NATSURV 10: Water and wastewater management in the tanning and leather finishing industry

Pamela Welz

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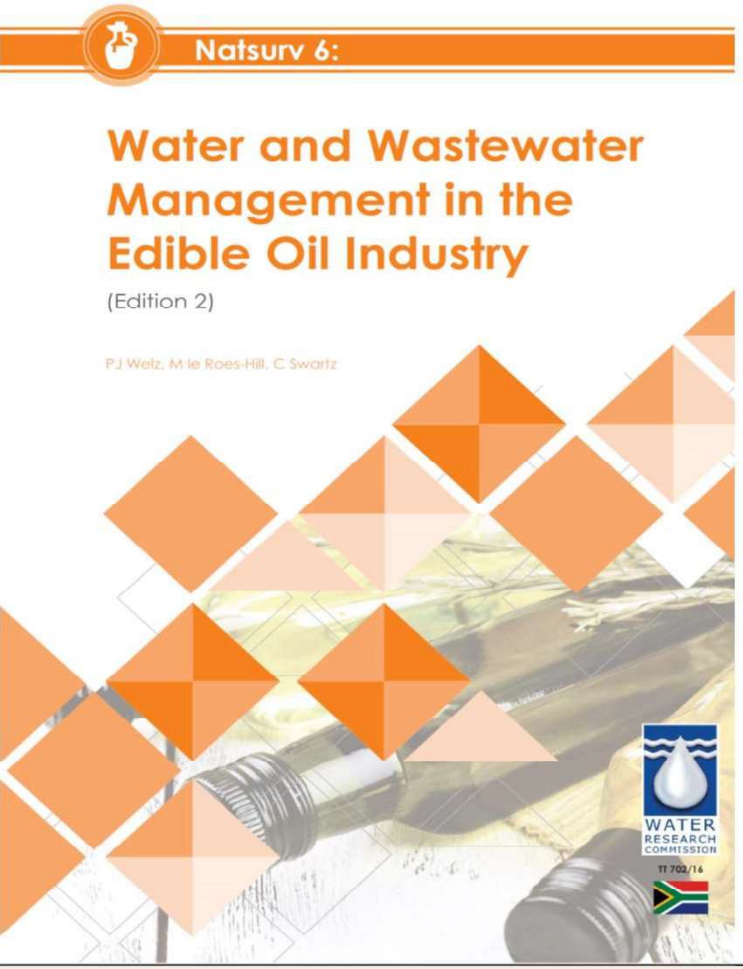

NATSURV 11: WATER AND WASTEWATER MANAGEMENT IN THE CANE SUGAR PROCESSING INDUSTRY

INDUSTRY

P.J. WELZ & A. NDOBENI

CAPE PENINSULA UNIVERSITY OF TECHNOLOGY

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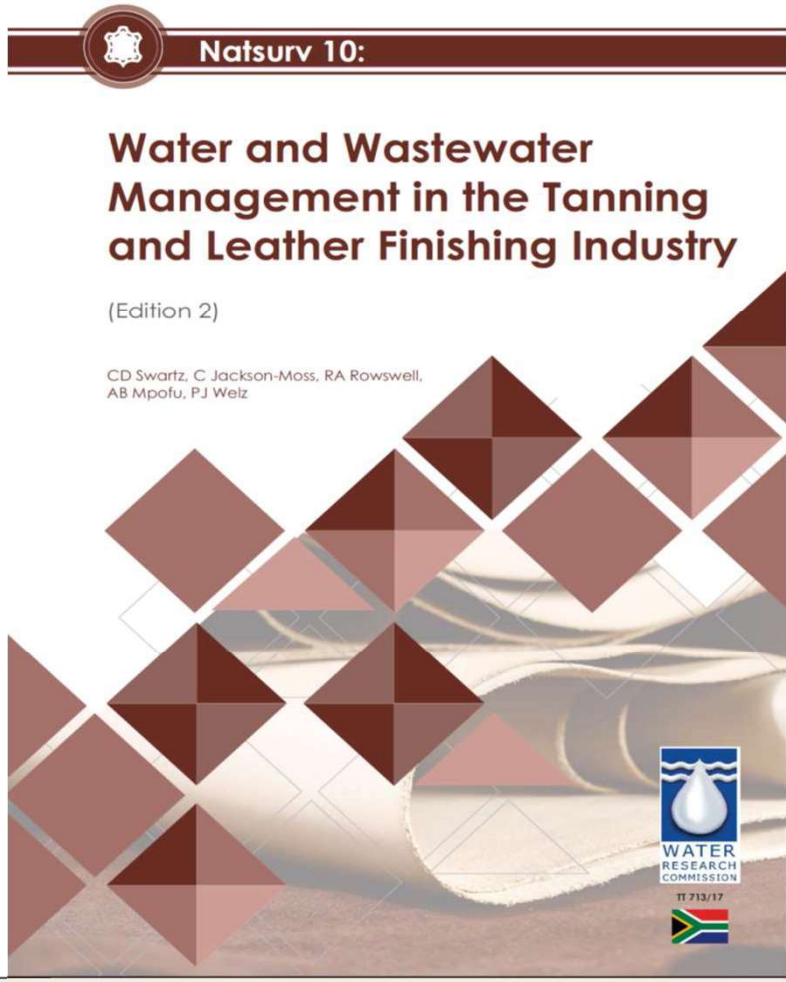

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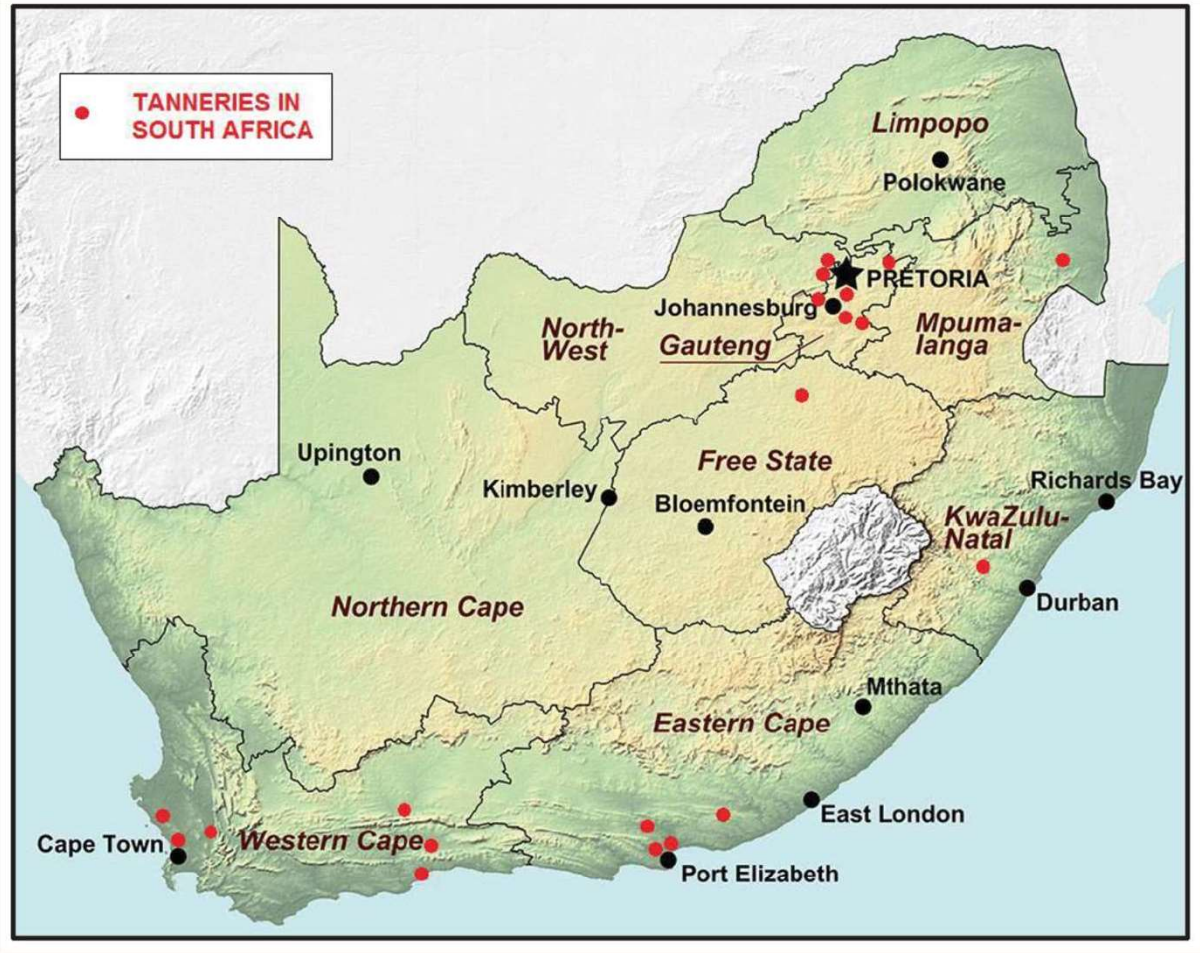
South African tanneries



- SA produces around 4% of global volume of bovine hides and ovine skins
- Net exporter of hides and skins
- Gross export value of US$45.5 and US$172.3 pa from 1999 to 2015 (World statistical compendium for raw hides and skins, leather, FAO)
- Significant contributor to GDP

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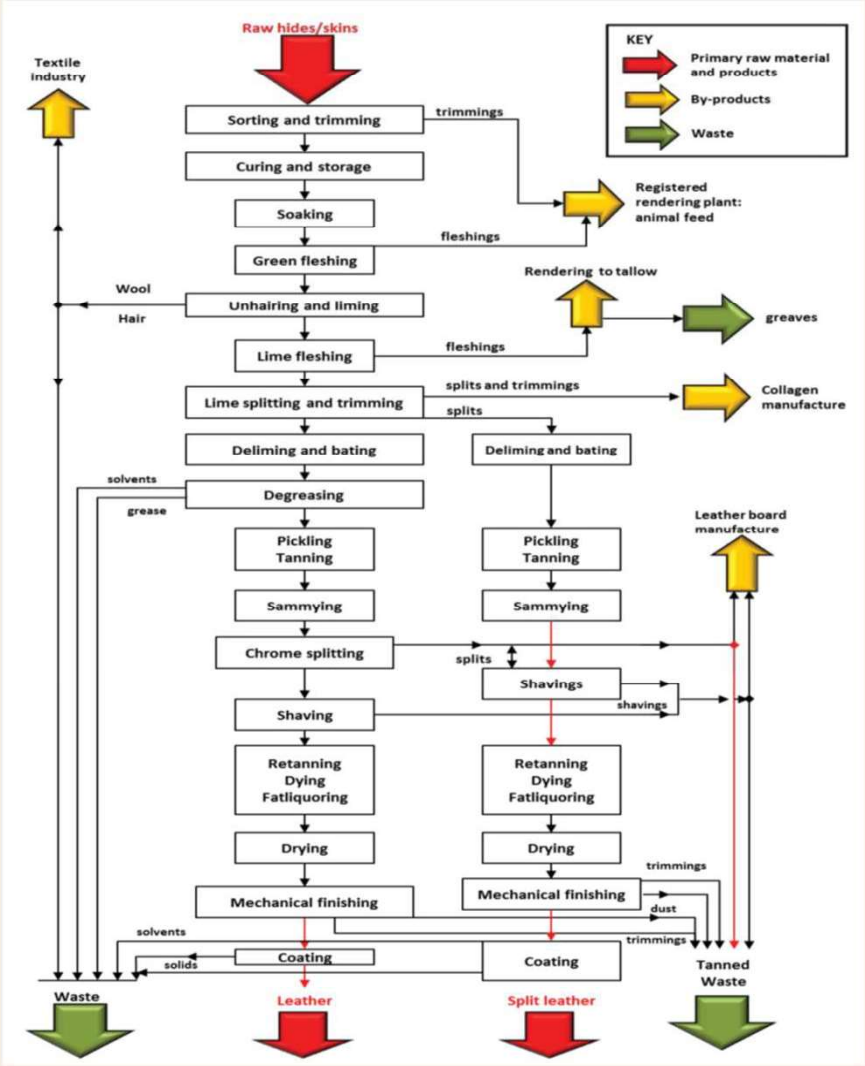

Wet blue (hide) – chromium

Pickled skins

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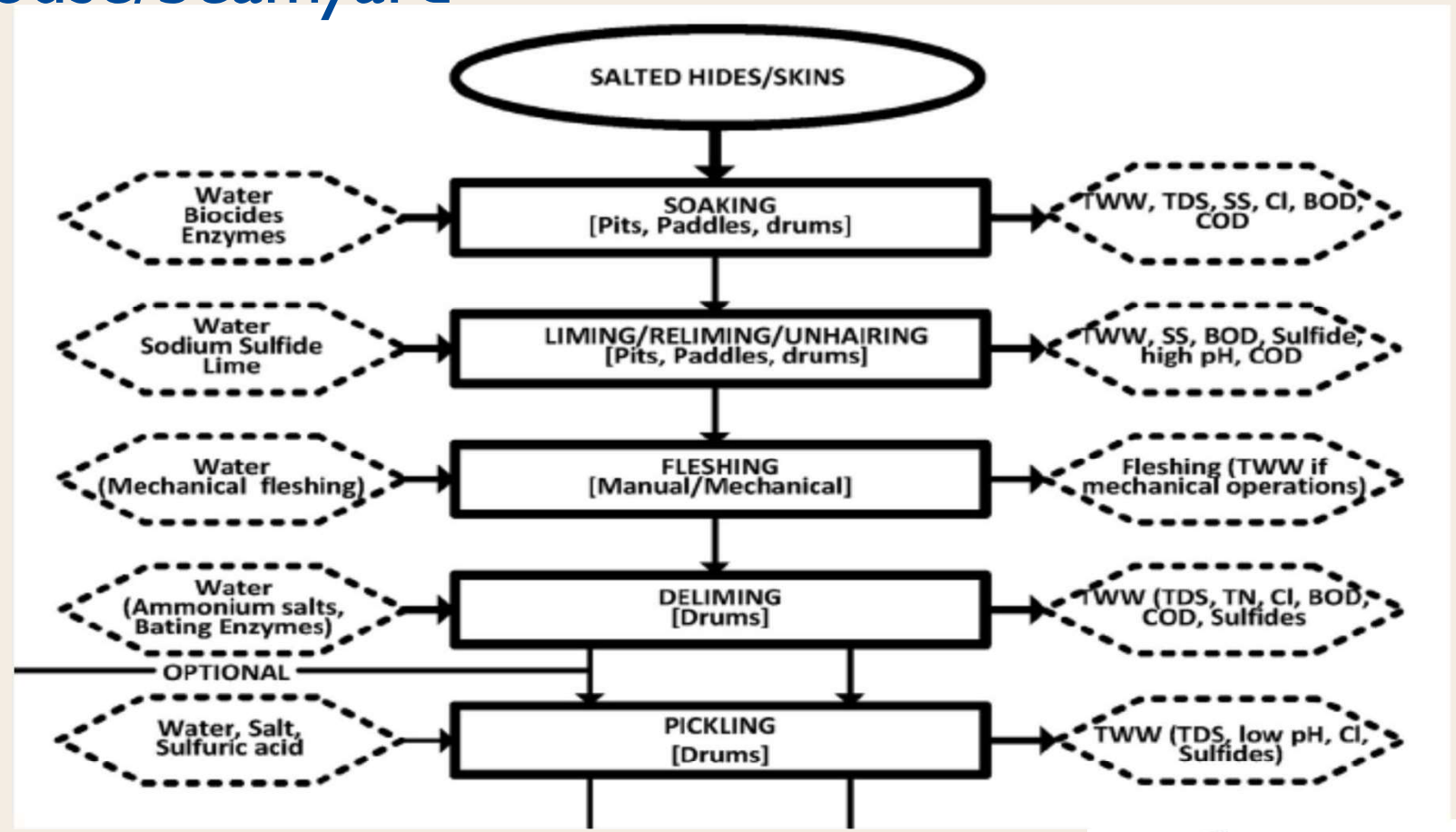
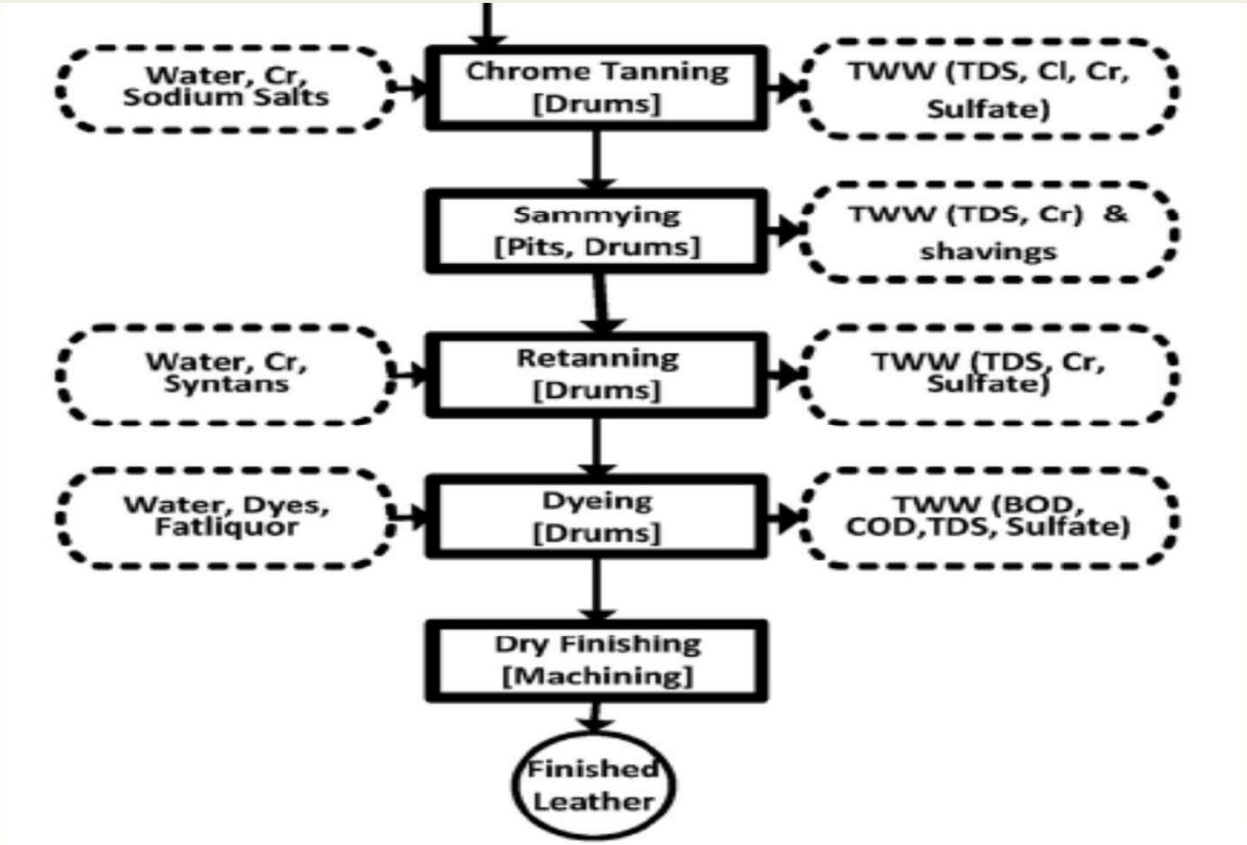
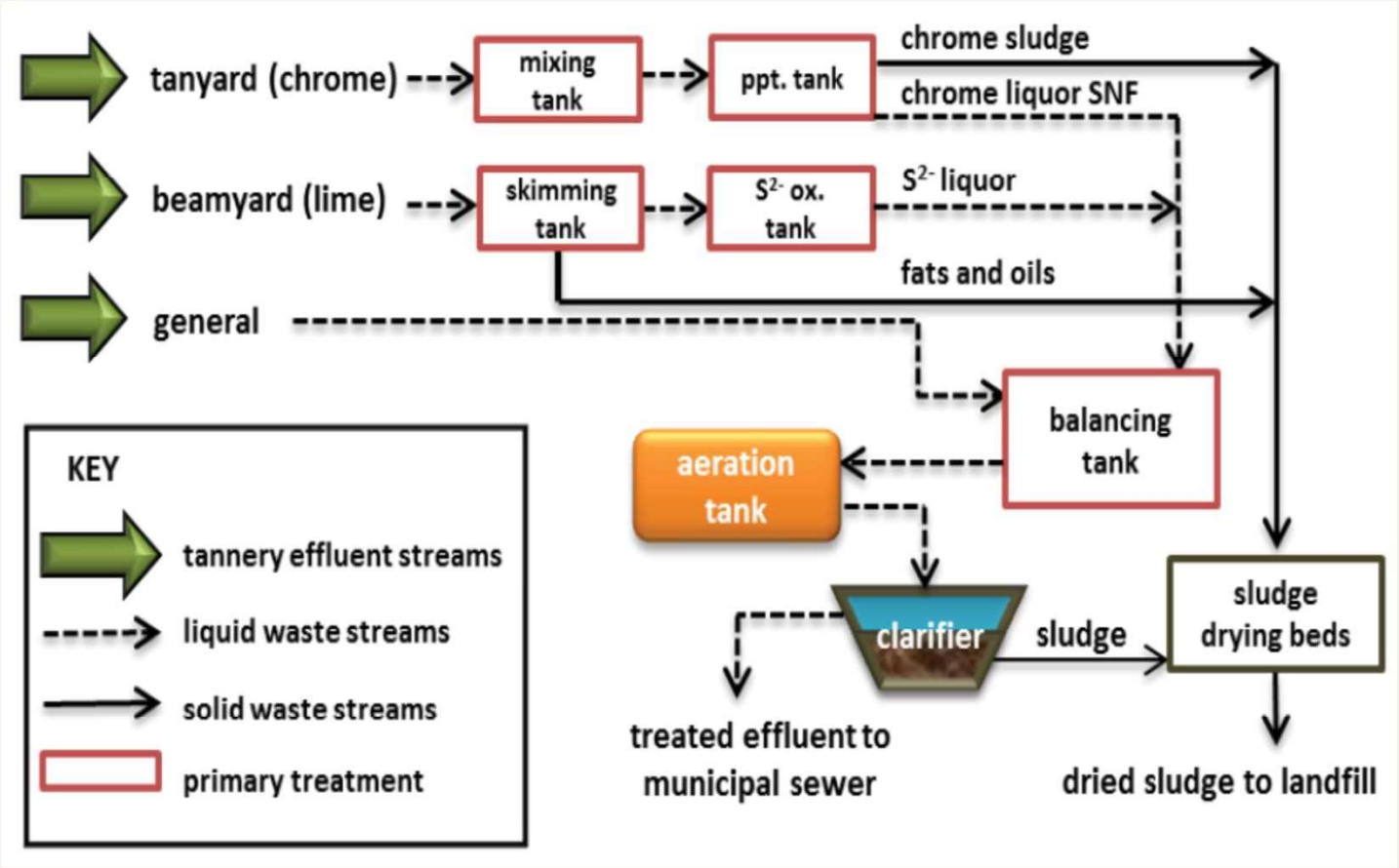
Beamhouse/beamyard



Tanhouse/tanyard




tanyard (chrome)
mixing tank
ppt. tank
chrome sludge
chrome liquor SNF
beamyard (lime)
skimming tank
S2- ox. tank
S2- liquor
fats and oils
general
balancing tank
aeration tank
clarifier
sludge
sludge drying beds
treated effluent to municipal sewer
dried sludge to landfill
KEY
tannery effluent streams
liquid waste streams
solid waste streams
primary treatment

Local authority/ country	pH	COD (mg/L)	σ-phosphate (mg/L as P)	TSS (mg/L)	Electrical conductivity (mS/m)	Sulphate (mg/L as SO_4)	Total chromium (mg/L as Cr)	Chloride (mg/L)
South Africa								
City of Tshwane	6-10	5 000	10	2 000	300	1 800	5	100
City of Cape Town	5.5-12	5 000	25	1 000	500	1 500	10	1 500
Nelson Mandela Bay Metro	6-12	10 000	-	1 000	500	1 500	20	1 000
Ekurhuleni	6-10	5 000	50	1 000	500	1 800	20	100
Oudtshoorn	6.5-10	4 000	10	1 000	500	250	5	500
Mossel Bay	6-11	3 000	-	1 000	500	500	10	1 000
Global								
France*	6.5-8.5	2 000	-	600	-	-	-	-
Italy*	5.5-9.5	500	-	200	-	1 000	4.0	1 200
India*	5.5-9.0	-	-	100	-	1 000	2.0	-

Specific water intake

Process	SWI (L/hide)		SWI (from 2016 survey) (L/hide)
	European Union, 2013	NATSURV 10, 1989	
Hide and skin reception and storage			
Curing and storage			
Wet blue process: Beamhouse (or limeyard) section			
Soaking	55-825	54	
Liming and unhairing	41.25-110	34	
Deliming and bating	~55	27	
Washing (all steps combined)		65	
Total	**151.25-990**	**180**	**270**
Wet blue process: Tanyard section			
Degreasing	Only sheepskins and pigskins		
Pickling and tanning (chrome)	27.5-82.5	10	
Draining, hosing, sammying and setting	Only wastewater		
Washing (all steps combined)	-	149	
Total	**27.5-82.5**	**159**	
Dyehouse process (wet finishing and dry finishing)			
Post-tanning	110-220		
Finishing	0-27.5		
Total	**110-247.5**	**-**	**110**
Total for all processes	**289-1 320**	**339**	**170-550**

- **Highly variable**
- **Compares favourably with EU**

Proposed water use targets

Process	SWU (L/skin)
Wet blue process stages	50-150
Dyehouse process stages	100-200
Total tanning and finishing stages	200-500

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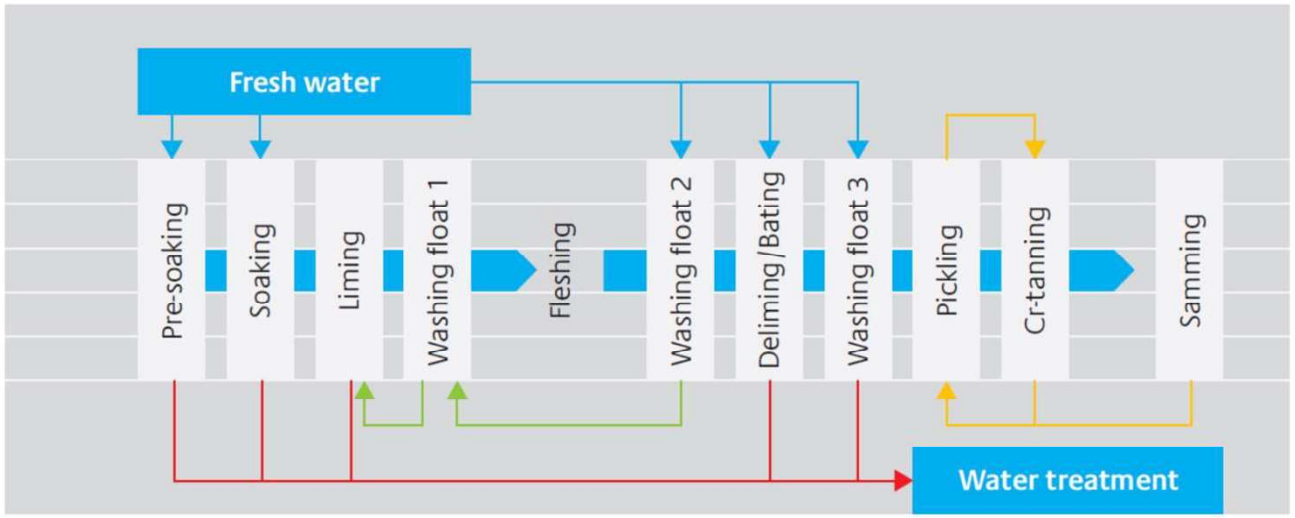
Examples of alternative 'clean' technologies

Alternative 'clean' technologies	Environmental benefit/s
Processing of fresh hides	• Less salt in the final effluent. • Savings in water consumption.
Recycling of soak floats	• Savings in water consumption. • Savings in chemical usage.
Use of enzymatic soaking chemicals	• Less use of surfactants. • Reduced soaking times leading to less energy consumption.
Use of biodegradable surfactants	• Less chance of surfactants persisting in the environment. • Reduced impact on aquatic organisms.
Hair-save unhairing	• A 60% reduction in COD of effluent. • A 50% reduction in sulphide usage. • A 35% reduction in nitrogen content of effluent.

Direct float recycling:

- Pre-soaking, main-soaking, the washing before deliming and after bating are all done with fresh water
- The washing float from before deliming is re-used as washing float after liming and this float is re-used as liming float
- Pickle and tanning floats are recycled in a closed loop
- Pre-soaking, main-soaking, liming, deliming and the washing floats after bating are discarded as waste water



THANK YOU FOR LISTENING