

General information

Remover name	Greensand		
Project code	GSDR006		
Project name	Opstelsterrein Arnhem Greensand		
Location	Arnhem, the Netherlands		
Area	14 km		
Year	2021		
Duration	>100	years	estimated permanence of removal and storage
Material dosage	3,586.41	ton	
Holding buffer	20%		freed up when measurements confirm projection pathways
Project emissions	0.068	tCO2eq/ton	LCA estimate
Reference material emissions	0.067	tCO2eq/ton	LCA estimate

Per project

Projected storage	962	tCO2	storage potential per ha x area x storage duration 100 year equivalent
LCA emissions	5.40	tCO2	project related emissions compared to reference material
Net storage potential	956	tCO2	project storage -/- emissions over 20 years

Removal credits issued

Holding buffer years 1-4 (5%)	8.8	units
Holding buffer (20%)	156	units
Total holding	165	
Credits issued	791	units

Material description				
Material type	Olivine			
Material name	Halfverharder GreenSand, fraction 0-4 mm, Olivine			
Material dossage	3586.405	ton		
Material origin	Spain			
Properties				
Magnesium percentage	39%			
Grain size distribution	< 16	mm	100%	
	< 8	mm	96,73%	
	<4	mm	64,7%	
	< 2	mm	39,12%	
	< 1	mm	22,75%	
	< 0,5	mm	12,81%	
	< 0,25	mm	8,6%	
	< 0,063	mm	3,95%	

Carbon Calculation for		GSDR006								
The following values are calculated with the Vink&Knops model (Vink & Knops, 2023; see https://doi.org/10.3390/min13020235)										
Duration	Erosion rate	Olivine dissolved (Icumulative)		CO2 sequestered		Weathering	Olivine Dissolved (/yr)	Net storage	Holding percentage	Holding
(year)	(um)	(kg)	(%)	(kg)	(ton)	(um/yr)	(kg/yr)	tCO2	(%)	(CRUs)
1	0.86	95,038	2.60%	80,973	81	0.86	95,038	80.545	5%	4.03
2	1.71	148,603	4.1%	126,610	127	0.86	53,565	126.287	5%	6.31
3	2.57	182,857	5.10%	155,794	156	0.86	34,254	155.124	5%	7.76
4	3.43	208,060	5.80%	177,267	177	0.86	25,203	176.006	5%	8.80
30	25.72	585,948	16.30%	499,228	499	0.86	11,427	496.197		
100	85.72	1,128,538	31.50%	961,515	962	0.86	7,205	956.596	20%	156.12

[illegible]

Source	https://cdn.shopify.com/s/files/1/0549/3696/1137/files/39658-halfverharder-greensand-fractie-0-6-mm-olivijn-202308281018-short_1.pdf?v=1695291373									
Declared unit	1 ton									
	A1	A2	A3	A4	A5					
GWP (kg CO2eq)	6.22E+00	4.57E+01	2.56E-01	1.19E+01	4.03E+00					
Total GWP	68.11	kgCO2eq / t material								
Total GWP	0.0681	tCO2eq/ton								
Life Cycle Assessment reference material										
Emissions (tCO2 / ton olivine)	0.0666									
CO2 mining (kg CO2)	2.8									
CO2 milling (kg CO2)	0.7									
CO2 transportation (kg CO2)	63.1	Quenast to Arnhem (252 km)			251	77.26566265	51.1			
					166	0.3078313253				