

Wivenhoe Dam

South-East Queensland

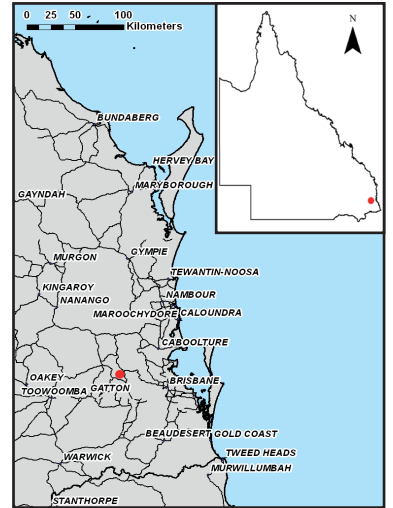


Study Area

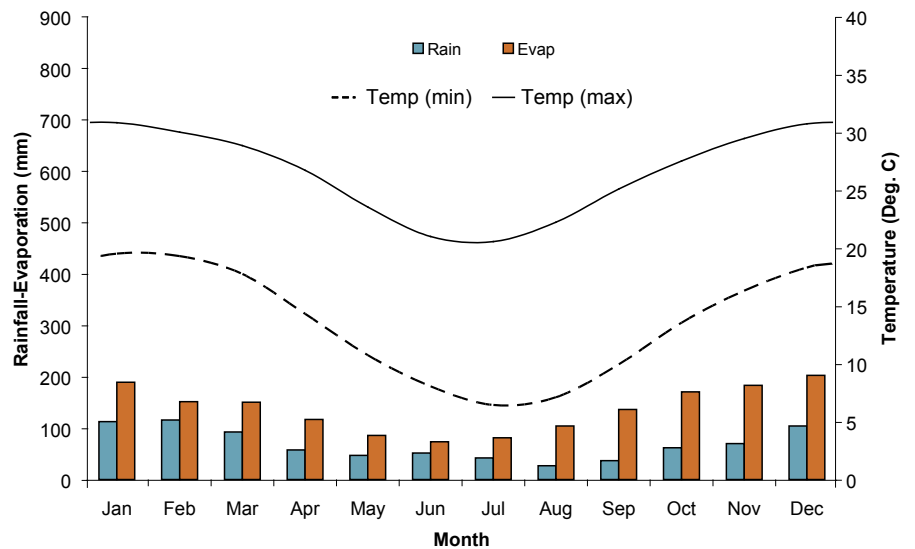
Wivenhoe Dam is located approximately 60 km north-west of Brisbane, South-East Queensland.

The dam was constructed in the 1980's for the purpose of water storage and flood mitigation in South-East Queensland. At the time of sampling the dam was at approximately 16% capacity.

Wivenhoe dam is an example of an artificial freshwater wetland within the South-East Queensland Bioregion.



Climate¹



The study area is situated within a subtropical climatic region with a wet and dry season. Evaporation exceeds rainfall every month. The average annual rainfall for the area is 819 mm.

Landform and Inundation	Artificial dam on very gentle to very steep slopes Freshwater permanent inundation from overland flow
Soils²	Hydrosols, Chromosols, Sodosols
Vegetation	Completely cleared
Geology³	Esk formation - Shale, sandstone, conglomerate, tuff and coal
Disturbance	Highly disturbed area for urban water supply



Australian Government

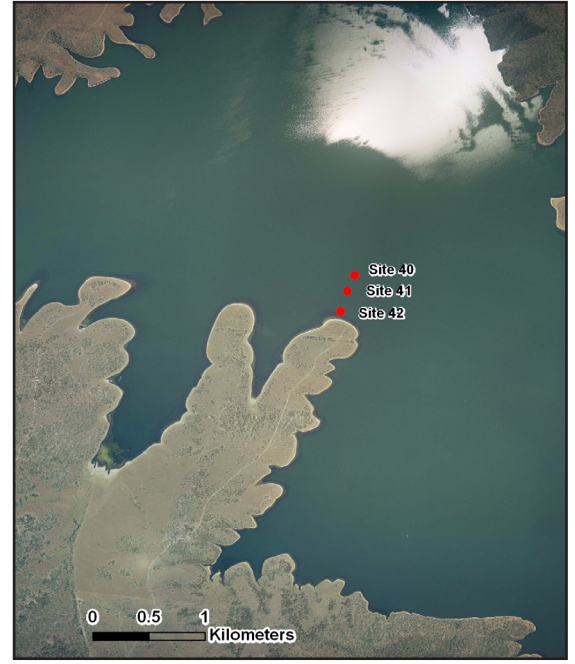


Queensland Government

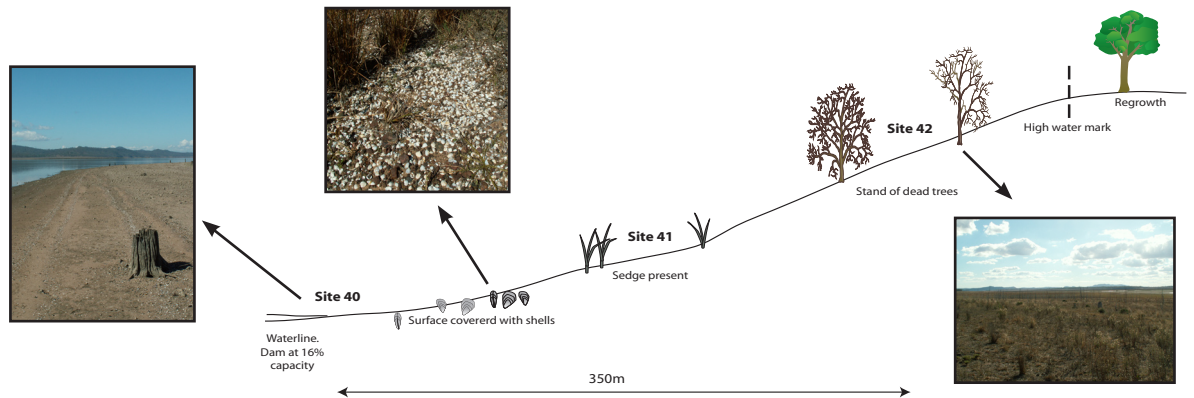
Queensland Wetlands Program

Location

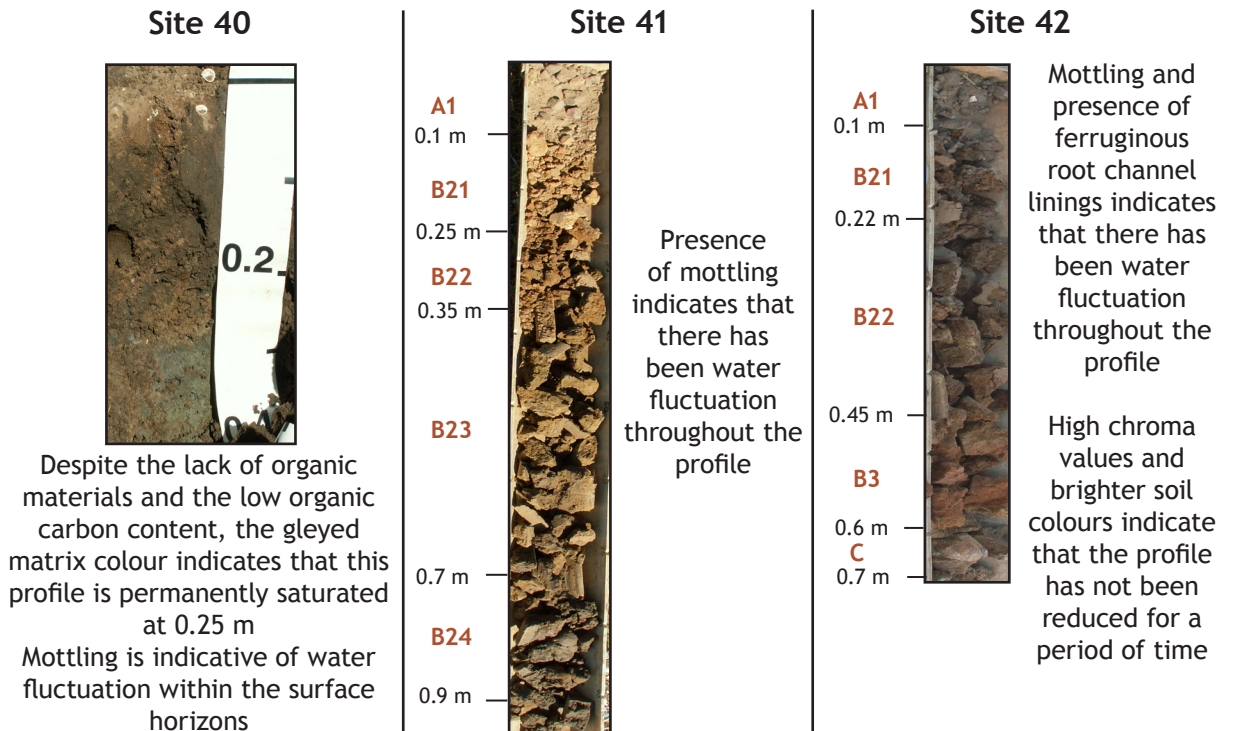
GDA94 • MGA Coordinates : 459066 E, 6976369 N, Zone 56 • Lat/Long : -27.33520 S, 152.58619 E
 *Aerial photograph on right was taken in 2002. At the time of sampling the water line was at site 40.



Landscape Diagram



Soil Profiles



Soil Indicators Present (within 0.3 m of surface)

Indicator ⁴	Site 40	Site 41	Site 42
Organic materials and organic carbon (OC)*	No organic materials OC: 0.84%	No organic materials OC: 0.54%	No organic materials OC: 0.67%
Matrix colour	Brown to greenish grey	Olive brown to grey	Yellowish brown to brown
Chroma (thickness of layer)**	Present (0.05 m)	Present (0.2 m)	Not present
Mottles and Segregations	Very few <5 mm faint orange mottles Very few 5-15 mm faint orange mottles Few <5 mm distinct red mottles	Common 5-15 mm distinct orange mottles	Very few <5 mm distinct red mottles Few 5-15 mm faint red mottles
Depth to groundwater	Not present	Not present	Not present
Ferruginous root channel and pore linings	Not present	Not present	Present
pH ⁵	Moderately acid	Mildly alkaline	Moderately alkaline
Texture	Sandy clay loam to heavy clay	Clayey coarse sand to medium clay	Clayey coarse sand to heavy clay
Acid sulfate material	Not present	Not present	Not present
Electrical Conductivity (EC) ⁵	Non saline	Non saline	Non saline

*Organic carbon % (Dumas method) and pH taken from surface (0-0.1 m)

**Chroma value is less than or equal to 2

Summary of Field Observations

- Mottling was observed at all sites along the transect, this suggests that there has been water fluctuation throughout the profiles at some stage but some mottling features appear to be relict with no evidence of recent inundation
- Ferruginous root channel linings appear to be relict wetland soil features as they are only present in site located at the high water mark which has not been inundated recently (Figure 1)
- Gley colours near the waters edge indicate a permanently saturated and reduced environment (Figure 2)
- No significant organic carbon content was measured at any sites sampled, the area lacks significant vegetation growth necessary to form an accumulation of organic materials



Figure 1. Ferruginous root channel linings

These provide reliable evidence of plant growth in a saturated environment where the root has pushed oxygen into the saturated soil, forming a coating of ferric iron around the root channel



Figure 2. Gley soil colours

When a soil is exposed to an anaerobic environment ferric iron (Fe III) in the soil is quickly reduced to the colourless and mobile ferrous iron (Fe II)

This gives the soil a characteristic grey/green/blue colour known as "gley"

Soil Chemistry

Site	Depth (m)	pH*	EC dS/m	Cl mg/kg	NO ₃ -N mg/kg	P mg/kg	S mg/kg	Ca meq/100g	Mg meq/100g	Na meq/100g	K meq/100g	Na corr meq/100g	Cu mg/kg	Zn mg/kg	Mn mg/kg	Fe mg/kg	TC** %	TN** %
40	0.00-0.10	5.9	0.07	52	2	27	20	4.17	1.9	0.462	0.134	0.315	0.9	0.4	127	226	0.84	<0.03
	0.20-0.30	6.6	0.06	22	<1	5	13	2.63	6.38	1.33	0.073	1.27	1.1	0.2	24.2	258	0.47	<0.03
	0.00-0.10	7.6	0.18	58	<1	12	15	8.47	0.916	0.433	0.05	0.269	0.3	0.5	20.8	66.6	0.54	<0.03
41	0.20-0.30	5.2	0.12	165	<1	3	16	0.886	6.49	1.85	0.079	1.38	0.8	0.1	12.5	67	0.23	<0.03
	0.40-0.50	5.3	0.11	154	<1	2	11	0.555	7.53	2.36	0.054	1.93	0.6	0.1	3.5	51.7	0.19	<0.03
	0.00-0.10	8.4	0.06	<20	<1	10	2	19.6	1.7	0.269	0.282	0.269	0.1	0.3	7.2	18.5	0.67	0.04
42	0.20-0.30	6.7	0.46	601	<1	2	38	2.6	26.7	6.17	0.366	4.48	1.1	0.2	0.6	53.6	0.42	0.04
	0.40-0.50	6.9	0.77	1110	<1	2	48	0.927	19.9	7.42	0.204	4.29	0.6	0.1	0.3	19.1	0.2	<0.03

*Aqueous 1:5

**Total carbon and total nitrogen

Soil Morphology

Site 40	Classification		Australian Soil Classification				Eutrophic, Chromosolic, Redoxic Hydrosol		
			Landform Element		Plain		Flat		
			Morphological Type		Structure		Segregations		
Horizon	Depth (m)	Boundary	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence
A1	0 to .02	-	coarse sandy clay loam	greyish brown (2.5Y53)	very few (<2%) fine (<5 mm) faint orange mottles	none	massive	none	-
A2	.02 to .25	-	sandy clay loam	greyish brown (2.5Y53)	very few (<2%) medium (5-15 mm) faint orange mottles	many (20-50%) angular same as substrate material medium pebbles (6-20 mm)	weak 2-5 mm angular blocky	none	-
B2	.25 to .4	-	heavy clay	dark greenish grey (10GY31)	few (2-10%) fine (<5 mm) distinct red mottles, very few (<2%) medium (5-15 mm) faint yellow mottles	few (2-10%) angular same as substrate material small pebbles (2-6 mm)	moderate 5-10 mm blocky	none	

Site 41		Classification			Australian Soil Classification				Sodic, Eutrophic, Brown Chromosol		
		Boundary			Landform Element				Hillslope		
		Depth (m)	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence		
A1	0 to .1	clayey coarse sand	olive brown (2.5Y44)	none	few (2-10%) angular ferruginised sandstone cobbles (60-200 mm), many (20-50%) angular ferruginised sandstone medium pebbles (6-20 mm)	massive	none	-			
B21	.1 to .25	medium clay	grey (2.5Y51)	common (10-20%) medium (5-15 mm) distinct orange mottles	common (10-20%) angular ferruginised sandstone medium pebbles (6-20 mm)	moderate 2-5 mm angular blocky	none	-			
B22	.25 to .35	medium clay	greyish brown (2.5Y52)	common (10-20%) medium (5-15 mm) distinct orange mottles	very few (<2%) angular ferruginised sandstone small pebbles (2-6 mm)	moderate 5-10 mm angular blocky	none	--			
B23	.35 to .7	heavy clay	olive brown (2.5Y44)	few (2-10%) medium (5-15 mm) faint orange mottles	very few (<2%) angular ferruginised sandstone small pebbles (2-6 mm)	weak 20-50 mm prismatic, moderate 5-10 mm angular blocky	none	-			
B24	.7 to .9	heavy clay	greyish brown (2.5Y52)	very few (<2%) medium (5-15 mm) distinct orange mottles	none	moderate 10-20 mm angular blocky	very few (<2%) fine (<2 mm) manganese nodules	-			

Site 42	Classification			Australian Soil Classification				Mesotrophic, Subnatic, Brown Sodosol		
	Horizon	Depth (m)	Boundary	Texture	Landform Element		Coarse Fragments	Structure	Segregations	Consistence
					Colour	Mottles				
A1	0 to .1	-	clayey coarse sand	dark yellowish brown (10YR4/4)	none	many (20-50%) angular ferruginised sandstone small pebbles (2-6 mm), many (20-50%) angular ferruginised sandstone medium pebbles (6-20 mm)	massive	none	-	
B21	.1 to .22	-	medium heavy clay	dark yellowish brown (10YR4/4)	very few (<2%) fine (<5 mm) distinct red mottles	very few (<2%) angular ferruginised sandstone small pebbles (2-6 mm)	moderate 2-5 mm angular blocky	none	-	
B22	.22 to .45	-	heavy clay	brown (10YR4/3)	few (2-10%) medium (5-15 mm) faint red mottles	none	moderate 10-20 mm lenticular, moderate 5-10 mm angular blocky	none	-	
B3	.45 to .6	-	coarse sandy light medium clay	brown (10YR4/3)	few (2-10%) medium (5-15 mm) distinct red mottles	none	weak 2-5 mm angular blocky	none	-	
C	.6 to .7	-		light brownish grey (2.5Y6/2)	few (2-10%) medium (5-15 mm) distinct yellow mottles, very few (<2%) medium (5-15 mm) distinct red mottles	very few (<2%) angular ferruginised sandstone large pebbles (20-60 mm)	-	none	-	

References

1. Queensland Department of Natural Resources and Water (2008). SILO [online]. Available at <http://www.longpaddock.qld.gov.au/silo/> [accessed 5/11/2007].
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