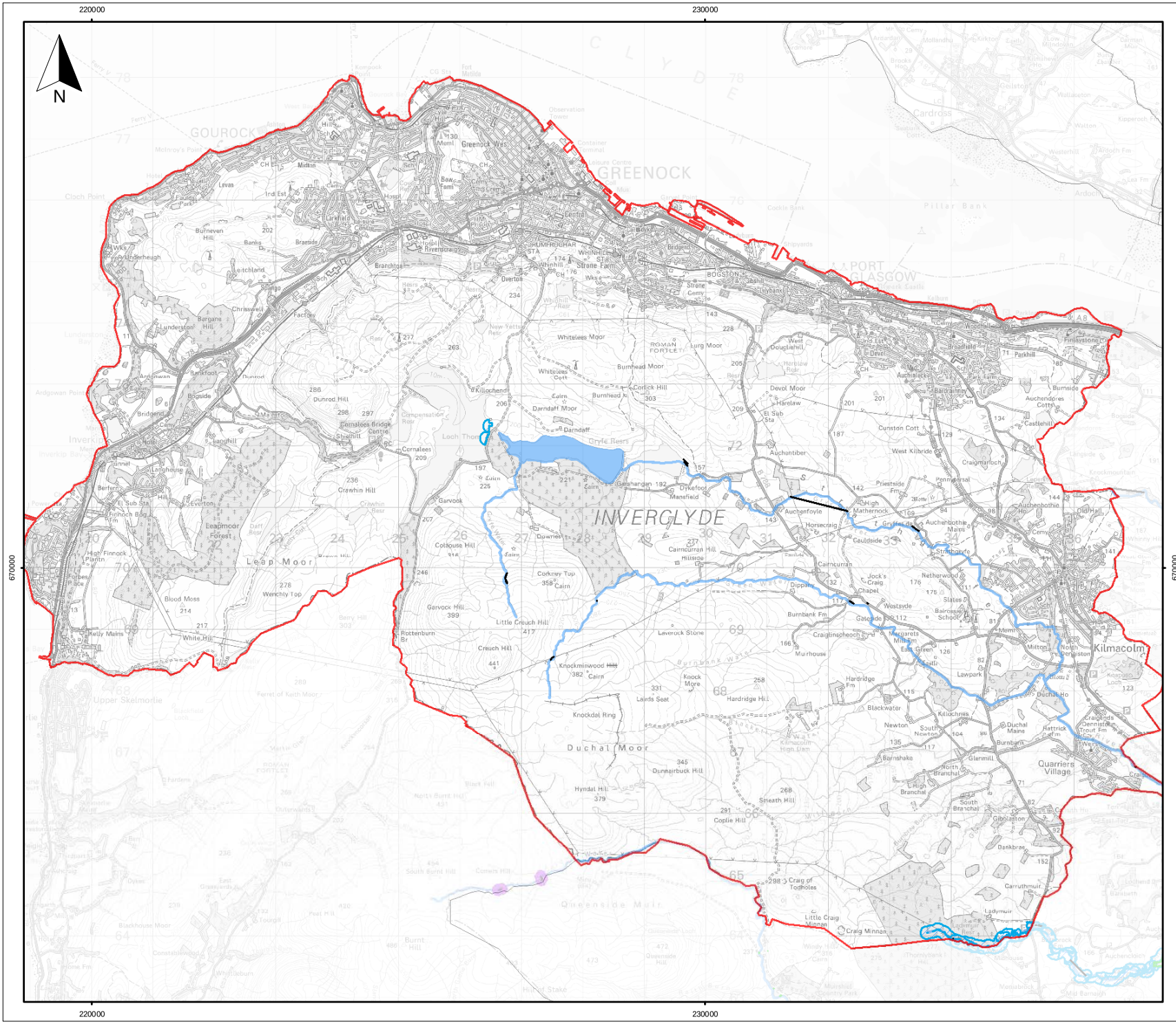


Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.10
Screening Steps 3 and 4:
Glasgow City Council

June 2010
25755-S36 musgh

Entec



Key:

- Bankside engineering structures
- Rivers

Screened areas, where habitat networks coincide with the following pressures:

- Morphology (Step 3)
- Morphology (Step 4)
- Urban diffuse pollution (Step 3)
- Urban diffuse pollution (Step 4)
- Riparian pressures (diffuse pollution or morphology) (Step 3)
- Riparian pressures (diffuse pollution or morphology) (Step 4)

0 2,500 Meters

Scale: 1:60,000 @ A3

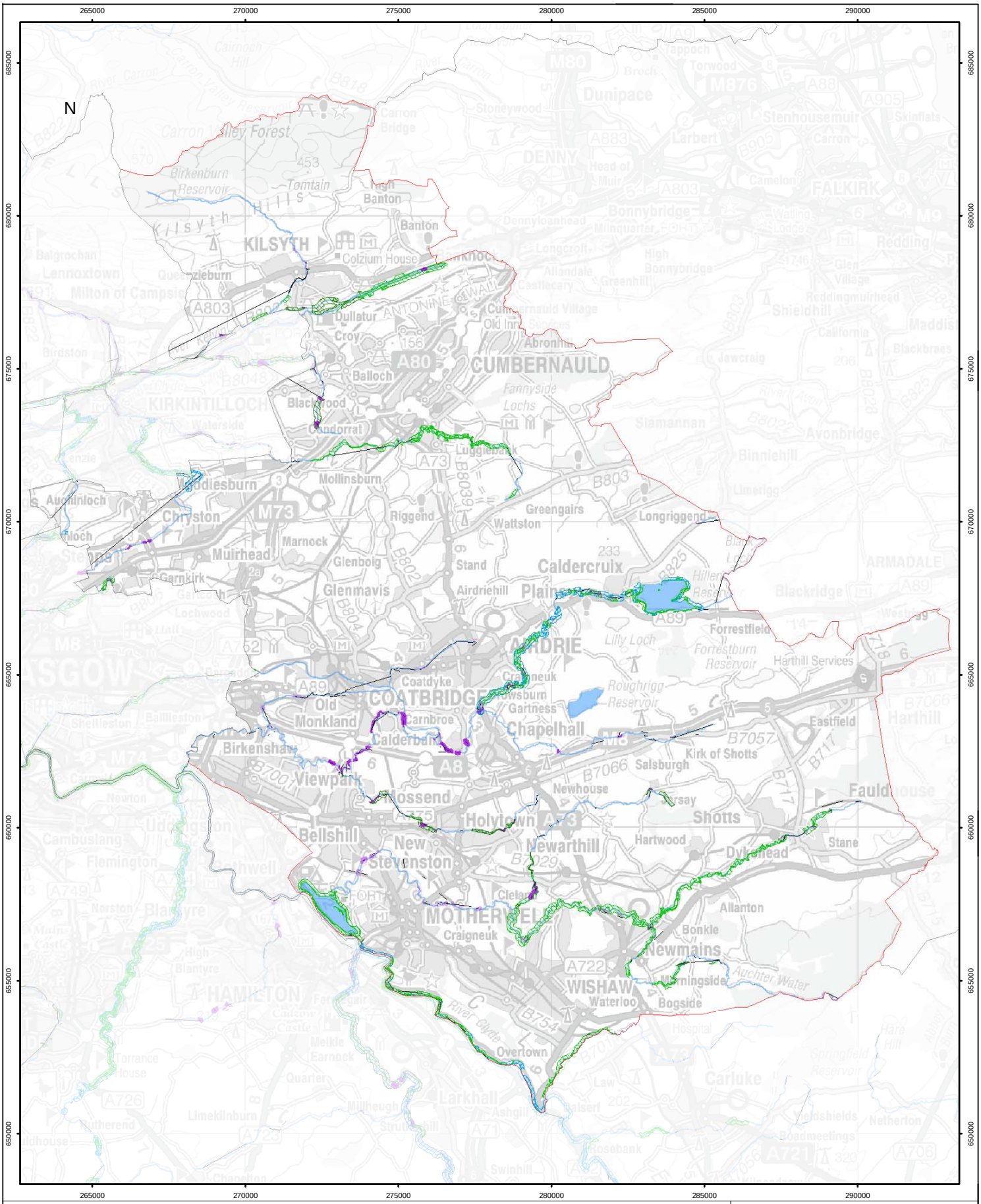
G:\MODEL\PROJECTS\HM-255\25755 Clyde Ecological Networks\ArcGIS\Figures\report figures\S37_Fig3.11 Inverclyde Steps 3+4.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.11
Screening Steps 3 and 4:
Inverclyde

June 2010
25755-S37 musgh

Entec



Key:

- Bankside engineering structures
- Rivers

Screened areas, where habitat networks coincide with the following pressures:

- Morphology (Step 3)
- Morphology (Step 4)
- Urban diffuse pollution (Step 3)
- Urban diffuse pollution (Step 4)
- Riparian pressures (diffuse pollution or morphology) (Step 3)
- Riparian pressures (diffuse pollution or morphology) (Step 4)

0 5,000 Metres

Scale: 1:115,000 @ A3

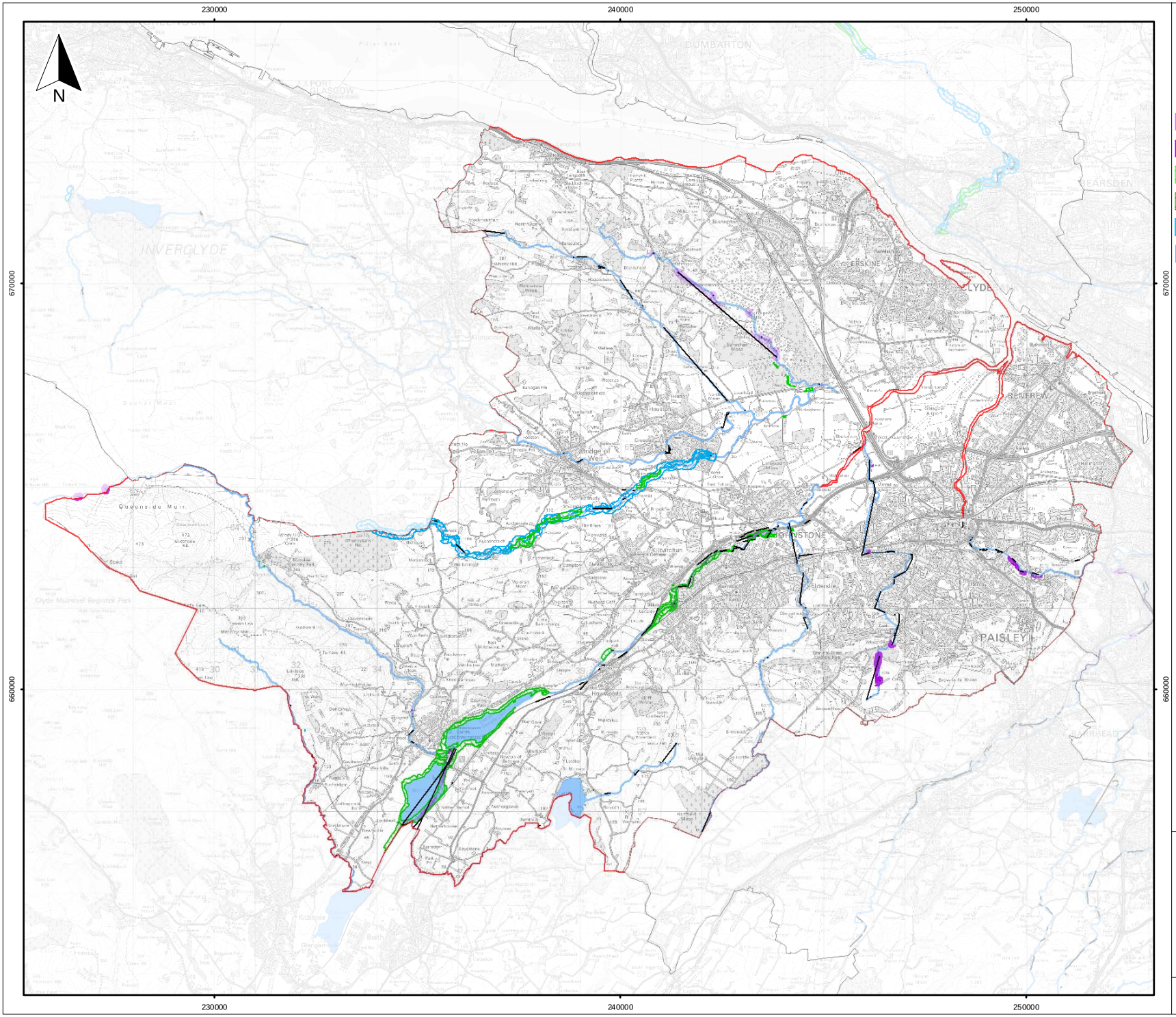
G:\MODEL\PROJECTS\HM-255\25755 Clyde Ecological Networks\ArcGIS\Figures\report figures\S40_Fig3.12 NLan Steps 3+4.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.12
Screening Steps 3 and 4:
North Lanarkshire

June 2010
25755-S40 musgh

Entec



Key:

- Bankside engineering structures
- Rivers

Screened areas, where habitat networks coincide with the following pressures:

- Morphology (Step 3)
- Morphology (Step 4)
- Urban diffuse pollution (Step 3)
- Urban diffuse pollution (Step 4)
- Riparian pressures (diffuse pollution or morphology) (Step 3)
- Riparian pressures (diffuse pollution or morphology) (Step 4)

0 2,500 Meters

Scale: 1:90,000 @ A3

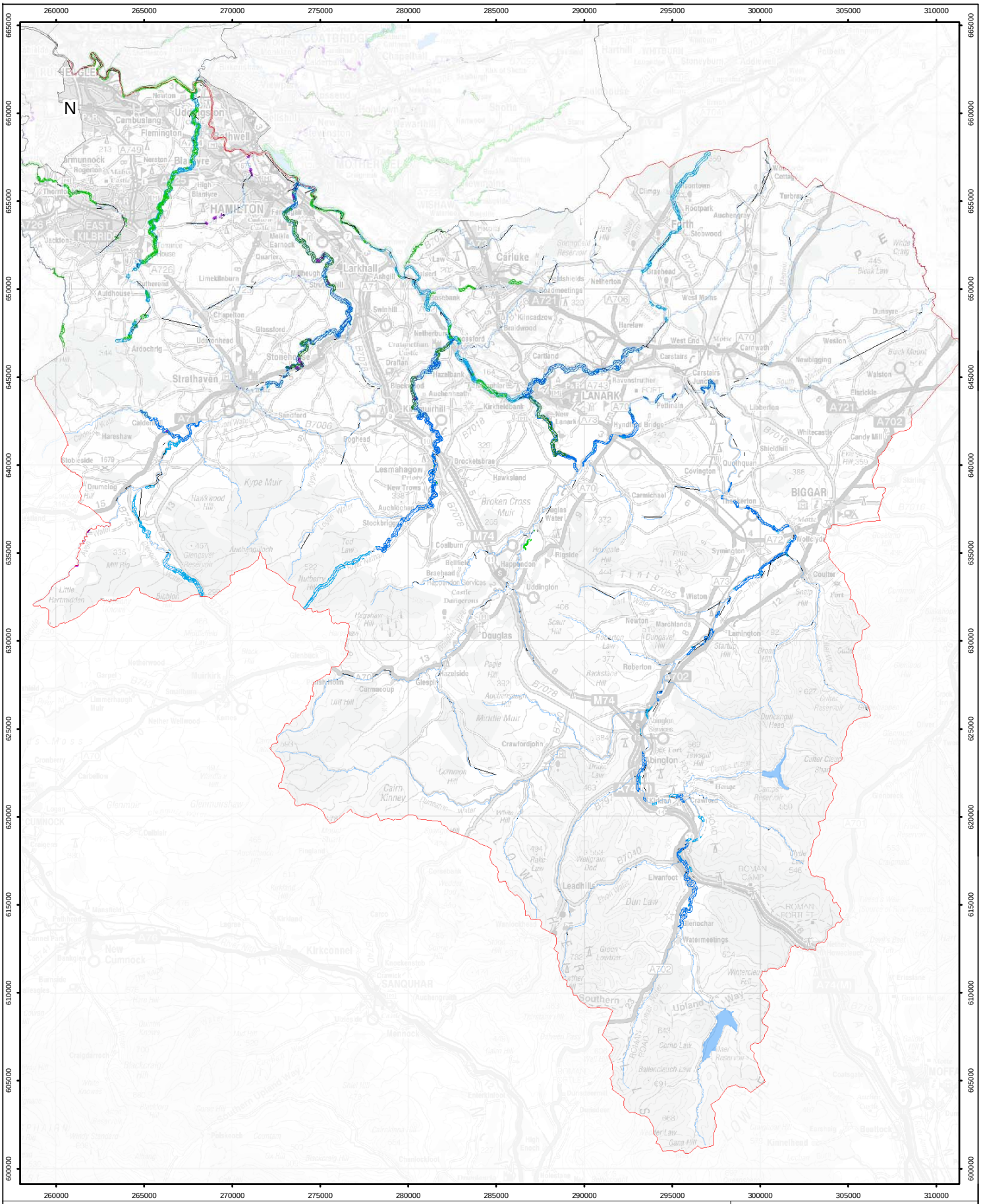
G:\MODEL\PROJECTS\HM-255\25755 Clyde Ecological Networks\ArcGIS\Figures\report figures\S38_Fig3.13 Renfr Steps 3+4.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.13
Screening Steps 3 and 4:
Renfrewshire

June 2010
25755-S38 musgh

Entec



Key:

- Bankside engineering structures
- Rivers

Screened areas, where habitat networks coincide with the following pressures:

- Morphology (Step 3)
- Morphology (Step 4)
- Urban diffuse pollution (Step 3)
- Urban diffuse pollution (Step 4)
- Riparian pressures (diffuse pollution or morphology) (Step 3)
- Riparian pressures (diffuse pollution or morphology) (Step 4)

0 7,500 Metres

Scale: 1:200,000 @ A3

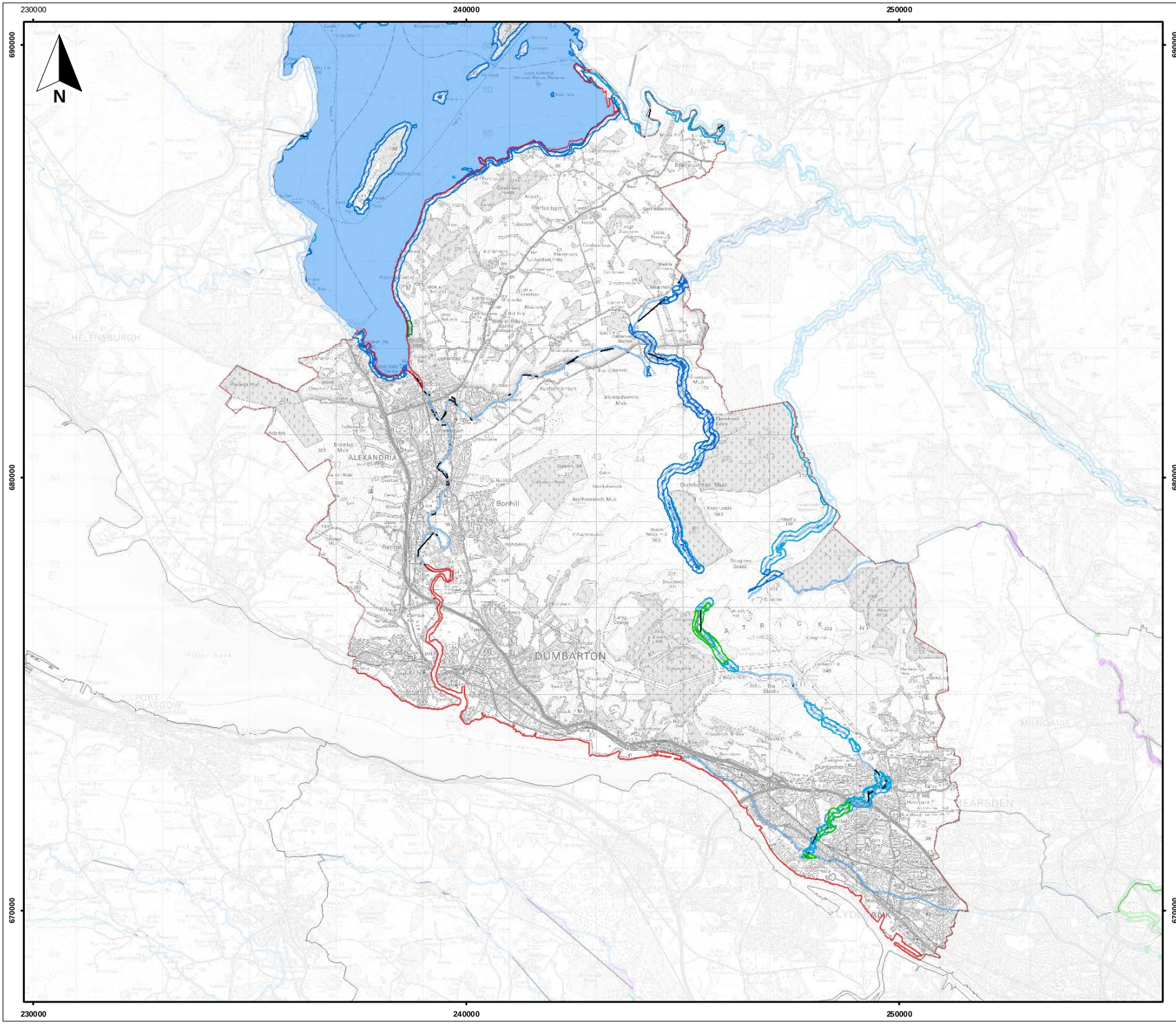
G:\MODEL\PROJECTS\HM-255\25755 Clyde Ecological Networks\ArcGIS\Figures\report figures\S41_Fig3.14 SLan Steps 3+4.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.14
Screening Steps 3 and 4:
South Lanarkshire

June 2010
25755-S41 musgh

Entec



Key:

- Bankside engineering structures
- Rivers

Screened areas, where habitat networks coincide with the following pressures:

- Morphology (Step 3)
- Morphology (Step 4)
- Urban diffuse pollution (Step 3)
- Urban diffuse pollution (Step 4)
- Riparian pressures (diffuse pollution or morphology) (Step 3)
- Riparian pressures (diffuse pollution or morphology) (Step 4)

0 2,500 Meters

Scale: 1:85,000 @ A3

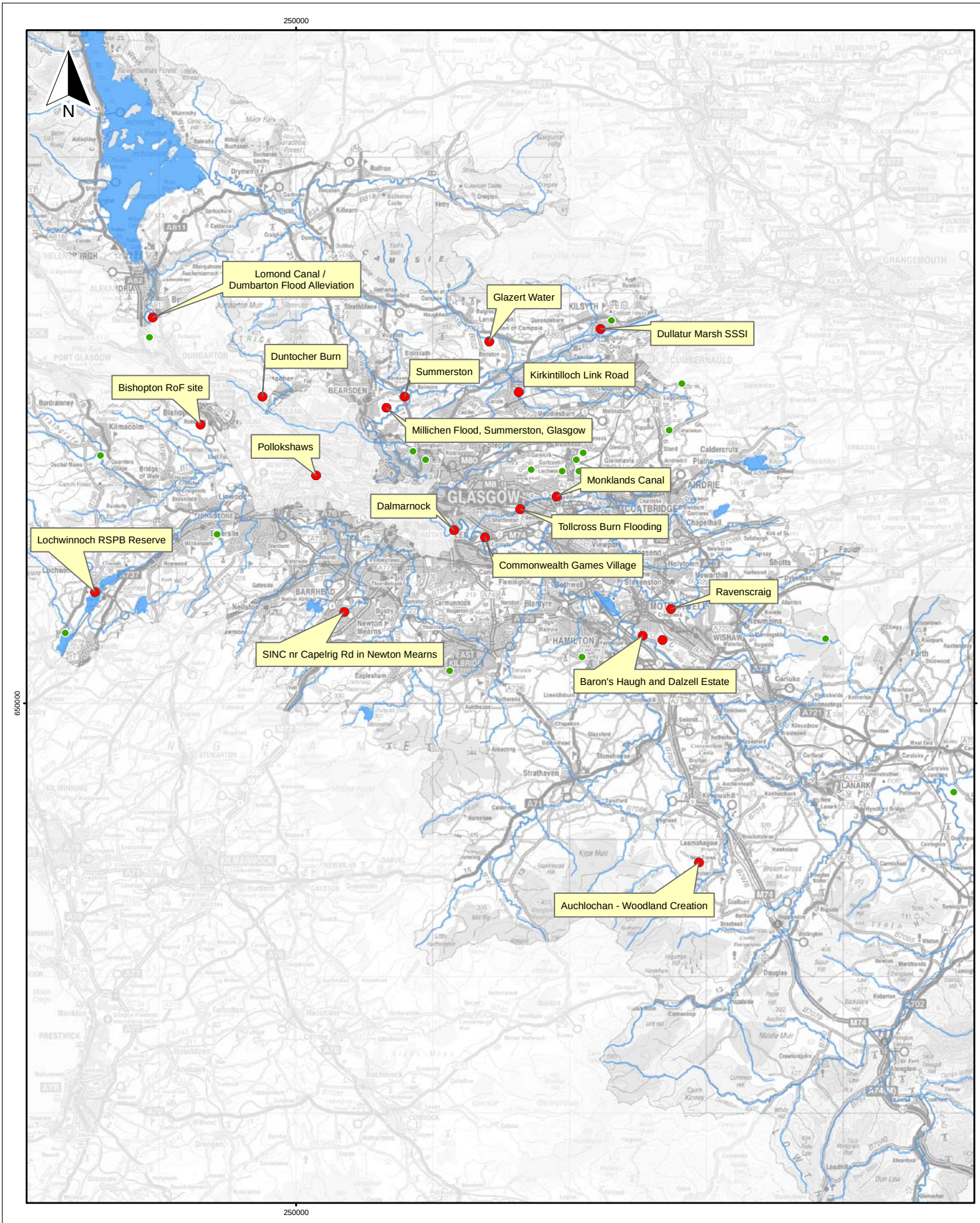
G:\MODEL\PROJECTS\HM-255\25755 Clyde Ecological Networks\ArcGIS\Figures\report figures\S39_Fig3.15 WDunb Steps 3+4.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.15
Screening Steps 3 and 4:
West Dunbartonshire

June 2010
25755-S39 musgh

Entec



Key

- Sites intersecting screening
- Other sites suggested at workshop
- Waterbody

0 5 10 Km

Scale: 1:260,000 @ A3

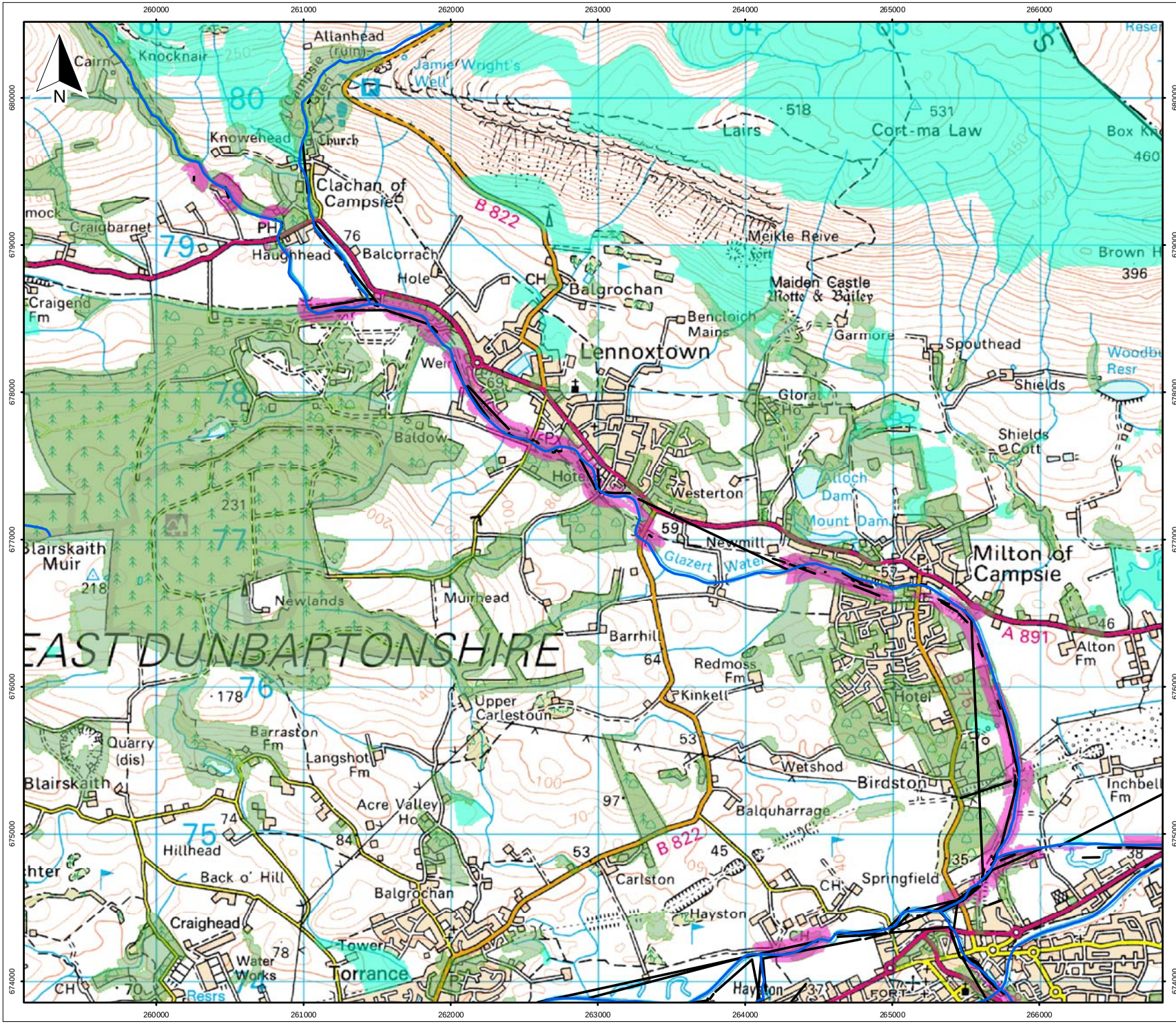
G:\MODEL\PROJECTS\HM-255\25755 Clyde Ecological Networks\ArcGIS\Figures\report figures\S50_Fig3.16 workshop sites.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 3.16
Workshop sites

July 2010
25755-S50 musgh

Entec

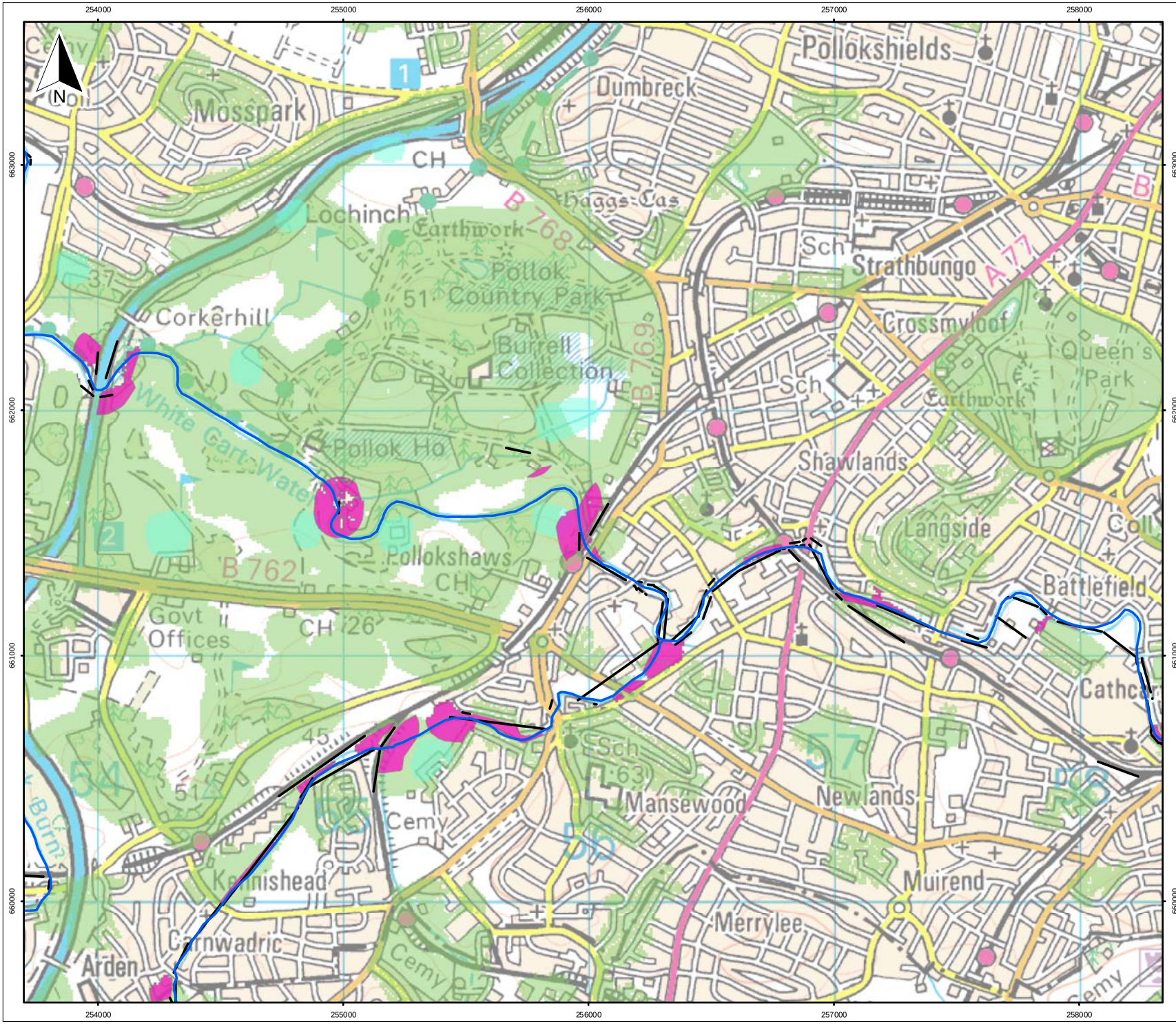


Ecological Networks and River Basin Management Planning: Clyde pilot study

Figure 4.1
Glazert Water

July 2010
25755-B56 musgh

Entec



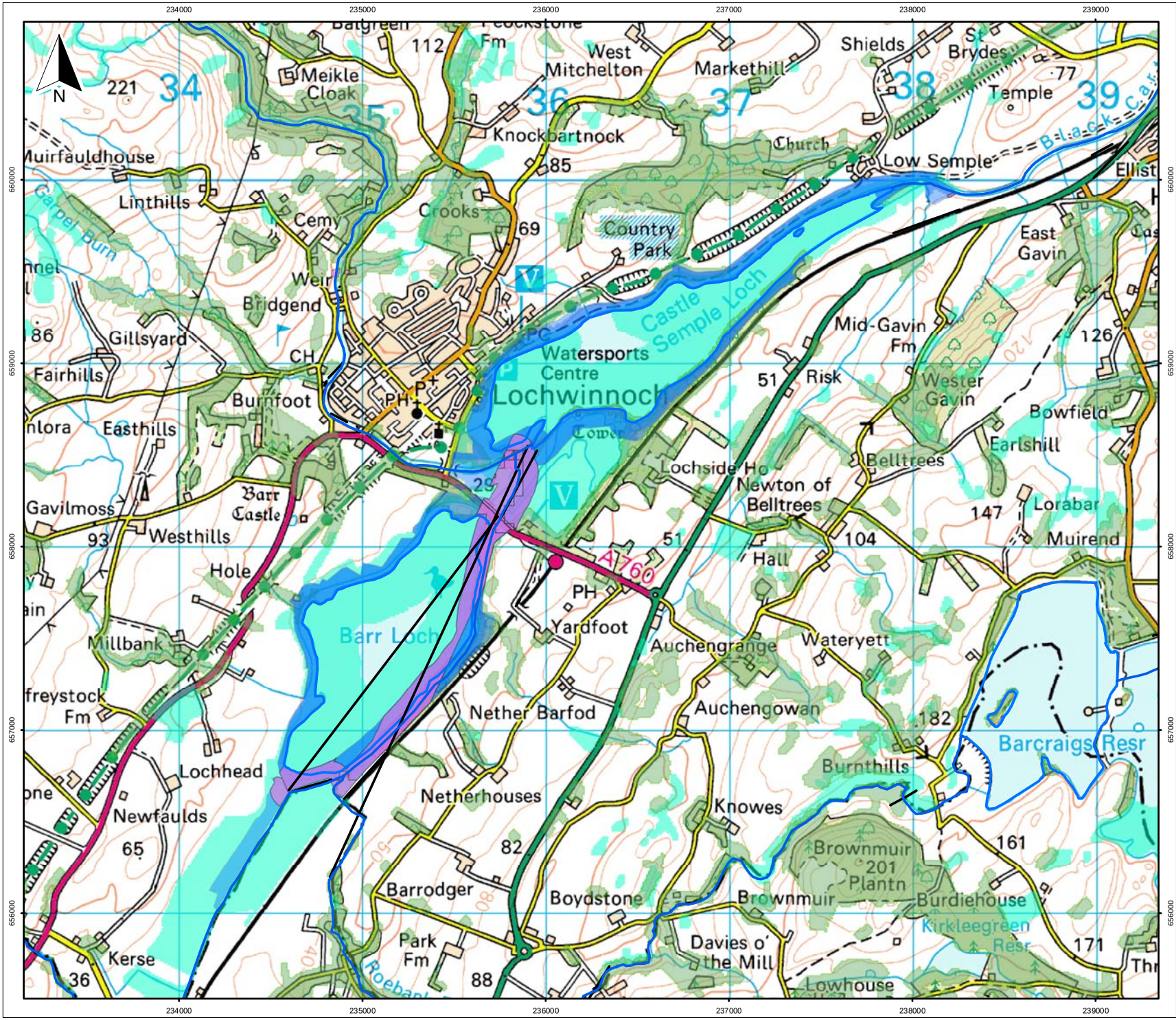
H:\Projects\HM-255\25755 Clyde ecological networks\drawings\project report\25755B52 Pollokshaws.mxd

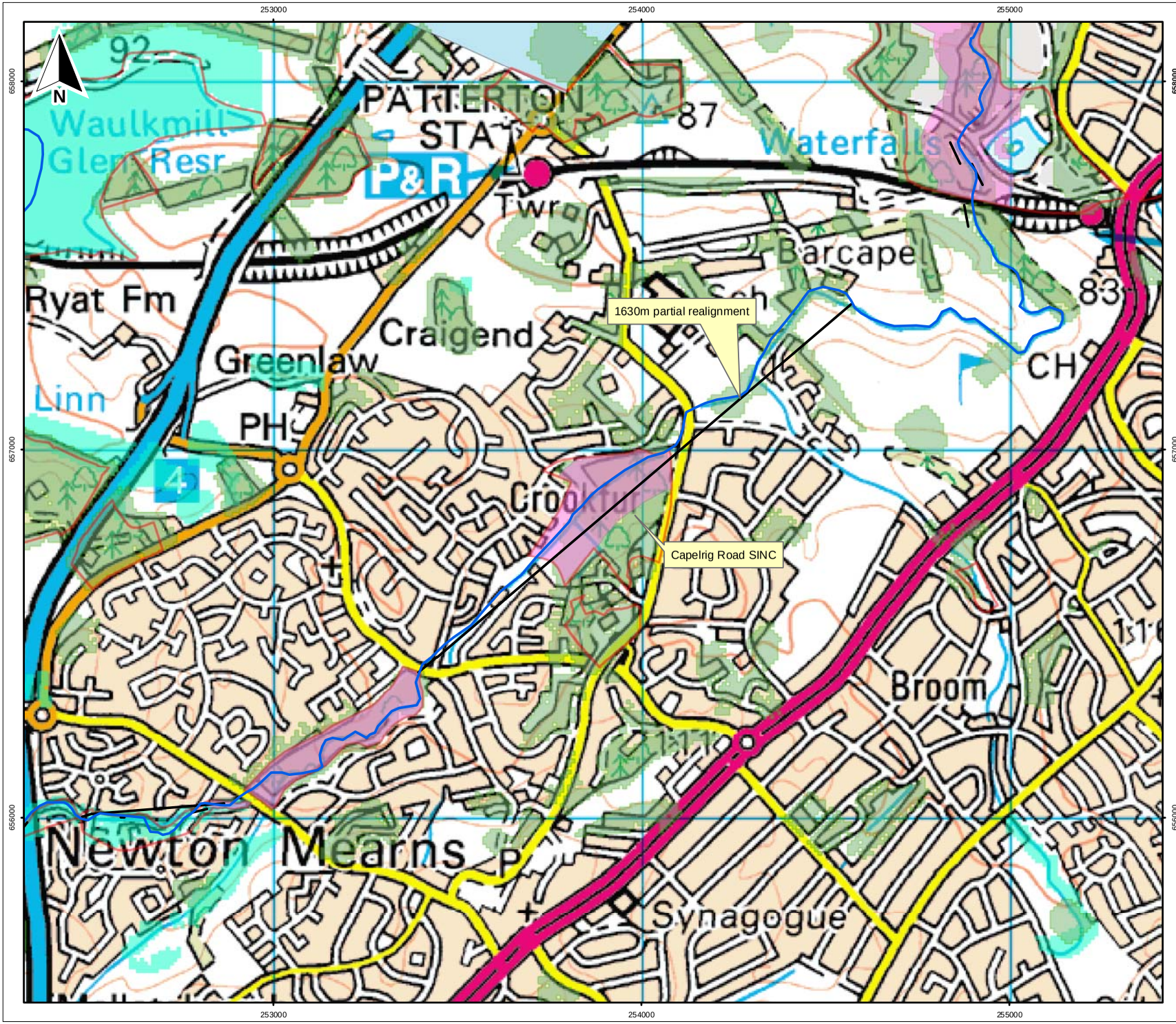
Ecological Networks and River Basin Management Planning: Clyde pilot study

Figure 4.2
Pollokshaws

July 2010
25755-B52 musgh

Entec





Key:

- Woodland 500m network
- Wetland 500m network
- Morphology screening
- E.Renfrewshire SINCs
- Morphology pressures

Scale: 1:10,000 @ A3

H:\Projects\HM-255\25755 Clyde ecological networks\drawings\project report\25755B54 Capelrig.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 4.4
Capelrig Road SINC

June 2010
25755-B54 musgh

Entec

Key:

- Woodland 500m network
- Wetland 500m network
- Wetland- rural diffuse pollution screening
- Woodland- rural diffuse pollution screening
- Morphology pressures

0 500 1,000 Meters

Scale: 1:35,000 @ A3

H:\Projects\HM-255\25755 Clyde ecological networks\drawings\project report\25755B55 Auchlochan.mxd

Ecological Networks and River Basin Management Planning: Clyde Pilot Study

Figure 4.5
Auchlochan

June 2010
25755-B55 musgh

Entec

Appendix A
GIS Methodology

PRE-PROCESSING

- Buffer rivers to 1m to convert them from polyline to polygon.
    - Remove overlaps between buffered rivers and loch waterbodies.

    Ensures that no lochs are mistakenly identified.

- Merge with loch waterbodies shapefile to create a combined waterbodies dataset.

    Reduces processing time

- Buffer combined waterbodies to 100m.

    Sets areas of interest

- Clip IHN 2km Networks to the 100m buffered combined waterbodies.

    Removes unnecessary and excess regions and reduces processing time

- Dissolve each IHN separately and explode to remove overlaps and ensure 'unique' areas.

- Opportunity Areas:
    - For each individual dataset, create a unique reference field, a source field and a class field. This creates a 'paper trail' once the analysis is complete so that it can be traced back if needed.
    - Enumerate the datasets so that any overlapping areas are identified and recorded.
    - Union the files together. This gives a combined opportunity areas dataset.

    Reduces processing time and repetition of analysis

- Buffer Identified Workshop Sites to 500m.

- Join the spreadsheet 'd17 clyde rbmp combined data_v#.xls' to the combined waterbodies.

SCREENING 1 – FAILING ON MORPHOLOGICAL ALTERATIONS

- Select combined waterbodies where:
    - [Improvement_needed_for_2027] = 'FAIL' *(or Y)*

    AND

    - [Morphological Alterations] = Y

- Select the clipped IHNs that intersect these failing combined waterbodies.

- Clip the opportunity areas to the selected clipped IHNs.

- Create a selection from the buffered morphological structures that apply to the failing combined waterbodies.

- Clip the opportunity areas again, except this time to the selected buffered morphological structures.

SCREENING 2 – FAILING ON DIFFUSE POLLUTION

- Select combined waterbodies where:
    - [Improvement_needed_for_2027] = FAIL *(or Y)*

    AND

    - [Diffuse_Source_Pollution] = Y

- Select the clipped IHNs that intersect these failing combined waterbodies.

- Clip the opportunity areas to the selected clipped IHNs.

SCREENING 3 – NON-URBAN LAND MANAGEMENT MEASURES

- Select combined waterbodies where:
    - [Improvement_needed_for_2027] = 'FAIL' *(or Y)*

    AND

    - [Measure_for_non_urban_land_management_measure] = 'non-urban land management measures'

    OR

    - [Measure_to_improve_riparian] = 'Improvement to condition of riparian zone and/or wetland habitats'

- Select the clipped IHNs that intersect these failing combined waterbodies.

POST-PROCESSING AND SPREADSHEET WORK

For each resulting screening output, the following steps are required:

- Explode output to separate polygons; ensuring that they are unique, standalone sites.

- Add the following fields to each output:
    - [SUB_REF] *(text, 40 length)*
    - [WB_ID] *(long integer)*
    - [WBUPSTREAM] *(long integer)*
    - [IN_2KMIHN] *(text, 25 length)*
    - [IN_500IHN] *(text, 25 length)*
    - [SPECIAL_IHN] *(text, 25 length)*
    - [WORKSHOP] *(text, 25 length)*
    - [FLOODING] *(text, 25 length)*

- Intersect the outputs with Clyde_interactive_catchments to get one waterbody ID per site.
    - Use field calculator in ArcGIS to update [WB_ID].

- Export the following fields to excel:
    - [FID]
    - [OA_REF]
    - [SUB_REF]

- Using the spreadsheet !Child_ID_Creator.xls:
    - Populate the [SUB_REF] field by pasting in the [FID] and [OA_REF] values.
    - Sort using the [SORT1] and [SORT2] fields.
    - Save the [FID] & [SUB_REF] columns to a new spreadsheet.
    - Join this spreadsheet to the output file, using the [FID] field. Use field calculator to update [SUB_REF] field.

- Perform a spatial join on the output file with Clyde_nested_catchments.
    - Using field calculator, update [WBUPSTREAM] with the joined [OVLP_CNT] field.

- For the fields [IN_2KMIHN], [IN_500MIHN] and [FLOODING] do a select by location query on the relevant dataset: (either IHN 2km General Wetland, IHN 500m General Wetland or Flooding_200year)
    - If intersects then = 'Partially'
    - If it is completely within = 'Completely'

- For [SPECIAL_IHN], do select by location using Broadleaved_2km_network and Ancient_Broadleaved_2km_network:
    - If intersects broadleaf = 'Broadleaf'
    - If intersects Ancient Broadleaf = 'Ancient and Broadleaf'

- For [Workshop] do select by location query using Identified_Workshop_Sites_500mBuffer:
    - If intersects = 'Yes'

- Re-sort shapefiles using the order:
    - [Class] > [Source] > [SUB_REF]

- Final output files from screenings 1 and 2 should have the following fields:
    - [OA_Ref], [SUB_REF], [Class], [Source], [Overlap1], [Overlap2], [WB_ID], [WBUPSTREAM], [In_2kmIHN], [In_500mIHN], [SpecialIHN], [Workshop] & [Flooding].

- Final output files from screening 3 should have the following fields:
    - [IHNWet_REF], [SUB_REF], [WB_ID], [WBUPSTREAM], [In_2kmIHN], [In_500mIHN], [SpecialIHN], [Workshop] & [Flooding].

- Using these final output files, use spreadsheets 'd17 clyde rbmp combined data_v#.xls', 'data extracted 2009-10-06 WB_Objectives_pressures_measures.xls', 'July_2009_pressures_concatenated.xls' and 'priority catchments.xls' to complete each screening.

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Creating the environment for business

Appendix B
Workshop 3rd December 2009

Introduction

A workshop was held at Glasgow Concert Hall on 3rd of December 2009. The aims of the workshop were:

- To identify priorities for selecting sites/areas for the achievement of multiple benefits (this will ensure development of a positive framework for future use of this pilot study throughout Scotland);
- To obtain local input to identifying potentially relevant sites/areas (to ensure development of achievable and effective opportunities for the Clyde valley);
- To obtain details of relevant datasets (to ensure use of the best available data for the Clyde valley); and,
- To provide opportunities for networking and establishment of working relationships (to ensure effective collaboration between partners in the Clyde valley).

Workshop Attendees

Table B1 lists the invitees to the workshop and identifies those who attended.

Table B1 Workshop Invitees

Name	Organisation	Attended
Alan Anderson	Scottish Wildlife Trust	
Alan Trainer	National Farmers Union Scotland	
Alan Williamson	West Dunbartonshire Council	
Alex Norton	Coal Authority	
Alistair Gemmell	West Dunbartonshire Council	Y
Ally Corbett	GCVGNP	Y
Andrew Jarrott	Forestry Commission Scotland	
Arthur Keller	SNH	Y
Brian Shaw	Ayrshire Rivers Trust	
Calum McPhail	SEPA	Y
Carlow Van Heddegem	Doon Salmon Fisheries Board	
Carmel Rowlands	Loch Lomond and Trossachs NP	
Carol MacLean	Glasgow City Council	
Catherine Scott	Glasgow City Council	
Cathy Johnston	Glasgow City Council	

Table B1 (continued) **Workshop Invitees**

Name	Organisation	Attended
David Cranstoun	Scottish Rural Property and Business Association	
D Crookall	Scottish and Southern	
David Reid	South Lanarkshire Council	
Doug Buchan	Scottish Water	Y
Emilie Wadsworth	Central Scotland Forest Trust	Y
Fiona Stewart	SNH	Y
Fiona Watt	Scottish Government	Y
Francesca Pandolfi	Glasgow City Council	
Frank Bradley	Renfrewshire Council	
Fraser Williamson	Inverclyde	
Geoff Foord	Glasgow City Council	Y
George Rattray	SEPA	Y
Gerry McAllister	Scottish Water	
Gillian Telfer	East Dunbartonshire Council	Y
Graham Morgan	Entec	Y
Gregor Caldwell	SGRPID	Y
Gwenda Diack	Loch Lomond and Trossachs NP	Y
Hans Schutten	SEPA	
Heather Musgrave	Entec	Y
Iain Gibson	Glasgow City Council	Y
Iain Hossack	North Ayrshire Council	Y
Ian Johnson	Joint Ayrshire Structure Plan	
Jenny Gough	Renfrewshire Council	
Jim Coyle	Glasgow City Council	
Jimmy Hislop	SNH	
Joanne Gilvear	SEPA	Y
Heather Musgrave	Entec	Y
John Crawford	Policy Manager, Scottish Enterprise	
John Donnelly	SEPA	

Table B1 (continued) **Workshop Invitees**

Name	Organisation	Attended
John Farrell	Forestry Commission Scotland	
Jonathan Hughes	Scottish Wildlife Trust	
Julia Stubbs Partridge	SNH	
Julie Nicol	East Renfrewshire Council	
Kate Arnold	SEPA	Y
Katriona Finan	SEPA	Y
Keith Watson	Glasgow City Council	
Keith Wishart	Forestry Commission Scotland	
Kirsty Blackstock	Macaulay Institute	
Lady Isabel Glasgow	Firth of Clyde Forum	
Laura Whyte	North Lanarkshire Council	
Liz Humphreys	BTO	
Louise Bond	SEPA	Y
Malcolm Muir	South Lanarkshire Council	Y
Mark Forrest	North Lanarkshire Council	
Martin Mckay	Clyde Gateway Urban Regeneration Company	
Max Hislop	GCVGNP	Y
Michelle Carroll	Glasgow and Clyde Valley SDP	Y
Mike Crichton	East Renfrewshire Council	
Mike Smith	Forest Research	Y
Neil McLean	SEPA	Y
Nigel Wallace	Ayrshire Rivers Trust	Y
Olivia Lassiere	British Waterways	Y
Peter Donaldson	Scottish and Southern Electric	
Petrina Brown	Renfrewshire Council	Y
Phil Baarda	SNH	
Philip Wilson	SEPA	Y
Richard Callender	East Dunbartonshire Council	
Richard Jefferies	SEPA	
Robert Kerr	SEPA. Chair of Clyde AAG	
Roger Horne	Clyde Port PLC	

Table B1 (continued) **Workshop Invitees**

Name	Organisation	Attended
Ron Bailey	Clyde Port PLC	
Ross Johnson	SNH	
Sandy Gillon	Glasgow City Council	
Sarah Gillman	Scottish Water	
Scot Mathieson	SEPA	Y
Sian Williams	South Lanarkshire Council	Y
Stuart McMillan	South Lanarkshire Council	
Stuart Tait	GCV Strategic Development Plan	
Suzanne Martin	Forestry Commission Scotland	
Sybil Johnson	Argyll and Bute Council	
Toby Wilson	RSPB	Y
Tommy McGrory	Forestry Commission Scotland	Y
Tony King	Scottish Wildlife Trust	Y
Vicky Abernethy	North Lanarkshire council	Y
Willie Yeomans	Clyde River Foundation	
Zoe Clelland	RSPB	

Datasets

The workshop attendees were split in to five discussion groups. During the discussion session, the groups first discussed datasets that may be useful to the study, and secondly discussed appropriate methodology and derivation of case studies. Table B2 shows the datasets that were suggested as potentially being of use. The table does not include datasets already obtained (a list of which was provided at the start of the workshop).

Table B2 Additional datasets

Dataset	Coverage	Purpose	Source
Diffuse pollution priority catchments	National	Priority areas for tackling diffuse pollution	SEPA
Datasets that fed into IHN in the progress of being updated	Clyde study area	Revised IHN	FR/GCVGN- not yet complete
IHN	Loch Lomond and Trossachs National Park	This area can now be included in the study area	FR/GCVGN
LiDAR	National but not complete coverage	Flood modelling/ inform alleviation of flood pressures	Local councils/Scottish Government
Scheduled Ancient Monuments	National		
Cycle networks/access			
Waste and mining sites	National	Identifying point source pressures	SEPA/ Coal Board
SUDs- existing schemes		Use for illustration/ expand existing schemes	Scottish Water
Existing flood schemes (esp. sustainable flood man.)		Use for illustration/ expand existing schemes	SEPA
Agricultural land use	National	Identifying diffuse pollution opportunities	Macaulay Inst
Transport infrastructure (roads/railways)		Identify green corridors; opportunities	
Sewer catchment areas (separate and combined)		Informing SuDS opportunities	Scottish Water
Aerial photography	National		Google Earth etc
Woodland datasets 'spaces for people'	National	Identify habitat extents	Woodland Trust (Gill Calder?)
SRDP new habitats	National	Identify areas that are/are not under agricultural scheme	Scottish Government
SRDP priorities	National	Identify funding opportunities	Scottish Government
Existing initiatives of voluntary groups	Clyde	Existing initiatives- use for illustration	
Open space	GCV; LAs		GCVGNP For GCC-Morris Frize
Community growth areas	National by LA	Up to date data	LAs
Access strategy- core path plan and waterway users	By LA area		
SWT and RSPB reserves	National	Identify existing habitats	SWT and RSPB

Discussion of Methodology

The following points and opinions were fed back or recorded from the discussion groups, regarding the aims, methodology and process:

- The method is not just screening (i.e. not all about trying to get rid of sites)- also about ranking/prioritisation. Having a case study bank was suggested as being useful, which could include a traffic-light ranking system: green for quick wins, amber for medium term or ones that could become green if resources etc permit, red for long term aims;
- Value ranking mechanisms already exist for biodiversity (based upon designated sites e.g. international>national>region>county>district>local). Can these be applied to the project?
- There were suggestions that case studies delivering multiple benefits should be prioritised (e.g. to access and landscape). However area-specific priorities also need to be considered, mean that the options with the 'most' benefits may not necessarily be chosen;
- Encompass a range of sites/case studies e.g. urban, urban fringe and rural; range of pressures; at a range of spatial scales;
- Identify measures that combat a number of pressures or pressures that can be addressed by a single measure while at the same time delivering multiple benefits.
- Some attendees felt that 'case studies should achieve planning gain'. However although this is important we do not expect it to universally be the case. In some cases the types of sites being addressed and projects proposed may not be planning related but will still achieve the direct benefits desired
- Encompass known threats;
- Critical to involve/get 'buy in' from landowners and NGOs to ensure case studies are successful. Implementation of RBMP will need to look at future delivery partners via AAGs;
- Invasive species- need to consider the potential that spread of INNS could actually be enhanced by enhancing networks;
- Need some quick wins to show benefits of the project. Temporary interventions should be considered as well as longer term more involved projects;
- Start with projects that will generate political goodwill/inertia – e.g. council-managed land such as parks. Tie in with existing local groups;
- Habitat creation tied in with IHN, flood alleviation schemes, flow of water through catchment;
- Tie in with existing projects/initiatives – e.g. community growth areas;
- Varying ideas about what the main focus should be- different thoughts about morphology, invasive species, fish barriers and in-river issues such as culverts

- Areas allied to defined funding streams, e.g. priority catchments;
- Reality check of data using – has to tie win with willing landowners, funding mechanisms such as SRDP, and be cost effective. Identify funding routes for future case studies. Key elements for good case studies- money, landowners, key partners, timeframe, RBMP;
- Good practice in case studies: Use forest +water guidelines. Look at River Restoration Centre for examples of good practice and identifying specific effective measures;
- Three is not enough case studies. Three is all that can be accommodated in the project, but the purpose is to develop a ranked list that can be used in to the future and will allow more flexibility and other studies to be carried out later on;
- Needs to address how this model can influence/ drive policy;
- Spatial differences in flooding- flood risk downstream- look to hold water higher in the catchment;
- Provide a method for dataset updates.

Mapping Session

A mapping session was held, in which participants were invited to mark the location of potentially relevant sites on a map and then provide further information relating to the site. The information obtained from the session is collated in Appendix E.

Appendix C
Datasets

Date received	Method of recei	Source	Sender	Contact	Name	Description of data	Format	Licence	Files
30/07/2009	CD	Forest Research	Ally Corbett, GCVGN	Ally Corbett	IHN outputs	Shapefiles with outputs from IHN project. For each habitat type there are 4 files: 1. 500m habitat 2. 500m network 3. 2km habitat 4. 2km network (note 1 and 3 are actually identical). Networks for each habitat are also summarised in to three generic types: wetland, woodland and grassland	esri shapefiles		ancient_broadleaved_2km_habitat.shp Ancient_Broadleaved_2km_network.shp Ancient_Broadleaved_500m_habitat.shp Ancient_Broadleaved_500m_network.shp broadleaved_2km_habitat.shp broadleaved_2km_network.shp broadleaved_500m_habitat.shp broadleaved_500m_network.shp grassland_generalist_2km_habitat.shp grassland_generalist_2km_network.shp grassland_generalist_500m_habitat.shp grassland_generalist_500m_network.shp low_grassland_2km_habitat.shp low_grassland_2km_network.shp low_grassland_500m_habitat.shp low_grassland_500m_network.shp lowacid_2km_habitat.shp lowacid_2km_network.shp lowacid_500m_habitat.shp lowacid_500m_network.shp mineral_wetland_2km_habitat.shp mineral_wetland_2km_network.shp mineral_wetland_500m_habitat.shp mineral_wetland_500m_network.shp peat_wetland_2km_habitat.shp peat_wetland_2km_network.shp peat_wetland_500m_habitat.shp peat_wetland_500m_network.shp upacid_2km_habitat.shp upacid_2km_network.shp upacid_500m_habitat.shp upacid_500m_network.shp upland_grassland_2km_habitat.shp upland_grassland_2km_network.shp upland_grassland_500m_habitat.shp upland_grassland_500m_network.shp wetland_generalist_2km_habitat.shp wetland_generalist_2km_network.shp wetland_generalist_500m_habitat.shp wetland_generalist_500m_network.shp woodland_generalist_2km_habitat.shp woodland_generalist_2km_network.shp woodland_generalist_500m_habitat.shp woodland_generalist_500m_network.shp
28/08/2009	zip files by email	via GCVGN	Ally Corbett, GCVGN	Ally Corbett	Community Growth Areas Vacant and derelict land	Designated community growth areas covering the Clyde valley Land designated as vacant or derelict in the Clyde valley. All 2008 data: 2009 file is blank	esri shapefiles esri shapefiles		GCVCORE_DBO_CGAs.shp LAND_SUPPLIES_DBO_VDL2008.shp LAND_SUPPLIES_DBO_VDL2009.shp
12/11/2009	CD	via GCVGN	Ally Corbett, GCVGN	Ally Corbett	Local plan allocation sites	Allocation sites for all LAs in the Clyde valley. May be out of date- data believed to be at least 2 years old	esri geodatabase		Local_Plans.gdb
08/10/2009	shapefiles by em	East Dunbartons	Catherine Mullen, EDC	Gillian Telfer, EDC	East Dunbartonshire local wildlife data	Local wildlife site data including SINCs, SSSIs, and wildlife corridors.	esri shapefiles	One-Scotland mapping agreement	IMP NATURE CONS SITES.shp important wildlife corridors.shp sincs_2007.dbf sssi.shp
10/11/2009	zipfile by email	Renfrewshire Co	Sean Culpan, RC	Petrina Brown, RC	Renfrewshire SINCs	Site of Importance to Nature Conservation (SINCs) and Local Nature Reserves (LNR) in Renfrewshire	esri shapefile	One-Scotland mapping agreement	lnr.shp sinc.shp
14/10/2009	shapefile by ema	North Lanarkshir	Laura Whyte, NLC	Laura Whyte, NLC	North Lanarkshire SINCs	Sites of Importance for Nature Conservation in North Lanarkshire	esri shapefile	One-Scotland mapping agreement	SINC- amendments 08NEW.shp
09/09/2009	CD	SEPA	Katriona Finan, SEPA	Katriona Finan, SEPA	draft RBMP classifications	Classifications from the draft River Basin Management Plan, for all waterbody types. This has been superseded by the final RBMP data	excel files		1_RIVER_Signed-off_classn_241108.xls 2_LOCH_Signed-off_classn_240908.xls 3_TRANSITIONAL_Signed-off_classn_140708.xls 4_COASTAL_Signed-off_classn_140708.xls 5_GROUNDWATER_Signed-off_classn_240908.xls
10/09/2009 (re-s	email	SEPA	Louise Bond, SEPA (re-sent	Katriona Finan, SEPA	final RBMP classifications	final classifications from the River Basin Management Plan, for all Clyde waterbodies.	excel and word files		Clyde_aag_classn_data_100909.xls Doc34.doc
06/11/2009	zip file by email	SEPA	Dominic Habron, SEPA	Richard Jeffries, SEPA	Morphological alterations database	Database identifying location and length of a range of morphological alterations (structures and channel modifications). This database does not include the riparian vegetation modifications	esri geodatabase		Morphology_Pressures_DB.gdb
14/10/2009	zip files by email	SEPA	Dominic Habron, SEPA	Katriona Finan, SEPA	River waterbodys Clyde catchment	Shapefiles identifying the location of main river waterbodies (As defined in the RBMP) in the Clyde catchment. Attribute data relating to classification should NOT be used- only use waterbody IDs Shapefile of Clyde catchment boundary (main river catchment only, not including the estuary)	esri shapefile esri shapefile	Sub-contractors licence agreement s	River_water_bodies.shp Clyde_Catchment.shp
27/08/2009	zip files by email	SEPA	Katriona Finan, SEPA	Katriona Finan, SEPA	Non-river waterbodies	Shapefiles identifying loch, transitional and coastal waterbodies, as defined in the RBMP	esri shapefiles		Coastal_water_bodies.shp Loch_water_bodies.shp transitional_water_bodies.shp

06/10/2009	email	SEPA	Katriona Finan, SEPA	Katriona Finan, SEPA	Clyde objectives, pressures and measur	Final RBMP data for Clyde waterbodies. Includes objective statuses for all waterbodies (2015, 2021 and 2027), pressures, and measures identified for each waterbody	excel file		data extracted 2009-10-06 WB_Objectives_pressures_measures.xls
08/09/2009	downloaded from	SNH	internet, downloaded by Hea	Phil Baarda, SNH	Nature conservation designations	Scotland Ancient Woodland Inventory	esri shapefile		awi_v3.shp
						Biosphere reservese- designated by SNG to promote conservation of biodiversity with sustainable use	esri shapefile		BIOSPH_SCOTLAND.shp
						Country parks, designated by LAs (non-statutory)	esri shapefile		CNTRYPK_SCOTLAND.shp
						Local Nature Reserves	esri shapefile		LNR_SCOTLAND.shp
						National Nature Reserves, designated under National Parks and Access to the Countryside Act 1949, and Wilflife and Countryside Act 1981	esri shapefile		NNR_SCOTLAND.shp
						National Parks, established under the National Parks (Scotland) Act 2000	esri shapefile		NP_SCOTLAND.shp
						European designated Special Areas of Conservation	esri shapefile		SAC_SCOTLAND.shp
						Semi-natural woodland inventory. Contains information obtained from remote sensing during the 1970s- may be out of date	esri shapefile		snawi_v3.shp
						European designated Special Protection Areas	esri shapefile		SPA_SCOTLAND.shp
						Sites of Special Scientific Interest. DEsignated under National Parks and Access to the Countryside Act 1949, mostly re-notified under Wildlife and Countryside Act 1981	esri shapefile		SSSI_SCOTLAND.shp
						On-shore windfarm proposals in the public domain. Not comprehensive and may not be up to date	esri shapefile		WINDFARM_Proposals.shp
26/11/2009	email	SNH	Brian Eardley, SEPA	Brian Eardley, SEPA	Designated sites feature condition within	Summary of site condition for all designated sites within the Clyde AAG area	excel file		Designated Sites Feature Condition within Clyde Area Advisory Gro.xls
30/11/2009	email	South Lanarkshir	Chris Waltho, South Lanarks	Chris Waltho, South Lana	South Lanarkshire SINCS	SINCs in South Lanarkshire- only covers northern parts of the authority area. Piecemeal data from previous authorities. c 1991. To be reviewed and updated in near future by the council	esri shapefile		SINCs EDIT09.shp
21/12/2009	email	SWT	Gill Dowse, Biodiversity data	Gill Dowse, Biodiversity da	SWT Clyde reserves	SWT reserves in the Clyde valley	esri shapefile		ClydeValleyGreenNetwork_SWT_reserves.shp
21/12/2009	email	RSPB	Clare Bunyard, RSPB	Clare Bunyard, RSPB	RSPB Clyde reserves	RSPB reserves in the Clyde valley- separate files for each site (Baron's Haugh, Lochwinnoch, Inner Clyde, Horse Island and Fannyside)	MapInfo files		BaronsHaugh.TAB Fannyside.TAB HorseIsland.TAB InnerClyde.TAB Lochwinnoch.TAB
24/12/2009	email	SEPA	Kevin Paterson, SEPA	Kevin Paterson, SEPA	Former waste sites	List of former waste sites in Scotland (from 2004)	excel file		2004 Landfill sites.xls
06/01/2010	email	West Dunbartons	Craig Valentine, W.Dunb cou	Craig Valentine W.Dunb/ (	West Dunbartonshire local nature sites	SINCs in West Dunbartonshire	esri shapefile		E3A.shp
						LNRs in West Dunbartonshire	esri shapefile		E3B.shp
07/01/2010	email	Glasgow City Co	Fiona Hunter, GCC	Francesca Pandolfi, GCC	Glasgow City Council SINCS	SINCS in Glasgow	esri shapefile	One-Scotland mapping agreement	GCC_City_Plan_2_SINCS.shp
18/01/2010	email	SEPA	Stuart Wilson, SEPA	Stuart Wilson/ Dominic Ha	RBMP catchments	Two versions of catchments- unique and nested. Unique shows only catchment area	esri shapefiles		Clyde_interactive_catchments.shp Clyde_nested_catchments.shp
20/01/2010	email	SEPA	Jonathan Bowes, SEPA	Jonathan Bowes/ Katriona	Clyde AAG priority catchments	Diffuse pollution impacted waterbodies (mostly related to livestock farming and bathing waters directive- Ayr catchments)	esri shapefiles		Clyde_AAG_impacted_DP_WBs.shp
						Baseline catchments containing the priority catchments	esri shapefiles		Clyde_AAG_baseline_PCs.shp
						Database detailing priority catchments	esri geodatabase		Clyde_AAG_DP_impacted_WBs_2008.dbf
25/01/2010	email	SNH	Fiona Stewart	Fiona Stewart, SNH	Phase 1 metadata	Metadata of digitised PHase 1 data included in SNH's shapefiles	excel file		Habitat surveys - Metadata for S&A surveys - 30 January 2007.xls
20/01/2010	CD	SEPA	Louise Bond, SEPA	Louise Bond/ Lorna Harris	WFD66 outputs	Shapefiles showing outputs of WFD66 for Clyde valley (land use and wetland classification)	esri files		WFD66_LAs.shp WDF66_LAs_Clip.shp Clyde wetlands.gdb Wetlands Dependency metadata.rtf
27/01/2010	email	SNH (via SEPA)	Stuart Wilson, SEPA	Lorna Harris/ Stuart Wilso	Spatial NVC data	Spatial NVC data for the Clyde valley. Data originates from SNH. NVC_community.dbf needs to be linked to NVC polygons using join	esri files		NVC_polygon.shp NVC_polygon_intersect.shp NVC_community.dbf
27/01/2010	email	SNH (via SEPA)	Stuart Wilson, SEPA	Lorna Harris/ Stuart Wilso	Spatial Phase 1 data	Spatial Phase 1 data for the Clyde valley. Data originates from SNH. Phase1_surveys.dbf needs to be linked to			Phase1_polygons.shp Phase1_polygons_intersect.shp Phase1_surveys.dbf
03/02/2010	email	SEPA	Stuart Wilson, SEPA	Stuart Wilson, SEPA	Flood maps	Shapefiles showing modelled 200 year fluvial and coastal flood extents- same extents as	esri shapefiles	licence agreement signed	200yr_coastal_flood.shp 200yr_fluvial_flood.shp
04/02/2010	email	East Renfrewshi	Paul Landman	Paul Landman/ Julie Nich	East Renfrewshire SINCs	Shapefile showing location of E Renfrewshire SINCs	esri shapefile	no	ERC-SINC.shp
08/02/2010	CD	SNH	Lachlan Renwick	Lachlan Renwick	SNH Phase 1 spatial data	Shapefile of Phase 1 polygons	esri shapefile	licence agreement signed	GIS_SNH_OWNER_PHASE1_FINAL.shp
29/01/2010	email	SEPA	Richard Jeffries	Richard Jeffries, SEPA	Morphology clasification results	Shows the percentage impact calculations for each waterbody and what they are composed of	excel file		July_2009_pressures_concatenated.xls
29/01/2010	email	SEPA	Richard Jeffries	Richard Jeffries, SEPA	Land Cover Classifications	land cover classes used to define the riparian vegetation categories	excel		RiparianVegMasterMap_20080129.xls
09/02/2010	email	Forest Research	Darren Moseley	Mike Smith	Updated wetland IHN	Wetland IHN with open water removed	esri shapefiles		less_wet_500m_habitat.shp
									less_wet_2km_habitat.shp less_wet_500m_network.shp less_wet_2km_network.shp
12/02/2010	email	Inverclyde Coun	Graham McCarey	Ron Gimby, Inverclyde Co	Inverclyde SINCs	SINCs in Inverclyde council area	esri shapefiles	no	sincs.shp

Appendix D
Filtering Spreadsheet (example)

Unique ID	Area (m2)	Waterbody ID	*Inside/Outside Catchment*	Heavily Modified Waterbody	Number of downstream waterbodies	2015	2021	2027	Abstraction Pressure	Abstraction Measures ID'd	Diffuse Source Pollution Pressure	Diffuse Source Pollution Measures ID'd	Flow Regulation Pressure	Flow Regulation Measures ID'd
Wood_Morph_CGVDL_1014_1	241.6666209	10000	*Within Clyde Catchment*	Y	1	Y	Y	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1014_2	44.51855329	10000	*Within Clyde Catchment*	Y	1	Y	Y	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1039	1719.794057	10047	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1069	7115.372531	10003	*Within Clyde Catchment*	N	2	N	N	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1108_1	6890.279807	10040	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1108_2	7182.821199	10040	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1145	327.4261191	10047	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1158_1	5874.767592	10130	*Within Clyde Catchment*	Y	1	N	N	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1158_2	2.318493773	10130	*Within Clyde Catchment*	Y	1	N	N	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1161	1944.578274	10040	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_117_1	153.8768586	10145	*Within Clyde Catchment*	Y	0	N	N	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_117_3	41.26478986	10145	*Within Clyde Catchment*	Y	0	N	N	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1173	1812.297355	10000	*Within Clyde Catchment*	Y	1	Y	Y	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_118_1	118.8085028	10145	*Within Clyde Catchment*	Y	2	N	N	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_118_2	5157.059188	10145	*Within Clyde Catchment*	Y	0	N	N	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_122_2	3772.224771	10731	*Within Clyde Catchment*	Y	2	N	N	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_124_1	74.1873345	10135	*Within Clyde Catchment*	N	2	N	N	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_126_3	11.57974187	10135	*Within Clyde Catchment*	N	2	N	N	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1263	13760.17939	10022	*Within Clyde Catchment*	Y	1	Y	Y	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1292_1	821.2024757	10000	*Within Clyde Catchment*	Y	1	Y	Y	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1292_2	11623.15901	10000	*Within Clyde Catchment*	Y	0	Y	Y	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1293_1	1400.726515	10000	*Within Clyde Catchment*	Y	1	Y	Y	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1293_2	173.2494522	10000	*Within Clyde Catchment*	Y	1	Y	Y	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1293_3	0.558409939	10000	*Within Clyde Catchment*	Y	1	Y	Y	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1294_1	3036.15368	10747	*Within Clyde Catchment*	Y	1	N	Y	Y	Y	N	Y	Y	Y	Y
Wood_Morph_CGVDL_130_1	3966.612555	10731	*Within Clyde Catchment*	Y	2	N	N	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_130_2	2934.639779	10731	*Within Clyde Catchment*	Y	2	N	N	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_130_3	5875.09285	10731	*Within Clyde Catchment*	Y	2	N	N	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_130_4	21.25083396	10731	*Within Clyde Catchment*	Y	2	N	N	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1305_1	4912.796719	10747	*Within Clyde Catchment*	Y	1	N	Y	Y	Y	N	Y	Y	Y	Y
Wood_Morph_CGVDL_1305_2	6.542291633	10747	*Within Clyde Catchment*	Y	1	N	Y	Y	Y	N	Y	Y	Y	Y
Wood_Morph_CGVDL_136_1	689.9231582	10130	*Within Clyde Catchment*	Y	1	N	N	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_136_2	1354.262658	10130	*Within Clyde Catchment*	Y	1	N	N	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_136_3	1204.903138	10131	*Within Clyde Catchment*	Y	2	Y	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_136_4	2576.899438	10131	*Within Clyde Catchment*	Y	2	Y	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1396	3856.770956	10409	*Within Clyde Catchment*	N	5	Y	Y	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1398	54442.51751	10040	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1399_1	107.0655928	10040	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1399_2	19026.98886	10040	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_14_2	523.2909863	10139	*Within Clyde Catchment*	N	4	Y	Y	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1402	3694.632541	10040	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_141	275.0978248	10007	*Within Clyde Catchment*	Y	2	N	N	Y	N	N	N	N	N	N
Wood_Morph_CGVDL_1439_1	8.63515527	10040	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1439_2	13605.33144	10040	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1440_1	14.17616734	10040	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N
Wood_Morph_CGVDL_1440_2	79182.27125	10040	*Within Clyde Catchment*	Y	1	N	Y	Y	N	N	Y	Y	N	N

Morphological Alterations Pressure	Morphological Alterations Measures ID'd	Point Source Pollution Pressure	Point Source Pollution Measures ID'd	Measure: Improve Condition of Riparian Zone	Measure: Improve Modified Habitat	Specific morphology pressure(s) - structures	*Specific morphology pressure(s) - structure IDs*	Morphology Score	Priority catchment	Floodplain
Y	Y	Y	Y	N	N	0		18.68%	0	0
Y	Y	Y	Y	N	N	0		18.68%	0	0
Y	Y	Y	Y	N	N	0		78.98%	0	0
Y	Y	Y	Y	N	Y	0		27.83%	2027	0
Y	N	Y	Y	N	N	0		21.04%	0	Partially
Y	N	Y	Y	N	N	0		21.04%	0	Partially
Y	Y	Y	Y	N	N	0		78.98%	0	0
Y	Y	Y	Y	N	N	0		72%	2027	0
Y	Y	Y	Y	N	N	0		72%	2027	0
Y	N	Y	Y	N	N	0		21.04%	0	0
Y	Y	Y	Y	N	N	0		33.05%	0	0
Y	Y	Y	Y	N	N	0		33.05%	0	0
Y	Y	Y	Y	N	N	0		18.68%	0	Completely
Y	Y	Y	Y	N	N	0		33.05%	0	Completely
Y	Y	Y	Y	N	N	0		33.05%	0	Partially
Y	Y	N	N	Y	N	1	*103193*	59.63%	0	Partially
Y	N	Y	Y	N	N	0		43.35%	0	0
Y	N	Y	Y	N	N	1	*110100*	43.35%	0	Completely
Y	Y	Y	Y	N	Y	1	*107993*	64.16%	0	Partially
Y	Y	Y	Y	N	N	0		18.68%	0	Partially
Y	Y	Y	Y	N	N	0		18.68%	0	Partially
Y	Y	Y	Y	N	N	0		18.68%	0	Partially
Y	Y	Y	Y	N	N	0		18.68%	0	Partially
Y	Y	Y	Y	N	N	0		18.68%	0	Partially
Y	Y	Y	Y	N	Y	1	*112588*	23.38%	2027	Completely
Y	Y	N	N	Y	N	0		59.63%	0	Partially
Y	Y	N	N	Y	N	1	*103193*	59.63%	0	Partially
Y	Y	N	N	Y	N	0		59.63%	0	Partially
Y	Y	N	N	Y	N	0		59.63%	0	Completely
Y	Y	Y	Y	N	Y	0		23.38%	2027	Partially
Y	Y	Y	Y	N	Y	0		23.38%	2027	Partially
Y	Y	Y	Y	N	N	0		72%	2027	Completely
Y	Y	Y	Y	N	N	1	*100219*	72%	2027	Completely
Y	Y	Y	Y	N	N	0		52.98%	2027	Completely
Y	Y	Y	Y	N	N	1	*100219*	52.98%	2027	Completely
Y	Y	Y	Y	N	Y	0		20.97%	0	0
Y	N	Y	Y	N	N	5	*100489, 100488, 100479, 100*	21.04%	0	Partially
Y	N	Y	Y	N	N	0		21.04%	0	Partially
Y	N	Y	Y	N	N	0		21.04%	0	Partially
Y	Y	N	N	N	Y	1	*113010*	37.34%	0	0
Y	N	Y	Y	N	N	0		21.04%	0	Partially
Y	Y	Y	Y	N	Y	0		28.77%	0	Partially
Y	N	Y	Y	N	N	0		21.04%	0	Partially
Y	N	Y	Y	N	N	1	*108453*	21.04%	0	Partially
Y	N	Y	Y	N	N	0		21.04%	0	Completely
Y	N	Y	Y	N	N	6	*108453, 100385, 100388, 100*	21.04%	0	Partially

Specialised IHN	Location within 500m IHN Woodland Network (total/edge)	Location within 2km IHN Woodland Network (total/edge)	Number of opportunity areas (overlap)		Within 500m of a Workshop Site
Broadleaf	Partially	Partially	Country Parks		0
Broadleaf	0	Completely	Country Parks		0
Broadleaf	Partially	Partially			0
Broadleaf	Partially	Partially			0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Completely	SINC		0
Broadleaf	Partially	Partially			0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Completely	Completely	SINC		0
Broadleaf	Partially	Completely			Yes
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Completely	SINC		0
Broadleaf	0	Partially			0
Broadleaf	0	Completely	SINC		0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
0	0	Partially	SINC		0
Broadleaf	Partially	Partially			0
Ancient and Broadleaf	Partially	Completely	SINC		0
Ancient and Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	Local Nature Reserve	SINC	0
Broadleaf	Partially	Partially	Local Nature Reserve	SINC	0
Broadleaf	Partially	Partially	Local Nature Reserve	SINC	0
Broadleaf	Partially	Partially			0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
0	0	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Completely			0
Broadleaf	Partially	Partially			Yes
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	0	Partially	SINC		0
Broadleaf	Partially	Partially			0
Broadleaf	0	Partially			0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0
Broadleaf	Partially	Partially	SINC		0

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Appendix E
Summary of Questionnaire Responses and Site-Specific Discussions

Information provided at workshop								Added information			Coincided with screening/sent questionnaire	
ID	Ref	Easting	Northing	Name	Description	Relevance	Contact	Landowner	Waterbodies	Pressures	Opportunity areas		
1	VA1	277423	656907	Ravenscraig & South Calde	Regeneration / New Town	Barriers / culverting - linking overland to create corridors Riparian woodland connections	Vicky Abernethy North Lan. Council	Ravenscraig Ltd	South Calder Water	morphology (bank reprofiling; box culverts)	Core Growth-regeneration and new town	Y	
2	MM1	270928	653402	Hamilton Burn Valleys & hamilton West Community Growth Area	Network of incised BurnValleys with semi-natural woodland running through Hamilton	Demonstrate and Evaluate Planning decisions & development pressures Greenspace / grounds management Pollution assessment & mitigation Culverting and other barriers etc	Malcom Muir	South Lanarkshire	Wellshaw/Earnock Burn	morphology	Core Growth		
3	IG1	267217	667113	Gartlock Pools - east Glasgow (Greater Easterhouse)	Slack wetland corridor between Blackfaulds / Gartlock Farms and Bishop Lock	Gartlock Pools pLNR - about to commence in 2010 - involves a significant area of wetland enhancement and open water creation. Agreement with developer and landowner, involving transfer of ownership to Council.	Iain Gibson Senior Ecologist DRS Glasgow CC	Glasgow CC	-	-	CGA/SINC/LNR etc		
4	KA1	261546	662680	Rutherglen / Dalmarnock	Land adjacent to A724 between where the M74 Northern extension is being built and the A724.	Currently supports buddleia etc, would make a nice public domain wildlife area. It is currently fenced off and has large amounts of rubbish dumped on it. It may be included for re-development for the Commonwealth Games	Kate Arnold, SEPA	Don't Know	River Clyde	morph and diffuse (extensive reprofiling, embankments etc)	growth area; SINC (river itself)	Y	
5	IG2	256598	671650	Millichen Flood, Summerston, Glasgow	Floodplain of River Kelvin - improved grassland and rush pasture.	About to commence (Dec 2009) in partnership with landowner (Caledonian Properties). Water control and creation of permanent waterbodies and sluice control system. Prime site for wetland birds	Iain Gibson Senior Ecologist DRS Glasgow CC	Caledonian Prope	River Kelvin	diffuse and morph pressures	SINC	Y	
6	PB2	253505	656701	SINC nr Capelrig Rd in Newton Mearns	SINC urban greenspace recently felled Sitka spruce plans to restore as greenspace	Auldhouse Burn runs through the site has been straightened and flooding issues	Petrina Brown	East Renfrewshire	Auldhouse Burn	morph and diffuse	not identified but should be SINC (missing data)	N but contacted later as point would have coincided if correctly located	
7	I	279485	638351	Auchlochan - Woodland Creation	Large agricultural acquisition by Forestry Commission	Forms part of the upper Clyde tributaries catchment	Tommy McGrory, Forestry Commission Central Scotland Conservancy	Forestry Commiss	Nethan Water	morph and diffuse	-	N but contacted later as point would have coincided if correctly located	
8	H1	288763	654742	Harelaw Hill (Kingsmills Mineworkings Network (1, 2, 3))	Various minewater rebound issues - watercourse (South Calder / Mouse...)	Existing treatment wetlands (Allanton) and potential for new schemes	G Rattray SEPA	Coal Board Fores	Auchter Water	morph and diffuse	(minewater)		
9	H2	277320	670000	Linked to H1 Harelaw Hill, Kingsmill mine workings network)	Various watercourses (Bothilon) Luggie, that are inpacted by minewater rebound	Existing treatment wetlands (Allanton) and potential for new schemes	G Rattray SEPA	???	-	-	CGA/SINC		

10	S	257938	672474	Sommerston	Rubbish dump - removal turn into flood plain		Geoff Foord, and Gillian Telfer		Kelvin/Allander Water	morph (embankments) on both; diffuse on Kelvin	not identified but waste site- check if on SEPA list	Y	
11	M	269072	665155	Monklands Canal	Buried canal worth opening up SUDs / Biodiversity etc		Geoff Foord		Tollcross Burn	morph and diffuse	CGA	Y	
12	PA1	266392	664227	Tollcross Burn Flooding	Study of work feeding into overall GSDP and delivery of essential objectives re. commonwealth games	Delivery of joint SW / local authority flood alleviation scheme	Paul Anderson		Tollcross Burn	morph and diffuse	SINCS/CGA	Y	
13	WH	271031	668351	Gartcosh / Gartlock CGA	Community growth area overlying network of waterbodies and burns	Opportunities through strategic development framework and masterplanning to pilot the approach of using HIN to inform development management	Vicky Abernethy	Mark Forrest New	-	-	CGA/SINC/LNR etc		
14	OL1	258557	668454	North Glasgow Canal regeneration area 1,000 acres	Regeneration area based around the Forth and Clyde canal - plans are a mix of individual and residential developments with associated greenspace / access water	Opportunity to demonstrate holistic developments that integrate SUDs.	Olivia Lassiere British Waterways	British Waterways	Forth and Clyde canal	-	CGA- mixed use development		
15	OL2	239485	678247	Lomond Canal / Dumbarton Flood Alleviation	River lever corridor between Dunbarton and Balloch - ambitious scheme to deliver a sustainable regeneration corridor, water transport link and flood defense for Dunbarton	Many opportunities at all scales to demonstrate RBMP interventions - a good best practise testing ground inc. dealing with contaminated runoff, SUDs, invasive species management	Olivia Lassiere British Waterways	East Dunbartonsh	River Leven (existing WB- new one to be created)	HMWB, predicted to continue failing in 2027	SINC (whole river); CGA	Y	
16	AK3	263814	662165	Commonwealth Games Village	Major development on waterfront. Heavily modified riparian zone could be brought back to more natural state	Potential to link habitat improvements along over and across over to XXXX loop	Arthur Keller, SNH	GCE, CGOC	River Clyde	morph and diffuse (extensive reprofiling, embankments etc)	growth area etc; Commonwealth Games infrastructure	Y	
17	C	259485	667835	Cowlairs Galsgow			Geoff Foord	Some GCC	Forth and Clyde canal	-	CGA		
18	PB1	242990	670412	Bishopton RoF site	Massive brownfield site, huge contamination, BAE systems open to projects	River and lots of ponds and SUDs required for development	Petrina Brown	BAE Systems	Dargavel Burn	morphology (realignment)	core growth area	N but contacted later as point would have coincided if correctly located	
19	GG	269485	667010	Gartcosh / Gartlock CGA's	Large area, many community growth areas. Vision of Wetland Park integrating community growth		Geoff Foord		-	-	CGA/SINC/LNR etc		
20	P	251443	666701	Pollockshaws	Proposed development site SEPA SUDs exemplar site		Geoff Foord		Clyde estuary	-	-		
21	GT1	239278	676804	River lever / Strathlever Corridor Project	Major watercourse linking Dunbarton to LLTNP and River Endrick	Proposed construction of a canal along corridor	Gillian Telfer Biodiversity Officer - WDS		River Leven (existing WB- new one to be created)	HMWB, predicted to continue failing in 2027	SINC (whole river); CGA		
22	DB1	261237	652371	East Kilbride - CGA	Community growth area partly within flood plain	Part of Exemplar SUDs project with IHN Remit	Doug Buchan, Scottish Water		Kittoch Water	morph and diffuse	not identified but should be CGA- perhaps not accurately located on map		
23	NW	266289	672784	Kirkintilloch Link Road	New link road and associated developments including new housing	Opportunities for network links with re-alignment of River Luggie, new housing and road link	N. Wallace	Kirkintilloch Initiati	Luggie Water, Bothlin Burn	morph (Luggie Water); diffuse (Bothlin Burn)	CGA; SINC (river)	Y	
24	DB2	244227	662371	Craigbog / Spateston / Auchewgreech	2 adjacent regeneration sites with de-culverting proposals	Part of Exemplar SUDs project with IHN Remit			Old Patrick Water	morphology (realignment, set back embankments, other unknown)	-		
25	IH1	233093	655155	Lochshore - Lochwinnocia	S. Enterprise Owned large vacant industrial land - zoned for potential long term housing	Useful (potential) use of aspen for S. R. C. and greening - catchment - being seriously considered for aspen (Beaver?)	Iain Hossack, North Ayrshire		Kilbirnie Loch	diffuse pollution	-		
26	AK1	270722	667010	Bishop Loch / Garthoch / Gartcosh	SSSI / LNR and several SINCS based on inter-linked waterbodies	Under pressure from housing but potential for wetlandcentre MVR - sites can be linked to improve natural heritage value and natural functions (eg drainage)	Arthur Keller, SNH	Glasgow CC et al	-	-	CGA/SINC/LNR etc		
27	OL1	272268	677423	Dullatur Marsh SSSI	SSSI - Wetland and open water - cattle encroachment / poaching of XXX and Clyde land edges	Small scale project lo cost / offer alternative water sources for cattles - solar power and drinking troughs, management of riparian areas	Olivia Lassiere, British Waterways	SWT / local farme	River Kelvin	morph and diffuse	SINC (SWT?)	Y	

28	VA1	276804	654639	Dalzell Estate and Baron's Haugh	Ancient woodland and wetland	Wetland birds. Opp. for food storage / connectivity - agricultural fields upstream Access issues - flooding of Clyde Walkway	Vicky Abernethy		Clyde	diffuse pollution	RSPB reserve	Y	
29	AK2	235670	668144	Castle Semple and Barr Loch	SSSI - 2 linked waterbodies subject to artificial drainage, currently under study to determine more natural management	Potential to restore more natural system - re-create links between waterbodies. may help to manage diffuse pollution and flooding to some degree	Arthur Keller, SNH	RSBP, clyde Mars	River Gryfe	-	-		
30	VA2	270515	667835	Gartcosh LNR	PLNR designated for Great Crested Newt. Also otter and watervole interest. Part of Wider Gartcosh/Garlock Green network	Oppportunity for connecting up a number of waterbodies. CGA offers mechanism for delivery to an extent	Vicky Abernethy		-	-	CGA/SINC/LNR etc		
31	VA3	273093	678041	Garrel / Erroch burns	Recovery Salmonid populations	Barrier removal Bankside works to improve spwaning habitats	Vicky Abernethy		-	-	SINC		
32	GT2	247526	672474	Duntocher Burn	Partly culverted, part natural wildlife corridor running through major urban area in Clydebank Area	Great opportunity for de-culverting, wildlife enhancement, invasive species eradication, pond restoration (in Auchentoshan Woods)	Gillian Telfer, LDC		Duntocher Burn	diffuse pollution	SINC	N but contacted later as point would have coincided if correctly located	
33	GT3	264124	676495	Glazert Water	Wildlife corridor running through Lennoxtown in EDC	Little info is known of the relevance fo this watercourse to fisheries conservation. Lot of development in this area.	Gillian Telfer, LDC		Glazert Water	morph	SINCS/wildlife corridors. Development too but not identified in available data	Y	
34	TW1	275361	654948	Baron's Haugh and Dalzell Estate	RSPB Reserve Wetland and estate woodland	On River Clyde and Clyde Wlakway and floodplain / water storage	Toby Wilson, RSPB	RSPB and North l	Clyde	diffuse pollution	RSPB reserve	Y	

35	TW2	235258	658144	Lochwinnoch RSPB Reserve and Wider Wetlands	Lochs and visitor centre	A big project is currently being planned to naturalise waterbodies	Toby Wilson, RSPB		Loch Semple, Barr Loch, Upper River Calder, Dubbs Water	diffuse and morph pressures	RSPB reserve	Y	
36	TK1	278247	673402	Cumbernauld SWT Reserve	4 extensive resources - plan to create wider habitat corridors / network	4 extensive resources - plan to create wider habitat corridors / network	Tony King, SWT	SWT	Luggie Water	Diffuse pollution	Country Park, SINC, SWT		
37	TW3	298144	643505	The Meetings near Costains	River meanders and floodplain	Key site for waders and wildfowl and flood management opportunities	Toby Wilson, RSPB		Clyde	Diffuse pollution	(RSPB?)		

	Feedback from questionnaire						Summary of discussions with contact
Name	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	
Ravenscraig & South Calde	Yes although it extends a bit wider than the circle shown and the nature park is planned for the area to the East of the Calder Water.	The Community nature park was planned as part of the Ravenscraig masterplanning exercise and is supported by the planned green network across the development site which links the main Community nature park with the SINC sites to the West of the site. The South Calder water (a Clyde Tributary) runs through the site although it is culverted for a significant section in the central part of the site. It forms the Eastern boundary of the Community nature Park.	1. Les Stevenson NLC Business manager, New communities. Involved in the site from an NLC planning perspective.2. Ravenscraig Ltd	The proposed nature Park area has undergone a number of habitat creation works to allow mitigation for the various development areas in the masterplan. This includes habitat creation for Great Crested newt, Grayling Butterfly, Little Ring Plover, badger. There is a need to ensure green connectivity across the site is maintained as the site develops to allow the various species to move across the site, particularly the green corridor that connects the two sections of the Calder Water where the culvert exists.	There needs to be agreement on how the green network within the site is managed both in terms of a comprehensive site management plan, but also a mechanism for management (this may or may not be the local authority). This will become a very important piece of green space both in terms of the wildlife habitat it form, but also as an urban greenspace for a new, large population of people so it is vital it is well developed and managed.		Large development already underway based on masterplan developed ~10 years ago. Vicky feels the development still has some significant barriers to developing green networks. GCVGN did study- find out more. Removal of culvert was discussed early on but at that time there was no driver for removal. Now too many requirements on that area- habitat compensation to allow for other parts of the development- to do anything about it.
Hamilton Burn Valleys & hamilton West Community Growth Area							
Gartlock Pools - east Glasgow (Greater Easterhouse)							
Rutherglen / Dalmarnock	The site marked is being used by travellers and has facilities for them. The adjacent area to the north of the mark is currently derelict.	This is a small brownfield site, much of the land is concreted, but this is derelict and largely broken up with plants coming through. It is bounded by broken down walls and fences. The river is probably not visible from the site, but it is linked through the sewage works which spans the western edge of the whole site including the travellers area. The travellers site is adjacent to the river, but is separated from it by a high fence. There are other similar patches of land nearby which are closer to the River Clyde. These are mainly within the Commonwealth Games 2014 area and may end up being developed as part of that	Travelling community. I think there is a small car wash business on the site.	I do not know the site very well. My feeling was that this is a piece of wasteground which would benefit from some clearance (removal of debris –rock, broken concrete etc), but could then continue with its natural colonisation. It may require ongoing litter removal	This is just from my own head and as I said I don't know the site well. Personally I would like to see a small coppice / woodland area, but this area of Glasgow may not be the best location for that. However, I think the site could be successful as open grassland with a hedgerow boundary, extending the hedgerow along the railway boundary to reach the banks of the River Clyde.	Possibly commonwealth games?	
Millichen Flood, Summerston, Glasgow	NS570717	Flood plain of River Kelvin at East Millichen Farm which is inundated during high river flows. Agricultural fields consisting of grazed improved grassland and damp rush pasture with a network of drainage ditches. It is possible to see the river from parts of the site.	1. Derek Dunsire, Greenspace Manager, Development & Regeneration Services, Glasgow City Council, 229 George Street, Glasgow G1 1QU. derek.dunsire@glasgow.gov.uk 2. Jim Coyle, Green Spaces Development Manager, Land & Environmental Services, Glasgow City Council, 37 High Street, Glasgow G1 1LX. jim.coyle@glasgow.gov.uk 3. Keith Watson, Biodiversity Officer, Land & Environmental Services, Glasgow City Council, 37 High Street, Glasgow G1 1LX. keith.watson@glasgow.gov.uk 4. Liz Parsons, Starling Learning, 22 Braehead, Lochwinnoch, Renfrewshire PA12 4AS. lizparsons714@hotmail.com	The site is owned by Caledonian Properties, factored by CKD Galbraith (Milngavie), Main Street, Milngavie, Dunbartonshire G62 6BJ. Tel.: 0845 337 6933. It is currently let to a tenant farmer but the lease is due to be terminated later in 2010. Most of the land is grazed but within the whole farm site (including West Millichen Farm) land is also managed for cereal production. There are hedgerows with mature trees. The Glasgow Greenspace Team (manager Derek Dunsire, contact details above) and the Glasgow Farmland Birds Project (Starling Learning) are currently working with CKD Galbraith to develop a plan for flood plain and farmland conservation management. Plans include restoration of flood retention pools as waterfowl/wader habitat, and hedgerow/tree management to conserve the breeding Tree Sparrow population. A winter bird supplementary feeding programme is also being undertaken by RSPB Glasgow Members' Group assisted by Starling Learning.	The Glasgow Farmland Birds project has been funded by the Landfill Tax Communities Fund via Glasgow City Council (Monitoring Officer Keith Watson – see above).	The Glasgow Farmland Birds project has been funded by the Landfill Tax Communities Fund via Glasgow City Council (Monitoring Officer Keith Watson – see above). Smaller scale fund raising has been undertaken by the Glasgow RSPB Members' Group for provision of winter supplementary feeding. CKD Galbraith on behalf of Caledonian Properties are investigating the possibility of funding farmland conservation management from the Scottish Rural Development Programme.	Questionnaire response indicates possible opportunities for change in land use (impr WQ) and reconnecting flood plain/ improving riparian zone. Spoke to Keith Watson, who explained that the area will still be a working farm and it will around a ha given over to new bird habitat. Habitat to be created from scrapes etc- not as large scale as breaching embankments. Current lease expires later this year and works will be undertaken after that
SINC nr Capelrig Rd in Newton Mearns							This site was used as a case study- see main report text
Auchlochan - Woodland Creation							Used as a case study- see main report text
Harelaw Hill (Kingsmills Mineworkings Network (1, 2, 3))							
Linked to H1 Harelaw Hill, Kingsmill mine workings network)							

Sommerston	Not quite – screening area is correct, but perhaps red dot should be placed further east and south in order to make the circle take into account the confluence of the Allander Water into the River Kelvin, plus the Balmuildy Bridge to the south.	Grassland/wetland/farmland area located alongside the Allander Water and River Kelvin. Dismantled railway running through site. The site is located along the Balmore Road which is near to the boundary between East Dunbartonshire Council and Glasgow City Council. The route of the Antonine Wall passes through the site. The Allander Water can be clearly seen from Balmore Road, whereas the Kelvin can easily be viewed from Balmuildy Bridge.	1. Iain Gibson, DRS, Glasgow City Council 2. Jackie Gillespie, Biodiversity Projects Officer, North Lanarkshire Council (formerly of Kelvin Clyde Greenspace, Glasgow City Council). 3. Gillian Barrie, Central Scotland Forest Trust 4. Willie Yeomans, Clyde River Foundation Trust 5. CKD Galbraith, Milngavie (land agents for Caledonian Properties)	The main bulk of the site is found within Glasgow City council (the boundary runs along the two waterbodies), therefore would advise you contact GCC on issues. Not sure if the site is planned to be turned into landfill, but have heard this is a possibility (there is a landfill site south of the site beside Wester Balmuildy Farm).On East Dunbartonshire land, the eastern bank of the Kelvin contains two SINCS – Buchley Farm SINC and Buchley Farm Sand Pit SINC. Future plans are to plant native woodland running alongside the Kelvin by Central Scotland Forest Trust.	Wetland creation, riparian woodland planting, grassland management for biodiversity, improved habitat for protected species recorded nearby (Salmon, Otter, Badger etc).	SRDP funding applied for by CSFT for riparian planting in East Dunbartonshire side. No known funding for the farmland, however this land is owned by Caledonian Properties who appear to be interested in applying for SRDP funding on a large scale (they are major landowners in East Dunbartonshire).	Gillian Telfer- most of this area is in GCC. The bits in Dunbartonshire, she has done some work on improving connectivitiy between woodland in two SINCs, with WIAT funding
Monklands Canal							
Tollcross Burn Flooding							
Gartcosh / Gartlock CGA							
North Glasgow Canal regeneration area 1,000 acres							
Lomond Canal / Dumbarton Flood Alleviation							
Commonwealth Games Village	NS 617 627 to 622 637 - the site is located on the east and south side of Springfield Road, Dalmarnock, Glasgow. The site is bordered to the south east by the River Clyde and to the south west by Dalmarnock Road.	The site boundary is separated from the river only by a wooded corridor 15m to 40m wide, which includes the Clyde Walkway/Cycleway. Can see the river from the site.	1. River Clyde Environmental Project – led by Glasgow City Council Public Health Unit (chris.dalrymple@glasgow.gov.uk) 2. WSP UK – consultants preparing Environmental Impact Assessment for the Commonwealth Games Village(Jenny.Hazzard@WSPGroup.com)	Brownfield site currently undergoing remediation in preparation for Games village development. Apparent aspiration to 'open up' parts of the riverside corridor by felling trees. Possible threats to protected mammals using the area.	Games village – will be housing once Games are over.	Funding by games legacy consortium, but does not include riverside corridor. Possibility of support for upgrade of riverside corridor coming via Scotland Rural Development Programme – Woodlands In and Around Towns scheme.	Village does not go to waterfront. Separate project on riverbanks looking to open up Clyde Walkway and make more useable. Extent of woodland habitat on the walkway may be reduced, but aim to tie in to new habitat areas around the village to improve network overall. GCVGN have been involved with this project.
Cowlairs Galsgow							
Bishopton RoF site							Spoke to Petrina 27/4. Lots going on here, and developer seems relatively interested in envtl improvements so worth raising any suggestions with the developer. This is a very long term programme, but in planning process now so ideas need to be fed in soon. Areas of undisturbed habitat will be created where contam land prevents development. Also replanting required in areas of conifer screening
Gartcosh / Gartlock CGA's							
Pollockshaws							This site was used as a case study- see text in main report
River lever / Strathlever Corridor Project							
East Kilbride - CGA							
Kirkintilloch Link Road							
Craigbog / Spateston / Auchewgreech							
Lochshore - Lochwinnocia							
Bishop Loch / Garthoch / Gartcosh							
Dullatur Marsh SSSI							

Dalzell Estate and Baron's Haugh	NS276655 (centre of site)	Dalzell Estate is a designed landscape with associated policy woodlands. The Dalzell burn flows through the site and into the Clyde just beyond the southern boundary of the site. The Clyde Walkway runs along the river and is an access point for the Estate. The walkway floods frequently in winter and an alternative route is signposted. The site is well used for informal recreation. It is managed by the council in close partnership with RSPB who manage the adjacent Barons Haugh reserve. The site is well used for recreation. There are views to the Clyde from the policy woodlands and the designed landscape previously incorporated rides of trees to accentuate these views.	1. Nick Chambers/Pardeep Chand RSPB 0141 331 0993 adjacent RSPB Barons Haugh site manager 2. Gerry Lewis, Senior Conservation Officer NLC 01236 780636 or LewisG@northlan.gov.uk for information on proposed woodland management or work underway with Phoenix Futures.	The site is managed by North Lanarkshire Council. The policy woodlands require management to address rhododendron infestation and thinning. The Dalzell burn requires treatment for Japanese knotweed. There is ongoing work to develop the designed landscape particularly around St Patricks Well . The ongoing flooding and scouring of the Clyde Walkway needs to be addressed either by a more suitable surface or by redirecting the route away from the areas of worst flooding on a more permanent basis. Partnerships have been developed with Phoenix Futures to develop volunteer input to site management.	Further promotion of the site as a key greenspace in the area. Woodland management to improve the biodiversity. Grassland management to improve biodiversity. Improved engagement of the local community through volunteering opportunities and events to increase legitimate use of the site and reduce anti social behaviour.	Just completed project involving funding from Heritage Lottery Fund, Historic Scotland, SNH, NLC and RSPB total budget £1.55 million. Woodlands in and Around Town funding applicable for woodland work. ? SEPA restoration grant for invasive species removal on Dalzell burn – not yet investigated. Landscape partnership bid currently underway with South Lanarkshire Council	Recent project with lots of HLF and other funding to improve the estate, including works to re-route part of the Clyde Walkway during wet periods. Embankments along farm land adjacent to the river are eroding and now breach often. Farmer seems happy to leave them like this so they will not be restored. Now well used by waterfowl so good example of wetland habitat creation.
Castle Semple and Barr Loch							See Lochwinnoch comments below
Gartcosh LNR							
Garrel / Erroch burns							
Duntocher Burn							Workshop pt missed the screening but discussed with Gillian as it looked as though it should have been relevant. As for Glazert Water, no specific plans, but interested in improving river esp removing a fish barrier? Some projects in woodland areas already (Dalmuir Park and Auchentoshan) with WIAT funding Further examination of screening shows that this river is failing mostly on diffuse pollution, with rural measures identified
Glazert Water	Not quite – screening area is correct, but perhaps red dot should be placed further north and east to take in the area between Milton of Campsie and Lennoxtown villages.	If the above location is used, the area encompasses rural villages that were subjected to fairly heavy industrial use in the past. A fair amount of contamination is therefore associated with Nailworks and Dye works at the turn of the century. no. 33 site also has a fairly important grassland site north of Redmoss Farm - called Redmoss Grasslands SINC	Willie Yeomans, Clyde River Foundation Trust	The Glazert Water is poorly understood in terms of its fisheries resource. Contamination of soil may be an issue and the area has been subject to increasing amounts of development in recent times (particularly near to Lennox Castle). The effects on the Glazert are unknown.	Wetland creation, riparian woodland planting, grassland management for biodiversity, improved habitat for protected and other species recorded nearby (Salmon, Otter, Trout, Bats etc).	A local fishing group would like to restore the habitat to improve fisheries resource and habitat quality.	This site was used as a case study- see main report text
Baron's Haugh and Dalzell Estate	The point is in an appropriate place but the buffer area should be expanded both east and west if it is to take in the whole of the site.	For Baron's Haugh: 'Haugh' is a term for a low lying meadow beside a river, which describes the site well. It is managed as a nature reserve by RSPB Scotland , predominantly as a wetland site but also holding important woodlands and grasslands to the north of the site. A sluice linked to the Clyde enables the control of water levels in the wetlands to benefit waders in the spring and autumn and wildfowl in the winter. Over 140 different species of bird have been recorded on the reserve. In spring and summer there is an influx of breeding warblers including grasshopper warbler, willow warbler and blackcap. Tufted duck, gadwall and little grebe all breed on the site and it is also good for water rail. In the autumn, the site attracts passage waders. There are large numbers of lapwing as well as more unusual species such as black-tailed godwit, green sandpiper and ruff. Water levels are raised in the winter months, bringing in birds such as wigeon, teal, whooper swan and affording good views of hunting raptors such as peregrine. There is a bund separating the site from the Clyde,	Nick Chambers, Central Scotland Site Manager E-mail: nick.chambers@rspb.org.uk Tel. 07843513369 Pardeep Chand,, Baron's Haugh Community and Assistant Warden E-mail: pardeep.chand@rspb.org.uk Tel. 0787281492 Laura Whyte Senior Biodiversity Officer, North Lanarkshire Council whytela@northlan.gov.uk 01236 780636	For Baron's Haugh: As mentioned above, the sluice is used to control water levels to provide ideal conditions for priority bird species. Cattle help to provide areas of short grass and poached up ground to encourage breeding waders. There are four basic hides around the site with sign posted trails around them. Most paths are suitable for pushchairs and wheelchairs, with the exception of the circular trail. The meandering of the Clyde is causing erosion to the Clyde Walkway, which runs along its northern banks at Barons Haugh. During times of high water, the Clyde floods the reserve, causing damage to footpaths and potentially compromising the bund around the site. There could be serious implications for the whole of the Clyde area if the bund and embankment around Barons Haugh collapsed into the Clyde. The appropriate management of Hamilton Low Parks on the south banks of the Clyde would be extremely beneficial for biodiversity and help with ecological links to Barons Haugh. Similarly, there would be considerable benefits to managing the site in combination with floodplain upstr	Continue to manage the water levels on the site for priority bird species. Improve grazing on the site to encourage breeding waders. Continue to promote the site as a visitor attraction and increase the numbers of people coming to enjoy it.	An HLF funded project to carry out habitat management and improve the visitor experience of the reserve has just come to an end. RSPB Scotland is looking at further funding from landfill tax to pay for repairs to footpaths and management of the grasslands and invasive species.	Embankment adjacent to RSPB reserve is maintained for their water level management. In the long term this could change but in short term it is not feasible to change management. However see Dalzell Estate comments above- some breaching of embankment occurring here

Lochwinnoch RSPB Reserve and Wider Wetlands	Point should be 600m to the east.	Barr Loch and Aird Meadow are part of a wetland system that encompasses a string of open water bodies (Kilbirnie Loch, Barcraigs Reservoir, Barr Loch, and Castle Semple Loch), their associated wetlands and a network of inter-connecting watercourses, principally Dubbs Water, Roebank Burn, Millbank Burn, the River Calder and Black Cart Water. The system eventually discharges to the River Clyde near Renfrew. The upper valley is host to RSPB's Lochwinnoch Nature Reserve, which receives about 40,000 visitors per annum and to Castle Semple and Barr Loch SSSI. The Barr Loch, Aird meadow and Castle Semple Loch is the largest wetland complex in the Greater Clyde area supporting a diverse assemblage of wintering and breeding wetland birds, concentrated on the RSPB reserve. Castle Semple and Barr Lochs are designated as a SSSI for their assemblage of breeding birds and the open water habitats. The site sits within Clyde Muirshiel Regional Park and lies adjacent to Castle Semple Loch, which is used for water sports and has a visitor centre on its west bank. Yes, it is pc	Charlie Woodward Regional Park Manager	There is currently little management on the reserve, however a major project is in progress, which seeks to re-naturalise the channels at the head of Barr Loch and increase the areas of marginal wetland habitat around the Aird Meadow Lochan. The water body is currently failing to meet Water Framework Objective targets due to artificial morphology. The Elliston Weir artificially raises water levels throughout the site. The southern part of the Dubbs Water, off RSPB's reserve, has been artificially straightened and it would provide significant benefits for biodiversity, water quality and flood management if this were returned to its natural meandering course through the floodplain. There are issues with eutrophication, probably as a result of agricultural run off. There are plans for the possible reintroduction of beavers to the area to assist with the management of water levels and provide a visitor attraction. SRANI is a project that aims to establish a network of paths linking routes, facilities and attractions around Castle Semple Loch	The Barr Loch, Aird meadow and adjacent Castle Semple Lochwill continue to be the largest wetland complex in the Greater Clyde area, supporting a diverse assemblage of wintering and breeding wetland birds, concentrated on the RSPB reserve. The bird populations and the wetland features will meet or exceed favourable SSSI conditions with the return of large numbers of breeding black-headed gulls, waders and possibly black-necked grebe. The wetland habitats will have responded to positive management and the restoration of diverse conditions, thereby emulating the site as it once was before the negative impact of the Elliston Weir in the early 1970's. The Barr Loch will contain an array of islands which will improve conditions for breeding birds such as black headed gulls, waders and breeding ducks. These wetland features will also act to reduce wave action and silt movement, reducing turbidity and encouraging more aquatic macrophytes and emergent vegetation. Through a combination of land acquisition, management agreements and working in partnership with other lan	RSPB Scotland has put in a bid for WREN funding to carry out management work to the head of Barr Loch and around the Aird Meadow and the Aird Meadow Lochan. The reserve is also likely to be suitable for SRDP funding.	This site was used as a case study- see main report text
Cumbernauld SWT Reserve							
The Meetings near Costains							

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Appendix F
Dissemination Seminar 26th May 2010

Introduction

The dissemination seminar for the project was held at Glasgow Concert Hall on 26th May 2010, with the following aims:

- The explain and illustrate project outputs, and discuss how they could be applied elsewhere;
- To illustrate the achievement of multiple benefits with presentations of the three case studies;
- To raise awareness of funding mechanisms for realising restoration projects.

Workshop Attendees

Table F1 lists the attendees at the event.

Table F1. Seminar attendees

Delegate	Organisation
Peter Robinson	AECOM
Alan Edgar	Ayrshire Joint Planning
Brian Shaw	Ayrshire Rivers Trust
Sue Evans	Central Scotland Green Network
Alison Brown	Clyde Gateway
Caroline McGillivray	Clyde River Foundation
David McColl	Clyde River Foundation
Jude Barber	Collective Architecture
Emilie Wadsworth	CSFT
Gillian Telfer	East Dunbartonshire Council
Graham Morgan	Entec
Heather Musgrave	Entec
Fiona Watt	Environmental Quality Directorate
Kirstie Dyson	Firth of Clyde Forum
Tommy McGrory	Forestry Commission Scotland
Ally Corbett	GCVGNP
Max Hislop	GCVGNP
Matthew Finkle	Glasgow City Council

Table F1 (continued) . Seminar attendees

Delegate	Organisation
Ian Gibson	Glasgow City Council
Liz Brunjes	HLF
Carmel Rowlands	Loch Lomond and Trossachs NP
Mark Forrest	North Lanarkshire Council
Vicky Abernethy	North Lanarkshire Council
Lisa Webb	RSPB
Toby Wilson	RSPB
Brian Cowan	SEPA
Calum McPhail	SEPA
George Rattray	SEPA
Jackie Galley	SEPA
James Curran	SEPA
Joanne Gilvear	SEPA
Johnston, Eilidh	SEPA
John Farrell	Forestry Commission Scotland
Julia MacPherson	SEPA
Kate Arnold	SEPA
Katie Wilson	SEPA
Katriona Lundberg	SEPA
Lorna Harris	SEPA
Louise Bond	SEPA
Neil Maclean	SEPA
Philip Wilson	SEPA
Richard Jeffries	SEPA
Scot Mathieson	SEPA
Shona McConnell	SEPA
Gregor Caldwell	SGRPID
Brigid Primrose	SNH
Graham Heenan	SNH
Julia Stubbs Partridge	SNH

Table F1 (continued) . Seminar attendees

Delegate	Organisation
Phil Baarda	SNH
Sarah Hutcheon	SNH
Fiona Stewart	SNH
Sian Williams	South Lanarkshire Council
David Beaton	South Lanarkshire Council
Nicola Bissett	Tweed Forum

Programme

The programme for the seminar included the following:

Session 1: Clyde project outputs – aligning RBMP with habitat network objectives

10.00 Welcome – Chair Robert Kerr (SEPA, Clyde Area Advisory Group Chair)

Introduction and project background – Prof James Curran (SEPA, Director of Science & Strategy)

GCV Green Network and Integrated Habitat Network – Ally Corbett (GCVGN partnership)

River Basin Management Planning, Clyde AMP – Katriona Lundberg (SEPA, RBMP co-ordinator)

10.35 Model Development: project methodology & outcomes – Heather Musgrave/Graham Morgan (Entec UK)

11.15 Introduction to Clyde Project Case Studies – Heather Musgrave (Entec)

11.20 Improvements to Barr Loch & Aird Meadow – Toby Wilson (RSPB)

11.35 Emerging ideas: Glazert Water (Heather Musgrave and E. Dunbartonshire Council)

11.50 Pollokshaws Community Growth Area: Integrated urban infrastructure (Collective Architecture)

12.05 Questions & answer session

12.20 LUNCH

Session 2: How to deliver multiple benefits

13.00 Introduction to delivery/funding workshops – Louise Bond (SEPA)

Each participant attended two workshop sessions (all four sessions ran in parallel twice)

13.10 Workshop A: Scottish Rural Development Programme – Tommy McGrory (FCS)

Workshop B: SEPA's Restoration Fund – Richard Jeffries (SEPA)

Workshop C: Heritage Lottery Fund – Liz Brunjes (HLF)

Workshop D: Development Planning, S Dalmarnock Masterplan – Alison Brown (Clyde Gateway)

14.10 Clyde project recommendations – Heather Musgrave (Entec UK)

14.20 Next steps – delivering multiple benefits through RBMP – Katie Wilson (SEPA)

14.40 Summing up – Max Hislop (GCVGN partnership)

15.00 Close of seminar

Presentations

Presentations for the day have been made available on the SEPA and GCVGN websites.

Feedback

Participants in the seminar were invited to provide feedback on:

- What are your key objectives and timescales for delivering improvements in the water environment?
- If you work within the Clyde pilot study area, are you encouraged to use the findings? Please explain why.
- If you do not work within the Clyde pilot area, are you interested in applying it in your area? Please explain why.
- How might you use the recommendations and/or findings from the study?
- Do you need additional information to apply the methodology? If yes, what type of information?
- Do you need support to apply the methodology? If yes, what type of support?
- Any other comments, general or specific?

A number of feedback forms were completed, and will be used to assist with taking forward the findings and recommendations of the project.

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Appendix G
RSPB consultation document: Lochwinnoch

Habitat Improvements to Barr Loch and Aird Meadow

Background to the proposals

RSPB Scotland manages the Lochwinnoch nature reserve, which incorporates Barr Loch, Aird Meadow and part of Castle Semple Loch. A key part of the reserve is the visitor centre, which overlooks an area of land known as the Aird Meadow. RSPB Scotland is keen to improve the wildlife value of the reserve's wetlands and create a system that functions in a more natural way. This will also enhance the viewing opportunities from the visitor centre, which currently does not meet RSPB Scotland's aspirations as a visitor attraction and educational resource.

Barr Loch and Aird Meadow are part of a wetland system that includes a string of open water bodies (Kilbirnie Loch, Barcraigs Reservoir, Barr Loch, and Castle Semple Loch), surrounding wetlands and a network of inter-connecting watercourses, principally Dubbs Water, Roebank Burn, Millbank Burn, the River Calder and Black Cart Water. The system eventually joins the River Clyde near Renfrew. Castle Semple and Barr Lochs are designated as a nationally important Site of Special Scientific Interest.

The area has undergone great changes in the last 200 years, brought about firstly by engineered drainage schemes that subsequently fell into disuse, and more latterly, installation of the Elliston Weir, which raised water levels throughout the site. These changes, combined with land use changes in the wider catchment, have left a legacy of impacts on the natural environment.

Vision for the project

Burns will follow their natural routes into the Barr Loch, reducing the threat from flooding and creating natural deltas as they enter the Loch. New wetland vegetation will thrive along the banks of the Barr Loch and Castle Semple Loch, improving water quality and creating habitat for a diverse range of wildlife. A channel of water through the Aird Meadow will bring wildlife closer to RSPB Scotland's visitor centre, enhancing the wildlife spectacle and providing improved opportunities for education.

Andy Hay (rspb-images.com)

What are the aims of the project?

The habitat improvement project has four key aims:

1. To enable the wetland system to function more naturally.

2. To maintain and enhance the natural features for which the site is designated as nationally important.

3. To enhance the biodiversity value of the wetland habitats within the Lochwinnoch nature reserve.

4. To improve the value of the Lochwinnoch nature reserve as a place for visitors to enjoy and learn about nature.

How will the aims be achieved?

With support from SEPA's Restoration Fund, RSPB Scotland commissioned a study to assess ways of achieving these aims. The study proposed:

1. Re-organising drainage at the head of Barr Loch (Fig 1) by:

- Reconnecting Millbank Burn to the Barr Loch;
- Reconnecting Dubbs Water to the Barr Loch;
- Reconnecting Roebank Burn to the Barr Loch.

The proposed new channels are marked in red in Fig 1.

These changes would help restore the natural wetland system. Sediment would be brought into the Barr Loch from Millbank Burn, Dubbs Water and Boebank Burn, creating local deltas and encouraging wetland vegetation at the edge of the loch, which is currently lacking. This, in turn would provide habitat for wildlife including wading birds and otters. Reconnecting the burns to the Barr Loch will also slow down the movement of water during periods of high rainfall and so reduce flood risk.

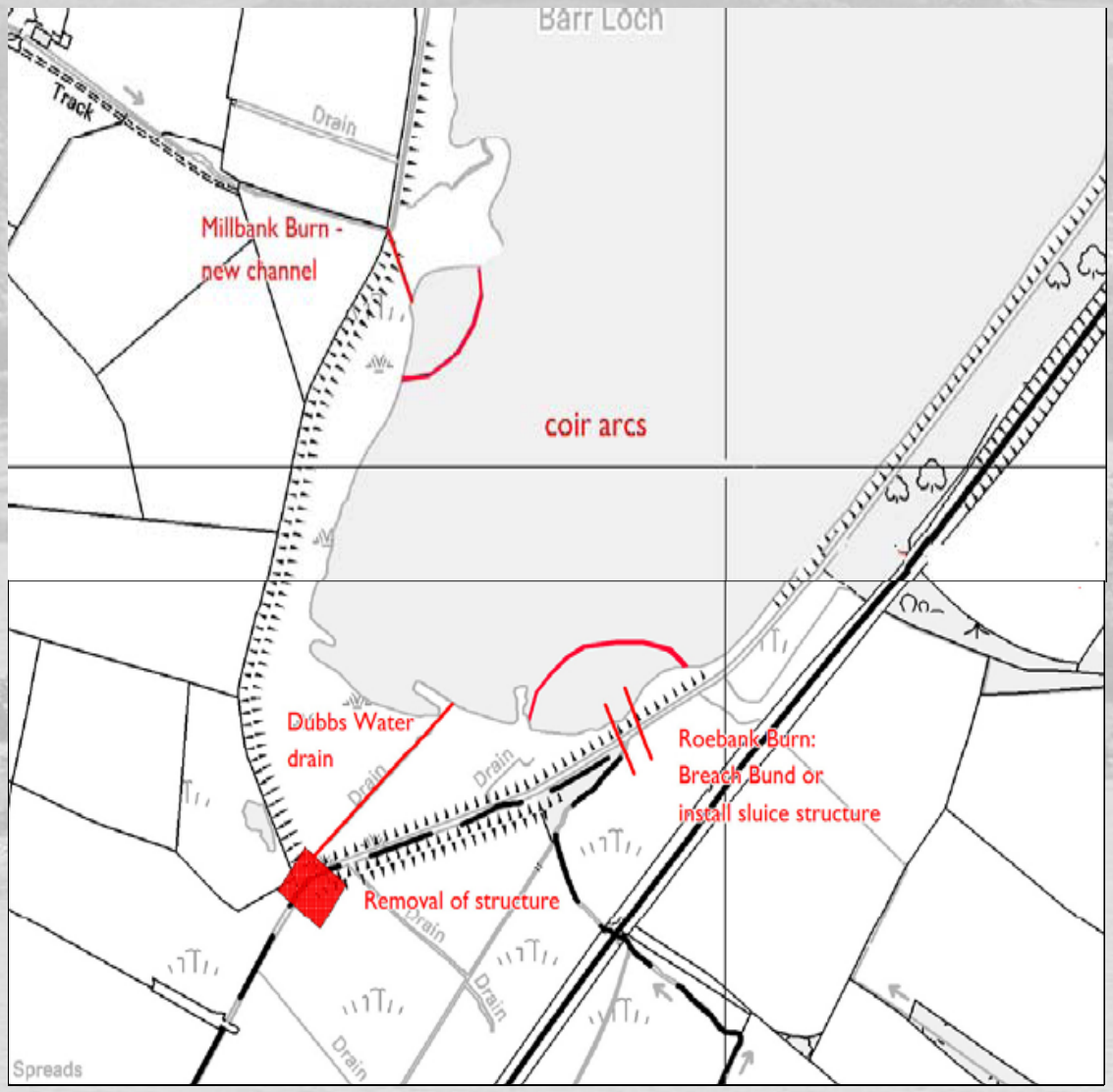

Fig 1. Re-organising drainage at the Barr Loch

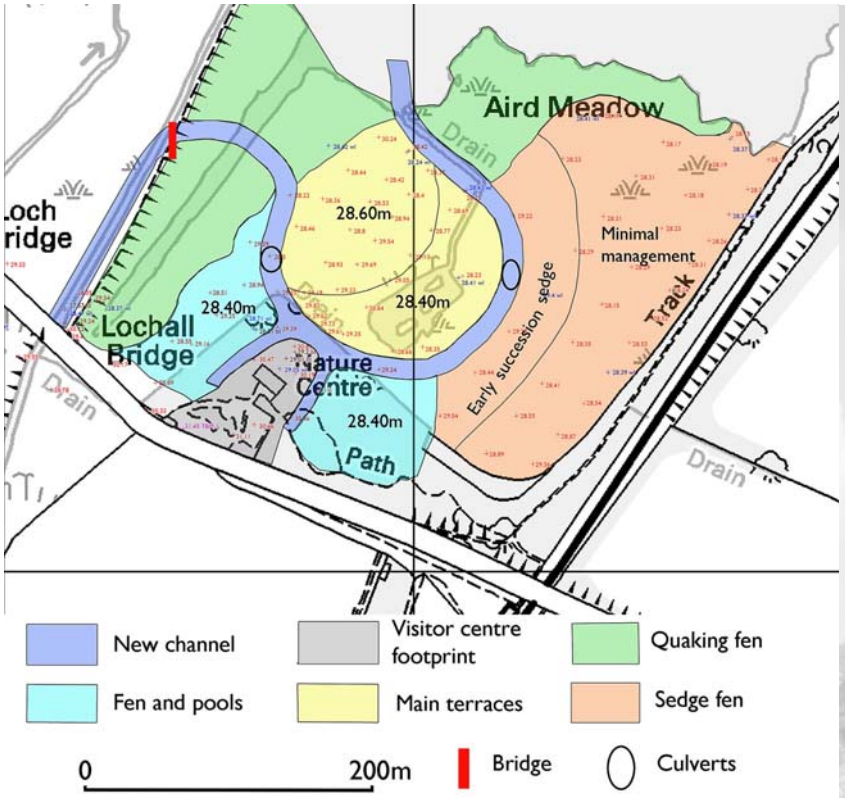

Fig. 2. Channel in Aird Meadow

2. Enhancing the Aird Meadow wetlands by:

- Creating a channel of water in Aird Meadow (Fig 2);
- Connecting the Barr Loch with Aird Meadow;
- Re-profiling the edge of the Aird Meadow bund (Fig 3):

This would increase the area of wetland within the Aird Meadow, creating feeding areas for waders and waterbirds. Re-profiling the edge of the Aird Meadow bund would give it a shallow edge and encourage the formation of wetland vegetation. Creating a channel across Aird Meadow will bring wetland birds closer to the visitor centre and so improve the visitors' enjoyment and the educational value of the centre.

The project will compliment future plans for a new, improved visitor centre at the Lochwinnoch reserve, resulting in a first class wildlife attraction that will bring significant benefits to the local economy. It will also fit well with local access plans.

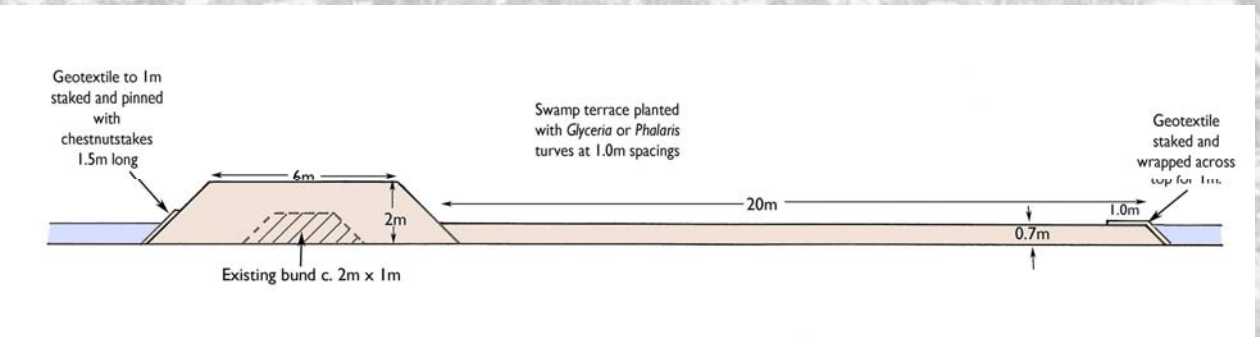

Fig 3. Re-profiling Aird Meadow Bund

Will there be any increase to the risk of flooding?

No, adjacent land will either experience no change or enhanced drainage as a result of the proposals. Flood risk will be reduced by the works, through dispersing the water into different channels and improving the storage of it during periods of high rainfall.

What about access?

The project will not create any restrictions to access and aims to improve visitors' enjoyment of the reserve.

When will this happen and how can I get involved?

The proposals for the scheme are still in their initial stages and there are opportunities to take comments on board. A funding application has been submitted for the habitat improvement works but this has not yet been approved.

The scheme will require planning permission and it is likely that the application for this will be submitted during summer 2010. There will be an extensive consultation process before the application is submitted, including meetings with key individuals and groups. This will be followed by further consultation as the application is assessed by the planning authority. Our funding application allows for some flexibility in what might be carried out (subject to planning permission) but it must be focussed on biodiversity benefits. If the funding application is unsuccessful it is unlikely that we will be able to progress quickly with these proposals.

Should the application for planning permission be approved, it is anticipated that works will start in early in 2011.

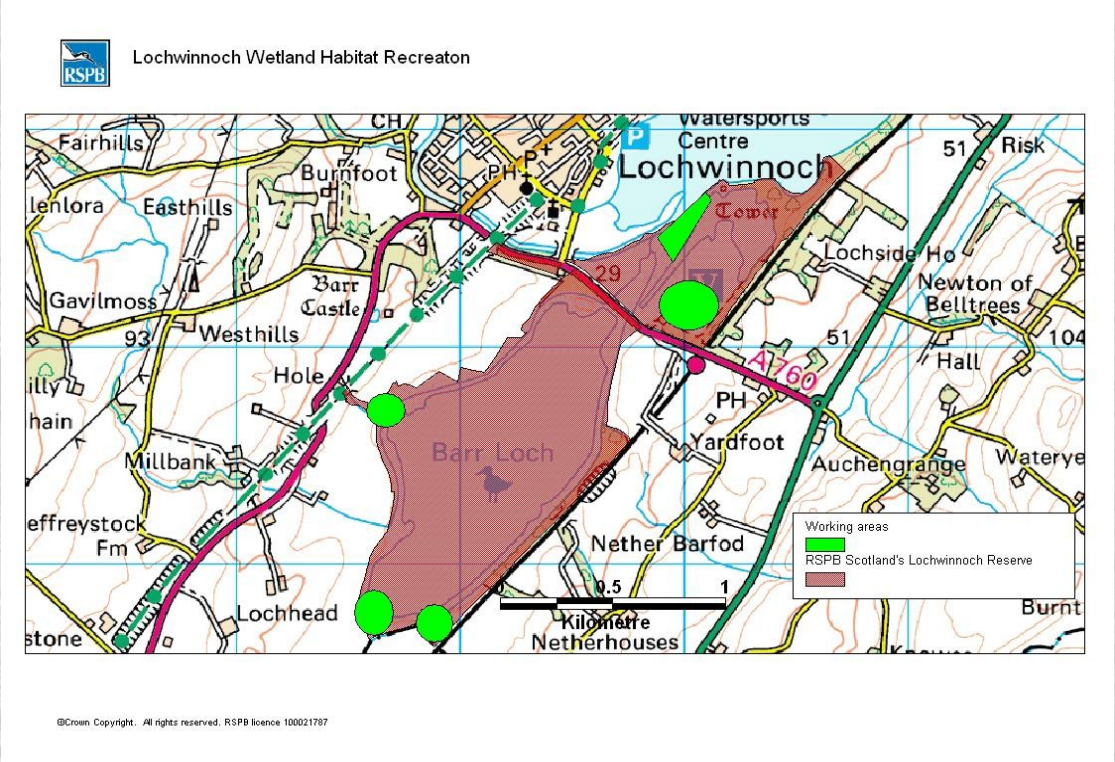

Fig. 4. Overview of the proposals

Andy Hay (rspb-images.com)

Comments on the proposals can be submitted at any point to:

Toby Wilson
Conservation Officer
10 Park Quadrant
Glasgow G3 6BS
Tel. 0141 3319096
E-mail. toby.wilson@rspb.org.uk

Or to the Lochwinnoch reserve visitor centre.

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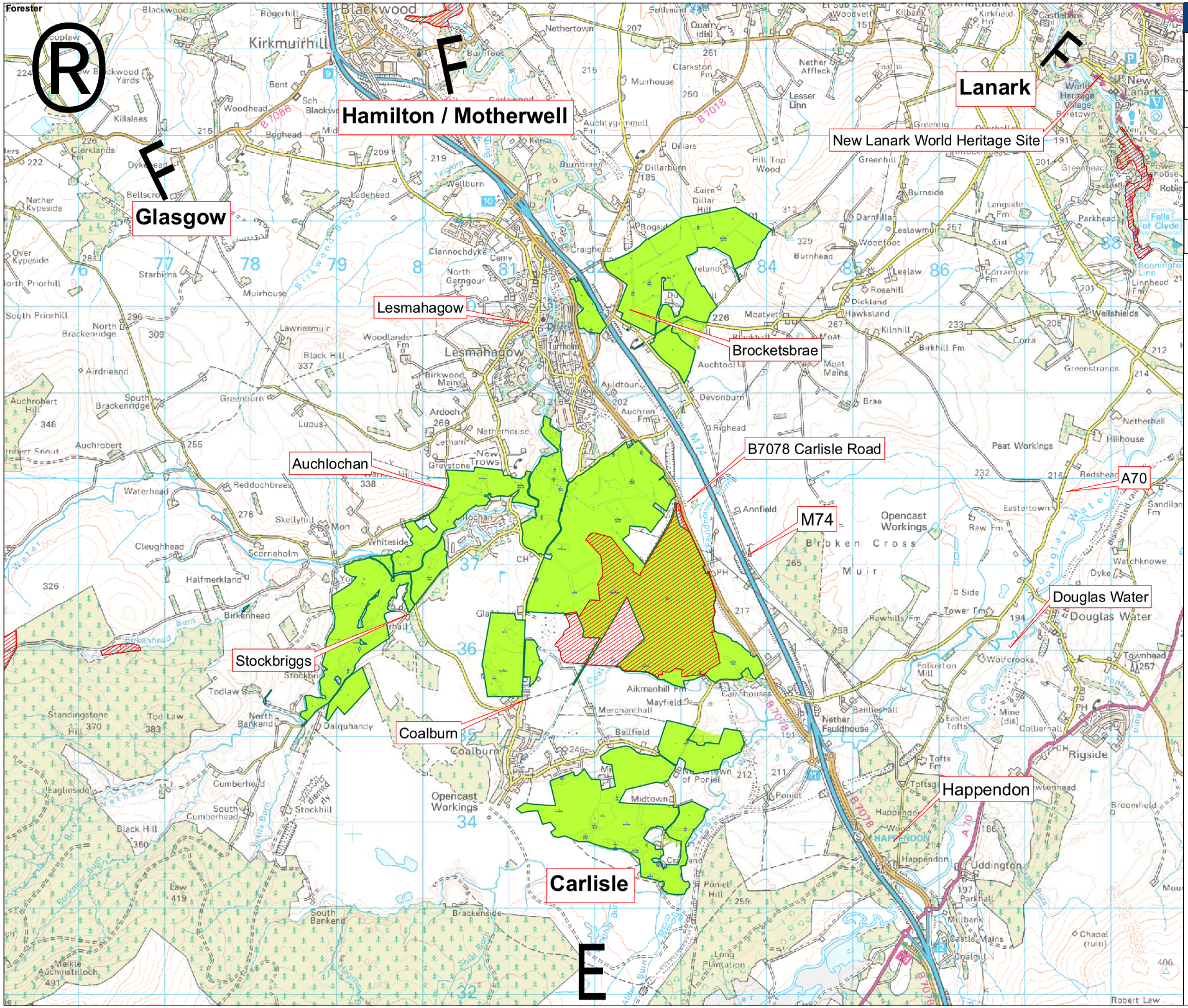
Appendix H
Forestry Commission: map of Auchlochan acquisition



Forestry Commission Scotland

Scottish Lowlands FD

Auchlochan

Location Map

Scale: 1: 30,000 at A1

0 220440 880 1,320 1,760 Meters

October 2009

Legend

- Road Segments
- SSSI Location
- Blocks
- Auchlochan
- Sub-Compartments

Appendix I
Invitations to Project Seminars

Delivering Ecological Networks Through River Basin Management Planning

One- day workshop to be held at:
Glasgow Royal Concert Hall - Thursday 3rd December 2009

The purpose of the workshop is to:

- Introduce the 'Ecological networks and RBMP' project;
- Gain feedback on appropriate methods of identifying opportunities for developing networks (within RBMP, development planning and Masterplanning);
- Identify key areas within the Clyde Valley where habitat enhancement and protection are required;
- Discuss potential case studies in the Clyde Valley.

The workshop is likely to be of interest to:

- Biodiversity and ecological network specialists in the Clyde Valley;
- Local Authority development planners
- River basin management planners;
- Those with an interest in river and floodplain restoration;
- Land owners/managers or property developers who may be interested in participating in improvement programmes.

The enhancement and expansion of habitats and ecological networks is key to improving the resilience of wildlife and landscapes, for example against changes in land use or climate change. Improvements to ecological networks can be undertaken explicitly as part of local or national biodiversity programmes and development plans, and may come about indirectly during property development or other improvement opportunities (e.g. flood defence schemes).
The River Basin Management Planning (RBMP) process under the Water Framework Directive (WFD) seeks to improve the quality of our water environment (including rivers, lakes, groundwater, estuaries and coastal waters), including their physical, chemical and biological characteristics. An extensive programme of 'measures' is being developed to achieve the required improvements.

Combining the improvement of ecological networks with the implementation of RBMP provides great opportunities for achieving multiple benefits and the greatest environmental improvement. For example, ecological networks can often be associated with river corridor habitats, or provide improvements to water quality (e.g. through wetland creation). These opportunities can also lead to improvements in waterbody status under WFD.
This project is developing a 'screening' model to identify appropriate target locations where this approach is likely to be beneficial, and will then progress a number of case studies in the Clyde valley in more detail. The project covers only the Clyde valley, but it is intended that the model could later be applied to other areas of Scotland.

If you are interested in attending, please respond to Charlie Kuzniar at kuznc@entecuk.co.uk by 30th October. Places are limited. Lunch will be provided. For further information, contact Heather Musgrave at musgh@entecuk.co.uk or 0118 377 5678.

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River Basin Management Planning for Ecological Networks

Clyde Valley Pilot Study: Dissemination Seminar
Glasgow Royal Concert Halls, 26th May 2010 at 10 am

Project Background

The enhancement and expansion of habitats and ecological networks is key to improving the resilience of wildlife and landscapes, for example against changes in land use or climate change. Within the Clyde Valley the enhancement of ecological networks is encouraged by the development of an Integrated Habitat Network model (http://www.gcvgreennetwork.gov.uk/projects/thematic_projects.php).

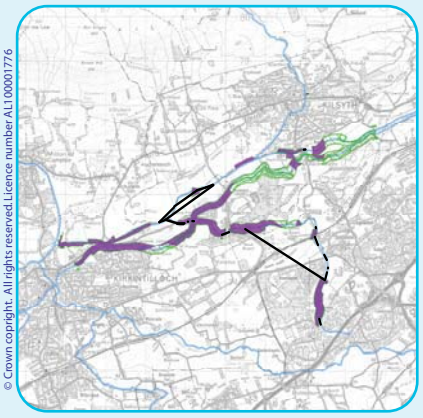
The River Basin Management Planning process under the Water Framework Directive (WFD) seeks to improve the quality of our water environment, including its physical, chemical and biological characteristics. An extensive programme of 'measures' is being developed by SEPA and partners to achieve the required improvements

(http://www.sepa.org.uk/water/river_basin_planning/area_advisory_groups/clyde.aspx).

This pilot study, commissioned by SEPA and the Glasgow Clyde Valley Green Network (GCVGN) partnership, has developed an approach to align RBMP requirements with the wetland and woodland network models for the Clyde valley. Combining the expansion and improvement of ecological networks with the implementation of WFD provides great opportunities for achieving multiple benefits and contributing to improvements in waterbody status under WFD.

Aims of the seminar:

- Explain and illustrate project outputs, and how this approach could be applied elsewhere;
- Illustrate the achievement of multiple benefits with case studies;
- Raise awareness of funding mechanisms for restoration projects.



Project Outputs

The project has developed a screening tool, which has been applied to the Clyde valley to identify areas where enhancements to ecological networks can be combined with measures to help improve the status of rivers and lochs, including:

- Removing morphological pressures (restoring more natural watercourses and floodplains);
- Introducing SuDS in new or existing developments, to address diffuse pollution;
- Improving wetland and woodland habitat in riparian areas, to improve water quality.

Case Studies

Through the screening and discussions with local experts, a range of areas have been identified where combined benefits could be or are being realised. Some of these will be discussed in more detail during the day.

Funding Mechanisms

Optional sessions will provide detail on funding options to support restoration programmes, including SEPA's restoration fund and SRDP.

There is no charge to attend, and lunch and refreshments will be provided.

Please reply to Heather Musgrave musgh@entecuk.co.uk or call 0118 377 5678 if you would like to attend. Places are limited.

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RIVER BASIN MANAGEMENT PLANNING FOR ECOLOGICAL NETWORKS

Clyde Valley Pilot Study: Dissemination Seminar

26th May 2010
Glasgow Royal Concert Halls

Programme

9.40 Registration and coffee

Session 1: Clyde project outputs – aligning RBMP with habitat network objectives

10.00 Welcome – *Chair Robert Kerr (SEPA, Clyde Area Advisory Group Chair)*
Introduction and project background – *Prof James Curran (SEPA, Director of Science & Strategy)*
GCV Green Network and Integrated Habitat Network – *Ally Corbett (GCVGN partnership)*
River Basin Management Planning, Clyde AMP – *Katriona Lundberg (SEPA, RBMP co-ordinator)*

10.35 Model Development: project methodology & outcomes – *Heather Musgrave/Graham Morgan (Entec UK)*

11.15 Introduction to Clyde Project Case Studies – *Heather Musgrave (Entec)*
11.20 Improvements to Barr Loch & Aird Meadow – *Toby Wilson (RSPB)*
11.35 Emerging ideas: Glazert Water (*Heather Musgrave and E. Dunbartonshire Council)*
11.50 Pollokshaws Community Growth Area: Integrated urban infrastructure (*Collective Architecture)*

12.10 Questions & answer session

12.20 LUNCH

Session 2: How to deliver multiple benefits

13.00 Introduction to delivery/funding workshops – Louise Bond (SEPA)
Each participant to attend two pre-selected workshop sessions
13.10 Workshop A: Scottish Rural Development Programme – *Tommy McGrory (FCS)*
Workshop B: SEPA's Restoration Fund – *Richard Jeffries (SEPA)*
Workshop C: Heritage Lottery Fund – *Liz Biunjes (HLF)*
Workshop D: Development Planning, S Dalmarnock Masterplan – *Alison Brown (Clyde Gateway)*

14.10 Clyde project recommendations – *Heather Musgrave (Entec UK)*
14.20 Next steps – delivering multiple benefits through RBMP – *Katie Wilson (SEPA)*
14.40 Questions, Summing up – *Max Hislop (GCVGN partnership)*
15.00 Close of seminar

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