ATTACHMENT F

Predictive Interburden Groundwater Hydrographs

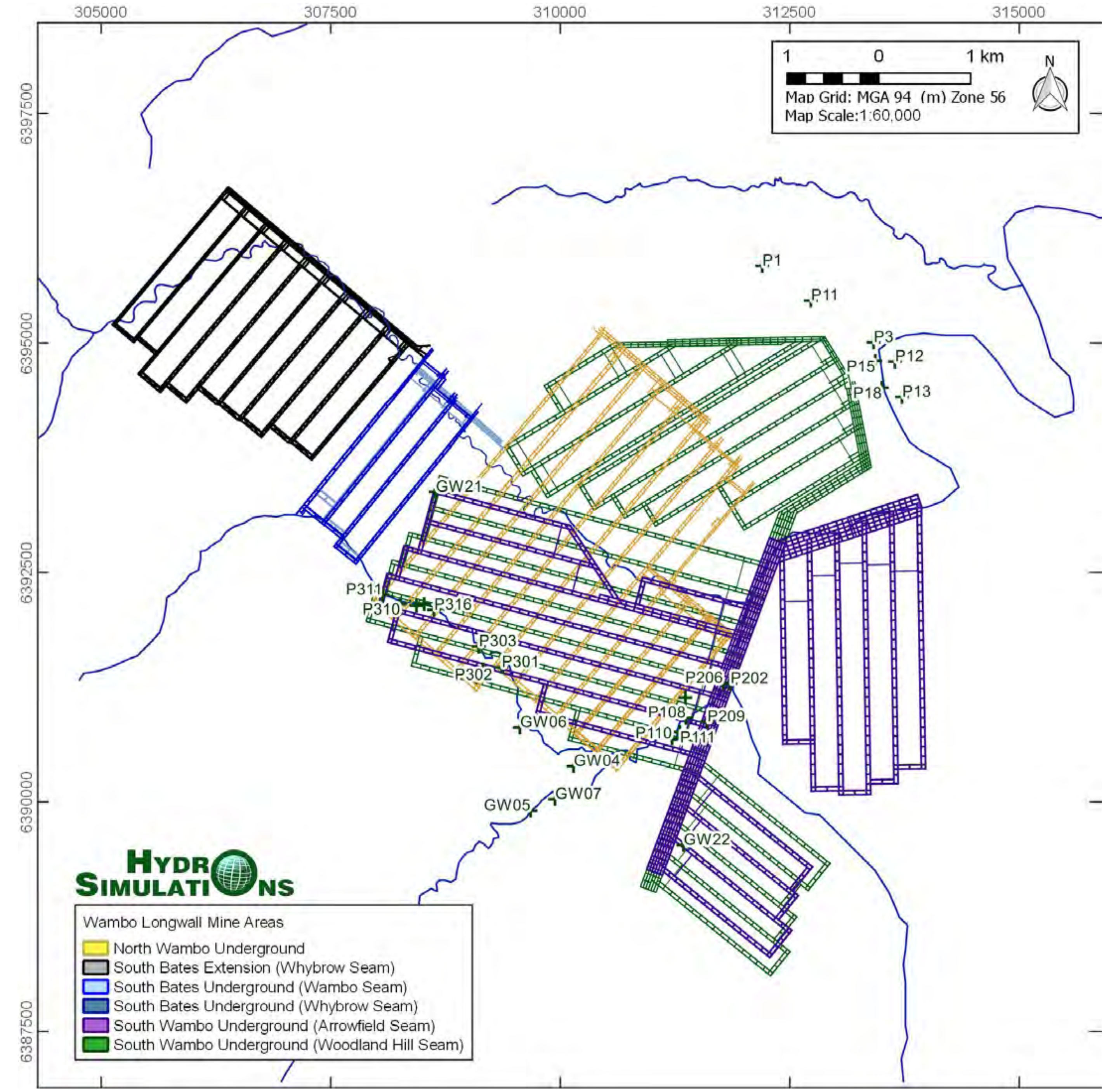


Figure F - 1 Interburden Groundwater Monitoring Network

Bore ID	Simulated Layer	Layer Litholgy
GW04	2	Overburden and coal seams above the Whybrow Seam.
GW05	2	Overburden and coal seams above the Whybrow Seam.
GW06	2	Overburden and coal seams above the Whybrow Seam.
GW07	2	Overburden and coal seams above the Whybrow Seam.
GW21	2	Overburden and coal seams above the Whybrow Seam.
GW22	2	Overburden and coal seams above the Whybrow Seam.
GW030732	16	Basal units.
GW030733	16	Basal units.
GW030740	16	Basal units.
GW043225	2	Overburden and coal seams above the Whybrow Seam.
GW080963	16	Basal units.
P1	2	Overburden and coal seams above the Whybrow Seam.
P3	8	Whynot–Woodlands Hill Seam interburden.
P11	7	Whynot Seam.
P12	2	Overburden and coal seams above the Whybrow Seam.
P13	2	Overburden and coal seams above the Whybrow Seam.
P15	2	Overburden and coal seams above the Whybrow Seam.
P18	2	Overburden and coal seams above the Whybrow Seam.
P104	2	Overburden and coal seams above the Whybrow Seam.
P108	2	Overburden and coal seams above the Whybrow Seam.
P110	2	Overburden and coal seams above the Whybrow Seam.
P111	2	Overburden and coal seams above the Whybrow Seam.
P202	2	Overburden and coal seams above the Whybrow Seam.
P206	2	Overburden and coal seams above the Whybrow Seam.
P209	2	Overburden and coal seams above the Whybrow Seam.
P301	2	Overburden and coal seams above the Whybrow Seam.
P302	2	Overburden and coal seams above the Whybrow Seam.
P303	2	Overburden and coal seams above the Whybrow Seam.
P310	2	Overburden and coal seams above the Whybrow Seam.
P311	2	Overburden and coal seams above the Whybrow Seam.
P312	2	Overburden and coal seams above the Whybrow Seam.
P314	2	Overburden and coal seams above the Whybrow Seam.
P316	2	Overburden and coal seams above the Whybrow Seam.
P317	2	Overburden and coal seams above the Whybrow Seam.
P318	2	Overburden and coal seams above the Whybrow Seam.
P319	2	Overburden and coal seams above the Whybrow Seam.

Table I - 1 Interburden bore lithology and model layer.

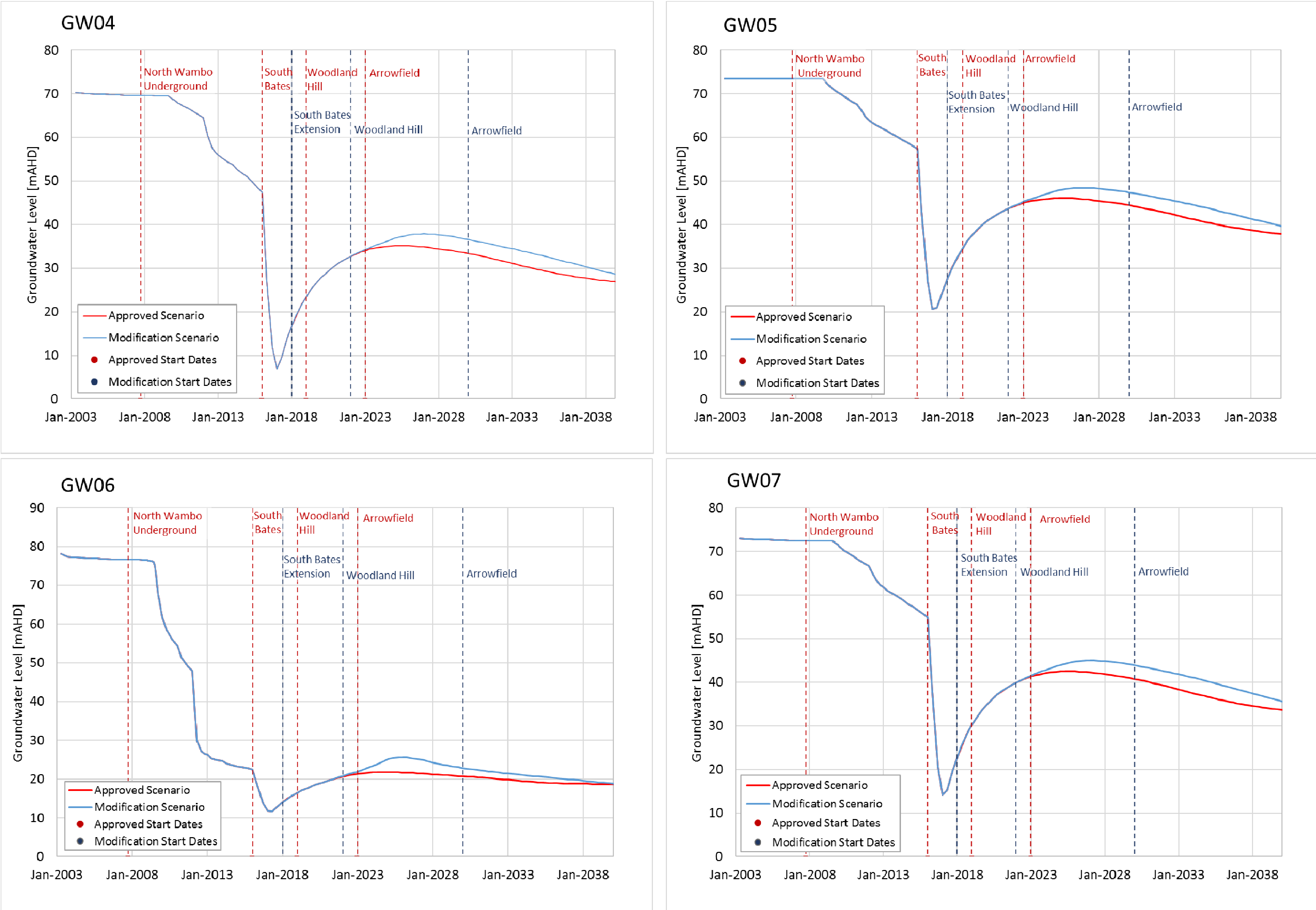


Figure F - 2 GW04, GW05, GW06, GW07 Predictive Hydrographs

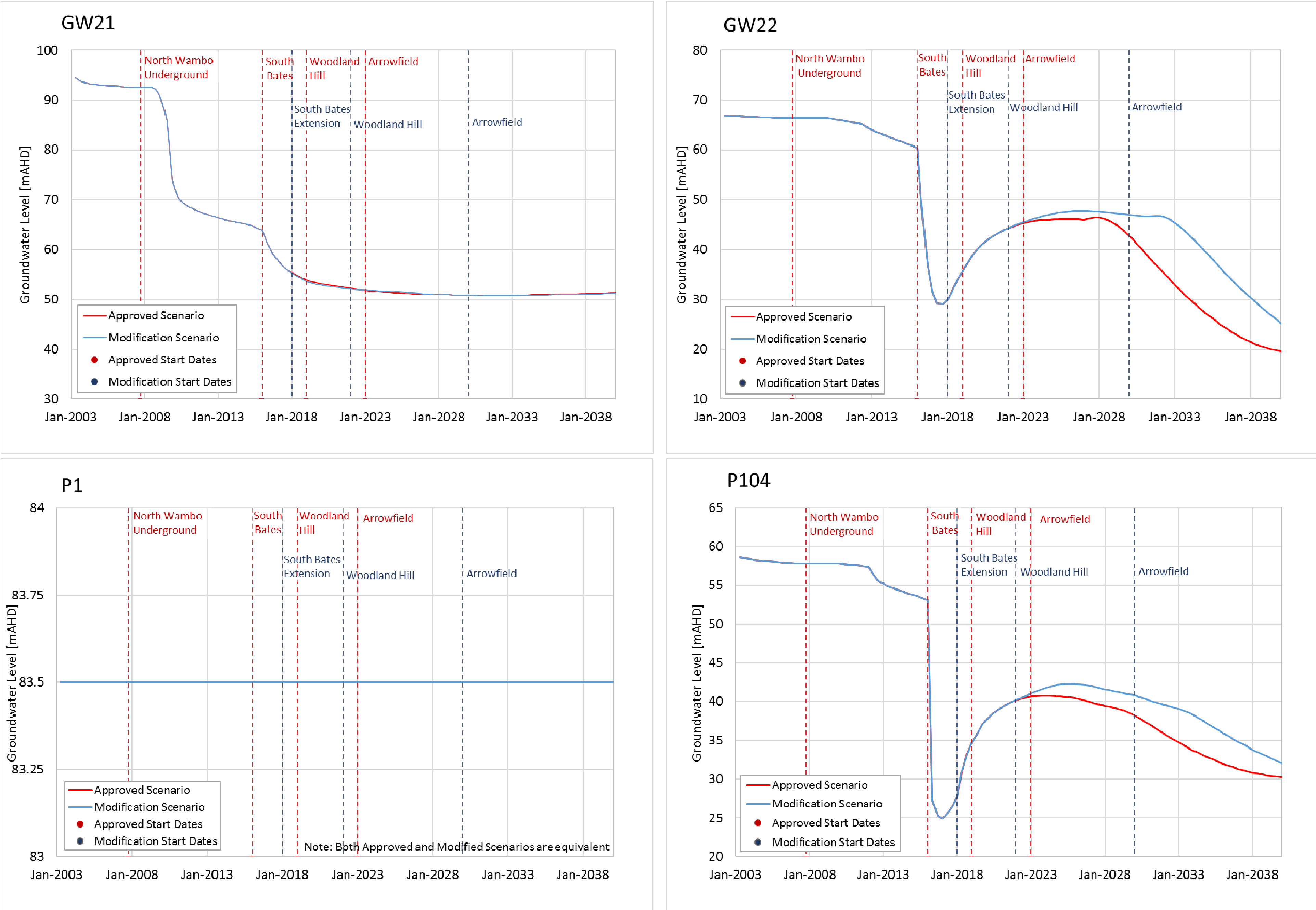


Figure F - 3 GW21, GW22, P1, P104 Predictive Hydrographs

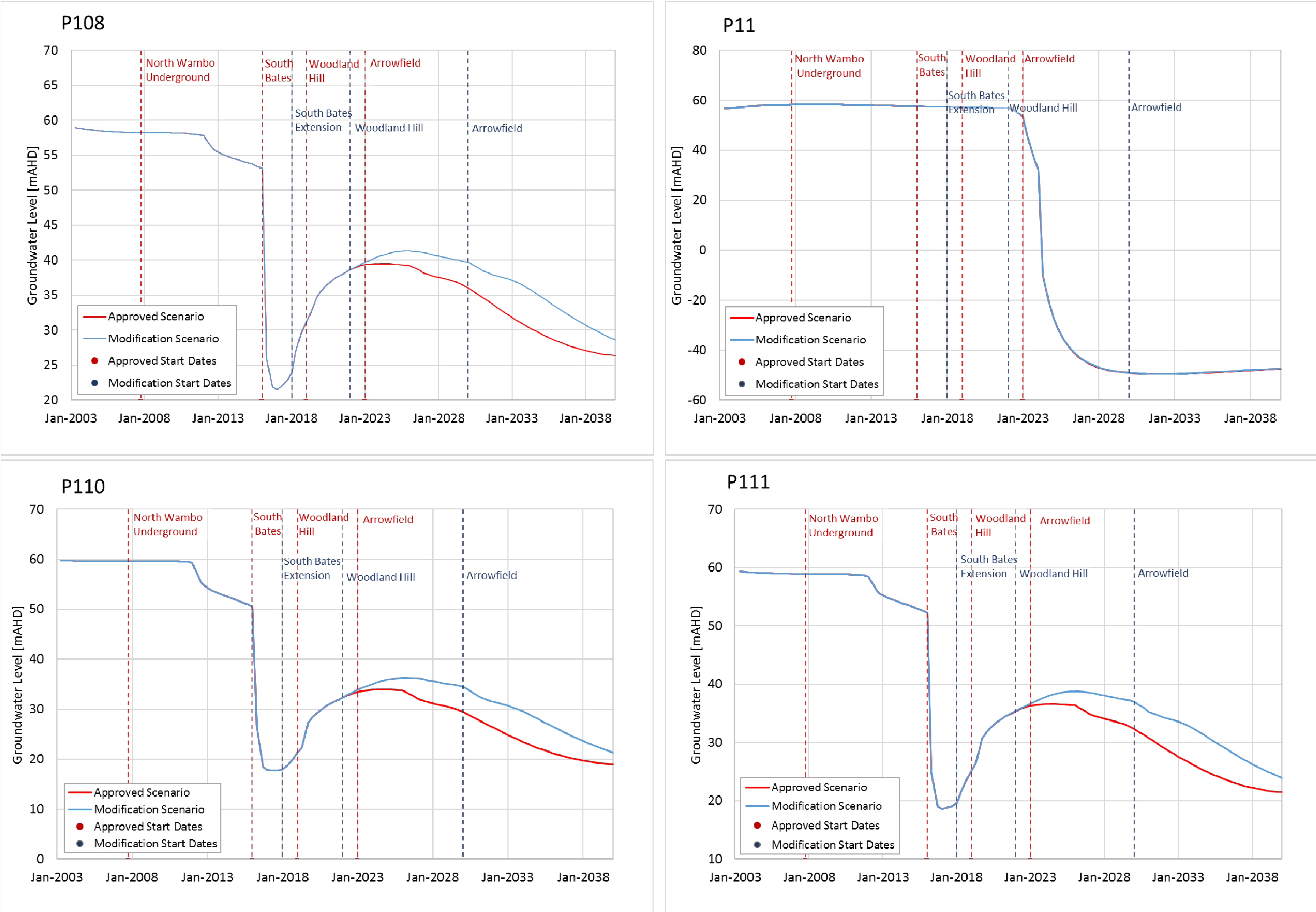


Figure F - 4 P108, P11, P110, P111 Predictive Hydrographs

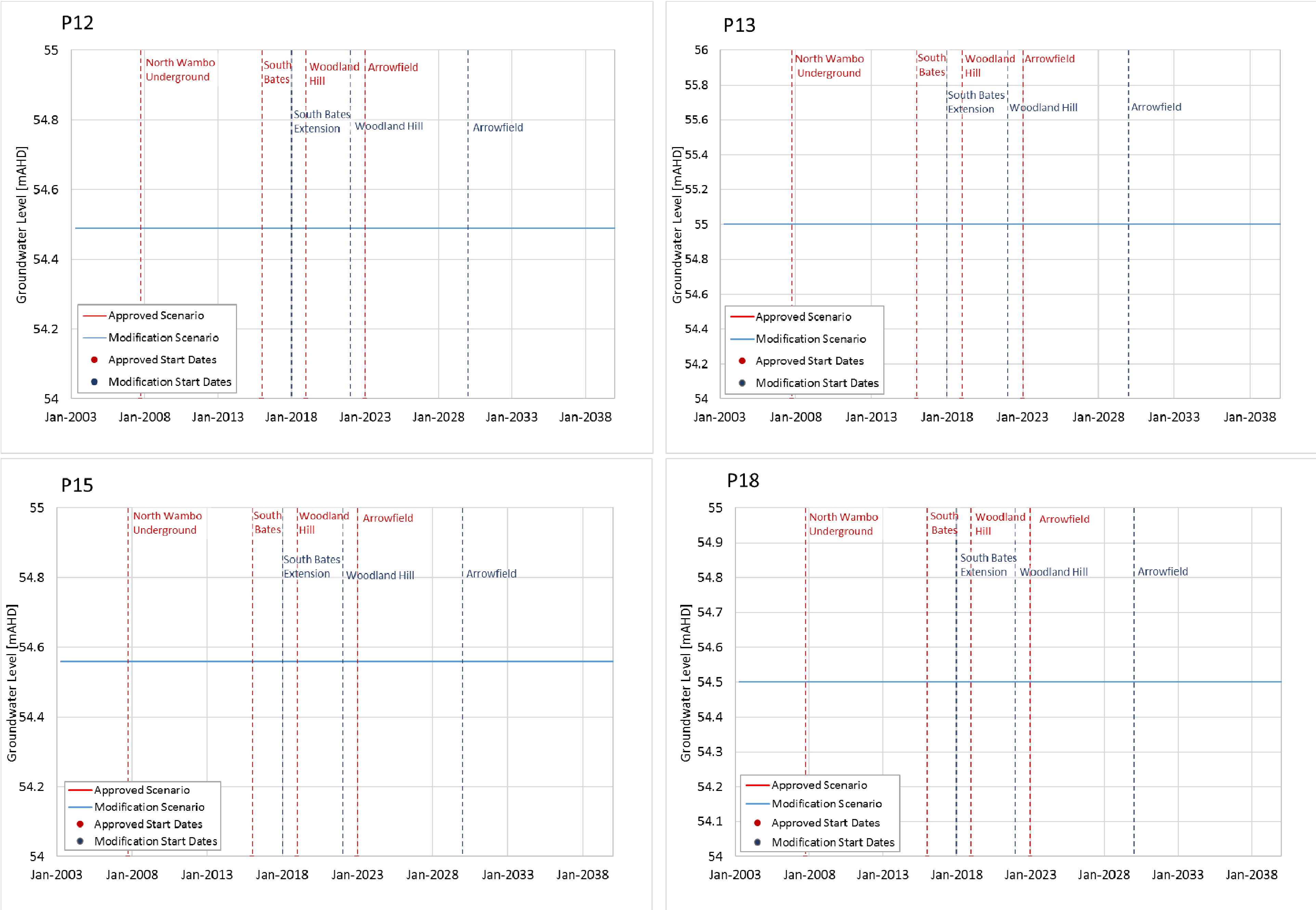


Figure F - 5 P12, P13, P15, P18 Predictive Hydrographs

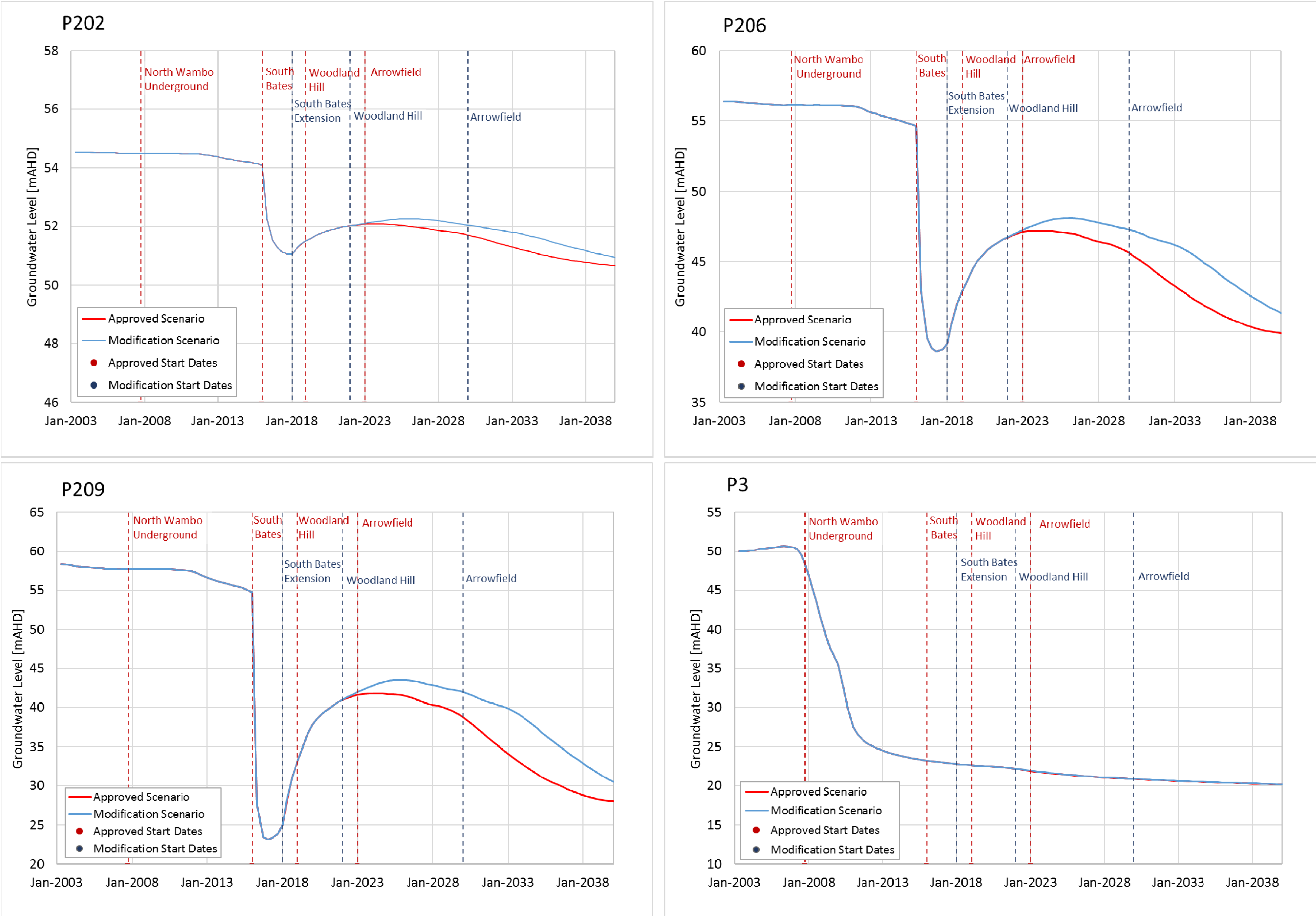


Figure F - 6 P202, P206, P209, P3 Predictive Hydrographs

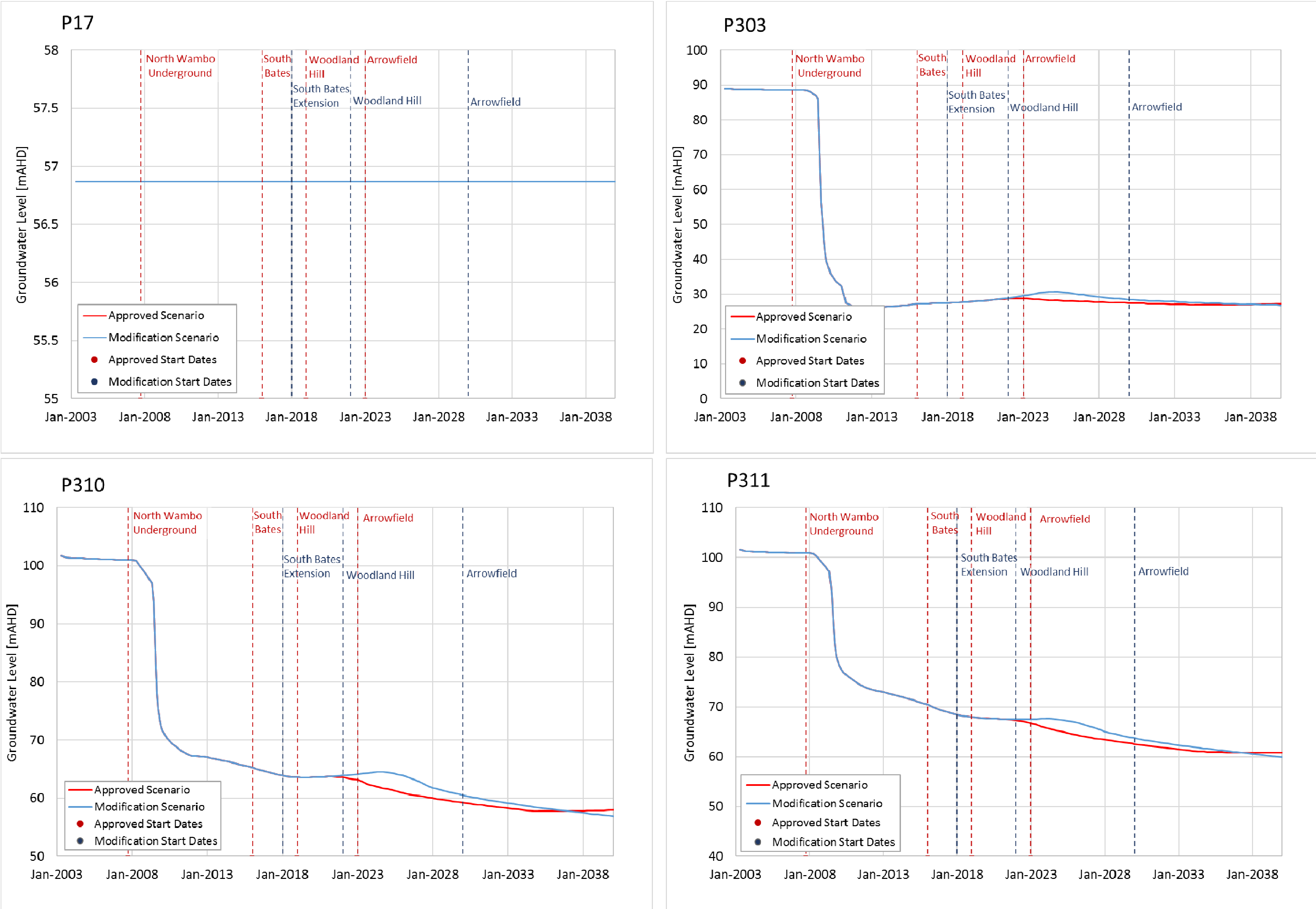


Figure F - 7 P17, P303, P310 Predictive Hydrographs

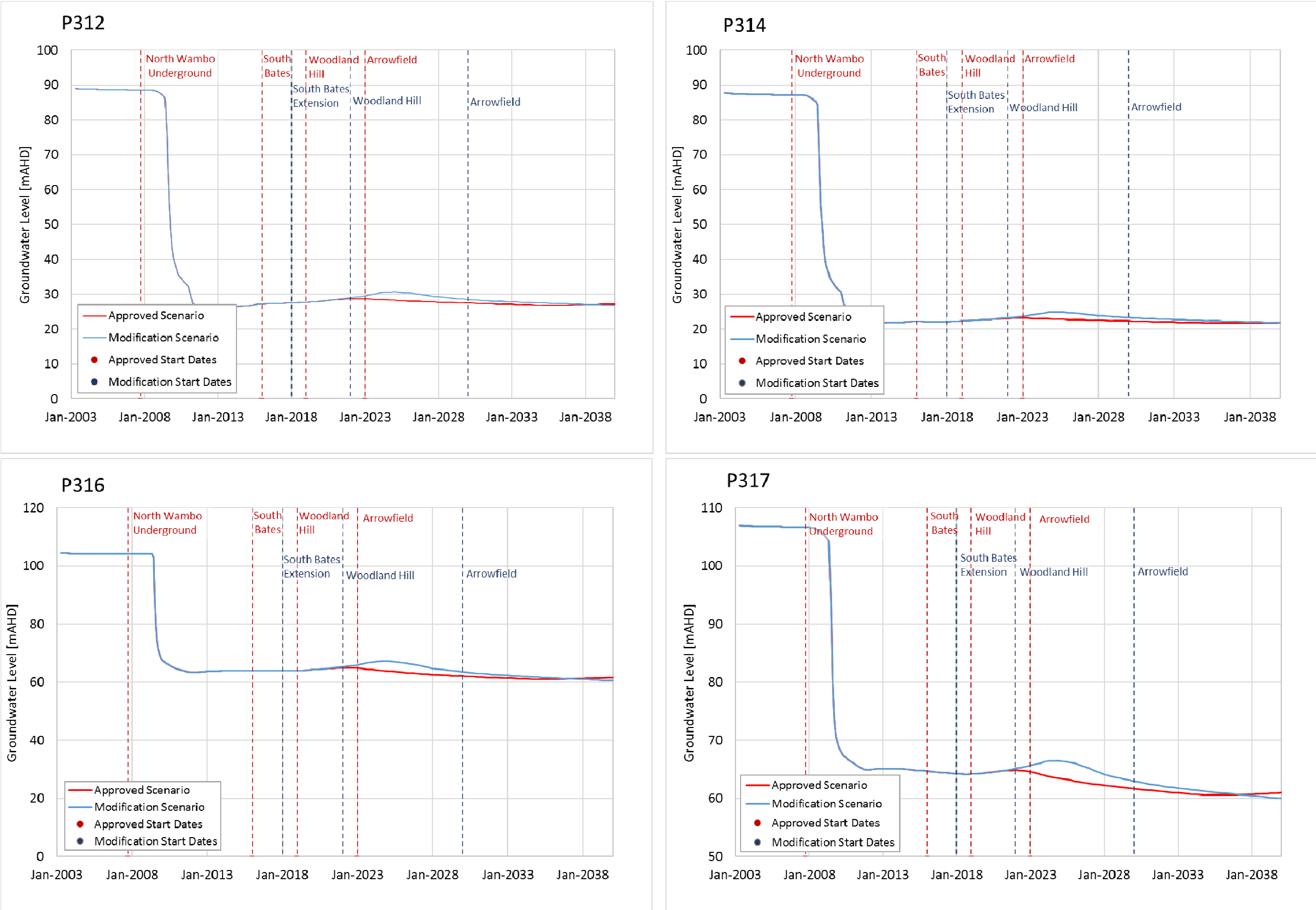
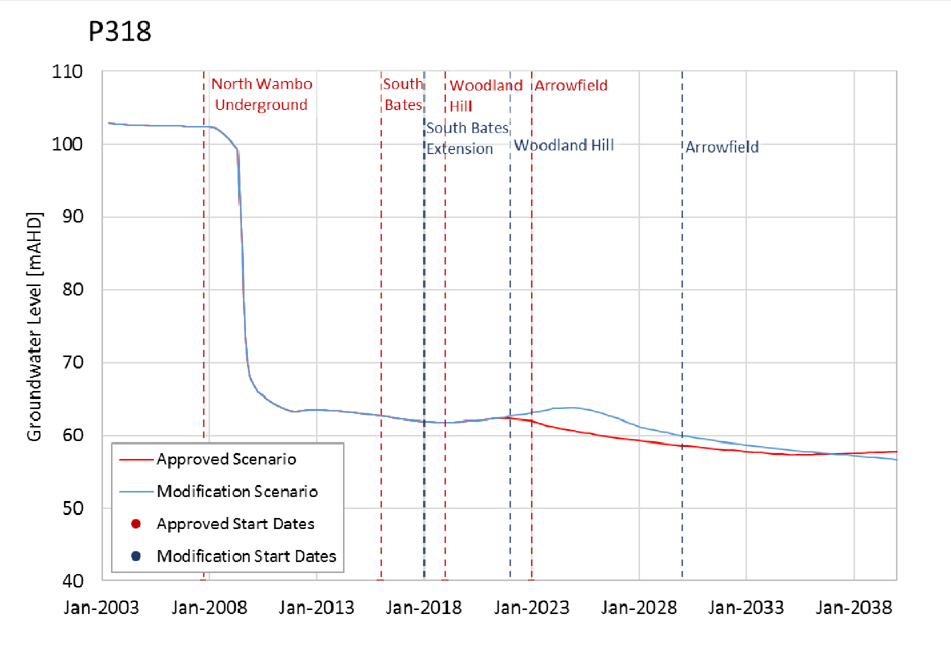


Figure F - 8 P312, P314, P316, P317 Predictive Hydrographs



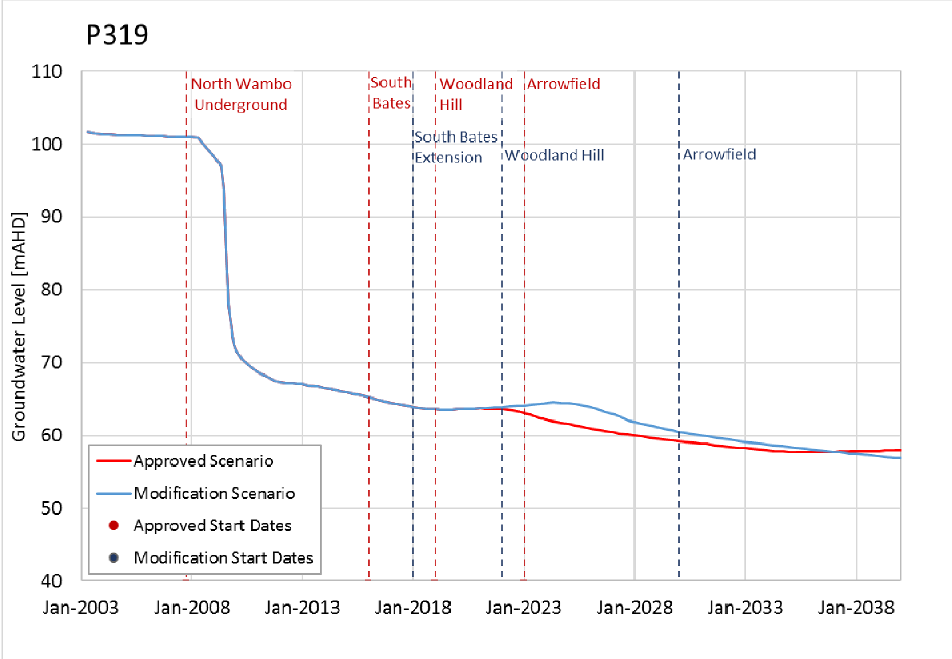


Figure F - 9 P318, P319 Predictive Hydrographs

ATTACHMENT G

Predictive

Vibrating Wire

Piezometer

Hydrographs

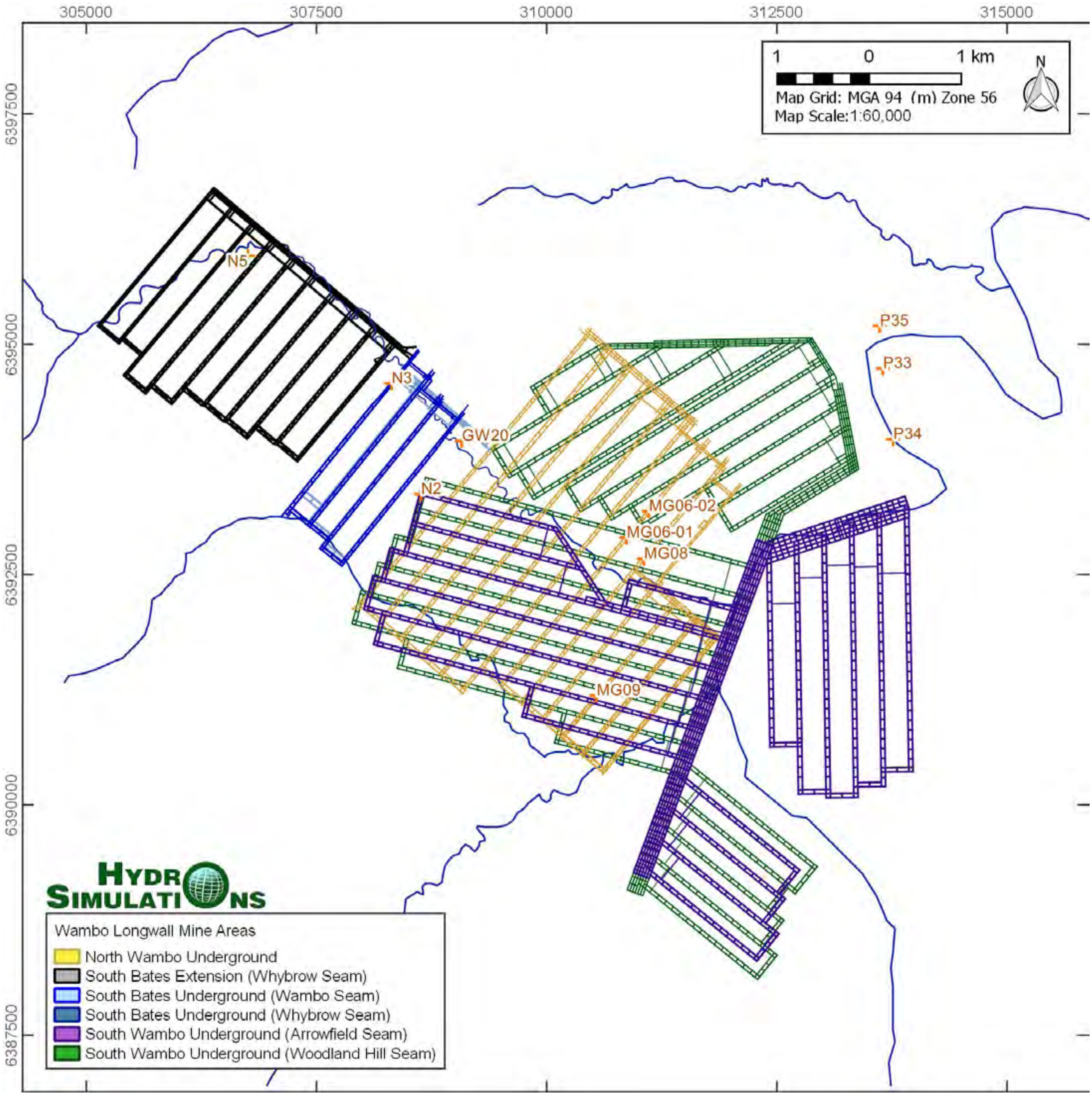


Figure G - 1 Vibrating Wire Piezometer Monitoring Network

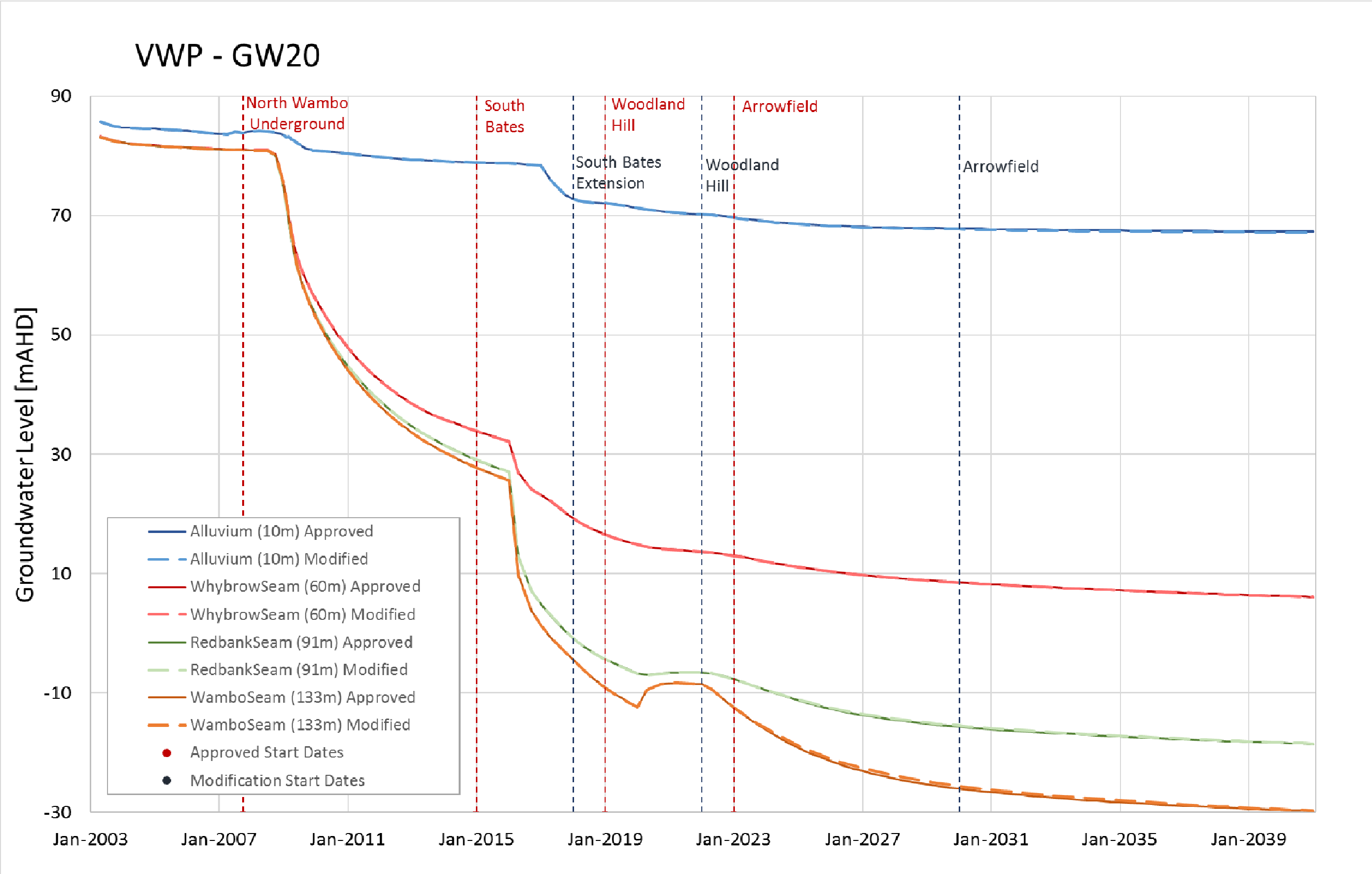


Figure G - 2 GW20 Predictive Hydrographs

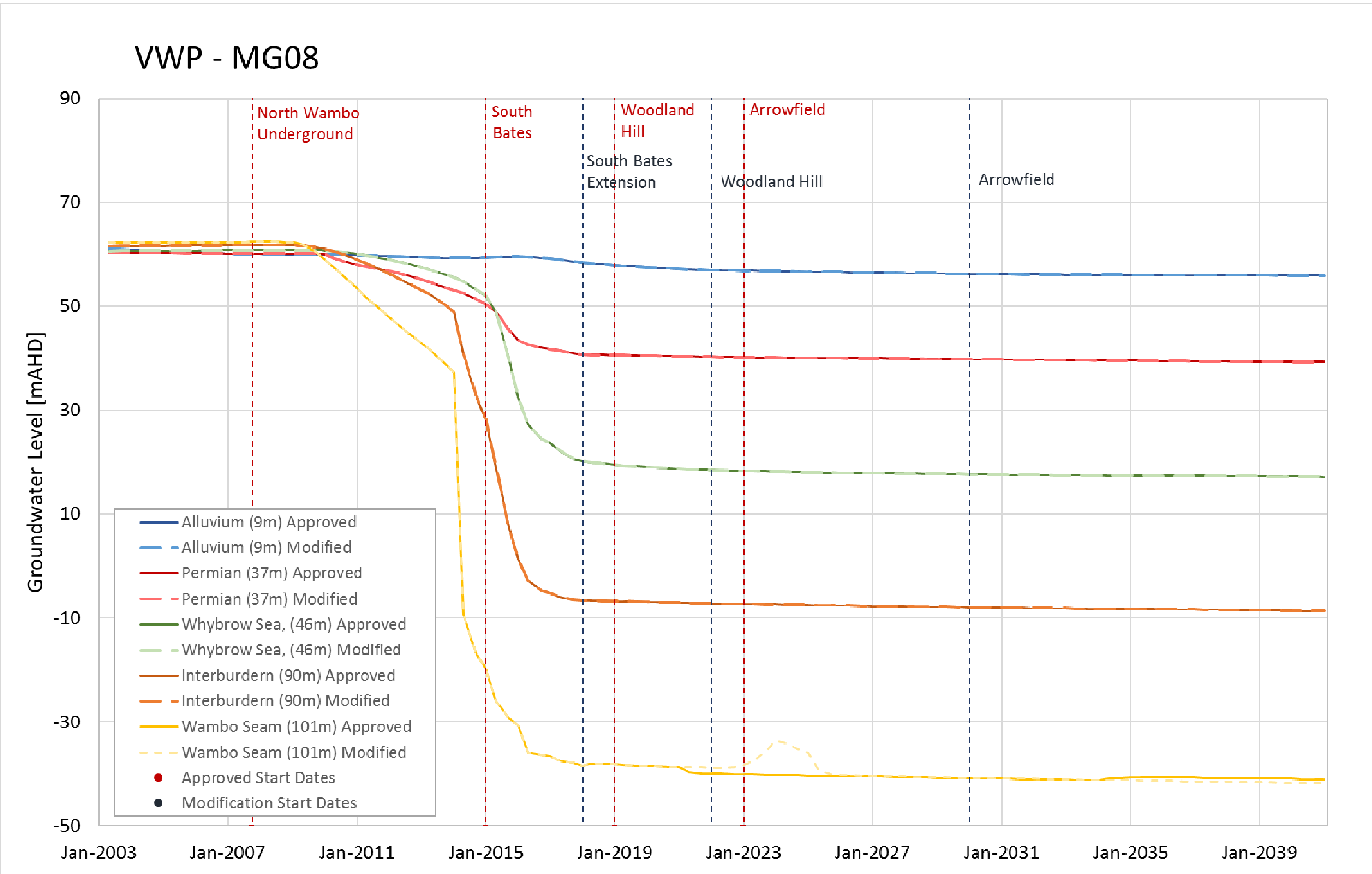


Figure G - 3 MG08 Predictive Hydrographs

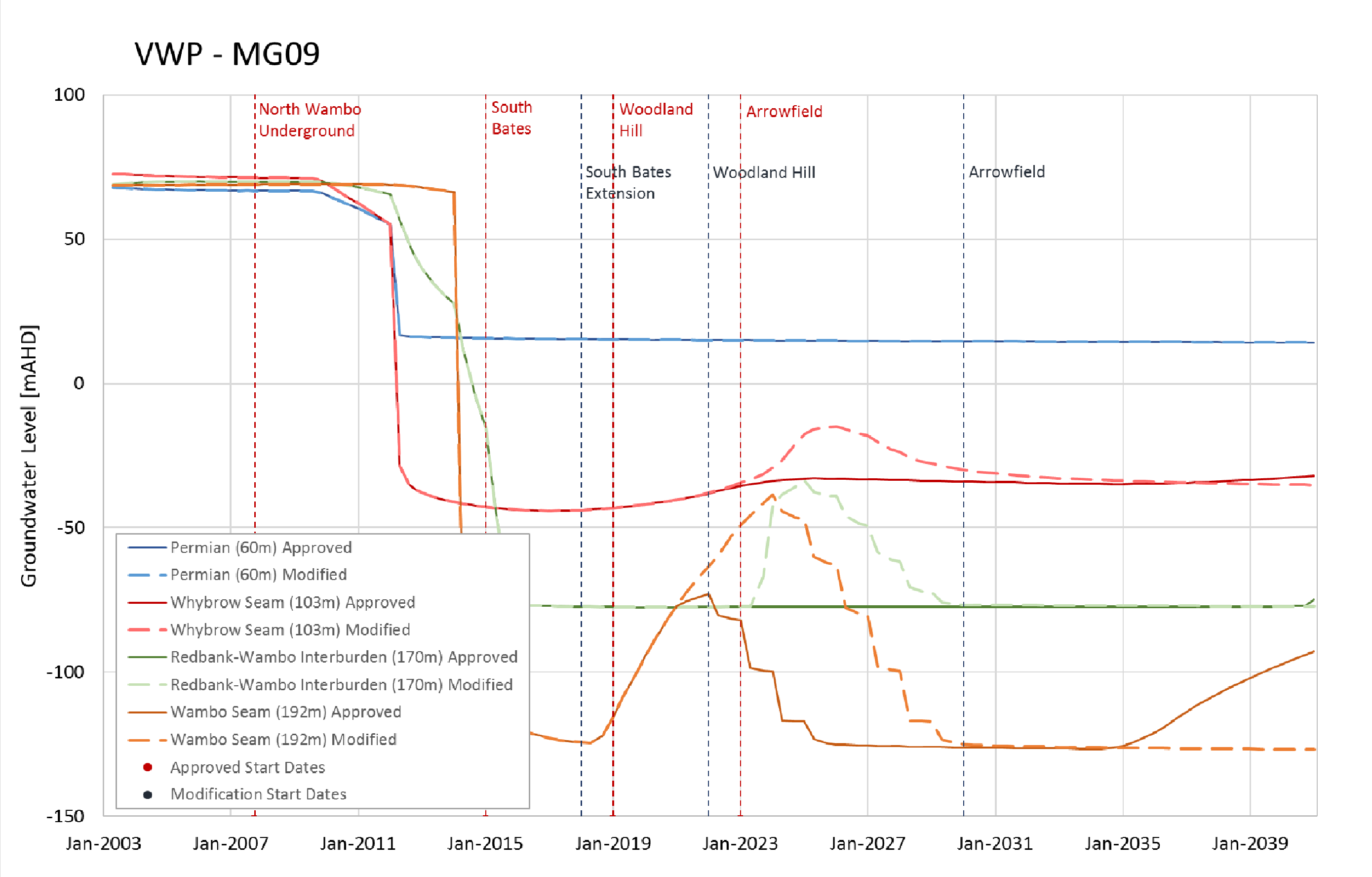


Figure G - 4 MG09 Predictive Hydrographs

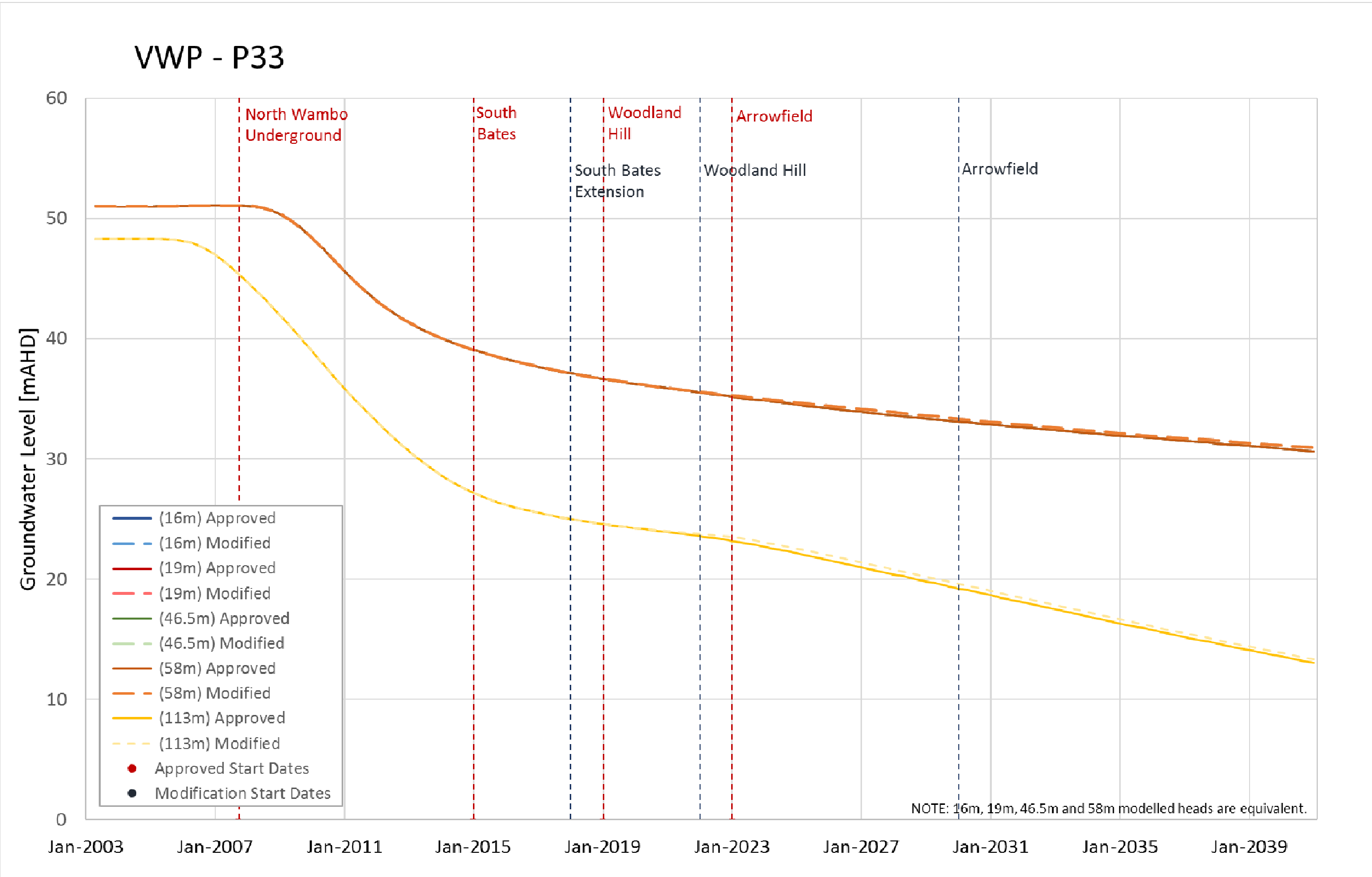


Figure G - 5 P33 Predictive Hydrographs

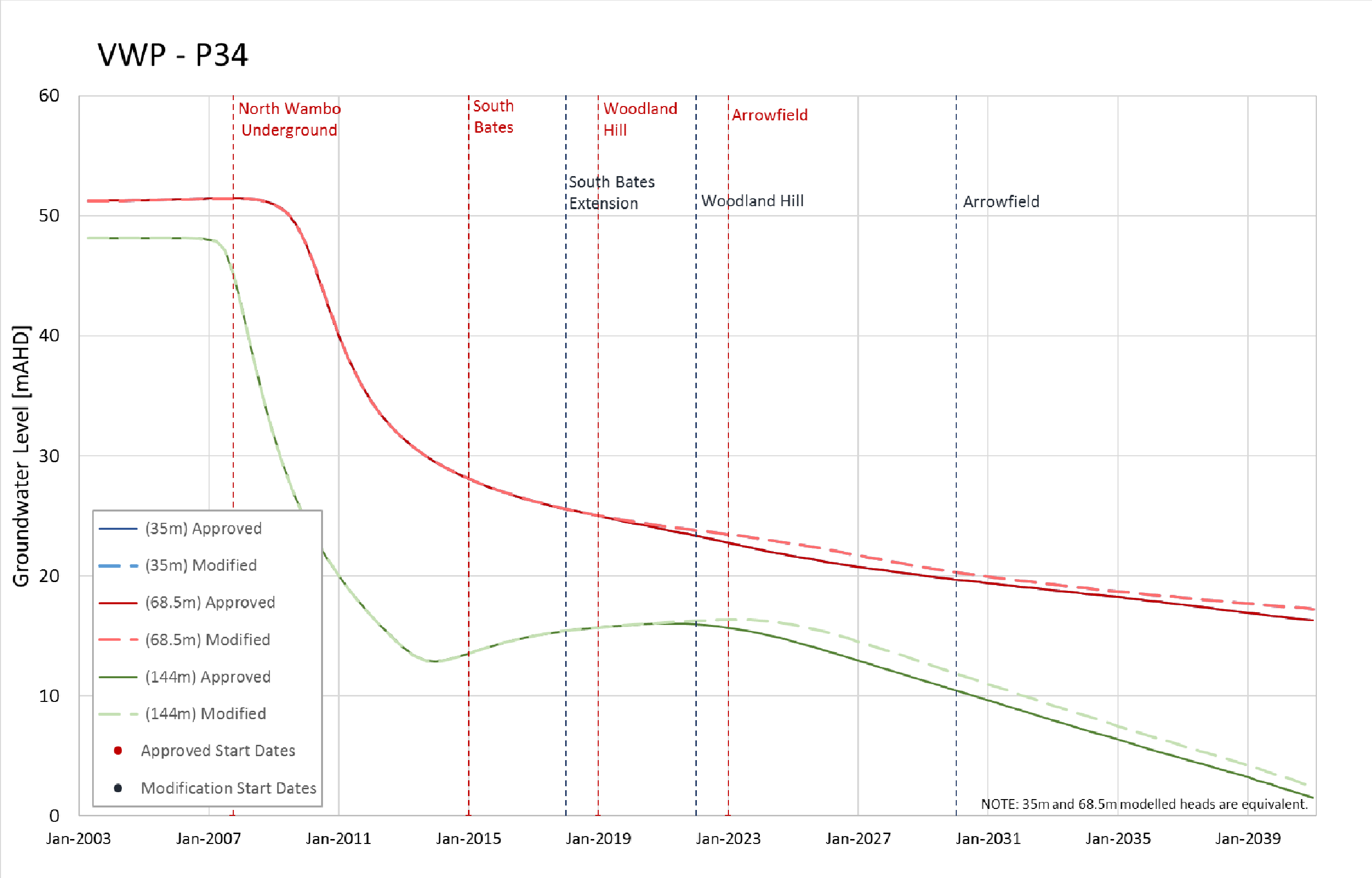


Figure G - 6 P34 Predictive Hydrographs

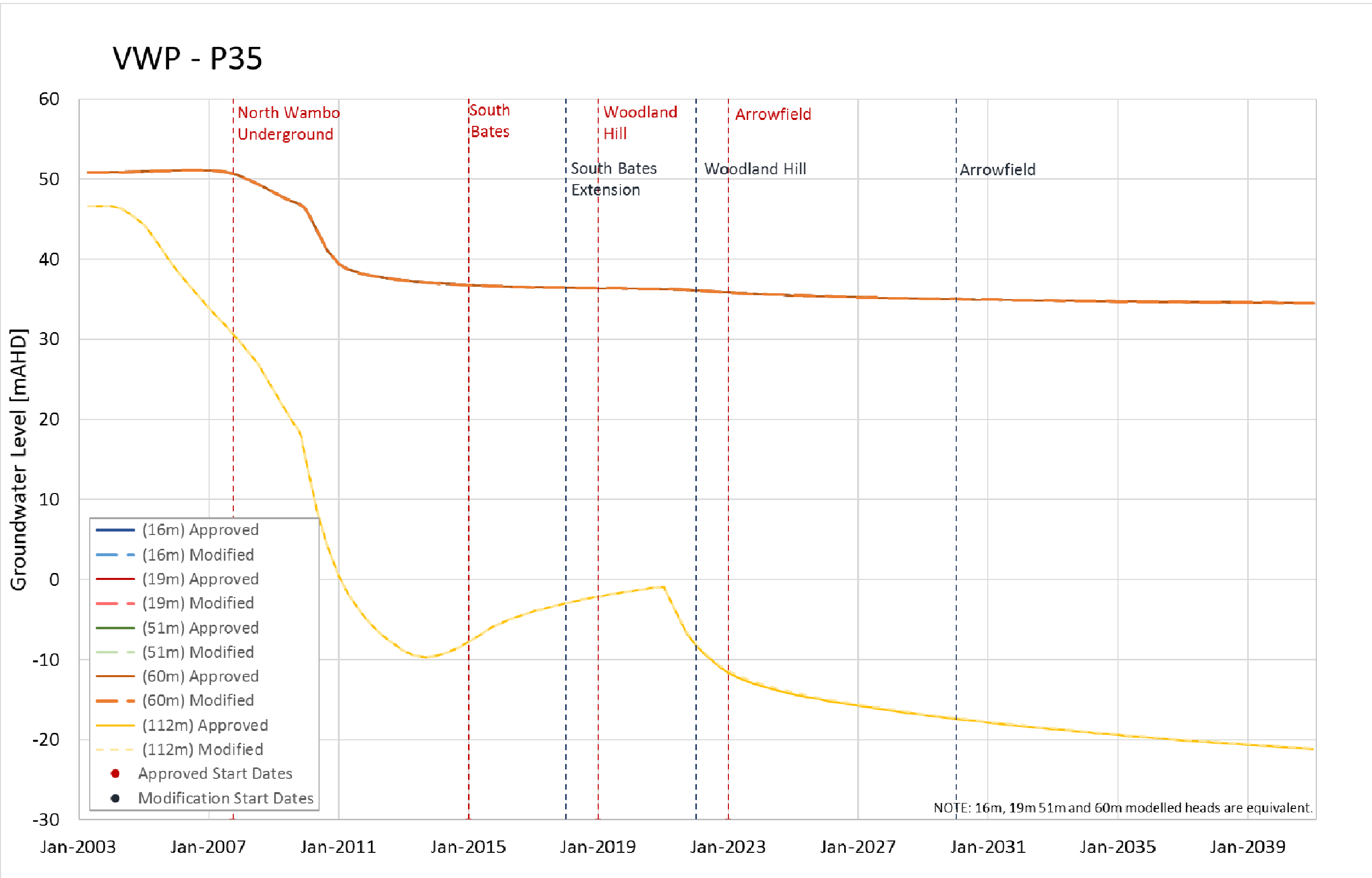


Figure G - 7 P35 Predictive Hydrographs

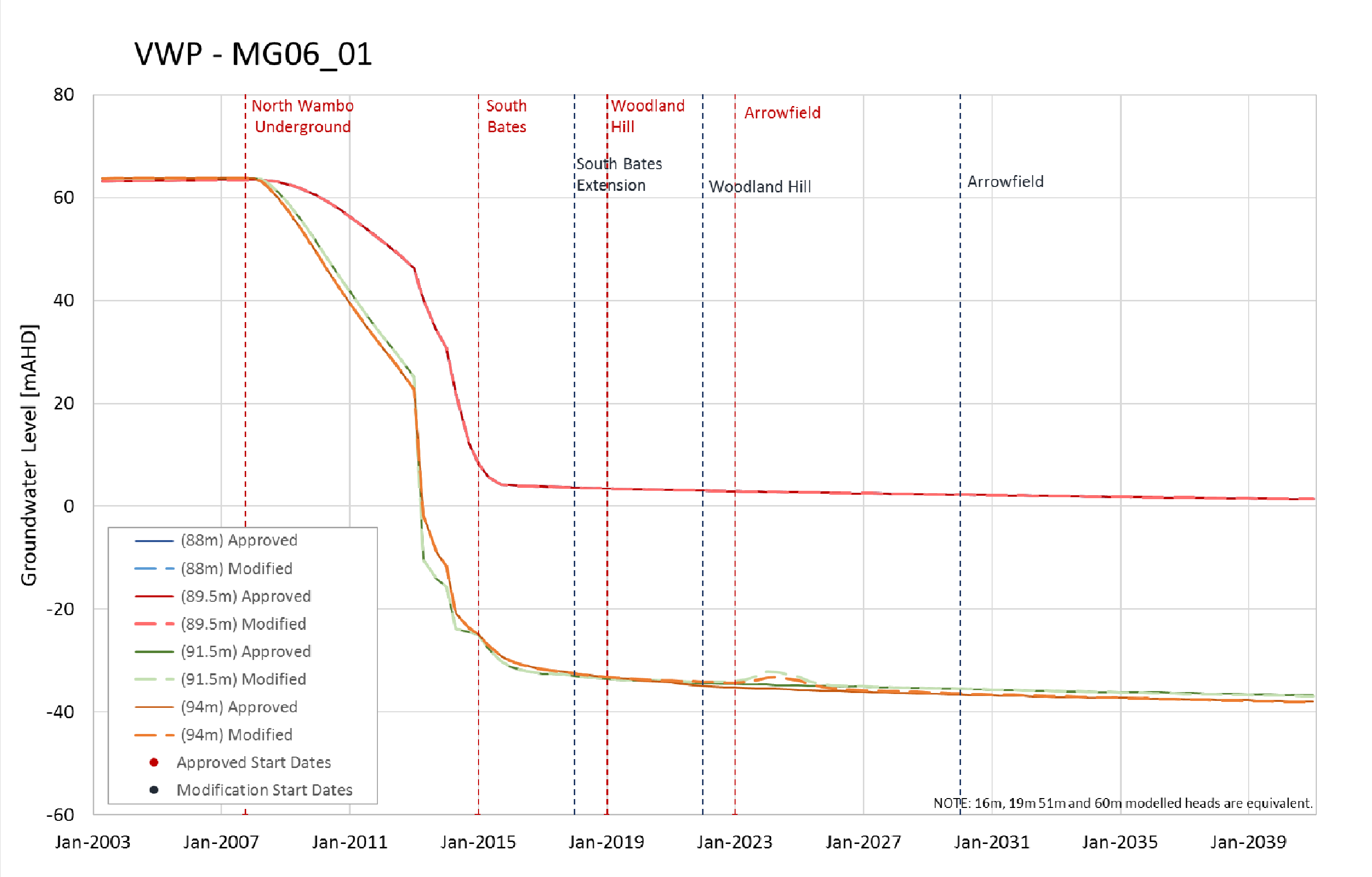


Figure G - 8 MG06_01 Predictive Hydrographs

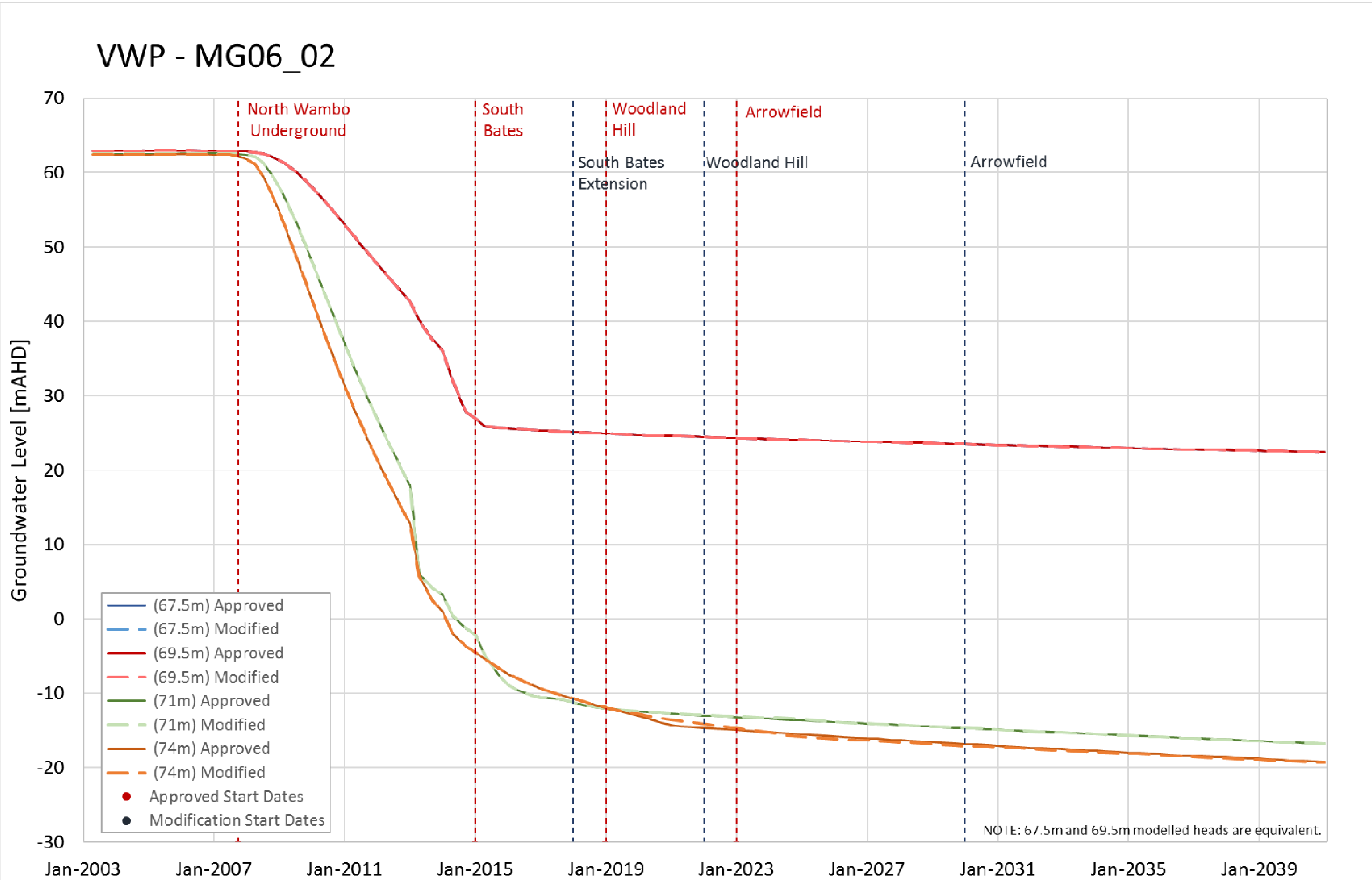


Figure G - 9 MG06_02 Predictive Hydrographs

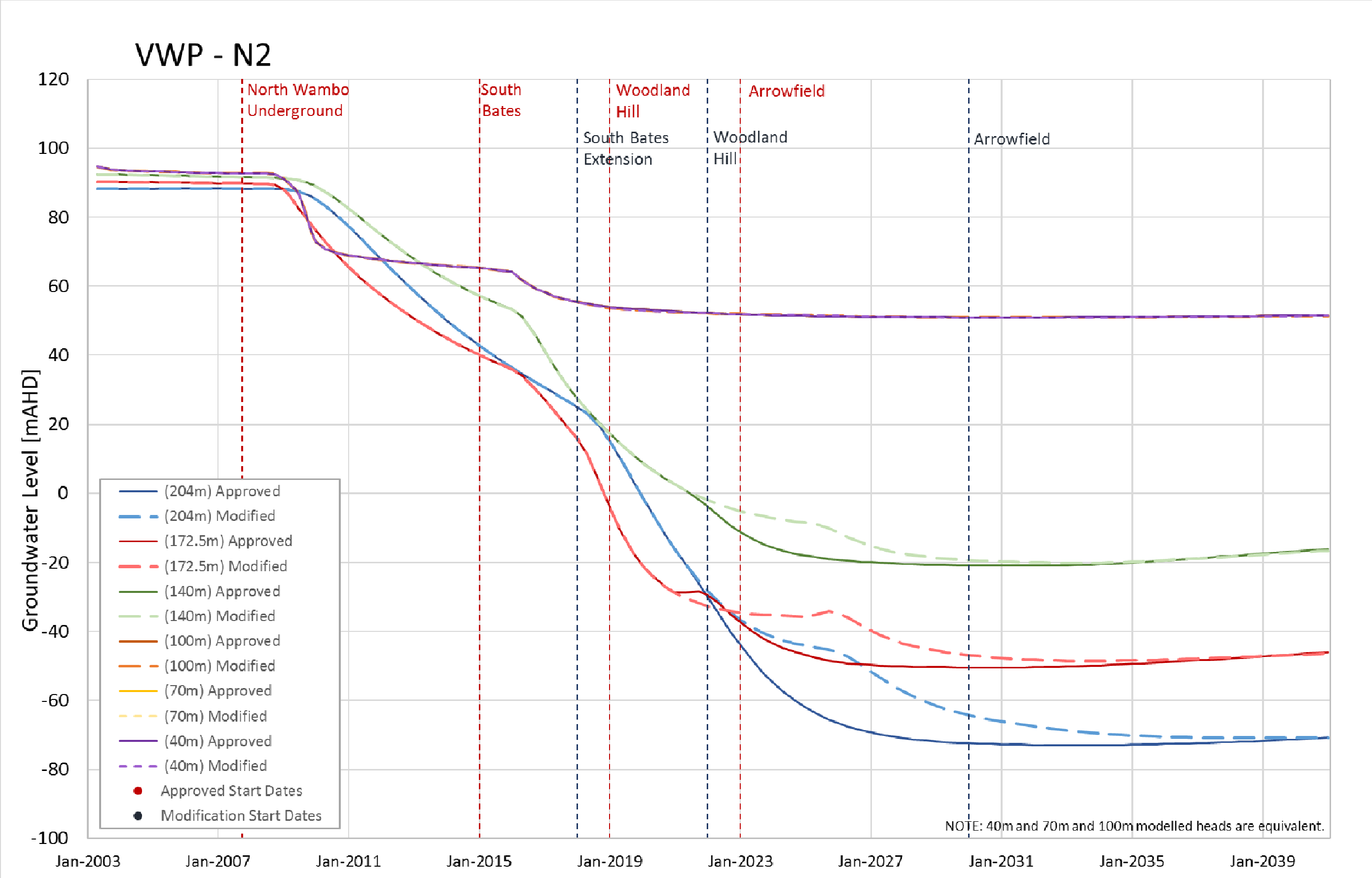


Figure G - 10 N2 Predictive Hydrographs

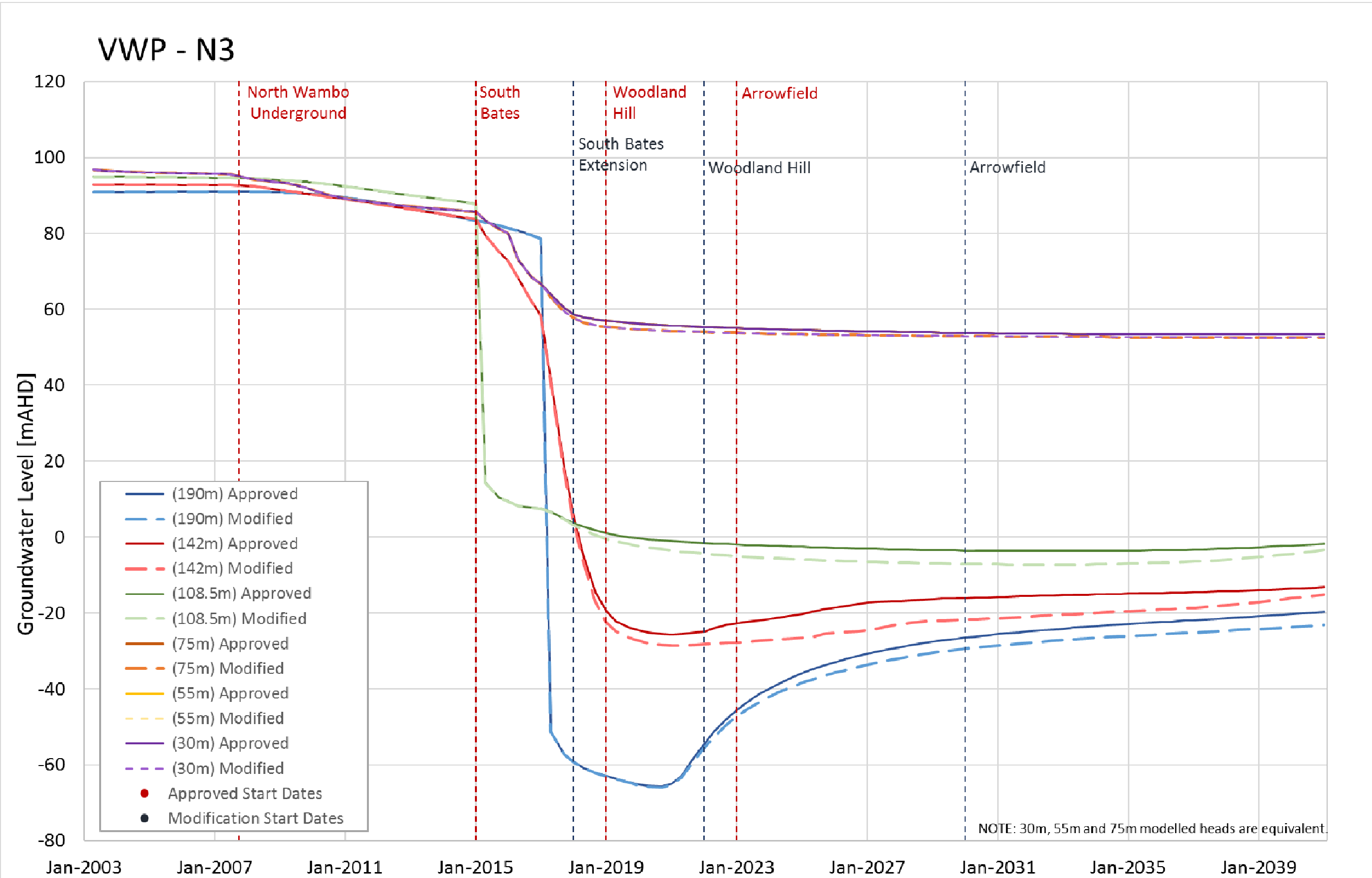


Figure G - 11 N3 Predictive Hydrographs

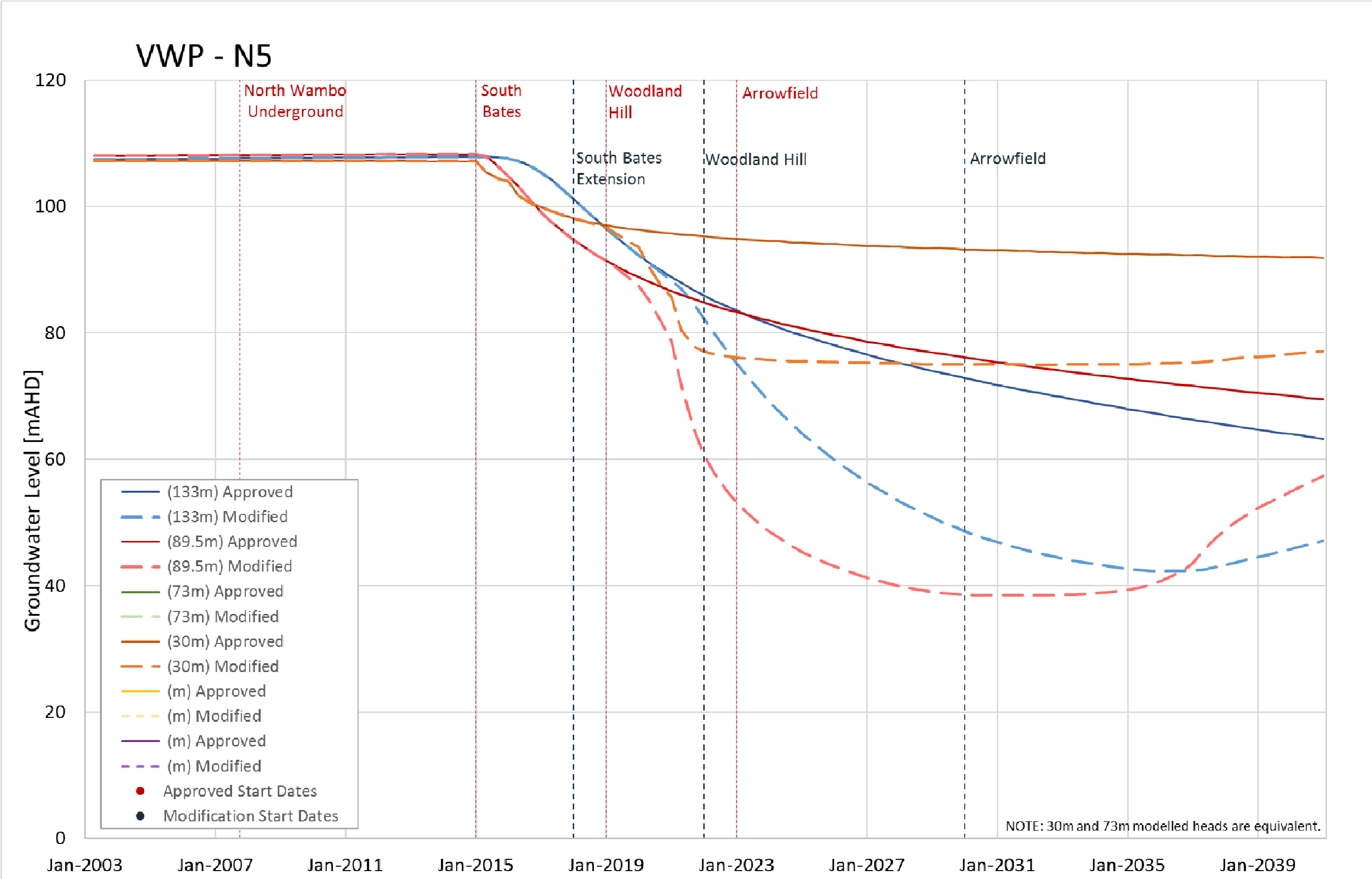


Figure G - 12 N5 Predictive Hydrographs

ATTACHMENT H

Predicted Drawdown Effects on Registered Bores

										Predicted Drawdown (m)	
Work No.	Licence	Owner Type	Comment	Final Depth (m)	Standing Water Level (mBGL)	Easting	Northing	Elevation (mAHD)	Lithology (interpreted by HydroSimulations)	Drawdown difference between Approved and Modified Scenario	Maximum cumulative drawdown
GW005327	20BL009540	Private		10.4	6.1	314683	6394498	59.92	Permo-Triassic	0	0
GW017462	20BL008224	Private				315339	6391460	98.43	Regolith	0	0
GW030732				16		316678	6398365	56.25		0	0
GW030733				15.9	12.8	316661	6397633	56.69		0	0
GW030740				16.3	12.9	316641	6397642	54.61		0	0
GW037184		Private	Within WCPL Owned Land	21	5.8	309685	6393911	81.31	Permo-Triassic	0	0
GW037998		Private	Within WCPL Owned Land	10.9		311589	6392530	62.38	Alluvium	0	6
GW037999		Private	Within WCPL Owned Land	13.7		311482	6392713	64.01	Permo-Triassic	0	6
GW038000		Private	Within WCPL Owned Land	9.4		311457	6392620	63.59	Alluvium	0	9
GW038579		Private	Within WCPL Owned Land	20.9	2.3	309738	6393882	78.4	Permo-Triassic	0	0
GW043225				22.5	12.1	303653	6398949	116		0	0
GW043673		Private	Within WCPL Owned Land	9.4		311486	6392467	63.11	Alluvium	0	12
GW043674		Private	Within WCPL Owned Land	8.2		311303	6392525	64.6	Alluvium	0	2

										Predicted Drawdown (m)	
Work No.	Licence	Owner Type	Comment	Final Depth (m)	Standing Water Level (mBGL)	Easting	Northing	Elevation (mAHD)	Lithology (interpreted by HydroSimulations)	Drawdown difference between Approved and Modified Scenario	Maximum cumulative drawdown
GW043675		Private	Within WCPL Owned Land	8.5		311433	6392527	63.73	Alluvium	0	1
GW043676		Private	Within WCPL Owned Land	10.6		311480	6392805	64.24	Permo-Triassic	0	5
GW047240	20CA209896	Private		12.7		316827	6397095	55.22	Alluvium	0	0
GW060326		Private	Within WCPL Owned Land	9.8	6.7	314104	6393348	58.38	Alluvium	0	0
GW060327		Private	Within WCPL Owned Land	9.8	6.7	314181	6393442	58.24	Alluvium	0	0
GW060328		Private	Within WCPL Owned Land	10	7	314205	6393534	57.69	Alluvium	0	0
GW060329		Private	Within WCPL Owned Land	6.4	2.6	311904	6392474	60.91	Alluvium	0	0
GW060330		Private	Within WCPL Owned Land	6.2	3.8	311727	6392163	62.13	Alluvium	0	14
GW060363	20BL132753	Private	Within WCPL Owned Land	6.3		311698	6392317	61.01	Alluvium	0	10
GW060364		Private	Within WCPL Owned Land	5.1		311636	6392808	63.17	Permo-Triassic	0	0

										Predicted Drawdown (m)	
Work No.	Licence	Owner Type	Comment	Final Depth (m)	Standing Water Level (mBGL)	Easting	Northing	Elevation (mAHD)	Lithology (interpreted by HydroSimulations)	Drawdown difference between Approved and Modified Scenario	Maximum cumulative drawdown
GW060365		Private	Within WCPL Owned Land	6.6		311691	6392686	62.06	Alluvium	0	0
GW060366		Private	Within WCPL Owned Land	5.2		311196	6392646	65.06	Alluvium	0	0
GW060750	20BL132130	Private		24.4	7.8	314310	6394923	58.99	Permo-Triassic	0	0
GW065117		Private	Within WCPL Owned Land	6		311154	6390735	64.23	Alluvium	0	30
GW066606		(Unknown)	Within WCPL Owned Land	2.5	1	311207	6390674	60	Alluvium	0	0
GW078055		Private	Purpose = 'Test bore' (WCPL test bore?)	198.5		310105	6390490	73.48	Permo-Triassic	4	56
GW078574	20BL167170	Private		12		309174	6390605	89.07	Regol or Permo-T	0	18
GW078575	20BL167171	Private		12		309505	6389687	80.23	Regol or Permo-T	0	32
GW078576	20BL167172	Private	KHARLIBE	7		309764	6389784	78.42	Regol or Permo-T	0	37
GW078577	20WA208559			10		309969	6389973	72.91	Alluvium	0	41
GW079059	20BL153300	NSW Office of Water	NSW Office of Water			314596	6394852	56.96	Alluvium	0	0
GW079060		NSW Office of Water	NSW Office of Water	14.6	7.18	314596	6394852	56.92	Alluvium	0	0
GW079780		(Unknown)	Within WCPL Owned Land			309589	6393932	77.28	Regolith	0	0

										Predicted Drawdown (m)	
Work No.	Licence	Owner Type	Comment	Final Depth (m)	Standing Water Level (mBGL)	Easting	Northing	Elevation (mAHD)	Lithology (interpreted by HydroSimulations)	Drawdown difference between Approved and Modified Scenario	Maximum cumulative drawdown
GW080502	20BL168017	Mining	Purpose = "mining", BROSI PROPERTY	250	105	308897	6390160	99.8	Permo-Triassic	-2	30
GW080513	20BL168880			10	7.53	312345	6394818	99.8		0	0
GW080514	20BL168881		Within WCPL Owned Land	55	42.7	310973	6394353	113.34	Permo-Triassic	0	2
GW080515	20BL168882		Within WCPL Owned Land	8.1	5.7	313418	6394794	56.38	Alluvium	0	0
GW080516	20BL168883		Within WCPL Owned Land	15	7.11	312899	6394954	71.93	Permo-Triassic	-1	17
GW080517	20BL168884		Within WCPL Owned Land	15	7.24	313573	6394742	55.44	Permo-Triassic	0	0
GW080518	20BL168885		Within WCPL Owned Land	10.8	6.95	313586	6394232	57.65	Permo-Triassic	0	0
GW080519	20BL168885		Within WCPL Owned Land	10.5	7.42	313622	6394161	57.98	Permo-Triassic	0	0
GW080951		(Unknown)		3.1	3.14	314619	6394878	55	Alluvium	0	0
GW080952		(Unknown)		1.6	1.59	314643	6394905	54	Alluvium	0	0
GW080963	20BL170103	NSW Office of Water	NSW Office of Water	84	60	315994	6397210	55.35	Permo-Triassic	0	1
GW200361	20BL170638		Within WCPL Owned Land		3.12	311833	6392209	60.97	Alluvium	0	0

										Predicted Drawdown (m)	
Work No.	**Licence**	**Owner Type**	**Comment**	**Final Depth (m)**	**Standing Water Level (mBGL)**	**Easting**	**Northing**	**Elevation (mAHD)**	**Lithology (interpreted by HydroSimulations)**	**Drawdown difference between Approved and Modified Scenario**	**Maximum cumulative drawdown**
GW200615	20BL168886	Mines	Within WCPL Owned Land	11.5	7.49	313434	6394246	63.01	Permo-Triassic	-1	8
GW200616	20BL168886	Mines	Within WCPL Owned Land	8.5	5.68	313473	6394446	58.85	Alluvium	0	0
GW200617	20BL168888	Mines	Within WCPL Owned Land	9	4.75	309987	6393974	90.64	Permo-Triassic	0	3
GW200618	20BL168888	Mines	Within WCPL Owned Land	11.5	5.26	310100	6393820	83.03	Permo-Triassic	0	3
GW200619	20BL168888	Mines	Within WCPL Owned Land	11.5	5.39	310182	6393656	77.32	Permo-Triassic	0	3
GW200620	20BL168888	Mines	Within WCPL Owned Land	49	39.09	310489	6394097	104.62	Permo-Triassic	0	2
GW200621	20BL168887	Mines		37	24.89	312857	6395909	80.54	Permo-Triassic	0	94
GW200622	20BL168887	Mines		30	29.95	312901	6395806	82.84	Permo-Triassic	0	94
GW200623	20BL168887	Mines		31	13.84	312982	6395319	65.27	Permo-Triassic	0	42
GW200624	20BL168939	Mines	Within WCPL Owned Land	260	6	310166	6392650	77.34	Permo-Triassic	0	139
GW200625	20BL168940	Mines	Within WCPL Owned Land	270		310901	6393375	83.56	Permo-Triassic	-1	48

										Predicted Drawdown (m)	
Work No.	**Licence**	**Owner Type**	**Comment**	**Final Depth (m)**	**Standing Water Level (mBGL)**	**Easting**	**Northing**	**Elevation (mAHD)**	**Lithology (interpreted by HydroSimulations)**	**Drawdown difference between Approved and Modified Scenario**	**Maximum cumulative drawdown**
GW200634	20BL168999	Mines	Within WCPL Owned Land	20		311470	6391252	59.65	Permo-Triassic	0	28
GW200635	20BL168999	Mines	Within WCPL Owned Land	20		311659	6391236	59.4	Permo-Triassic	0	22
GW200636	20BL168999	Mines	Within WCPL Owned Land	20		311749	6391078	60.15	Permo-Triassic	0	18
GW200637	20BL168999	Mines	Within WCPL Owned Land	15	8.45	311662	6391094	59.92	Alluvium	0	25
GW200638	20BL168999	Mines	Within WCPL Owned Land	20	5.18	311452	6391103	60.21	Permo-Triassic	0	30
GW200639	20BL168999	Mines	Within WCPL Owned Land	20	8.46	311455	6390889	60.22	Permo-Triassic	0	32
GW200640	20BL168999	Mines	Within WCPL Owned Land	50		311638	6390920	60.61	Permo-Triassic	0	30
GW200641	20BL168999	Mines	Within WCPL Owned Land	20	7.01	311761	6390921	61.41	Permo-Triassic	0	21
GW200642	20BL168999	Mines	Within WCPL Owned Land	20	15.12	311696	6390688	59.88	Permo-Triassic	0	31
GW200643	20BL168999	Mines	Within WCPL Owned Land	15	7.3	311454	6390685	65.38	Permo-Triassic	0	35

										Predicted Drawdown (m)	
Work No.	Licence	Owner Type	Comment	Final Depth (m)	Standing Water Level (mBGL)	Easting	Northing	Elevation (mAHD)	Lithology (interpreted by HydroSimulations)	Drawdown difference between Approved and Modified Scenario	Maximum cumulative drawdown
GW200827	20BL172237			9		312505	6391469	69.44	Permo-Triassic	0	0
GW200828	20BL172237			11.5		310061	6393206	75.4	Permo-Triassic	0	2
GW200829	20BL172237			36		308641	6393376	119.35	Permo-Triassic	0	13
GW200830	20BL172240			16.8		313335	6392745	66.03	Permo-Triassic	0	0
GW200833	20BL172255			54		311340	6389530	91.49	Permo-Triassic	-4	37
GW200834	20BL172257			15		313695	6389546	63.77	Permo-Triassic	-1	1
GW200835	20BL172256			11		308424	6394517	102.68	Permo-Triassic	0	27
GW200942	20BL167947			37	32	312325	6395750	91.82	Permo-Triassic	0	22
GW200943	20BL167947			30	27	312332	6395760	91.82	Permo-Triassic	0	31
GW017647	20BL009858			9.1	7.6	307326	6399905	72.02	Alluvium	0	0
GW021773	20BL014201			12.5	9.1	309532	6401950	69.23	Alluvium	0	0
GW053690	20BL119580			11.3	10.1	308429	6402268	67.19	Alluvium	0	0
GW053708	20BL117803			13.4		304231	6403327	75.88	Alluvium	0	0
GW201125	20BL168820			12		308386	6402778	70.36	Alluvium	0	0
GW018045	20BL010054			27.4	6.1	302941	6398556	140.31	Permo-Triassic	0	0
GW018046	20BL010053			18.3	9.3	303013	6398866	136.46	Permo-Triassic	0	0
GW018434	20BL010847			11	10.1	311134	6401457	27.27	Regolith	0	0
GW018464	20BL010603			13	11.9	317783	6400471	54.9	Alluvium	0	0
GW022685	20BL015155			14.6	9.8	309073	6401387	70.68	Alluvium	0	0

										Predicted Drawdown (m)	
Work No.	**Licence**	**Owner Type**	**Comment**	**Final Depth (m)**	**Standing Water Level (mBGL)**	**Easting**	**Northing**	**Elevation (mAHD)**	**Lithology (interpreted by HydroSimulations)**	**Drawdown difference between Approved and Modified Scenario**	**Maximum cumulative drawdown**
GW049187	20BL108626			10	8.5	303025	6403550	75.49	Regolith	0	0
GW053173	20BL118414			14.8	5.2	309098	6401449	70.84	Alluvium	0	0
GW064382	10BL157687			60	18.5	303908	6394477	414.36	Permo-Triassic	0	0
GW078477	20BL167575			102.5		304018	6398990	109.76	Permo-Triassic	0	0
GW201532	20BL172923			27	19	301010	6403253	97.25	Permo-Triassic	0	0
GW017644	20BL009861			11.6		306708	6399431	75.33	Alluvium	0	0
GW017798	20BL009821			12.2		307290	6399042	86.59	Regolith	0	0
GW017800	20BL009819			27.4		304413	6398000	133.22	Permo-Triassic	1	1
GW017801	20BL009818			42.7		304320	6397443	148.96	Permo-Triassic	1	2
GW018047	20BL010041			36.3		302620	6398920	145.5	Permo-Triassic	0	0
GW018371	20BL010483			12.2		317683	6398775	55.33	Alluvium	0	0
GW029155	20BL022682			10.1		305403	6402148	71.99	Alluvium	0	0
GW042364				13.3		316764	6397649	55.68	Alluvium	0	0
GW067099	20BL143751			14	9.2	312664	6401979	70	Alluvium	0	0
GW067109	20BL144341			13	9.4	310153	6400884	60	Alluvium	0	0
GW078722	20BL167495			15		304737	6402674	73.62	Permo-Triassic	0	0
GW200664	20BL169641			16.1		309638	6402500	69.58	Permo-Triassic	0	0
GW200831	20BL172242		WCPL monitoring bore	12		306639	6396174	113.05	Regolith	13	28

										Predicted Drawdown (m)	
Work No.	Licence	Owner Type	Comment	Final Depth (m)	Standing Water Level (mBGL)	Easting	Northing	Elevation (mAHD)	Lithology (interpreted by HydroSimulations)	Drawdown difference between Approved and Modified Scenario	Maximum cumulative drawdown
GW200832	20BL172242		WCPL monitoring bore	14		306885	6396081	110.51	Regolith	7	19
GW201008	20BL172683			15		308112	6402680	70.2	Permo-Triassic	0	0
GW201121	20BL168820			11.9		308675	6402724	68.13	Alluvium	0	0
GW201122	20BL168820			12		308502	6403116	70.39	Alluvium	0	0
GW201127	20BL168820			14.6		308239	6402959	69.79	Alluvium	0	0
GW201223	20BL170498			14		312903	6402123	65.4	Alluvium	0	0
GW201260	20BL171852			15	9.59	312196	6401176	65.11	Permo-Triassic	0	0
GW202134	20BL170596			8.86		318272	6403565	#N/A	Regolith	0	0
GW017648	20BL009859			12.8	9.1	307397	6400276	70.28	Alluvium	0	0
GW018370	20BL010484			11.9		317573	6399112	55.69	Alluvium	0	0
GW018549	20BL012095			9.1	5.5	313134	6401987	63.61	Alluvium	0	0
GW032632	20BL025579			33.5		303253	6402568	98.06	Permo-Triassic	0	0
GW053123	20BL118095			13.1	2.1	309609	6402013	69.81	Alluvium	0	0
GW053292	20BL119690			10		317670	6398097	53.33	Alluvium	0	0
GW053709	20BL119757			12.2	2.4	304370	6402898	74.56	Alluvium	0	0
GW057775	20BL120623			13.4	4.6	309122	6401542	70.75	Alluvium	0	0
GW059178	20BL128781			13.9	11.8	303887	6403536	76.35	Alluvium	0	0
GW078379	20BL166638			14	9.53	308341	6402759	70.5	Alluvium	0	0
GW017646	20BL009860			11		306937	6399774	72.71	Alluvium	0	0

										Predicted Drawdown (m)	
Work No.	Licence	Owner Type	Comment	Final Depth (m)	Standing Water Level (mBGL)	Easting	Northing	Elevation (mAHD)	Lithology (interpreted by HydroSimulations)	Drawdown difference between Approved and Modified Scenario	Maximum cumulative drawdown
GW045123	20BL105224			12.2		309154	6402621	81.72	Regolith	0	0
GW053932	20BL120968			7.3		312637	6402070	61.27	Alluvium	0	0
GW200666	20BL169641			8		310333	6402255	70.28	Alluvium	0	0
GW200669	20BL169641			7		310088	6402049	66.88	Alluvium	0	0
GW201006	20BL172683			14.4		307924	6402680	70.69	Alluvium	0	0
GW201123	20BL168820			15		308277	6402702	70.43	Permo-Triassic	0	0
GW201126	20BL168820			13.44		308609	6402945	69.68	Alluvium	0	0
GW201214	20BL170497			11		313539	6402384	61.58	Alluvium	0	0
GW201216	20BL170497			6		313502	6402051	69.99	Alluvium	0	0
GW078332	20BL166324			42.68		303704	6401464	96.1	Permo-Triassic	0	0
GW017799	20BL009820			12.2		306598	6398412	108.68	Regolith	0	7
GW200008	20BL150172			10	5.93	312623	6398421	86.54	Regolith	0	0
GW060780	20BL132167			25.5		305926	6399385	104.24	Permo-Triassic	0	5
GW065014	20BL166572			14.5		305777	6400368	85.03	Regolith	0	0
GW027120	20BL020353			13.4	8.8	309521	6401149	68.74	Alluvium	0	0
GW037734	20BL031436			13.4	9.7	309616	6401644	67.07	Alluvium	0	0
GW042993	20BL104637 and 20BL121565			8.8		309721	6403001	75.18	Alluvium	0	0
GW201262	20BL171855			15	10.52	311852	6400928	66.28	Permo-Triassic	0	0
GW027121	20BL016019			15.8	10.1	309561	6401797	69.14	Permo-Triassic	0	0

										Predicted Drawdown (m)	
Work No.	Licence	Owner Type	Comment	Final Depth (m)	Standing Water Level (mBGL)	Easting	Northing	Elevation (mAHD)	Lithology (interpreted by HydroSimulations)	Drawdown difference between Approved and Modified Scenario	Maximum cumulative drawdown
GW078208	20BL166957			19.2	10.14	309950	6402647	70.53	Permo-Triassic	0	0
GW078380	20BL166639			22.5	9.41	308813	6402676	66.82	Permo-Triassic	0	0
GW078381	20BL166640			22.5	16.53	309634	6403370	77.53	Permo-Triassic	0	0
GW078382	20BL166640			15.8	10.88	309818	6403200	75.13	Permo-Triassic	0	0
GW078383	20BL166640			21.7	10.3	309775	6402970	73.72	Permo-Triassic	0	0
GW078384	20BL166642			13.2	9.2	310403	6402799	74.11	Alluvium	0	0
GW201562	20BL173062			47.4	33.3	317699	6394412	88.4	Permo-Triassic	0	2
GW201565	20BL173065			29.5	3.4	318354	6393926	76.4	Permo-Triassic	0	0
GW045122	20BL105223			12.2		309572	6402567	70.49	Alluvium	0	0
GW067101	20BL144340			15.6	12.2	310826	6401143	66	Permo-Triassic	0	2
GW067110	20BL144342			16.7	9.8	310760	6400495	58	Permo-Triassic	0	3
GW200665	20BL169641			13.8		310339	6402252	70.28	Alluvium	0	0
GW200667	20BL169641			16.4		310438	6402179	69.3	Permo-Triassic	0	0
GW200668	20BL169641			16.44		310083	6402052	66.88	Permo-Triassic	0	0
GW200670	20BL169641			16		310245	6402370	69.66	Permo-Triassic	0	0
GW201120	20BL168820			32.75		308664	6402721	68.46	Permo-Triassic	0	0
GW201124	20BL168820			34.1		308272	6402688	70.41	Permo-Triassic	0	0
GW201128	20BL168820			17		308877	6402939	68.5	Permo-Triassic	0	0
GW201261	20BL171854			15	8.28	311233	6400727	67.2	Permo-Triassic	0	4

										Predicted Drawdown (m)	
Work No.	Licence	Owner Type	Comment	Final Depth (m)	Standing Water Level (mBGL)	Easting	Northing	Elevation (mAHD)	Lithology (interpreted by HydroSimulations)	Drawdown difference between Approved and Modified Scenario	Maximum cumulative drawdown
GW201263	20BL171856			18	10.53	310776	6400546	67.22	Permo-Triassic	0	3
GW201564	20BL173064			30.6	9.37	317319	6395338	57.63	Permo-Triassic	0	8
GW053931	20BL120263			10.4		312626	6402625	67.34	Regolith	0	0
GW200681	20BL171905			19.4		310494	6403291	86.08	Permo-Triassic	0	0
GW201217	20BL170497			11.35		313600	6402238	59.94	Alluvium	0	0
GW034569	20BL030566			12.2	9.8	316745	6398696	55.06	Regolith	0	0
GW056696	20BL123304			10.5		313297	6401651	75.46	Regolith	0	0
GW200682	20BL171905			30.4		310511	6403229	86.06	Permo-Triassic	0	0
GW201213	20BL170497			12		313429	6402130	60.62	Alluvium	0	0
GW201224	20BL170498			15		312927	6401839	64.96	Permo-Triassic	0	0
GW034568	20BL027195			12.2	8.5	316674	6398325	53.61	Alluvium	0	0
GW078770	20BL167426			10		318094	6398098	61.82	Regolith	0	0
GW200802	20BL151941			11.9	10.5	318025	6396083	71.89	Regolith	0	0
GW030734				16.5		316578	6397861	55.98	Permo-Triassic	0	0
GW030735				14		316447	6397858	55.57	Alluvium	0	0
GW030736				17.5		316628	6397985	54.21	Permo-Triassic	0	0
GW201212	20BL170497			18.8		313501	6401824	60.77	Permo-Triassic	0	0
GW201566	20BL173069			37.5	32	318281	6395675	80.79	Permo-Triassic	0	0
GW201215	20BL170497			42		313508	6402047	60.51	Permo-Triassic	0	1

										Predicted Drawdown (m)	
Work No.	**Licence**	**Owner Type**	**Comment**	**Final Depth (m)**	**Standing Water Level (mBGL)**	**Easting**	**Northing**	**Elevation (mAHD)**	**Lithology (interpreted by HydroSimulations)**	**Drawdown difference between Approved and Modified Scenario**	**Maximum cumulative drawdown**
GW201218	20BL170497			60		313328	6401783	69.1	Permo-Triassic	0	0
GW201219	20BL170497			54		313601	6401922	66.38	Permo-Triassic	0	0
GW201221	20BL170498			60		312891	6401639	64.73	Permo-Triassic	0	0
GW201222	20BL170498			16		312883	6401639	65.44	Permo-Triassic	0	0
GW201225	20BL170498			17.3		312823	6401692	64.71	Permo-Triassic	0	0

ATTACHMENT I

Ramp Function Formula

Fracture Zone Conceptualisation

In modelling conducted by HydroSimulations (HS), the fracture zone is represented as an equivalent porous medium, as are all other model layers in traditional groundwater modelling.

This conceptualisation of the fracture zone is supported by the view of Professor Bruce Hebblewhite (2010)[1], whose opinion is:

"There is not expected to be open-path continuous vertical fracturing throughout the extent of the fracture zone… As a result, it is expected that whilst there may be some potential for pore pressure reductions, particularly close to the bottom of the fracture zone, these pore pressure reductions would be expected to become smaller as one moves vertically upward through the fracture zone, by virtue of the deformation and discontinuous fracturing nature (subject to the extent of horizontal permeability increases of course). As a result, there would be expected to be evidence of positive pore pressure present within the fracture zone, particularly in the upper regions, with a gradient ranging upwards from atmospheric or zero pressure at or close to the caved zone interface."

He provides the following rare photograph of a fracture zone (**Figure I1**) after removal of laterally adjacent overburden, showing "apparently intact rock outside the angle of break line, and well compacted fracture material within the caved and lower region of the fractured zone":

Figure I1. Photograph of a fracture zone above a longwall

Ramp Function

In the connected part of the fracture zone, enhanced values of vertical and horizontal hydraulic conductivity are applied. In the disconnected part of the fracture zone, only enhanced values of horizontal hydraulic conductivity are applied. These enhanced values are applied dynamically as

[1] Hebblewhite, B. K., 2010, BHP-Billiton Illawarra Coal: Bulli Seam Operations Project – Independent Review. Letter Report No. 1002/02.1, 31 March 2010.

mining proceeds, necessitating the use of time-varying properties in the groundwater model by means of the TMP facility in MODFLOW-SURFACT or the TVM facility in MODFLOW-USG.

Enhanced time-varying storage properties can also be applied, but this action is usually restricted to the goaf layer (the mined coal seam) and the caved zone immediately above, if there is a suitable model layer representing the caved zone's limited thickness. The goaf and the caved zone account for the majority of the extra porosity generated by subsidence in response to mining. Enhanced storage properties should not be applied to higher layers that might have some degree of saturation unless there is a correction to the heads in those layers to offset "created" water volumes.

Given the assumption of a porous medium, the pressure head in the fracture zone, as calculated by the model, would be a weighted average of the heads in the rock matrix and the atmospheric heads in the fractures. Similarly, the hydraulic conductivities in the modelled fracture zone would be a weighted average of the low values in the rock matrix and the high values in the fractures.

The assumption of a porous medium does not imply that there is no dewatering or desaturation above the mined seam. The model is given the freedom to establish dewatering or depressurisation throughout the fracture zone, if required, during model calibration and prediction. This is consistent with the view of Hebblewhite (2010): "*these pore pressure reductions would be expected to become smaller as one moves vertically upward through the fracture zone".*

Enhanced fracture zone properties can be estimated as multiples of the host properties, or as height-dependent changes in the form of a monotonic ramp function. The ramp function option is more consistent with the photograph supplied by Hebblewhite (2010) (**Figure I1**) which suggests that discrete aquitard layers are unlikely to survive across the fracture zone. The multiplier option would preserve distinct aquitard layers, though weaker in their ability to retard vertical flow.

The ramp function commences with high values at the goaf and declines to host values at the estimated top of the connected part of the fracture zone, as illustrated in **Figure I2**. A log-linear function provides an exponentially decreasing hydraulic conductivity across the connective fracture zone. A step function of higher hydraulic conductivity accounts for the expected very high values in the goaf and caved zone.

The gradient of the ramp function is:

$$grad = \frac{\log(Kmax) - \log(Kmin)}{hmax - hmin}$$

where the terms are defined in **Figure I2**.

The enhanced hydraulic conductivity (*K*) at any arbitrary point (*K, h*) along the ramp function, at height *h* above the roof of the caved zone, is derived from:

$$\log(K) = \log(Kmax) - grad\ x\ (h - hmin)$$

In practice, the ramp function is sampled at the mid-elevations of each layer within the connective fracture zone. An optional correction can be made in the layer that hosts the top of the fracture zone by accounting for the relative thicknesses of fractured and unfractured material within that layer.

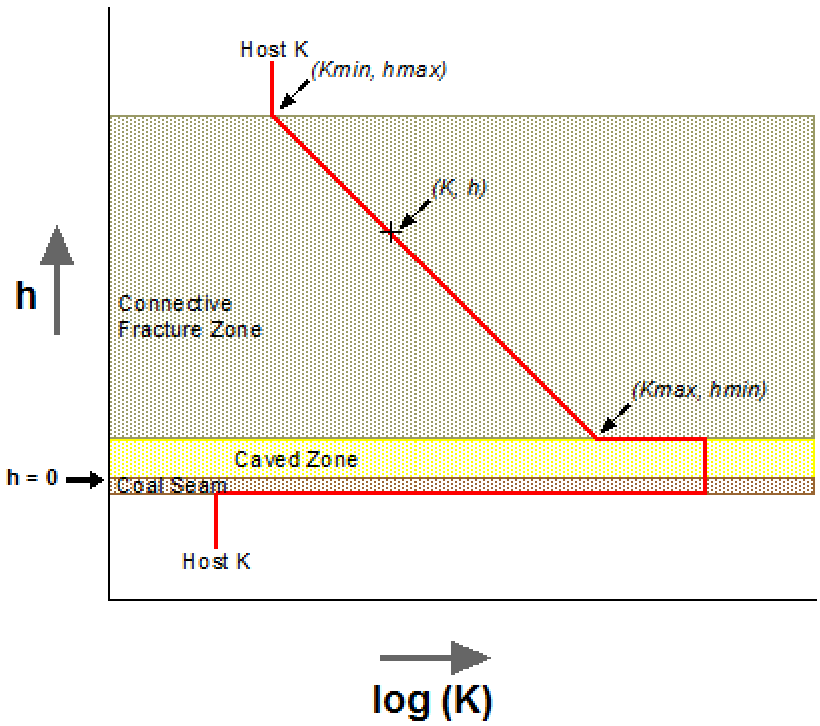


Figure I2. Ramp function

Step-by-Step Procedure

Ramp function calculations are accomplished with spreadsheet formulas that automate the procedure in the following table.

Step	Action
1	Calculate median thickness of each layer above a longwall (segment or cell)
2	Calculate roof heights of layers above the roof of the mined seam
3	Calculate the mid-elevation of each layer (height above the roof of the mined seam)
4	Record the calibrated host *Kz* value for each layer
5	Separately determine the height *hmax* of the connective fracture zone (by one of several available algorithms).
6	Identify the layer hosting the top of the connective fracture zone
7	Specify *Kmin* to be the same or similar to the host *Kz* at the top of the connective fracture zone
8	Specify an estimate for *Kmax* at the bottom of the connective fracture zone. This value is to be resolved during calibration.
9	Specify estimates for enhanced *K* in the mined coal seam and caved zone.

10	Examine which layer(s) host the caved zone (assume 30-50m thick).
11	Assign *hmin* to the roof of the layer hosting the caved zone. If the layer overlying the coal seam is too thick, assign *hmin* to the roof of the coal seam layer.
12	Convert *Kmin* and *Kmax* to log form.
13	Compute the gradient of the *log(K)* vs *height* ramp function.
14	Compute the enhanced *Kz* value at the middle of each layer.
15	Check that all computed *Kz* exceed host *Kz*. Adjust if necessary to ensure some enhancement.
16	Apply a simple multiplier to *Kz* for the layer beneath the mined seam to allow for floor heave.
17	Repeat for *Kx*, or use multipliers instead, extending into the disconnected part of the fracture zone to represent bed dilation.

Example – South Bates Extension

An extract from the spreadsheet used to calculate enhanced *Kz* values for the South Bates Extension is shown below. The "HI-FRAC" column applies to those model cells where fracturing to model layer 1 is expected, while "LOW-FRAC" pertains to fracturing no higher than model layer 2.

MEDIAN THICKNESS (m)	*LAYER*		*LITHOLOGY*	ROOF HEIGHT ABOVE SEAM (m)	MID-HEIGHT ABOVE SEAM (m)		SOUTH BATES EXTENSION UG HI-FRAC ZONE Kz (m/d)	SOUTH BATES EXTENSION UG LOW-FRAC ZONE Kz (m/d)
2.0	1		Alluvium and Regolith	126.9	125.9		3.00E-02	
124.9	2		Overburden	124.9	62.4		1.1E-04	2.3E-05
2.5	3		Whybrow Seam	0.0	0.0		10	10
68.9	4		Interburden	-71.4	-36.9		3 x Kz host	3 x Kz host
5.0	5		Wambo Seam	-76.4	-73.9			
			ENTER HERE...			Kmin	**1E-05**	**1E-05**
						Kmax	**1E-03**	**5E-05**
						hmin	2.8	2.8
						hmax	126.9	124.9
						LOG(Kmin)	-11.51	-11.51
						LOG(Kmax)	-6.91	-9.90
						Gradient	0.03711	0.01318

ATTACHMENT J

Wambo Site Groundwater Monitoring Network

Bore ID	Easting (GDA94 Z56)	Northing (GDA94 Z56)	Collar Elevation (mAHD)	Depth (m)	Casing Stick-up (m)	Bore Base Elevation (mAHD)	Date Drilled	Lithology	Owner
P1	312198.640	6395839.700	59.8	37	0.6	22.8	02-Feb-98	Coal Measure Overburden	United
P3	313411.790	6395006.300	58.1	141	0.4	-82.9	02-Feb-98	Blakefield Seam	United
P5	309835.500	6394000.740	78.6	11.5	0.6	67.1	2002	North Wambo Creek Alluvium	United
P6	309995.760	6393841.330	77.	11.5	0.6	65.7	2002	North Wambo Creek Alluvium	United
P11	312727.988	6395461.890	71.8	31	0.7	40.8	2002	Blakefield Seam	United
P12	313643.88	6394797.08	56	15		41		Alluvium	United
P13	313722.17	6394411.54	56						
P15	313431.3	6394803	56						
P16	313479.530	6394654.930	57.5	11.5	0.7	46	25-Jun-03	Wollombi Brook Alluvium	United
P18	313502.66	6394512.49	56						
P20	313638.760	6394166.350	57.4	10.6	0.7	46.8	25-Jun-03	Wollombi Brook Alluvium	United
P106	311514.967	6391082.838	61.1	14	1	47.1	04-Sep-98	Wambo Creek Alluvium	Wambo
P108	311367	6390916							
P109	311214.934	6390764.306	62.4	12.1	1	50.4	07-Sep-98	Wambo Creek Alluvium & underlying interburden	Wambo
P110	311217	6390690		10.9					
P111	311301	6390761		10.4					
P114	311205.132	6391286.403	61.4	11.2	1	50.3	09-Sep-98	Wambo Creek Alluvium	Wambo
P116	311509.493	6391292.471	59	9.2	1	49.8	10-Sep-98	Wambo Creek Alluvium	Wambo
P202	311849.997	6391256.638	60.3	21	1	39.2	16-Sep-98	Alluvium / Whybrow interburden	Wambo
P206	311770.825	6391067.769	60.2	50.7	0.9	9.5	16-Sep-98	Alluvium / Whybrow interburden	Wambo
P301	309358.792	6391468.547	88.2	20.4	0.7	67.8	15-Sep-98	Alluvium / Whybrow interburden	Wambo
P303	309111	6391694							
P314	309157	6391445							
P315	309082.453	6391862.059	94.7	9.5	1.00	85.3	14-Dec-99	Stoney Creek Alluvium	Wambo
GW02	309109.000	6389680.000	82.5	11.2		71.3	<Jan1994	Wambo Creek Alluvium	Brosi
GW08	311793.000	6392268.000	60	7		53		North Wambo Creek Alluvium	Wambo
GW09	311644.000	6392565.000	62	7.1		54.9		North Wambo Creek Alluvium	Wambo
GW11	309228.000	6389699.000	80	9.6			Feb-03	North Wambo Creek Alluvium	Wambo
GW12	309841.000	6391056.000	87.3	12.9	0.7	73.7		Stoney Creek Alluvium	
GW13	313810.000	6388990.000	62.6	15.8	0.7	46.1		Wollombi Brook Alluvium	
GW14	312478.000	6391358.000	68	9.5	0.5	58		Wollombi Brook Alluvium	
GW15	313164.000	6392807.000	62.4	17.3	0.5	44.6		Wollombi Brook Alluvium	
GW16	306641.000	6396034.000	113.2	12.9	0.7	99.5		North Wambo Creek Alluvium	

GW17	306895.000	6396048.000	111.3	14.8	0.7	95.9		Permian Overburden	
GW18	310061.000	6393206.000	74.9	11.9	0.4	62.485		Alluvium	
GW19	308550.000	6394648.000	102.4	11	0.5	90.9		Alluvium	
GW21	308646.610	6393378.070	121.8	36.7	0.6	85.1		Whybrow Coal Interburden	Wambo
GW22	310548.000	6389505.000		54.9				Whybrow Coal Interburden	
MG08-02	311054.430	6392670.110	65.4	118.8	1.7	-53.4		Alluvium to Wambo Seam	Wambo
MG09-01	310539.710	6391186.670	69.753	199	1.8	-129.2		Alluvium to Wambo Seam	Wambo
N2	308633.208	6393372.085	122.5	40		82.53		Permian Overburden	
				70		52.53		Permian Overburden	
				100		22.53		Permian Overburden	
				140		-17.5		Whybrow Seam	
				173		-50		Whybrow-Wambo Seam Interburden	
				204		-81.5		Wambo Seam	
N3	308313.366	6394573.657	105	30		75		Permian Overburden	
				55		50		Permian Overburden	
				75		30		Permian Overburden	
				109		-4		Whybrow Seam	
				142		-37		Wybrow-Wambo Seam Interburden	
				190		-85		Wambo Seam	
N5	306752.98	6395959.57	110.8	30		80.8		Permian Overburden	
				73		37.8		Whybrow Seam	
				89.5		21.3		Wybrow-Wambo Seam Interburden	
				133		-22.22		Wambo Seam	
P33	313757	6394659	57	13		44		Unnamed C Seam	
				19		38		Unnamed D Sean	
				46.5		10.5		Unnamed E Seam	
				58		-1		Blakefield Seam	
				113		-56		Arrowfield Seam	
P34	313757	6393961	59	35		24		Glen Munro Seam	
				68.5		-9.5		Blakefield Seam	
				144		-85		Bowfield Seam	
P35	313611	6395196	59	16		43		Interburden	
				19		40		Interburden	
				51		8		Blakefield Seam	
				60		-1		Blakefield Seam	
				112		-53		Arrowfield Seam	