

LES GEOSYNTHETIQUES AU SERVICE DE L'ENVIRONNEMENT ET LE DEVELOPPEMENT DURABLE



Selection and proper installation of geomembrane barriers: What to use, how to install it and what are reasonable expectations for performance.

Sélection et installation appropriée des barrières géomembranes : quoi utiliser, comment l'installer et quelles sont les attentes raisonnables en matière de performance

Marrakech Maroc 9 juin 2023



- Boyd Ramsey Consulting LLC
- Boyd@BoydRamseyConsulting.com
- www.BoydRamseyConsulting.com
- +1 28 17 97 61 83

How do you choose what material you use for your geosynthetic barrier application?

How do you choose who and how your geosynthetic barrier is installed?

What information and resources are available to make the sustainability case for geosynthetics?

Material selection criteria – Designing with Geosynthetics

Material Property	Weighting Factor
Durability:	
Chem. Resistance	7
UV Resistance	10
Expected Lifetime	10
Stress Crack Resistance	10
Mechanical:	
Tensile Strength	4
Tensile Elongation	8
Tear Resistance	8
Puncture Resistance	9
Impact Resistance	9
Shear Strength	5
Exp./Cont.	4
Barrier:	
WVT	4
SVT	1
Installation/Maintenance:	
Placement	7
Seaming	10
Drainage Sensitivity	8
Repairs	8
Total Benefit	n/a
Installed Cost (Dollars per sq. meter)	n/a
Benefit/Cost Ratio	n/a

GRI White Paper #12

The Development of a Benefit/Cost Ratio Matrix for Optimal Selection of a Geosynthetic Material

<http://www.geosynthetic-institute.org/papers/paper12.pdf>

Koerner, R. M., *Designing With Geosynthetics*, 6th Edition, Volumes 1 and 2

amazon Deliver to Nathalie Massy 91300 Books Search Amazon EN

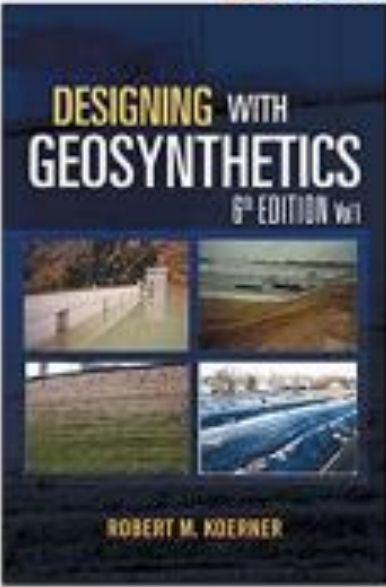
All Today's Deals Buy Again Boyd's Amazon.com Gift Cards Customer Service Browsing History Registry Sell

Books Advanced Search New Releases Best Sellers & More Amazon Book Clubs Children's Books Textbooks Textbook Rentals Best Books of the Month Your Company Bookshelf

AMA ASSOCIATION OF MUNICIPAL ENGINEERS CPT Professional 2023 and E/M Companion 2023 and CPT Quickref App Bundle \$130.00 prime

Books Engineering & Transportation Engineering

Look inside



Designing with Geosynthetics - 6th Edition Vol. 1 Paperback –

January 16, 2012
by Robert M. Koerner (Author)
4.4 ★★★★★ 75 ratings

See all formats and editions

Kindle \$2.99 Read with Our Free App	Hardcover \$34.99 7 Used from \$15.41 14 New from \$30.87	Paperback \$23.99 5 Used from \$16.40 12 New from \$21.48
--	---	---

Report incorrect product information.

Print length	Language	Publisher	Publication date	Dimensions	ISBN-10
526 pages	English	XLIBRIS	January 16, 2012	6 x 1.32 x 9 inches	1462882889

Material selection criteria



GeoAfrica 2017 Conference
Marrakech, Morocco 08 – 11 Octobre 2017



Geomembrane selection criteria: an update for today's products

B. Ramsey; Boyd Ramsey Consulting LLC, Houston, Texas, USA boydramsey@me.com

Barrier Decision Checklist - Ramsey

What happens if it leaks?

How long should it last?

What will it be exposed to?

How "tough" is the material?

Can we repair it?

Barrier Decision Checklist - Ramsey

What happens if it leaks?

Action Leakage rates, Leak detection &
Permit values

How long should it last?

Accelerated Aging criteria (OIT, exposures,
SIM)

What will it be exposed to?

EPA 9090 or other chemical testing

How "tough" is the material?

Puncture Strength

Can we repair it?

Crosslinking, exposed weldability

Barrier Decision Checklist - Ramsey

Water reservoir

Landfill

What happens if it leaks?

Action Leakage rates, Leak detection &
Permit values

How long should it last?

Accelerated Aging criteria (OIT, exposures,
SIM)

What will it be exposed to?

EPA 9090 or other chemical testing

How "tough" is the material?

Puncture Strength

Can we repair it?

Crosslinking, exposed weldability

Barrier Decision Checklist - Ramsey

Water reservoir

We lose a little water

A few years

Water and sunlight

Easily damaged/punctured

Yes

What happens if it leaks?

Action Leakage rates, Leak detection & Permit values

How long should it last?

Accelerated Aging criteria (OIT, exposures, SIM)

What will it be exposed to?

EPA 9090 or other chemical testing

How "tough" is the material?

Puncture Strength

Can we repair it?

Crosslinking, exposed weldability

Landfill

Very bad things

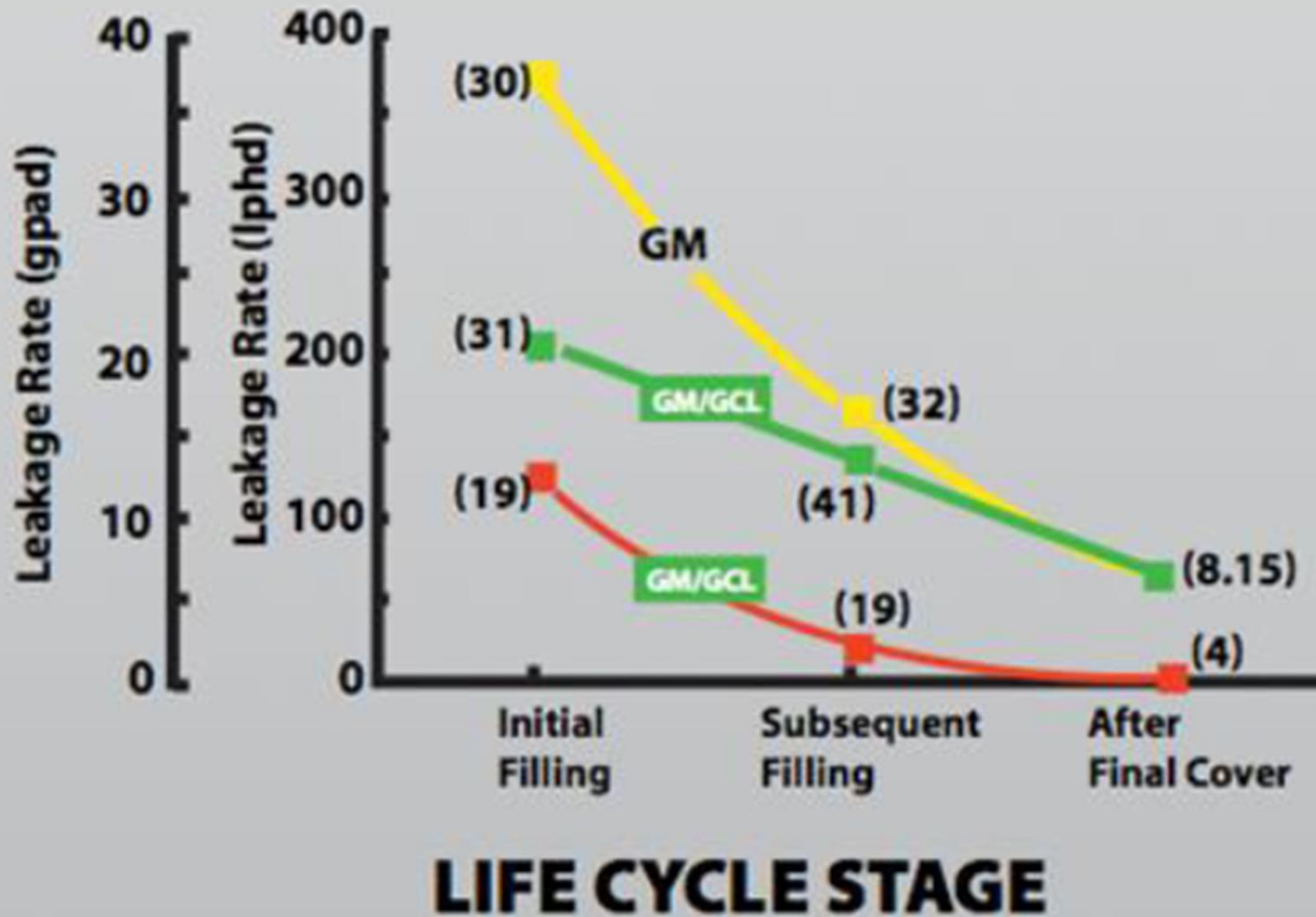
Forever

Don't know, could be anything

High Puncture Strength

No, under lots of waste





Bonaparte, R, Daniel, D.E. and Koerner, R.M., "Assessment and Recommendations for Improving the Performance of Waste Containment Systems", EPA/600/R-02/099 EPA National Risk Management Research Laboratory,

<http://pbadupws.nrc.gov/docs/ML1217/ML12179A248.pdf>

















<https://www.cfg.asso.fr/>



Nom d'utilisateur Mot de passe

Linked 



Les Géosynthétiques

Nos missions

Les membres

Publications

Événements

Partenaires & Organisations

Photothèque

Vous êtes ici : Accueil » Publications » Guides de recommandations » Utilisation des normes de dimensionnement dans la conception des ouvrages avec géosynthétiques : géotextiles & produits

Guides de recommandations

- Guide d'utilisation des normes de dimensionnement dans la conception des ouvrages avec géosynthétiques : géotextiles et produits...

Utilisation des normes de dimensionnement dans la conception des ouvrages avec géosynthétiques : géotextiles & produits

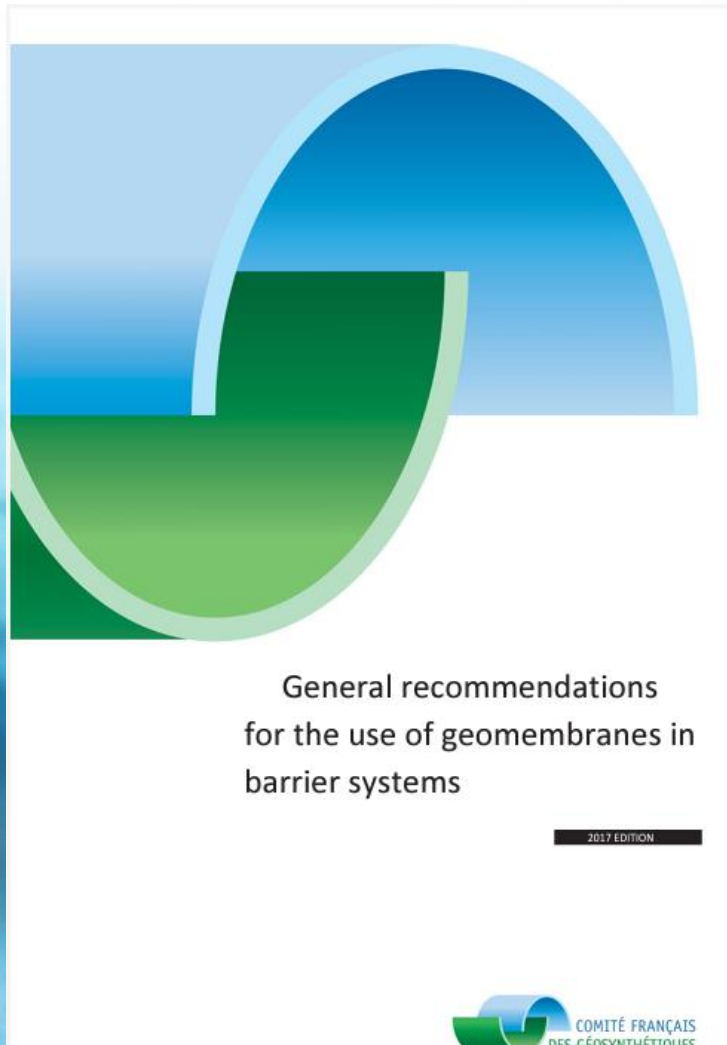
Ce « **Guide d'utilisation des normes de dimensionnement dans la conception des ouvrages avec géosynthétiques : géotextiles et produits apparentés** » est destiné à familiariser le plus grand nombre d'utilisateurs avec les solutions géosynthétiques et les normes de dimensionnement qui leur sont associées. Il est composé à ce jour de deux fascicules.

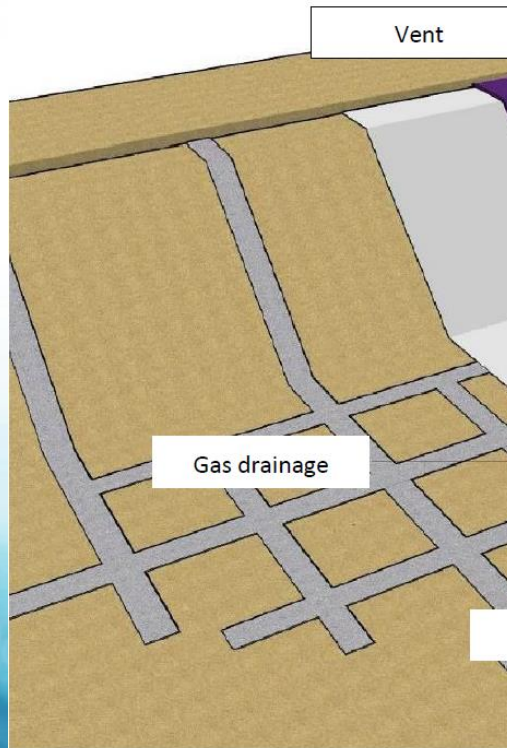
<https://www.cfg.asso.fr/publications/guides-de-recommandations/utilisation-des-normes-de-dimensionnement-dans-la-conception>

Comité Français des Géosynthétiques: Guides de recommandations

- Guide d'utilisation des normes de dimensionnement dans la conception des ouvrages avec géosynthétiques : géotextiles et produits...
- N° 9 - Recommandations pour l'emploi des géotextiles dans le renforcement des ouvrages en terre
- N° 10 - Recommandations générales pour la réalisation d'étanchéité par géomembranes
- N° 11 - Recommandations générales pour l'utilisation des géosynthétiques dans les centres de stockage de déchets
- N° 12 - Recommandations générales pour la réalisation d'étanchéité par géosynthétiques bentonitiques
- N° 13 - Recommandations pour l'utilisation des géosynthétiques bentonitiques en installations de stockage de déchets
- Recommandations générales pour l'emploi des géosynthétiques comme dispositifs retardant la remontée des fissures dans les chaussées
- Géosynthétiques et érosion
- Présentation de méthodes de détection et de localisation de défauts dans les dispositifs d'étanchéité par géomembranes
- Guide pour la réalisation des planches d'essais pour endommagement
- Recommandations pour l'emploi des Géosynthétiques dans les systèmes de Drainage et de Filtration
- Recommandations pour la protection contre le poinçonnement des géomembranes

N° 10 - Recommandations générales pour la réalisation d'étanchéité par géomembranes





Figure



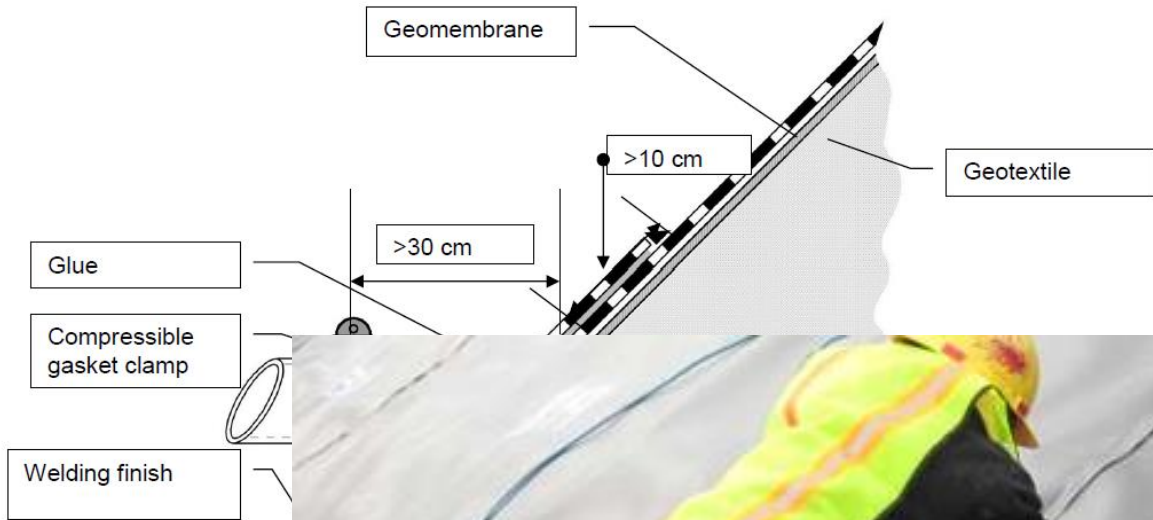
So where do things go **wrong/mauvais/bad/horrible?**



So where do things go **wrong/mauvais/bad/horrible**?

- Designing things that cannot be built.
- Not paying proper attention to subgrade quality and preparation
- Choosing the low bid for installation
- Not using a qualified and well trained quality assurance firm/program
- Not planning for errors/barrier damage/leaks
- Not restricting access to exposed barrier – or having a fill plan/program
- Not keeping a record/history of the site
- Not completing maintenance/inspections on a scheduled timetable

Designing things that cannot be built.



Guidance on the Design and Construction of Leak-Resistant Geomembrane Boots and Attachments to Structures
R. Thiel, Thiel Engineering, Grass Valley, CA, USA
G. DeJarnett, Envirocon, Houston, TX, USA

Not paying proper attention to subgrade quality and preparation

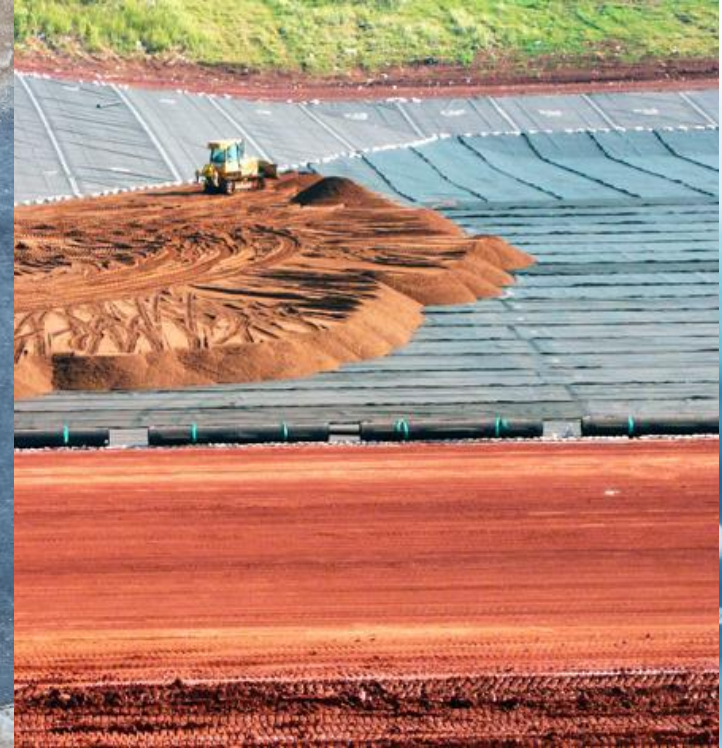


Choosing the low bid for installation

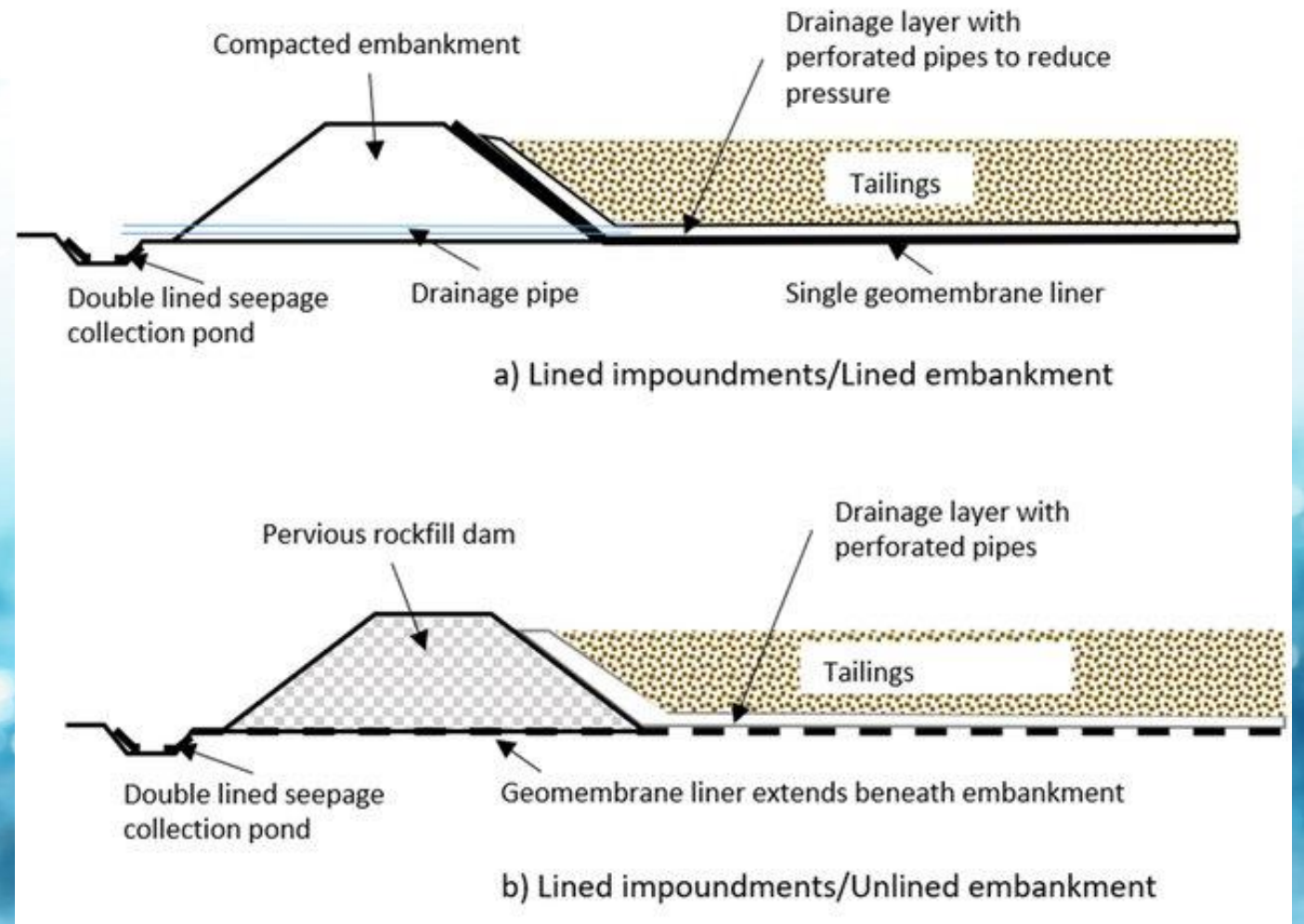


Not using a qualified and well trained quality assurance firm/program

- Everyone does a better job when they are being watched.

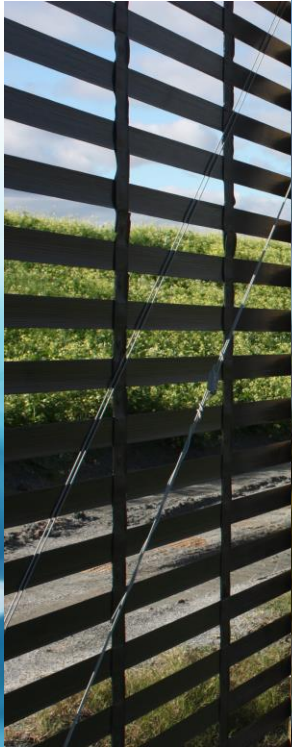


Not planning for errors/barrier damage/leaks



Tuomela, A, et.al.(2021). Using Geomembrane Liners to Reduce Seepage through the Base of Tailings Ponds—A Review and a Framework for Design Guidelines. Geosciences. 11. 93. 10.3390/geosciences11020093.

Not restricting access to exposed barrier – or having a fill plan/program



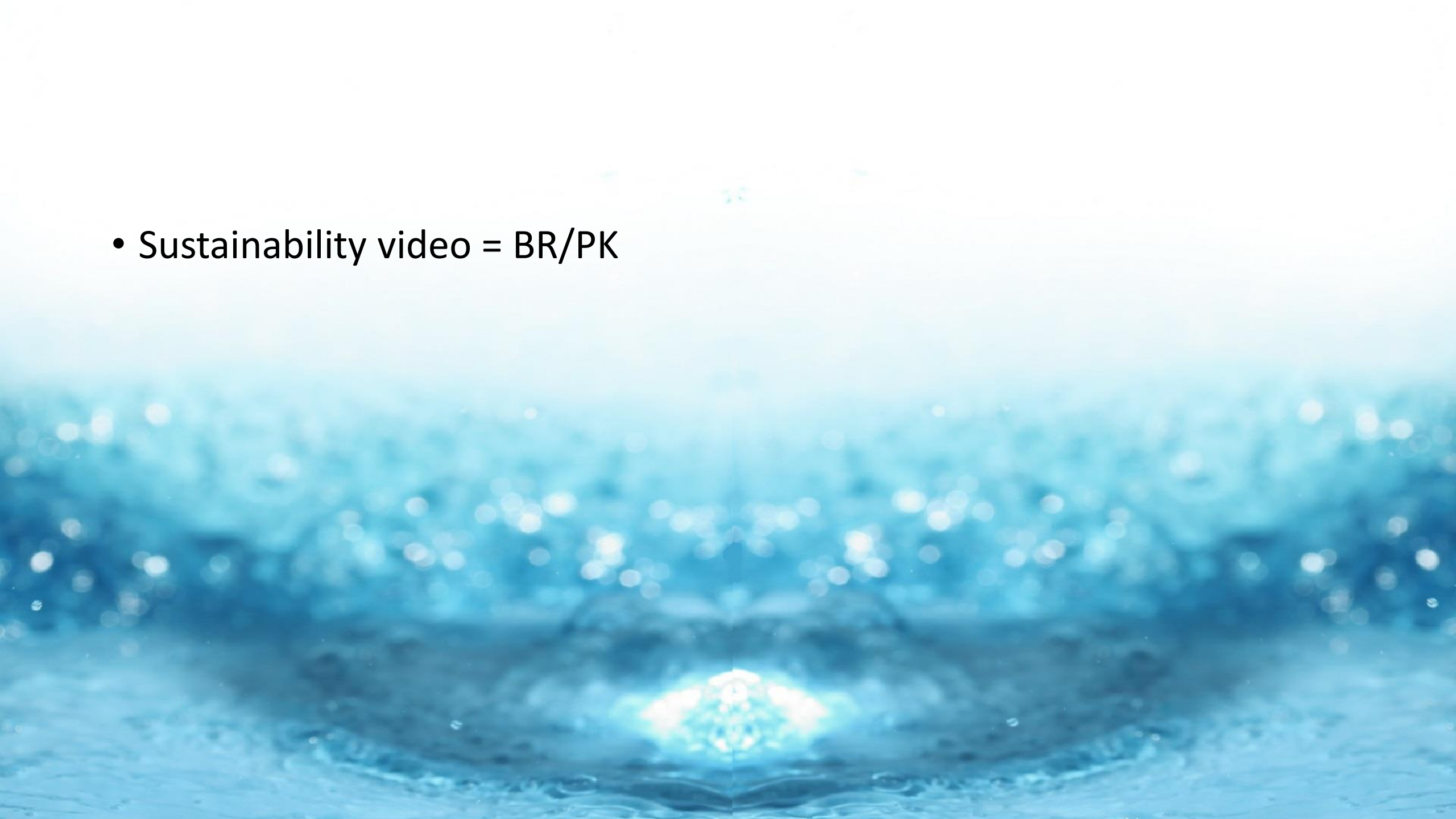
Not completing maintenance/inspections on a scheduled timetable



What can I do to build my project to the best performance?

- Use a well trained quality assurance firm/program
- Buy good materials and installation from experienced and dependable manufacturers and suppliers
- Conduct Electronic Leak Detection Surveys – if possible both prior to and after cover placement.
- Include the barrier system in training for employees working on the site.
- Do preventative maintenance/inspections on a scheduled timetable

- Sustainability video = BR/PK



Boyd Ramsey Consulting LLC

