



**LANDFORM  
DESIGN  
INSTITUTE**

Summer 2021

# Landform Design Quarterly

## AGM heralds Institute accomplishments

by David Wylanko

After nearly two years since its 2019 founding, the Landform Design Institute (LDI) held its first formal annual general meeting on July 21, 2021, as a videoconference through Zoom. Nearly half the membership were in attendance for an informative and enthusiastic hour-long discussion.

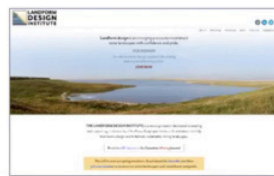
Board Members Gord McKenna and June Pollard performed hosting duties, with approximately 30 other members joining from around the world. They unanimously re-elected McKenna, Pollard and the other three board members — Loix Boxill, Anne Naeth, and Mike O’Kane — to continue leading the organization for staggered terms.

No changes were made to the Technical Advisory Panel’s membership, but McKenna described its composition as “a little too North America-focused” and not adequately representative of the wide variety of disciplines involved in landform design. As a result, more efforts would be made to attract new panel members from other continents and fields other than geotechnical engineering.

Pollard described the Institute’s accomplishments to date, including the inaugural 40-hour landform design course, several lectures delivered at universities and institutions in Canada and the US, the “Getting Closure” podcast, completion of a gap analysis

### Corporate / operations

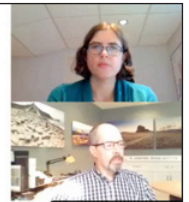
- Gaining legal status as a not-for profit organization, with a lawyer, tax accountant, chequing account, and a Board of Directors.
- Establishment of a Board and Technical Advisory Panel
- Establishment of a strategic plan.
- Initiation of a membership drive.
- Creation of a business plan.



### 2019/2020 Accomplishments

### Products

- [www.landformdesign.com](http://www.landformdesign.com) website
- 40-hour UofA landform design course at the University of Alberta in 2019
- 5 Landform Design Quarterly newsletters
- “Getting Closure” podcast series with 3 episodes with world experts on landform design and mine closure (now 5)
- Delivery of landform design lectures
- Gap analysis for mine reclamation
- Production of a draft position paper
- Initial drafting of the outline and cover for the Landform Design for Sustainable Mining textbook
- Generation of a preliminary library of landform design publications over the past 20 years



**LDI Director June Pollard and Chair Gord McKenna convene the first LDI annual general meeting.**

for mine reclamation, assembly of a landform design library, and the spring 2021 publication of the groundbreaking landform design position paper, *Mining with the end in mind*.

McKenna reported that feedback to the position paper has been overwhelmingly positive. In response to a query about making the contents of the paper more accessible, he noted that video vignettes and PowerPoint presentations that members can tailor to their

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## Making landform design routine worldwide

**The Landform Design Institute is dedicated to creating and supporting a community of landform design practitioners.**

**Its intention is to help their teams design and build truly sustainable mining landscapes.**

**Its mission is to make landform design routine in the mining industry worldwide by 2030.**

# Essay:

## Building an effective design basis memorandum for a landform design

by June Pollard

Landform design practitioners advocate for the use of a design basis memorandum (DBM) as an essential step in successful reclamation. The Global Industry Standard on Tailings Management (GISTM), released by the ICMM in August 2020,



now requires that the Engineer of Record “shall prepare a Design Basis Report (DBR) that details the design assumptions and criteria, including operating constraints, and that provides the basis for the design of all phases of the tailings facility lifecycle” (Requirement 4.8).

The LDI supports having an effective design basis for all phases including closure and/or aftercare. This is the essence of designing with the end in mind, which is one of the Landform Design Institute’s (LDI) key principles and initiatives. The GISTM is focused on tailings facilities, but the Institute reasons that all mining landforms require a detailed design basis which supports all

phases of operation including closure.

What does a DBM include? The GISTM requires that it includes design assumptions, design criteria, and operating constraints. As such, it is a living document which shall be updated over time, and one

that guides the design and operational decisions for the landform in order to steer toward the desired outcome. Without a sound DBM, the team can still be debating halfway through the project what they are trying to achieve, a problem prevalent in the real world. In essence, the DBM is a roadmap which documents the main criteria and assumptions relied upon for the landform design.

So how does one create a DBM for a mining landform? Start by setting up a team. The LDI position paper focuses on the Landform Design Team and provides initial guidance for the formation of that team for success. Ultimately, you need a well-

rounded design and governance team, and you need it for the entirety of the landform’s life. Ideally the team will include or work with members of local communities and the regulator (though efficient methods of such collaboration are still being explored).

Define the mining landform/project area for the DBM, and draw a site boundary on the map (are the slopes included, is the toe berm included, is a watercourse included etc.). Put together all your supporting documents. These can include: mine plans (mine, tailings, closure, volumes and schedules, business plans); design documents (pit, dyke designs, previous designs, design manuals, material properties, tailings technology data, research reports); substrate maps and details (geological surface and models, infrastructure as-builts, substrate maps, topographical maps); governance and permitting conditions, commitments and constraints (targeted end land uses, regulatory, site wide risk register, EPEA,

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## Building an effective design basis memorandum for a landform design

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corporate commitment register); closure plan maps; and project area polygons.

Identification of the returning reclaimed land uses is an important part of the DBM process for closure of a mining landform. There may already be a comprehensive Life of Mine (LOM) closure plan in place for the mine site which the design basis for the mining landform can be based on or aligned with. If a LOM plan doesn't exist, the returning land use will need to be selected through the DBM process. Consider what suite of land uses the community desires. What land uses have been chosen for nearby mines? What might be technically and economically feasible? What else is being done in the region or world?

The closure vision is paramount. What is the big picture that will be achieved? In turn, what are the goals that support the vision? Goals can be financial, cultural, regulatory, physical, land use, biological, chemical or other. What design objectives and criteria then support the overall goals?

For example, the vision might be to build a reclaimed landscape such that reclaimed landforms can support a self-sustaining, locally common boreal forest. A goal in support of that vision may be that the slopes for the mining landform are safe and stable. A design objective in support of that goal may be to avoid ponded water near slopes. The design criteria might therefore be a criteria of a 2% gradient in certain areas to shed water or a 2m height berm to separate the slope from the plateau, or zoning the landform to identify critical areas for ponded water during specific precipitation events. Important areas to focus on during the identification of closure design criteria include dam safety during operations, dam safety during closure/post closure, the integrity of the lease-wide drainage system, and slopes above critical infrastructure.

*As an engineering community, we concentrate on the design objectives and criteria.*

*But for the end land user, just as important is the vision of returning the land to a desirable post-mining use.*

For the technical community, there is a focus on the design objectives and criteria. But for the end land user, just as important is the vision of returning the land to a desirable post-mining use. What will this be like? Can it be achieved? Defined goals and objectives in direct support of the vision give stakeholders confidence that the design matches our closure aspirations and commitments. Even more essential as part of this process is to provide clear documentation so the vision, goal, objective, and criteria can be revisited over time.

We need to be explicit and detailed in our design basis criteria for closure in all aspects; define closure timeframes (erosion, climate change), geotechnical (factor of safety

for closure designs, trafficability, seismic), surface and groundwater (quantity, design storm, water quality) soils (quality, quantity, and capability), vegetation (species, stocking, establishment) and wildlife habitat. If technology selection, development, and use is relied upon to achieve these objectives it should be defined as part of the DBM.

Then we need to consider contingencies. What happens when some goals are not met? Are our criteria realistic? Are the objectives achievable? Are realistic and achievable contingencies in place? Will all interested parties buy into these objectives and criteria? The LDI is capturing examples of closure objectives and criteria as part of case studies, providing how-to guidance for development of closure design criteria and starting a discussion with industry, regulators, and stakeholders.

While people on the team will invariably be replaced over the life of the mine, the DBM remains a consistent document throughout mining and beyond. It must be kept up to date and everyone participating must be actively involved throughout. Creating and maintaining a DBM can transform the mine reclamation process, making it consistent, verifiably, and above all an essential ingredient to seeing the land returned to users after mining. It will prove integral to designing and building truly sustainable mining landscapes.

*June Pollard is a Director of the Landform Design Institute. This article is taken from a presentation she made to the inaugural landform design course in Edmonton, Alberta on December 6, 2019.*

These elements are included in a sound design basis for landform design:

- project description, introduction and background, including purpose of the DBM;
- description and map of existing site conditions;
- description of how the DBM was put together;
- list of specific inputs;
- list of regulatory requirements (documents) that the DBM meets;
- table of goals, design objectives, and design criteria (the main output of the DBM);
- material types and design parameters;
- a map of design constraints;
- a statement about how the document will be used and updated over time.

# Introduction to the LDI position paper

*Feedback at the LDI annual general meeting indicated that some members found the denseness of the Institute's new position paper daunting. To gain a snapshot of the paper, the Spring issue of the Quarterly contains an abridged excerpt of the paper's summary. Below is the entire Introduction.*

Since its inception, the discipline of landform design has helped mines, regulators, Indigenous peoples and local communities collaborate on the creation of mining landforms and landscapes that reliably and economically meet agreed-upon goals and objectives. It is becoming an essential component of successful reclamation, sustainable mining, and global sustainable development. This integrated and multidisciplinary approach to designing and reclaiming mining landscapes — or mining with the

end in mind — is progressing on numerous independent fronts around the world.

While useful direction on what needs to be done and why is widely available, little practical guidance is available on just how to do it, and no central repository exists of useful and accessible supportive documents and illustrative case histories. Mining with the end in mind means

cultivating a shared vision for the reclaimed landforms and landscapes that remain long after mining has finished and the extracted resources consumed.

The Landform Design Institute (LDI) was founded in 2019 to formally develop and globalize this new discipline of landform design and to support an international community of landform design practitioners. Building on an initial 2002 survey of what was promised by mine reclamation versus what was delivered on the ground, and drawing on recent interviews and a high-level literature review, the Institute completed a gap analysis in 2021 to identify ways to address the shortcomings of the status quo through the production of technical publications, including reports, databases, tools, training videos, and lectures.

***This integrated and multidisciplinary approach to designing and reclaiming mining landscapes — or mining with the end in mind — is progressing on numerous independent fronts around the world.***

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# Introduction to the LDI position paper

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In the course of the gap analysis, it became clear that to foster the global community of practitioners, we needed to improve the landform design framework and better define the language of the discipline. This position paper updates and refines dozens of definitions related to landform design and the concept of successful reclamation in an effort to provide a common vocabulary and process.

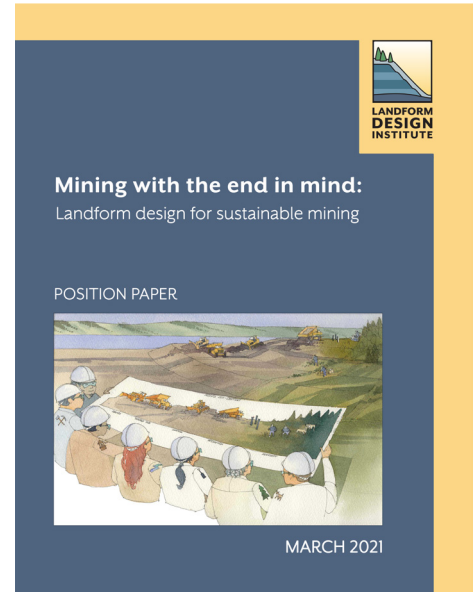
Building on the results of the gap analysis, the Institute has created a detailed five-year plan with three focus areas:

- **Developing how-to resources**
- **Providing education and training**
- **Supporting the global landform design community.**

A pressing need exists to close the significant and ubiquitous gap between what mines are promising for their reclaimed landscapes and what is being delivered. From a financial point of view, all mines already focus on all phases of mining as part

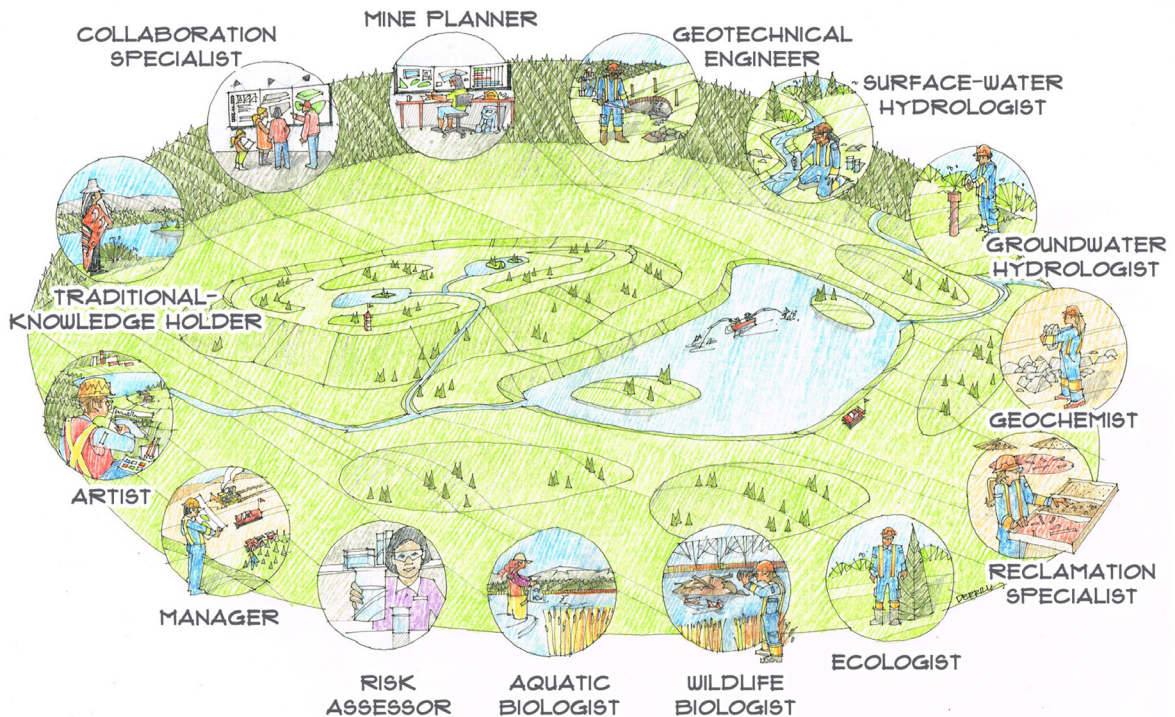
of their need to keep mines profitable and valuable to shareholders. The next step is to fully understand the requirements of post-mining land uses, how much it will actually cost, how that can be achieved through sound strategic and operational decision-making, and how to work collaboratively with all those affected.

Much comes down to integrating planning, design, and construction of mining landforms and landscapes — across spatial and time scales, across disciplines and communities, across the multitude of mining activities and teams, and across the financial system — to deliver financial returns to shareholders and society (through royalties, taxation, and employment) while creating safe, useful, and ecologically productive reclaimed mine land for all.



<https://landformdesign.com/position.html>

*A pressing need exists to close the significant and ubiquitous gap between what mines are promising for their reclaimed landscapes and what is being delivered.*





## Corporate membership a key 2021 focus

The Landform Design Institute (LDI) has set a broad expansion of corporate membership as a key objective for the fall of 2021. Achieving the goal of making landform design routine in the mining industry worldwide by 2030 will require a commitment by all key players. Only with broad corporate participation will the transformation required of the mining industry be possible.

Interest in the Institute’s activities has become widespread, with social media, traditional media, and specialized media interest growing rapidly. But the Institute requires a sound budget to operate, which calls for at least 30 corporate members to join in the fall of 2021. Learn more at: <https://landformdesign.com/benefits.html>.

Corporate members enjoy prominent recognition and logo placement on LDI communications, along with an individual membership and access to how-to resources, technical reports, discussion papers and literature reviews, tools and checklist, hot-topic video vignettes, and a curated online library with reviews (and imagery database). A groundbreaking landform design case-history webinar is also being planned. To discuss a corporate membership, contact the fundraisers at [info@landformdesign.com](mailto:info@landformdesign.com).

## LDI broadening membership benefits

As the Landform Design Institute (LDI) undertakes a broad corporate membership drive, it is also expanding its offering to individual and student members. Starting in the fall of 2021, the Institute will begin providing members with a series of educational and informational landform design short essays, video-vignettes, and excerpts from papers and reports on sustainable reclamation.

The essay series will be built around the presentations of the inaugural landform design course, held at the University of Alberta in December of 2019. Members will get access to transcripts of upwards of 40 presentations that span the spectrum of landform design issues, including current state of practice, engaging Indigenous and local communities, surface drainage design, regulatory frameworks, and mine waste management, to name a few.

The video-vignettes will be recorded by LDI Chair Gord McKenna and will provide insights on how the 12 principles of landform design translate into practice. As well, members will receive updates on important publications and events, and excerpts from studies, papers, and major reports, as well as analysis of trends in the reclamation and closure community of practitioners. The LDI library is also being expanded, and members will gain access to short descriptions of major related publications.

## AGM heralds Institute accomplishments *continued from page 1*

specific audiences are now in development as part of an overall communications strategy.

The take-home message from the meeting was that the LDI is just getting started. Since

its inception in 2019, the LDI has become a vibrant and global community of hundreds of landform design and reclamation experts. A recording recording is available to members.

*David Wylynko is the LDI Director of Communications and the principal of the communications firm West Hawk Associates*



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