Name	Lars Hässler		
Year of Birth	1953	**Marital Status**	Married
Profession/ Specialisation	Civil engineer larger structures. PhD Soil&Rock mechanics Design and construction of hydropower projects, design and construction of larger road and railway projects and design and construction of tunnels and rock caverns.		
Years with present Firm	6	**Nationality**	Swedish
Years of Experience	>40		

Key Qualifications

Lars Hässler has with the base of his broad educational background worked with most aspects of civil constructions including contracts handling and project management. He has been appointed as tunnel expert for the Swedish Rail administration and has been working as expert on rock mechanical and grouting design issues for the Swedish Road Administration. Over the last 20 years he has been specially engaged as a problem shooter covering the Arlanda Link train project, the Zongo Valley Hydroelectric Expansion Project, the Rio Esti hydro power project, the Changuinola 1 hydropower project, the Citybanan" railway and the "By Pass Stockholm" motorway project both in manager positions and as expert in rock mechanics, grouting and soil mechanics. During these and other projects, he has successfully been involved in a number of contractual negotiations and claims. Even if his speciality is focused on geo-engineering he has large experience from all kinds of interfacing disciplines such as hydrogeology, structures, concrete works and environmental issues.

Employment Record

Mars 2019-present	**Psicons AB** - Sweden Owner Senior advisor, project manager and expert in grouting, geotechnics, rock mechanics and hydropower projects
2018-February 2019	**SWECO Energuide AB** - Sweden Senior Geotechnical Engineer Senior advisor, project manager and expert in grouting, geotechnics, rock mechanics and hydropower projects
2015-2017	**SWECO Energuide AB** - Sweden PRD team leader and legal representative in Albania. Senior engineering geologist responsible for design and commissioning of all drill and blast underground works at the Moglicee hydropower plant in Albania.
2010 - 2015	**Golder Associates AB** – Stockholm, Sweden Associate and Senior Geotechnical Engineer Technical developments manager, senior advisor, project manager and expert in grouting, geotechnics, rock mechanics and hydropower projects
2007 - 2010	**CCWJV** (Joint venture between Pihl & son and MTHøjgaard) – Changuinola, Panama Design and geotechnical manager Responsible for optimization of design, design-contractor interface management and the design consultant's timely delivery as client for the civil designs necessary for construction of the project.
2004 - 2007	**Golder Associates AB** – Stockholm, Sweden Senior Geotechnical Engineer Senior advisor, project manager and expert in grouting, geotechnics, rock mechanics and hydropower projects

2001 – 2003	**Skanska** – David, Panama Specialist in geotechnics, rock mechanics, grouting and hydropower disciplines. Geotechnical Engineer and "Chief Geotechnical Team" at the Rio Esti project
1999 – 2001	**SwedPower AB** – Stockholm, Sweden Senior Geotechnical Engineer. Specialist in geotechnics, rock mechanics, grouting, hydropower and project management on various projects
1997 – 1999	**SwedPower International AB** – La Paz, Bolivia Geotechnical manager Zongo Valley Hydroelectrical Expansion project. Specialist in geotechnics, rock mechanics, grouting and general hydropower constructions
1994 – 1997	**Vattenfall Hydropower AB** – Stockholm, Sweden Geotechnical specialist and project manager Specialist in grouting, geotechnics, rock mechanics, hydropower and project management on various projects
1989 – 1994	**Golder Associates AB** – Uppsala, Sweden Geotechnical specialist and project manager Specialist in grouting, geotechnics, rock mechanics, hydropower and project management on various projects
1986 – 1989	**Royal Institute of Technology**, Stockholm – Stockholm, Sweden Doctoral Student and teacher
1984 – 1984	**SKANSKA** – Sweden Specialist FEM calculations for Rock support
1982 – 1986	**Royal Institute of Technology**, Stockholm – Stockholm, Sweden Research Engineer and teacher

Experience Record

2017-Present	**Senior Geotechnical Engineer** Expert advisor in rock mechanics for a feasibility study regarding transformer location at the Kvistforsen hydroelectric plant
	Senior Geotechnical Engineer Production support and expert advisor in grouting, geotechnics and rock mechanics for the new subway in Stockholm
	Senior Geotechnical Engineer Appointed grouting expert advising the construction works of the Dhap dam Nepal.
	Senior Geotechnical Engineer Senior advisor and expert in geotechnics and rock mechanics for a second opinion in relation to some power line tower foundations, Georgia.
	Senior Geotechnical Engineer Fact witness in successful arbitration between AES Panama and MTHøjgaard in relation to a partly damaged poorly maintained headrace tunnel at the Changuinola 1 hydropower project.
	Senior Geotechnical Engineer Senior advisor and expert adviser in grouting, geotechnics and rock mechanics for the design of a new subway under Stockholm.

Project Manager
Maintenance repair works of power line foundations in Zambia.

Project manager and supervisor
ROV tunnel inspection at the Grundsjön dam spillway tunnel

Senior Geotechnical Engineer
Senior advisor and expert in grouting, geotechnics and rock mechanics for several minor construction activities around Stockholm.

Senior Geotechnical Engineer
Senior advisor and expert in grouting, geotechnics and rock mechanics for the supervision of the Caculo Cabaça hydropower project in Angola.

2015-2017 **Team leader and legal representative PRD, SWECO, Moglecee hydropower project Albania.** Consultant to Statkraft with the responsibility for the design and follow up of all underground drill and blast tunnel structures in the Moglicee hydropower project. The responsibility mainly consisted of around 10 km of drill and blast tunnels, a power house cavern, a transformer cavern, an access tunnel for the TBM that excavated a major part of the headrace tunnel and a rock cavern for disassembling of the TBM, all in rocks of very varying quality.

2010-2015 **Expert adviser for the motorway "By Pass Stockholm", Swedish Transportation Administration**
Technical expert adviser in rock mechanical, grouting, geotechnical and geohydrology matters for the south part of the project (Kungens Kurva). This stretch includes design-build tender documents for bridges, road rock cuts and concrete tunnels. Main challenges were to write tender documents that ensures safe construction of several kilometres of rock slopes with up to 20 m high vertical cuts, groundwater levels according to environmental ruling and to make possible that the contractor with the best knowledge, resources and price wins the contracts

Expert rock mechanical adviser, Fortum, Sweden. Responsible for the rock mechanical design of tunnels and excavations for a feasibility study of a new stop log system at the Krångede hydropower plant.

Expert grouting adviser, Fountain Intertrade Corp, Panama. Expert grouting adviser during the finalization of the grout curtain at the La Potra dam at the hydropower project Bajo Frio in Panama.

Expert rock mechanical adviser, Skanska. Appointed rock mechanical expert representing Skanska preparing defence for the arbitration between Skanska and AES regarding a partly damaged poorly maintained headrace tunnel at the Rio Estí hydropower plant in Panama.

Rock mechanical design leader, Citybanan, Swedish Rail Road Administration, Stockholm Sweden. Responsible for rock mechanical design implementation and adjustments for unit price parts of the contract during construction.

2007-2010 **Design and Geotechnical Manager, Changuinola 1 hydroelectric power plant, CCWJV. Changuinola Panama.** Manager of the Design & Geotechnical department under the EPC Consortium for the civil work´s (Changuinola Civil Work´s Joint Venture consisting of Pihl & son and MThøjgaard). The project contains mainly one RCC dam (100 m high with around one million m3 of concrete), 4,5 km of tunnels with areas of around 100 m2, some 30 km of roads with up to 100 m high cut slopes in weathered volcanic terrain, a mini hydro power station and a main power station cut into a steep hillside consisting of volcanic

tuffs, agglomerate and karstic limestone. Hässlers duties included setting up civil design contracts between the EPC Consortium and the designers, handling of all technical contract changes towards the client, handling of all civil works design and design implementation, optimization of all geotechnical aspects of the project including setting up and adjustment of procedures for all types of geotechnical works.

2004-2007

Rock mechanical design leader, Citybanan, Swedish Rail Road Administration. Responsible for the preliminary rock mechanical design of the stretch from Station City to the "Söderströmstunnel" stretch. This stretch includes tender documents for access tunnel. Responsible for the rock mechanical design and related tender documents (both design-build and unit price) for the "Söderströmstunnel" stretch from Riddarholmen to Södermälarstrand. This stretch includes design of tunnels with low rock cover under existing sensitive structures and tender documents for a submerged concrete tunnel with connections to rock tunnels.

Rock-mechanical expert advisor, Skanska, Brasil. Expert advisor for the rehabilitation of the collapsed tailrace tunnel at the Ponte de Pedra hydroelectrical power plant.

Expert grouting and rock mechanical adviser, Skanska. Appointed grouting and rock mechanical expert representing Skanska in arbitration between Skanska and Bottniabanan AB.

2001-2003

Chief Geotechnical Team at the Rio Esti hydro power project, SKANSKA, David Panama. Working directly under the EPC consortiums project manager. Responsible for the team working with geotechnical documentation, geotechnical design implementation, geotechnical design adjustment, geotechnical design optimization and geotechnical construction works supervision for dams, canal and tunnels and grouting works design and supervision for dams and tunnels. Duties included time estimates and resource evaluation for tunnel production, material and foundation approvals and handling of all types of geotechnical and rock mechanical failures including the authority to stop the works if necessary. The project included two dams, a canal, a tunnel with several adits, several roads, several bridges and a powerhouse with tailrace canal. The scheme begins with a 15 m high combined embankment and concrete dam followed by a 6 km long canal cut through young volcanic terrain with up to 30 m high slopes. The canal ends up in a 65 m high concrete face rock fill dam which in turn feeds a 4.5 km long pressurised tunnel with an area of around 65 m2 going through andesites, tuffs and agglomerates with a vertical surge arrangement. The tunnel ends in a raising penstock feeding the turbines in the powerhouse. Key issues in the project were an enormous time pressure in combination with late design changes caused by geotechnical surprises.

1999-2001

Stockholm Southern Link underground motorway, The Swedish National Road Administration. Rock-mechanical expert responsible for commissioning of all rock related works at the Stockholm South Link underground motorway. The project consisted of the construction of 4.7 km of tunnels. This made it the second longest urban motorway tunnel in Europe after Madrid M30 orbital motorway. The tunnel is 4 lanes wide each way at its widest point (total 8 lanes).

CLAB 2, SKB, Sweden. Expert rock-mechanical Engineer and responsible for the rock mechanical design and design implementation during construction. In total 87,500 m3 of rock was excavated.

SKB, Sweden. Expert Advisor on Grouting with special focus on grouting at large depths with high water pressures.

Kafue Gorge Rehabilitation Project, ZESCO, Zambia. Consultant´s representative during contract negotiations between Chinese contractor and client.

A-train Stockholm Sweden. Expert Rock-mechanical Advisor related to new constructions in the vicinity of the Arlanda Link train tunnels and underground stations.

Rio-Esti Hydropower Project in Panama, Stockholm Sweden. Quality control of SwedPower's geotechnical and rock-mechanical design.

1997-1999

Zongo Valley Hydroelectric Expansion Project, COBEE, La Paz Bolivia. Owners´ representative, Manager, Project Manager Replacement, Site Manager Replacement and Geotechnical Expert. The Zongo Valley Hydroelectric Expansion Project consists of 2 new Hydropower plants, refurbishing and additions to four old plants and 45 km of new transmission lines. Hässler´s work was to take responsibility for all geotechnical parts of the project including design, training and supervision and to initiate and execute necessary dramatic changes in project organisation and contracts. The original consulting company (Canadian) responsible for design and supervision was replaced with specially formed Bolivian company. The project included several bridges, several power houses with intakes and tailrace-canals, over 10 km of tunnels with overburden up to 800 m, two vertical shafts 110 and 210 m high, a surge shaft 6 m wide 60 m high and some 10 km of access roads under extreme geotechnical conditions with severe slope stability problems. The major parts of the underground and road works were placed in sedimentary rock ranging from good quality meta-siltstone to totally decomposed graphitic shist.

1994-1997

Arlanda Link, Banbrytarna, Stockholm Sweden. Chief engineer and SwedPower´s Project Manager for rock- soil- and groundwater related design and construction supervision working together with the contractor. The project consisted of more than 1 km of cut and cover, three railway stations directly under the flight terminals and connecting tunnels. In total 12 roller-stairs and elevator shafts were constructed connecting the underground with the existing terminal buildings above.
These shafts were specially supported with concrete structures to protect surrounding existing constructions. Underground excavation volume for tunnels and caverns was around 800 000 m3. The span of the stations was 21 m and the rock cover varied from 8 m till 14 m. All station caverns were constructed in a mica schist with varying quality.

Kafue Gorge Rehabilitation Project, ZESCO, Zambia. Working in Zambia with collection of essential information for tender documents for the rehabilitation project.

Swedish National Road Administration, Stockholm Sweden. Technical specialist and reviewer for the Swedish Road Administration´s technical departments on rock mechanics and grouting subjects during the design of "the Stockholm Ring".
Nacka Port. Specialist advisor on investigation and design of soil tunnels and concrete lining.

Cost estimates and excavation method evaluations for tunnels in very poor rock and polluted soil.
Several projects concerning risk assessment analysis of groundwater-related problems.

Swedish National Road Administration, north. Technical specialist on "Cable Grouting" at the Veda bridge.

SKB, Sweden. Development of methods to compare different sites for a future nuclear waste repository from a construction point of view.

1990-1994

Finnsjön site, SKB, Sweden. Discrete Fracture Flow Modelling.

Säteriet, Vallentuna Sweden. Evaluation of capacity of groundwater well for energy production in Vallentuna.

Los Frailes open pit mine, Boliden, Sweden. Prediction of long terms development of water inburst at the Los Frailes open pit mine.

Langøya waste deposite, WMI. Rock mechanical and geotechnical review of the Langøya waste deposit.

Vika landfill, KMÅ, Sweden. Analysis of stability and stabilisation measures at Vika landfill.

Kovik Landfill, WMI, Sweden. Preliminary design of water barriers at Kovik landfill.

WMI, Sweden. Cost estimates for landfill covers.

Äspö Hard Rock Lab, Skanska, Sweden. Expert advisor on grouting at the Äspö Hard Rock Lab.

Hallandsås tunnels, Kraftbyggarna, Sweden. Development of "Observational Design" concept for the construction of the Hallandsås tunnels. Review of rock support design for the Hallandsås tunnels. Development of prequalification program for groutmaterials to be used at the Hallandsås tunnels. Expert advisor on design of grouting at the Hallandsås tunnels.

Skanska, Sweden. Development of rock classification system for grouting.

1984-1990

Skanska, Indonesia. Expert investigator of erratic grouting system at Mrica Hydro Power Project in Indonesia.

Skanska, Sweden. Specialist FEM analyser for stability, design and rock support for large crude oil storage caverns.

Doctoral student, Royal Institute of Technology, Stockholm Sweden. Development of numerical methods for multi-fluid non-Newtonian flow in rock joints (three-dimensional channel systems). Thesis. Development of a system for

measuring grouts properties and their change with time. Thesis. Development of computer programs for multi-fluid radial and channel flow. Thesis.

1982-1984 **Cementa, Slite Sweden.** Wall stability prediction of the Slite limestone quarry.

BFR, Sweden. A comparison between field and laboratory tests for cohesive and frictional soils.

Publications

2024 H. Indridason, L. Hässler, M. Rahman
Tunnelling under water passage Ladugårdslandsviken- Technical design and as built rock reinforcement
World tunnelling congress Stockholm 2024, Paper.

2017 Carter T.G, M.G. Jefferies, V. Rombough, Y., L. Hässler, R. Granata. A Retrospective Evaluation of the Progress of Computer Monitored Grouting. International Congress on Grouting, Honolulu 2017, Paper.

Terron J., S Wellershaus., R Glamheden., L Hässler., B Stuge. Rock mass behaviour of a cavern complex excavated in ophiolotes, 7th International Symposium on Tunnels and Underground Structures in SEE 2017, May 3-5, 2017, Sheraton, Zagreb, Croatia.

2014 Hässler L., A. Olsson, E. Runslätt, J. Niland. Practical use of the observational method at the Riddarholmen excavations. BeFo, Paper Bergmekanikdagen 2014, BeFo, In Swedish..

2012 Stille H, G. Gustafson, L. Hässler. Application of new theories and technology for grouting of dams and foundations on rock, ASCE, Int. Jour. of Geotechnical and Geological Engineering, 2012.

Creütz M, L. Hässler, N. Shirlow, W. Kay. Sealing of a temporary excavation for the Down Town Line - application of Scandinavian grouting practice in Singapore. 4th International Conference on Grouting and Deep Mixing, New Orleans, 2012, Paper.
.

2006 Bröchner J., U. Håkansson, L. Hässler. Contractors and Design Risk in Major Civil Works Design/Build Projects, 1st International Construction Specialty Conference, Calgary, Canada, 2006, Paper.
.

2001 Fredriksson A., L. Hässler, L. Söderberg. Extension of CLAB – Numerical modelling, deformation measurements and comparison of forecast with outcome. ISRM regional symposium EUROCK 2001, Espoo, Finland, 2001, Paper.

1999 Chang Y., L. Hässler, M. Forhaug. Rock supports of underground train stations in Arlanda airport area, Stockholm. International Congress on Rock Mechanics, Paris 1999, Paper.

1997 Hässler L., M. Forhaug. Experiences of grouting works at the Arlanda train project. Swedish Rock Engineering Research, SweBeFo, Paper Bergmekanikdagen 1997. In Swedish.

1996 Hansen L., L. Hässler, T. Olsson, P. Wilén, R. Sturk, L. Olsson. Risk analysis based constructability evaluation on the basis of existing facilities. Swedish Nuclear Fuel and Waste management company, SKB Sweden, 1996. In Swedish.

1994	Fredriksson A., L. Hässler. J. Johansson, L. Olsson, T. Olsson. Passage av park väster om Bellevueberget med lindar från 1700-talet. RAP 0013, Vägverket region Stockholm, 1994. In Swedish.
	Hansen L., L. Hässler, T. Olsson, N. Rahm, A. Fredriksson, J. Johansson, L. Olsson. Grundvattenpåverkan vid passage Roslagsvägen, Norra Länken. RAP 0008, Vägverket region Stockholm, 1994. In Swedish.
	Hässler L., T. Olsson., N. Rahm. Grundvattenproblem vid Åbyvägens trafikplats. Problemidentifiering. RAP 0009, Vägverket region Stockholm, 1994. In Swedish.
	Hässler L., T. Olsson, N. Rahm, H. Sundström. Nacka Port. Tunnel under Nobel Industrier. RAP 00048, Vägverket region Stockholm, 1994. In Swedish.
	Rahm N., L Hässler., H Sundström., T Olsson. Södra Länken. Generisk bedömning av tillåtna läckagevärden i bergtunnlar. RAP 0049, Vägverket region Stockholm, 1994. In Swedish.
1993	Chang Y., L. Hässler. An Analythical Solution of Ground Reaction Curves for Grouted Tunnels. International Conference on Grouting in Rock and Concrete, Salzburg, 1993, Paper.
	Hässler L., U. Håkansson. The Influence of Flow Geometry on the Interpretation of Lugeon Tests and the Choice of Grout and Grouting Method. International Conference on Grouting in Rock and Concrete, Salzburg, 1993, Paper.
1992	Geier J E., L. Hässler. Scale effects in estimating fractured rock block conductivity from packer tests, Rock Mechanics proceedings of the 33rd U.S Symposium, 1992.
	Geier J E., C_L. Axelsson, L. Hässler, A. Benabderrahmane. Discrete farcture modelling of the Finnsjön rock mass: Phase 2. Swedish Nuclear Fuel and Waste management company, SKB report 92-07, 1992.
	Håkansson U., L. Hässler, H. Stille. Rheological Properties of Microfine Cement with Additives, ASCE Speciality Conference on Grouting, Soil Improvement and Geosynthetics, 1992. Paper.
	Håkansson U., L. Hässler, H. Stille. Rheological Properties of Microfine Cement with Additives, Tunnelling and Underground Space Technology, Vol. 7, No. 4, pp 453-458, 1992.
	Hässler L., U. Håkansson, H. Stille. Classification of Jointed Rock with Emphasis on Grouting, ASCE Speciality Conferene on Grouting, Soil Improvement and Geosynthetics, 1992, Paper
	Hässler L, U. Håkansson, H. Stille. Classification of Jointed Rock with Empasis on Grouting, Tunnelling and Underground Space Technology, Vol. 7, No. 4, pp 447-452, 1992
	Hässler L., U. Håkansson, H. Stille. Computer Simulated Flow of Grouts in Jointed Rock, ASCE Speciality Conference on Grouting, Soil Improvement and Geosynthetics, 1992, Paper.
	Hässler L., U. Håkansson, H. Stille. Computer Simulated Flow of Grouts in Jointed Rock, Tunnelling and Underground Space Technology, Vol. 7, No. 4, pp 441-446, 1992.
1991	Hässler L. Grouting of Rock – Simulation and Classification, PhD Thesis, Royal Institute of Technology, Stockholm, 1991.

	Håkansson U., L. Hässler, H. Stille. A Technique for Measuring the Rheological Properties of Injected Grout, BeFo 241:1/91, Swedish Rock Engineering Research Foundation, Stockholm, 1991. In Swedish.
1990	Hässler L. Undercut and fill mining applied on the Garpenberg mine. Stiftelsen bergteknisk forskning, BeFo, Paper Bergmekanikdagen 1990. In Swedish.
1989	Hässler, L., U. Håkanson. Injektering i modell och verklighet. Stiftelsen bergteknisk forskning, BeFo, Paper Bergmekanikdagen 1989. In Swedish
	Hässler L., U. Håkansson, H. Stille. Undercut and fill mining applied on the Garpenberg Mine, BeFo 251:1/89, Swedish Rock Engineering Research Foundation, Stockholm, 1989. In Swedish.
1987	Hässler L., H. Stille, U. Håkansson. Simulation of grouting in jointed rock. Proc. 6th International Congress on Rock Mechanics Vol. 2, pp. 943-946, Montreal, 1987. .
1986	Hässler L. Teoretiska aspekter på berginjektering. Seminarium om dammar, 20-21 November 1986, Inst. för vattenbyggnad, KTH. In Swedish.
	Hässler L., J. Andersson, H. Stille. Injekteringens styrmekanismer, Etapp I - Grundläggande samband. BeFo 105:1/85, Stiftelsen Bergteknisk Forskning. Stockholm, 1986. In Swedish. .

Professional Societies

Swedish Geotechnical Association
Swedish Society of Civil Engineers
International Society of Rock Mechanics

Member of the ISRM commission on grouting (1992 and 2014)

Education

1991	Ph.D. Soil & Rock-mechanics, Royal Institute of Technology, Sweden.
1983	M.Sc. Civil Engineering, Royal Institute of Technology, Sweden.
1982	B.Sc. Chemistry, Biology with specialities in Analytical Chemistry, Biochemistry and Limnology, University of Uppsala, Sweden.

Courses Soil and Rock Mechanics, Soil and Rock Dynamics, Geostatistics, Mathematics, Numerics, Electrotechnical Engineering and FEM

Languages	**Speaking**	**Reading**	**Writing**
English	Excellent	Excellent	Excellent
Swedish	Mother tongue	Mother tongue	Mother tongue
Spanish	Basic	Basic	Basic

CERTIFICATION:
I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.
Date: 19 September 2025

Lars Hässler