

Appendix E: Response to Section 126A of the EP Act 1994 – Requirements for site-specific and amendment applications – underground water rights

A number of assessments have been undertaken which relate to the exercise of underground water rights for all of Arrow tenures which include:

- Underground Water Impact Report 2025 for the Surat Cumulative Management Area (2025 Surat CMA UWIR (OGIA, 2025)): https://www.ogia.water.qld.gov.au/data/assets/pdf_file/0017/2161061/uwir-2025-report.pdf
- Surat Gas Project (SGP) Environmental Impact Statement (EIS) and Supplementary Report to the EIS (SREIS) <https://www.arrowenergy.com.au/publicnotices/reports-and-plans/>
- Water Resource Monitoring and Management Plan for the EPBC approval for the Surat Gas Expansion Project (EPBC 2010/5344) https://www.arrowenergy.com.au/wp-content/uploads/2025/12/SGP-WRMMP_Revision-1.pdf

In addition to this, Arrow has completed groundwater monitoring in accordance with existing EA00014001 obligations, including seepage monitoring for the Hopeland Dam and implementing the Hopeland Groundwater Monitoring Plan (GMP) for monitoring around Lot 40 DY85. Modelling of the predicted impact of Arrow's proposed development on the groundwater regime and contaminants associated with the former Linc Energy Underground Coal Gasification (UCG) operations at Lot 40 DY85 has also been completed for this EA amendment application (Worley Consulting, 2026), and is also provided in **Appendix E**. Reference should be made to all of these existing assessments with respect to addressing Section 126A. The following information is provided to satisfy the provisions of Section 126A of the EP Act for the exercise of underground water rights for a resource project for this EA Amendment Application.

- 1) *This section applies to site-specific application, involving the exercise of underground water rights, for-***
 - a) a resource project that includes a resource tenure that is a mineral development licence, mining lease or petroleum lease; or***
 - b) a resource activity for which the relevant tenure is a mineral development licence, mining lease or petroleum lease.***

This EA Amendment Application applies to the exercise of underground water rights, seeking approval for an additional 55 production wells. This is described in more detail in **Section 1.5** of this amendment application.

- 2) *The application must also state the following-***
 - a) any proposed exercise of underground water rights during the period in which resource activities will be carried out under the relevant tenure***

Arrow proposes to exercise underground water rights on Hopeland tenure (PL253) based on the resource activities described in this amendment application.

There are six existing production testing wells (forming the then Hopeland pilot) which have been administratively converted to development wells within PL253, and 55 production wells (yet to be drilled) approved under the existing EA0001401.

As indicated in **Sections 1.5** of this amendment application, a total of 55 new production wells are proposed to be constructed in addition to the production wells already authorised under EA0001401 (Section 1.2.2). The CSG water production over the life of the 55 new production wells will be in the order of 6.4GL with a peak rate of approximately 5.6ML/day in year 1 (2030) and diminishing through the project period to 2061. The total CSG water production for the authorised and new wells will be in the order of 17.3GL with a peak rate of approximately 10.1ML/day in 2030.

Arrow provides its water production volumes and forecasts to the Office of Groundwater Impact Assessment (OGIA) for inclusion in the Surat CMA UWIR.

b) the areas in which underground water rights are proposed to be exercised

Underground water rights are proposed to be exercised within the south and east of PL253 and discussed in more detail in **Sections 1.5** of this amendment application. It is noted that well locations may change prior to construction following liaison with landholders and pre-disturbance ecology and cultural heritage field assessments.

c) for each aquifer affected, or likely to be affected, by the exercise of underground water rights

i. a description of the aquifer;

All aquifers that occur within or outside of the tenure are described in detail in the 2025 Surat CMA UWIR (OGIA, 2025) as well as the SGP EIS and SREIS. A generalised hydrostratigraphy of this is shown in **Figure 1** below. It should be noted that PL253 is located to the southwest of the Condamine Alluvium (CA) and does not contain the deposits of this formation.

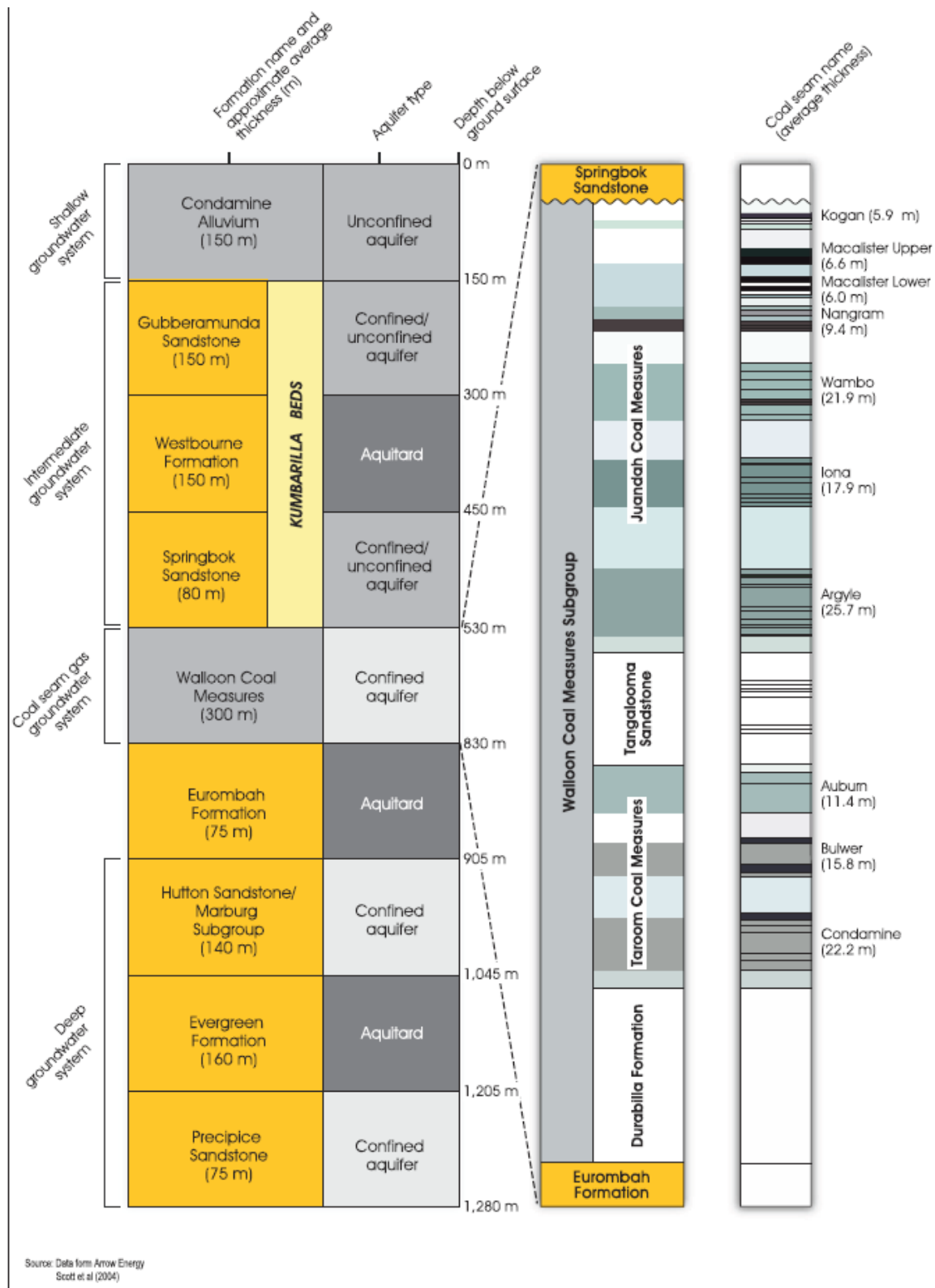


Figure 1 – Hydrostratigraphy of all formations that occur within and adjacent to PL253 (Scott et al., 2004; OGIA, 2021)

PL253 lies within the Surat Basin, a highly heterogeneous mix of alternating layers of sandstones, siltstones, mudstones and coal of Jurassic and Early Cretaceous age which attains a maximum thickness of approximately 1,000 m in the southwest of the PL. The Surat Basin here sits unconformably over basement rocks, whilst generally relatively thin accumulations of unconsolidated Cenozoic sediments overly much of the Surat Basin sediments in the lower relief terrain. The extent of the Cenozoic sediments and underlying Surat Basin formation is shown in **Figure 2**, with a cross-section in **Figure 3**. The Arrow geological model was used to develop the cross section, and incorporates Arrow's geological drilling log data, which details the depth to formation and aquifer top intersected in the bore holes along the section lines. The geological model is developed using Arrow

and other drill log data and seismic data collected within PL253 and regionally. The location and orientation of the cross section have been chosen to assist with the visual presentation and interpretation of the underlying geology and aquifer data. The vertical axis scale is exaggerated to assist with the presentation and visualisation of the underlying geology.

The aquifer and water quality assessment incorporates data from 35 groundwater monitoring bores within the GMP monitoring network. This network comprises 21 government-installed bores (constructed in 2018 and 2020 and now operated by the Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development [DNRMMRRD]), 12 Arrow-installed bores (constructed in 2019 and 2024), and two pre-existing landholder bores (RN147004 and RN160158) recorded in the Department of Local Government, Water and Volunteers (DLGWV) groundwater database (GWDB). In addition, data from registered bores (obtained from bore cards, baseline, or bore assessments), have been considered where relevant. Six monitoring bores located near the pilot wells and pilot dam (Hopeland 11 to 17) are also included in the aquifer and water quality discussions.

The Surat Basin is a sub-basin of the Great Artesian Basin (GAB), with the multiple layers of alternating sandstone, siltstone, mudstone and coal forming sequences of aquifers and aquitards. The Surat Basin sediments within the area of PL253 generally dip toward the southwest at an angle of 1 to 2 degrees as shown in the cross-section in **Figure 3**. This dip is consistent with the geological model developed for the 2025 Surat CMA UWIR (OGIA, 2025). Arrow monitoring bore Hopeland 17 (RN160699), in the southwest of the tenement as shown in **Figure 2**, was drilled to 1223.16m depth, penetrating the entire Surat Basin sequence within PL253.

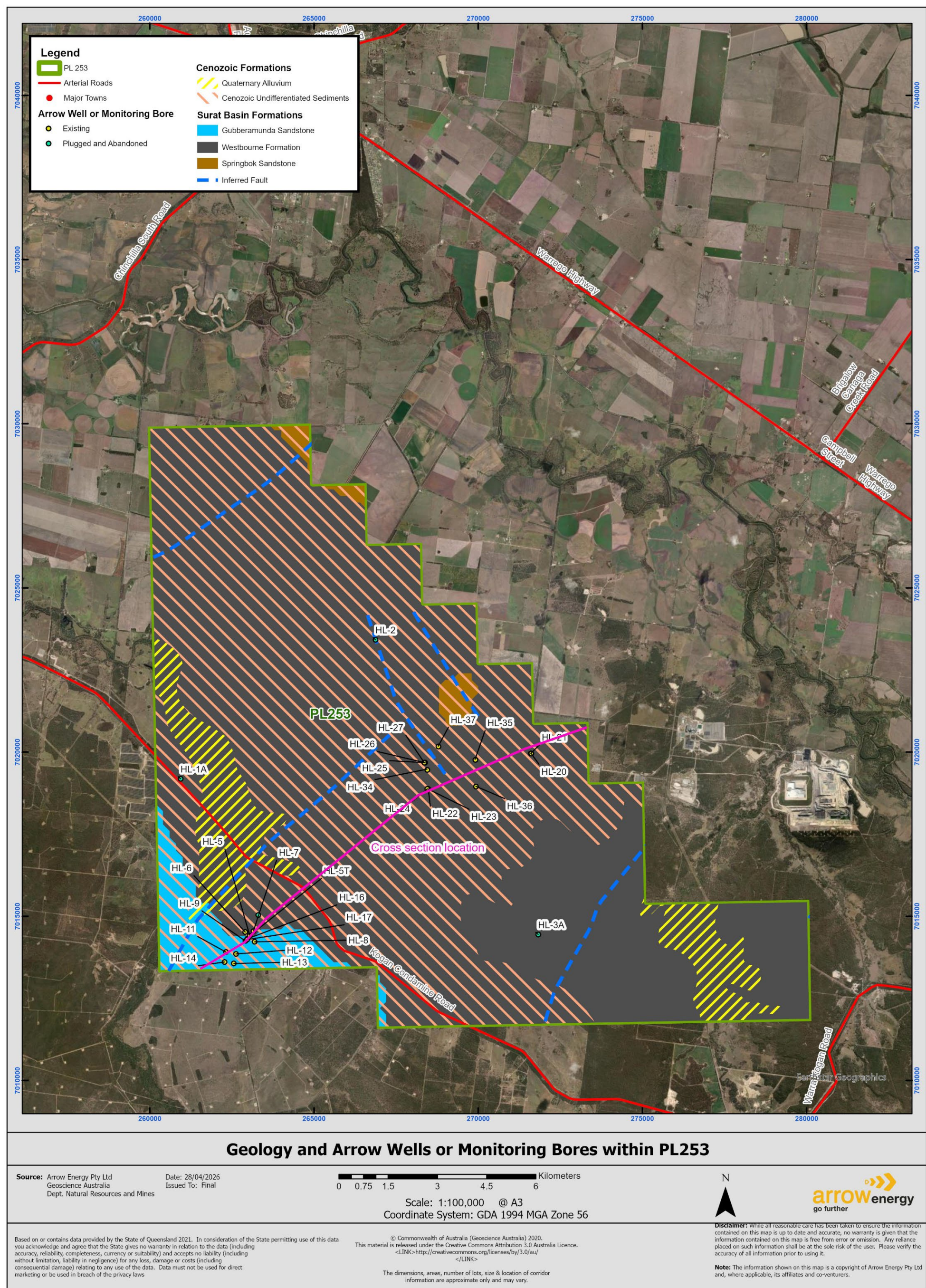


Figure 2 – Geology map and location of Arrow’s Hopeland (HL) wells or monitoring bores

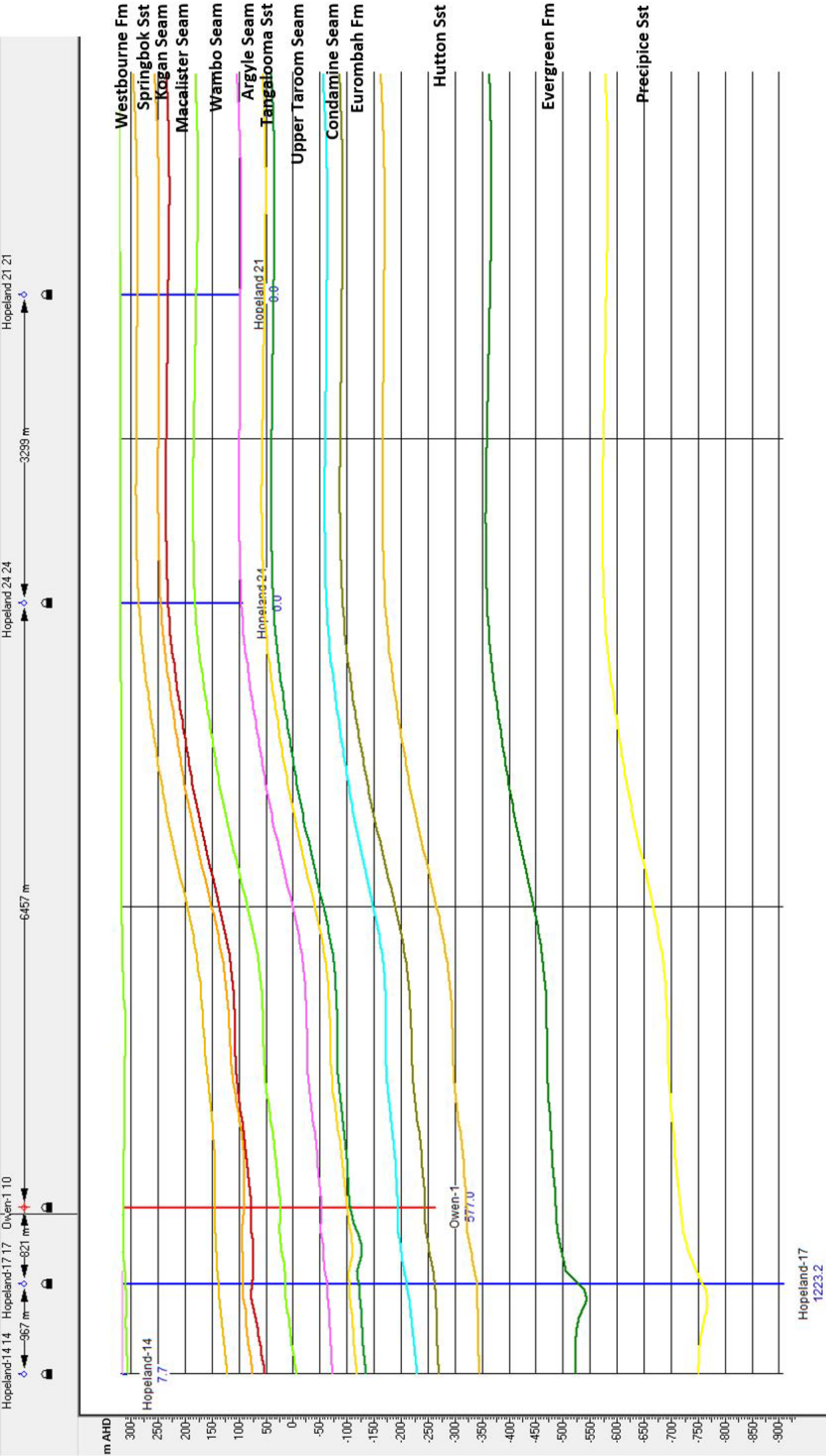


Figure 3 – Geological cross section of PL253

The underlying aquifers for the tenement are described in more detail below. The discussion of the aquifers is based on the following four attributes:

- Aquifer composition,
- Aquifer thickness,
- Groundwater levels for unconfined aquifers and piezometric data for confined aquifers, and
- Groundwater quality.

The data on aquifer composition and thickness was obtained directly from Arrow Energy's drill logs and data recorded in the GWDB. These data were supplemented by stratigraphic descriptions contained in the Surat CMA UWIR (OGIA, 2025) when drill logs or other stratigraphic data were not available.

Depth to groundwater and aquifer pressure data were obtained for bores where a reliable aquifer attribution could be made, and is sourced from Arrow Energy's groundwater monitoring program and baseline and bore assessment program together with the GWDB. Where sufficient data are available, hydrographs have been developed for each aquifer, showing the elevation of the water table (or piezometric surface) in meters Australian Height Datum (mAHD). There are limited data available on the depth to water or the elevation of the piezometric surface from the deeper aquifers (i.e. Hutton Sandstone and Precipice Sandstone).

Data on groundwater quality in the key aquifers has been derived from the following sources:

- Water quality samples from the landholder bores where a baseline or bore assessment has been undertaken by Arrow Energy personnel,
- Seepage Monitoring Program and Groundwater Monitoring Plan, carried out by Arrow Energy, associated with current Environmental Authority (petroleum activities) no. EA0001401,
- Groundwater samples collected from Arrow Energy's CSG productions wells, and
- Additional water quality data captured and stored in the GWDB.

Groundwater quality data for monitoring wells within and adjacent to Lot 40 DY85 has been used for development of the groundwater flow and contaminant transport models (Worley Consulting, 2026) also provided in **Appendix E** of this EA amendment application to assess potential impacts to these contaminants as a result of the exercise of underground water rights within PL253.

Cenozoic sediments

The topographical relief of the area of PL253 is generally flat, with elevations between 310 (toward the northern and western edges) and 320 mAHD (through the centre), with steeper gradients to the southeast (up to approximately 370 m AHD). The majority of the area drains toward the south and west into Sixteen Mile and Wambo Creeks, while a small portion of the northern area drains to the north into the Condamine River. The elevated terrain in the southeast is bisected by the northerly flowing Kogan Creek.

The Cenozoic sediments consist of floodout and sheet sand with some alluvium, formed as a result of movement of sediments from higher ground in the east to lower ground in the west, toward Wambo Creek and the Condamine River. Drill logs in the area indicate that these Cenozoic sediments attain a maximum thickness of approximately 30 m closer to the creeks, thinning toward the east where it does not exist on the elevated terrain. The sediments comprise sand, red sandy soil, silt and some gravel, and can contain small local unconfined to semi-confined aquifers in the more permeable sediments.

Due to the shallow depth and heterogeneous nature, there are no groundwater bores installed into the Cenozoic sediments within PL253 from which to obtain depth to water level or hydrographs within PL253. Arrow has installed groundwater monitoring bores (Hopeland 11 to 14) to the base of the Cenozoic sediments at a depth of approximately 10 m to monitor for potential seepage from the Hopeland Pilot Dam, however these monitoring bores have remained dry since installation in 2013. There are also no indications of water strikes within these sediments in drill logs within the GWDB. However, these sediments are expected to intermittently contain

groundwater, particularly in the alluvium associated with the creeks, following rainfall periods sufficient to generate runoff.

Gubberamunda Sandstone

The Late Jurassic to Early Cretaceous-aged Gubberamunda Sandstone is the shallowest of the Surat Basin sedimentary succession that exists within PL253, sub-cropping under the Cenozoic sediments in the southwest of the tenement as shown in **Figure 2**.

Arrow's geological model indicates that the Gubberamunda Sandstone is up to approximately 10m thick within PL253, however in the area modelled the lithology encountered during drilling of Arrow's Hopeland wells (Hopeland 5 to 9) and monitoring bores (Hopeland 11 to 17) is highly weathered to clay and sand and so is indistinguishable from the Cenozoic sediments. Elsewhere in the Surat Basin the Gubberamunda Sandstone forms a significant aquifer, however in PL253 it is dry due to the shallow depth. The Gubberamunda Sandstone will not be considered further in this document.

Westbourne Formation:

The Late Jurassic-aged Westbourne Formation is a significant aquitard or confining layer in the GAB and locally, consisting primarily of mudstone interbedded with siltstone, with minor fine- to very fine-grained quartzose sandstone and minor coal sequences. Depth and thickness of the formation from drill logs within PL253 are provided in **Table 1**, with the location of wells provided in **Figure 2**. The Westbourne Formation conformably underlies the Gubberamunda Sandstone in the southwest of the tenement, with a maximum thickness of approximately 170m. Further up-dip the Westbourne Formation is eroded and thins, unconformably sub-crops under the Cenozoic sediments through most of the tenement and outcrops in the elevated terrain in the east, pinching out in the north.

Table 1 – Drill log data for the Westbourne Formation

Bore ID	Depth From (m)	Depth To (m)	Thickness (m)
Hopeland 1A	10.2	150.8	140.6
Hopeland 2A	19.8	73.0	53.2
Hopeland 3A	0	89.0	89.0
Hopeland 5	5	173.5	168.5
Hopeland 5T	5	173	168
Hopeland 6	4.6	170.7	166.1
Hopeland 7	5	174.6	169.6
Hopeland 8	5	181.6	176.6
Hopeland 9	5	176.3	171.3
Hopeland 16	5.0	49.6*	>49.6
Hopeland 17	5.0	175.3	170.3
Hopeland 24	9.0	43.5	34.5
Hopeland 27	21.0	41.6	20.6

*Drilling ceased mid-way through the Westbourne Formation

As the Westbourne Formation is an aquitard with limited groundwater, there are no groundwater supply bores installed into this formation and there are no indications of water strikes within this formation in drill logs within the GWDB. Arrow has installed a groundwater monitoring bore (Hopeland 16) to a depth of approximately 49.6 m as a background monitoring bore to the seepage detection network for the Hopeland Pilot Dam. The groundwater is contained in thin coal seams interbedded with mudstone at a depth of 43 to 44 meters below ground level (mbgl), and the groundwater is subartesian with depth to groundwater of 18.5 to 18.8 mbgl since commencement of monitoring in 2013 as shown in the hydrograph in **Figure 4**.

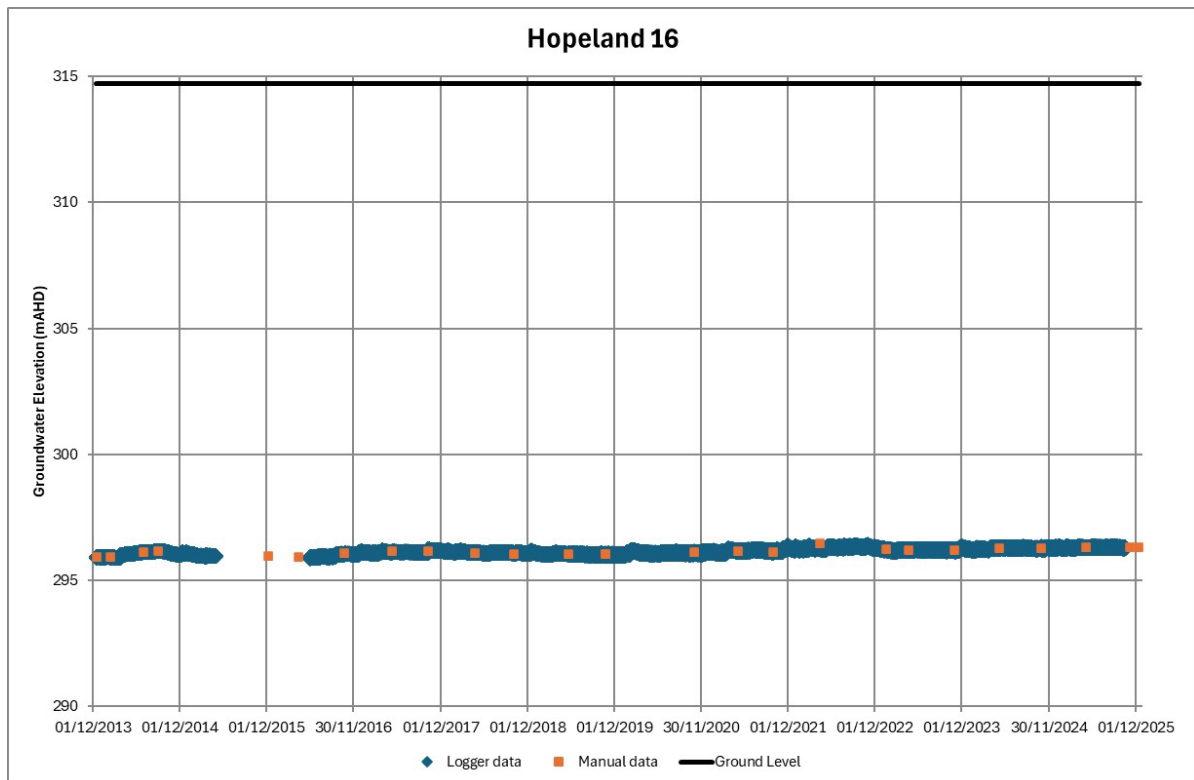


Figure 4 – Hydrograph for Hopeland 16, Westbourne Formation

The groundwater quality data available for the Westbourne Formation, limited to Hopeland 16, indicates that it is slightly acidic, saline (electrical conductivity of 48,400 μ S/cm) and of a sodium-chloride type water with minor calcium and magnesium components, as shown in **Attachment A**. This poor quality of the groundwater is consistent with the fine grained and low permeability nature of the formation, resulting in water-rock geochemical interaction over a long residence time.

Springbok Sandstone:

The late Jurassic-aged Springbok Sandstone consists of interbedded fine- to coarse-grained, feldspathic to lithic and often clayey sandstones, siltstones and mudstones. It is considered to be a significant but tight aquifer within the Surat Basin in the 2025 Surat CMA UWIR (OGIA, 2025), with medium to low transmissivity, bore yields that are regionally inconsistent and exhibiting a high degree of heterogeneity. The Springbok Sandstone is considered a confined aquifer within PL253 and, at many locations, contains a high proportion of mudstone and siltstone, resulting in very low permeability. This tends to locally isolate groundwater contained in the formation. Regionally, the geological model developed for the 2025 Surat CMA UWIR (OGIA, 2025) has recognised that the upper part of the Springbok Sandstone is generally finer grained than the relatively thin but coarser grained and more permeable lower section.

The Springbok Sandstone conformably underlies the Westbourne Formation throughout the tenement apart from in the north where it sub-crops under the Cenozoic sediments where the Westbourne Formation has pinched out. Depth and thickness of the formation from drill logs within PL253 are provided in **Table 4**, with the location of wells provided in **Figure 2**. The contact between the Springbok Sandstone and underlying Walloon Coal Measures is unconformable, with the Springbok Sandstone depositing on an undulating erosional surface. The thickness of the Springbok Sandstone is therefore variable throughout the tenement.

Table 4 – Drill log data for the Springbok Sandstone

Bore ID	Depth From (mbgl)	Depth To (mbgl)	Thickness (m)
Hopeland 1A	150.8	180.8	30.0
Hopeland 2A	73.0	98.9	25.9
Hopeland 3A	89.0	140.7	51.7
Hopeland 5	173.5	222.9	49.4

Hopeland 5T	173.0	223.1	50.1
Hopeland 6	170.7	220.1	49.4
Hopeland 7	174.6	220.4	46
Hopeland 8	181.6	221.8	40.2
Hopeland 9	176.3	221.1	44.8
Hopeland 17	175.3	221.0	45.7
Hopeland 21	43.4	77.1	33.7
Hopeland 24	43.5	133.5	90.0
Hopeland 27	41.6	124.8	83.2
Hopeland 34	21.3	120.1	98.8
Hopeland 35	41.8	96.5	54.7
Hopeland 36	24.0	97.0	73.0
Hopeland 37	27.5	101.0	73.5

A review was undertaken for groundwater level data available on PL253, with the data provided in **Table 5**. This included data collected from registered water supply bores as shown in **Figure 5** and Arrow monitoring bores as shown in **Figure 2**. Sufficient data are available to generate hydrographs for twenty-one bores, as shown in **Figure 6**. These data include bores operated by DNRMMRRD, Arrow, and landholders. Based on this data, groundwater levels in the Springbok Sandstone range from approximately 0 to 159.2 mbgl (between 155.7 and 315.4 mAHD) including effects from significant pumping and remnant drawdown from UCG operations at Lot 40 DY85.

Groundwater levels in the Springbok Sandstone within and immediately adjacent to the former Linc Energy UCG site on Lot 40 DY85 have been affected by operations on that site as indicated by a suppressed water level compared to Arrow's adjacent monitoring bores Hopeland 22 and 25. Data supplied by DNRMMRRD indicate that depth to groundwater in the Springbok Sandstone within this site varies from approximately 22.2 to 117.4 mbgl (199.8 to 295.4 mAHD), although the permeability of the formation is low with water levels still recovering either after monitoring bore installation or with recovery after the UCG operations. The suppressed water levels within Lot 40 DY85 indicate that there has been, and potentially still is, connection between the target of the UCG operation (the Macalister seam of the Walloon Coal Measures) and the Springbok Sandstone. Potential connection mechanisms include fracture propagation from the gasifiers up into the Springbok Sandstone, gasifier roof collapse, or failed well integrity in wells or bores on site.

The 2025 Surat CMA UWIR (OGIA, 2025) has identified both an Immediate and a Long-term Affected Area (IAA and LAA) for the Springbok Sandstone at PL253 due to exercise of underground water rights.

Table 5 – Groundwater level data for the Springbok Sandstone

Bore ID	Depth to Water (mbgl)	Water Level (mAHD)	Comment
33553	40.8 to 71.5	266.1 to 296.8	Water levels pump affected, hydrograph shown in figure
87505	19.0 to 21.0	297.2 to 299.2	3 water levels, 1991, 2019 and 2020
87897	11.4 to 11.8	299.6 to 299.3	2 water levels in 2019
107857	50.5 to 66.3	253.1 to 268.9	Water levels pump affected, hydrograph shown in figure
147004	31.0 to 32.3	291.8 to 293.0	Water levels from Q3 2024, hydrograph shown in figure
160145	22.3	298.9	1 water level, 2008
Hopeland 17	0 to 159.2	155.7 to 315.4	Logger data from 2014, hydrographs shown in figure, low permeability evident in slow recovery response to workover in 2020
Hopeland 22	21.9 to 21.2	296.6 to 297.3	Logger data from 2020, hydrograph shown in figure
Hopeland 25	23.4 to 24.5	292.5 to 293.7	Logger data from 2020, hydrograph shown in figure
Hopeland 34	22.2 to 25.4	292.3 to 295.5	Logger data from 2024, hydrograph shown in figure
Hopeland 35	31.7 to 32.6	285.3 to 286.1	Logger data from 2024, hydrograph shown in figure
Hopeland 36	28.4 to 31.0	288.1 to 290.7	Logger data from 2024, hydrograph shown in figure
Hopeland 37	89.9 to 92.0	225.7 to 227.7	Logger data from 2024, hydrograph shown in figure

HSMB1S	50.0 to 78.4	239.2 to 267.6	Logger data from 2018, hydrograph shown in figure
HSMB2S	43.0 to 110.0	208.5 to 275.6	Logger data from 2018, hydrograph shown in figure
HSMB3S1	32.7 to 86.5	230.9 to 284.7	Logger data from 2018, hydrograph shown in figure
HSMB3S2	92.5 to 117.4	199.8 to 224.8	Logger data from 2018, hydrograph shown in figure
HSMB4S	22.2 to 36.7	280.9 to 295.4	Logger data from 2018, hydrograph shown in figure
HSMB6S	44.1 to 49.9	267.6 to 273.4	Logger data from 2018, hydrograph shown in figure
HSMB7S	21.0 to 33.6	284.1 to 296.7	Logger data from 2018, hydrograph shown in figure
NB01S	50.7 to 98.5	220.4 to 268.3	Logger data from 2018, hydrograph shown in figure
NB02S	26.8 to 36.7	282.1 to 292.0	Logger data from 2018, hydrograph shown in figure
NB04D(S)	24.0 to 30.1	288.2 to 294.3	Logger data from 2018, hydrograph shown in figure
NB05S	24.9 to 27.4	291.7 to 294.2	Logger data from 2018, hydrograph shown in figure

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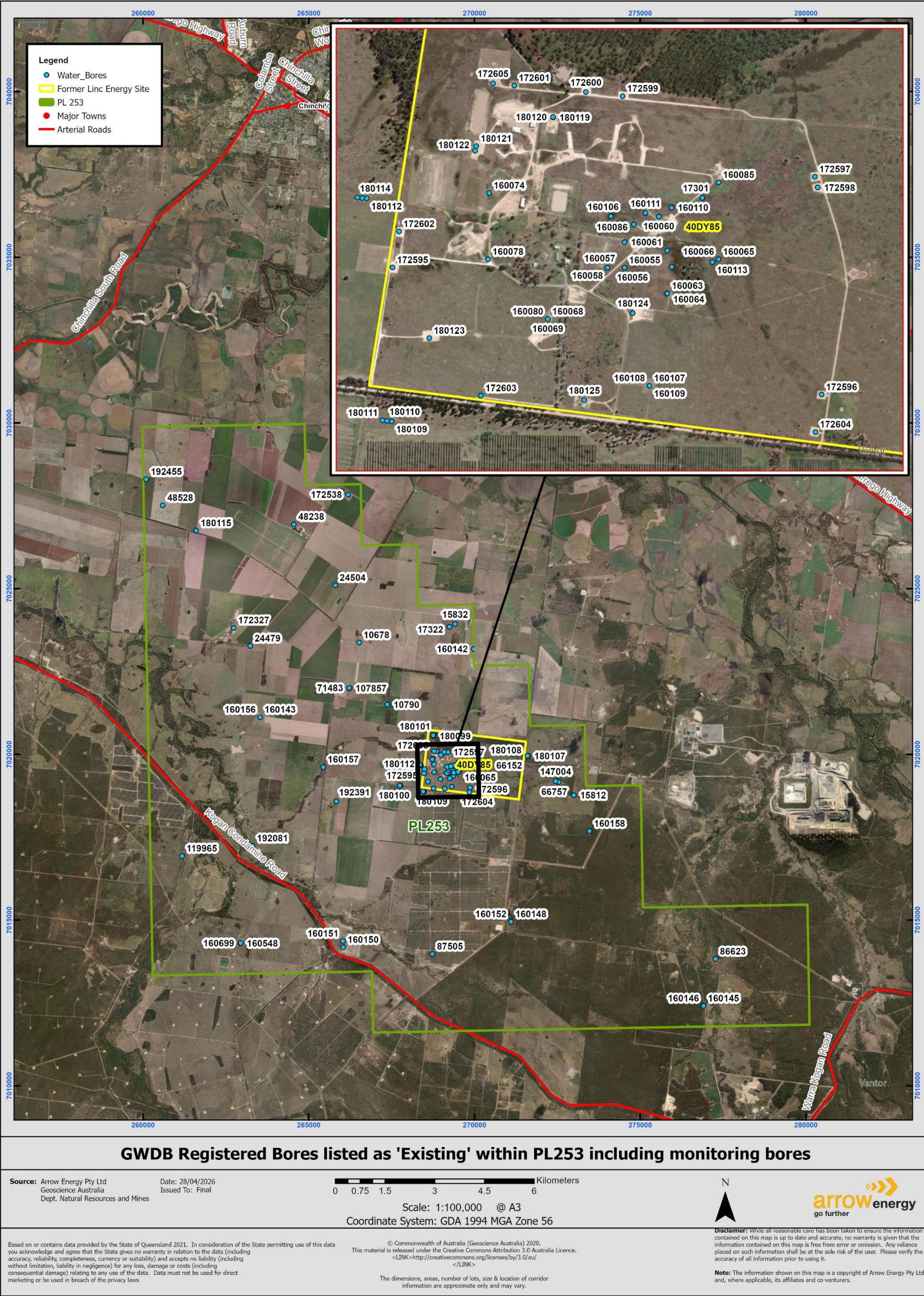


Figure 5 – Location of registered water bores and monitoring bores listed as existing in the GWDB

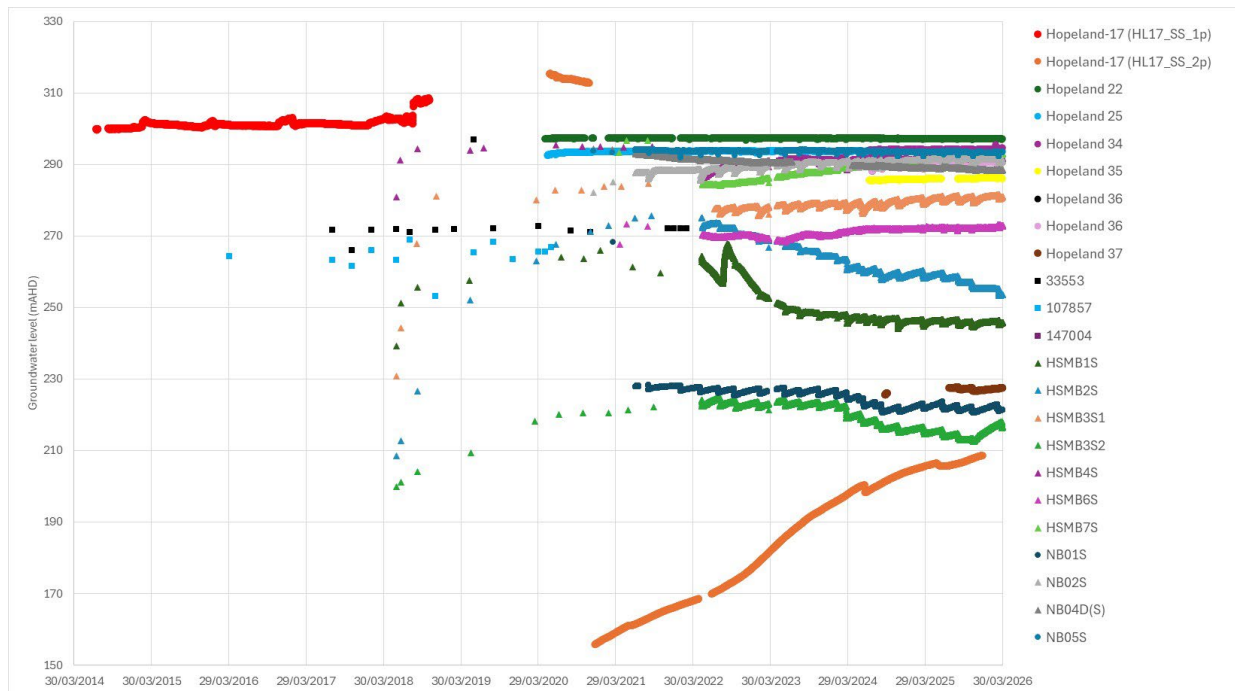


Figure 6 – Hydrograph for Springbok Sandstone bores

Groundwater quality from the most recent sampling event for 11 DNRMMRRD-operated bores, 6 Arrow monitoring bores, and 7 landholder bores for the Springbok Sandstone are provided in **Attachment A** and shown graphically in the Piper diagram in **Figure 7**. Piper diagrams provide a graphical representation of the chemistry of the groundwater samples using the ratio of major ions. Groundwater within this formation is typically near neutral to slightly alkaline, brackish, and of a sodium-chloride type. The median concentrations for TDS and the major ions are: TDS 7,940 mg/L, sodium 2,030 mg/L, calcium 124 mg/L, chloride 4,105 mg/L, and bicarbonate 92.5 mg/L for the most recent sample from each bore. The median field pH is 7.95.

Within the site of the former Linc Energy UCG operations on Lot 40 DY85, the Springbok Sandstone is contaminated with varying levels of BTEX, phenolic, and polycyclic aromatic hydrocarbon compounds, and is more saline than that of the Springbok Sandstone regionally due to a higher TDS and chloride level. The median TDS is 10,900 mg/L, and the major ions are: sodium 2,140 mg/L, calcium 246 mg/L, chloride 5,370 mg/L, and bicarbonate 31 mg/L with a median pH of 7.92 for the 13 monitoring bores, including both Arrow and DNRMMRRD-operated bores, with the most recent sample for each bore presented in the Piper diagram in **Figure 7**. It should be noted that there is evidence of drilling fluids salts (principally potassium chloride) in these groundwater samples, and although improving over time, they may not be fully representative of the groundwater.

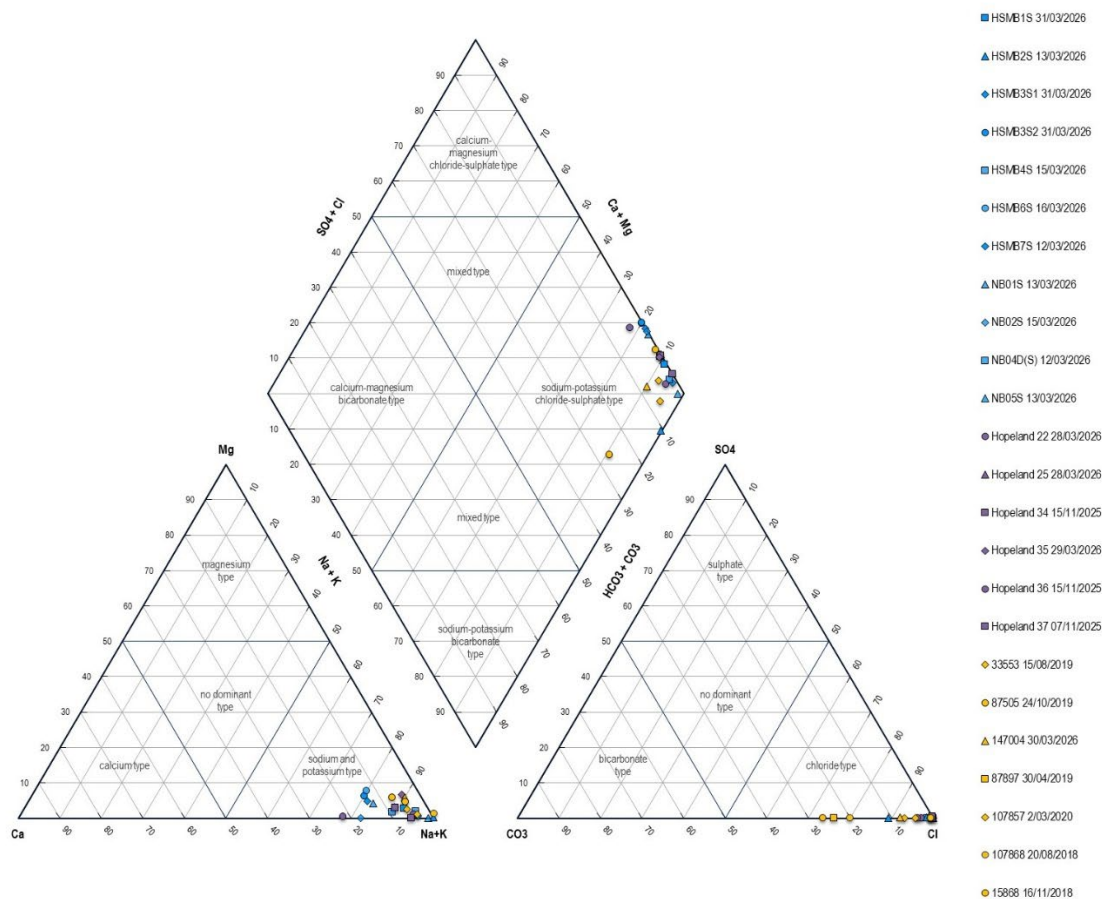


Figure 7 – Piper diagram of groundwater quality data for the Springbok Sandstone within PL253 (DNRMMRRD-operated bores, Arrow bores, and landholder bores are depicted in blue, purple, and yellow symbols, respectively)

Walloon Coal Measures

The middle Jurassic-aged Walloon Coal Measures (WCM) are classified as an interbedded aquitard in the 2025 Surat CMA UWIR (OGIA, 2025), with thin, spatially limited water-yielding zones interbedded in an otherwise tight aquitard. The WCM has thin permeable coal seams which sit within a sequence of mainly low permeability mudstones, siltstones and fine- to medium-grained lithic sandstone. The WCM are formally subdivided into the following formations:

- Upper Juandah Coal Measures, further divided into the Kogan and Macalister coal seam packages,
- Lower Juandah Coal Measures, further divided into the Wambo and Argyle coal seam packages,
- Tangalooma Sandstone (fine grained and coal poor),
- Taroom Coal Measures, further divided into the Upper Taroom and Condamine coal seam packages, and
- The Eurombah or Durabilla Formation (low permeability, coal poor, siltstone, mudstone and massive fine- to medium-grained lithic/feldspathic sandstone) forming an aquitard between the base of the WCM the underlying Hutton Sandstone).

Depth and thickness of the formations from drill logs within PL253 are provided in **Table 6**, with the location of wells provided in **Figure 2**. The geology of the WCM is complex; individual layers thicken, thin and are often discontinuous within each seam package. The coal forms thin, discontinuous seams that generally comprise less than 5 to 10% of the total thickness of the WCM. Each coal seam package is picked on the basis of grouping together cycles of coal seams. The character of each package can vary greatly, and it is often difficult to correlate individual coal seams even over a short distance. Often the most regionally pervasive and reliable correlation markers are the seams of the Macalister and the Condamine packages.

The WCM are unconformably overlain by the Springbok Sandstone, which is incised into the coal measures in places, completely removing the upper coal seam groups in some areas as observed at Hopeland 2.

Table 6 – Drill log data for the WCM

Well Name	Formation	Depth From (m)	Depth To (m)	Thickness (m)	Net Coal (m)	Total WCM Thickness (m)
Hopeland 1A	Kogan	180.8	195.6	14.8	0.3	427.9
	Macalister	195.6	239.5	43.9	5.7	
	Wambo	239.5	316.8	77.3	3.2	
	Argyle	316.8	374.3	57.5	2.9	
	Tangalooma	374.3	386.3	12	0	
	U. Taroom	386.3	468.6	82.3	2.4	
	Condamine	468.6	534.1	65.5	8.2	
	Eurombah	534.1	608.7	74.6	0	
Hopeland 2	Kogan	NA	NA	NA	NA	437.6
	Macalister	98.9	149.8	50.9	7.45	
	Wambo	149.8	249.3	99.5	9.51	
	Argyle	249.3	310.3	61	4.51	
	Tangalooma	310.3	318.1	7.8	0	
	U. Taroom	318.1	429.1	111	8.88	
	Condamine	429.1	451.4	22.3	6.27	
	Eurombah	451.4	536.5	85.1	0.25	
Hopeland 3A	Kogan	140.7	148.3	7.6	0	423.0
	Macalister	148.3	193.1	44.8	7.4	
	Wambo	193.1	283.0	89.9	3.3	
	Argyle	283.0	330.3	47.3	4	
	Tangalooma	330.3	339.8	9.5	0	
	U. Taroom	339.8	445.7	105.9	6.6	
	Condamine	445.7	476	30.3	7.2	
	Eurombah	476	563.7*	>87.78	0.1	
Hopeland 17	Kogan	221.9	240.2	18.3	0	433.2
	Macalister	240.2	299.5	59.3	5.93	
	Wambo	299.5	378.2	78.7	5.05	
	Argyle	378.2	431.4	53.2	3.2	
	Tangalooma	431.4	436	4.6	0.85	
	U. Taroom	436	522.5	86.5	2.53	
	Condamine	522.5	580.7	58.2	5.5	
	Eurombah	580.7	655.1	74.4	0	
Hopeland 21	Kogan	77.1	87.4	10.3	0.3	>148.4*
	Macalister	87.4	142.1	54.3	6.05	
	Wambo	142.1	182.0	39.9	4.63	
	Arglye	182.0	225.4*	>43.4*		
Hopeland 24	Kogan	133.5	136.2	2.7	0.21	>133.2*
	Macalister	136.2	171.5	35.3	8.77	
	Wambo	171.5	266.4*	>94.9*	6.05	
Hopeland 27	Kogan	124.8	128.7	3.9	0.3	>131.5*
	Macalister	128.7	159.2	30.5	9.8	
	Wambo	159.2	256.4*	>97.2*	5.7	

*Drilling ceased mid-way through the WCM

A review was undertaken of groundwater level data for the WCM available within PL253, with a summary of data for bores registered on the GWDB shown in **Table 7** and the corresponding hydrographs in **Figure 8**. Arrow's groundwater monitoring bore Hopeland 17 is located with the existing Hopeland Pilot production wells (Hopeland 5 to 9) as shown in **Figure 2**, and monitors three discrete coal seams in the WCM. The hydrograph for these monitoring intervals and the water production from the Hopeland Pilot production wells is provided in **Figure 9**.

At the Hopeland pilot, the multilevel monitoring bore Hopeland 17 monitors three separate sections of the WCM being the Macalister seam package of the Upper Juandah Coal Measures, Argyle seam package of the Lower Juandah Coal Measures, and Upper Taroom seam package of the Taroom Coal Measures, as well as the

Springbok Sandstone. Hopeland 17 is located approximately in the middle of the pilot and operation of the pilot production wells, which produce from the full thickness of the WCM, results in drawdown in the units monitored as shown in **Figure 9**. CSG production wells operate in adjacent tenures as close as 900m to the south of Hopeland 17. The production in these adjacent tenures produces a general downward trend in water pressures in the WCM in Hopeland 17, as seen during the period from the end of 2014 to the middle of 2016 when the pilot was not operational. As the development in the adjacent tenures has progressed, continued drawdown within the WCM has occurred.

Groundwater levels in the Macalister seam package of the WCM within and immediately adjacent to the former Linc Energy underground coal gasification (UCG) site on Lot 40 DY85 have been affected by operations on that site as indicated by a suppressed water level and high well head gas pressures. Groundwater levels in Arrow monitoring bores Hopeland 20, 23 and 26 in the Macalister seam package are between 59.7 and 146.0 mbgl, which is 35.2 to 109.4m deeper than those in the paired bores (Hopeland 21, 24 and 27 respectively) monitoring the Wambo seam package as provided in **Table 8**. Allowing for the wellhead pressures, the potentiometric pressure (combination of water level and gas pressure contained within the well) is approximately 210.7 and 302.1 mAHD for the Macalister seam package compared to approximately 291.0 and 294.8 mAHD for the Wambo seam package, a difference of 26.3 to 33.5m close to the site boundary at the Hopeland 23/24 and 26/27 pairs as shown in **Figure 10**. Data supplied by DNRMMRRD indicate that depth to groundwater in the WCM within the site varies from approximately 46 to 120 mbgl for the most recent data available, with wellhead pressures of 0 to 703 kPa, giving a potentiometric pressure of approximately 253 to 280 mAHD. These suppressed water levels and pressures in the Macalister seam package relative to the regional groundwater levels and water levels in the deeper coal seams indicates that movement of groundwater is currently toward the former Linc Energy site locally.

These depth to groundwater measurements are highly dependent on which coal seam package of the WCM the bore is screened across, however based on this data, groundwater levels in the WCM range from approximately 25 to 50 mbgl (between 270 and 300 mAHD) when unaffected by significant pumping, CSG production or depressurisation from the former Linc Energy UCG operations.

The 2025 Surat CMA UWIR (OGIA, 2025) has identified that all of PL253 is within both the IAA and LAA for the WCM.

Table 7 – Groundwater level data for GWDB registered bores within the Walloon Coal Measures

Bore	Depth to Water (mbgl)	Water Level (mAHD)	Comment
10790	36.5 to 81.6	236.9 to 282.1	Relatively stable water levels, hydrograph shown in figure
15811	42.7 to 48.0	269.0 to 274.3	2 water levels, 1964 and 2003, bore now self-purges
15868	46.5 to 90.8	228.8 to 273.1	Water levels pump affected, hydrograph shown in figure
24466	28.3 to 33.0	283.7 to 288.4	Relatively stable water levels, hydrograph shown in figure
24469	45.7 to 47.8	273.4 to 275.5	Relatively stable water levels, hydrograph shown in figure
24475	47.5 to 47.8	273.0 to 273.3	Relatively stable water levels, hydrograph shown in figure
24504	49.5 to 51.4	270.8 to 272.7	Relatively stable water levels, hydrograph shown in figure
38191	32.7 to 44.3	272.4 to 284.1	Water levels pump affected, hydrograph shown in figure
107868	43.0 to 64.4	257.1 to 278.5	Water levels pump affected, hydrograph shown in figure
160158	43.4 to 44.2	297.8 to 298.6	Relatively stable water levels, hydrograph shown in figure

Table 8 – Groundwater level data for Arrow monitoring bores in the Walloon Coal Measures close to the former Linc Energy site

Bore	Depth to Water (mbgl)	Water Level (mAHD)	Wellhead Pressure (kPa)	Potentiometric Surface Elevation from Formation Pressure (mAHD)	Comment
Hopeland 20 (Macalister seam)	>113.0 (dry)	206.4 to 259.7	329.6 to 919.3	292.3 to 302.1	Logger data from 2020, hydrograph shown in figure

Hopeland 21 (Wambo seam)	24.5 to 26.4	292.9 to 294.8	0.0 to 10.0	292.9 to 294.8	Logger data from 2020, hydrograph shown in figure
Hopeland 23 (Macalister seam)	144.7 to 146.0	172.5 to 173.9	797.2 to 832.9	254.2 to 258.4	Logger data from 2020, hydrograph shown in figure
Hopeland 24 (Wambo seam)	24.9 to 36.6	282.3 to 294.0	0.0 to 130.0	293.5 to 294.0	Logger data from 2020, hydrograph shown in figure
Hopeland 26 (Macalister seam)	89.5 to 133.4	183.7 to 227.6	78.9 to 769.6	210.7 to 262.6	Logger data from 2020, hydrograph shown in figure
Hopeland 27 (Wambo seam)	26.3 to 30.9	288.0 to 292.6	0.0 to 30.0	291.0 to 292.6	Logger data from 2020, hydrograph shown in figure

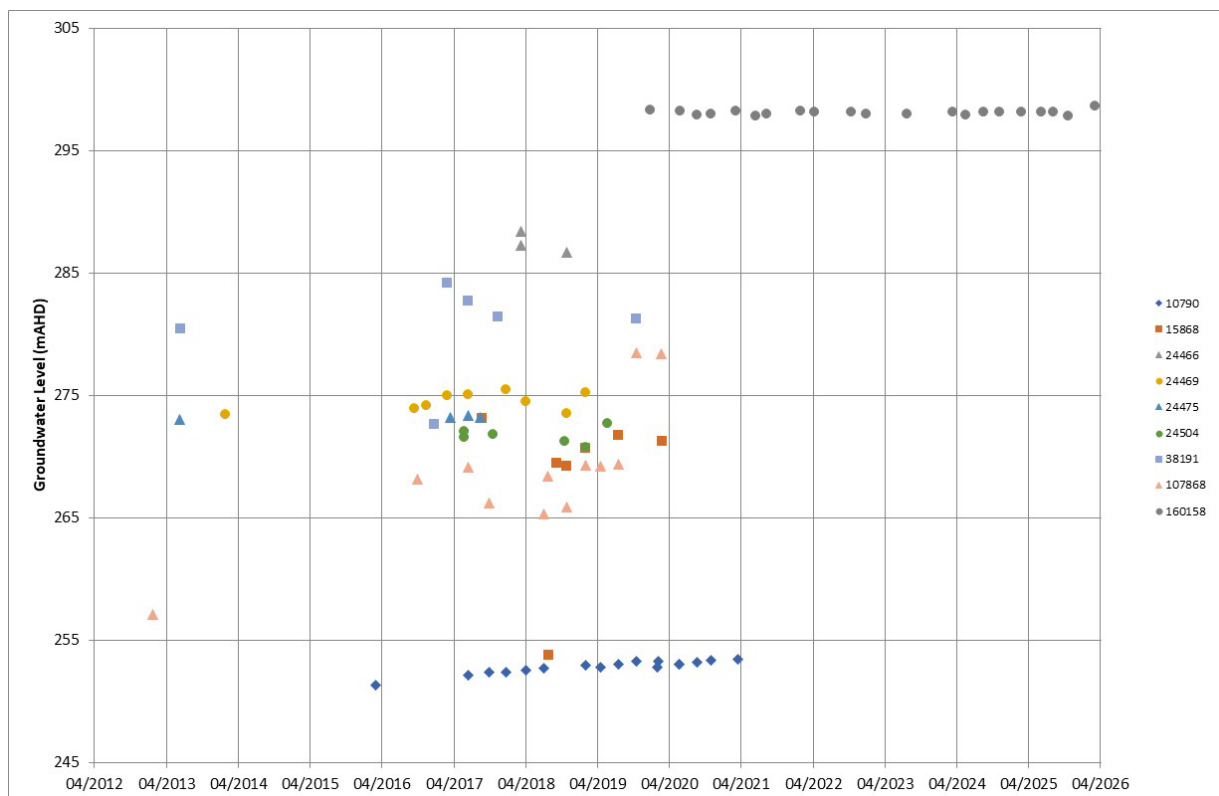


Figure 8 – Hydrographs for registered groundwater bores, Walloon Coal Measures

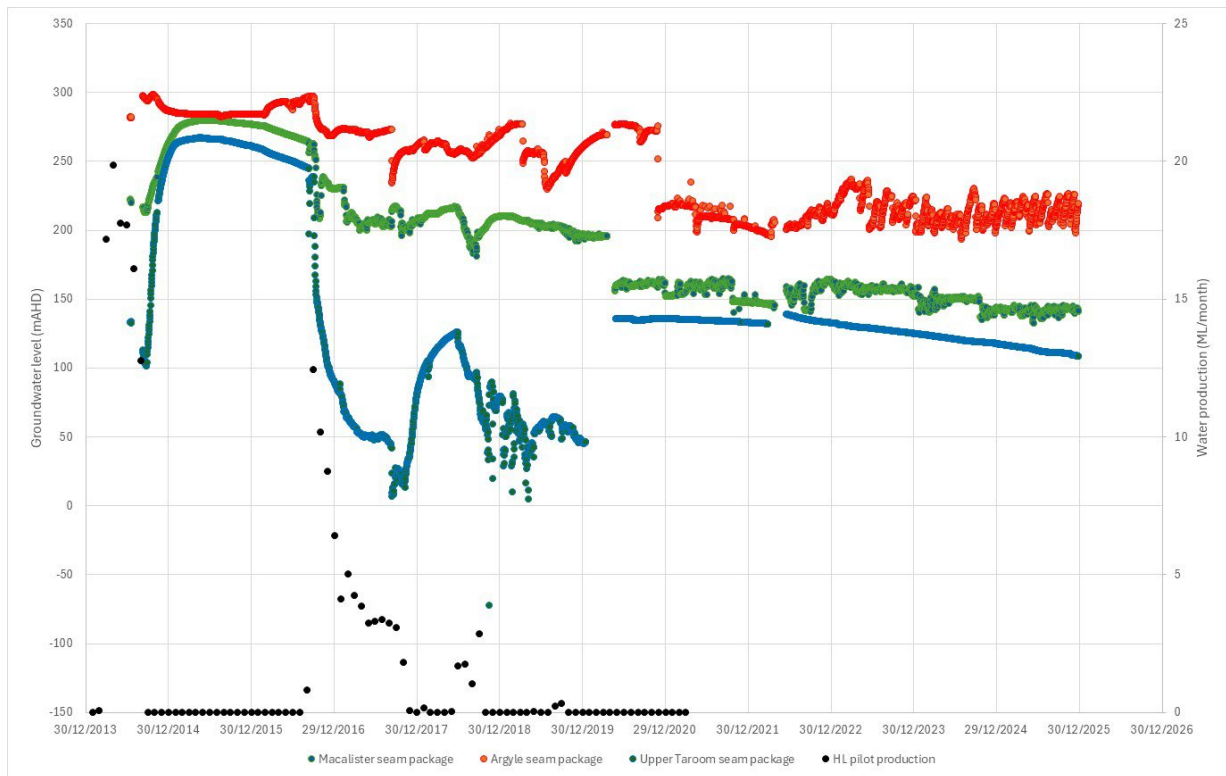


Figure 9 – Hydrographs for discrete seam packages of multilevel monitoring bore Hopeland 17 and monthly water production from the Hopeland Pilot production wells

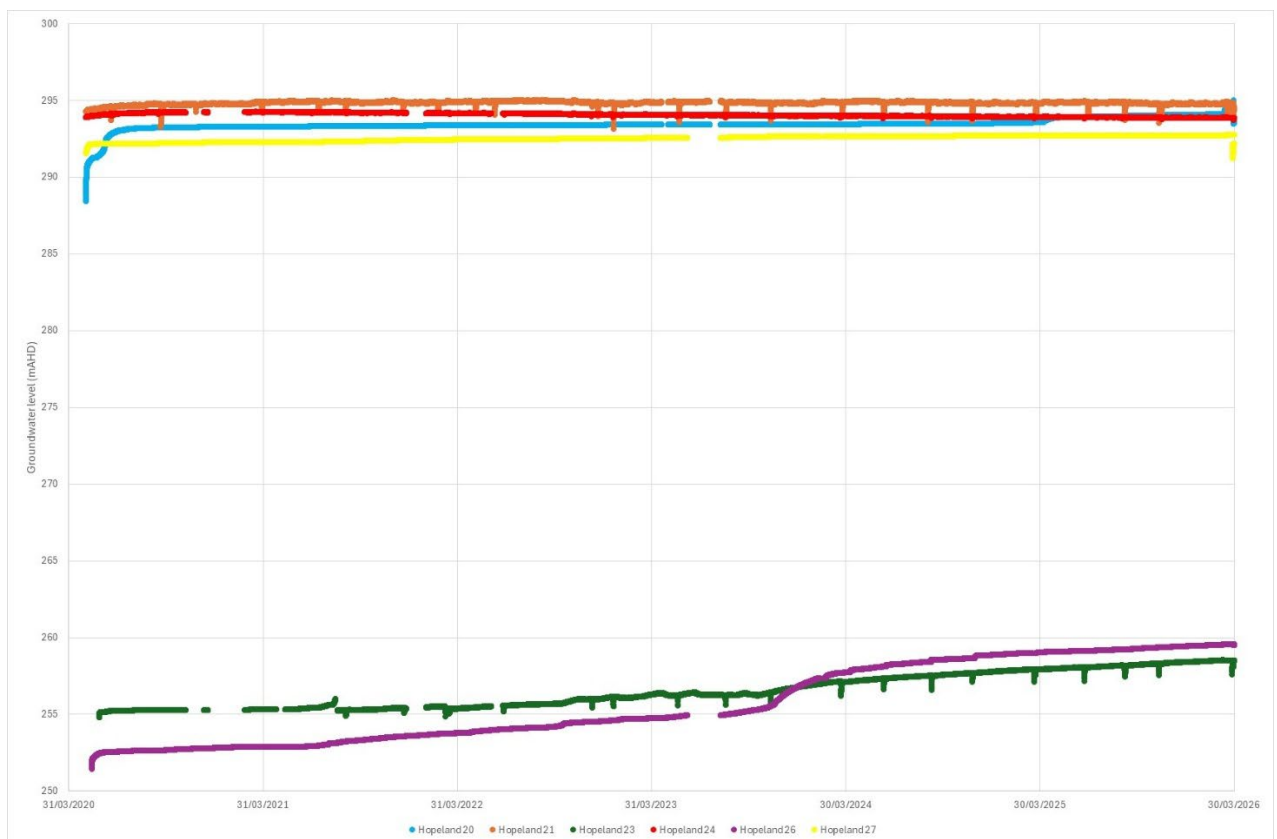


Figure 10 – Hydrographs for groundwater monitoring bores adjacent to Lot 40 DY85, Walloon Coal Measures

Groundwater quality from landholder and Arrow monitoring bores for the WCM are provided in **Attachment A** and shown graphically in the Piper diagram in **Figure 11**. Groundwater within this formation is typically moderately alkaline, brackish, and of a sodium chloride-bicarbonate type.

A total of 51 groundwater samples from 27 bores have been analysed for the WCM. The median concentrations for TDS and the major ions are: TDS 2,316 mg/L, sodium 914 mg/L, calcium 6 mg/L, chloride 600 mg/L, and bicarbonate 731 mg/L for the most recent sample from each bore. The median field pH is 8.59.

Within the site of the former Linc Energy UCG operations on Lot 40 DY85, the WCM is contaminated with varying levels of BTEX, phenolic, and polycyclic aromatic hydrocarbon compounds, and the groundwater also tends to be more alkaline and saline than the WCM regionally. The median concentrations for TDS and the major ions are: TDS 6,530 mg/L, sodium 1,815 mg/L, calcium 11 mg/L, chloride 2,995 mg/L, and bicarbonate 405 mg/L for the 6 monitoring bores with the most recent sample for each bore presented in the Piper diagram in **Figure 10**. The median field pH is 9.10. It should be noted that there is evidence of drilling fluids salts (principally potassium chloride) in these groundwater samples and therefore they may not be fully representative of the groundwater.

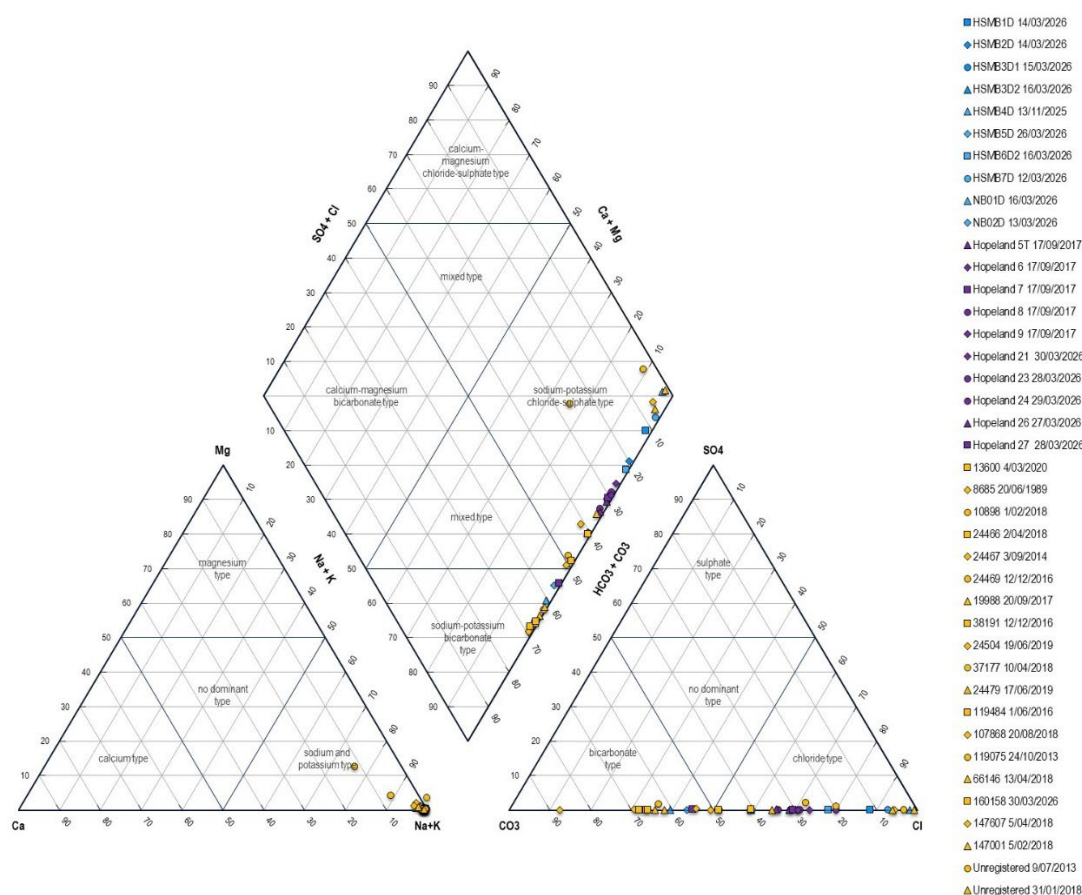


Figure 11 – Piper diagram of groundwater quality data for the Walloon Coal Measures within PL253 (DNRMMRRD-operated bores, Arrow bores, and landholder bores are depicted in purple, blue, and yellow symbols, respectively)

Hutton Sandstone

Conformably underlying the WCM, the middle Jurassic-aged Hutton Sandstone consists of fine- to medium-grained quartzose to sub-labile sandstone with interbedded siltstone and shale, and is heterogeneous with significant lateral and vertical facies changes. The permeable quartzose sandstones make the Hutton Sandstone a regionally important GAB aquifer. The 2025 Surat CMA UWIR classifies the Hutton Sandstone as a partial aquifer with medium transmissivity, bore yields that are vertically and laterally inconsistent at a regional scale and exhibiting a high degree of heterogeneity. From the limited drilling that has been undertaken through

the Hutton Sandstone in PL253, the formation is up to 200 m thick, with a depth to the top of the formation ranging from approximately 655 m below ground level (mbgl) in the southwest of the tenement at Hopeland 17 to approximately 440 mbgl in the north at water bore 172538A.

Development of groundwater resources within the Hutton Sandstone within PL253 has recently commenced, with the first water supply bore installed in July 2017. A review was undertaken for groundwater level data available on PL253 which is shown in **Table 9**, with a hydrograph in **Figure 12**. Based on this data, groundwater levels in the Hutton Sandstone range from approximately 17 to 25 mbgl (between 291 and 297 mAHD) when unaffected by significant pumping. The non-pumping water level in 172538A has decreased from approximately 25.2 to 31.3 mbgl over about 5.5 years since monitoring commenced, which is consistent with regional drawdown trends in the Hutton Sandstone reported by in the Surat CMA UWIR and is related to non-CSG stresses on the aquifer. The 2025 Surat CMA UWIR has identified that there is no IAA or LAA within PL253 for the Hutton Sandstone. Therefore, this aquifer is not affected or likely to be significantly affected by the exercise of underground water rights on PL253 and won't be considered further in this Appendix.

Groundwater quality data is available from one of the two landholder bores for the Hutton Sandstone, as provided in **Attachment A**. Groundwater from this bore is slightly alkaline, brackish, and of a sodium-bicarbonate type.

Table 9 – Groundwater level data for the Hutton Sandstone

Bore	Depth to Water (mbgl)	Water Level (mAHD)	Comment
172327	17.5 and 18.9	296.9 to 298.3	2 water levels, 2017
172538A	25.2 to 31.3	286.5 to 292.6	Water levels pump affected, hydrograph shown in figure

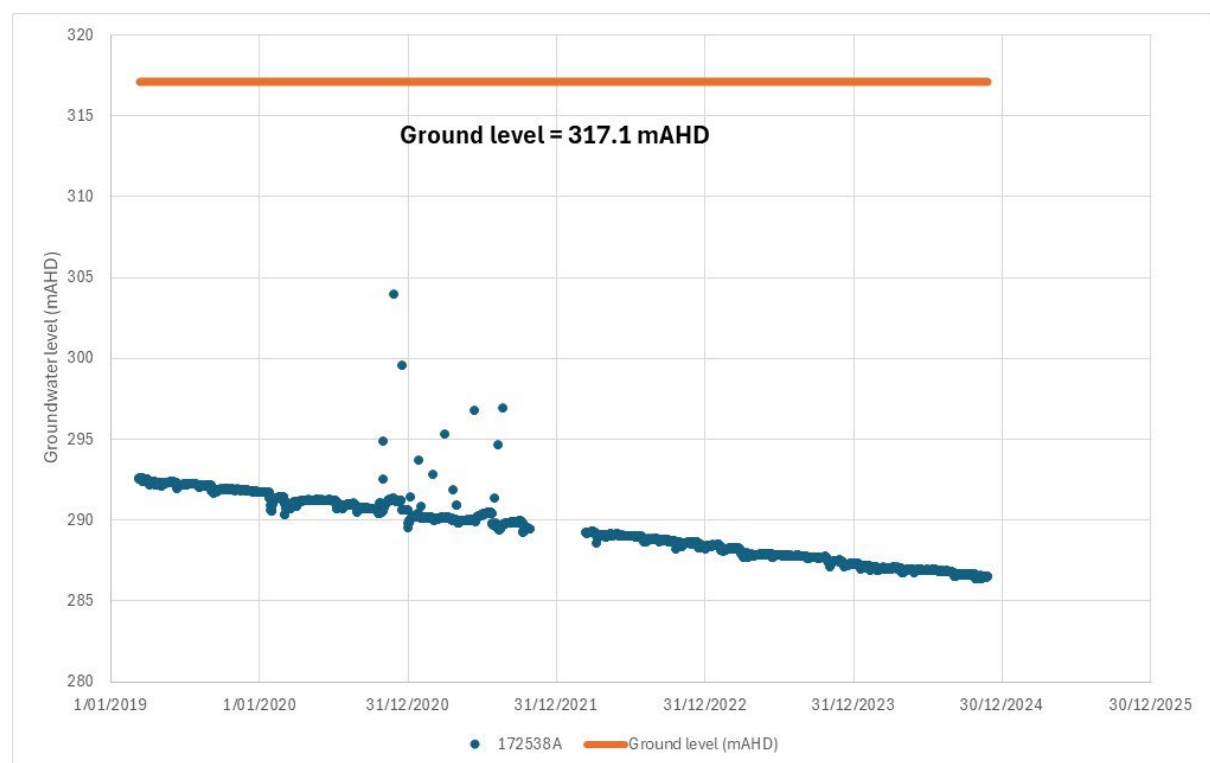


Figure 12 – Hydrograph for 172538A, Hutton Sandstone

Evergreen Formation

The Evergreen Formation conformably underlies the Hutton Sandstone, and from the limited drilling logs (Hopeland 17 and regional monitoring bore 119965, location shown in **Figure 2** and **5** respectively) comprises siltstone, mudstone and subordinate fine-grained labile sandstone and is up to 200m thick. The Evergreen Formation conformably overlies the Precipice Sandstone, however seismic surveys within PL253 indicate that basement highs may have precluded deposition of the Precipice Sandstone in the north of the tenement where the Evergreen Formation is expected to onlap onto basement. The Evergreen Formation is a regional aquitard in the GAB and locally, and there are no water bores completed in this formation in PL253.

Precipice Sandstone

The Precipice Sandstone is the lowermost formation in the Surat Basin sequence within PL253 and conformably underlies the Evergreen Formation. From the limited drilling undertaken into this formation (Hopeland 17 and 119965A), the Precipice Sandstone is approximately 30 to 80 m thick in the southwest of the tenement, and consists of fine to coarse grained thickly bedded quartzose sandstone with minor siltstone.

The 2025 Surat CMA UWIR classifies the Precipice Sandstone as a laterally continuous regional aquifer in the Surat Basin with high transmissivity and bore yields that are vertically and laterally consistent at a regional scale. Within PL253 it unconformably overlies basement and pinches out against basement highs in the north of the tenement as discussed above.

A review was undertaken for groundwater level data available on PL253 for the Precipice Sandstone. Only one bore, regional monitoring bore 119965A, accesses the Precipice Sandstone within PL253. For this bore, groundwater levels have reduced from approximately 6.0 to 19.3 mbgl (between 292.9 and 306.2 mAHD) over the 18 years since monitoring commenced as shown in **Figure 13**, which is consistent with regional drawdown trends in the Precipice Sandstone reported in the Surat CMA UWIR and is related to non-CSG stresses on the aquifer. The 2025 Surat CMA UWIR has identified that there is no IAA or LAA within PL253 for the Precipice Sandstone. Therefore, this aquifer is not affected or likely to be significantly affected by the exercise of underground water rights on PL253 and won't be considered further in this Appendix.

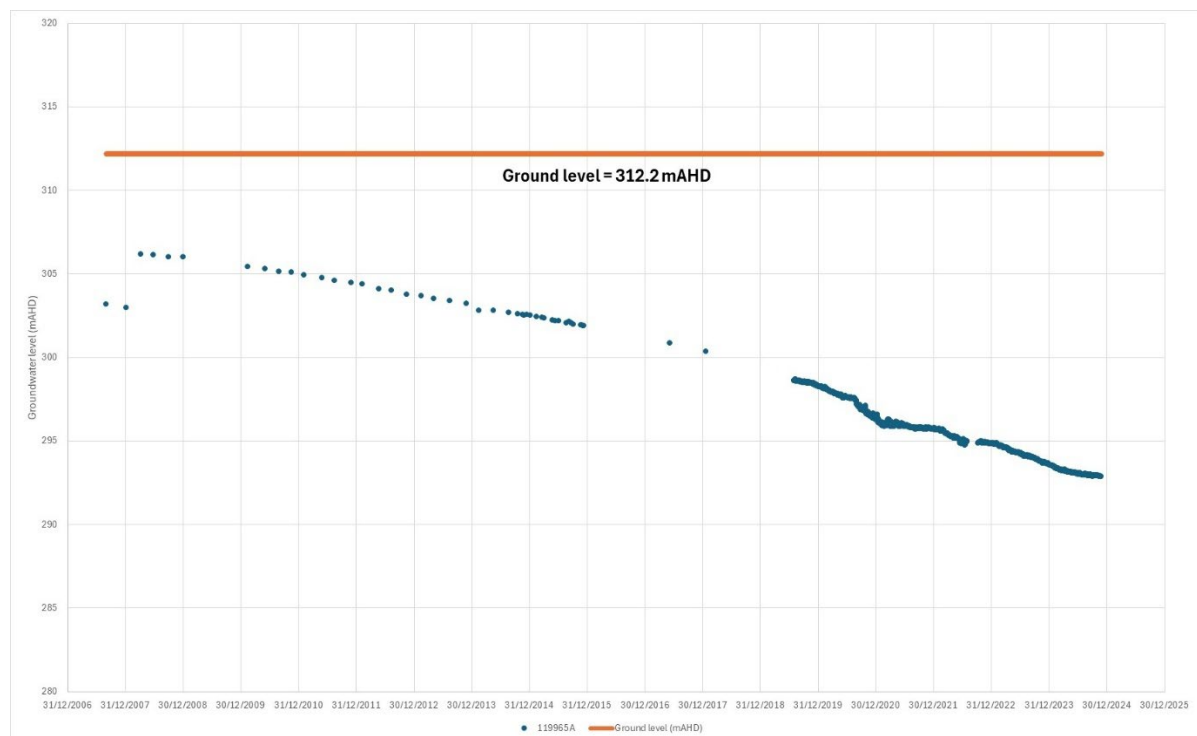


Figure 13 – Hydrograph for 119965A, Precipice Sandstone

ii. an analysis of the movement of underground water to and from the aquifer, including how the aquifer interacts with other aquifers and surface water

Groundwater flow processes, movement, connectivity and flow paths are described in more detail in the SGP EIS and SREIS as well as the 2025 Surat CMA UWIR (OGIA, 2025) for Arrow tenements including PL253.

Cenozoic sediments

Groundwater flow in the Cenozoic sediments is characterised by local flow in unconfined aquifer systems near the surface. These local flow paths are found in the relatively more permeable alluvial sediments found predominately along the watercourses. Mechanisms for recharge and discharge for the Cenozoic sediments indicate that aquifer recharge occurs via rainfall and leakage from stream beds, with little baseflow from aquifers to watercourses. Discharge from the Cenozoic sediments is also expected to occur by evapotranspiration from the terrestrial groundwater dependent ecosystems along the watercourses.

Surat Basin formations

Groundwater movement in the major confined aquifers of the Surat Basin is predominantly horizontal. The lower permeability units between these aquifers restrict vertical interconnection between the groundwater systems; however, vertical inter-aquifer flow may occur in areas where aquitards are thinner or eroded. In addition, if significant groundwater pressure differences occur across different formations, then inter-aquifer groundwater flow can occur.

The hydraulic connection between the unconfined aquifers in the Cenozoic sediments and the deeper confined aquifers of the Surat Basin is governed by the vertical permeability of the two formations in contact and the vertical pressure gradient. Vertical groundwater flow will occur readily where the two formations have similar high permeability's or where there is considerable vertical pressure driving the flow. Within PL253, the Westbourne Formation is the main unit which underlies the Cenozoic sediments across the tenure. The Westbourne Formation is a tight aquitard, and therefore vertical groundwater flow will be retarded between the Cenozoic sediments and the underlying Surat Basin formations. In the north of the tenure, where the Springbok Sandstone subcrops under the Cenozoic sediments, vertical groundwater flow may occur into the Springbok Sandstone.

The WCM in the tenure area is not connected to any surface water and the Condamine alluvium is located to the north and north east outside of PL253. Regional groundwater flow in all the seam packages of the WCM within PL253 is to the south and west, as shown in the groundwater model (Worley Consulting, 2026) also provided in **Appendix E** developed for this EA amendment application, and the 2025 Surat CMA UWIR (OGIA, 2025), with groundwater flow toward the significant drawdown resulting from existing CSG operations on tenures adjoining PL253 to the west and south. This general flow direction is modified in the area of the former Linc Energy site on Lot 40 DY85 where the groundwater levels in the Macalister seam package have been lowered by the previous UCG operations. There is no evidence that groundwater flow in the Wambo seam package below Lot 40 DY85 have been altered by operations in the overlying unit.

The WCM is the main aquifer to be impacted due to the CSG water production. In areas of CSG development, such as at the Hopeland Pilot production wells or the tenures to the south and west of PL253, groundwater pressures began to fall in the WCM when development began. However, the coal formations are complex with relatively high-permeability coal seams existing in a relatively low-permeability matrix of mainly mudstones and siltstones. The individual coal seams do not extend over large distances and as a result, the pressure response to CSG water extraction within the formation is complex. Pressure falls quickly in coal seams at the start of development but falls more slowly in the interburden aquitard material and coal seams that remain disconnected. At this stage, pressure reductions of over 200 metres have been observed at the Hopeland 17 monitoring location within the WCM. Pressure impacts in the Walloon Coal Measures tend to be limited to the immediate vicinity of CSG production areas.

The Arrow geological model incorporates faults as presented on **Figure 2**, derived from drilling data and seismic surveys. These faults tend to be small, with fault throws less than 20m, such that juxtaposition of coal seams against overlying or underlying aquifers would be limited. Assessments conducted by OGIA for the Surat CMA UWIRs includes an analysis of smaller faults and indicates that although there is potential to increase connectivity with overlying aquifers at some locations, widespread connectivity is not expected.

Groundwater flow in the Springbok Sandstone within PL253 is to the south and west, as shown in the groundwater model (Worley Consulting, 2026) developed for this EA amendment application in **Appendix E** and the 2025 Surat CMA UWIR (OGIA, 2025). This general flow direction is modified in the area of the former Linc Energy site on Lot 40 DY85 where the groundwater levels have been lowered by secondary connection of the formation to the gasifier in the Macalister seam package of the WCM.

The Springbok Sandstone will, with the exercise of underground water rights in the underlying WCM, be the first aquifer to be affected. As reported in the 2025 Surat CMA UWIR (OGIA, 2025), both the WCM and the Springbok Sandstone tend to be highly stratified and include significant proportions of siltstone and mudstone. As a result, the vertical permeability is much lower than in the horizontal direction. Interconnectivity between these two units is therefore considered likely to be low despite the direct erosional contact between the units (i.e. the absence of an intervening aquitard). However, since the contact between the two formations is erosional, there are areas where the Springbok Sandstone is in contact with the productive coal seams. A higher degree of interconnectivity is expected in these areas.

Groundwater flow in the deeper confined aquifer systems of the Hutton and Precipice Sandstones is regional and consistent with the overall groundwater flow patterns in the GAB as modelled in the Surat CMA UWIR. That is, regional groundwater flow in these strata is toward the west and south-west. This groundwater flow is dominantly horizontal because vertical groundwater flow is restricted by the low permeability mudstone and claystone beds within the WCM and the extensive low permeability Eurombah or Durabilla Formation at the base of the WCM. Vertical groundwater flow between the Hutton Sandstone and the Precipice Sandstone is restricted by the thick low permeability Evergreen Formation that separates these strata.

Springs

Arrow has no assigned responsibilities regarding potentially affected springs within PL253 under the Spring Impact Management Strategy (SIMS) in the 2025 Surat CMA UWIR (OGIA, 2025). The SIMS is considered to adequately address the potential impact to springs and no further assessment has been undertaken. In addition, no springs within Arrow tenure other than those identified and considered in the Surat CMA UWIR are known to be present.

Within PL253 a spring has been identified which discharges to a small tributary off Wambo Creek, with the location shown in **Figure 14**. This spring had been included in the list of springs considered in the 2019 Surat CMA UWIR. It is listed as Spring Complex 765 "Orana" and being a Type 4a spring. Type 4a springs are semi-permanent fresh to palustrine wetland springs, mainly fed by local groundwater systems and associated with a riverine environment with deep, sandy alluvial deposits (non-GAB). 3D Environmental (2017) investigated this spring (referred to as the 'Trebilco Spring') for Arrow's Stage 1 Water Monitoring and Management Plan and found that it is an ephemeral spring which is fed by groundwater stored intermittently in the sandy ridge located west of the creek and is not likely sourced from the underlying GAB aquifers subject to potential impact through Arrow's activities. The groundwater in the sand is perched on low permeability clay and discharges where the phreatic surface intersects the lower slope of the creek bank at an elevation of approximately 301 m AHD. This is supported by the quality of the water which discharge from the spring, which is fresh and slightly acidic, with a dissolved solids of 146 mg/L and a sodium-chloride type as shown in the major ion chemistry in **Attachment A**. The conceptual model of the spring developed by 3D Environmental is provided in **Plate 1**. The source aquifer is attributed to Cenozoic sediments, and the 2025 Surat CMA UWIR (OGIA, 2025) spring risk assessment has now identified this spring as a Category D (previously at risk) as the revisions to the conceptual understanding or impact predictions have reduced or eliminated the risk. No mitigation measures are proposed by OGIA for this

spring. It is considered unlikely that there will be any ecological impact to this sole non-GAB spring GDE as a result of the exercise of underground water rights.

Arrow is compliant with all its Responsible Tenure Holder obligations for Springs as prescribed in the 2025 Surat CMA UWIR (OGIA, 2025).

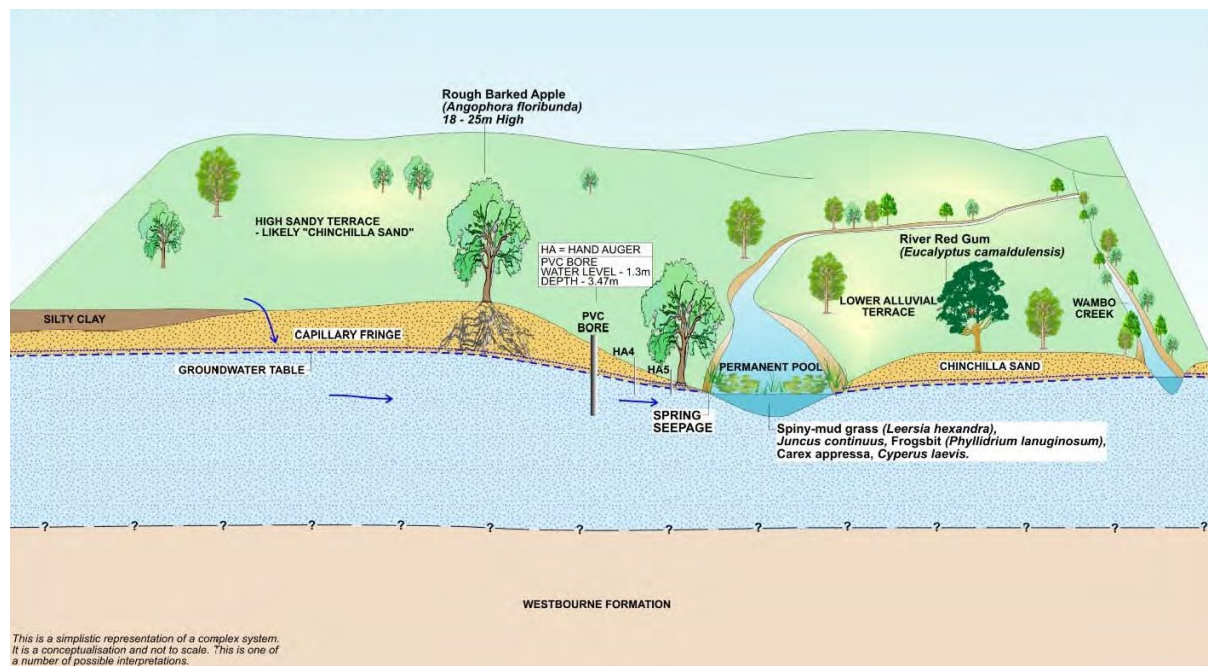


Plate 1 – Conceptual model of the Orana Spring

Non-Spring Groundwater Dependent Ecosystems

Riparian vegetation that represents terrestrial groundwater dependent ecosystems (GDEs) may be present along significant reaches of some watercourses and their tributaries as shown in **Figure 14**. Regional mapping, derived with varying levels of confidence from assessment of vegetation types and geology, indicates that the alluvial deposits associated with creek systems and the sandy plains of the Cenozoic sediments overlying the Westbourne Formation may support terrestrial GDEs. These GDE are described as ecosystems intermittently connected to aquifers with brackish to saline salinity and near neutral to alkaline pH in sandy plains or unconsolidated alluvia (<https://wetlandinfo.detsi.qld.gov.au/wetlands/facts-maps/>). These potential terrestrial GDE are located over the shallow unconfined aquifers above the Westbourne Formation aquitard or Springbok Sandstone, and the 2025 Surat CMA UWIR (OGIA, 2025) determined that drawdown within the supporting aquifer would be less than 0.2 m within PL253 across the majority of the terrestrial GDE areas and therefore did not assign a risk rating to these terrestrial GDEs. However there are small areas of potentially 'low' and 'high' long-term at-risk terrestrial GDEs in the large aggregation of potential alluvial and sandy plain terrestrial GDEs in the eastern third of PL253 around Kogan Creek.

Arrow conducted a desktop assessment of the potential risk of impact from predicted groundwater drawdown to potential terrestrial GDEs as part of its SGP EPBC approval conditions. This desktop assessment collectively reviews the mapped vegetation, geology mapping and data, position in the landscape, depth to groundwater data and predicted groundwater drawdown (as provided in the 2021 Surat CMA UWIR, which is similar to the 2025 Surat CMA UWIR (OGIA, 2025)) to identify the potential for a site to be a terrestrial GDE and, if so, the level of risk for potential impact from coal seam gas activities. The desktop assessment was completed in April 2023. The assessment identified two areas associated with Kogan Creek and its tributaries within PL253 requiring further investigation through a field survey. The field survey, completed in October 2024 and reported in May 2025 in *File Note: Summary of GDE Investigations Completed for the Surat Gas Terrestrial GDE Assessment* (3D Environmental), utilised a methodology which aims to provide a consistent framework against which the likely degree and nature of groundwater dependence can be inferred including:

- An initial measurement of leaf water potential (LWP) used to infer the degree of moisture availability to a tree from either soil moisture or groundwater.
- Measuring soil moisture potential (SMP) from soil profiles collected at individual assessment sites which allows calibration of LWP results (i.e. can the reported moisture availability in the shallow soil profile explain LWP values?).
- Application of stable isotopes (oxygen 18 ($\delta^{18}\text{O}$) and deuterium ($\delta^2\text{H}$)) to trace moisture interactions between trees and the potential available moisture sources, including soil moisture or groundwater.
- Collection of surface water samples for analysis of ^{222}Rn to assess the level of groundwater contribution to the water body.

Preliminary field inspections of the two sites identified that groundwater dependence is unlikely at one of the sites due to the site being located on a lateritic escarpment with a surrounding apron of sandy colluvial sediments, and vegetation at the site, *Eucalyptus crebra* and *Angophora leiocarpa*, are confirmed to have shallow rooting systems and are unlikely to be facultative phreatophytes (ie not terrestrial GDEs). Further detailed data collection at this site was therefore not required, and this site is not considered at risk from CSG induced groundwater.

The results of data collected at the second site indicated the riparian vegetation is predominantly utilising a mix of shallow groundwater and surface water, noting that the groundwater is hosted in a perched system disconnected from the deeper regional groundwater system, namely:

- The average LWP value was -0.3 MPa, indicating extremely high moisture availability at this assessment locality.
- SMP values overlapped with LWP values in the upper 0.5 m of the soil profile.
- The stable isotope biplot of twig xylem, soil moisture, surface water and groundwater stable isotope samples indicates the riparian vegetation is utilising a mix of shallow (perched) groundwater and surface water.
- Radon activity on Kogan Creek has background levels of radon activity (0 to 0.071 bq/l), indicating the limited likelihood of groundwater discharge into surface water.

Results of the field investigation at the second site indicate that, while the site is a terrestrial GDE it is reliant on a shallow perched groundwater system which is disconnected from the deeper regional system, and therefore is unlikely to be impacted by CSG depressurisation.

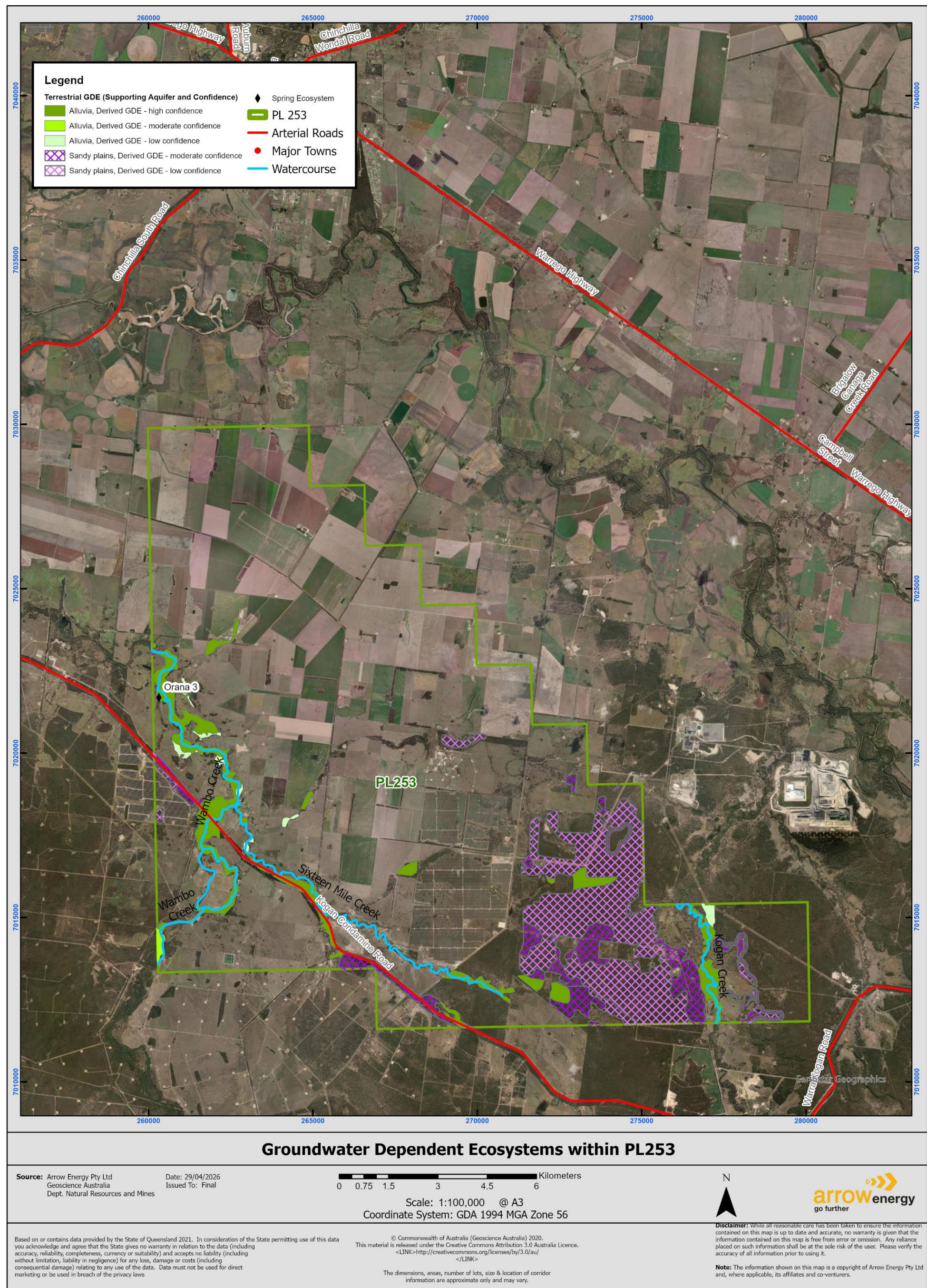


Figure 14 – Mapped groundwater dependent ecosystems within PL253

iii. a description of the area of the aquifer where the water level is predicted to decline because of the exercise of underground water rights

The 2025 Surat CMA UWIR (OGIA, 2025) identifies aquifers where groundwater levels are predicted to fall by more than the trigger threshold as specified in the *Water Act 2000* due to the exercise of underground water rights by petroleum tenure holders. The trigger thresholds are 2 m in unconsolidated aquifers and 5 m in consolidated aquifers. The areas of aquifers where groundwater level declines are predicted to exceed these thresholds within three years are defined as the Immediate Affected Areas (IAA). The areas of aquifers where groundwater level declines are predicted to exceed these thresholds at any time are defined as the Long-term Affected Area (LAA).

The 2025 Surat CMA UWIR (OGIA, 2025) model produced outcomes that indicate that all of the PL253 area is within the IAA for the WCM and part of PL253 is within the IAA for the Springbok Sandstone (**Figure 15**). The former Linc UCG site is not within the IAA of the Springbok Sandstone. All of PL253 is within the LAA for the WCM, and most of PL253 is within the LAA for the Springbok Sandstone as shown in **Figure 15**.

There are no other IAAs or LAAs within any other aquifers within PL253, with any impact in these aquifers predicted to be less than the trigger thresholds.

The modelled drawdown in all aquifers, as a result of the exercise of underground water rights on all tenures including PL253 in the Surat CMA, are presented in Figures 10-5 to 10-10 of the 2025 Surat CMA UWIR (OGIA, 2025).

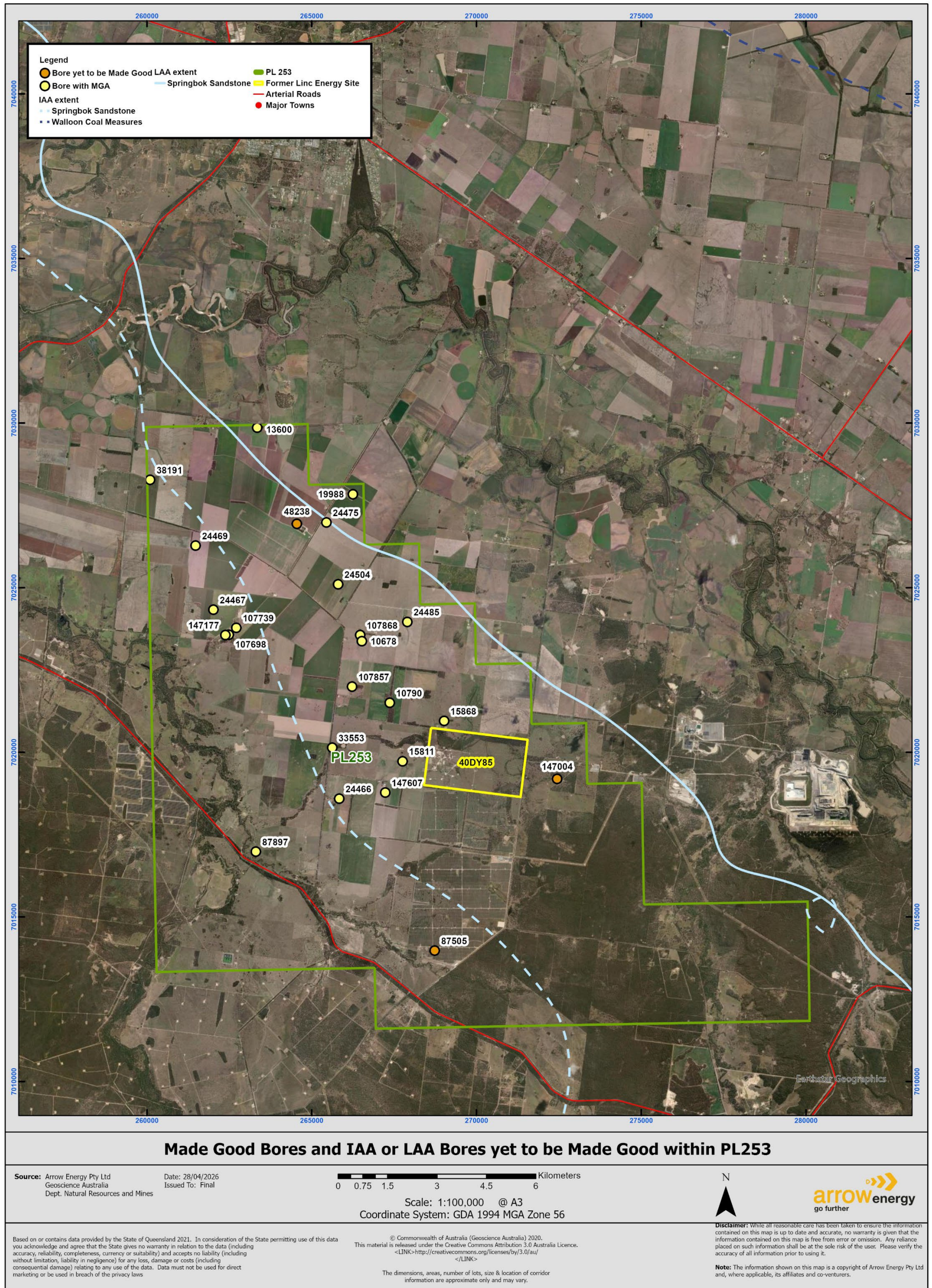


Figure 15 – IAA and LAA for PL253 and status of bores with a make good agreement or yet to be made good

iv. the predicted quantities of water to be taken or interfered with because of the exercise of underground water rights during the period in which resource activities are carried out.

As indicated in this amendment application, a total of 55 new production wells are proposed to be constructed in addition to the production wells already authorised under EA0001401. The CSG water production over the life of the 55 new production wells will be in the order of 6.4GL with a peak rate of approximately 5.6ML/day in year 1 (2030) and diminishing through the project period. The total CSG water production for the authorised and new wells will be in the order of 17.3GL with a peak rate of approximately 10.1ML/day in 2030..

Arrow provides its water production volumes and forecasts to the Office of Groundwater Impact Assessment (OGIA) for inclusion in the Surat CMA UWIR.

d) the environmental values that will, or may, be affected by the exercise of underground water rights and the nature and extent of the impacts on the environmental values;

An assessment of groundwater environmental values was undertaken as part of the Surat Gas Project EIS and SREIS, as well as the 2025 Surat CMA UWIR (OGIA, 2025). The table below provides a summary of the values that relate to the system where impacts are predicted from the identified resource activities on PL253. Based on this, any impacts to environmental values will be in line with that presented in the EIS, SREIS and 2025 Surat CMA UWIR (OGIA, 2025).

Table 10 – Existing environmental values that may be affected by the exercise of underground water rights

Existing Environment/Groundwater System	Intrinsic Characteristics and Hydrogeological Processes
Springbok Sandstone	- Groundwater from this system is of moderate biological importance due to generally brackish water quality - There are no known areas of physical connection between this groundwater system and surface features within PL253 - This aquifer is not known to support specific areas of cultural or spiritual significance - This aquifer provides a quality and supply generally suitable for agricultural uses, excluding irrigation - This aquifer forms a regional aquifer system across the GAB, and equivalent aquifers are common in many areas - There are multiple recharge mechanisms producing a moderately resilient system that can recover over the medium term - Rehabilitation can be achieved when impacts are removed
WCM	- Groundwater from this system is of moderate biological importance due to generally brackish water quality - There are no known areas of physical connection between this groundwater system and surface features within PL253 - This aquifer is not known to support specific areas of cultural or spiritual significance - The aquifers in the WCM provide a quality and supply generally suitable for agricultural uses, excluding irrigation - The coal seam gas groundwater system is a regional aquifer system across the GAB, and equivalent aquifers are common in many areas

	• The WCM groundwater system is less dynamic than other shallower systems, with limited recharge mechanisms. The aquifers within the WCM groundwater system are recharged through rainfall only where outcropping and through inter-aquifer leakage and can recover from groundwater drawdown slowly. • Rehabilitation can be achieved when impacts are removed.
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Within PL253, there are 24 water bores predicted to be impacted by the exercise of underground water rights, within the IAA and LAA of the 2025 Surat CMA UWIR (OGIA, 2025). The location of water bores that Arrow has made good as a result of this or previous UWIR are shown in **Figure 15**. There are 3 remaining bores for which Arrow will conduct bore assessments and make best endeavours to negotiate make good agreement with affected bore owners.

Arrow Energy undertakes a subsidence monitoring program involving use of both Interferometric Synthetic Aperture Radar (InSAR) and Light Detection and Ranging (LiDAR) which provides baseline data and a regular interpretation of ground movement over the area of CSG extraction or planned extraction. InSAR technology provides high temporal resolution and wide coverage of change in elevation, while LiDAR provides high spatial resolution targeted coverage of terrain including slopes. Arrow Energy also collect geodetic measurement of ground movement at selected locations by conventional survey as well as at continually operating reference stations (CORS) to provide a ground-truthing check on subsidence. Arrow's Water Resource Monitoring and Management Plan includes a subsidence assessment, as does the 2025 Surat CMA UWIR (OGIA, 2025). Both these assessments cover PL253. The assessments include modelling of predicted subsidence for different regions within areas potentially affected by CSG drawdown, and risk assessment to identify if environmental values are likely to be adversely affected by ground subsidence resulting from CSG extraction activities. Review of potential impacts on various assets indicates that differential settlement or change in slope is more relevant than total subsidence. Predicted subsidence within PL253 in the 2025 Surat CMA UWIR (OGIA, 2025) is predicted to be less than 100mm for most of the tenure, with a small area along the western extent predicted to be up to 150mm, with change in regional ground slopes generally predicted to be less than 0.001% (10 mm over 1 km). As the topography is gently undulating, the potential for material impact from subsidence is low. However, where the CSG-related subsidence exceeds the investigation levels in the WRMMP, further assessment will be carried out to assess the site-specific infrastructure that may be impacted and identify whether an impact has occurred as a result of the Arrow operations.

Additionally, the Surat Gas Project EPBC Act approval conditions require assessment of potential impacts on non-spring based groundwater dependent ecosystems. This assessment has been completed and involves the identification of potential GDE landscapes, use of modelling to predict areas of potential impact and a risk assessment to identify GDEs at risk of impact. This assessment is presented in the Stage 1 Water Monitoring and Management Plan, and based on this assessment there are no GDEs at risk of impact on PL253.

e) any impacts on the quality of groundwater that will, or may, happen because of the exercise of underground water rights during or after the period in which resource activities are carried out;

The SGP SREIS presented the groundwater within key aquifer units classified by its groundwater quality composition, based on major ion composition, total dissolved solids (TDS) and pH. The following section provides data specific to PL253 and represents the baseline water and reference point for any future assessment of impacts to groundwater quality.

The proposed CSG activities on PL253 has the potential to directly and indirectly degrade groundwater quality. Surface activities generally have the greatest potential to directly impact groundwater quality and subsurface activities (i.e. aquifer depressurisation) have the greatest potential to indirectly impact groundwater quality. The

magnitude of both the potential direct and indirect impacts is a function of the depth below the surface of the receiving aquifer. Shallow unconfined aquifers have a higher potential to be directly impacted while the deeper confined aquifer have a lower probability of being directly impact; however, they do have a potential to be indirectly impacted.

In the broadest sense, direct impacts are mostly like to occur as the result of surface spills and uncontrolled releases of liquids and solids. Indirect impacts are most likely to occur as the result of changes in groundwater flux directions following groundwater pumping used to depressurise the WCM.

Potential direct impacts to groundwater quality could result from:

- Surface leaks and spills from CSG infrastructure. This includes drilling mud, chemical, solid and liquid waste, and associated water spills.
- Leaks from buried infrastructure such as pipelines, gathering lines and underground storage containers and tanks.
- Leaks from the untreated water storage dam at the Hopeland Pilot production wells.
- Associated water discharges to streams, which has the potential to infiltrate the subsurface profile and impact the groundwater systems.

Potential indirect impacts to groundwater quality could result from:

- Induced aquifer interflow and groundwater mixing in aquifers above and below the WCM caused by direct CSG water extraction from the WCMs.
- Induced changes in groundwater flux directions due to depressurisation from the WCM resulting in the migration of poorer quality groundwater to higher quality groundwater, or inducing inter-aquifer flows.
- Piezometric surface drawdown in adjacent aquifers due to leakage through coal seam gas wells (well failure) resulting in the migration of poorer quality groundwater to higher quality groundwater.
- Piezometric surface drawdown surrounding non-CSG bores promoting the influx of comparatively poor quality water to the bore.
- Incomplete or incorrect well installation resulting in the interconnection of aquifers allowing the mixing of lower quality groundwater with higher quality groundwater.

Depressurisation of the WCM has the potential to increase the current flux from aquifers above the WCM and increase flux to the WCM from underlying aquifers. This potential increase to groundwater flux will act to reduce the potential of moving poorer quality deep groundwater of the Walloon Coal Measures into the overlying or underlying aquifers.

Potential Mobilisation of UCG Contaminants

UCG operations were conducted on Lot 40 DY85 within the area of PL253 by Linc Energy between 1999 and 2013 before the company went into liquidation. The site is now managed by the DNRMMRRD.

Contamination of the groundwater in the Springbok Sandstone and WCM is evident in data available for the site and groundwater monitoring conducted by Arrow for the Groundwater Monitoring Plan developed for the existing EA0001401 conditions. Contaminants include phenolic compounds, polynuclear aromatic hydrocarbons, BTEX compounds (benzene, toluene, ethylbenzene and xylene), and other hydrocarbon or organic compounds. As discussed previously, the UCG operation has caused connection and enhanced permeability between the target of the UCG operation, the Macalister seam package, and the overlying Springbok Sandstone. The connection between the Springbok Sandstone and the Macalister seam package may result in movement of the contaminants as a result of the exercise of underground water rights within the WCM, by either increasing or changing the flow within or between units.

Since 2020, Arrow Energy has undertaken quarterly groundwater monitoring, annual reporting and hydrogeological modelling. These activities, together with historical studies (e.g., AECOM, 2018; DNRME, 2020) and published literature (McKellar, 1999; Camp and White, 2015; Mallants et al., 2018; OGIA, 2016, 2021; Scott

et al., 2004) have supported the development of a robust understanding of the groundwater system, enabled characterisation of the extent of contamination, and improved understanding of contaminant fate and transport within and surrounding Lot 40 DY85.

The initial site conceptual model (SCM) and groundwater flow and contaminant transport models for Lot 40 DY85 and its surrounding were developed by GHD (2019 and 2020). These were subsequently refined and further advanced by AGE (2020 and 2023) to incorporate later data and uncertainty analysis. A comprehensive technical review on groundwater modelling and management in Arrow's previous EA amendment application was undertaken by CSIRO (2023) for the then Department of Environment and Science (DES). Based on this work, DES issued Environmental Authority EA0001401 (DES, 2023), dated 25 May 2023, for an initial 55 production wells (Kogan Creek batch) within PL253. Recommendations from CSIRO's review are incorporated in the EA conditions, including:

- Ongoing groundwater monitoring data coupled with updates in groundwater modelling to predict changes in groundwater water quality,
- Extending the simulation period and density of particle tracking in the models, and
- Installation of additional monitoring wells, with core collected and analysed for residual contamination, to better characterise the contaminant source term and use in the transport model.

Arrow Energy further developed a Groundwater Monitoring Plan (GMP) which includes a groundwater monitoring program, a SCM for Lot 40 DY85, groundwater flow and contaminant transport models, and an uncertainty analysis conducted by Intera (2024). The goal of the GMP is to fulfill the requirements of the condition Water 2 in the existing EA to ensure that potential impacts of Arrow's activities on groundwater systems are properly understood, predicted, and managed. Specifically, it aims to assess and model changes to groundwater flow, pressure, and contaminant behaviour; establish a robust conceptual and numerical understanding of the site; implement monitoring for early detection of any adverse changes; and define clear procedures for reporting and responding to groundwater impacts.

Arrow installed the four new Springbok Sandstone groundwater monitoring wells (Hopeland 34–37) in 2024 and collected 12 months of monitoring data from Q3 2024 to Q2 2025, with ongoing monitoring continuing since installation.

In 2025, Arrow updated the GMP (Arrow, 2025) and advanced the groundwater assessment and previous modelling (Intera 2024). This included updating the SCM to improve understanding of potential contaminant migration from Lot 40 DY85, revising and calibrating the groundwater flow model using all available data (including new monitoring from Hopeland 34–37), and incorporating uncertainty analysis to account for hydrogeological variability. In addition, particle tracking and contaminant transport modelling were undertaken and calibrated against observed water quality data, followed by predictive simulations to assess future contaminant behaviour with the 55 approved production wells (Kogan Creek batch). The updated GMP and modelling report (Intera, 2025), and the annual report (Arrow, 2025) were submitted to DETSI in December 2025.

A groundwater monitoring network, comprising a total of 35 monitoring bores, has been installed as shown in **Figure 16**.

since 2020. Arrow assumed monitoring responsibility for the DNRMMRRD owned monitoring bores from Q1 2024, with all previous data for these bores provided to Arrow.

Following each monitoring event, an investigation report was prepared and provided to DETSI, supporting a clearer understanding of the current status and historical trends of the contaminants, including how concentrations have changed over time. The investigation reports confirm that groundwater conditions at Lot 40 DY85 reflect a stable, legacy impacted system associated with historical UCG activities, with no evidence of continuing contaminant mobilisation or off site migration. Groundwater flow remains regionally east to west, with localised depressions within the former UCG area that continue to hydraulically contain contaminants. UCG related contaminants concentrations in the Springbok Sandstone and Macalister coal seam are consistent with historical trends and are generally stable or declining over time. Importantly, no UCG contaminants have been identified in the deeper Wambo coal seam package.

Groundwater contamination

Concentrations of UCG contaminants—including phenolic compounds (e.g. phenol, 2-methylphenol, and 3- and 4-methylphenol), polynuclear aromatic hydrocarbons (PAHs) (e.g. naphthalene), total recoverable hydrocarbons (TRH; silica gel clean-up fractions such as >C16–C34 and >C34–C40), total cyanide, and BTEXN (e.g. benzene, toluene, ethylbenzene, and xylene)—have generally been below the investigation limits or show no increasing trend outside Lot 40 DY85. These contaminants are largely confined to Lot 40 DY85, where concentrations in monitoring bores have remained stable or are generally decreasing over time.

GHD (2020) identified benzene and naphthalene as the primary contaminants associated with UCG operations. Other organic constituents, such as toluene, have been detected at generally low concentrations, well below their respective investigation limits. Accordingly, benzene and naphthalene are presented here as representative contaminants of concern (COCs), as they are sufficient to delineate the extent of groundwater impacts and were also adopted in the contaminant transport modelling. Time series of other COCs are presented in Attachment B.

Benzene, a known carcinogen, is the most mobile of the BTEX compounds due to its high solubility and low adsorption potential (Odermatt, 1994), while naphthalene is the most water-soluble PAH (Bayard et al., 2020). Both compounds exhibit the highest concentrations within their respective groups in the site dataset and have been used in previous studies (AGE, 2023). In addition, benzene degrades more slowly than other BTEX compounds (Prommer et al., 2002, 2003), making it a reliable indicator of the spatial extent of groundwater contamination.

Figure 17 and **Figure 18** present benzene and naphthalene concentration time series for Springbok Sandstone monitoring bores in and around Lot 40 DY85. The data indicate naphthalene already attenuated to below the limit of reporting (LOR = 1 µg/L, Investigation Limits > LOR) in the Springbok Sandstone. There are clear and consistent declining trends in contaminant concentrations across the site, reflecting gradual attenuation over time consistent with ongoing natural attenuation processes. Elevated concentration of benzene remains localised in the specific monitoring bore, NB01S, indicating proximity to residual source areas (i.e., gasifiers). However, this impact is spatially constrained and does not indicate plume expansion. It should be noted that benzene concentration at this location was initially increasing from 2021 to 2024, followed by a stabilising or declining trend since 2024. Importantly, benzene and naphthalene have not been detected in off-site monitoring bores, including downgradient locations. This provides additional confidence that contamination is not migrating beyond the site boundary and confirms that groundwater impacts remain contained within Lot 40 DY85.

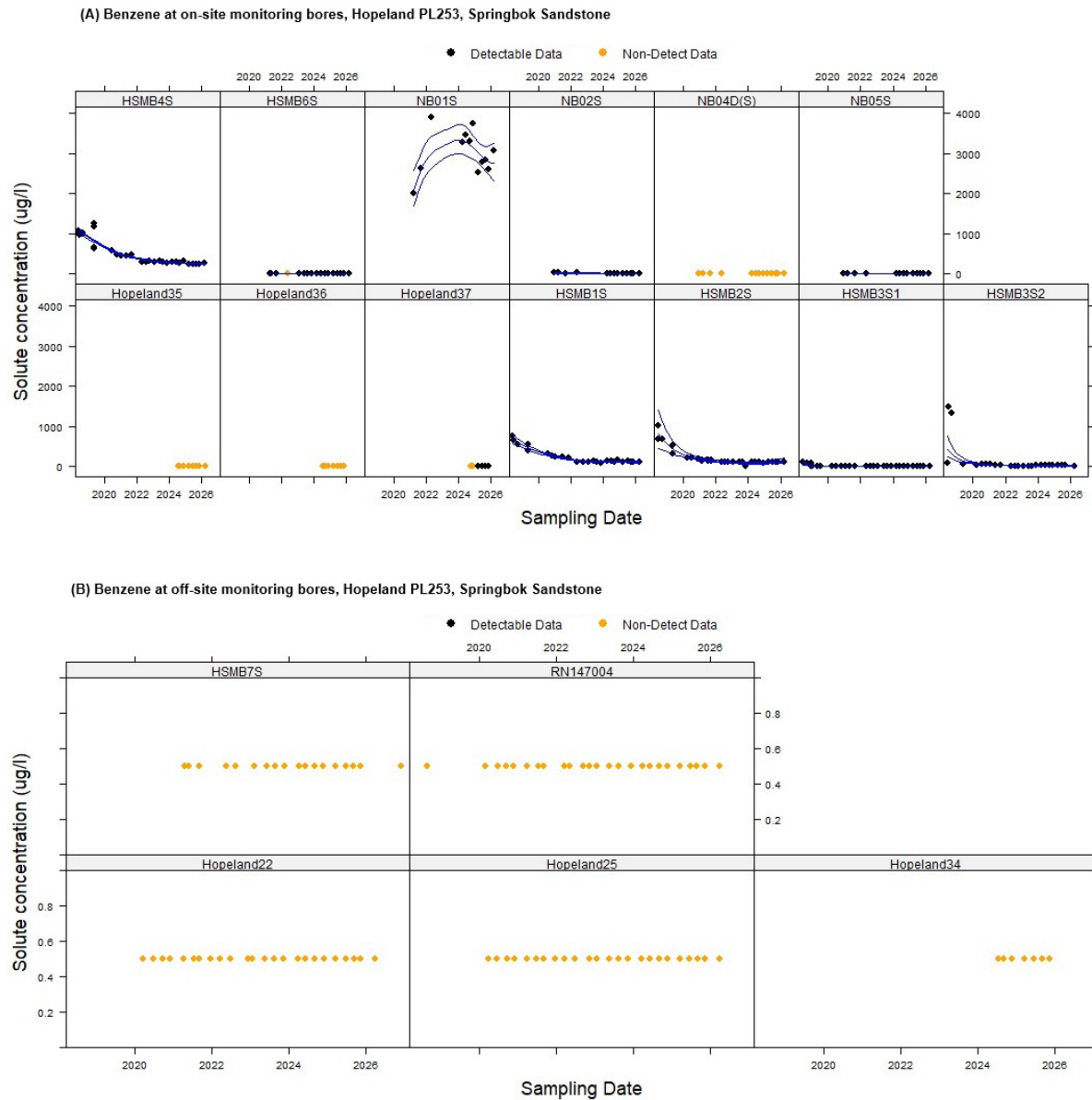


Figure 17 – Benzene concentration time series at monitoring bores screened in Springbok Sandstone, Hopeland PL253. (A) on-site monitoring bores, and (B) off-site monitoring bores

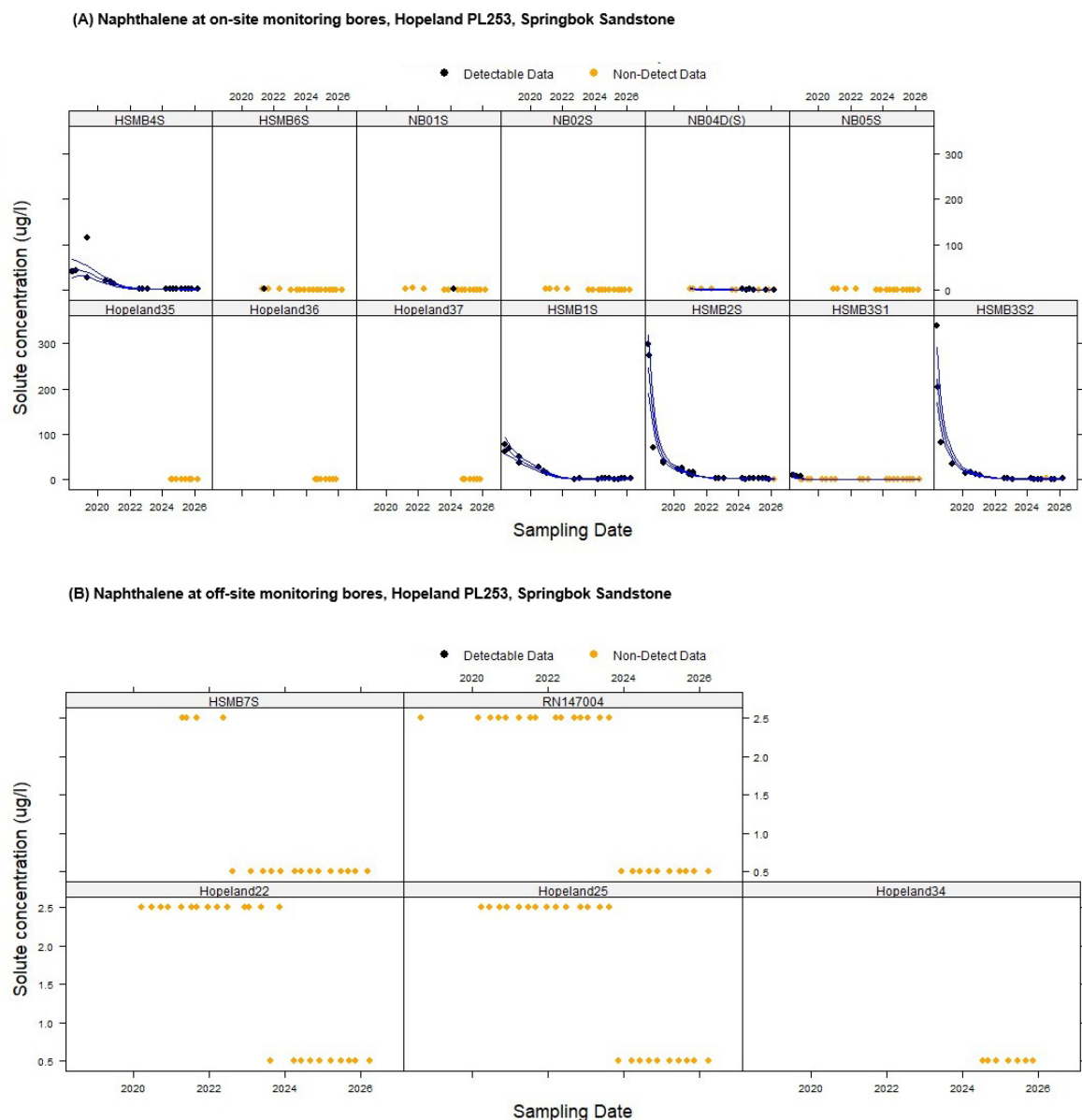


Figure 18 – Naphthalene concentration time series at monitoring bores screened in Springbok Sandstone, Hopeland PL253. (A) on-site monitoring bores, and (B) off-site monitoring bores

Figure 19 and Figure 20 present benzene and naphthalene concentration time series for Macalister coal seam monitoring bores in and around Lot 40 DY85. Similar to the Springbok Sandstone, naphthalene has attenuated to below the detection limit in the Macalister coal seam. Benzene has undergone long-term exponential attenuation, with concentrations in the majority of bores falling below detection limits in recent years. It is noted that benzene was detected above the investigation limit in only one monitoring bore outside Lot 40 DY85 (HSMB7D).

No benzene or naphthalene above the LOR have been reported in the monitoring bores installed in the Wambo coal seam.

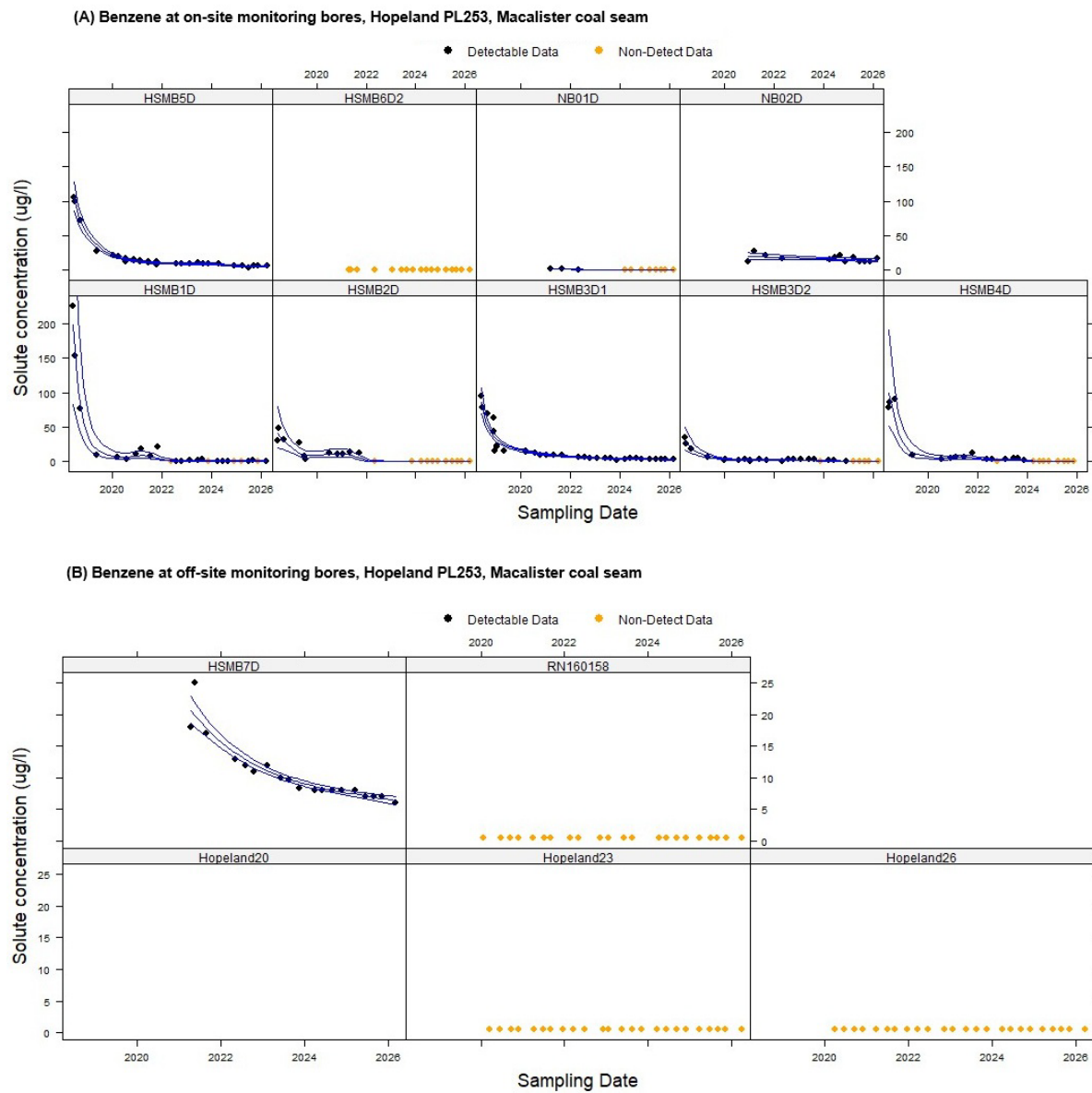


Figure 19 – Benzene concentration time series at monitoring bores screened in Macalister coal seam, Hopeland PL253. (A) on-site monitoring bores, and (B) off-site monitoring bores

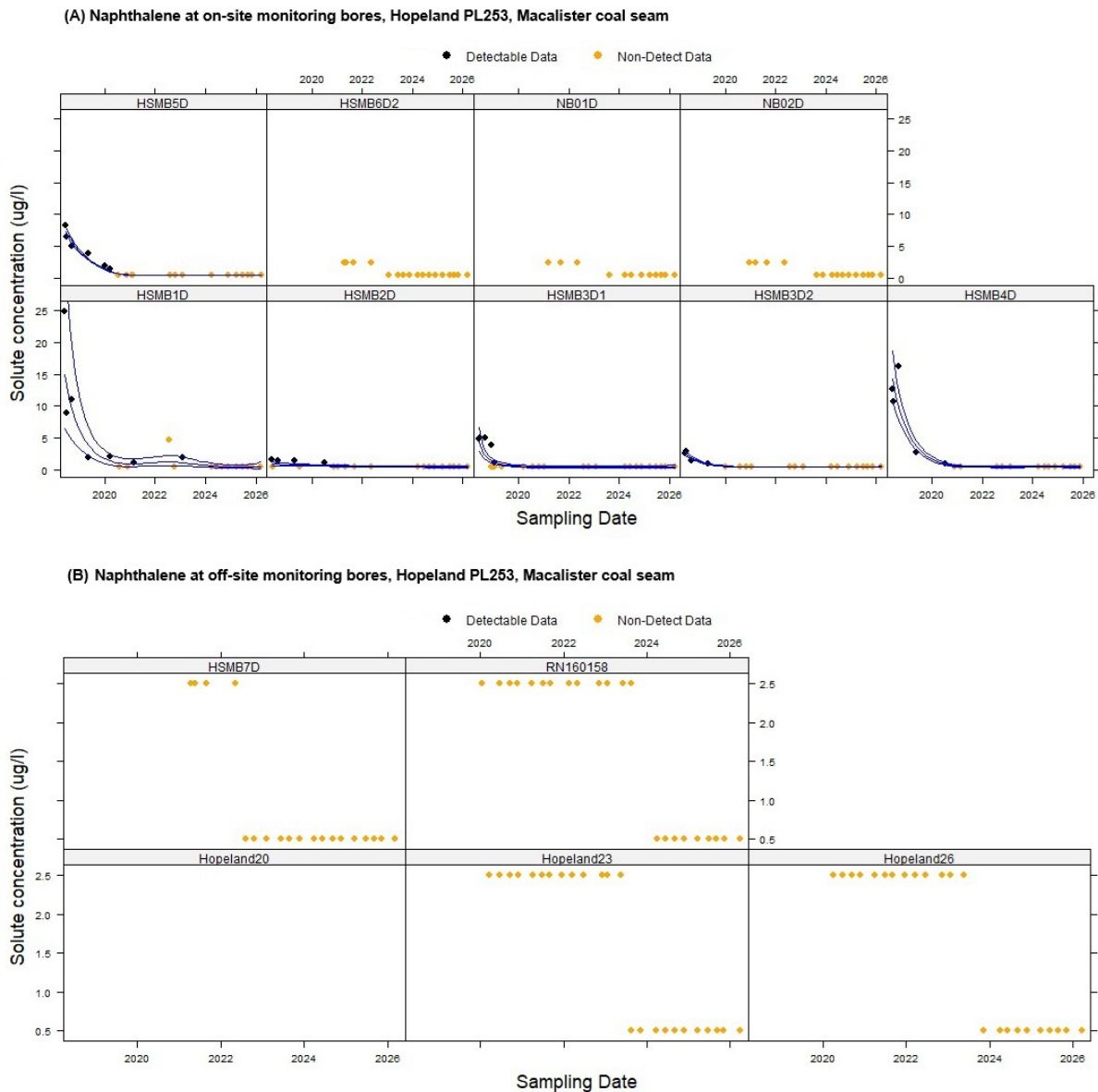


Figure 20 – Naphthalene concentration time series at monitoring bores screened in Macalister coal seam, Hopeland PL253. (A) on-site monitoring bores, and (B) off-site monitoring bores

Site conceptual model

The site conceptual model (SCM) synthesises geological, hydrogeological, operational, and monitoring information to describe how groundwater flows and how residual contaminants behave at the former UCG site (Lot 40 DY85) within PL253. It provides the foundation for groundwater flow and contaminant transport modelling and subsequent impact assessment.

Of primary hydrogeological importance are the Springbok Sandstone and the underlying WCM, particularly the Macalister coal seam. These units form the major aquifer and coal bearing interval influencing groundwater flow and contaminant behaviour at and around the former Lot 40 DY85 UCG site.

Although UCG activities have locally altered hydraulic properties near gasifiers, there is no evidence of laterally extensive faults or preferential pathways that would facilitate rapid off site groundwater flow. Indeed, analysis of well logs (e.g., FMI) and cores at from monitoring bores at the site (Intera, 2025) indicates that conductive fractures are primarily confined to interburden shales and siltstones, while coal seams and deeper sandstones are largely unfractured. The Macalister coal seam exhibits the highest fracture density, whereas the Springbok Sandstone and Wambo coal seam remain mostly intact. Small faults and partially conductive fractures in the Kogan and Wambo coal seams may locally enhance vertical connectivity but are unlikely to form permanent preferential pathways for groundwater or contaminant transport from the Macalister coal seam to shallower units.

UCG operations conducted between 1999 and 2013 caused localised modifications to the hydrogeological system within Lot 40 DY85. Thermal alteration, gasification voids, and depressurisation led to increased permeability and the introduction of hydrocarbon related contaminants in proximity to gasifier locations. These impacts were spatially restricted to the immediate UCG footprint and did not propagate regionally.

Following cessation of UCG activities, pressures have progressively recovered and monitoring data indicate stabilisation and improvement in groundwater conditions. The conceptual model concludes that UCG impacts as discrete, legacy features with finite contaminant mass and diminishing influence through time, rather than as ongoing or expanding sources.

Groundwater flow at the regional scale, in PL253, is directed predominantly toward the south to southwest, consistent with Surat Basin hydraulic gradients and the cumulative influence of long term coal seam gas production. These regional controls dominate groundwater behaviour beyond the immediate site. At the local scale, groundwater flow near Lot 40 DY85 reflects a combination of residual UCG effects and regional depressurisation. In the Springbok Sandstone, hydraulic heads tend to define inward directed gradients toward the site, promoting hydraulic containment of the affected area. Within the Macalister coal seam, groundwater flow is mainly directed west to southwest, in alignment with broader WCM flow patterns.

Vertical groundwater movement between the Springbok Sandstone and the Macalister coal seam is constrained by intervening low permeability strata and is governed by a consistent downward hydraulic gradient. Monitoring data indicate that groundwater levels in the Springbok Sandstone remain higher than those in the Macalister coal seam across the site and surrounding area. This downward gradient reduces the likelihood of upward contaminant migration from the coal seams into the overlying aquifer. Importantly, the conceptual model identifies no sustained or widespread upward gradients under historical, current, or proposed development conditions, reinforcing the understanding that vertical contaminant transfer is limited.

Long term groundwater monitoring demonstrates that elevated concentrations of contaminants are largely confined to the site and that off site monitoring bores generally report concentrations below laboratory limits of reporting, except for HSMB7D, where benzene concentrations have been detected above applicable investigation limit but exhibit an exponential attenuation trend. Temporal trends show a sustained decline in detected concentrations—particularly since 2018–2020—indicating plume stability and attenuation rather than expansion.

The conceptual model incorporates natural attenuation processes as a key mechanism governing the long term behaviour of residual contamination. These processes include sorption to coal and fine grained sediments, biodegradation, and dispersion within a low velocity groundwater system. Residual contaminant sources are conceptualised as finite and progressively depleting. While small areas near former gasifiers may retain detectable concentrations for extended periods, the available evidence indicates that these zones do not act as strong or persistent drivers of plume migration beyond the site boundary.

Integration of geological controls, groundwater flow patterns, monitoring data, and historical operational context leads to a conceptual understanding that overall groundwater risk is low and diminishing. Hydraulic gradients favour containment, vertical connectivity is limited, and contaminant sources are finite and attenuating. Key conceptual risk conclusions are that:

- off site lateral migration is slow and restricted,
- upward vertical migration is unlikely,
- concentrations are declining with time, and
- proposed CSG development by Arrow Energy does not fundamentally alter the controlling hydrogeological processes.

This conceptual understanding provides a strong and coherent foundation for the numerical groundwater flow and contaminant transport modelling and supports the conclusion that long term risks to surrounding groundwater resources are minimal.

Groundwater flow modelling and contaminant fate and transport modelling

Groundwater flow modelling and contaminant fate and transport modelling has been undertaken to assess the risk of migration of contaminants as a result of Arrow's proposed development, as presented in the report by Worley Consulting (2026) in **Appendix E** of this EA amendment application.

A total of 364 calibrated model realisations met the convergence and performance criteria. Key characteristics of the groundwater flow model include:

- representation of both regional and local groundwater flow controls,
- explicit simulation of vertical hydraulic gradients between aquifers and coal measures,
- incorporation of temporal changes in stresses associated with development and recovery, and
- provision of a stable and defensible foundation for particle tracking and contaminant transport simulations.

The contaminant transport modelling focused on benzene and naphthalene, which were identified as the primary contaminants of concern associated with historical UCG operations. The contaminant model incorporates finite source zones, sorption, degradation, and other natural attenuation processes consistent with the updated conceptual understanding of the site.

Collectively, results from groundwater level predictions, hydraulic gradient assessments, particle tracking, and contaminant transport modelling demonstrate that the proposed 55 wells result in minor localised incremental changes relative to the already approved development. No material changes are predicted in groundwater flow directions, vertical gradients, contaminant migration, or contaminant depletion timing. The ensemble of 364 contaminant transport predictions indicate continued decline in benzene and naphthalene concentrations across both the Springbok Sandstone and Macalister coal seam formations, with concentrations predicted to remain confined to areas proximal to former gasifier locations, consistent with the observed monitoring data. Predicted depletion timing indicates that, at the ensemble median (P50), benzene concentrations fall below detectable limits by approximately 2049 in the Springbok Sandstone and approximately 2035 in the Macalister coal seam, while naphthalene concentrations fall below detectable limits by approximately January 2027 and April 2024, respectively. Upper-bound (P95) predictions indicate that it is very unlikely for benzene depletion to extend beyond approximately 2053 for Springbok Sandstone or 2042 for Macalister coal seam, and for naphthalene beyond approximately 2037 and mid-2024, respectively. Importantly, the predicted timing of contaminant depletion is unchanged between different scenarios, indicating that the proposed 55 well development does not materially affect contaminant attenuation rates or plume behaviour. The assessment indicates that the proposed development is unlikely to increase the risk of contaminant migration off-site of Lot 40 DY85 or compromise long-term groundwater recovery and containment of residual contamination associated with the former Hopeland UCG site.

Accordingly, the assessment concludes that the proposed development is unlikely to result in unacceptable groundwater impacts or increased risk of off site contamination. Continued groundwater monitoring is recommended to confirm predicted trends and support adaptive management.

f) strategies for avoiding, mitigating or managing the predicted impacts on the environmental values or impacts on the quality of groundwater mentioned in paragraph (e)

Potential impacts on groundwater systems for Arrows tenements including PL253 will be managed through a hierarchy of design, mitigation, monitoring and management options that form the basis for an adaptive management framework.

Arrow will implement the commitments it made in the EIS and updated in the SREIS in order to effectively manage and monitor the effects of CSG water extraction and related activities on local and regional groundwater values. These commitments are consistent with the existing legislative framework, specifically Chapter 3 of the

Water Act and the EPBC Act Water Trigger. These legislative requirements are further detailed in the 2025 Surat CMA UWIR (Part IV, where applicable to the SGP) and Arrow's Water Resource Monitoring and Management Plan (WRMMP) (the direct links to these reports were provided above).

The commitments summarised below will be adapted to allow management decisions based on an increased knowledge developed over time.

Design and planning commitments

The following measures have been developed to manage the potential impacts on groundwater values during the design and planning phase of the project:

- Apply appropriate international, Australian and industry standards and codes of practice for the handling of hazardous materials (such as chemicals, fuels, and lubricants).
- A baseline assessment plan to establish benchmark data in registered third party bores (where possible) prior to the commencement of Arrow extraction activities in the PL253 area in accordance with the Water Act 2000, including the preparation and implementation of a groundwater monitoring and investigation strategy.
- Consider local biological, groundwater and surface water conditions when identifying sites for CSG infrastructure including storages.
- Consider local groundwater conditions when identifying sites and routes for the installation of buried infrastructure (e.g. gathering lines).
- Avoid unnecessary impervious surface coverings and minimise land footprint and vegetation clearing when designing facilities.
- Develop make-good agreements that include the outcome of bore assessments and implementation of make-good measures in the event that impaired capacity occurs.
- Ongoing collection of relevant geological and hydrogeological data from existing and future production wells, monitoring bores and registered third party bores (where possible) together with information collated collaboratively with other proponents and regulatory authorities.
- Maintain water balance models for long-term planning and management of CSG water. Review and update modelling in alignment with the production forecasting schedule.

Construction commitments

The following mitigation, monitoring and management measures have been developed to address the potential impacts on groundwater values during the construction phase of the project:

- Avoid disturbance of contaminated soil and groundwater when it is identified or observed during intrusive works.
- Manage disturbed contaminated soil or groundwater that cannot be avoided through physical investigation; manage quantification of the type, severity and extent of contamination; and remediate or manage in accordance with the relevant Queensland Government's legislation and guidelines.
- Construct all monitoring bores, water bores or production wells in accordance with the latest version of the *Minimum Construction Requirements for Water Bores in Australia*, the *Minimum Standards for the Construction and Reconditioning of Water Bores that Intersect the Sediments of Artesian Basins in Queensland*, or the *Code of Practice for the Construction and Abandonment of Petroleum Wells and Associated Bores in Queensland*, as appropriate.
- Select drilling fluids to minimise potential impacts to groundwater. Oil based drilling fluids will not be used.
- Ensure well drilling is monitored by a suitably qualified personnel to ensure aquifers are accurately identified so wells are constructed correctly to protect groundwater by isolating aquifers.

Operational commitments

The following measures have been developed to address the potential impacts on groundwater values during the operations phase of the project:

- Carry out corrective actions immediately upon the identification of any contamination of soil or groundwater that has occurred as a result of project activities.
- Manage potential impacts to identified spring complexes by:
 - Supporting the identification of specific aquifers that serve as a groundwater source for discharge springs
 - Assessing springs that are predicted to be subject to unacceptable impacts through the source aquifer
 - Developing monitoring and mitigation strategies to avoid or minimise unacceptable impacts
- Implement a well integrity management system during commissioning and operation of production wells.
- Minimise impacts of groundwater depressurisation on sensitive areas (e.g. groundwater dependent ecosystems).
- Implement a procedure for investigating any impaired capacity of third party bores that may become evident through monitoring and landholder liaison.
- If impaired capacity is confirmed (bore can no longer produce quality or quantity of groundwater for the authorised purpose, and the impact is due to CSG activities), implement make-good measures in accordance with the Water Act.

Decommissioning commitments

All production wells and monitoring bores will be repaired (in the event of a failed integrity test) or decommissioned (at the end of their operating life span) in accordance with either the Petroleum and Gas (Production and Safety) Act 2004 and Water Act 2000 and relevant regulations, as appropriate. Should production wells or monitoring bores be converted to other uses, it will be done in accordance with relevant regulations.

Regional groundwater monitoring program

A water monitoring strategy (WMS) is included in the 2025 Surat CMA UWIR (OGIA, 2025). The WMS includes an integrated regional groundwater monitoring network to collect data on water pressure and water quality in the Surat CMA across a network of monitoring points and sites, monitoring all major aquifers and aquitards in the Surat CMA. The purposes of the WMS are to:

- Identify past groundwater impacts from CSG, conventional oil and gas, and coal mining in the Surat Basin;
- Improve knowledge about the groundwater flow system, which in turn improves ability to predict future impacts; and
- Support the evaluation of impact management strategies.

The WMS assigns requirements to petroleum tenure holders to establish the regional monitoring network, undertake routine monitoring and reporting of results and report water production data from petroleum and gas wells. The OGIA will routinely assess the monitoring results and report on these annually. Arrow is compliant with the water monitoring strategy and spring impact management strategy as prescribed in the 2025 Surat CMA UWIR (OGIA, 2025). This process has resulted in the collection of a significant data set describing baseline groundwater pressure and quality for reference purposes as required for the larger area and not limited to PL253. Arrow will continue to implement the elements of the UWIR WMS in future versions of the UWIR.

Arrow has installed a comprehensive regional groundwater monitoring network (that satisfies Arrow's obligations as described in the groundwater impact reports in the EIS/SREIS and confirmed in Chapter 12 of the 2025 UWIR) to:

- Establish baseline groundwater level and groundwater quality conditions

- Assess natural variation (i.e. seasonal variations) in groundwater levels
- Monitor groundwater levels during the operations phase
- Establish suitable datum levels for each aquifer system
- Target sensitive areas where more frequent monitoring and investigation is required (e.g. groundwater dependent ecosystems)
- Monitor groundwater drawdown as a result of CSG extraction
- Monitor impacts in accordance with the Water Act and regulations
- Provide an 'early warning system' that identifies areas potentially impacted by project activities to allow early intervention and adaptive management.

Commitments in relation to Lot 40DY85

Modelling allows Arrow to explore potential impacts in the future under different scenarios in order to assess the risk posed by its activities. It is important to understand that models do not represent a prediction of what may happen in the future. Rather, they determine the potential outcomes under a set of assumed conditions and are therefore a powerful tool to assess potential change, to indicate risk and to identify scenarios that have a low likelihood of occurring. The model work undertaken by Worley Consulting (**Appendix E**) shows that:

- groundwater movement away from Lot 40 DY85 is slow as it has been in all simulations since 2018
- Arrow's proposed development on PL253 will have no significant impact on either the rate of groundwater movement or the quality of groundwater.

Given the above, the focus of Arrow's future management of groundwater on PL253 is appropriately placed on managing risk, consistent with the existing EA0001401 conditions. The following will be undertaken:

- Arrow will maintain and sample on a quarterly basis the groundwater monitoring bores on- and off-site of Lot 40 DY85. These bores are appropriately placed to operate as an early warning trigger mechanism.
- If the sampling results from any of the 35 monitoring bores on- or off-site of Lot 40 DY85 exceed any of the trigger limits specified in the EA, Arrow will:
 - notify DETSI within forty-eight (48) hours of receiving the results
 - complete an investigation into the potential for environmental harm
 - provide a written report of the investigation to DETSI within 10 days of receiving the results for the quarterly event, with the report outlining details of the investigation conducted and proposed actions to prevent environmental harm.
- Groundwater will continue to be sampled and reported to DETSI on an annual basis as per the existing Groundwater Monitoring Plan.
- The groundwater model will be updated on an annual basis to include the current year of sampling results and predictions with regards to groundwater movement and particle tracking in the Springbok Sandstone and Macalister. This information will be included in the above-mentioned Groundwater Monitoring Plan.

Attachment A – Groundwater quality results

Bore ID	Formation	Date	pH	EC (µS/cm)	TDS (mg/L)	Na (mg/L)	K (mg/L)	Ca (mg/L)	Mg (mg/L)	HCO ₃ as CaCO ₃ (mg/L)	CO ₃ as CaCO ₃ (mg/L)	OH as CaCO ₃ (mg/L)	Cl (mg/L)	SO ₄ (mg/L)
Orana 3 spring	Cenozoic sediments	30/11/2016	5.4	151.7	146	21	5	1	1	4	<1	<1	30	9
Hopeland-16	Westbourne Formation	7/11/2025	6.3	48400	27700	8000	36	591	753	306	<1	<1	14200	99
33553	Springbok Sandstone	15/08/2019	8.1	7760	5040	1620	10	52	10	325	<1	<1	2580	<1
87505	Springbok Sandstone	24/10/2019	7.2	29000	20000	6370	26	460	224	105	<1	<1	10700	2
87897	Springbok Sandstone	30/04/2019	8	3840	2500	848	4	10	<1	502	61	<1	932	<1
107857	Springbok Sandstone	2/03/2020	7	9440	5410	1870	11	94	28	234	<1	<1	3070	<1
107868	Springbok Sandstone	20/08/2018	8.3	10700	6960	2140	8	53	14	359	<1	<1	3520	<1
15868	Springbok Sandstone	16/11/2018	8.2	6410	4170	1270	5	56	34	946	<1	<1	1530	<1
147004	Springbok Sandstone	30/03/2026	7	10026	6150	2240	15	90	76	525	<1	<1	3540	15
Hopeland 22	Springbok Sandstone	28/03/2026	8.4	7125	4510	1380	94	58	9	127	19	<1	2450	<1
Hopeland 25	Springbok Sandstone	28/03/2026	5.8	12332	9100	2230	76	174	44	<1	<1	<1	4670	<1
Hopeland 34	Springbok Sandstone	15/11/2025	6.9	13720	8920	2510	531	215	51	4	<1	<1	5090	<1
Hopeland 35	Springbok Sandstone	29/03/2026	9	15081	10900	2140	1230	124	112	62	<1	<1	5370	<1
Hopeland 36	Springbok Sandstone	15/11/2025	8.6	4876	2950	1070	70	5	8	341	85	<1	1400	<1
Hopeland 37	Springbok Sandstone	7/11/2025	11	24454	14400	1130	5640	222	<1	<1	129	104	7250	35
HSMB1S	Springbok Sandstone	31/03/2026	6.8	12923	9880	2270	339	140	39	31	<1	<1	4960	<1
HSMB2S	Springbok Sandstone	13/03/2026	9.8	3309	3360	1080	102	<1	<1	344	151	<1	1650	1
HSMB3S1	Springbok Sandstone	31/03/2026	5.4	19155	16300	3370	214	505	110	<1	<1	<1	7190	<1

Bore ID	Formation	Date	pH	EC (µS/cm)	TDS (mg/L)	Na (mg/L)	K (mg/L)	Ca (mg/L)	Mg (mg/L)	HCO ₃ as CaCO ₃ (mg/L)	CO ₃ as CaCO ₃ (mg/L)	OH as CaCO ₃ (mg/L)	Cl (mg/L)	SO ₄ (mg/L)
HSMB3S2	Springbok Sandstone	31/03/2026	6.8	25230	20700	4410	361	688	193	25	<1	<1	9300	<1
HSMB4S	Springbok Sandstone	15/03/2026	7	16280	10600	1830	1480	246	26	44	<1	<1	5110	<1
HSMB6S	Springbok Sandstone	16/03/2026	6.8	31100	19100	4960	28	667	254	<1	<1	<1	9090	<1
HSMB7S	Springbok Sandstone	12/03/2026	8.7	5920	4350	1490	192	51	6	49	<1	<1	2640	<1
NB01S	Springbok Sandstone	13/03/2026	6.8	18700	12600	3120	87	418	86	6	<1	<1	6020	<1
NB02S	Springbok Sandstone	15/03/2026	11	21671	14200	3620	111	688	<1	16	<1	<1	6970	8
NB04D(S)	Springbok Sandstone	12/03/2026	7.9	10390	5880	1920	24	62	20	80	<1	<1	3230	2
NB05S	Springbok Sandstone	13/03/2026	11	5070	5000	1710	53	21	<1	76	36	<1	2840	9
8685	Walloon Coal Measures	20/06/1989	9	3500	2370	1000	2.8	4.1	3.1	1600	145		410	4
10790	Walloon Coal Measures	9/04/2021	8.5	5940	3560	661	26	<1	1690	1	1470	5	6	4
10898	Walloon Coal Measures	1/02/2018	8.8	3880	2520	970	4	10	6	973	202	<1	600	<1
13600	Walloon Coal Measures	4/03/2020	7.4	3873	2270	955	4	3	1	1310	167	<1	384	<1
15811	Walloon Coal Measures	15/07/2021	9	2460	1460	616	106	<1	474	<1	633	3	2	<1
15868	Walloon Coal Measures	26/11/2020	8.1	7610	4190	898	<1	<1	2130	<1	1550	7	72	51
19988	Walloon Coal Measures	20/09/2017	8.4	3490		914	2	4	1	1300	40		419	<1
24466	Walloon Coal Measures	2/04/2018	8.6	2500	1620	578	2	3	1	685	49	<1	420	<1
24467	Walloon Coal Measures	3/09/2014	8.6	2780	1810	721	3	6	2	821	50	<1	466	<1
24469	Walloon Coal Measures	12/12/2016	7.8	12400	8060	2540	12	170	63	258	<1	<1	4400	<1

Bore ID	Formation	Date	pH	EC (µS/cm)	TDS (mg/L)	Na (mg/L)	K (mg/L)	Ca (mg/L)	Mg (mg/L)	HCO ₃ as CaCO ₃ (mg/L)	CO ₃ as CaCO ₃ (mg/L)	OH as CaCO ₃ (mg/L)	Cl (mg/L)	SO ₄ (mg/L)
24479	Walloon Coal Measures	17/06/2019	8.8	4640	3020	1030	6	8	3	923	137		972	1
24504	Walloon Coal Measures	19/06/2019	8.2	2693	1920	664	2	10	8	695	30		580	<1
37177	Walloon Coal Measures	10/04/2018		3640	2370	763	9	36	16	808	<1	<1	728	17
38191	Walloon Coal Measures	12/12/2016	8.2	2650	1720	697	2	5	2	1080	54	<1	293	<1
66146	Walloon Coal Measures	13/04/2018		14500	9420	2870	11	31	18	525	118	<1	4590	<1
107868	Walloon Coal Measures	20/08/2018	7.3	10700	6690	2140	8	53	14	359	<1	<1	3520	<1
119075	Walloon Coal Measures	24/10/2013		2990	1690	511	2	67	45	484	<1	<1	766	32
119484	Walloon Coal Measures	1/06/2016	8.6	3780	2460	998	3	5	1	1400	146	<1	417	<1
147001	Walloon Coal Measures	5/02/2018	8.6	10400	6760	2200	8	34	10	50	62	<1	3300	<1
147607	Walloon Coal Measures	5/04/2018	8.6	4460	1450	474	1	2	1	686	61	<1	337	<1
160158	Walloon Coal Measures	30/03/2026	8.3	3318	2080	865	3	4	1	828	62	<1	700	2
Hopeland 21	Walloon Coal Measures	30/03/2026	9.1	4352	2690	1070	46	3	2	685	223	<1	958	1
Hopeland 23	Walloon Coal Measures	28/03/2026	6.9	2152	1340	504	3	4	<1	412	72	<1	464	<1
Hopeland 24	Walloon Coal Measures	29/03/2026	8.8	3136	1950	783	21	3	1	949	121	<1	559	1
Hopeland 26	Walloon Coal Measures	27/03/2026	5.7	2498	1560	619	18	4	1	611	54	<1	673	2
Hopeland 27	Walloon Coal Measures	28/03/2026	8.4	2903	1820	734	15	3	1	980	101	<1	466	2
H SMB1D	Walloon Coal Measures	14/03/2026	8.2	7100	3630	1190	202	13	3	441	45	<1	1940	1

Bore ID	Formation	Date	pH	EC (µS/cm)	TDS (mg/L)	Na (mg/L)	K (mg/L)	Ca (mg/L)	Mg (mg/L)	HCO ₃ as CaCO ₃ (mg/L)	CO ₃ as CaCO ₃ (mg/L)	OH as CaCO ₃ (mg/L)	Cl (mg/L)	SO ₄ (mg/L)
HSMB2D	Walloon Coal Measures	14/03/2026	8.1	5553	2890	1040	115	8	2	602	73	<1	1400	<1
HSMB3D1	Walloon Coal Measures	15/03/2026	8.6	3419	1820	644	37	4	1	599	86	<1	776	1
HSMB3D2	Walloon Coal Measures	16/03/2026	8.3	2642	2410	912	89	6	2	1020	85	<1	861	<1
HSMB4D	Walloon Coal Measures	13/11/2025	7.4	15911	9930	2400	1480	70	13	176	<1	<1	5390	<1
HSMB5D	Walloon Coal Measures	26/03/2026	8.7	2350	1400	551	35	2	<1	575	82	<1	492	<1
HSMB6D2	Walloon Coal Measures	16/03/2026	8.8	6890	3790	1450	96	4	3	823	153	<1	1700	<1
HSMB7D	Walloon Coal Measures	12/03/2026	8.7	8030	4070	1460	208	5	5	316	51	<1	2370	1
NB01D	Walloon Coal Measures	16/03/2026	8.1	5312	3190	1200	26	8	4	1880	188	<1	711	<1
NB02D	Walloon Coal Measures	13/03/2026	7.2	7120	3960	1750	22	14	6	2360	320	<1	1060	<1
Unregistered	Walloon Coal Measures	9/07/2013		3740	2270	963	3	2	1	1390	92	<1	463	29
Unregistered	Walloon Coal Measures	31/01/2018		4120	2680	1060	3	6	1	1290	252	<1	461	<1
Hopeland 5T	Walloon Coal Measures	17/09/2017	8.3	6180	3560	1450	6	7	1	1100			1400	<1
Hopeland 6	Walloon Coal Measures	17/09/2017	8.3	5850	3230	1340	8	9	2	961			1340	<1
Hopeland 7	Walloon Coal Measures	17/09/2017	8.4	6120	5010	1380	17	9	2	1040			1380	<1
Hopeland 8	Walloon Coal Measures	17/09/2017	8.4	5920	3350	1300	5	9	1	948			1360	<1
Hopeland 9	Walloon Coal Measures	17/09/2017	8.4	6710	3690	1560	7	11	2	984			1590	<1
172327	Hutton Sandstone	5/12/2017	8.2	3180	2070	798	2	2	<1	1460	50	<1	166	1

Attachment A – Time series of other Contaminants of Concern (COCs) investigated in Lot 40 DY85

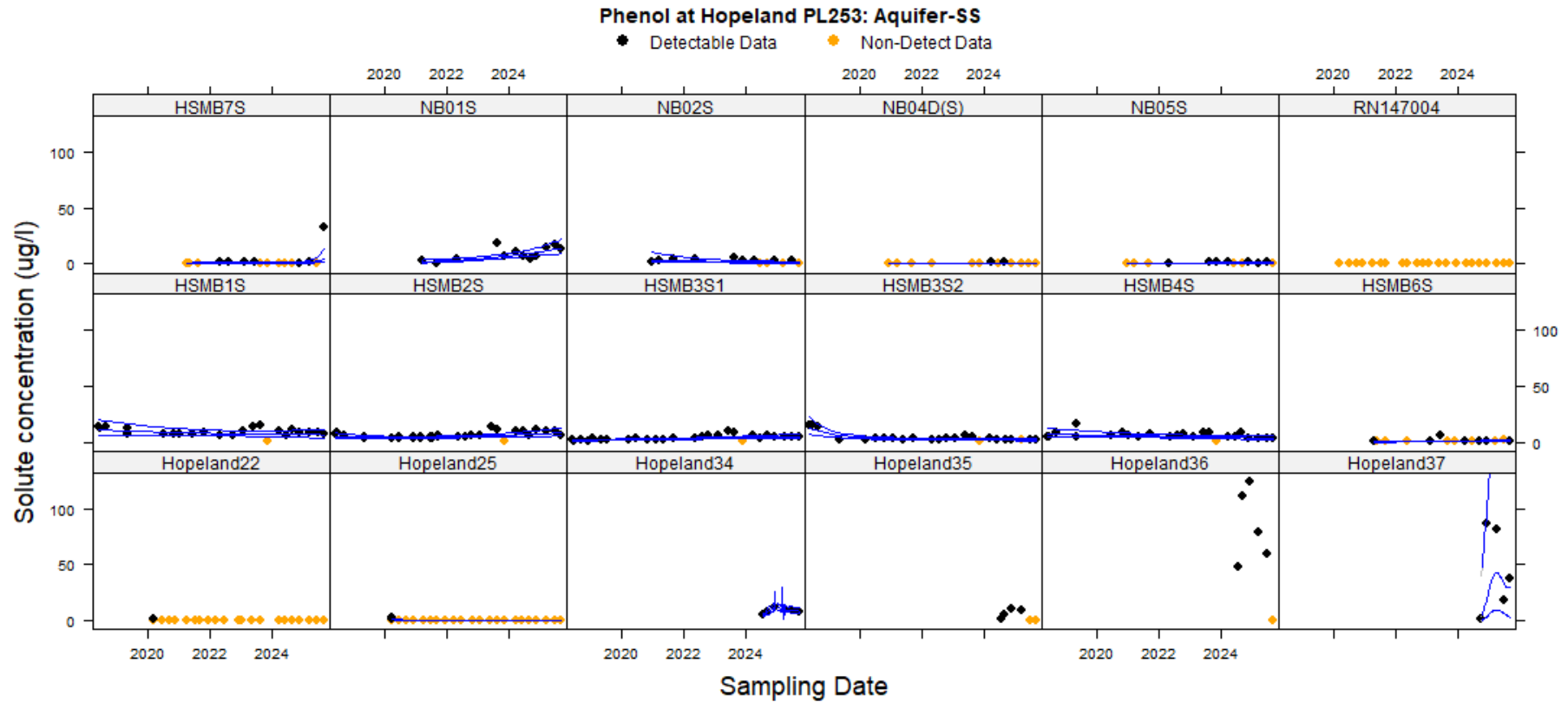


Figure 1: Phenol (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Springbok Sandstone

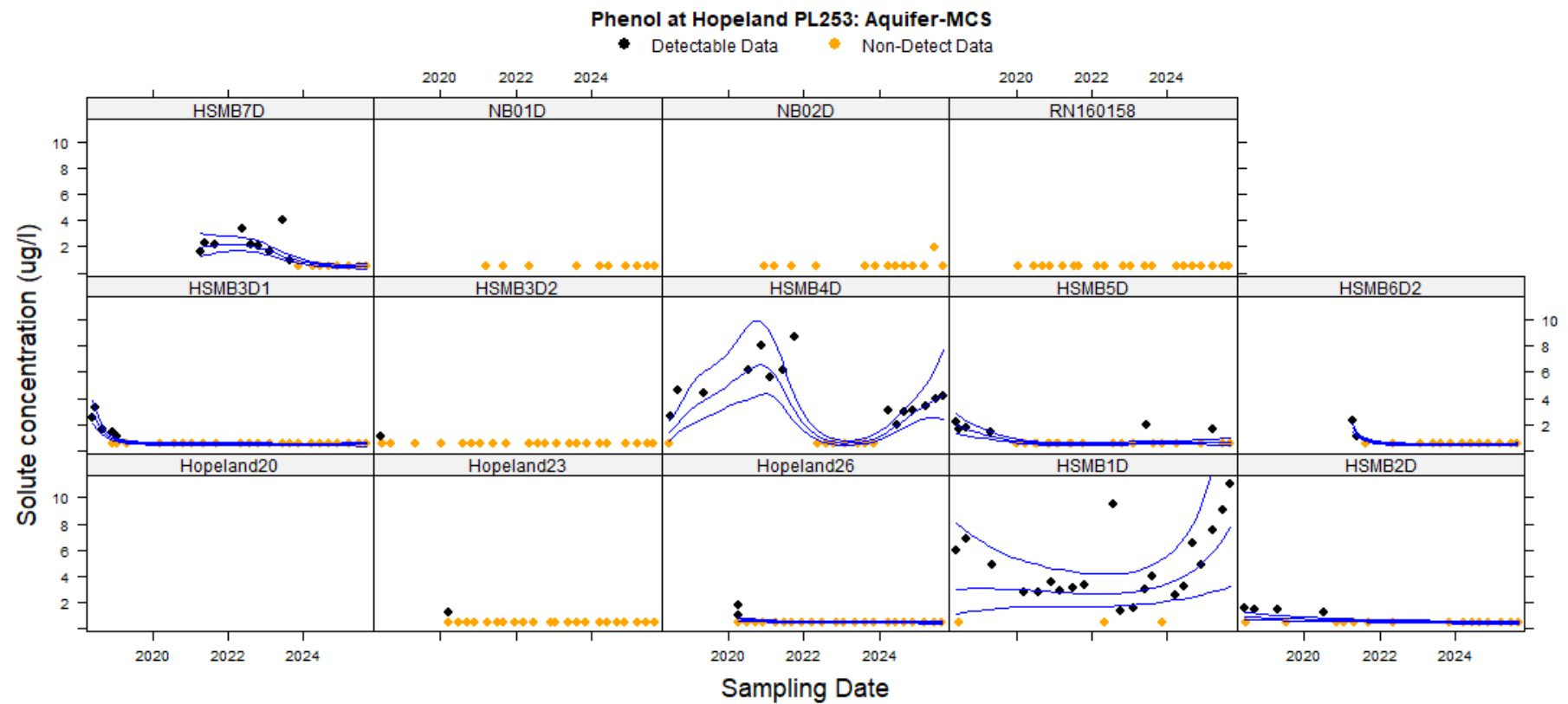


Figure 2: Phenol (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Macalister coal seam

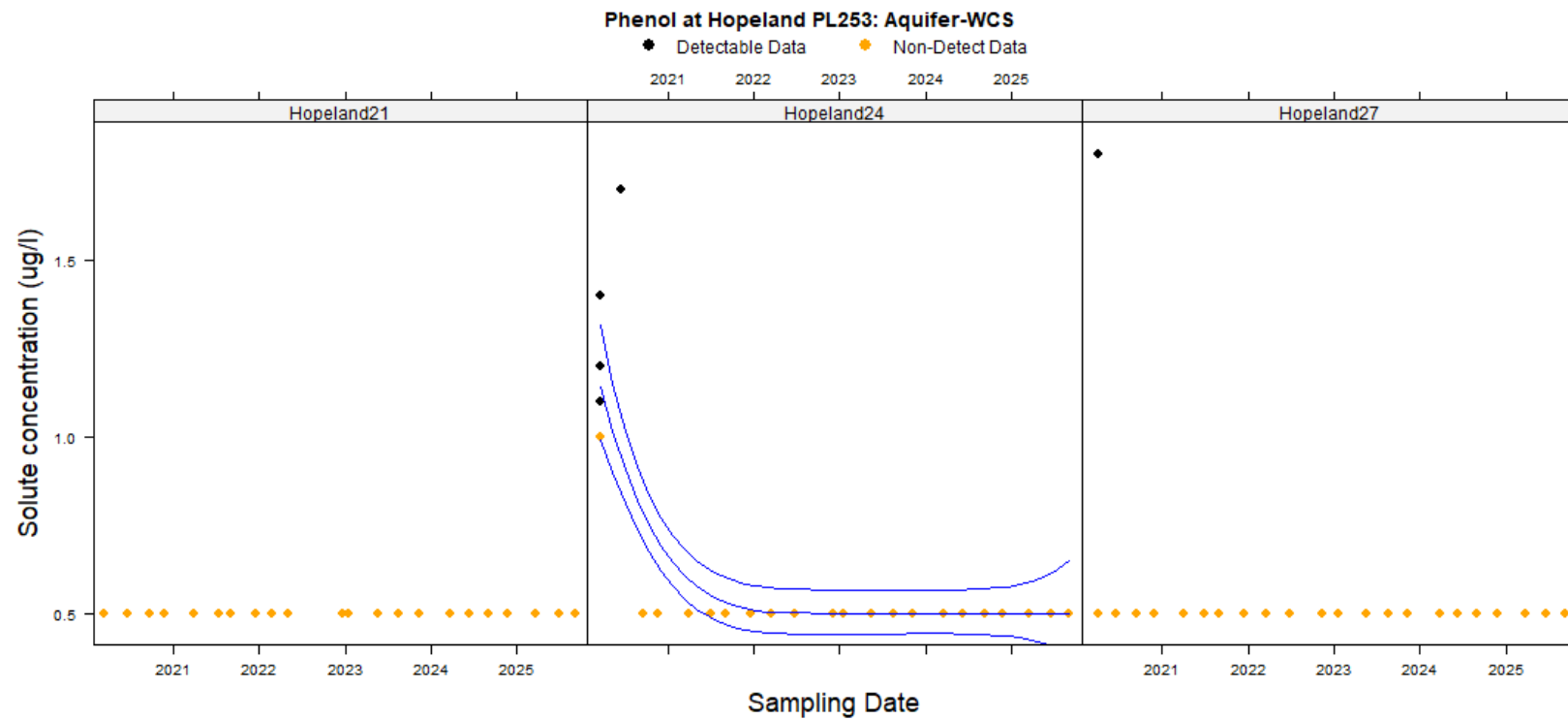


Figure 3: Phenol (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Wambo coal seam

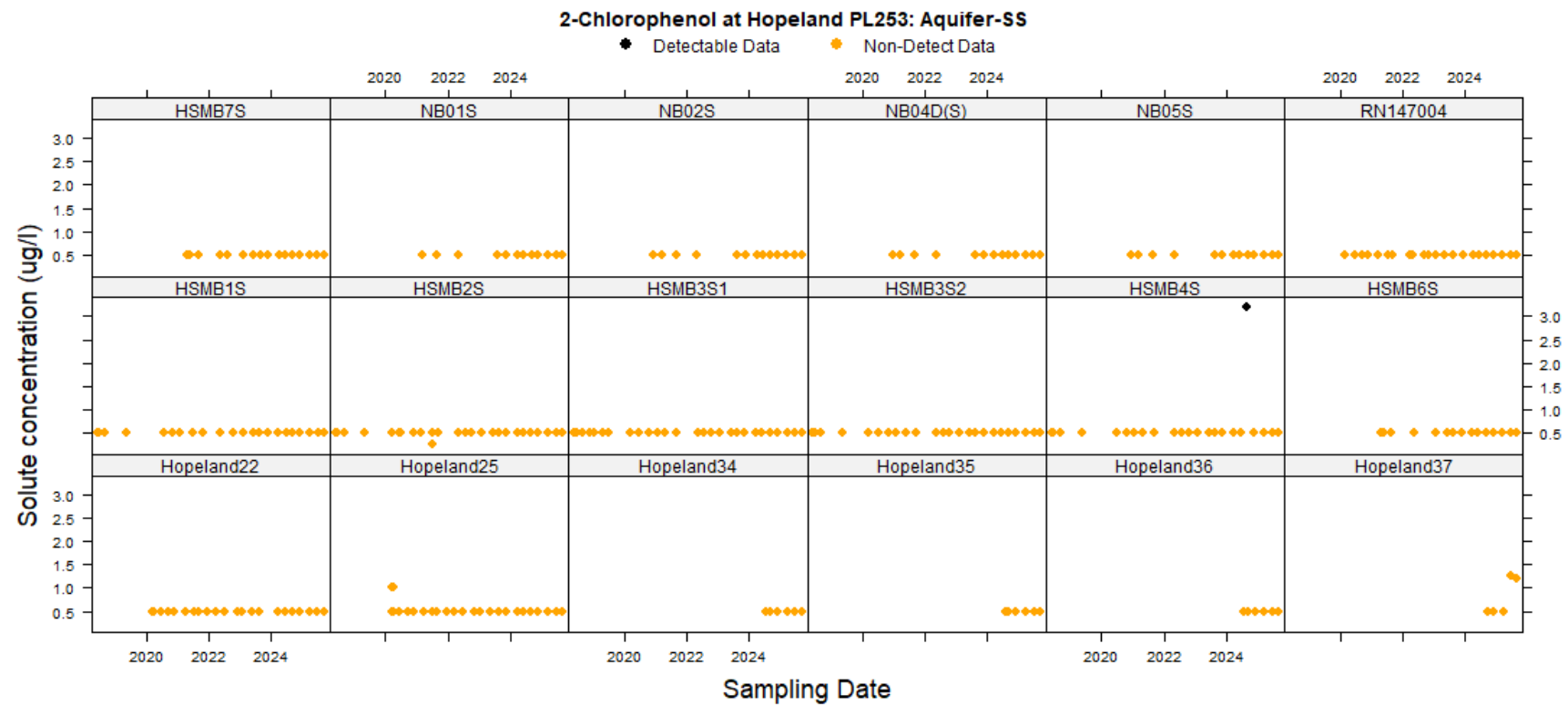


Figure 4: 2-Chlorophenol (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Springbok Sandstone

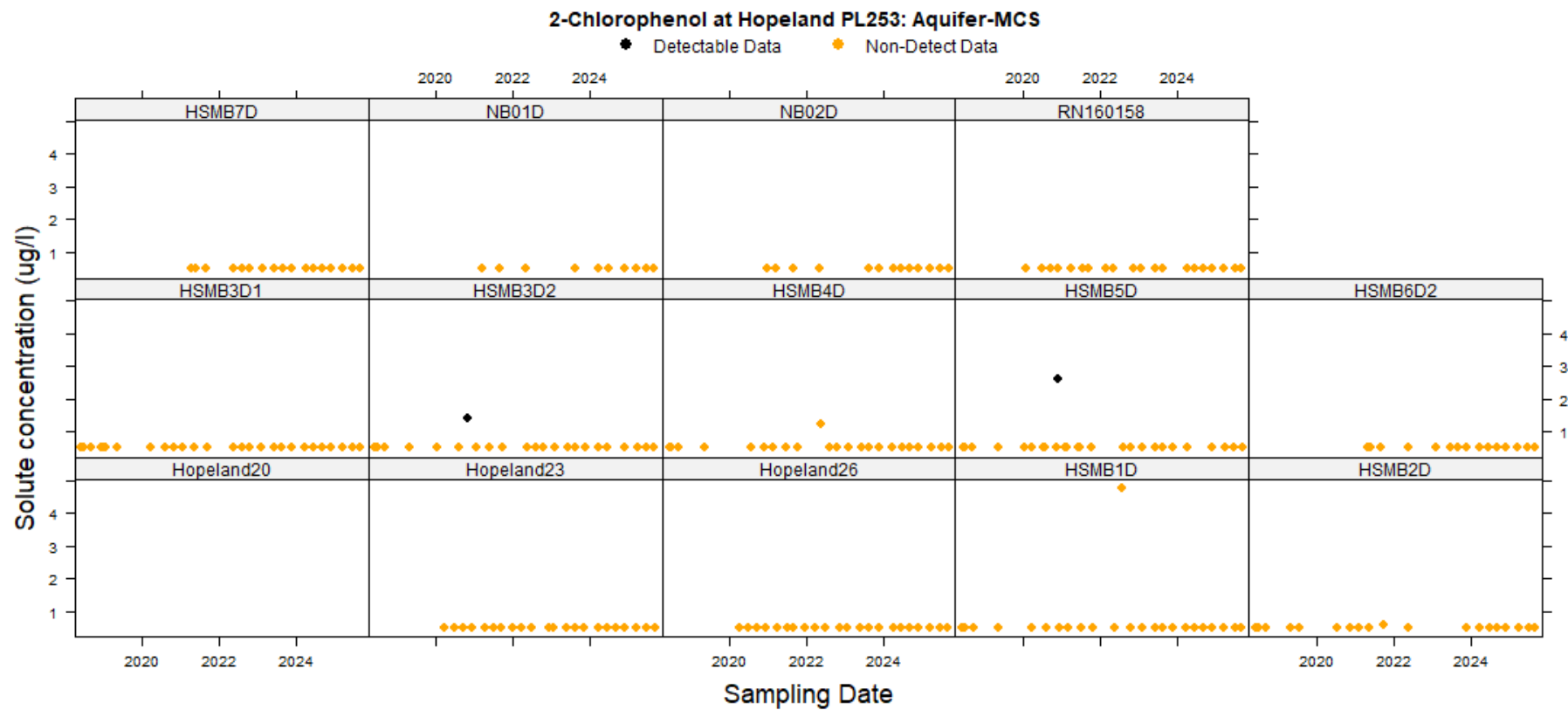


Figure 5: 2-Chlorophenol (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Macalister coal seam

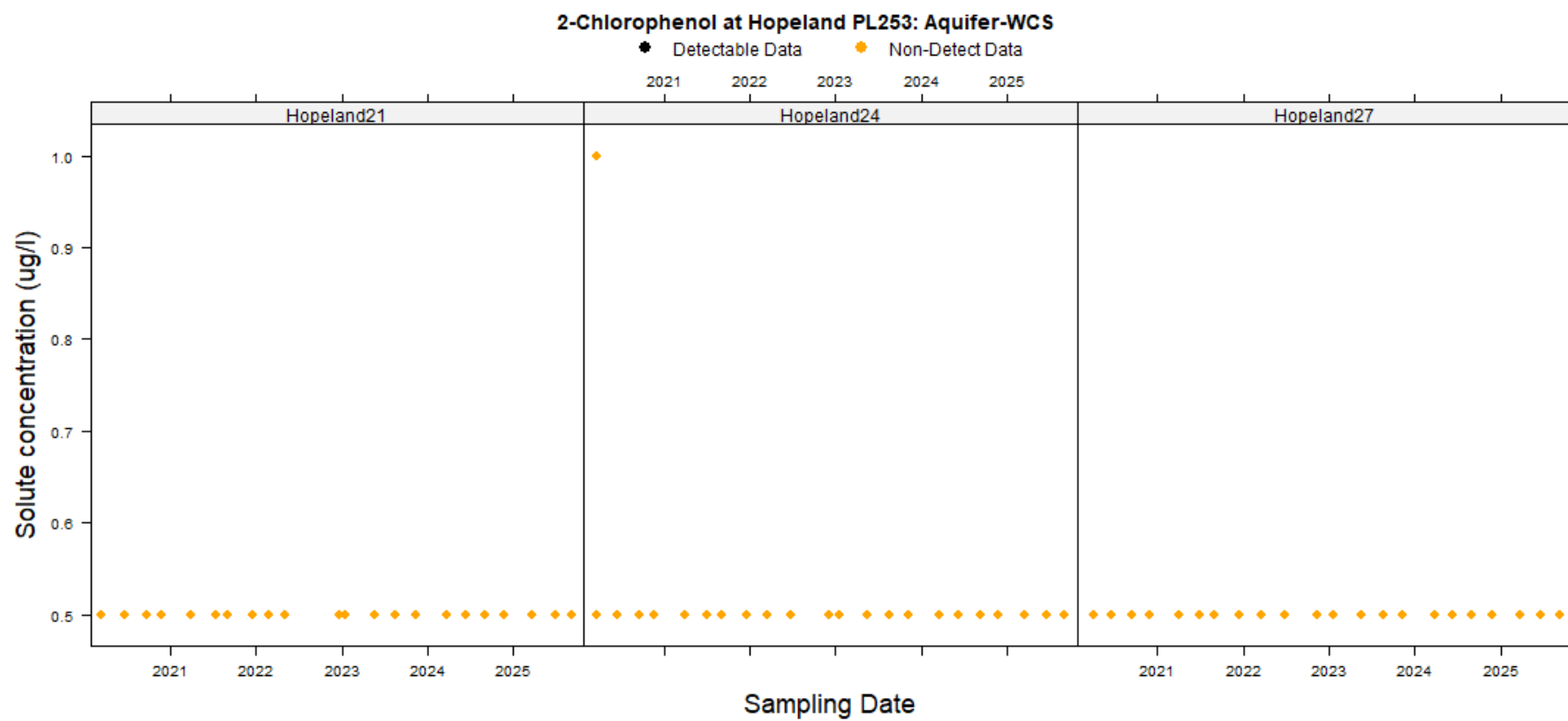


Figure 6: 2-Chlorophenol (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Wambo coal seam

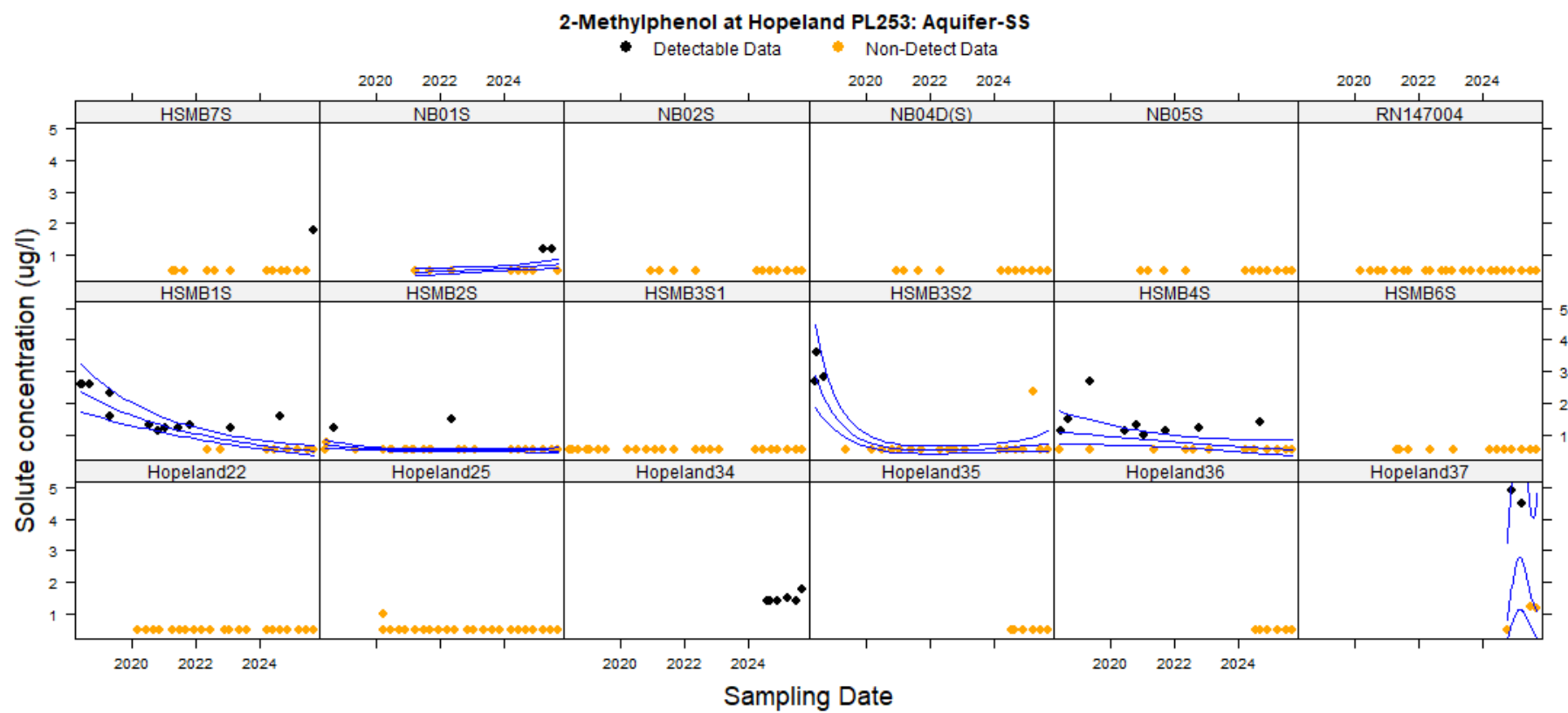


Figure 7: 2-Methylphenol (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Springbok Sandstone

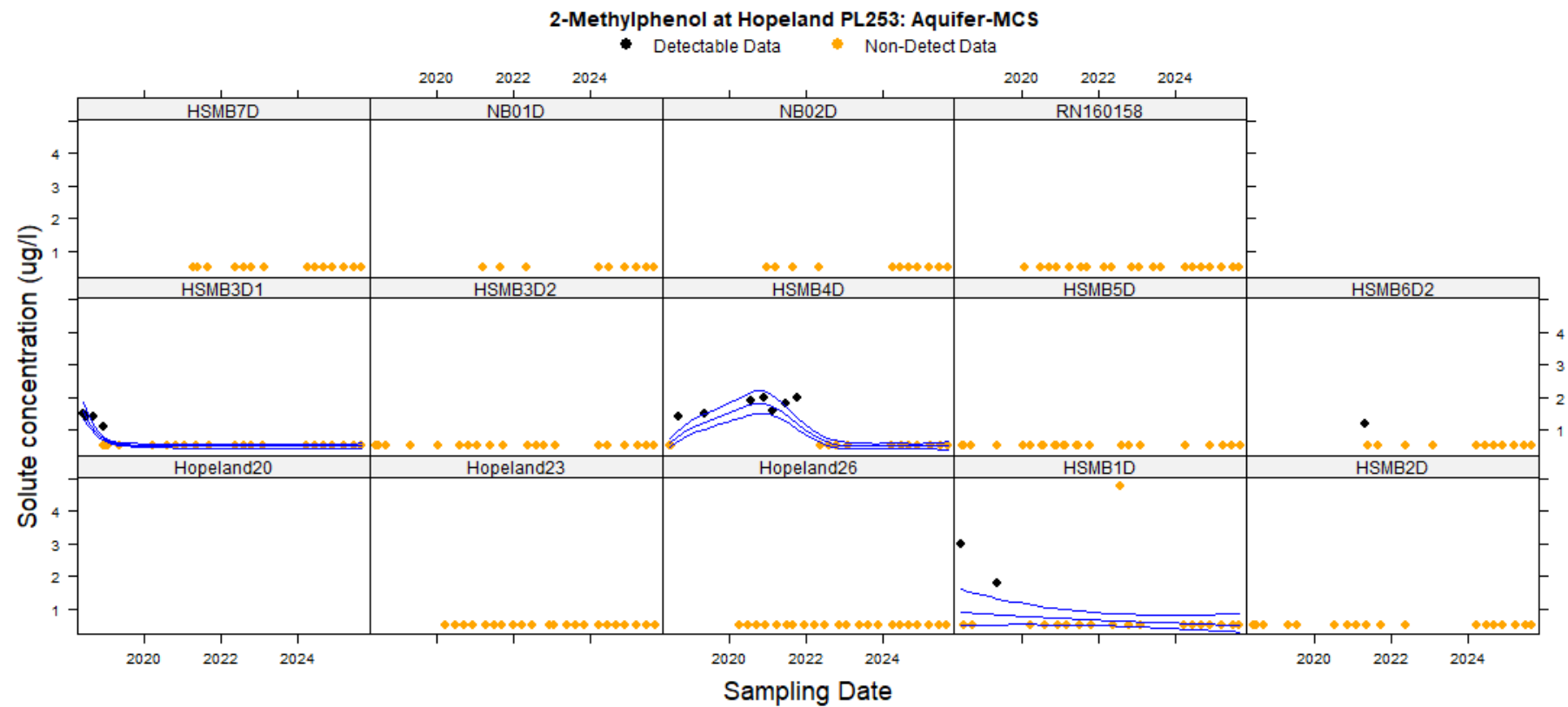


Figure 8: 2-Methylphenol (LOR = 1 $\mu\text{g/L}$, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Macalister coal seam

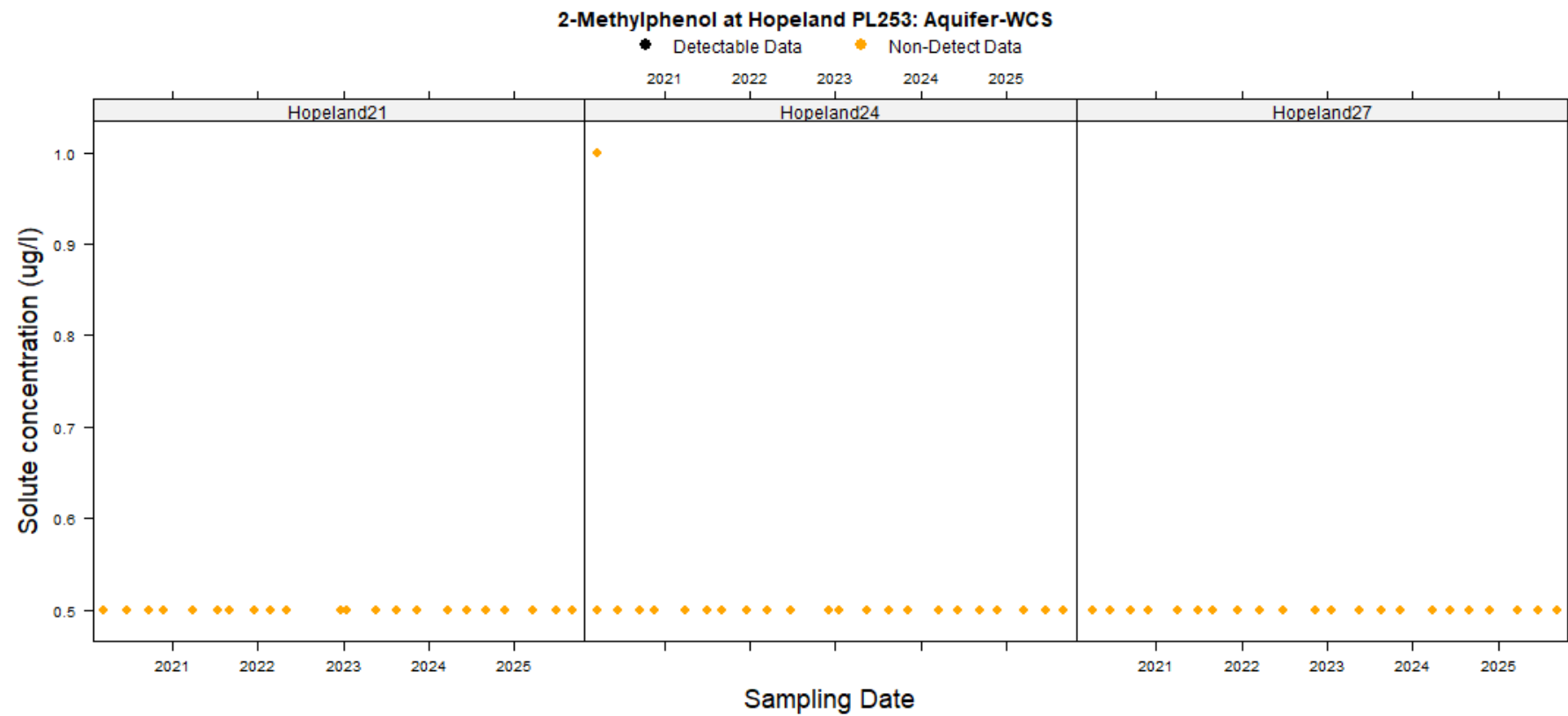


Figure 9: 2-Methylphenol (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Wambo coal seam

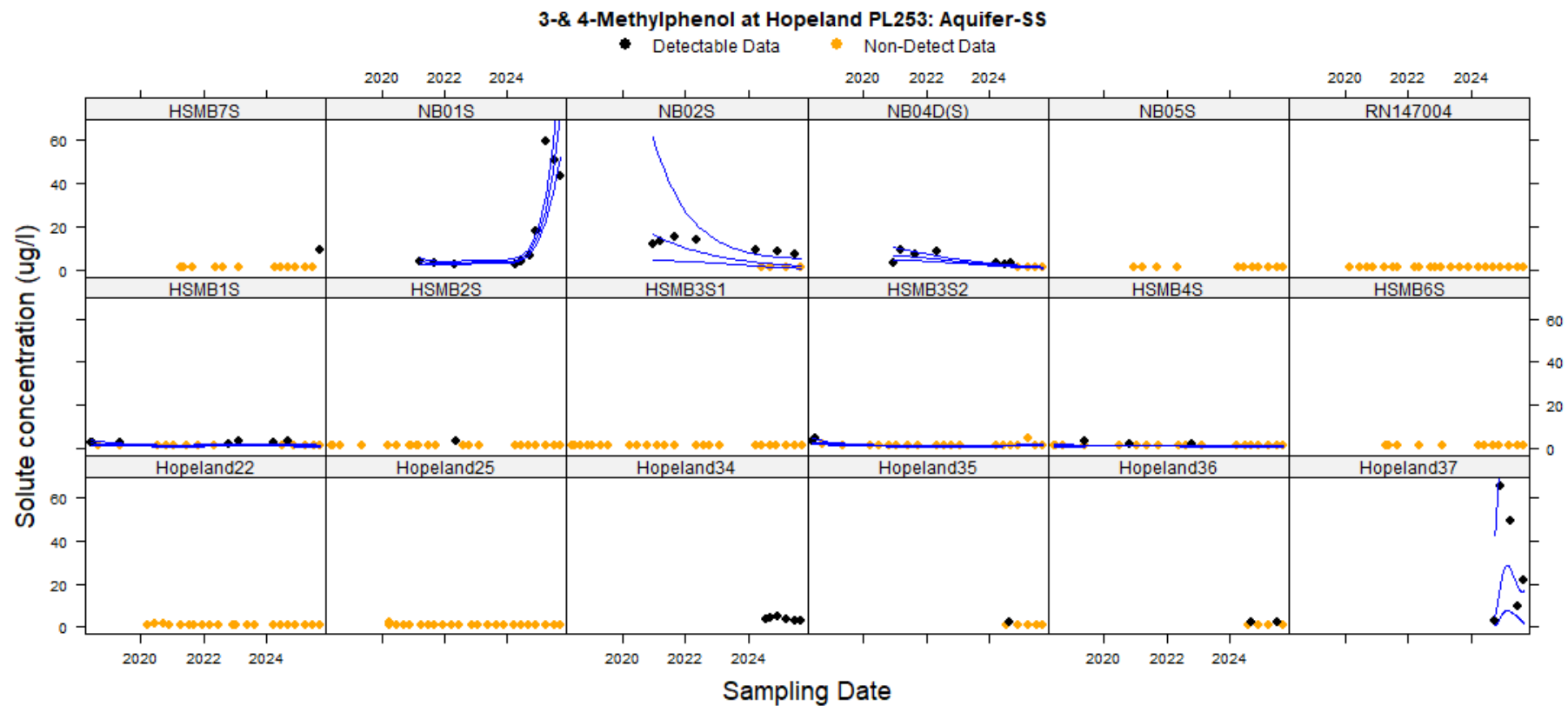


Figure 10: 3- & 4-Methylphenol (LOR = 2 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Springbok Sandstone

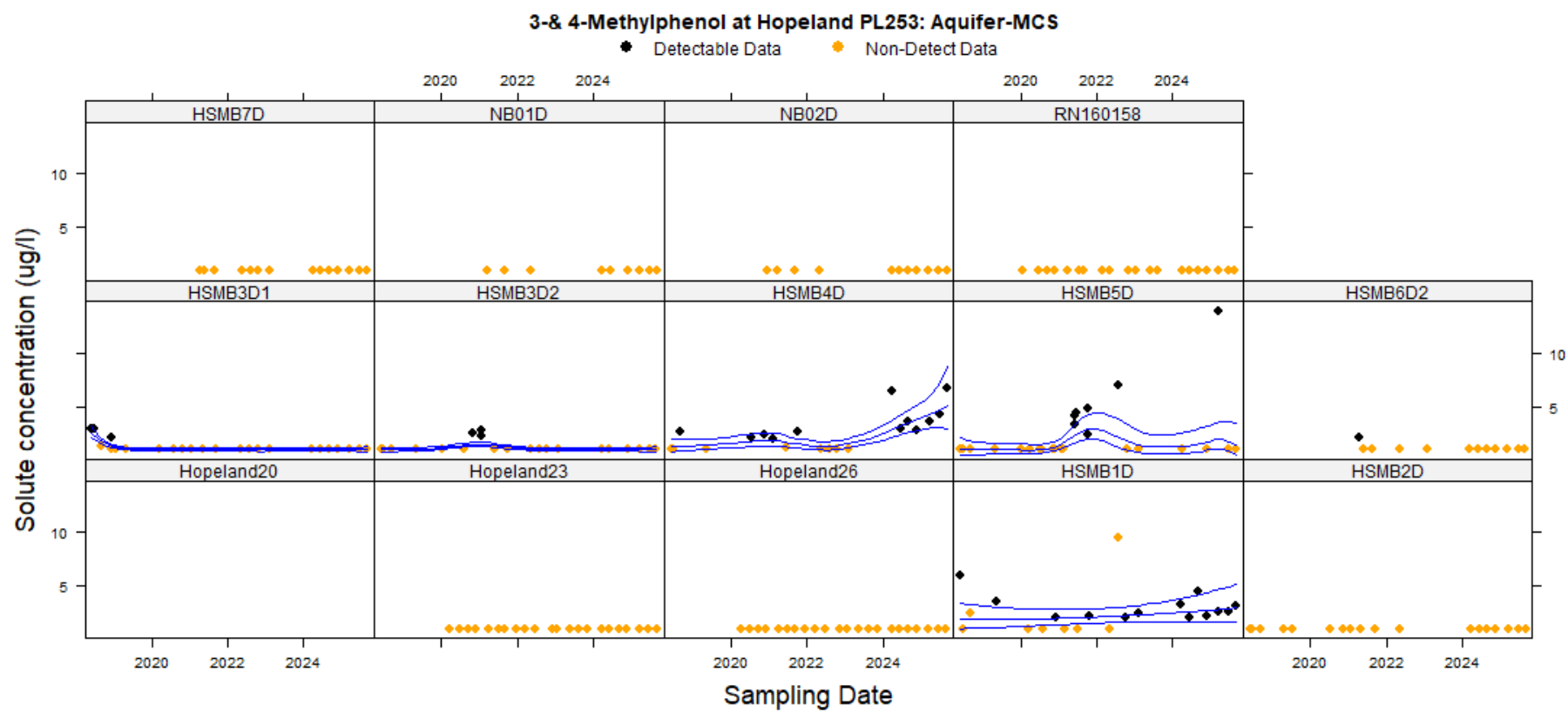


Figure 11: 3- & 4-Methylphenol (LOR = 2 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Macalister coal seam

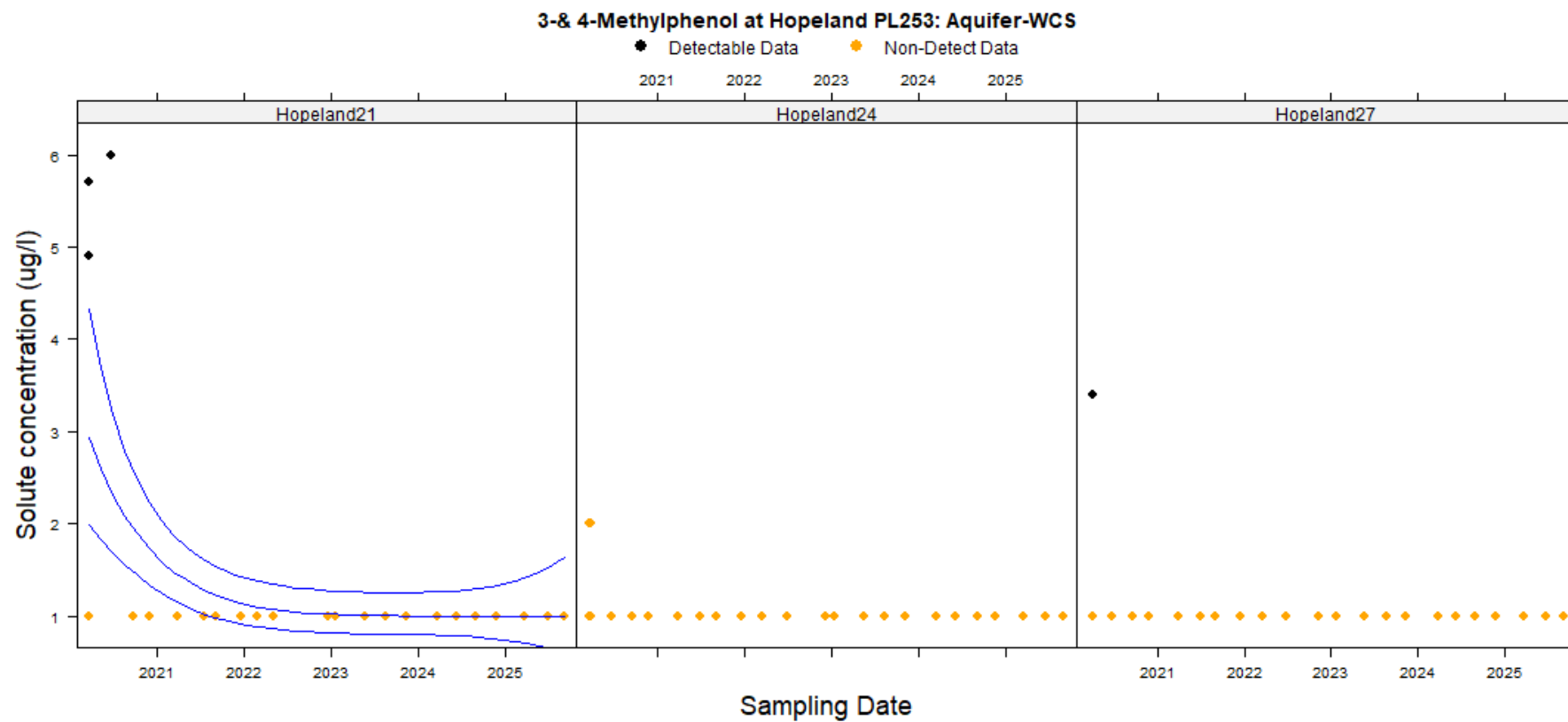


Figure 12: 3- & 4-Methylphenol (LOR = 2 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Wambo coal seam

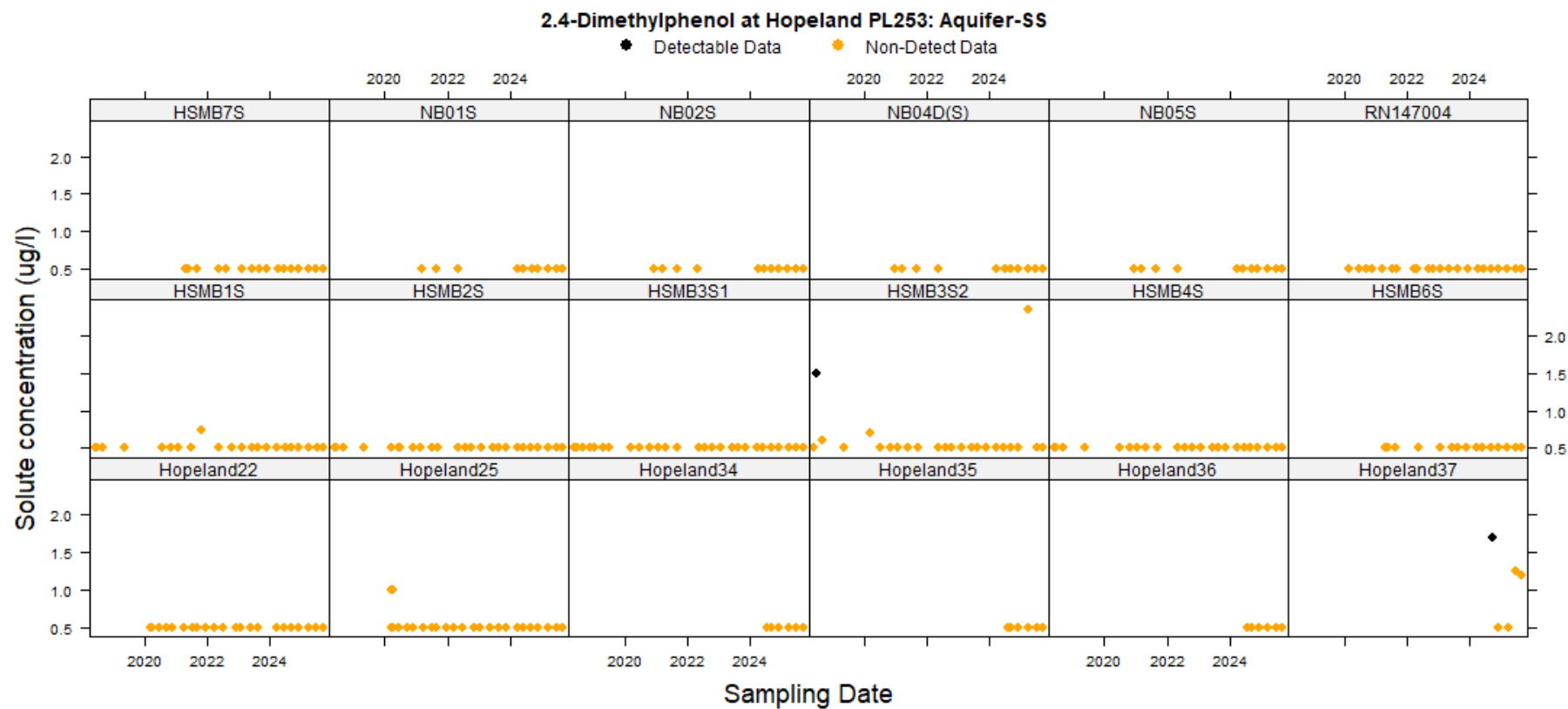


Figure 13: 2,4-Dimethylphenol (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Springbok Sandstone

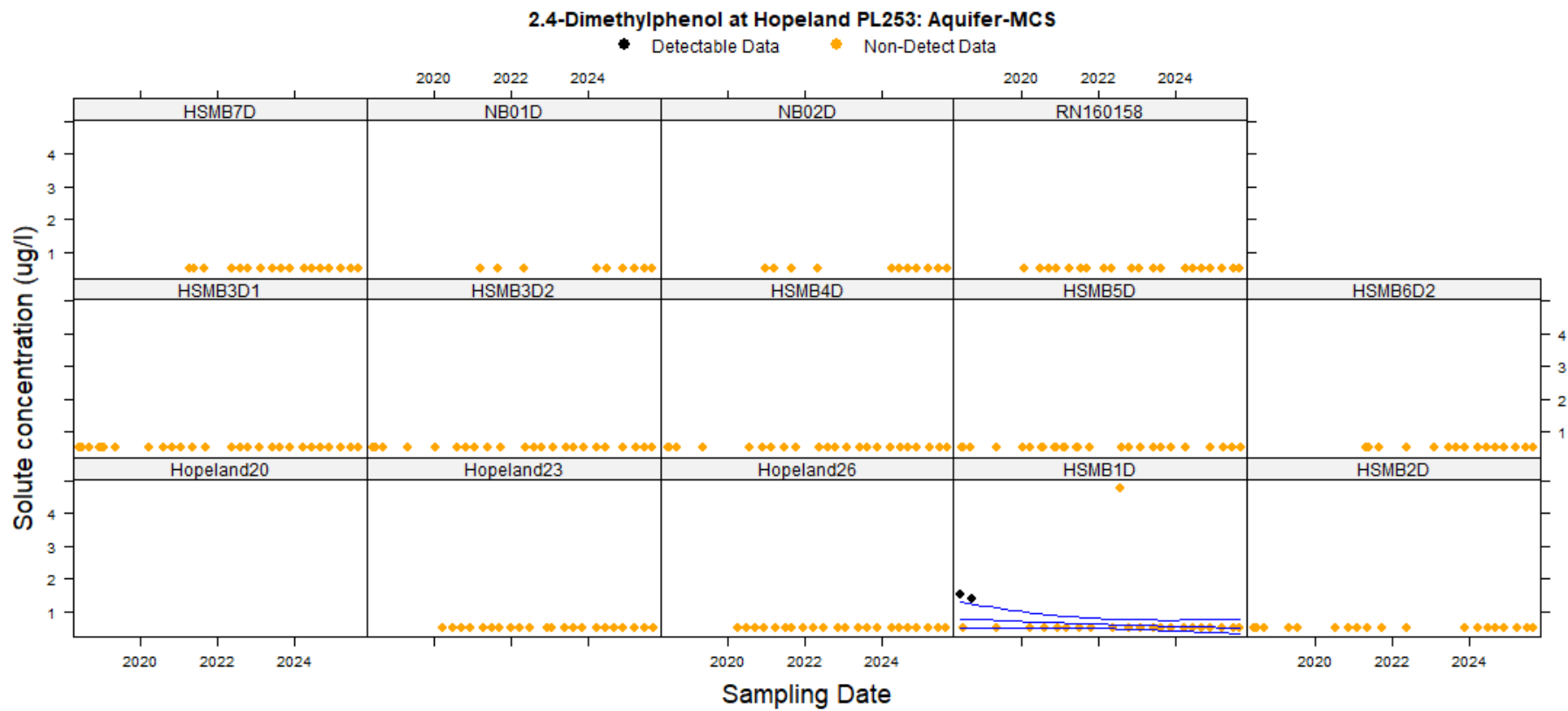


Figure 14: 2,4-Dimethylphenol (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Macalister coal seam

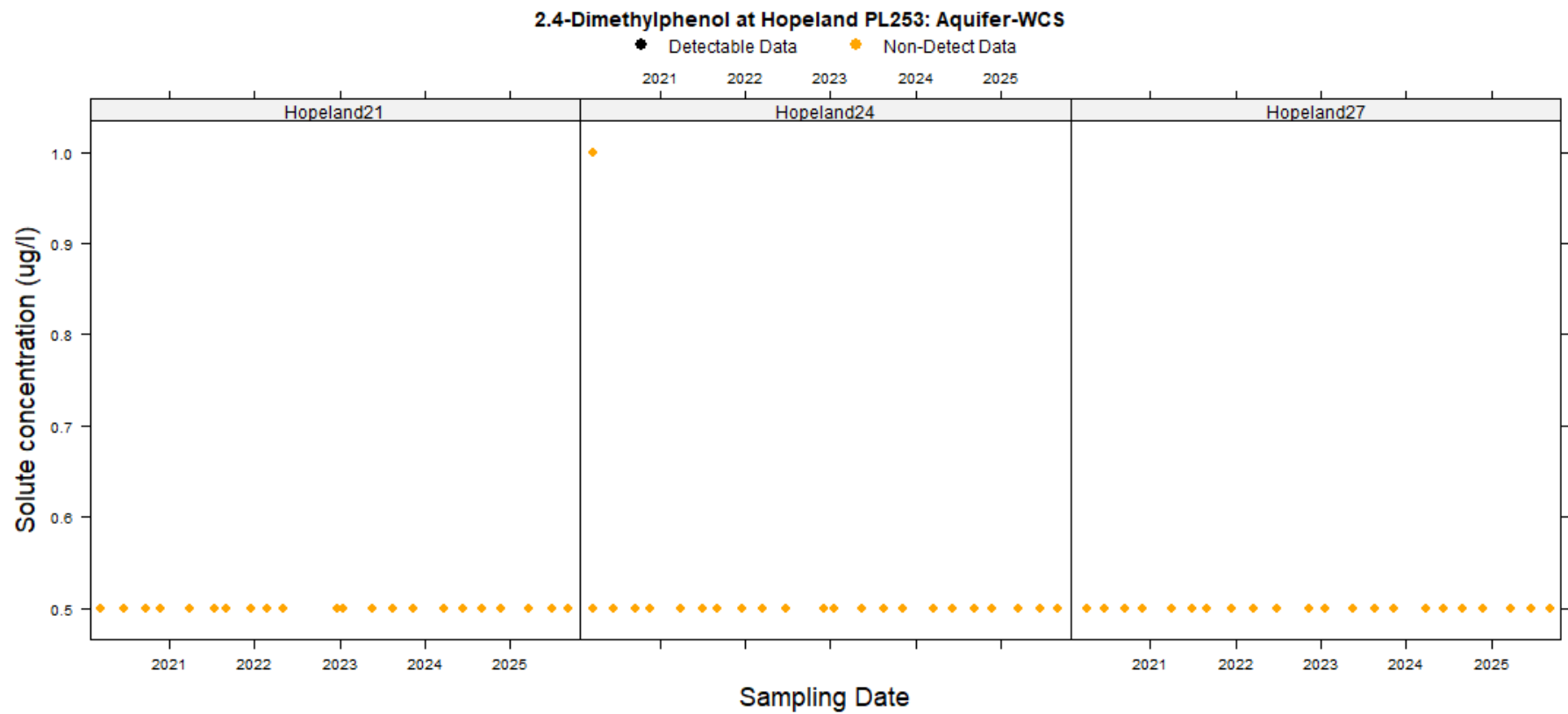


Figure 15: 2,4-Dimethylphenol (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Wambo coal seam

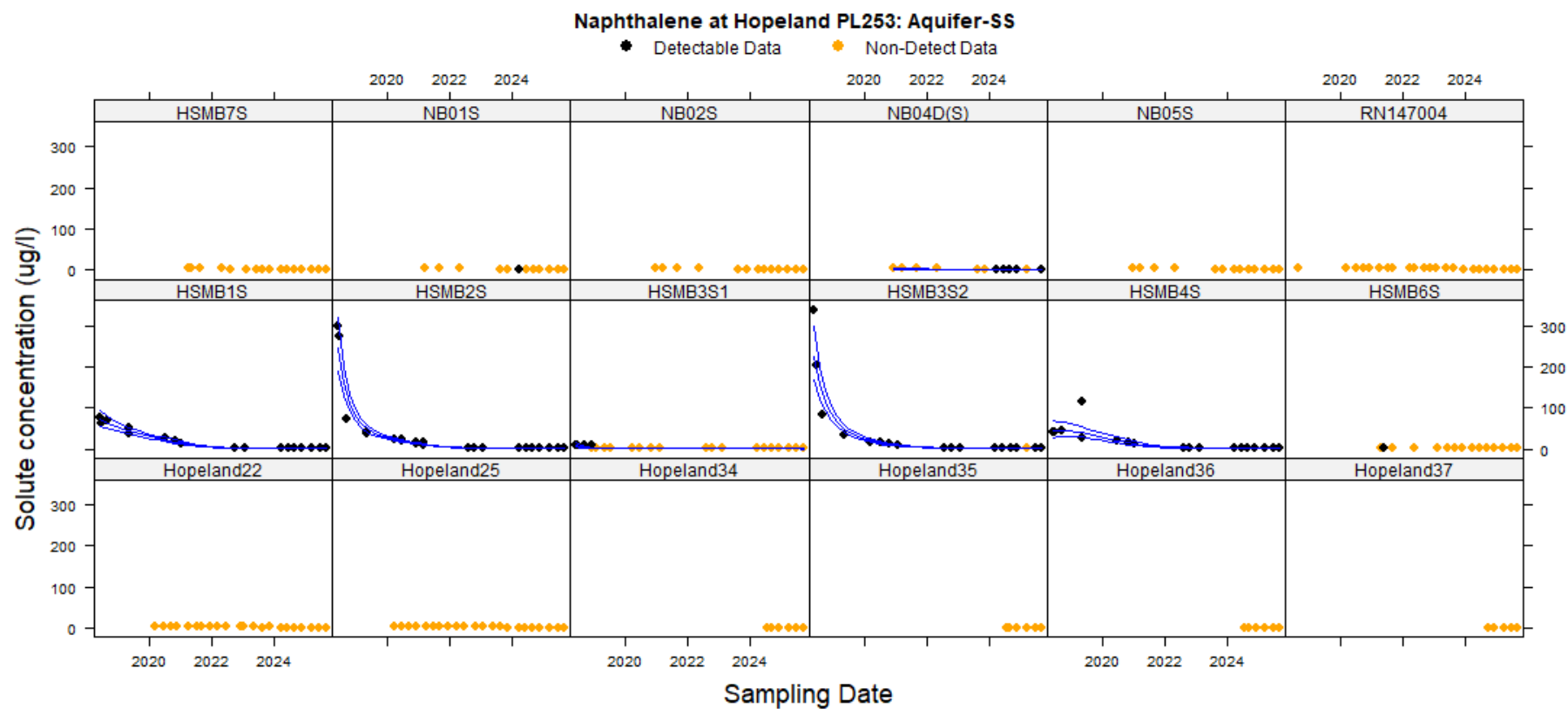


Figure 16: Naphthalene (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Springbok Sandstone

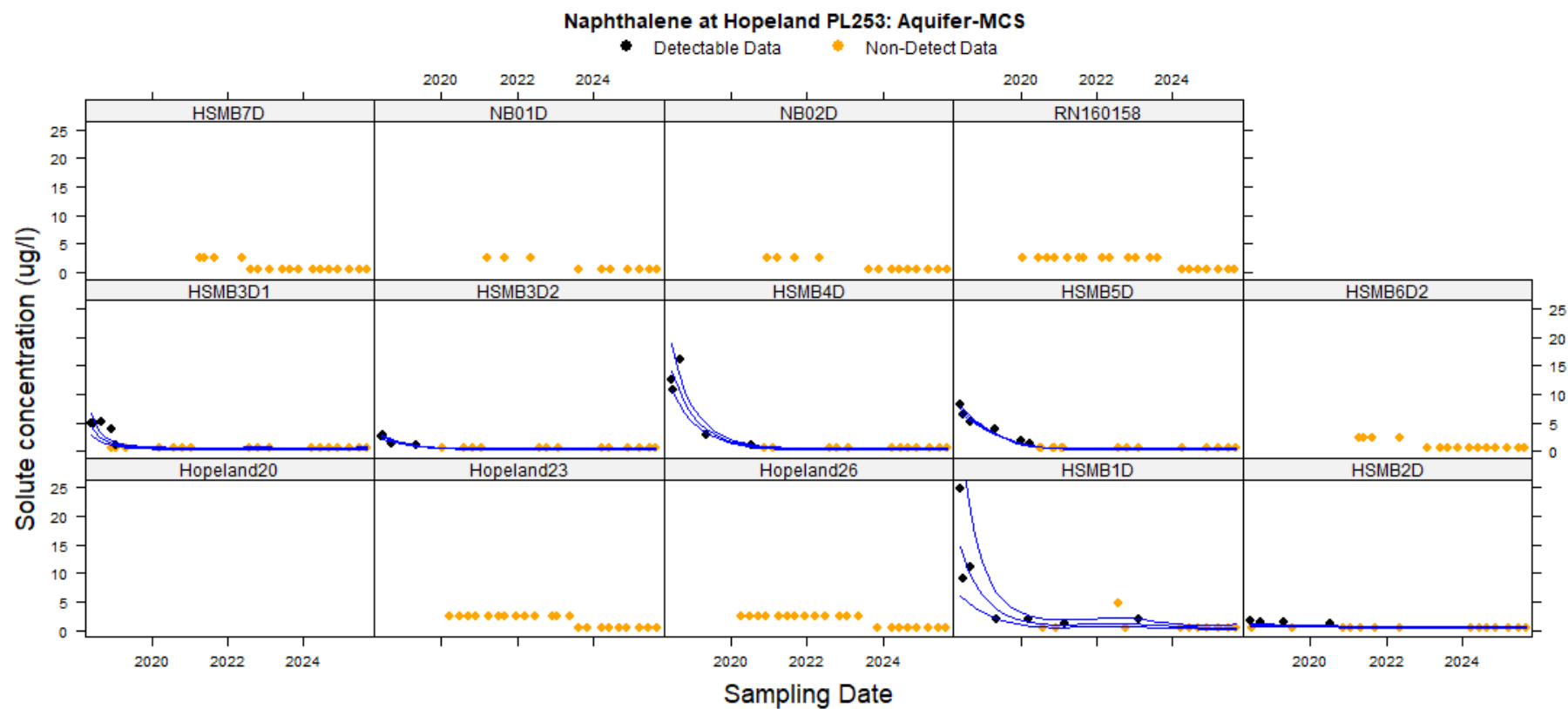


Figure 17: Naphthalene (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Macalister coal seam

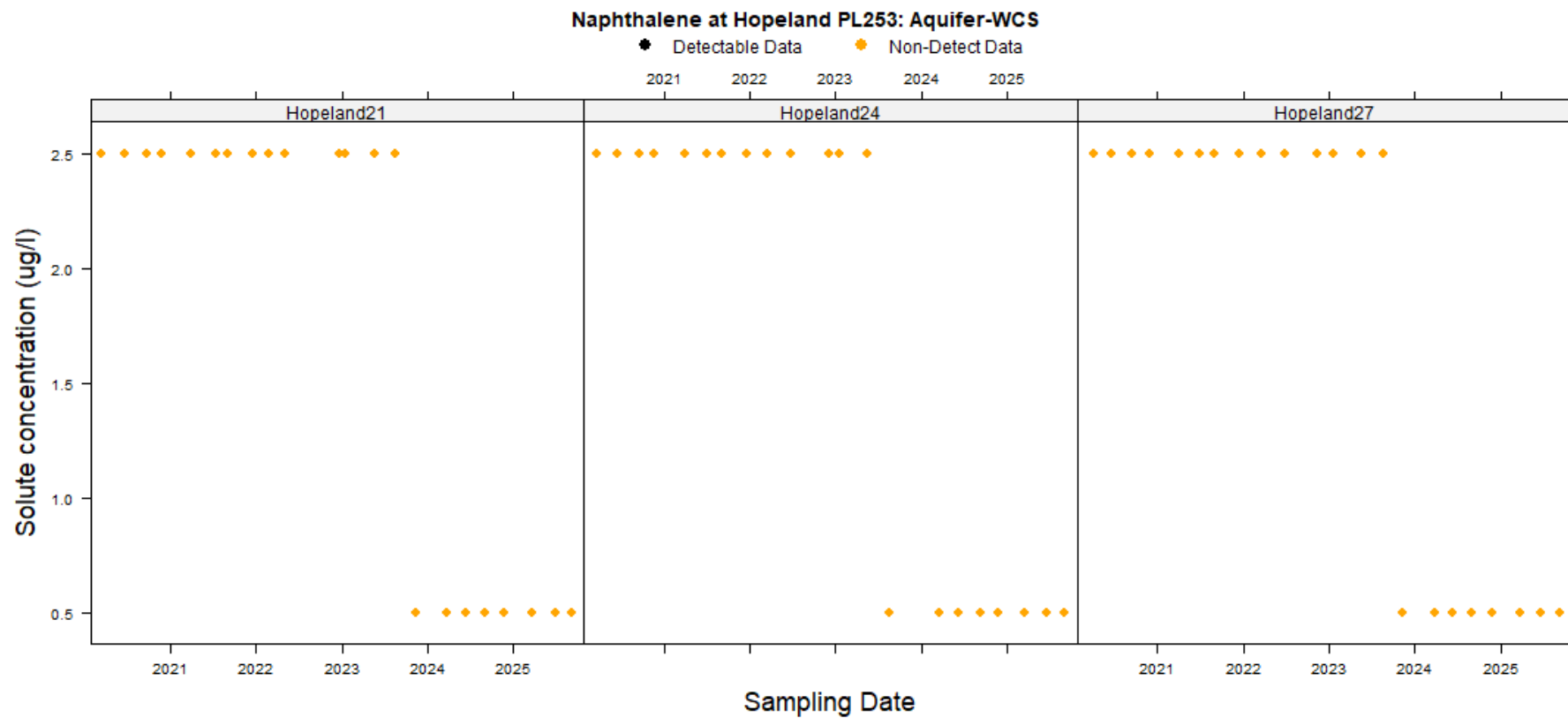


Figure 18: Naphthalene (LOR = 1 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Wambo coal seam

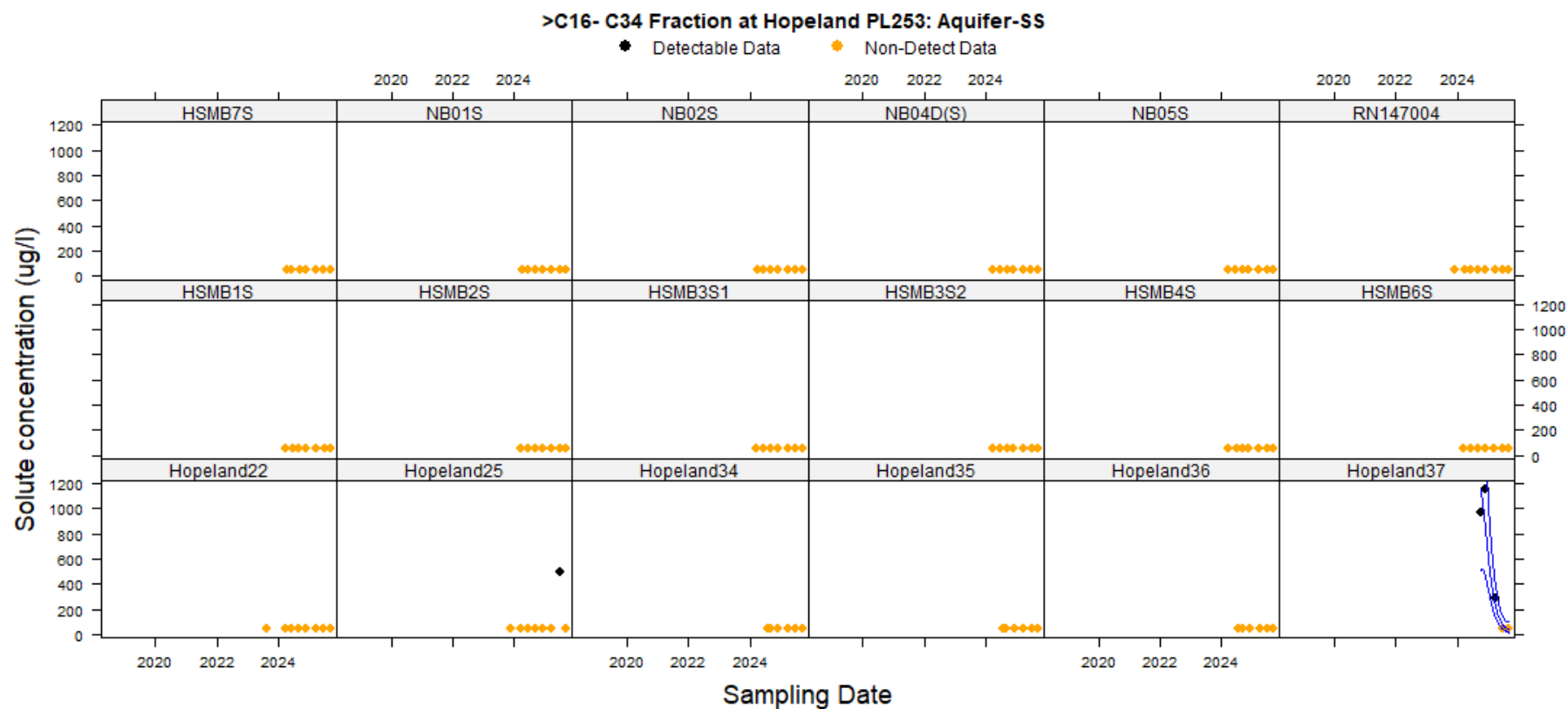


Figure 19: Total recoverable hydrocarbons (TRH) silica gel cleanup (>C16 - C34 Fraction) (LOR = 100 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Springbok Sandstone

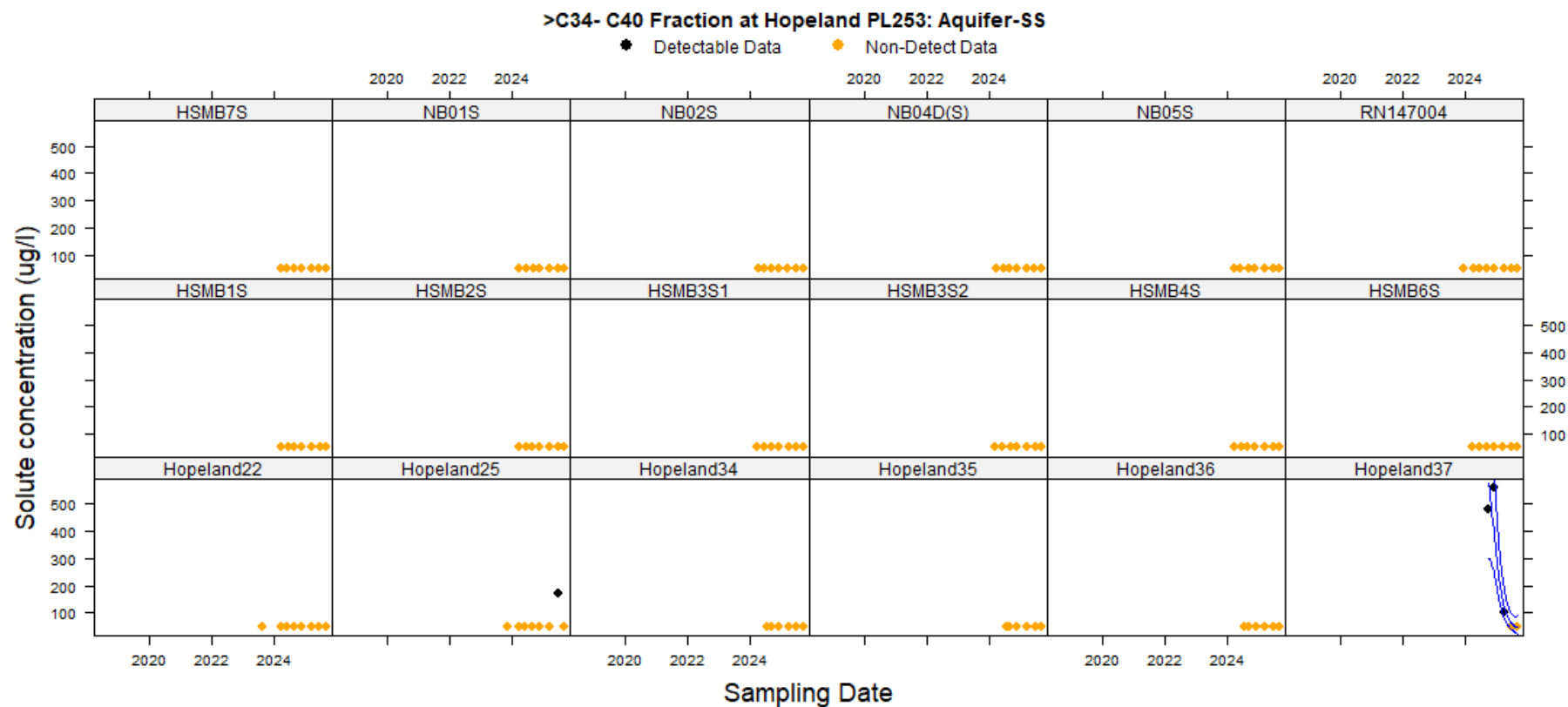


Figure 20: Total recoverable hydrocarbons (TRH) silica gel cleanup (>C34 - C40 Fraction) (LOR = 100 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Springbok Sandstone

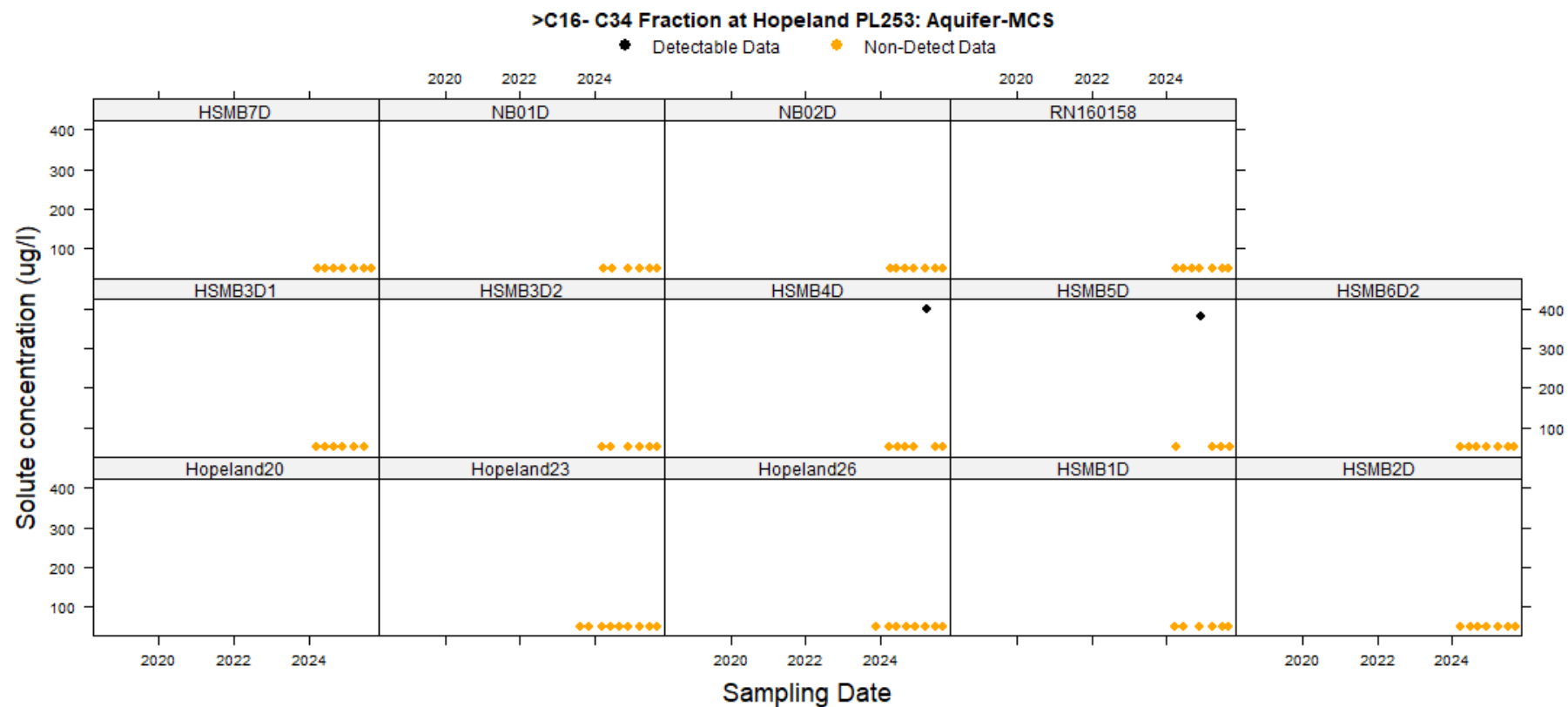


Figure 21: Total recoverable hydrocarbons (TRH) silica gel cleanup (>C16 - C34 Fraction) (LOR = 100 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Macalister coal seam

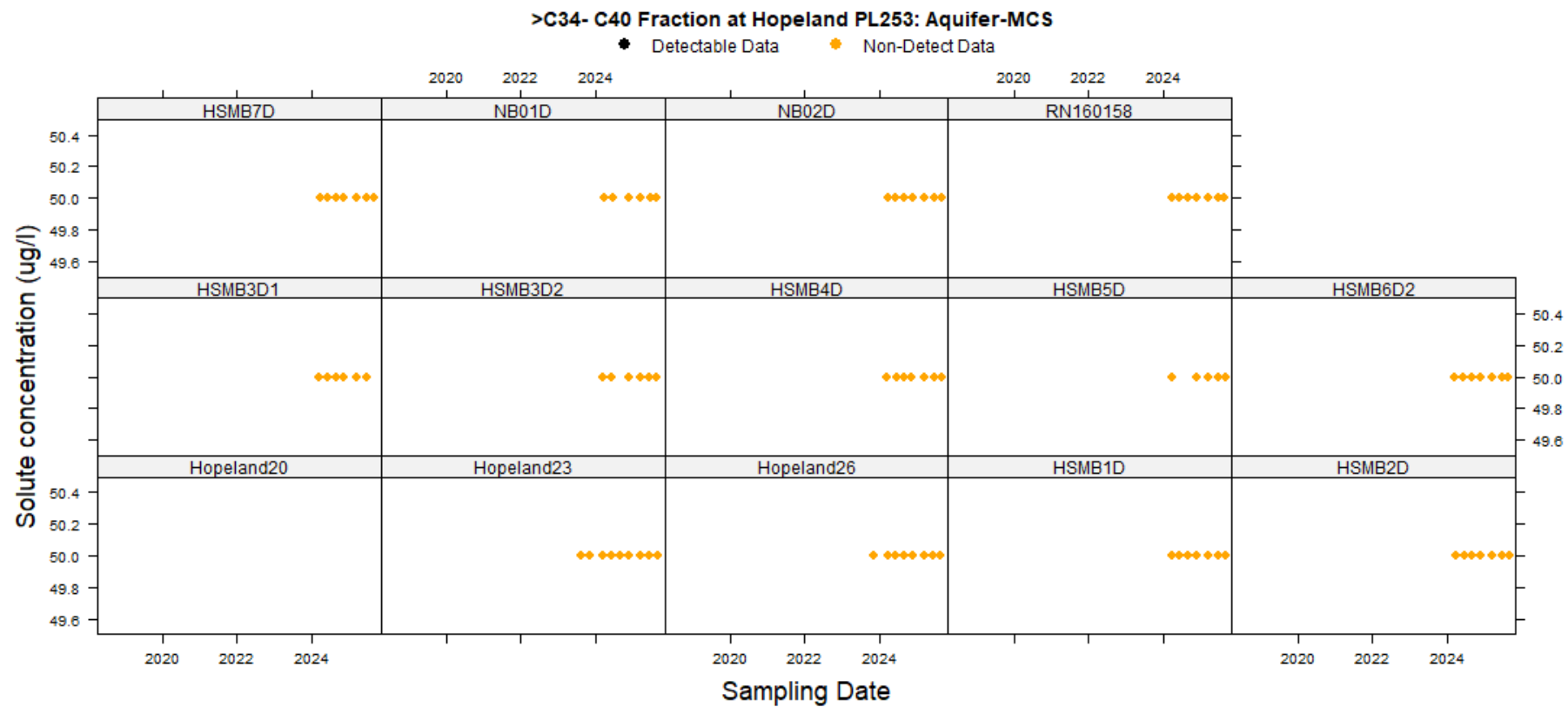


Figure 22: Total recoverable hydrocarbons (TRH) silica gel cleanup (>C34 - C40 Fraction) (LOR = 100 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Macalister coal seam

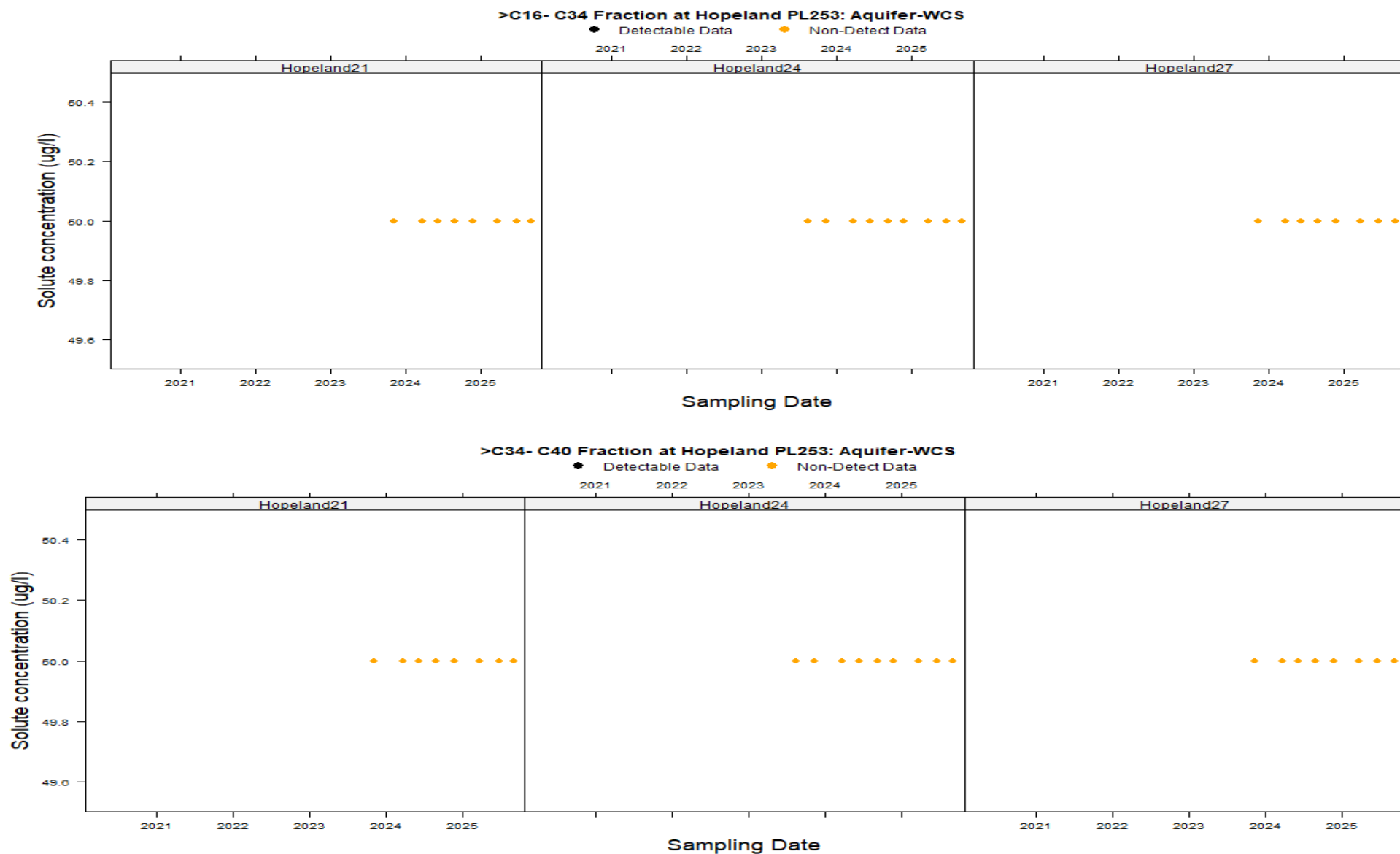


Figure 23: Total recoverable hydrocarbons (TRH) silica gel cleanup (>C16 - C34 & >C34 - C40 Fractions) (LOR = 100 µg/L, Investigation Limits > LOR) concentration time series in the monitoring bores screened within Wambo coal seam

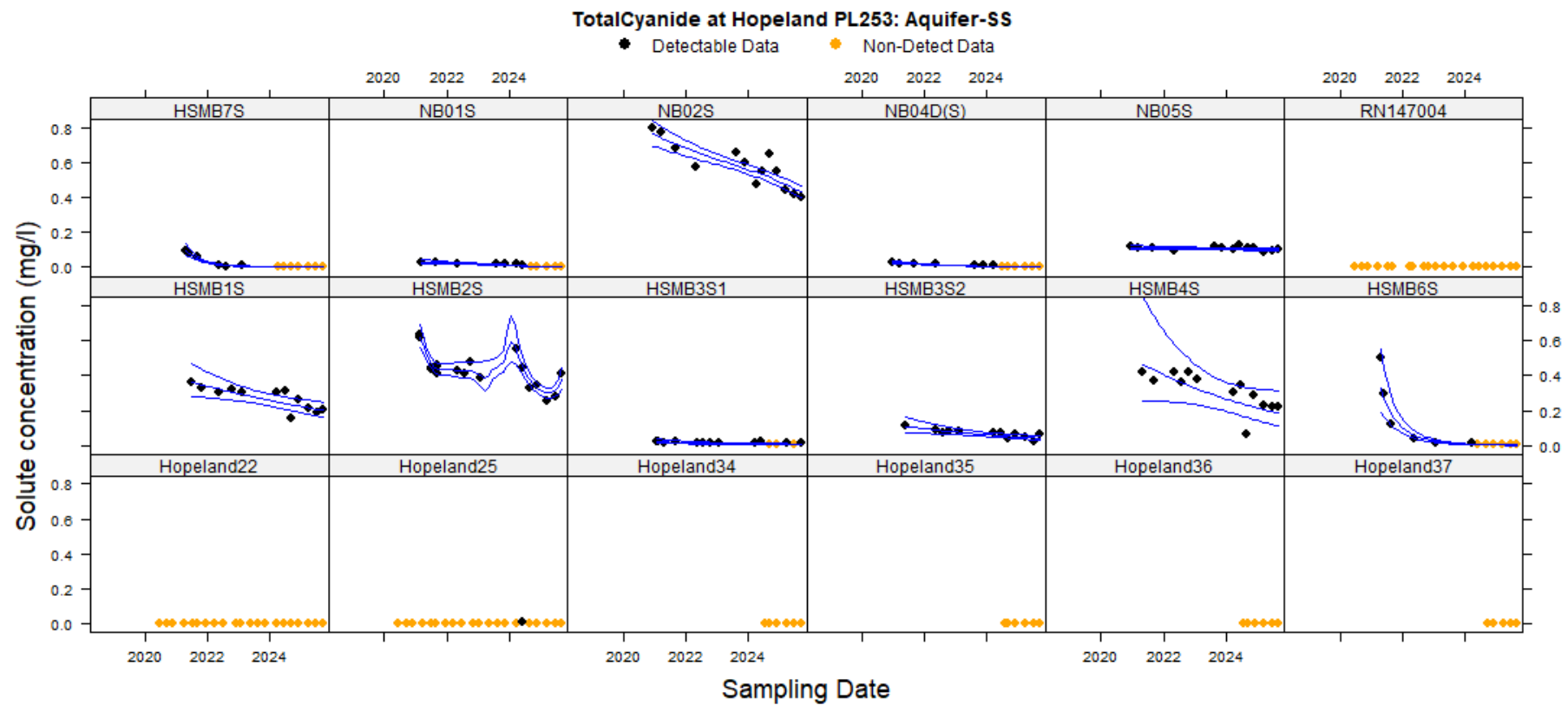


Figure 24: Total cyanide (LOR = 0.004 mg/L, Investigation Limits = 0.08 mg/L) concentration time series in the monitoring bores screened within Springbok Sandstone

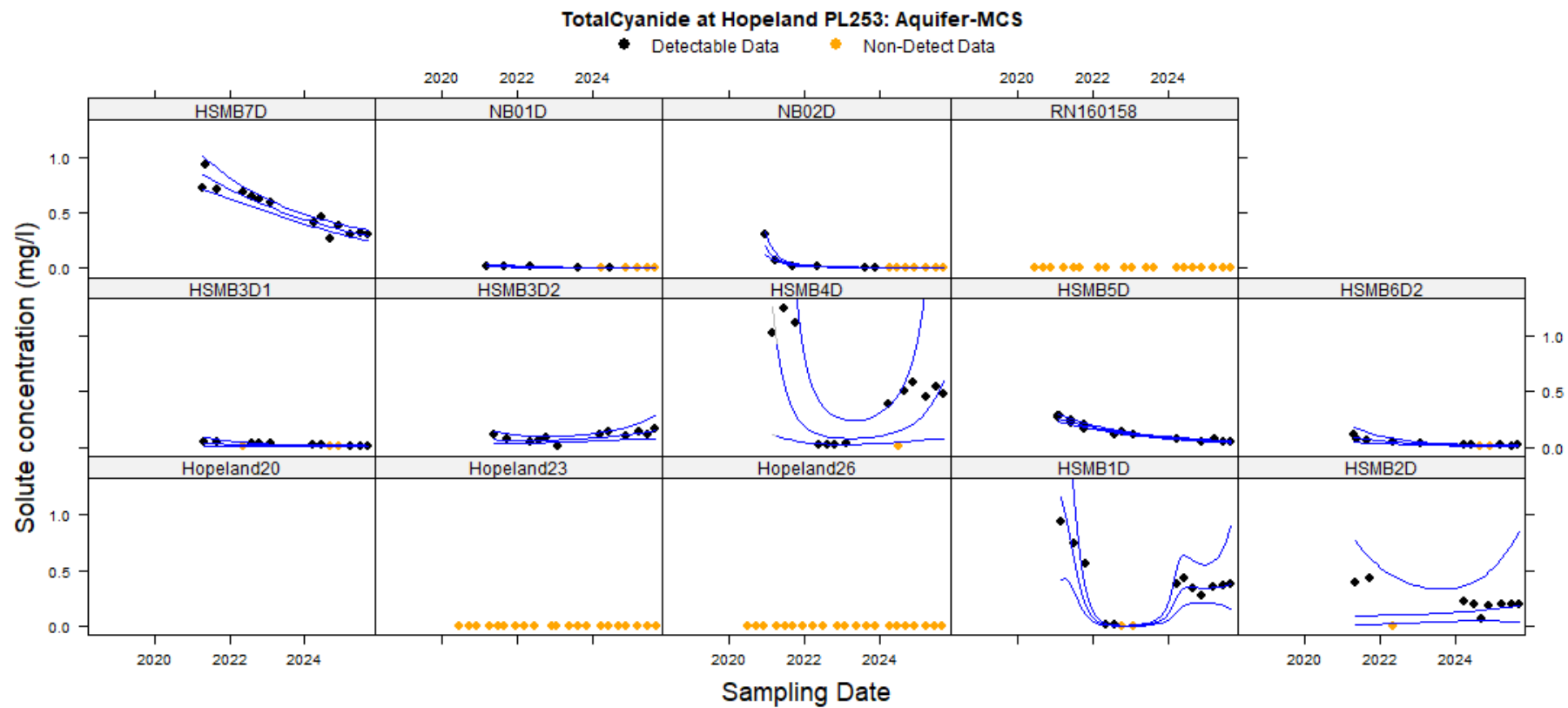


Figure 25: Total cyanide (LOR = 0.004 mg/L, Investigation Limits = 0.08 mg/L) concentration time series in the monitoring bores screened within Macalister coal seam

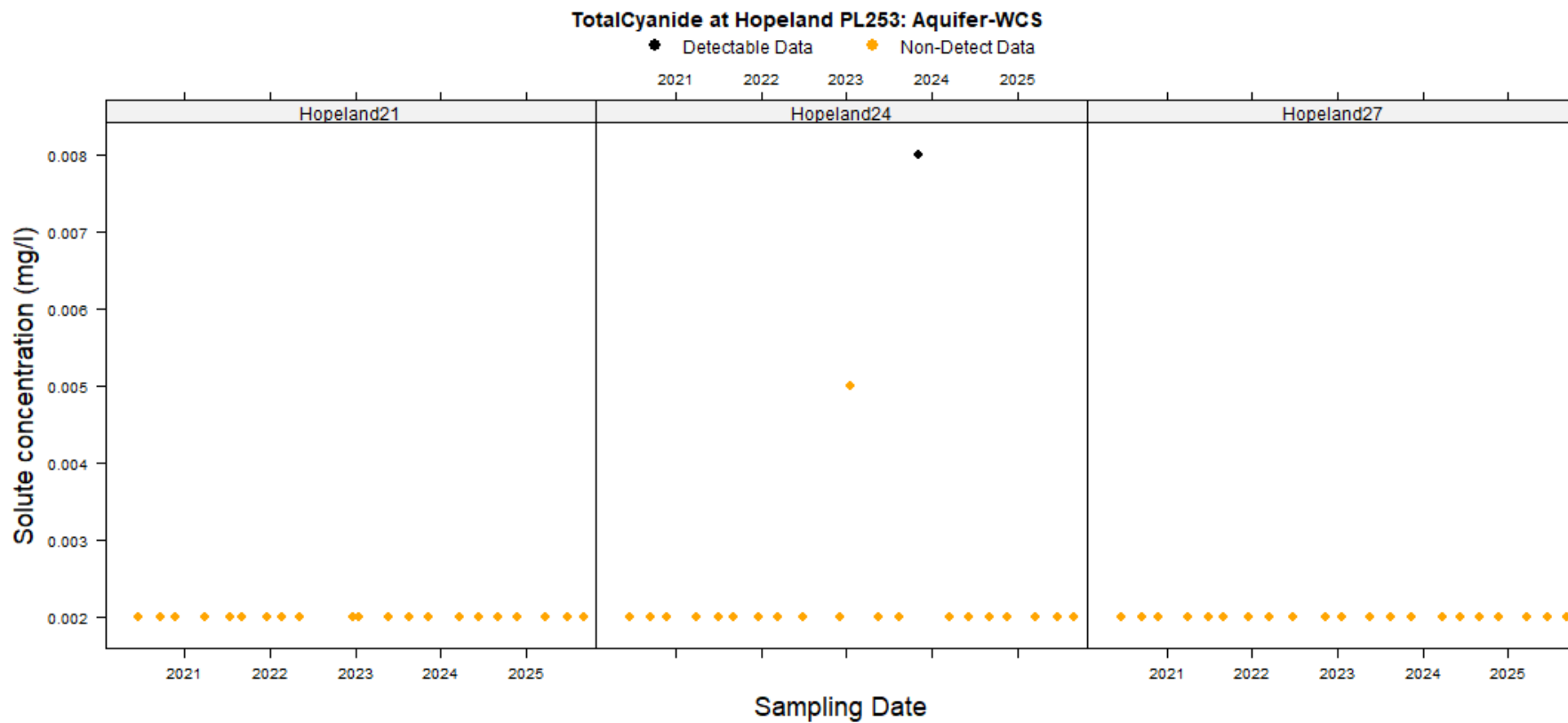


Figure 26: Total cyanide (LOR = 0.004 mg/L, Investigation Limits = 0.08 mg/L) concentration time series in the monitoring bores screened within Wambo coal seam

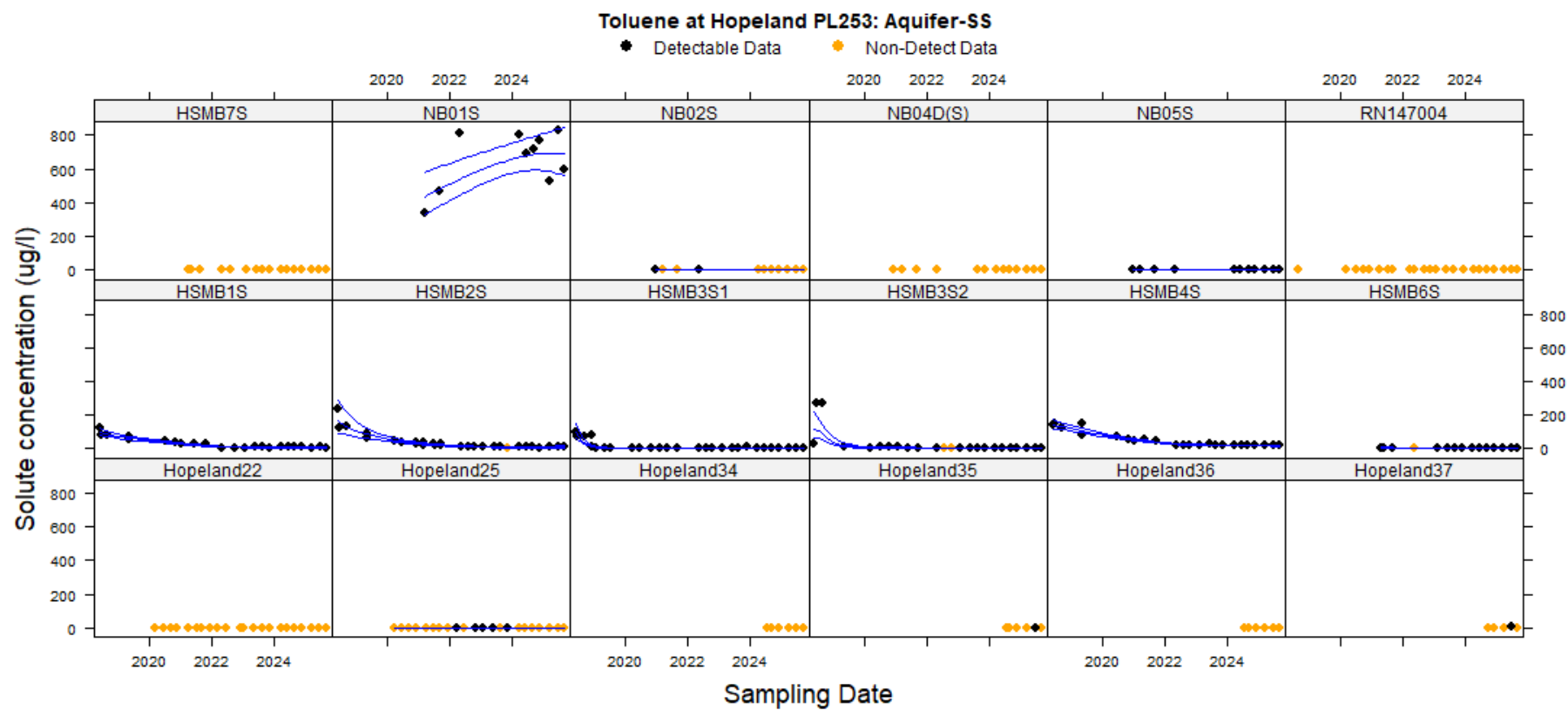


Figure 27: Toluene (LOR = 2 µg/L, Investigation Limits = 800 µg/L) concentration time series in the monitoring bores screened within Springbok Sandstone

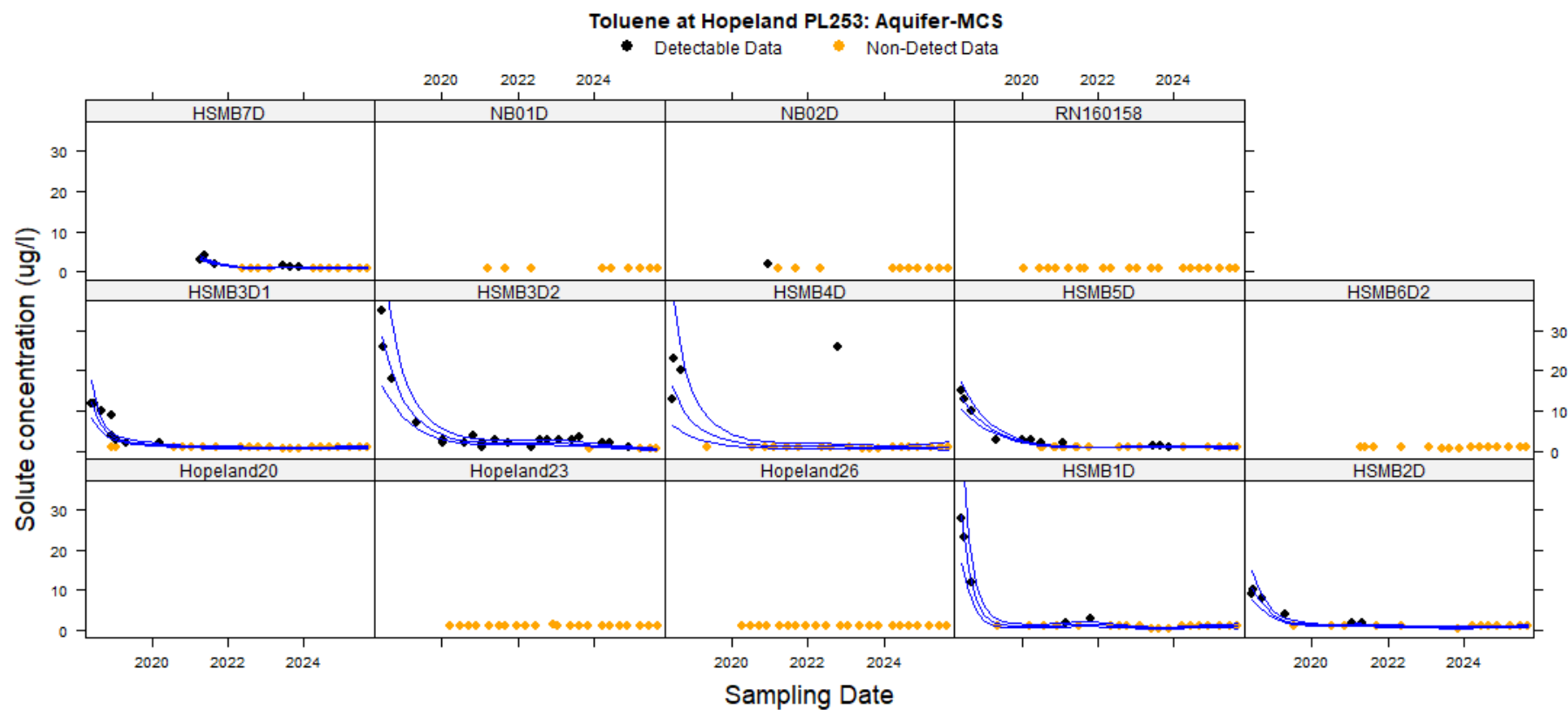


Figure 28: Toluene (LOR = 2 µg/L, Investigation Limits = 800 µg/L) concentration time series in the monitoring bores screened within Macalister coal seam

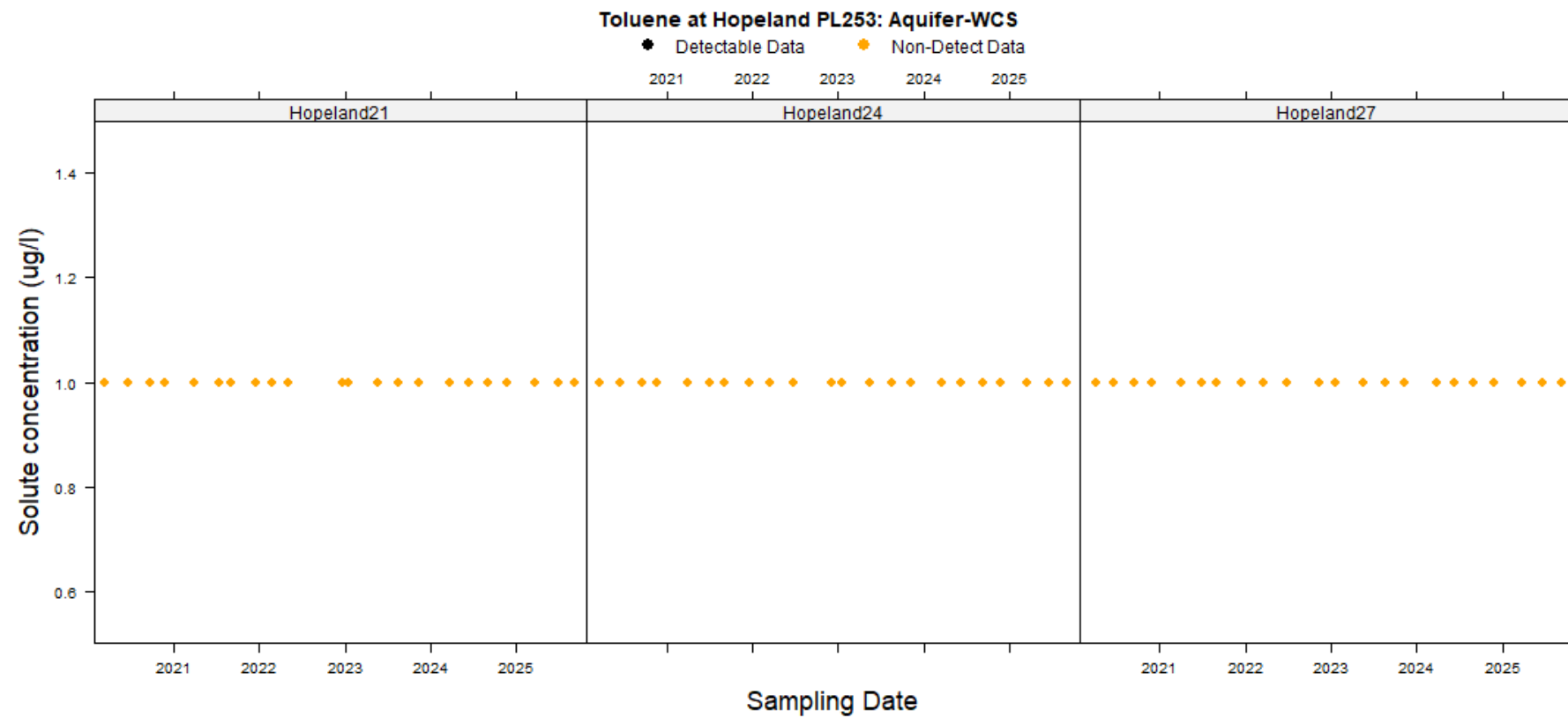


Figure 29: Toluene (LOR = 2 µg/L, Investigation Limits = 800 µg/L) concentration time series in the monitoring bores screened within Wambo coal seam

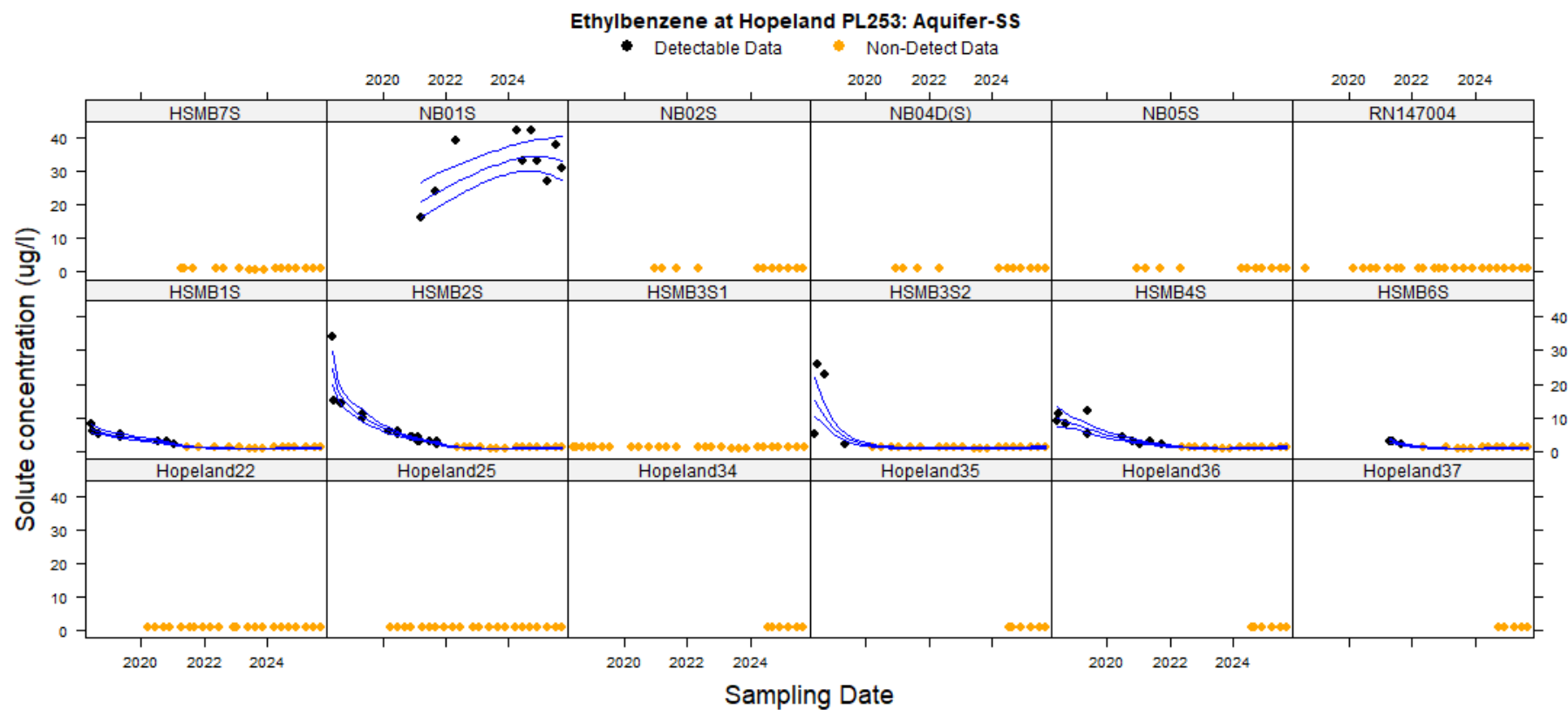


Figure 30: Ethylbenzene (LOR = 2 µg/L, Investigation Limits = 300 µg/L) concentration time series in the monitoring bores screened within Springbok Sandstone

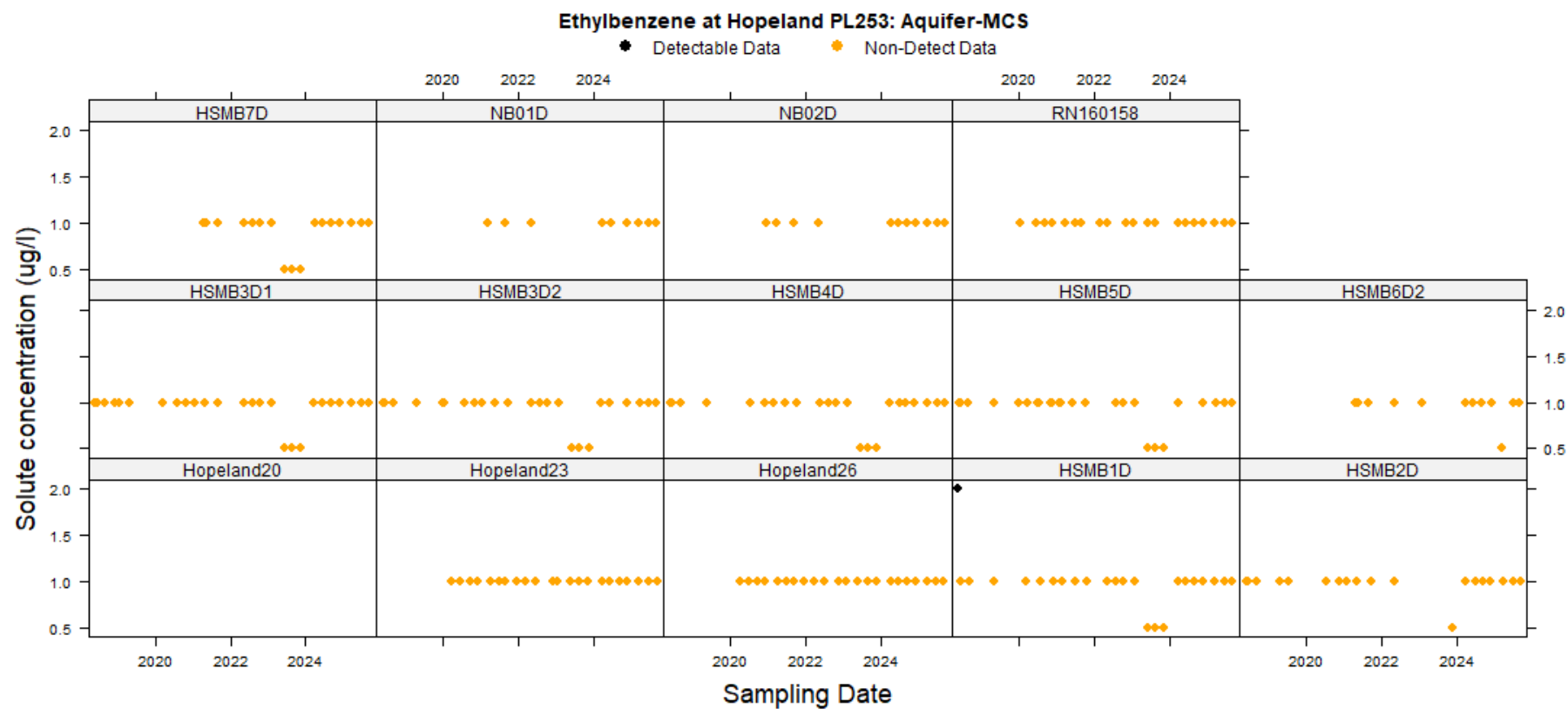


Figure 31: Ethylbenzene (LOR = 2 µg/L, Investigation Limits = 300 µg/L) concentration time series in the monitoring bores screened within Macalister coal seam

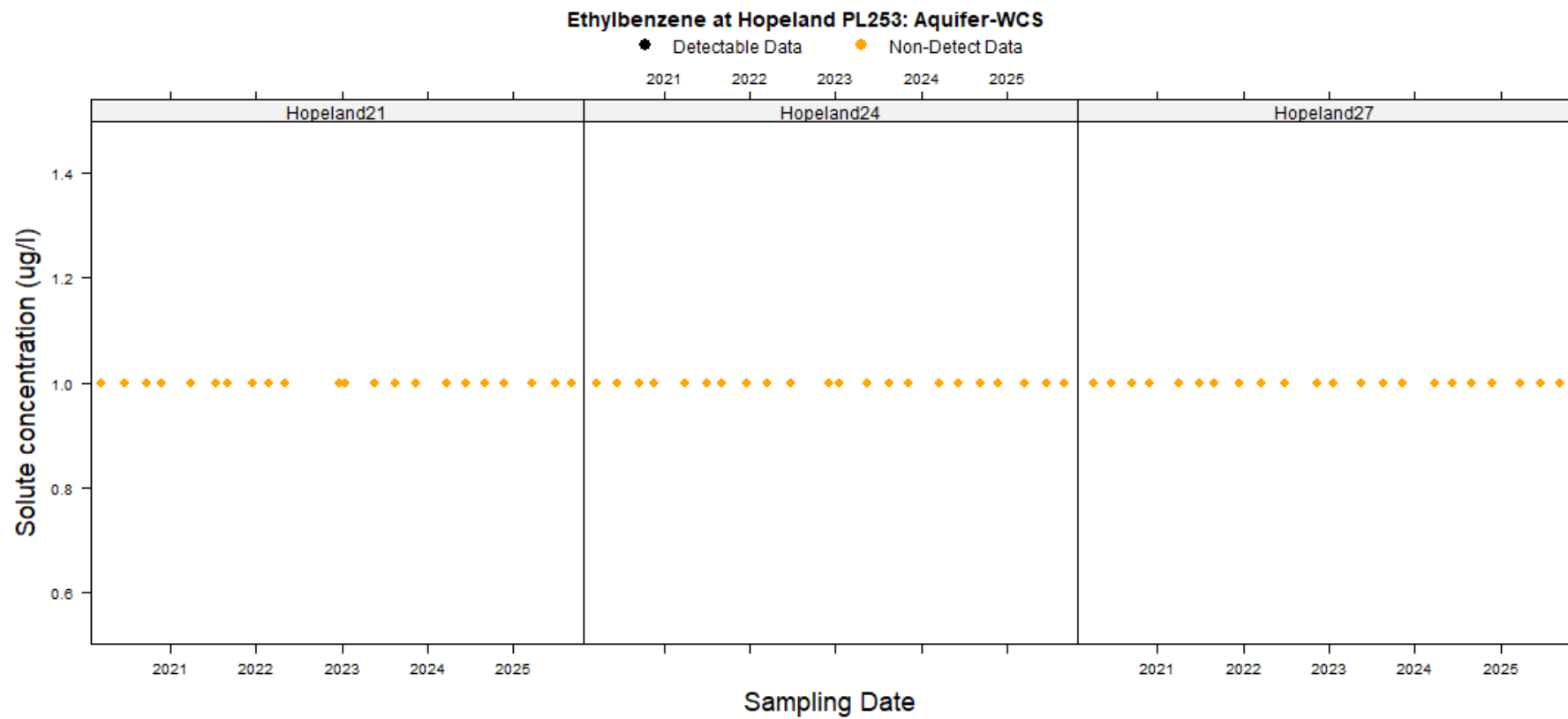


Figure 32: Ethylbenzene (LOR = 2 µg/L, Investigation Limits = 300 µg/L) concentration time series in the monitoring bores screened within Wambo coal seam

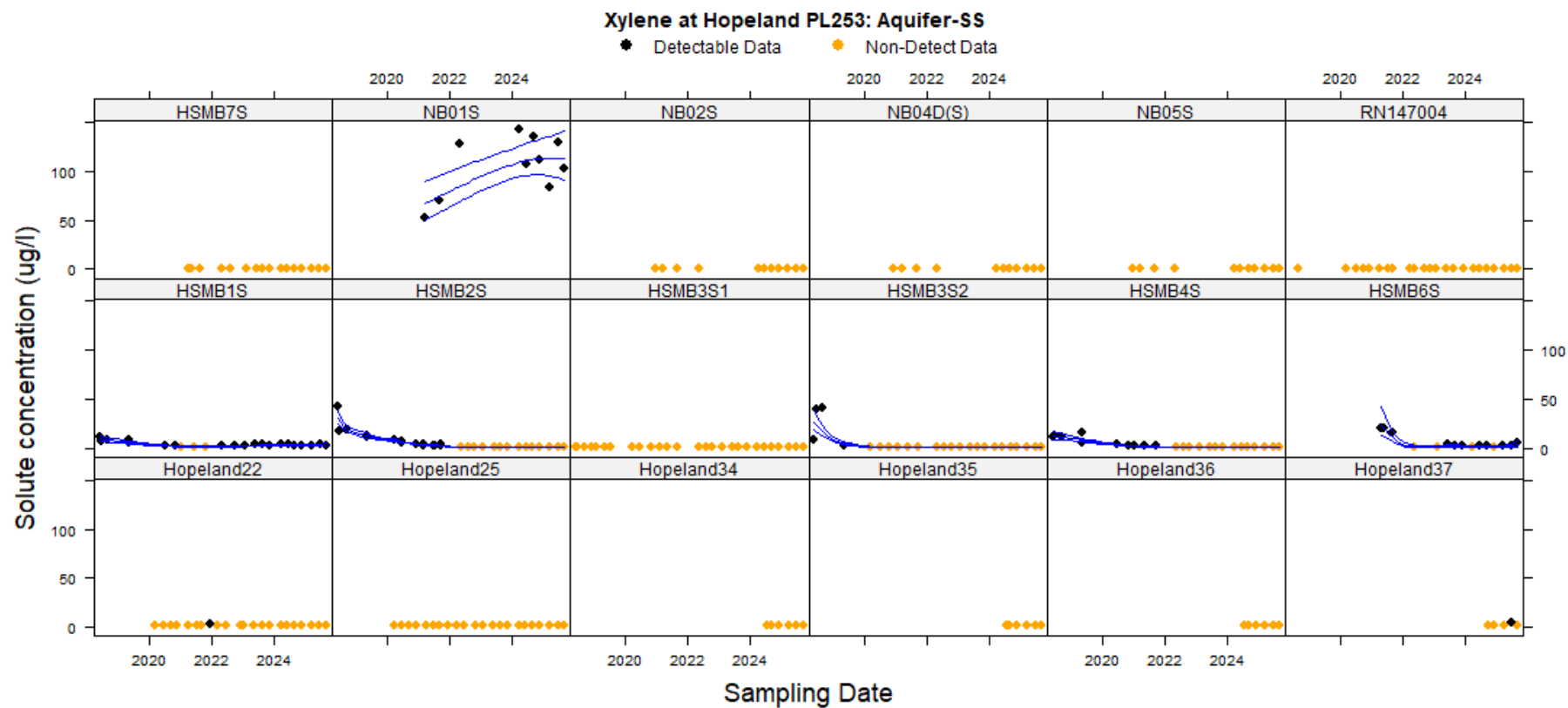


Figure 33: Xylene (LOR = 2 µg/L, Investigation Limits = 600 µg/L) concentration time series in the monitoring bores screened within Springbok Sandstone

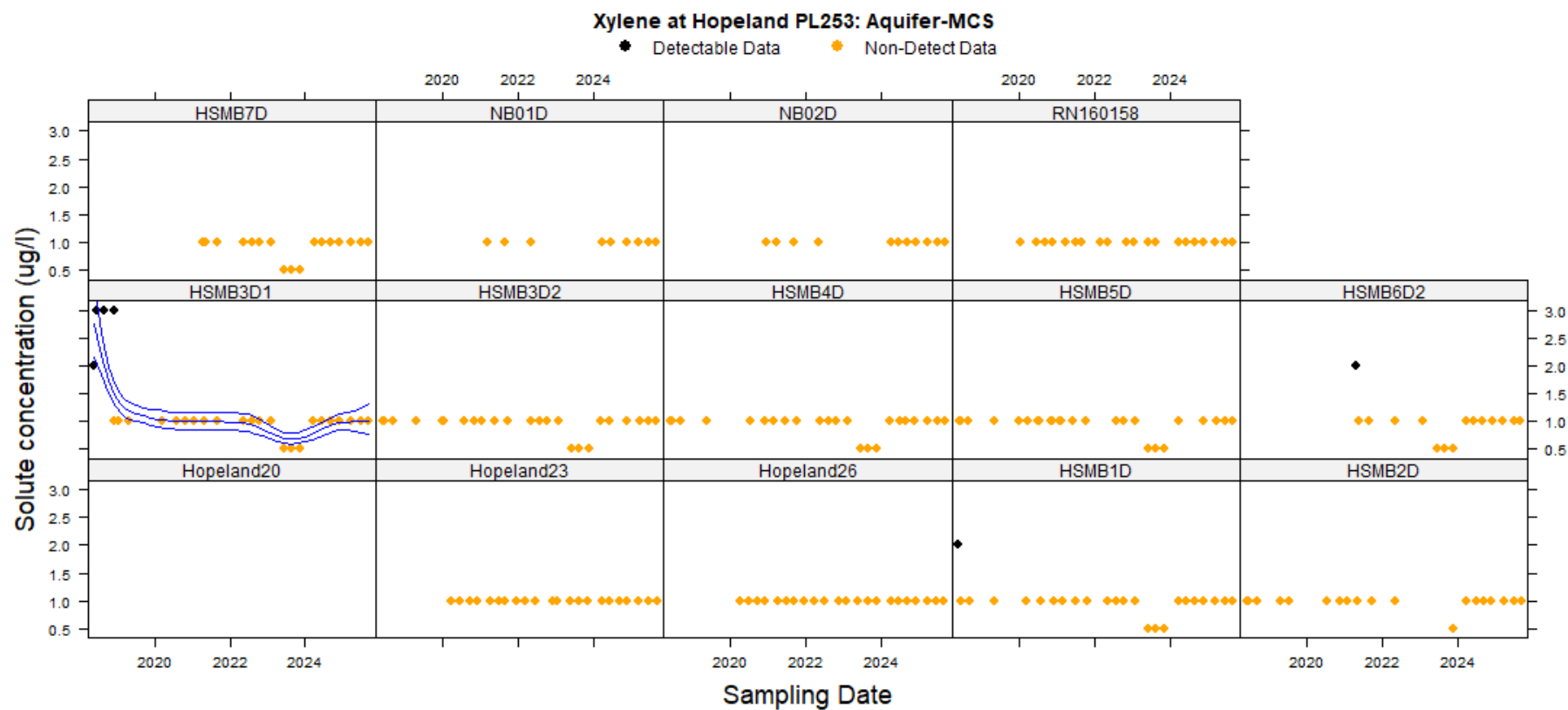


Figure 34: Xylene (LOR = 2 µg/L, Investigation Limits = 600 µg/L) concentration time series in the monitoring bores screened within Macalister coal seam

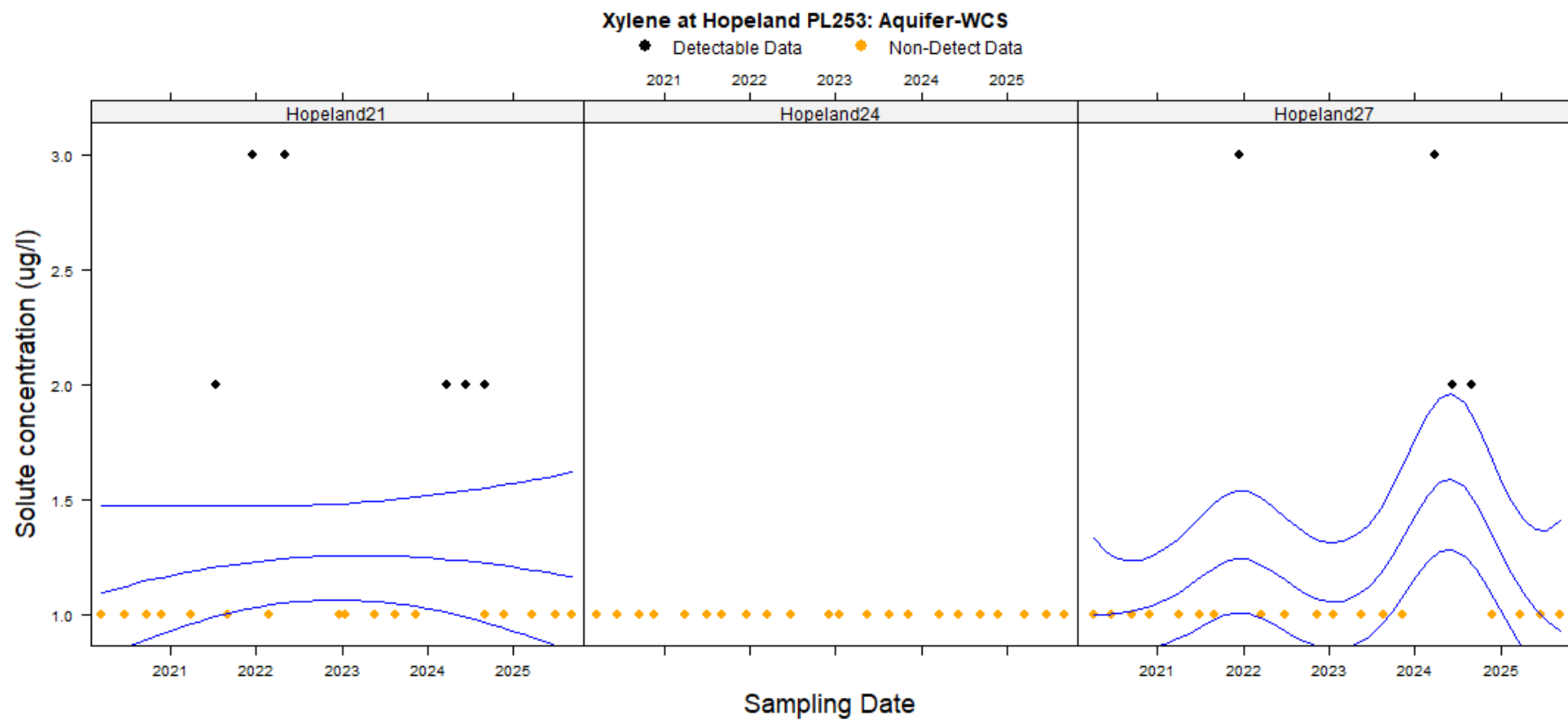


Figure 35: Xylene (LOR = 2 µg/L, Investigation Limits = 600 µg/L) concentration time series in the monitoring bores screened within Wambo coal seam