4 Waterway specifications

To understand the scale of and overall need for sediment management, waterway specifications have been developed. These have recently been used to set targets and to aid in prioritising expenditure. Targets include physical elements such as channel width and depth, as defined in consultation with users, and also cover environmental quality standards such as contaminant levels, nutrient content and sufficient depth for aquatic life.

Barton Broad Regatta

Simon Finlay

Waterway user specifications

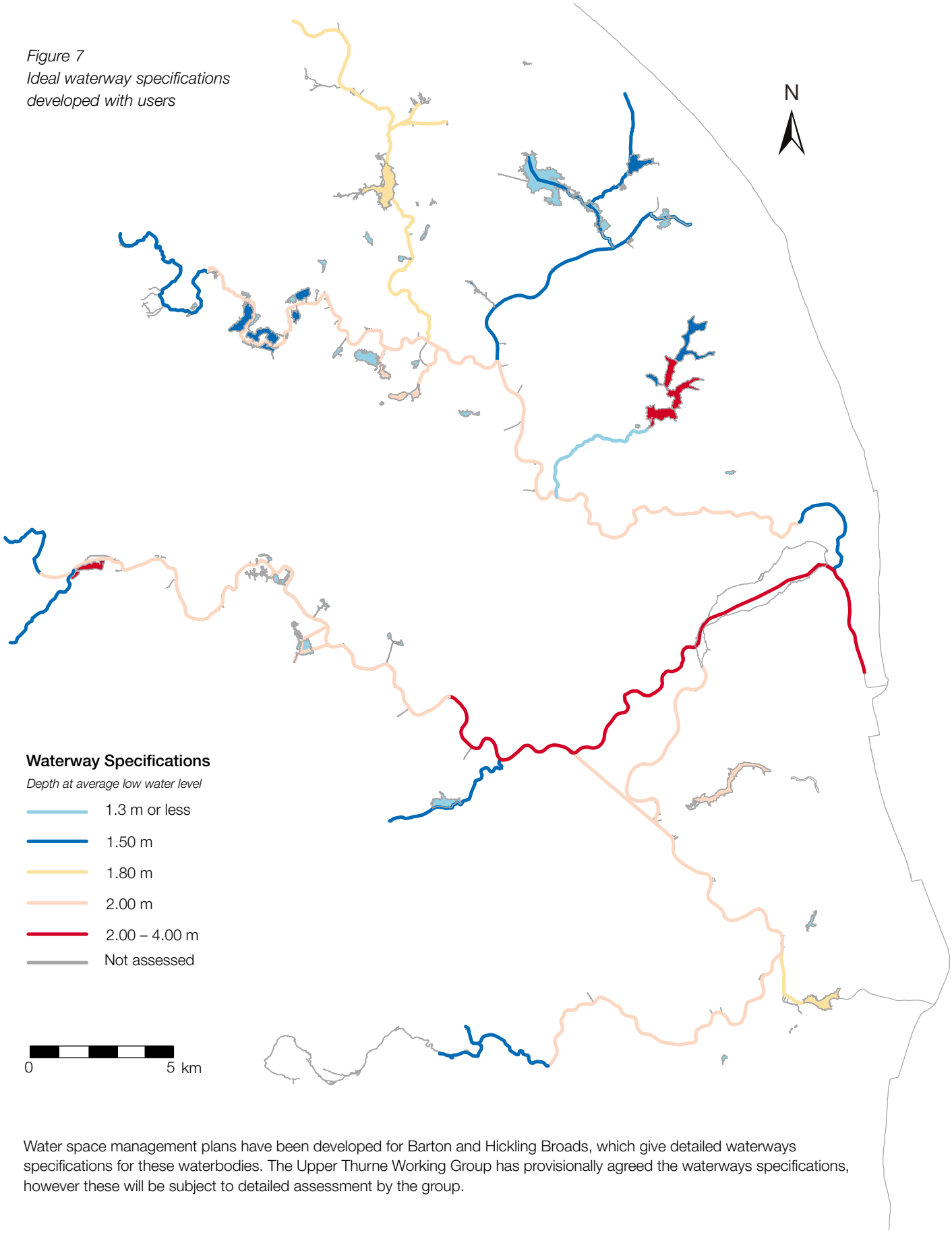
The user-defined waterway specifications, detailing standard water depth requirements to achieve current navigation and lake restoration objectives, were developed in partnership with user representatives to:

- Provide straightforward and transparent rationale for works
- Facilitate provision of information to the public
- Allow agreement of partners at a strategic level to simplify site specific discussions etc
- Help to quantify programmes of works; programmes for disposal; long-term financial budget plans.

The prioritisation of sediment removal in open water bodies to achieve recovery of the aquatic ecosystem, as well as meeting biodiversity and protected site targets, can be complex. The main reasons are to reduce nutrient input and increase water depth to promote aquatic plant recovery. With the loss of many open waterbodies over the last 50-100 years and the fact that high nutrient levels remain the most significant factor preventing ecological recovery of the Broads, there is a good case for continuing sediment removal. Other reasons for sediment removal to achieve nature conservation targets include decreasing sediment resuspension into the water and exposure of water plant seeds (particularly stoneworts) that may re-grow if water clarity allows.

However, sediment removal can also have potentially negative effects on ecosystems, for example, increasing the potential for saline incursion and higher tidal water levels further upstream of the sediment removal site, both of which

Figure 7
Ideal waterway specifications developed with users



Water space management plans have been developed for Barton and Hickling Broads, which give detailed waterways specifications for these waterbodies. The Upper Thurne Working Group has provisionally agreed the waterways specifications, however these will be subject to detailed assessment by the group.

can have an impact on the condition of freshwater grazing marsh dykes or adjacent fens. Increasing the water volume of waterbodies also increases the time the water remains in the waterbody; this can have an impact on water quality. In addition the increased depth can result in aquatic plants having less light to re-grow. Dredging can also result in habitat removal such as spawning sites, or removal of sedentary species such as freshwater mussels. Careful consideration of all these factors is required at the initial prioritisation and detailed design stage.

A developing lake restoration strategy will include a review of sediment removal in the Broads; this review will collate existing evidence on the role of sediment removal in lake restoration on a case-by-case basis.

At a waterway user specifications workshop, held in January 2005, key user representatives addressed the results of a consultation questionnaire hosted on the Norfolk and Suffolk Boating Association website. This successful event enabled participants to discuss issues and concerns as well as gain an insight and understanding of the constraints that apply to management projects. The outputs included a list of criteria for use in prioritising works and produced a set of ideal waterway users specifications (Figure 7) with a broad consensus.

The waterway user specifications across the Broads will be subject to appropriate assessment under the Habitat Regulations. This is currently being undertaken.

Navigable envelope

The condition of the 'navigable envelope'[1] is one of the principal indicators of the Broads Authority's performance in providing service to our customers. The navigable envelope defines the width, depth, slope and non-intervention margin of navigation channels. Additionally, the definition of the navigable envelope allows for the development of a more dynamic river system, by ensuring that natural erosion/deposition processes can be tolerated without compromising enjoyment of the system for navigation ie where shoaling areas are naturally mitigated by complementary erosion.

[1] Navigable envelope defines the area of water space used for all types of boating within the river channel.

The navigable envelope, example shown below, has been developed from the depth criteria established through the waterway specifications consultation. For further details and site specific profiles see Appendix 6.

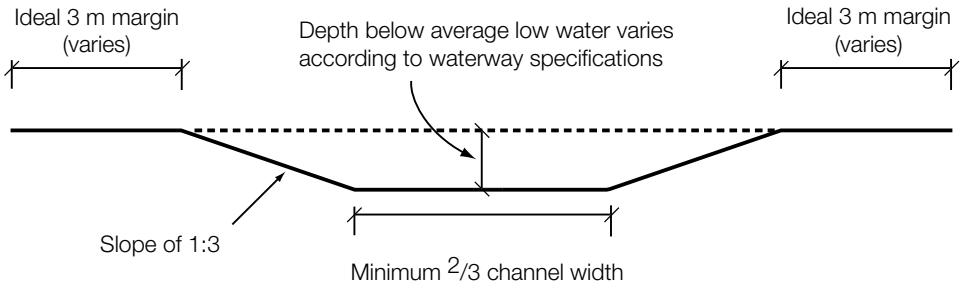


Figure 8
Ideal navigable envelope (not to scale)
Broads Authority

Whereas British Waterways have developed the 'Minimum Open Channel' box profile, suited to piled canals, the navigable envelope developed here reflects conditions in the Broads. In many areas of the Broadland rivers, the typical undisturbed cross-section profile follows a 'V' shape, with a central channel naturally scoured to depths exceeding those required by the waterway specifications. The majority of maintenance dredging is completed to re-establish navigable width following shoal formation at river edges.

By including a 'non-intervention margin' this ensures that the retention of the emergent vegetation, which provides erosion protection and hence habitat, is protected. In more urban areas it likewise ensures private frontages are not undermined or over-steepened.

Environmental Quality Standards

In addition to minimum depth requirements, the other elements of the waterway specifications are the environmental targets. Although currently Environmental Quality Standards for sediment are not developed, there are relationships between sediment and water quality. The sediment characterisation survey (Section 3) gives a general picture of the quality of Broads sediment, although further analysis is required for assessing any toxic effects or site-specific maintenance.

The survey showed the majority (88%) of samples taken were suitable for agricultural disposal. Less than 10% have zinc or copper concentrations above thresholds[1], that could adversely affect growth of some plants at the disposal site (Figure 5).

[1] Thresholds used were those developed by the Interdepartmental Committee for the Redevelopment of Contaminated Land (ICRCL).

The remaining 3% of samples had high levels of Polycyclic Aromatic Hydrocarbons (PAHs), which are generally released during combustion or release of substances such as diesel fuel, oil, or from historic industrial processes. This survey provides overall data for the Broads and was not designed to pick up particular, previously identified hotspots of contaminants. The majority of the sediment in the Yare from Norwich to upstream of Cantley is contaminated with mercury and copper discharged from the Whitlingham sewage treatment works, Norwich, from 1964 to 1973. An Environment Agency policy provides a clear framework for decision making relating to the treatment of dredgings in the Yare and concludes that the bulk of material needs to be disposed of to licensed landfills with site-specific risk assessment for all other disposal routes. For other contaminated hotspots, such as boatyards and urban areas, a risk-based, cost benefit, approach is required to assess the impact of removal and disposal or retention within the aquatic system. Defined targets for the Broads will evolve through new disposal criteria and research, informed by partnership working.

Removal of sediment to reduce the reservoir and release of stored nutrients has proved beneficial for lake restoration projects. Lower phosphorus release rates up to five years after the completion of mud pumping on Barton Broad have been documented, (Kelly, 2005) indicating that sediment removal may be a potentially useful tool to deliver SSSI and Water Framework Directive (WFD) targets. However, the benefit over the longer term needs further investigation.