



10TH ANNIVERSARY

FINALIST



Ground Stiffness News



Spring 2018

A bright new wave in geotechnics

It's a full house! GSS makes the grade

GSS's ongoing commitment to standards and technical excellence has been recognised across the board with a range of prestigious accreditations and shortlisting for not one, but **two** of the 2018 Ground Engineering Awards.

In December we were elected as a member of the Association of Geotechnical and Geo-environmental Specialists – many thanks to our sponsors Geotechnics Ltd and BAM Ritchies. AGS membership is an important part of the continuing establishment of our ACSW testing technology in the ground investigation market.

In February we obtained Constructionline Acclaim SSIP accreditation for our health & safety systems, reflecting the high-standards of our processes and our aim to put safety and quality at the forefront of all our operations. In the same month we also achieved RISQS verification as a railway supplier for non-intrusive surveys – confirming the importance of the rail sector in our portfolio, with recent rail projects including investigations for mineworkings, trackbed stiffness, high speed rail, earthworks, retaining walls and foundations. In March we obtained Constructionline Gold membership, recognising the enhanced level of our quality and environmental systems.

Finally, we are very proud to announce that we are finalists for the Sustainability Award *and* the Ground Investigation Specialist of the Year category of the 2018 Ground Engineering Awards. The awards will be made in London on 6th June at the London Hilton on Park Lane, where GSS will be an official Supporter of the event – we hope to see many of our friends, clients and colleagues there, cheering us on at what is always a great night.

It is hard to believe it has been only 3 years since the company was formed. It has been an incredible journey; we are grateful to everyone who has supported us – we can't wait for what the next 3 years will bring!

IN THIS ISSUE



Testing on the Almaty Highway

GSS takes on the challenge of testing on the wintry steppes of Kazakhstan



Shaft investigations on the A1

GSS has been undertaking investigations on the carriageway of the busy A1 to locate capped shafts

ABOUT GSS

Ground Stiffness Surveys Limited is a specialist contractor, developer and researcher in Advanced Continuous Surface Wave (ACSW) ground profiling, continually improving and expanding the scope of its engineering testing systems to take account of the latest research developments.

GSS works closely with major engineering contractors and consultants and regularly publishes on practical ACSW testing applications.

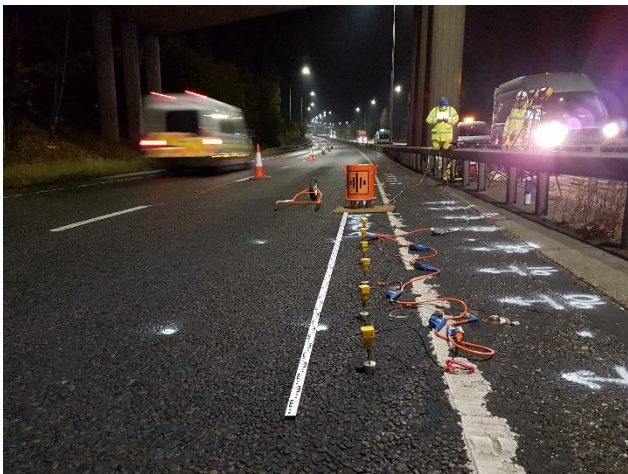
CONTACT INFO

Recent projects

Almaty Highway, Kazakhstan

GSS has just completed one of its most challenging projects, testing along the 112km Almaty Highway in Kazakhstan - part of the New Silk Road - for consultants Coffey Geotechnics and contractor Dogus-Gulsan JV.

Using our ACSW system allowed us to complete nearly 90 tests in only 5 days of testing, often in sub-zero temperatures and including testing non-intrusively through the concrete pavement. We were on site within 4 weeks of the initial enquiry and, helped by the 6-hour time difference, able to supply full reports within 12 hours of completion of testing – a pretty impressive achievement.



Thames Tideway

Testing on the foreshore of the Thames at Blackfriars for the Port of London Authority has proved our most challenging project yet. Offshore training was required to allow us to complete testing in the short 40-minute tidal window available.

Our robust and rapid ACSW system enabled us to complete testing safely in this extreme environment, which included craning of personnel and equipment from a jack up rig and setting up on mud and rip-rap – very challenging conditions where most other forms of testing would have struggled.



A1 Scotswood to North Brunton

GSS has been undertaking mineshaft capping investigations for Central Alliance and SWECO on the busy A1 in Newcastle.

Testing conditions were challenging and included testing along cutting slopes and on the carriageway, all at night under traffic management. Successful results were obtained on the carriageway non-intrusively through 200mm of tarmac and 100mm of concrete despite adjacent lanes being open to heavy traffic. Up to 16 tests were completed in a single 4-hour shift with immediate on-site assessment, demonstrating the speed and practicality of our ACSW system even in traditional wet and cold UK Autumn weather.



Croydon Tramway

GSS has completed nighttime investigations along the Croydon Tramlink for Arcadis. The speed of our testing meant that a 700m section of the route could be investigated in two nights testing within tight possessions.

Our portable ACSW equipment was transported easily by a single rail trolley with set-ups being undertaken directly on the ballast, for a rapid low-risk ground profiling and accurate trackbed formation stiffness assessment.

New Health & Safety Adviser appointed

GSS has appointed experienced health and safety professional James Woolgrove of James Woolgrove Associates as our health & safety advisor, continuing our drive towards the highest standards and excellence in the most important area of our business – undertaking work safely.

James is Chairman of the South Cumbria Occupational Health & Safety Group, of which GSS is a corporate member, and in which role he organises regular health and safety seminars in the very splendid surroundings of the grand Victorian-age Netherwood Hotel in Grange-over-Sands, conveniently located just across the bay from our Arnside office.



GSS partners with Terrafirma

GSS is partnering with ground risk specialists Terrafirma to provide a package of non-intrusive mining feature assessment. ACSW ground profile data will be used in conjunction with Terrafirma's systems to provide an additional layer of information to existing data, refining the level of risk cost effectively and with minimum disruption.

Both companies are focused on market changing technology, with a similar forward-thinking ethos. GSS Director Chris Milne, who has specialist mine risk and treatment experience, has joined the Terrafirma Advisory Board as part of a joint knowledge sharing approach and both companies are looking to work closely together on future initiatives.



Ground Related Risk to Transportation Infrastructure

In October, GSS attended the Geological Society conference on Ground Related Risk to Transportation Infrastructure at Burlington House in London.

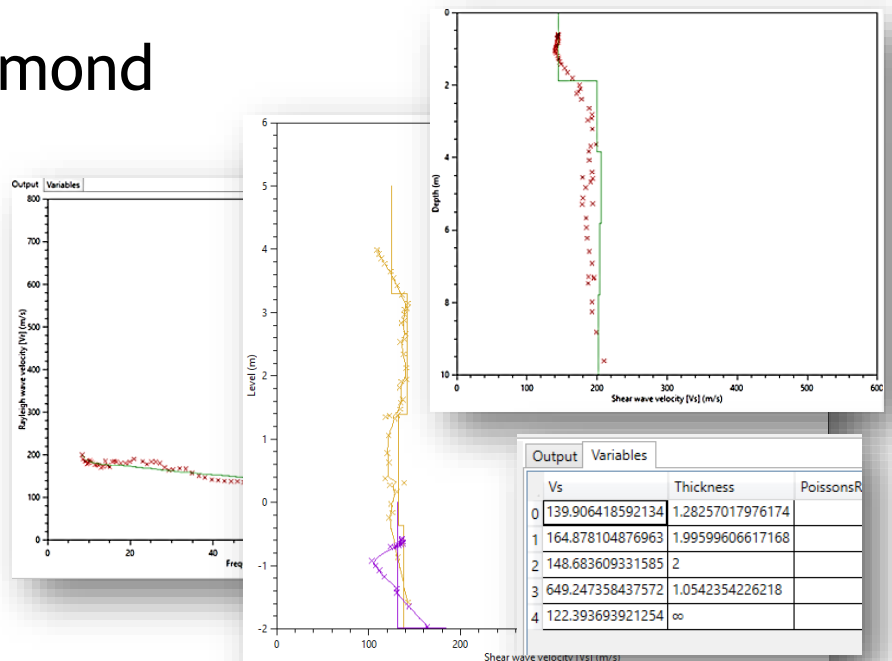
The well-attended event included many applications of new technology to ground risk assessment, and ACSW testing was included in one of the keynote speeches by Richard Garland of BAM Ritchies on Developments and Future Challenges in Responding to Hazards and Events as an example of an exciting new approach.



We're nuts about Almond

We are currently enjoying using the latest 'Almond' release of our integrated C-DAS control and analysis software. In response to client requests, Almond includes even greater flexibility in reporting permitting data to be adjusted for reduced levels and allowing the import of Vs profiles for Rayleigh wave modelling (an important factor for high speed rail design).

Using these new features we can easily demonstrate the effects of ground improvement to Rayleigh wave velocity profiles, with direct application for major high speed rail projects such as HS2.



Recent publications

GSSGN023 Using ACSW for mining investigations

Following from GSS's recent experience of investigation for shallow mineworkings, guidance note GN023 covers the application of ACSW to the location of mine workings and shafts, and on using ACSW data for mine treatment validation. The guidance note includes examples of 3D modeling using ACSW data for rapid and cost-effective design of mine treatment schemes.


	GUIDANCE NOTE		
	Using ACSW for mining investigations		
	January 2018	Page 3 of 5	GN023

Figure 2 below shows the results of two tests undertaken in an area of mine workings located beneath a railway. Figure 2a shows a typical result obtained away from mineworkings. Figure 2b shows a profile obtained in an area subsequently shown via dynamic probing to be an area of disturbed ground associated with mineworkings. Due to the close spacing of tests at this site it was possible to generate a 2D (figure 2c) and 3D model (figure 2d) for the site to assist in interpretation.

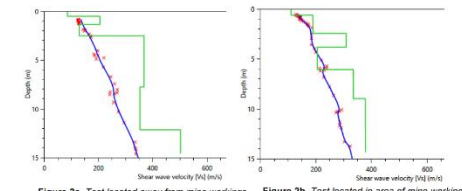


Figure 2a Test located away from mine workings showing shallow rock head at around 2.5m depth. Figure 2b Test located in area of mine workings showing disturbed ground to approximately 6m.

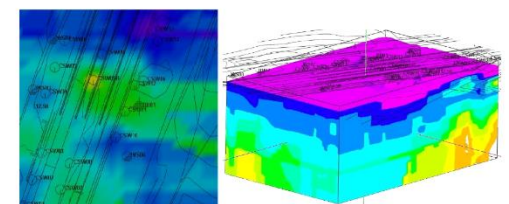


Figure 2c Contoured model of ground stiffness at 6m depth showing low stiffness areas in green subsequently shown to correspond to disturbed ground associated with mine workings. Figure 2d 3D model of ACSW to assist in interpretation of areas affected by mine workings.


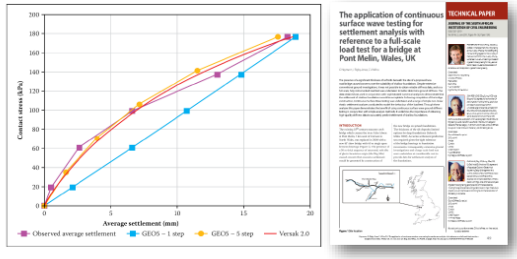
	GUIDANCE NOTE					
	Sustainability of ACSW testing					
	March 2018		Page 2 of 3		GN024	

TABLE 3 Summary of spread footing analyses	STUDY SITE 1			STUDY SITE 2		
	Emp. E _{15%}	CSW E _{15%}	Emp E _{15%} /CSW E _{15%} (%)	Emp. E _{15%}	CSW E _{15%}	Emp E _{15%} /CSW E _{15%} (%)
Settlement of 2.5m square pad under 250kPa (mm)	9.3	5.2	179	9.4	7.0	134
Square pad dimension for 5mm settlement (m)	2.8	1.3	215	1.7	1.2	148

TABLE 4 Summary of pile analyses	STUDY SITE 1			STUDY SITE 2		
	Emp. E _{15%}	CSW E _{15%}	Emp E _{15%} /CSW E _{15%} (%)	Emp. E _{15%}	CSW E _{15%}	Emp E _{15%} /CSW E _{15%} (%)
Pile head displacement (mm)	1.6	0.6	277	1.5	0.6	244
Max shear force (kN)	46.6	30.5	153	37.9	24.6	154
Max. Bending Moment (kNm)	74.1	71.3	104	74.2	70.3	106

Tables 3 & 4 from Deighton, M and Rigby-Jones, J. (2016) Improved estimation of ground stiffness for railway projects using Continuous Surface Wave testing. *Ground Engineering*, comparing displacements using empirically derived stiffness data with those using GSS CSW data.




Comparison between CSW derived settlement analyses and large-scale load test data. The application of continuous surface wave testing for settlement analysis with reference to a full-scale load test for a bridge at Pont Melin, Wales, UK.

GSSGN024 Sustainability of ACSW testing

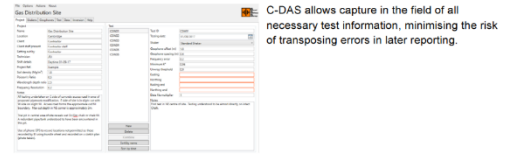
This guidance note sets out the environmental and sustainability advantages of GSS ACSW testing as a low-intensity, low-energy low-waste alternative to intrusive investigations, in addition to the significant environmental benefits of routine design optimisation from accurate, low-cost stiffness profiling.

GSSGN022 GSS ACSW testing system

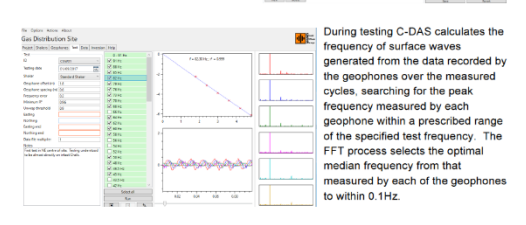
Guidance note GN022 outlines the development and capabilities of the GSS ACSW testing system, including GSS C-DAS software, shakers and data acquisition system. The guidance note details the key advantages and unique features of the GSS ACSW system.

	GUIDANCE NOTE		
	GSS ACSW testing system		
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C-DAS
GSS's C-DAS package is the first fully integrated commercial CSW data acquisition, analysis and reporting software.



C-DAS automatically controls and analyses testing in both monotonic mode (measurement at a set of pre-specified frequencies) and sweep mode (measurement over a continuously varying frequency over a specified range). Data is captured at a minimum 1kHz sampling rate per geophone over a minimum 100 wave cycles during monotonic data acquisition.



Ground Stiffness News

www.GroundStiffnessSurveys.com

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If you would like to know more about ACSW testing or to discuss getting better stiffness data for your projects, please contact John or Chris - we would be happy to help.

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