

Fluvial Geomorphology



Fluvial geomorphology describes how natural processes of river flow and sediment movement act to shape channels, floodplains and catchments over a range of timescales. An understanding of geomorphology and its relationships to river engineering and ecology is central to sustainable river management.

The EU Water Framework Directive and the Floods and Water Management Act require surface water bodies to be managed to safeguard and improve their hydromorphological function in order to achieve or maintain good ecological status.

This can be achieved through catchment and site characterisation to develop appropriate management options. Fluvial geomorphology provides an appropriate assessment to help satisfy this legislation.

Our Expertise

Jacobs' expertise in catchment and site assessment includes:

- Sediment budgeting to identify sediment sources, sinks and transfers at a reach to catchment scale
- Historical assessments of channel planform change, palaeohydrology, floods and their impacts
- Monitoring and modelling of water flow and sediment transfer, using Flood Modeller Pro hydrology/sediment modelling packages and field based techniques
- Engineering impact assessment and options appraisal for river, waterway and floodplain engineering works
- River Restoration to improve the physical and ecological environment, without increasing flood risk
- How regulation of river flows can impact channel stability, water quality and ecology
- How natural and modified river channels respond to changes in land use and changes in catchment hydrology projected by climate change

Our Approach

Jacobs emphasise a client-focused and solution-driven approach, making us accessible to you, your issues and your priorities. We achieve this by:

- Applying best practice to achieve robust and efficient delivery that exceeds client expectations
- Utilising a dedicated team of professional and research-active geomorphologists who work closely with hydrologists, geologists and ecologists, as dictated by the project needs
- Working closely with internationally- renowned sub-consultants from UK universities who provide peer review and help develop innovative approaches

About Jacobs

Jacobs leads the global professional services sector delivering solutions for a more connected, sustainable world. With \$15 billion in fiscal 2017 revenue when combined with full-year CH2M revenues and a talent force of more than 74,000, Jacobs provides a full spectrum of services including scientific, technical, professional and construction and programme management for business, industrial, commercial, government and infrastructure sectors.

Contact us

Katy Kemble –
Geomorphologist
Tel: +44 121 4562345
Email: Katy.Kemble@jacobs.com

Ian Griffin –
HOD for Water Science & Geomorphology
Tel: +44 (0)118 946 7066
Email: Ian.Griffin@jacobs.com

www.jacobs.com
and connect with Jacobs on



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Delivering value – project examples

River Valency catchment management strategy, Cornwall

Jacobs award-winning flood defence scheme and catchment management strategy provides a catchment-wide solution to control the transport of woody debris and sediment into Boscastle. A catchment-wide geomorphological survey identified sediment and debris 'hotspots' whilst analysis of video footage established the cause of bridge blockages. Reach-specific management measures have been implemented to control the mobilisation and transport of debris into Boscastle Village. Post-project appraisal is being used to monitor their effectiveness in reducing long-term maintenance demands.



Ponesk Burn restoration, Ayrshire

This commission used geomorphological principles to aid sustainable river restoration design for a 2.5km channel diversion. Design criteria for channel long profile, planform and cross-sections were derived to account for natural geomorphological processes.

Gravel Management Plans

Fluvial Audit was used to determine a sediment budget for the Upper Irwell and River Roch in North West England, identify areas of high flood risk and evaluate the relationship between flooding and in-channel sedimentation. The Environment Agency commissioned the study to appraise the need for channel dredging and aid the development of a more sustainable maintenance plan. The outputs included a detailed geomorphological survey report and an Action Plan. The



Action Plan:

- Describes how geomorphology affects river maintenance.
- Summarises the flood risk, current river management and geomorphology in the catchment.
- Identifies and prioritises specific sites or reaches where improvements can be made and recommends a list of actions.

Strollamus intake protection, Isle of Skye

This commission investigated an upland water intake subject to boulder impacts during flood flows. Geomorphological mapping and evaluation of boulder transport potential were used to assess a range of channel diversion and sediment control measures designed to protect the intake. A preferred option was identified along with recommendations for post-project appraisal to ensure the selected option functioned effectively.

River Anker restoration, Midlands

Jacobs was commissioned by the Environment Agency to provide a feasibility study, options appraisal and outline design for restoration works through Nuneaton. This complex project included weir removal and addition of in-channel bars and berms, in order to improve the river's morphological diversity and ecological potential, while taking into consideration the constraints of the urban environment.

