

Marri Park Golf Course: Irrigation and Agronomy Impact Report

Technology Trial: President Water Vortex Generators
Trial Period: July 2025 – June 2026
Location: 34 Marri Park Dr, Casuarina, Western Australia
 Coordinates: 32.2356749, 115.8614999

Executive Summary

For the past four years, NewGround has proudly managed the grounds and turf maintenance at Marri Park Golf Course. At the conclusion of the 2024/2025 irrigation season, our management team reviewed the exceptional, documented outcomes of President Water Vortex Generators installed across several demanding environments, including the City of Armadale's Gwynne Park, Curtin University, and various government and educational facilities. Compelled by these proven regional successes, NewGround authorized a comprehensive, large-scale trial of the vortex technology at Marri Park for the 2025/2026 irrigation season.

Our objective was to evaluate the technology's true impact on our production bore water consumption, turf resilience, and overarching operational efficiency. The results have been a sweeping success, made even more significant by our challenging Bassendean sand soil profile. We concluded the trial year with our lowest bore water consumption in memory—achieving a 30.1% reduction against our previous three-year average. By indexing our water usage against historical localised rainfall, we have isolated the vortex generators as the clear catalyst for these savings. Furthermore, the enhanced water efficacy dramatically improved our soil moisture retention and turf health, allowing us to completely eliminate routine returfing for the first time since commencing the contract.

1. Water Usage and Historic Averages

Our course operates with a total production bore allocation of 432,000 m³ per financial year. Protecting this allocation while maintaining high-quality playing surfaces is our top priority. To definitively measure the impact of the vortex generators, we compared our 2025-2026 trial year extraction against our individual previous years, as well as our aggregated 3-year historical baseline.

Financial Year	Bore Water Used (m ³)	% of Licence Allocation	Variance from 3-Year Avg
2022 - 2023	353,065	81.7%	-
2023 - 2024	354,407	82.0%	-
2024 - 2025	297,978	69.0%	-
Prior 3-Year Average	335,150	77.5%	Our Baseline
2025 - 2026 (Trial)	234,018	54.2%	30.1% Reduction

By the close of the 2025–2026 financial year, our total bore usage had dropped to just 54.2% of our licence allocation. This represents a 21.5% volumetric reduction strictly compared to last season, and a massive **30.1% reduction** against our previous 3-year historical average.

Full bore metered numbers at the conclusion of the document.

2. Isolating Generator Efficiency: Litres per mm of Rain

We are aware that irrigation requirements fluctuate with the weather. To prove that these savings were generated by the vortex technology and not simply a byproduct of a wetter season, we calculated our efficiency ratio by indexing the daily rainfall at our exact coordinates against the volume of water we pumped: **Bore Litres used per millimetre of natural rainfall.**

- **2022 - 2023:** 471,570 Litres per mm of rain
- **2023 - 2024:** 656,552 Litres per mm of rain (*Dry year anomaly*)
- **2024 - 2025:** 381,485 Litres per mm of rain
- **2025 - 2026 (Trial): 298,150 Litres per mm of rain**

Our Key Finding: The financial years of 2024-2025 and 2025-2026 provided us with virtually identical natural rainfall conditions (781.1 mm vs. 784.9 mm). Historically, our irrigation demands would have mirrored one another. Instead, with the vortex generators running in 2025-2026, **our reliance on supplemental irrigation dropped by 21.8%** per millimetre of rain.

This metric proves that our treated water provided vastly superior soil penetration and moisture retention, allowing our team to drastically reduce pumping volumes under the exact same climatic conditions.

The source for rainfall data was Open-Meteo Historical Weather API.

Open-Meteo aggregates decades of historical weather data using global and local meteorological reanalysis models, which combine localised weather station readings and satellite data to provide highly accurate weather measurements for specific GPS coordinates.

3. Turf Health, Bassendean Sand, and The Elimination of Returfing

Beyond absolute water volume savings, the qualitative change in our turf has been exceptional, especially given our local geology.

Marri Park Golf Course is built on a **Bassendean sand** soil profile. As any turf manager knows, this sand type is notoriously fast-draining, highly prone to becoming hydrophobic (water-repellent), and possesses extremely poor natural moisture retention. Historically, combatting this profile required us to execute aggressive watering regimes and regular returfing (turf laying) to repair dry patches and turf fatigue. It is a highly resource-intensive maintenance reality for our team.

However, during the 2025-2026 trial, **we did not have to perform any returfing.**

The vortex-treated water fundamentally altered how moisture interacted with the Bassendean sand. By reducing the surface tension of the water, the generators improved soil penetration and deep root hydration, effectively overcoming the natural hydrophobic tendencies of the sand profile. Our existing turf was able to withstand seasonal stress and recover naturally. Because establishing new turf typically requires intensive, high-volume watering, eliminating this maintenance step provided us with immense compounding water savings and serves as indisputable agronomic proof of the system's effectiveness.

Pictured Below 16th Fairway - Previously scarred with brown patches (donut circles) from poor sprinkler coverage.



4. Additional Operational Synergies

While this report focuses heavily on quantified volumetric data and rainfall indexing, it is critical to acknowledge the broader, cascading operational savings we generated over the past year.

Pumping over 100,000 m³ less water than our three-year historical baseline has yielded a massive reduction in our tertiary operational inputs. While we have not itemised the specific dollar figures in this document, the facility has realised significant and obvious cost savings in:

- **Power Consumption:** Dramatic reductions in our kilowatt-hour (kWh) electricity draw due to significantly lower pump run-times and extraction durations across Bores 1 through 4.

- **Hardware Longevity:** Substantially decreased wear and tear on our expensive bore pumps, irrigation lines, and valving, directly extending the lifespan of our vital infrastructure.
- **Labour and Maintenance:** Highly impactful reductions in labour hours across our grounds team, driven primarily by the total eradication of returfing tasks, alongside fewer manual interventions for spot watering.

5. Summary

The President Water Vortex Generators have transformed our irrigation profile at Marri Park Golf Course. By indexing our water usage against corresponding localised rainfall, the data confirms a pure irrigation efficiency gain of nearly 22%, completely independent of seasonal weather variations. When applied to our notoriously difficult Bassendean sand profile, the treated water bypassed our historic moisture-retention issues, resulting in the complete elimination of routine returfing.

This twelve-month trial proves that vortex-treated water not only protects our vital 432,000 m³ water allocation, but it fundamentally elevates the agronomic baseline of our turf while driving down power, hardware, and labour burdens across our entire operation.

6. Bore Meter Results

Continued on following pages.

For further information contact:

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Marri Park Golf Course

Production Bore Usage

Total Allocation

432,000

Total Usage to date

234,018

Total Remaining to Licence

197,982

Percentage to 2025-2026 Licence Allocation

54.2%

Total Budget Calculation to ET Projected

315,967

Total Usage 2025-2026

234,018

Total Usage Remaining to ET Applications

81,949

Percentage to Licence Budget

74.1%

Mnth	Date	Bore 1 (Driving Range)		Bore 2 (First Hole)		Bore 3 (Compound)		Bore 4 (Ninth Hole)		Total Production Usage (m ³)	Actual Accumulative Total	Projected Monthly Usage	Projected Accumulative	Under/Over	Daily Projected Usage	Actual Average Daily Usage
		Meter (m ³)	Monthly Usage	Meter (m ³)	Monthly Usage	Meter (m ³)	Monthly Usage	Meter (m ³)	Monthly Usage							
	30th June 2025	1,222,226	0	16,519	0	4,306	0	150,672	0			1,550.0		-1,550	52	
1	30th July 2025	1,222,226	0	16,519	0	4,306	0	150,672	0	0	0	1,550.0	1,550	-1,550	50	202
2	31st August 2025	1,222,582	356	16,519	0	4,392	86	151,406	734	1,176	1,176	9,276.0	3,100	-1,924	309	891
3	30th September 2025	1,224,313	1,731	16,476	1,957	4,392	0	153,792	2,386	6,074	7,250	9,276.0	12,376	-5,126		1689
4	31st October 2025	1,229,810	5,497	25,133	6,657	4,392	0	157,975	4,183	16,337	23,587	33,415.0	45,791	-22,204	1,078	527
5	30th November 2025	1,241,256	11,446	32,359	7,226	4,942	550	165,480	7,505	26,727	50,314	43,829.0	89,620	-39,505	1,414	891
6	31st December 2025	1,261,422	20,166	56,925	24,566	4,946	4	173,089	7,609	52,345	102,659	51,793.0	141,413	-38,754	1,671	1689
7	31st January 2026	1,280,508	19,086	81,190	24,265	4,948	2	188,340	15,251	58,604	161,263	50,563.0	191,976	-30,713	1,631	1890
8	28th February 2026	1,298,334	18,326	83,479	2,289	4,948	0	202,841	14,501	35,116	196,379	47,388.0	239,364	-42,985	1,692	1254
9	31st March 2026	1,309,499	10,665	83,479	0	4,948	0	212,991	9,550	20,215	216,594	41,978.0	281,342	-64,748	1,354	652
10	30th April 2026	1,309,981	482	83,479	0	4,948	0	222,388	9,997	10,479	227,073	22,575.0	303,917	-76,844	753	349
11	31st May 2026	1,309,981	0	83,479	0	4,948	0	229,333	6,945	6,945	234,018	10,500.0	314,417	-80,399	350	
12	30th June 2026	0	0	0	0	0	0	0	0	0	234,018	1,550.0	315,967	-81,949	50	
Totals			87,755		66,960		642		78,661	234,018						
									234,018							



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Marri Park Golf Course

Production Bores Usage

Total Allocation		432,000
Total Usage to date		297,978
Total Remaining to Licence		134,022
Percentage to 2024-2025 Licence Allocation		69.0%
Total Budget Calculation to ET Projected		315,967
Total Usage 2024-2025		297,978
Total Usage Remaining to ET Applications		17,989
Percentage to Licence Budget		94.3%

Month	Date	Bore 1 (Drinking Range)		Bore 2 (First Hole)		Bore 3 (Compound)		Bore 4 (ninth Hole)		Total Production Bore Usage (m3)	Actual Accumulative Total	Projected Monthly Usage	Projected Accumulative	Under / Over	Daily Projected Usage	Actual Average Daily Usage
		Meter (m3)	Monthly Usage	Meter (m3)	Monthly Usage	Meter (m3)	Monthly Usage	Meter (m3)	Monthly Usage							
	30th June 2024	1,144,125	1	250,855	0	1,805	0	84,424	0	1,114	1,114	1,590.0	1,550	-436	52	
1	30th July 2024	1,144,144	19	250,855	0	1,805	0	85,519	1,095	16,901	18,015	1,590.0	3,100	14,915	50	599
2	30th Augst 2024	1,144,144	0	250,855	0	16,705	14,800	87,520	2,001	17,980	35,995	9,276.0	12,376	23,619	309	1040
3	30th September 2024	1,144,144	0	250,855	0	31,121	14,416	91,084	3,564	32,232	68,227	33,415.0	45,791	22,436	1,078	1345
4	31st October 2024	1,144,146	2	269,407	18,552	37,306	6,185	98,577	7,493	32,232	108,565	43,829.0	89,620	18,945	1,414	1193
5	30th November 2024	1,155,335	11,188	290,959	21,552	11,046	2,788	103,386	4,809	40,338	149,545	51,793.0	141,413	4,132	1,671	1345
6	31st December 2024	1,171,175	15,840	305,525	14,566	13,633	2,687	107,373	3,987	36,980	186,565	50,563.0	191,976	1,074	1,631	1193
7	31st January 2025	1,188,025	17,850	327,073	21,548	17,175	3,542	111,938	4,565	47,505	193,050	47,388.0	239,364	3,849	1,692	1532
8	28th February 2025	1,203,378	14,353	337,362	10,289	19,409	1,879	135,580	23,642	50,163	243,213	41,978.0	281,342	-7,154	1,354	1792
9	31st March 2025	1,214,354	10,876	10,145	10,145	3,471	3,471	141,933	6,353	30,945	274,158	22,575.0	303,917	-8,956	753	998
10	30th Aprl 2025	1,221,471	7,117	15,833	5,688	4,306	835	149,096	7,163	20,803	294,961	10,500.0	314,417	-17,213	350	693
11	31st May 2025	1,222,226	755	16,519	666	4,306	0	149,898	802	2,243	297,204	1,550.0	315,967		50	
12	30th June 2025	1,222,226	0	16,519	0	4,306	0	150,672	774	774	297,978					
Totals			78,102		103,026		50,803		66,248	297,978		315,967			10,404	



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Marri Park Golf Course

Production Bore Usage

Total Allocation 2022 - 2024

Total Usage to date

Total Remaining

Percentage to 2022-2023 Licence Allocation

Total Budget Calculation to ET Projected

Total Usage

Total Usage additional used to Budget

Percentage to Budget

432,000	354,407	-77,593	82.0%	Amount to Licence
315,967	354,407	38,440	10.8%	Amount to ET Usage Over Budget

Month	Date	Bore 1 (Driving Range)		Bore 2 (1st Hole)		Bore 3 (Compound)		Bore 4 (10th Hole)		Total Production Bore Usage (m3)	Actual Accumulative Total	Projected Monthly Usage	Projected Accumulative	Under / Over	Daily Projected Usage
		Meter (m3)	Monthly Usage	Meter (m3)	Monthly Usage	Meter (m3)	Monthly Usage	Meter (m3)	Monthly Usage						
	30th June 2023	1,031,484		146,721		705,234		637,493							
1	30th July 2023	1,031,485	1	146,722	1	705,249	15	637,600	107	124	124	1,550.0	1,550	-1,426	52
2	30th August 2023	1,032,864	1,479	149,217	2,495	706,451	1,202	638,132	532	5,708	5,832	1,550.0	3,100	2,732	50
3	30th September 2023	1,037,429	4,455	156,375	7,158	709,847	3,396	638,132	0	15,019	20,851	9,276.0	12,376	8,475	309
4	31st October 2023	1,048,017	10,588	158,151	31,776	724,052	14,205	10,407	10,407	66,976	87,827	33,415.0	45,791	42,036	1,078
5	30th November 2023	1,059,729	11,712	207,904	19,753	734,782	10,730	19,976	9,569	51,764	139,591	43,829.0	89,620	49,971	1,414
6	31st December 2023	1,072,743	13,014	223,203	15,299	744,745	9,963	29,300	9,324	47,800	187,191	51,793.0	141,413	45,778	1,671
7	31st January 2024	1,082,591	19,848	242,997	19,794	755,009	10,254	45,136	15,836	65,742	252,933	50,563.0	191,976	60,957	1,692
8	28th February 2024	1,111,685	19,094	250,855	7,858	755,998	989	59,065	13,929	41,870	294,803	47,388.0	239,364	55,439	1,692
9	31st March 2024	1,126,806	15,171	250,855	0	755,998	0	72,200	13,135	28,256	323,059	41,978.0	281,342	41,717	1,394
10	30th April 2024	1,139,325	12,519	250,855	0	755,998	0	77,693	5,453	17,972	341,031	22,575.0	303,917	37,114	753
11	31st May 2024	1,144,124	4,799	250,855	0	1,805	1,805	83,712	6,059	12,863	353,894	10,500.0	314,417	39,277	350
12	30th June 2024	1,144,125	1	250,855	0	1,805	0	84,924	712	713	354,407	1,550.0	315,967	38,440	50
Totals			112,641		104,134		52,569		85,063	354,407		315,967			10,404

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Marri Park Golf Course

Production Bore Usage

Total Allocation 2022 - 2023	432,000
Budget 2022-2023	432,000
Total Usage to date	353,065
Total Remaining	78,935
Percentage to Budget	111.7%
Percentage to 2022-2023 Licence Allocation	81.7%

Month	Date	Bore 1		Bore 2		Bore 3		Bore 4		Total Production Bore Usage (m ³)	Actual Accumulative Total	Projected Monthly Usage	Projected Accumulative	Under / Over	Daily Projected Usage	Actual Average Daily Usage
		Meter (m ³)	Monthly Usage	Meter (m ³)	Monthly Usage	Meter (m ³)	Monthly Usage	Meter (m ³)	Monthly Usage							
	30th June 2022	953,883		278,943		621,725		592,259		0	0	15,500.0	1,550	-1,550	52	
1	30th July 2022	953,883	0	278,943	0	621,725	0	593,952	1,693	1,693	1,693	15,500.0	3,100	-1,407	50	
2	30th August 2022	953,883	0	278,943	0	621,725	0	593,952	1,693	1,693	1,693	15,500.0	1,237.6	-9,065	309	54
3	30th September 2022	954,927	1,044	0	0	621,725	0	594,526	574	1,618	3,311	9,276.0	45,791	-33,589	1,078	287
4	31st October 2022	957,833	2,906	3,870	3,870	621,785	60	596,581	2,055	8,991	12,202	33,415.0	89,620	-53,589	1,414	2,461
5	30th November 2022	970,246	12,413	25,838	21,968	647,005	25,220	610,809	14,228	73,829	86,031	43,829.0	141,413	14,198	1,631	2,285
6	31st December 2022	988,300	18,054	59,173	33,335	662,723	15,718	613,282	2,473	69,580	155,611	51,793.0	191,976	29,125	1,692	2,116
7	31st January 2023	1,005,901	17,601	88,186	29,013	677,204	14,481	617,787	4,505	65,600	221,211	50,563.0	239,364	54,617	1,354	2,606
8	28th February 2023	1,026,954	21,053	119,685	31,499	692,412	15,208	622,997	5,210	72,970	294,481	47,388.0	281,342		753	1,354
9	31st March 2023	1,029,488	2,534	140,173	20,488	702,281	9,869	632,067	9,070	41,961	336,142	41,978.0	303,917		350	370
10	30th April 2023	1,031,290	1,802	144,277	4,104	703,971	1,690	635,573	3,506	11,102	347,244	22,575.0	315,967			
11	31st May 2023	1,031,484	194	146,607	2,330	705,179	1,208	637,294	1,721	5,453	352,697	10,500.0	315,967			
12	30th June 2023	1,031,484	0	146,721	114	705,234	55	637,483	199	368	353,065	15,500.0	315,967			
Totals			77,601		146,721		83,509		45,234	353,065	353,065				10,404	

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