Appendix C Draft Native Vegetation Clearance Application

ecological associates pty ltd

Native Vegetation Clearance

Billy Lights Point: Eyre Peninsula Desalination Plant Project Data Report - Working Draft

Clearance under the *Native Vegetation Regulations 2017*

22 May 2024

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Table of contents

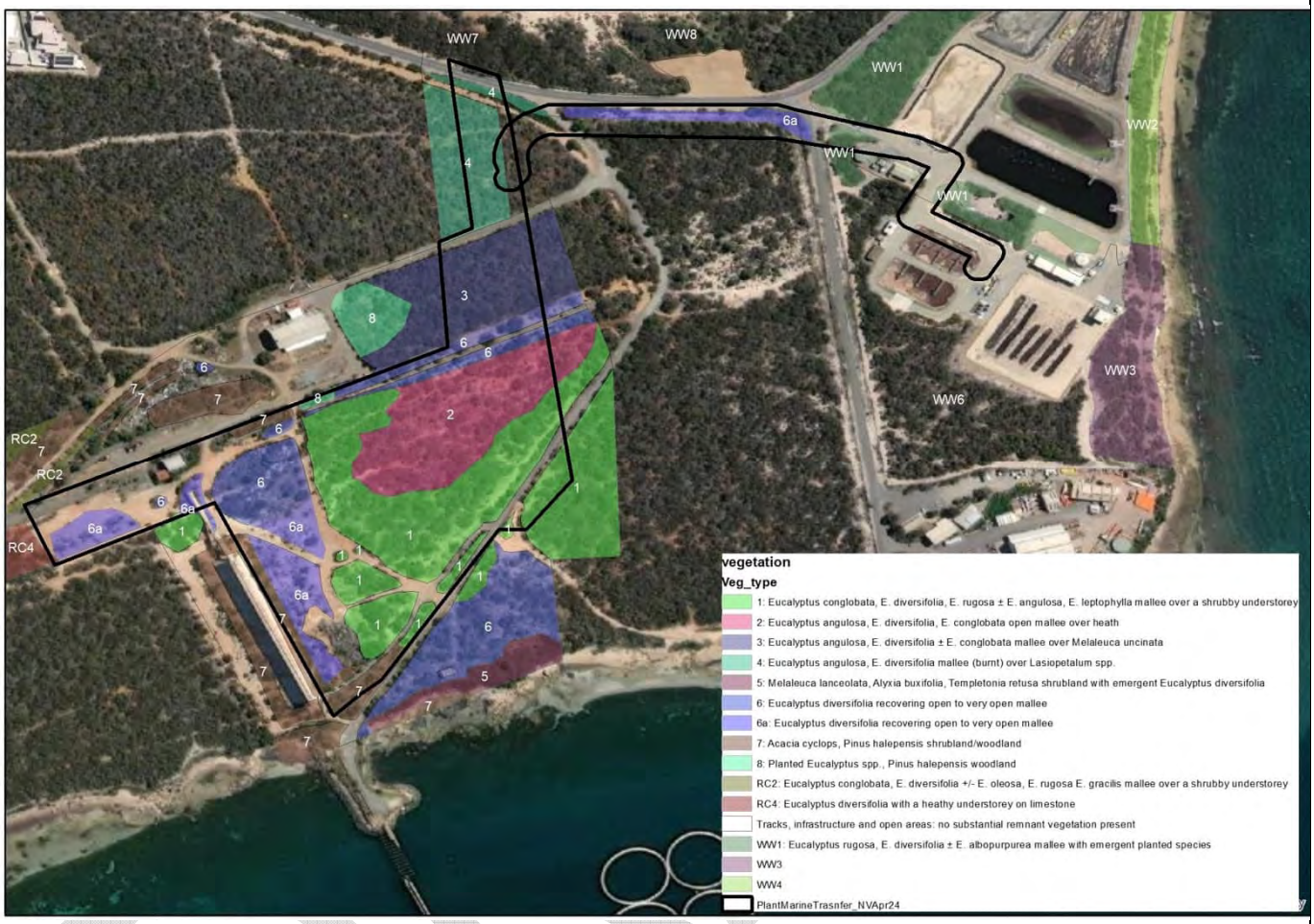
1. Application information

Application Details

Applicant:	SA Water		
Key contact:	Hazel Vandeleur Senior Environmental Impact Assessment Officer 250 Victoria Square Adelaide SA 5000		
Landowner:	SA Water		
Site Address:	via St Andrews Drive, Port Lincoln		
Local Government Area:	City of Port Lincoln District Council of Lower Eyre Peninsula	Hundred:	Lincoln
Title ID:			
Saline Waste/Seawater Transfer Pipelines	CT 6193/313	Parcel ID	D113518 A82
Desalination Plant	CT 6275/756	Parcel ID	D129500 A10
Desalination Plant / Pump Station Connection	CR 5753/706 (To be included WWTP)		
Pump Station (Waste Water Treatment Plant)	CR 5753/706	Parcel ID	D31966 A3
Desalinated Water Transfer Pipeline	CT 6275/757	Parcel ID	D129500 A11
Desalinated Water Transfer Pipeline	CT 6275/758	Parcel ID	D129500 A12
Desalinated Water Transfer Pipeline (Greyhound Rd Reserve)			
Drinking water/water supply transfer pipeline alignment in Crown Lease	CL 6221/531	Parcel ID	H510600 S499
Desalinated Water Transfer pipeline	CT 6248/729	Parcel ID	D124175 QP70
Desalinated Water Transfer pipeline (Bluefin Road Reserve)			
Desalinated Water Transfer pipeline (adjacent Bluefin Road)	CT 5149/26	Parcel ID	H510600 S1237
Desalinated Water Transfer pipeline (Northside Hill Tanks)	CR 5757/942	Parcel ID	H510600 S538

Summary of proposed clearance

Purpose of clearance	Clearance is required for the construction of a desalination plant at a portion of the former BHP sand operations land, Billy Lights Point, Port Lincoln and associated infrastructure at the existing Port Lincoln WWTP, Billy Lights Point, Port Lincoln
Native Vegetation Regulation	Regulation 12(34) - Infrastructure 5(1)(d) Clearance incidental to the construction or expansion of a building or infrastructure (and associated services) where the Minister has declared that the clearance is in the public interest.
Description of the vegetation under application	Mallee woodland dominated by *Eucalyptus diversifolia, E. oleosa* and *E. albopurpurea* Coastal shrubland dominated by *Myoporum insulare* and *Leucopogon parviflorus*
Total proposed clearance - area (ha) and number of trees	Marine intake and outfall pump station (MIPs), Saline Waste/Seawater Transfer Pipelines 0.9389 ha of native vegetation Reverse Osmosis Desalination Plant 5.2932 ha of native vegetation Desalinated Water Transfer pipeline & SAPN Section 7.5592 ha of native vegetation
Level of clearance	**Level 4**
Overlay (Planning and Design Code)	Overlays: Marine Section of Seawater Intake and Brine Disposal Pipelines • Building Near Airfields • Coastal Areas • Hazards (Acid Sulfate Soils) • Historic Shipwrecks - State • Hazards (Bushfire - Medium Risk) • Hazards (Bushfire - Outback) • Heritage Adjacency • Hazards (Flooding- Evidence Required) • Native Vegetation • State Significant Vegetation Desalination Plant and Pump Station • Coastal Areas • Hazards (Bushfire - Medium Risk) • Hazards (Flooding - Evidence Required) • Native Vegetation Desalinated Water Transfer Pipeline (East of Greyhound Road) • Affordable Housing • Coastal Areas • Hazards (Bushfire - Medium Risk) • Hazards (Flooding - Evidence Required) • Native Vegetation Desalinated Water Transfer Pipeline (West of Greyhound Road) • Limited Land Division • Coastal Areas • Hazards (Bushfire - General) • Hazards (Bushfire - High Risk)

	• Hazards (Flooding - Evidence Required) • Native Vegetation • State Significant Native Vegetation • Significant Landscape Protection • Water Resources
Map of proposed clearance area **To be updated with design certainty. 	
Mitigation hierarchy	**<u>Reverse Osmosis Desalination Plant site</u>,** Clearance has been largely constrained to areas that were impacted during the site/s previous establishment and industrial use. The less disturbed coastal portion of the site has been excluded from the project footprint. Excluding the coastal section also minimises potential disturbance impacts to an adjacent structure which has previously been utilized nesting by white-bellied sea-eagles. Construction laydown areas are also within cleared or significantly degraded areas. The width of the entry corridor from St Andrews Drive to the desalination plant has been minimised while meeting two-way access requirements for emergency vehicle entry/exit. <u>Desalinated Water Transfer pipeline to Northside Hill Tank</u> Clearance has been minimised locating works in degraded vegetation as much as possible when clearance cannot be avoided. The SAPN maintenance corridor has been co-located with the transfer main to reduce clearance. The width of the disturbance corridor for the transfer

	main will be reduced when passing through the SA Rare Port Lincoln Mallee plant community. Clearance of the EPBC vulnerable Subtropical and Temperate Coastal Saltmarsh will be avoided by the positioning of the transfer main along Greyhound Road. Clearance has been avoided along Proper Bay Road by remaining in the road verge. Clearance along Blue Fin Road has been minimised by making use of the roadbed and where required impacting vegetation on the more degraded north vegetation rather than the intact south verge which adjoins Kathai Conservation Park. **Marine Pump Station and Brine Transfer** The marine pump station is located mainly in areas of previously cleared vegetation in the Port Lincoln Wastewater Treatment Plant. The marine pipelines will be contained within an underground tunnel for approx.. 500m thereby avoiding disturbance to coastal vegetation and *Posidonia* beds in the intertidal to subtidal marine zones. **Rehabilitation** Vegetation that is disturbed for construction but not required for ongoing operation will be allowed to recover.
SEB Offset proposal	Clearance will be offset by the establishment of a new SEB area on SA Water land at Uley South. **Uley Basin On-ground SEB Proposal**

2. Purpose of clearance

2.1 Description

Clearance of native vegetation is required to construct a desalination plant and associated infrastructure at Billy Lights Point at Port Lincoln, South Australia (Figure 1).

2.2 Background

SA Water is planning to construct a desalination plant at Billy Lights Point to augment the water supply to Eyre Peninsula.

The Eyre Peninsula water supply region services 35,000 customers and includes the towns of Port Lincoln, Cummins, Wudinna, Streaky Bay, Cowell, Tumby Bay and Ceduna. Uley South Basin, located 30 km west of Port Lincoln, is the last remaining major productive groundwater source on Eyre Peninsula and currently supplies approximately 75% of the region's drinking water. Water pumped from the River Murray supplements this supply. For many years water in the Uley South Basin has been gradually depleting towards historic low levels, placing the region's main source of water under severe pressure. Sustained over-extraction puts the basin at risk of salinisation and permanent degradation from seawater intrusion. To ensure the basin remains a viable resource for the long term a desalination plant is proposed as a climate-independent water source.

The planned desalination plant is approximately 3 km south-east of Port Lincoln (Figure 1), with its marine pumps station and marine pipelines located on unused land at the SA Water Wastewater Treatment Plant 500 m to the north-east of the site adjacent to the coastline south of Billy Lights Point.

The plant site was previously a depot for a sand-limestone mix sourced from Coffin Bay for use as flux in the Whyalla steelworks. Material was hauled by train to the storage site at Billy Lights Point. The site was decommissioned in 2000 but still includes an old wharf and several disused buildings including a sand-storage shed and maintenance depot. The subject site does not include the sand transfer shed or the jetty adjacent to the desal plant site.

2.3 General location map

The proposed desalination plant site is planned for construction at the south-eastern outskirts of the Port Lincoln township (Figure 1). The site is on a headland between Porter Bay to the north and Proper Bay to the south. The headland terminates at Billy Lights Point in the north-east and Murray Point in the south-west. The landscape in the vicinity of the plant site lies at 5 to 15 m AHD.

The desalination plant will be located on the former BHP depot. A new transfer main will be constructed to take potable water from the plant to the existing storage tanks at Northside Hill adjacent to Kathai Conservation Park, 4 km south-west of Port Lincoln. Saline Waste/Seawater Transfer Pipelines will provide seawater to the plant and dispose of brine. The marine pipelines will extend approximately east into Proper Bay. A new pump station will be constructed in the Saline Waste/Seawater Transfer Pipelines lies within the existing Billy Lights Point Wastewater Treatment Plant. A new electricity connection will be required to supply the plant and will connect to the grid in Port Lincoln.

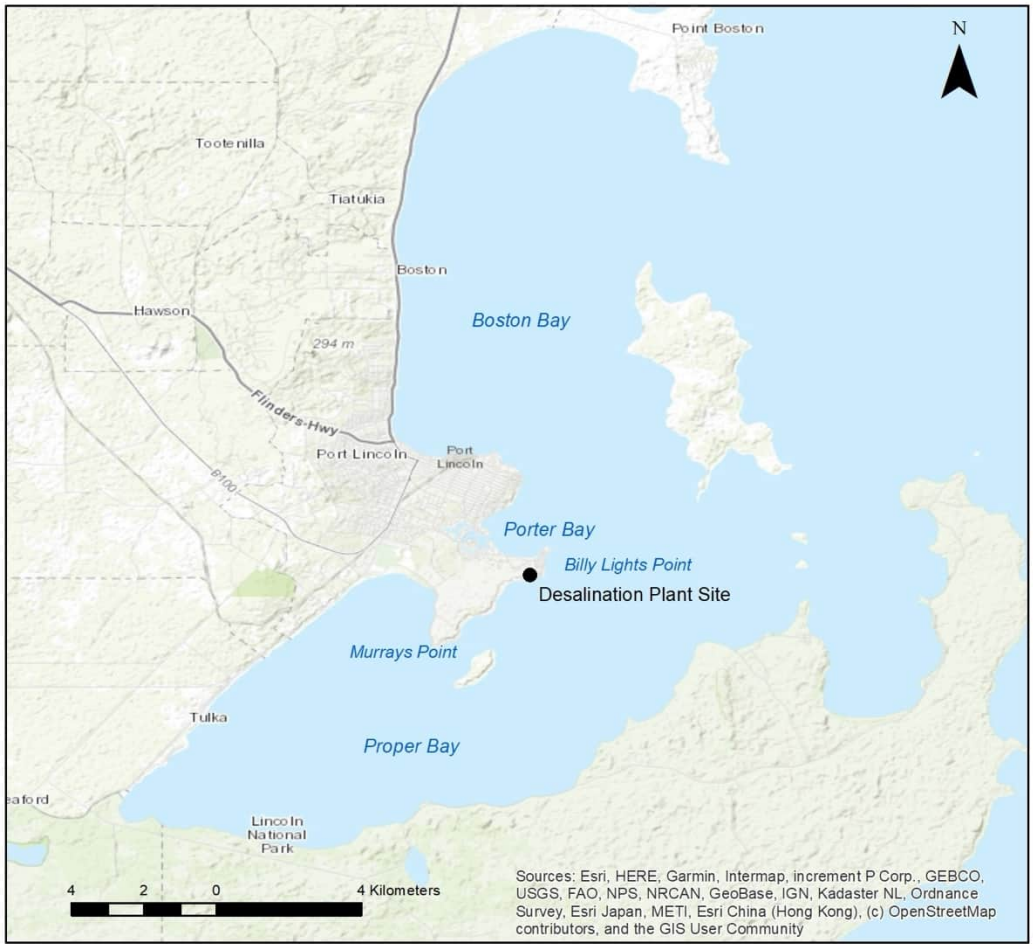


Figure 1. Site Location.

2.4 Details of the proposal

Reverse Osmosis (RO) Desalination Plant

The desalination plant is in an area of relatively degraded vegetation east of the former BHP sand storage shed. A new entrance way will be created to join St Andrews Drive to the north (Figure 2).

Marine intake and outfall pump station (MIPs), Saline Waste/Seawater Transfer Pipelines (Marine)

The marine pipelines will extend north from the desalination in the main entrance corridor to St Andrews Drive until they turn eastward towards the Wastewater Treatment Plant (Figure 4). The pipelines will connect to the pump station located in a decommissioned settling pond in the north of the plant. The seawater intake and brine disposal pipelines will be drilled beneath the surface to avoid clearance of coastal vegetation and will terminate approximately 1 km off the coast in Proper Bay.

Desalinated Water Transfer Pipeline and SAPN Powerline

The main will extend south-west from the plant and will be located immediately to the north of the former BHP trainline (Figure 3). Where it joins Greyhound Road to the west it will be located mainly in the road bed or in degraded vegetation on the northern verge. The transfer main will pass through cleared vegetation on the east side or Proper Bay Road until it joins Blue Fin Road. The main will be located in Blue Fin Road bed and verge and will pass around the corner of the Northside Hill Tanks to enter the site from the western side.

A new overhead powerline is required to supply the desalination plant. The power line will connect to the grid at two locations (Port Lincoln Marina Substation and Port Lincoln Substation) and will extend south to join the transfer main corridor on Greyhound Road. The powerline will be located immediately adjacent to the transfer main in the section along the former BHP tramline but for the purposes of construction and access will share the transfer main disturbance corridor.

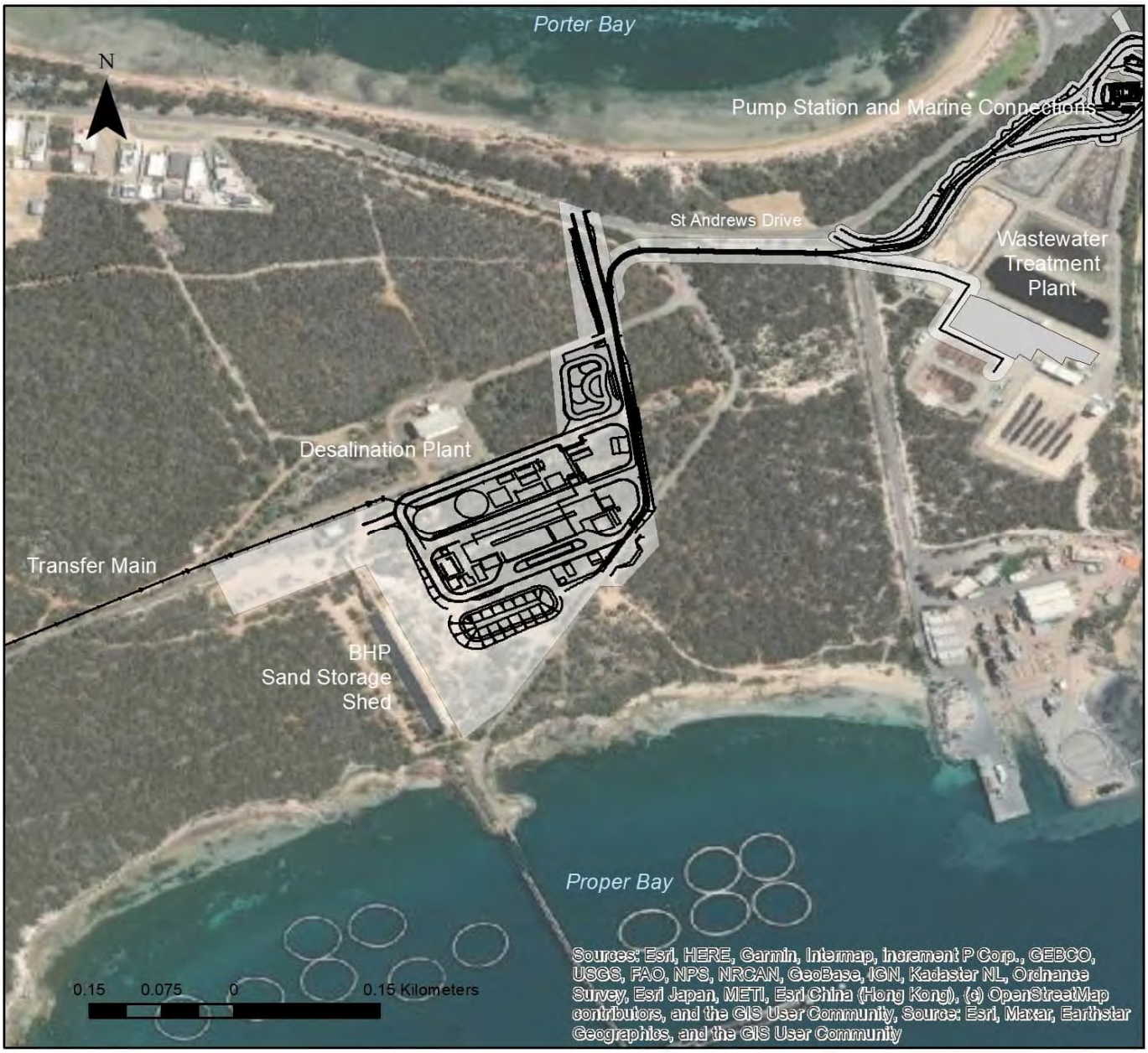


Figure 2. RO Desalination plant

Figure 3. Desalinated water, Saline Waste/Seawater Transfer mains including SAPN connection footprint which will require removal of Native Vegetation.

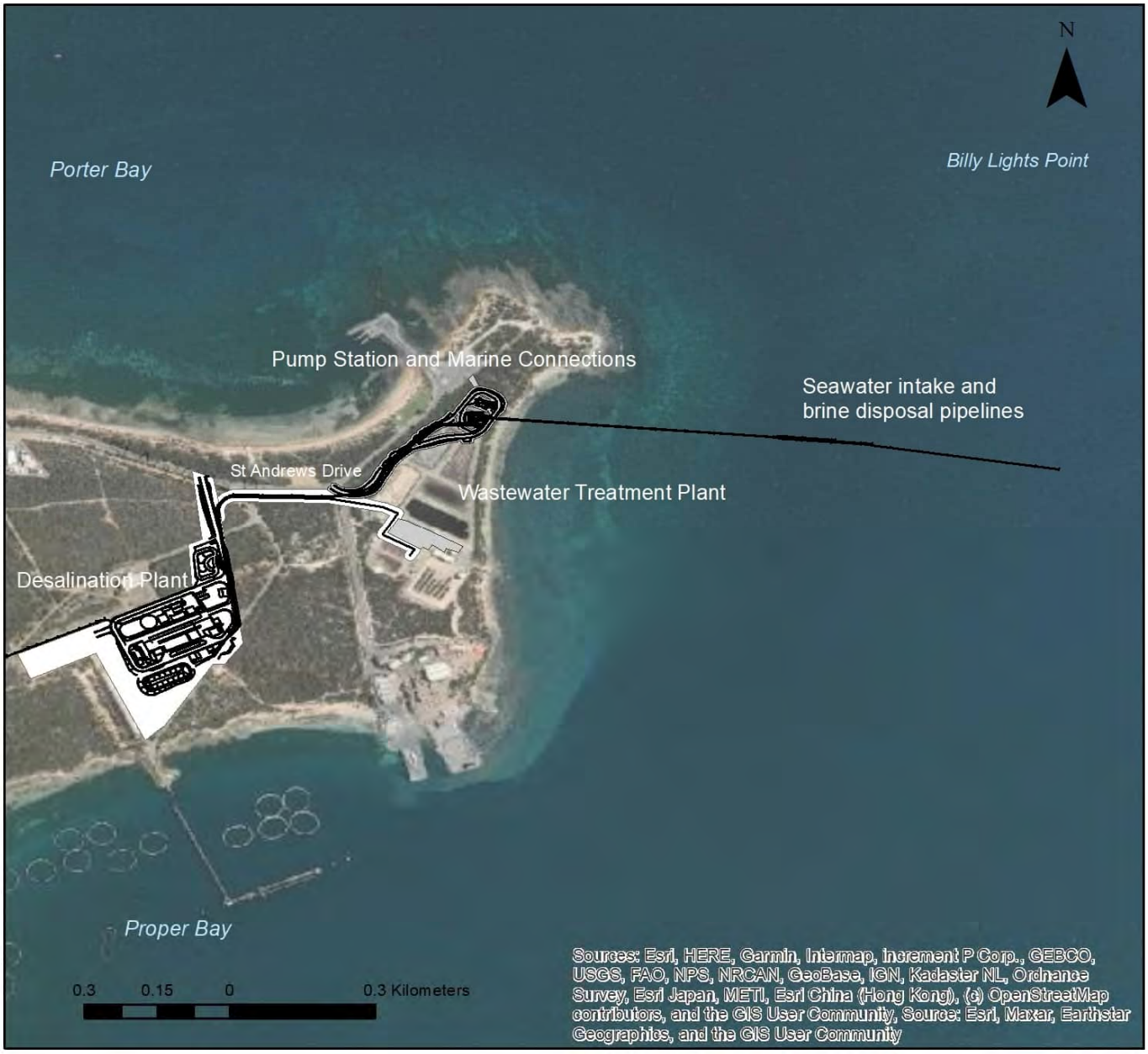


Figure 4. Marine intake and outfall pump station (MIPs), Saline Waste/Seawater Transfer Pipelines (Marine)

2.5 Approvals <u>required</u> *or* <u>obtained.</u>

Native Vegetation Act 1991

The project will require approval to clear native vegetation on the site under the *Native Vegetation Act 1991*.

Regulation 12(34) - Infrastructure 5(1)(d) applies to this project. This Regulation allows for clearance incidental to the construction or expansion of a building or infrastructure (and associated services) where the Minister has declared that the clearance is in the public interest.

Environment Protection and Biodiversity Conservation Act 1999 (impacts on MNES)

The site is located within an area that supports Matters of National Environmental Significance (MNES) under the *EPBC Act*. Seventeen MNES (four flora and 13 fauna species) are known to occur within 5 km of the project works.

Of these, four fauna species may find suitable habitat within vegetation impacted by the works.

No significant impacts are expected.

Coast Protection Act 1972 (SA)

Coast Protection Board Policy[1] states that any development must establish a spatial buffer of 2 km from the breeding territories of White-bellied Sea-eagle, and 1 km from the breeding territories of Osprey. A lesser buffer distance may be supported where there is specific, independent advice provided by a suitably qualified person to demonstrate a lesser distance is acceptable with regards to the proposed development.

Aboriginal Heritage Act 1988

SA Water has lodged a Section 21 and Section 23 application with the Minister for Aboriginal Affairs and Reconciliation.

2.6 Native Vegetation Regulation

Vegetation clearance in this project is permitted under Regulation 12(34) - Infrastructure 5(1)(d) Clearance incidental to the construction or expansion of a building or infrastructure (and associated services) where the Minister has declared that the clearance is in the public interest.

2.7 Development Application information

The project is subject to development assessment and has not yet been lodged with the Minister for Planning c/- State Commission Assessment Panel to undertake that assessment.

Planning and Design Code - Natural Resource and Environment overlays:

Marine Section of Seawater Intake and Brine Disposal Pipelines

- Building Near Airfields
- Coastal Areas
- Hazards (Acid Sulfate Soils)
- Historic Shipwrecks - State
- Hazards (Bushfire - Medium Risk)
- Hazards (Bushfire - Outback)
- Heritage Adjacency
- Hazards (Flooding- Evidence Required)
- Native Vegetation
- State Significant Vegetation

Desalination Plant and Marine Pump Station

- Coastal Areas
- Hazards (Bushfire - Medium Risk)
- Hazards (Flooding - Evidence Required)
- Native Vegetation

Desalinated Water Transfer Pipeline (East of Greyhound Road)

- Affordable Housing
- Coastal Areas
- Hazards (Bushfire - Medium Risk)
- Hazards (Flooding - Evidence Required)
- Native Vegetation

Desalinated Water Transfer Pipeline (West of Greyhound Road)

- Limited Land Division

[1] Coast Protection Board (2016). Coast Protection Board Policy Document. Coast Protection Board, Adelaide.

- Coastal Areas
- Hazards (Bushfire - General)
- Hazards (Bushfire - High Risk)
- Hazards (Flooding - Evidence Required)
- Native Vegetation
- State Significant Native Vegetation
- Significant Landscape Protection
- Water Resources

3. Method

3.1 Database Searches for Flora and Fauna

Existing records of threatened flora and fauna were reviewed for a 5 km search radius centred on the site using:

- NatureMaps and Atlas of Living Australia (20th May 2024).
- EPBC Protected Matters Search Tool (20th May 2024)
- South Australian Department for Environment and Water Biological Database of South Australia search (21st May 2024: Record set number DEWNRBDBSA240521-1.)

Figure 5. Protected Matters search area following route from Northside Hill tanks near Kathai Conservation Park to the Billy Lights Point Wastewater Treatment Plant, with 5 km Buffer.

The 5km buffer has been applied as specified appropriate under the Native Bushland Assessment Manual (DEW/NVC 2019). Observations from BDBSA, ALA, on-ground survey and sightings are considered reliable. Terrestrial records with a locational reliability greater than 1km or occurring prior to 1995 in the BDBSA, NatureMaps and Atlas of Living Australia, were excluded. The EPBC PMST is considered a guide to possible occurrence based on modelled and interpreted data of variable reliability. The Bushland Assessment manual (DEW/NVC 2019) requires reports from the PMST for species where the type of presence is "Species or species habitat known to occur within the area".

For EPBC Protected Matters, species were only included if the species or its habitat is known to occur in the search area. Data and spatial limitations may apply in relation to threatened, migratory and marine species within the PMST which can result in buffers being applied to older / limited data with poor spatial species definition (Commonwealth of Australia 2013). For EPBC Protected Matters, threatened, migratory and marine species were included if they are known to occur, or their habitat is known to occur, in the search area.

For EPBC Protected Matters, species were included if they are known to occur, or their habitat is known to occur, in the search area.

National Conservation Ratings are in accordance with the most recent (20th May 2024) *EPBC Act* Listing Status available in the Species Profile and Threats Database.

State Conservation Ratings are in accordance with the *National Parks and Wildlife Act 1972*.

Regional conservation ratings were sourced from Gillam, S. and Urban, R. (2009) Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments, West Region. Department for Environment and Heritage, South Australia.

3.2 Flora assessment

A vegetation survey of the entire route was conducted in July 2021 to identify plant communities, compile plant species lists and evaluate risks to fauna (T&M Ecologists 2021). Additional surveys were undertaken to assess coastal vegetation near the wastewater treatment plant on 7th July 2023 (Ecological Associates 2024). Targeted surveys for spring-flowering threatened flora, particularly orchids, were conducted along the entire route from 3rd-6th October 2023 (Ecological Associates 2024). At the same time mapping was refined for plant communities at the desalination plant and along the tramline route.

Bushland Assessments were completed for each plant association as prescribed by the Native Vegetation Council (NVC) Bushland Assessment Manual (July 2020). This included recording the plant species present, the vegetation structure, and habitat values offered by the plant community. Plant associations were mapped and classified according to composition and condition.

3.3 Fauna assessment

Two fauna surveys were undertaken along the proposed route.

July 2021 (T&M Ecologists):

Three areas were surveyed for birds:

- mallee woodlands in the proposed site for the desalination plant (Sites 1-4);
- mallee woodlands adjacent to the railway corridor (Sites RC1-RC6); and
- open water and adjacent saltmarsh at the western end of the proposed pipeline route (Site RC9).

The bird survey was undertaken in three areas, representing habitats that had not previously been extensively surveyed as part of this project. At least one hour was spent during the early morning and late afternoon recording bird species present in the area, as per standard Biological Survey of South Australia methods [1]. Identification was either visual or by call. In addition, opportune observations were made whilst vegetation data was being gathered.

December 2023 (David Armstrong)

A more extensive survey of woodland birds and shore birds was conducted along the proposed pipeline route from 4th -7th December 2023. This included five locations along the old rail corridor from Billy Lights Point west to the coast on Greyhound Road, and three points along Blue Fin Road on the north-eastern side of the Kathai Conservation Park (Figure 6). Shore birds were monitored within the bay south of the racetrack at four locations. Opportunistic fauna sightings were recorded during visits to the sewage works ponds, coast adjacent to Billy Lights Point and the Northside Hill tanks site. A night-time traverse of the woodland west of Billy Lights Point was undertaken on 6th December, to listen for nocturnal birds, specifically Bush Stone-curlew, owl, frogmouth or nightjar species.

Opportunistic observations of fauna during general field surveys were also recorded.

Lists of all fauna species observed during these surveys are provided in Appendices 1 and 2.

Results from these fauna surveys were supplemented with desktop searches. For State or Nationally threatened species, the suitability of the site for rare and threatened fauna was assessed based on the known distribution and occurrence of species, their habitat requirements and the quality of habitat available at the site.

Figure 6. Location of fauna survey sites conducted in December 2023 at 8 woodland (WB) sites and 4 shoreline (SB) sites along the proposed works alignment

3.4 Marine assessment

Broad-scale habitat mapping based on towed camera surveys of the Boston and Proper Bays was undertaken for SA Water in 2023 & 2024 (J Diversity Pty Ltd (2023), J Diversity Pty Ltd (2024)). Additional video drops and subsequent survey habitat mapping was undertaken to better inform the habitat types surrounding the proposed intake and outfall alignments extending eastwards from Billy Lights Point.

Towed camera surveys in the vicinity of Billy Lights Point were undertaken in several phases.

- SA Water completed one transect extending 900 m directly east of the Wastewater Treatment Plant (WWTP) on 5th July 2021 and three transects of length 150–400 m near the BHP Jetty on 26th July 2021 (Figure 7). This work was in relation to a previous design option for the intake and outfall alignments.
- Transects were undertaken near the currently proposed intake and outfall alignments, on 9th November 2023. These transects were in the direction of the prevailing wind/current and were generally 50 m long. They included:
    - 21 transects with start points spaced approximately 50 m apart, each approximately 50 m long.
    - 23 transects forming a buffer around the proposed alignment, with start points spaced approximately 100 m apart, and 100 m from the proposed alignment.
    - 16 transects covering a broader area 200 m north, 300 m east and 600 m south of the proposed alignment, with start points spaced approximately 200 m apart.
    - Five transects near the old and new WWTP outfalls.
    - Five transects opportunistically located to capture habitat transitions identified during that survey trip.

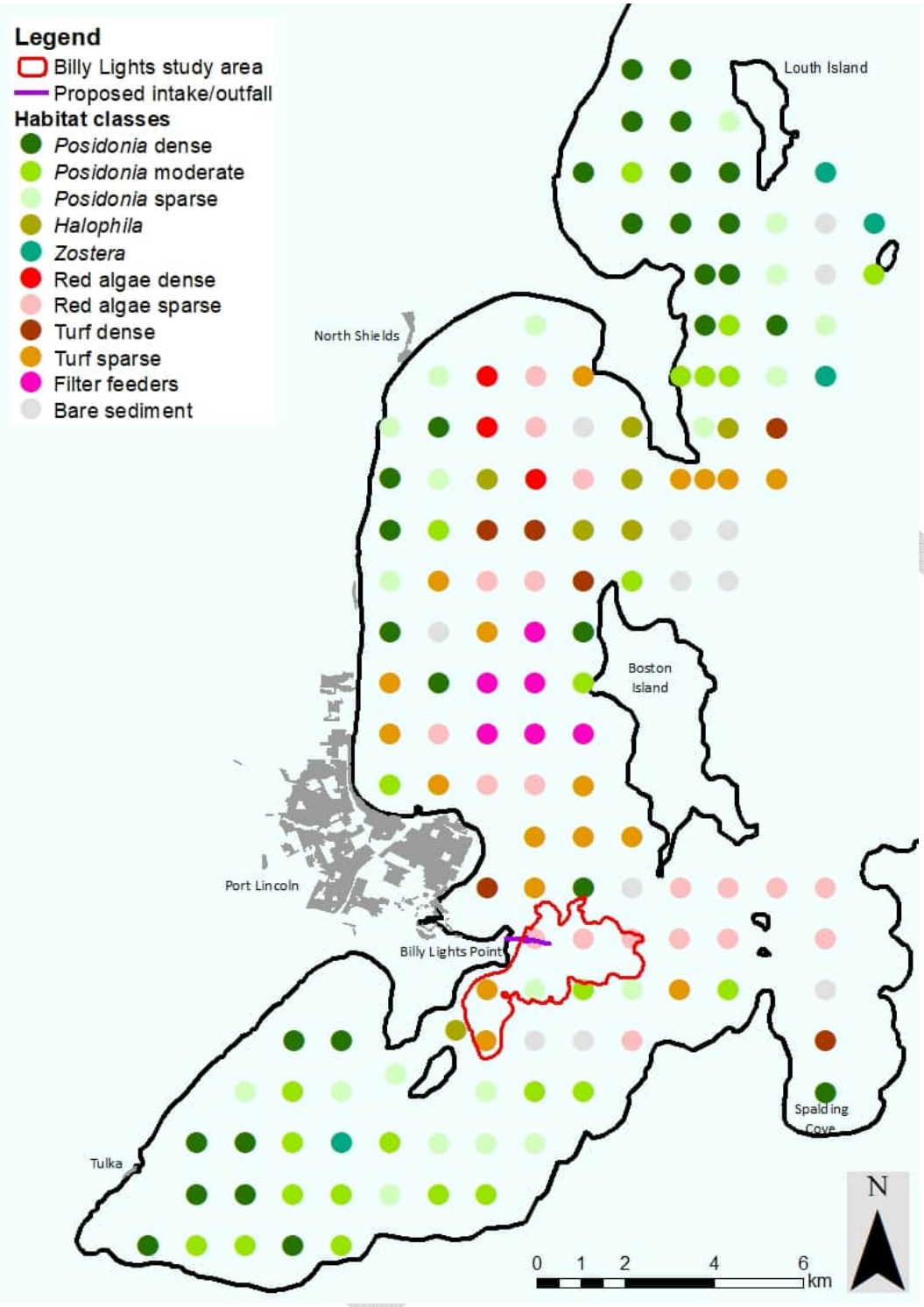


Figure 7 Habitat classes mapped from towed camera surveys undertaken in Louth, Boston and Proper Bays during 2021 and 2022.

- Another 95 transects were undertaken during 13–14 November following hydrodynamic modelling of the saline return water dispersion. These transects filled gaps in the predicted saline plume locations for both summer and winter. Spacing of transects was approximately 100 m in the area where predicted salinity increases (99th percentile) were 0.30–0.45 and 200 m where predicted salinity increases were 0.15–0.30. The location of some of these transects was adjusted to capture information relating to bathymetric features.

- An additional 117 transects were undertaken on 9 & 10th May 2024 following further hydrodynamic modelling of the predicted discharge plumes. The study boundary was extended to include the union of the 99th percentile contours for two seasonal modelling scenarios, which extended the area mainly to the south and east. Transects in the extended area were spaced approximately 200 m apart. Additional transects were added to increase the resolution in areas of uncertainty from the previous mapping.

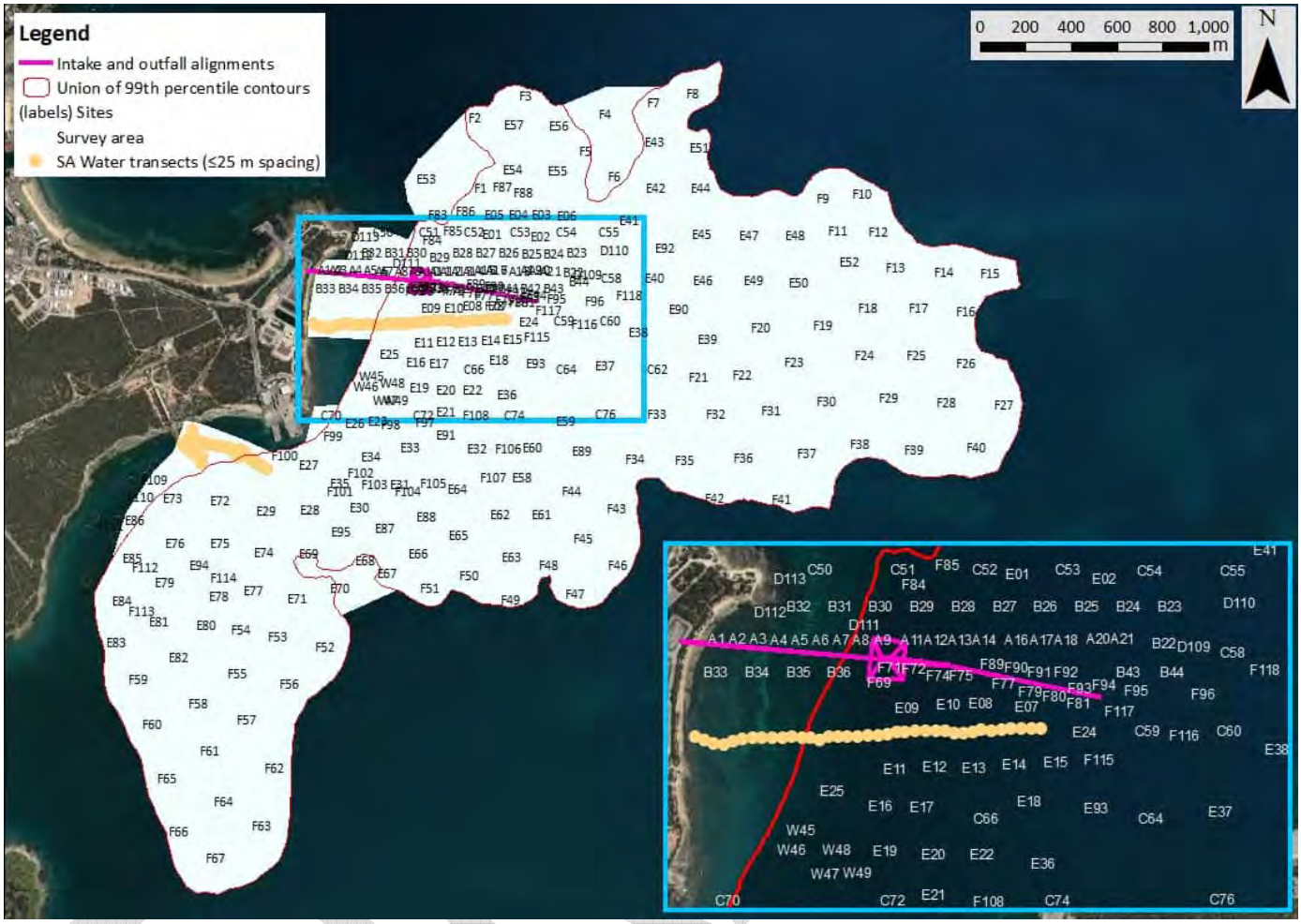


Figure 8 Sites of towed camera surveys undertaken to inform habitat mapping near Billy Lights Point during 2023/24. Note that the inconsistent site labelling scheme reflects the incremental nature of the survey program.

Habitat descriptions were informed and built upon earlier video analysis of habitats throughout Boston and Proper Bays (J Diversity Pty Ltd (2023), J Diversity Pty Ltd (2024)), and distinguished between ecosystem components identified by Tanner & Drabsch (2021) as being relevant to desalination plant impact assessment, namely macroalgae, seagrasses and invertebrates.

A habitat description based on combinations of substrate type, species composition, density and epiphyte cover were assigned to each second of video. Density classifications of sparse, medium, and dense were based on thresholds of 33% and 66%.

The habitat points were used to guide the manual construction of habitat polygons based on the dominant habitat class within them. There were three considerations applied, in order of priority, to place the boundaries such that they:

- crossed through significant habitat transitions identified during transects.
- followed relevant bathymetric contours.

- bisected the distance between points of different habitat classes in the same manner as the Thiessen polygon algorithm.

In some cases, polygons were drawn in areas with relatively few habitat points, and these were identified as being of lower certainty.

The polygons were projected using the Map Grid of Australia (Zone 53)

The habitat features identified during analysis of the towed camera footage included: bare sand, reef and bivalve beds as substrate; the large, bodied seagrass *Posidonia* ("strapweed"), mainly *P. australis*, of varying densities and sometimes with dense epiphytes, colonising seagrasses including *Halophila* ("paddleweed") and *Zostera* ("eelgrass"), macroalgae of varying densities and turf mats; and mixed habitats with two or more of the above components.

Posidonia was generally restricted to depths less than 12 m AHD[2] (***Error! Reference source not found.***). Inshore, north of the WWTP, *Posidonia* was generally dense and free of epiphytes. It transitioned to reef or bivalve beds near the Point. To the west of the BHP Jetty, it was typically sparse. Beyond depths of approximately 10 m, *Posidonia* was generally interspersed with macroalgae or had epiphytic (plant-covering) filamentous brown macroalgae, except on the bank near the south-eastern corner of the study area. Mixed seagrass communities were observed in deeper water in this area.

The dominant seagrass in depths greater than 12 m was *Halophila*, generally interspersed with macroalgae or turf mats. *Zostera*, generally sparse or in association with *Posidonia* was present at the most inshore sites east of the WWTP.

Macroalgae, often interspersed with turf mats, was present throughout most of the study area. Density was typically low or medium. In the north-eastern corner of the study area, macroalgae was in association with *Halophila*, and near the south-eastern corner, it was in association with *Posidonia*. The most inshore areas north of the WWTP were characterised by reef with sparse macroalgae, becoming dense macroalgae near the Point.

Invertebrate-based habitats, including razor clams and reef-forming bivalve beds (comprised of razor clams, hammer oysters and occasional scallops and mussels) were restricted to inshore areas near the northern tip of Billy Lights Point, or south-west of the BHP Jetty.

[2] Below Australian Height Datum

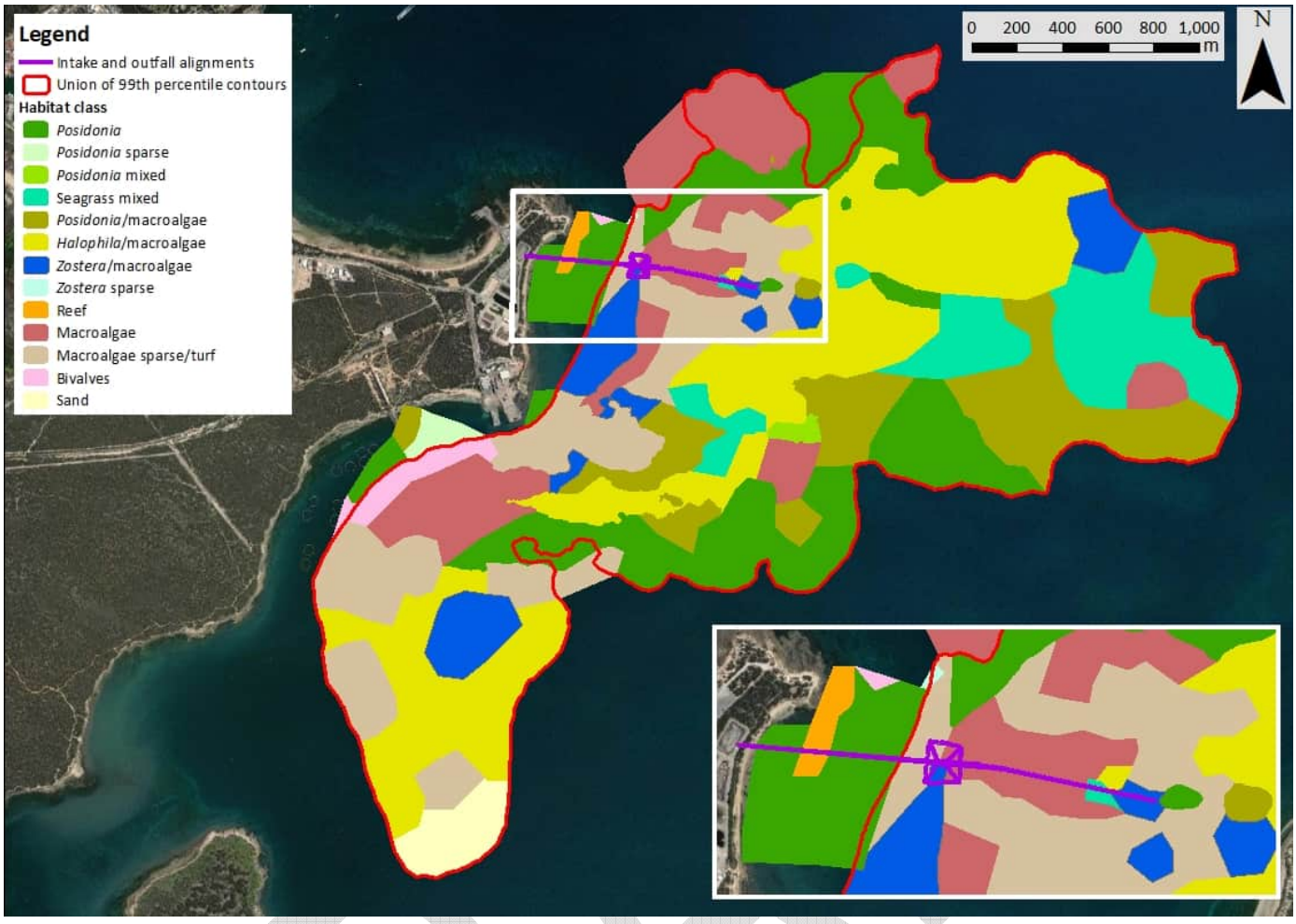


Figure 9. Habitat polygons based on broad habitat classes indicating polygons with a relative low certainty of the habitat classification.

The location of the marine infrastructure proposed in the design has been established with consideration of the habitat mapping and to avoid seagrass beds.

The marine pipeline proposes a tunnel from the WWTP end decommissioned lagoon out to 430m. This tunnel removes the impact on the dense *Posidonia* beds that are found directly offshore of the plant.

A trapezoid area of substrate (approximately 0.8 ha) will require excavation to retrieve the tunnel boring machine and to provide for the transition from tunnelled pipelines to the lay on bed pipelines. The benthic habitat in the retrieval/transition zone is characterised by macroalgae (0.35 ha), sparse macroalgae/turf habitat (0.23 ha) and macroalgae/*Zostera* habitat (0.21 ha)

Habitat disturbance will also occur via installation of the lay on bed pipelines; the design identifies the pipes as being 900mm in diameter and to be placed on site with preinstalled pre-concrete collars to secure the pipes in place. The construction disturbance footprint is expected to be contained within a 30m buffer along the pipeline route. The lay on bed portion of the two proposed intake pipelines are 100m and 150m respectively. The total length of the lay on bed portion of the outfall pipeline is 530m. Beyond the first 50m of the pipeline route within the retrieval/transition zone, the remainder of the proposed pipeline route intersects predominantly macroalgal habitat (for approximately 313 m) with shorter sections intersecting mixed macroalgal and seagrass habitat (approximately 113 m through Zostera/macroalgae and Halophila /macroalgae habitat) and mixed seagrass habitat (through approximately 56 m).

A conservative 30m wide construction disturbance footprint from the construction of the Project will result in the loss of an area of up to 1.8 ha of macroalgal habitat, 0.3 ha of mixed macroalgae and seagrass (*Zostera and Halophila*)

habitat and 0.2 ha of mixed seagrass habitat. The majority of the macroalgal habitat lost during construction will be within the retrieval/transition zone and this area will be replaced with approved backfill material. This area can be expected to be colonised by similar algal species over time.

4. Assessment Outcomes

4.1 Vegetation Assessment

General description of the vegetation, the site and matters of significance

The proposed desalination plant site is planned for construction at the south-eastern outskirts of the Port Lincoln township. The site is on a headland between Porter Bay to the north and Proper Bay to the south. The headland terminates at Billy Lights Point in the north-east and Murray Point in the south-west. The landscape in the vicinity of the plant site lies at 5 to 15 m AHD.

The site is located in the Lincoln IBRA Association which comprises the Jussieu Peninsula on the south-eastern tip of Eyre Peninsula and nearby island in Spencer Gulf. Landforms in the area are strongly influenced by the shallow and very hard Lincoln Complex Granitoids whose weathered surface contributes to the hills, islands and embayments in the region. The surface geology mainly comprises the poorly consolidated coastal dune calcarenites of the Bridgewater Formation. The underlying granitoids frequently outcrop through the more recent material in hills, coastal cliffs and coastal rock platforms (Parker, Fanning and Flint 1985).

Murray's Point Peninsula has a low relief limestone sheet lying at mostly less than 10 m elevation with shallow sandy soils. Murrays Point is connected by a low-lying marshy area between Porter Bay and the Murrays Point Wetlands. Part of this area has been developed for the Port Lincoln Marina and a former waste disposal site (dump) in Section 507.

The topography rises to the west of Port Lincoln to 150 m AHD at the site of the Northside Tanks where soils are deeper and sandier.

The desalination plant site is situated on part of former BHP land, located approximately 1 km south-east of Billy Lights Point The site was used as a sand depot for the BHP train line that hauled lime sand from a mine at Coffin Bay to a wharf at Proper Bay. The site was decommissioned in 2000 but still contains several disused buildings including a very large sand shed, maintenance depot and associated smaller infrastructure. The SA Water Wastewater Treatment Plant is located 500 m to the north-east of the site adjacent to the coastline south of Billy Lights Point.

The site is nested within a large tract of contiguous remnant native vegetation which extends across the entire headland covering an area of more than 380 ha. This vegetation comprises mallee woodland, mangrove shrublands and samphire flats, and is separated from extensive remnant vegetation in the west by a 1-2 km wide strip of coastal urban development. Kathai Conservation Park lies 4.9 km west of the proposed desalination plant site, and Port Lincoln National Park lies ~4.6 km south on the other side of Proper Bay. The nearest Heritage Agreements are situated 15 km north-east and 15 km south-east of the site.

Mallee is the dominant vegetation across the study area. On Murrays Point peninsula where sandy soils overlie limestone plant communities are dominanted by *Eucalyptus diversifolia, E. oleosa* and *E. albopurpurea*. The shallow limestone sheet between the desalination plant and Greyhound Road is dominated by *E. oleosa* and *E. conglobulata*. Recent jumbled sand dunes on the south side of the peninsula, facing Proper Bay, are mostly cleared of native vegetation but include coastal shrublands dominated by *Myoporum insulare* and chenopods with coastal saltmarsh vegetation present in Murrays Point Wetland. Native vegetation is largely absent from the limestone plain at the foot of the hills to the west of Port Lincoln. Native vegetation on the slopes and crest of the hill, including Kathai Conservation Park, is dominated by *E. diversifolia*.

Average annual rainfall from 1976 to 2005 at Port Lincoln is 468 mm (Naturemaps).

<u>Proposed desalination plant site</u>

The vegetation in the proposed plant site includes:

- highly disturbed areas where existing tracks and infrastructure occur;

- areas where previous clearance has occurred but natural regeneration is occurring (Sites 6 and 7);
- areas where some planting has been undertaken with non-indigenous species but there is natural regeneration occurring underneath (Site 8);
- coastal shrublands (Site 5); and
- areas of mallee, generally in good condition, albeit with some disturbance around the edges (Sites 1-4).

In areas which support mallee, it was observed that where limestone was closer to the surface*, Eucalyptus diversifolia* and *E. angulosa* are dominant over a dense understory of low and medium shrubs and sedges (Sites 2 and 4). In lower lying areas *Melaleuca uncinata* becomes a dominant understory species (Site 3). Where soils are deeper and heavier, the overstorey includes *E. conglobata*, *E. rugosa* and *E. leptophylla* as co-dominants, over a more open low shrub understory, with *Melaleuca lanceolata* also prominent. Vegetation condition ranges from poor in previously disturbed areas through to good in the remnant mallee patches.

SA Water Port Lincoln Wastewater Treatment Plant

The proposed brine transfer line traverses north east of the desalination plant, through parts of the SA Water Port Lincoln Wastewater Treatment Plant (WWTP) with the outfall discharging off the coast to the east of the WWTP.

The SA Water Wastewater Treatment Plant includes significant areas of infrastructure, with remnant vegetation principally around the edges of the Plant. Along the northern, western and southern edges (Site WW1), the overstorey is principally *E. diversifolia* and *E. rugosa*, with scattered patches of *E. albopurpurea* and scattered emergent planted Eucalypt species. The principal dominants in the understorey are *M. lanceolata* and *Myoporum insulare*. There are small, lower lying sections where water accumulates during winter, and moisture-loving species such as *Melaleuca brevifolia* and *Atriplex paludosa* occur. Vine lifeforms, such as *Tetragonia implexicoma*, *Cassytha melantha*), *Clematis microphylla* and *Comesperma volubile* are prominent features of this vegetation.

Along the eastern edge where soils are shallower adjoining the coast (Sites WW3, WW4 and WW5), the overstorey becomes *E. angulosa*, *E. conglobata* and *E. diversifolia*, with *M. lanceolata* and *Myoporum insulare* prominent medium-large shrubs. The most abundant small shrubs are *Rhagodia candolleana* and *Acrotriche patula*.

Whilst most of the area has clearly seen previous disturbance as a result of installation of the Treatment Plant, the vegetation has generally recovered well and is considered to be in a moderate to good condition.

Proposed potable pipeline and powerline route – eastern end

The proposed potable pipeline/powerline route initially passes through a large patch of mallee. There is a cleared track of width approximately 3 metres, and also the old trainline which is of similar width of disturbance. There are broad sections of mallee that are in good to excellent condition with little disturbance and very few weeds present. The mallee varies from being dominated by *E. conglobata* and *E. diversifolia* with low shrubs prominent in the understorey (Sites RC2, RC3 and RC 4), to areas where *E. gracilis*, *E. oleosa* and *E. rugosa* are dominant, generally with a dense mid-shrub understorey of *Melaleuca* spp. over a dense leaf litter layer (Site RC 6). Towards the western end, *E. albopurpurea* makes up the dominant overstory although these sections have been disturbed by rubbish dumping and track clearances (Site RC1).

Proposed potable pipeline and powerline route – western end

To the west of the large patch of mallee, the proposed powerline/pipeline route comes close to wetland systems associated with the coast. The existing track in this area remains at approximately 3 meters in width and is elevated above the samphire/saltmarsh wetland communities to the south. Between the track and the saltmarsh community, and in sections to the north of the track, the vegetation comprises typical coastal shrubland vegetation (Site RC7). Two other degraded examples of this community also occur, one where there has been overstorey plantings of non-indigenous Eucalypt and Casuarina species but where the disturbed remnant community persists beneath (Site RC12), and another where there has been past clearance and the overstorey is quite scattered with heavy invasion by grassy and herbaceous weeds (Site RC10). There is also a small section where *Nitraria billardieri* becomes the overstorey dominant (Site RC14).

The coastal saltmarsh community (RC9) appears to be tidally influenced, and consists of a low shrub/sedge overstorey dominated by *Suaeda australis*, *Salicornia sp.* and patches of the introduced **Juncus acutus*, along with scattered emergent *Melaleuca halmaturorum*. There is no proposed clearance of vegetation within the saltmarsh community,

Another wetland system, which is less likely to be tidally influenced, occurs in patches on the northern side of the existing track (Site RC13) and consists of an overstorey of *Melaleuca halmaturorum* over *Distichlis distichophylla*, and the small/medium shrubs *Rhagodia candolleana* and *Threlkeldia diffusa*, with several highly threatening weeds, including **Juncus acutus*, **Asparagus asparagoides* and **Lycium ferocissimum*.

There are broad sections of highly disturbed habitat (RC8) north of the track, where there are only very scattered colonising native shrubland species, with **Lycium ferocissimum* prominent (although treated in some areas), and the understorey dominated by introduced grasses and herbs.

Proposed potable pipeline route – to Northside Hill tanks

At the northern end, there is *Eucalyptus diversifolia* with co-dominant *E. albopurpurea* and some emergent *Allocasuarina verticillata* over a highly diverse heathy shrub understorey (Site TR1). On the northern side of the road, there is a section where this community is regularly slashed for fire risk mitigation (Site TR2), but a highly diverse understorey remains, albeit with some small, disturbed patches from what may be previous digging in the area. Heading southwards, there is a broad section of mallee where the overstorey is still principally *E. diversifolia* and *E. albopurpurea* but becomes more open with a dense mid-shrub layer of *Acacia paradoxa*, and a lower diversity and cover of native heath species, likely as a result of previous disturbance (Site TR3). There are also sections that are in recovery, where there is regeneration of native shrub species, with a moderate diversity, but generally very low cover (Site TR4). This regenerating vegetation occurs along the road reserve, but also appears to extend into adjoining properties. These areas would formerly have been mallee, and so are considered to be highly disturbed.

Vegetation in this section ranges in condition from poor in disturbed areas through to very good in the mallee at the northern end.

Descriptions of the affected associations follow.
Flora lists are provided in Appendix 4.

The route has been divided into three sections:

- Reverse Osmosis (RO) Desalination Plant
- Marine intake and outfall pump station (MIPs), Saline Waste/Seawater Transfer Pipelines (Marine)
- Desalinated Water Transfer Pipeline and SAPN Powerline

Details of the vegetation associates/scattered trees proposed to be impacted

Vegetation Association	**Site 1: *Eucalyptus conglobata, E. diversifolia, E. rugosa +/- E. angulosa, E. leptophylla* mallee over a shrubby understory**

Representative photograph of Site 1, facing west at 581093, 6154216 (WGS 84 Zone 53).

Additional representative photograph of Site 1, facing SSE at 581063, 6154231 (WGS 84 Zone 53).

General description	This vegetation association occurs throughout the central and western sections of the proposed desalination plant site, where soils are deeper and heavier. The overstorey comprises *Eucalyptus conglobata* (Port Lincoln Mallee), *E. diversifolia* (Coastal White Mallee) and *E. rugosa* (White Mallee) as co-dominants, over an open low shrub understory including *Acrotriche patula* (Prickly Groundberry), *Lasiopetalum discolor* (Coast Velvet-bush), *Templetonia retusa* (Cockies Tongue) and *Melaleuca lanceolata* (Dryland Tea-tree). At least eight species of winter- and spring-emergent orchids were recorded, including *Pterostylis* spp. (Greenhoods), *Microtis sp.* (Onion-orchid), *Diuris sp.* (Donkey Orchid), *Caladenia* spp. (Spider-orchids) and *Thelymitra* spp. (Sun-orchids) Weed species are a minor component of the community and include *Asparagus asparagoides* (Bridal Creeper), *Pinus halepensis* (Aleppo Pine), *Casuarina glauca* (Swamp Oak), *Senecio pterophorus* (African Daisy) and *Asphodelus fistulosus* (Onion Weed). **The vegetation community is in good condition.**				
Threatened species or community	State-listed vegetation community: • State Rare *Eucalyptus conglobata* Low Woodland on fertile loams over limestone. State-threatened flora observed: • State Rare Alcock's Wattle (*Acacia alcockii*) • Port Lincoln Mallee (*Eucalyptus conglobata*) Nationally- and State-threatened fauna that might utilise this vegetation community: • Nationally Vulnerable: Diamond Firetail • State Endangered: White-bellied Sea Eagle • State Vulnerable: Yellow-tailed Black Cockatoo, Brown Quail • State Rare: Purple-gaped Honeyeater, Elegant Parrot, White-winged Chough, Rock Parrot, Western Gerygone, Shy Heathwren, Peregrine Falcon, Bush Stone-curlew & Painted Buttonquail. The State Endangered Eastern Osprey has been recorded nearby, but vegetation at the site is not preferred nesting habitat.				
Landscape context score	1.12	Vegetation Condition Score	57.35	Conservation significance score	1.28
Unit biodiversity Score	82.22	Area (ha)	1.7615 (Plant)	Total biodiversity Score	144.83 (Plant)

Vegetation Association	**Site 2: *Eucalyptus angulosa, E. diversifolia, E. conglobata* open mallee over heath**

Representative photograph of Site 2, facing south-east at 581053, 6154259 (WGS 84 Zone 53).

Additional representative photograph of Site 2, facing south at 581105, 6154327 (WGS 84 Zone 53).					
General description	This vegetation association occurs within the proposed desalination plant site, in areas where limestone is closer to the surface. *Eucalyptus angulosa* (Coast Ridge-fruited Mallee), *E. diversifolia* and *E. conglobata* are co-dominant canopy species. Sedges such as *Gahnia deusta* (Limestone Saw-sedge) and *Lomandra collina* (Sand Mat-rush), and small to medium shrubs such as *Acrotriche cordata* (Blunt-leaf Groundberry) and *Templetonia retusa* are characteristic understory species. At least eight species of winter- and spring-emergent orchids were detected including *Pterostylis flavovirens* (Tall Greenhood), *P. sanguinea* (Blood Greenhood), *Acianthus pusillus* (Mosquito Orchid), *Cyrtostylis robusta* (Robust Gnat-orchid), *Microtis frutetorum* (Onion-orchid), *Thelymitra megcalyptra* (Scented Sun-orchid), *T. luteocilium* (Yellow-tuft Sun-orchid) and *Caladenia campestris* (Spider-orchid). Weed species are a minor component of the community and include Bridal Creeper, Aleppo Pine and *Polygala myrtifolia* (Myrtle-leaf Milkwort). **The vegetation community is in good condition.**				
Threatened species or community	State-listed vegetation community: • State Rare *Eucalyptus conglobata* Low Woodland on fertile loams over limestone. State-threatened flora observed: • State Rare Alcock's Wattle (*Acacia alcockii*) • State Rare Port Lincoln Mallee (*Eucalyptus conglobata*) Nationally- and State-threatened fauna that might utilise this vegetation community: • Nationally Vulnerable: Diamond Firetail • State Vulnerable: Yellow-tailed Black Cockatoo, Brown Quail • State Endangered: White-bellied Sea Eagle • State Rare: Purple-gaped Honeyeater, Elegant Parrot, Rock Parrot, White-winged Chough, Western Gerygone, Shy Heathwren, Peregrine Falcon, Bush Stone-curlew and Painted Buttonquail. The State Endangered Eastern Osprey has been recorded nearby, but vegetation at the site is not preferred nesting habitat.				
Landscape context score	1.12	Vegetation Condition Score	54.38	Conservation significance score	1.28
Unit biodiversity Score	77.95	Area (ha)	0.9988 (Plant)	Total biodiversity Score	77.86 (Plant)

Vegetation Association	**Site 3: *Eucalyptus angulosa, E. diversifolia* ± *E. conglobata* mallee over *Melaleuca uncinata***

Representative photograph of Site 3, facing south at 581091, 6154439 (WGS 84 Zone 53).

Additional representative photograph of Site 3, facing SW at 581103, 6154409 (WGS 84 Zone 53).

General description	This vegetation association occurs in lower lying areas in the north-western section of the proposed desalination plant site. *Melaleuca uncinata* (Broombush) and *M. lanceolata* (Dryland Teatree) become dominant understory species beneath a canopy of *Eucalyptus angulosa, E. diversifolia* and *E. conglobata*. Other common understory species include *Gonocarpus mezianus* (Broad-leaf Raspwort), *Lepidosperma viscidum* (Sticky Sword-sedge), *Templetonia retusa* and *Pomaderris flabellaris* (Fan Pomaderris). The groundlayer supports a variety of orchid species, including Greenhoods, Mosquitos orchids, Gnat-orchids, Onion orchids, Donkey orchids and Sun-orchids. *Freesia* sp. was the most encountered weed species, with Bridal Creeper, Aleppo Pine, *Acacia cyclops* (Western Coastal Wattle) and *Moraea setifolia* (Thread Iris) being minor components of the association. The plant community has a very high diversity of native species, good structural diversity, deep leaf litter and provides good habitat value. **The vegetation community is in very good condition.**				
Threatened species or community	State-listed vegetation community: • State Rare *Eucalyptus conglobata* Low Woodland on fertile loams over limestone. State-threatened flora observed: • State Rare Alcock's Wattle (*Acacia alcockii*) • State Rare Port Lincoln Mallee (*Eucalyptus conglobata*) Nationally- and State-threatened fauna that might utilise this vegetation community: • Nationally Vulnerable: Diamond Firetail • State Endangered: White-bellied Sea Eagle • State Vulnerable: Yellow-tailed Black Cockatoo, Brown Quail • State Rare: Purple-gaped Honeyeater, Elegant Parrot, Rock Parrot, White-winged Chough, Western Gerygone, Shy Heathwren, Peregrine Falcon, Bush Stone-curlew and Painted Buttonquail. The State Endangered Eastern Osprey has been recorded nearby, but vegetation at the site is not preferred nesting habitat.				
Landscape context score	1.12	Vegetation Condition Score	60.30	Conservation significance score	1.28
Unit biodiversity Score	86.45	Area (ha)	0.493 (Plant)	Total biodiversity Score	42.62 (Plant)

Vegetation Association	**Site 4: *Eucalyptus angulosa, E. diversifolia* mallee (burnt) over *Lasiopetalum spp.***

Representative photograph of Site 4, facing south at 581105, 6154511 (WGS 84 Zone 53).

Additional representative photograph of Site 4, facing south at 581118, 6154577 (WGS 84 Zone 53).

General description	Vegetation association 4 occurs along the proposed access route to the north of the desalination plant. *Eucalyptus angulosa* and *E. diversifolia* provide the main canopy cover, with *E. conglobata* and *Eucalyptus oleosa ssp. ampliata* (Red Mallee) also present. Velvet-bushes (*Lasiopetalum* spp.), *Eutaxia microphylla* (Common Eutaxia), *Templetonia retusa* and *Acacia spinescens* (Spiny Wattle) are common in the understory. Several species of spring-flowering orchids were observed in the groundlayer. Weed cover is low but includes scattered plants of Bridal Creeper, Myrtle-leaf Milkwort and Western Coastal Wattle. The community has a high diversity of native plant species and is regenerating well after a fire approximately 8 years ago. It is of high habitat value with good structural diversity and fallen timber and debris. **The vegetation community is in very good condition.**				
Threatened species or community	State-listed vegetation community: Not considered a threatened ecosystem State-threatened flora observed: • State Rare Port Lincoln Mallee (*Eucalyptus conglobata*) Nationally- and State-threatened fauna that might utilise this vegetation community: • Nationally Vulnerable: Diamond Firetail • State Endangered: White-bellied Sea Eagle • State Vulnerable: Yellow-tailed Black Cockatoo, Brown Quail • State Rare: Purple-gaped Honeyeater, Elegant Parrot, Rock Parrot, White-winged Chough, Western Gerygone, Shy Heathwren, Peregrine Falcon, Bush Stone-curlew and Painted Buttonquail. The State Endangered Eastern Osprey has been recorded nearby, but vegetation at the site is not preferred nesting habitat.				
Landscape context score	1.12	Vegetation Condition Score	62.44	Conservation significance score	1.14
Unit biodiversity Score	79.72	Area (ha)	0.3353 (Plant)	Total biodiversity Score	26.73 (Plant)

Vegetation Association	**Site 6: *Eucalyptus diversifolia* recovering open mallee**

Representative photograph of Site 6, facing south at 581133, 6154152 (WGS 84 Zone 53).

Representative photograph of Site 6, facing south at 580979, 6154257 (WGS 84 Zone 53).

General description	Vegetation association 6 comprises areas where areas where previous clearance has occurred but natural regeneration of the mallee community is occurring. The canopy layer is sparse and dominated by *Eucalyptus diversifolia* and *E. rugosa* and the understory supports regenerating shrub species such as *Alyxia buxifolia* (Sea Box), *Templetonia retusa* and several species of wattles. Two species of spring-flowering orchids were observed (*Caladenia* sp. and *Microtis* sp.). The community has a moderate diversity of native species, represented by shrubs, sedges, vines and grasses. Exotic species include Bridal Creeper, Aleppo Pine, Swamp Oak, Onion Weed and Western Coastal Wattle, each being a minor component of the community. **The vegetation community is in moderate condition.**				
Threatened species or community	State-listed vegetation community: Not considered a threatened ecosystem State-threatened flora observed: • State Rare Alcock's Wattle (*Acacia alcockii*) Nationally- and State-threatened fauna that might utilise this vegetation community: • Nationally Vulnerable: Diamond Firetail • State Vulnerable: Yellow-tailed Black Cockatoo • State Rare: Purple-gaped Honeyeater, Elegant Parrot, Western Gerygone, Shy Heathwren, Peregrine Falcon and Rock Parrot. The Rock Parrot was observed within this vegetation association. The State Endangered Eastern Osprey and White-bellied Sea Eagle occur nearby, but vegetation at the site is not their preferred nesting habitat. The State Rare Bush Stone-curlew, White-winged Chough and Painted Buttonquail have been recorded within 5 km of the site but are unlikely to use degraded habitats with little leaf litter.				
Landscape context score	1.12	Vegetation Condition Score	36.49	Conservation significance score	1.12
Unit biodiversity Score	45.77	Area (ha)	0.6391 (Plant)	Total biodiversity Score	29.25 (Plant)

Vegetation Association	**Site 6a: *Eucalyptus diversifolia* recovering open to very open mallee**

Representative photograph of Site 6a, facing south at 580988, 6154224 (WGS 84 Zone 53).

General description	This plant community is a more degraded version of vegetation association 6, occurring in the vicinity of the existing infrastructure at the site and along the southern road verge of St Andrews Drive. Both the canopy and shrub layers are sparser due to previous clearance and disturbance, but several species are naturally regenerating. **The vegetation community is in poor to moderate condition.**
Threatened species or community	State-listed vegetation community: Not considered a threatened ecosystem State-threatened flora observed: • State Rare Alcock's Wattle (*Acacia alcockii*) Nationally- and State-threatened fauna that might utilise this vegetation community: • Nationally Vulnerable: Diamond Firetail • State Vulnerable: Yellow-tailed Black Cockatoo • State Rare: Purple-gaped Honeyeater, Elegant Parrot, Western Gerygone, Rock Parrot, Peregrine Falcon The State Endangered Eastern Osprey and White-bellied Sea Eagle occur nearby, but vegetation at the site is not their preferred nesting habitat. The State Rare Bush Stone-curlew, White-winged Chough and Painted Buttonquail have been recorded within 5 km of the site but are unlikely to rely on this plant community.

Landscape context score	1.12	Vegetation Condition Score	31.76	Conservation significance score	1.12
Unit biodiversity Score	39.84	Area (ha)	0.0034 (MIPS) 0.7339 (Plant)	Total biodiversity Score	0.14 (MIPS) 29.24 (Plant)

Vegetation Association	**Site 7: **Acacia cyclops, *Pinus halepensis* shrubland/woodland**

Representative photograph of Site 7, facing south at 581000, 6154136 (WGS 84 Zone 53).

Representative photograph of Site 7, facing south at 581059, 6154120 (WGS 84 Zone 53).

General description	This plant community occurs in highly disturbed areas adjacent to the disused BHP shed and associated tracks and infrastructure. It has been cleared in the past and is now dominated by exotic trees and shrubs (*Acacia cyclops* (Western Coastal Wattle), *Pinus halepensis* (Aleppo Pine), *Rhamnus alaternus* (Blowfly Bush) and *Lycium ferocissimum* (African Boxthorn)). Although sparse, the understory supports a medium diversity of regenerating native species including *Eucalyptus diversifolia* (Coastal White Mallee), several *Acacia* species, *Pomaderris obcordata* (Wedge-leaf Pomaderris), *Templetonia retusa* (Cockies Tongue), *Carpobrotus rossii* (Native Pigface), and a variety of small shrubs, forbs and grasses. **The vegetation community is in poor to moderate condition.**				
Threatened species or community	State-listed vegetation community: Not considered a threatened ecosystem State-threatened flora observed: • State Rare Port Lincoln Mallee (*Eucalyptus conglobata*) Nationally- and State-threatened fauna that might utilise this vegetation community: • Nationally Vulnerable: Diamond Firetail • State Vulnerable: Yellow-tailed Black Cockatoo • State Rare: Purple-gaped Honeyeater, Elegant Parrot, Western Gerygone, Rock Parrot, Peregrine Falcon. Given the poor condition of the vegetation and limited structural diversity it is unlikely to provide important habitat for most of these species. The State Endangered Eastern Osprey) and White-bellied Sea Eagle occur nearby, but vegetation at the site is not their preferred nesting habitat. The State Rare Bush Stone-curlew, White-winged Chough and Painted Buttonquail have been recorded within 5 km of the site but are unlikely to rely on this plant community.				
Landscape context score	1.12	Vegetation Condition Score	34.25	Conservation significance score	1.12
Unit biodiversity Score	42.97	Area (ha)	0.2508 (Plant) 0.0737 (Transfer)	Total biodiversity Score	10.78 (Plant) 3.17 (Transfer)

Vegetation Association	**Site 8: Planted *Eucalyptus spp., *Pinus halepensis woodland***				
 *Representative photograph of Site 8, facing south-east at 581036, 6154416 (WGS 84 Zone 53).*					
General description	Plant association 8 occurs adjacent to an old shed and a section of the southern road verge along St Andrews Drive. It compromises areas where some planting has been undertaken with non-indigenous *Eucalyptus* species but there is natural regeneration occurring underneath. The community supports a medium diversity of native species including regenerating *Eucalyptus diversifolia* (Coastal White Mallee) and *E. conglobata* (Port Lincoln Mallee), as well as several species of *Acacia*. The understory comprises a variety of shrubs (e.g. *Lasiopetalum* spp. (Velvet-bushes), *Acrotriche* spp. (Ground-berries)), vines, daisies and native grasses. Exotic species are a significant component and include *Pinus halapensis* (Aleppo Pine), *Asparagus asparagoides* (Bridal Creeper), *Polygala myrtifolia* (Myrtle-leaf Milkwort), *Scabiosa atropurpurea* (Pincushion) and *Piptatherum miliaceum* (Rice Millet). **The vegetation community is in poor to moderate condition.**				
Threatened species or community	State-listed vegetation community: Not considered a threatened ecosystem State-threatened flora observed: • State Rare Port Lincoln Mallee (*Eucalyptus conglobata*) Nationally- and State-threatened fauna that might utilise this vegetation community: • Nationally Vulnerable: Diamond Firetail • State Vulnerable: Yellow-tailed Black Cockatoo • State Rare: Purple-gaped Honeyeater, Elegant Parrot, Western Gerygone, Rock Parrot and Peregrine Falcon Given the poor condition of the vegetation and limited structural diversity it is unlikely to provide important habitat for most of these species. The Eastern Osprey, White-bellied Sea Eagle, Bush Stone-curlew, Painted Buttonquail and White-winged Chough occur nearby, but vegetation at the site is not their preferred habitat.				
Landscape context score	1.12	Vegetation Condition Score	30.50	Conservation significance score	1.12
Unit biodiversity Score	38.26	Area (ha)	0.0182 (Plant) 0.003 (Transfer)	Total biodiversity Score	0.70 (Plant) 0.11 (Transfer)

Vegetation Association	**Site 9: Mallee – To be assessed**

Google Earth Streetview of private property on the southern side of St Andrews Drive.

General description	The plant association 8 occurs on private property on the southern side of St. Andrews Drive linking the desalination plant with the marine pump station. **A vegetation assessment is required for this area of impact pending access to private property.**				
Threatened species or community					
Landscape context score	1.12	Vegetation Condition Score		Conservation significance score	
Unit biodiversity Score		Area (ha)	0.433	Total biodiversity Score	

Vegetation Association	**Site WW1: *Eucalyptus rugosa, E. diversifolia* ± *E. albopurpurea mallee* with emergent planted species**

Representative photograph of Site WW1, facing south at 581384, 6154601 (WGS 84 Zone 53).

Representative photograph of Site WW1, facing north-east at 581539, 6154733 (WGS 84 Zone 53).

General description	This plant community occurs along the northern, western and southern edges of the Wastewater Treatment Plant. The overstorey is principally *Eucalyptus diversifolia* (Coastal White Mallee) and *E. rugosa* (White Mallee), with scattered patches of *E. albopurpurea* (Purple-flowered Mallee Box) and scattered emergent planted Eucalypt species. The principal dominants in the understory are *Melaleuca lanceolata* (Dryland Tea-tree) and *Myoporum insulare* (Common Boobialla). There are small, lower lying sections where water accumulates during winter, and moisture-loving species such as *Melaleuca brevifolia* (Short-leaf Honey-myrtle) and *Atriplex paludosa ssp. cordata* (Marsh Saltbush) occur. Vine lifeforms, such as *Tetragonia implexicoma* (Bower Spinach), *Cassytha melantha* (Coarse Dodder-laurel), *Clematis microphylla* (Old Man's Beard) and *Comesperma volubile* (Love Creeper) are prominent features of this vegetation. The most abundant weed species are *Lycium ferocissimum* (African Boxthorn) and *Oxalis pes-caprae* (Soursob), with *Juncus acutus* (Spiny Rush) and *Watsonia* sp. present as minor components. **The vegetation community is in moderate to good condition.**				
Threatened species or community	State-listed vegetation community: Not considered a threatened ecosystem State-threatened flora observed: • State Rare Alcock's Wattle (*Acacia alcockii*) Nationally- and State-threatened fauna that might utilise this vegetation community: • State Endangered: White-bellied Sea Eagle • State Vulnerable: Yellow-tailed Black Cockatoo, Brown Quail • State Rare: Purple-gaped Honeyeater, Elegant Parrot, White-winged Chough, Western Gerygone, Shy Heathwren, Rock Parrot, Peregrine Falcon and Painted Buttonquail. The State Endangered Eastern Osprey has been recorded nearby, but vegetation at the site is not preferred habitat. The Nationally Vulnerable Diamond Firetail and State Rare Bush Stone-curlew have been recorded within 5 km of the site but prefer more open habitats and are unlikely to use this plant community.				
Landscape context score	1.12	Vegetation Condition Score	46.71	Conservation significance score	1.12
Unit biodiversity Score	58.59	Area (ha)	0.8641 (MIPS) 0.0605 (Plant)	Total biodiversity Score	50.63 (MIPS) 3.54 (Plant)

Vegetation Association	**Site WW4: *Eucalyptus conglobata* + *E. diversifolia mallee* over dense understory of *Myoporum insulare, Olearia axillaris and Tetragonia implexicoma***
	 *Photo 7146 facing west at Latitude 135.891395/ Longitude -34.78552*
General description	Vegetation association WW4 occurs along the coast east of the Wastewater Treatment Plant sedimentation ponds. The overstorey becomes dominated by *Eucalyptus diversifolia* and *E. conglobata* with scattered *E. oleosa, E. angulosa* and emergent *E. leptophylla*. *Myoporum insulare, Olearia axillaris, Templetonia retusa* and *Leocopogon parviflorus* shrubs along with *Tetragonia implexicoma and Threlkeldia diffusa* (Coast Bonefruit) are prominent features of the dense understory and groundlayer. The mallee thins out along the coastal frontage where sedges such as *Gahnia deusta, Lepidospermum viscidum* and *Ficinia nodosa,* and tussocks of *Austrostipa stipoides* grow amongst the shrublayer. Bridal Creeper occurs throughout the understory, but other weed species are a minor component and include very sparse individuals of African Boxthorn and African Daisy. Soursob grows mostly along the edges of the walkway. The plant association has a medium to high diversity of native species including many regenerating species, very high structural diversity, and moderate weed cover. **The vegetation community is in good condition.**
Threatened species or community	<u>State-listed vegetation community:</u> • State Rare *Eucalyptus conglobata* Low Woodland on fertile loams over limestone. <u>State-threatened flora observed:</u> • State Rare Port Lincoln Mallee (*Eucalyptus conglobata*) <u>Nationally- and State-threatened fauna that might utilise this vegetation community:</u> • Nationally Vulnerable: Diamond Firetail • State Endangered: White-bellied Sea Eagle, Eastern Osprey • State Vulnerable: Yellow-tailed Black Cockatoo, Brown Quail • State Rare: Purple-gaped Honeyeater, Elegant Parrot, White-winged Chough, Western Gerygone, Shy Heathwren, Rock Parrot, Peregrine Falcon and Painted Buttonquail. The Bush Stone-curlew prefers more open habitats and is unlikely to use this community.

Landscape context score	1.12	Vegetation Condition Score	57.28	Conservation significance score	1.24
Unit biodiversity Score	79.55	Area (ha)	0.0661 (MIPS)	Total biodiversity Score	5.26 (MIPS)

<table>
<tr><td>Vegetation Association</td><td colspan="5">Site WW5: Eucalyptus diversifolia, E. conglobata mallee over Pomaderris paniculosa, Alyxia buxifolia, Exocarpos aphyllus and Melaleuca lanceolata</td></tr>
<tr><td></td><td colspan="5"> 
Photo 7257, facing west at Latitude 135.892051 / Longitude -34.76006</td></tr>
<tr><td>General description</td><td colspan="5">Vegetation association WW5 occurs between the coast and the decommissioned ponds of the Wastewater Treatment Plant. The overstorey is similar to that of WW4, being dominated by Eucalyptus diversifolia and E. conglobata, but the groundlayer becomes more open, and the predominant shrubs are Pomaderris paniculosa, Alyxia buxifolia, Exocarpos aphyllus and Melaleuca lanceolata. Moss covers the ground beneath the mallee, and two species of winter-flowering orchids (Cyrtostylis robusta and Pterostylis erythroconcha) were observed.
The most abundant weed is Bridal Creeper which occurs scattered throughout the mallee understory. Other exotic species such as African Daisy and Box Thorn are present as minor components and Soursob grows mostly along the edges of the walking track.
The plant association has a medium to high diversity of native species including many regenerating species, very high structural diversity, and moderate weed cover.
The vegetation community is in good condition.</td></tr>
<tr><td>Threatened species or community</td><td colspan="5"><u>State-listed vegetation community:</u>
• State Rare Eucalyptus conglobata Low Woodland on fertile loams over limestone.
<u>State-threatened flora observed:</u>
• State Rare Port Lincoln Mallee (Eucalyptus conglobata)
<u>Nationally- and State-threatened fauna that might utilise this vegetation community:</u>
• Nationally Vulnerable: Diamond Firetail
• State Endangered: White-bellied Sea Eagle, Eastern Osprey
• State Vulnerable: Yellow-tailed Black Cockatoo, Brown Quail
• State Rare: Purple-gaped Honeyeater, Elegant Parrot, White-winged Chough, Western Gerygone, Shy Heathwren, Rock Parrot, Peregrine Falcon and Painted Buttonquail.
The Bush Stone-curlew prefers more open habitats and is unlikely to use this community.</td></tr>
<tr><td>Landscape context score</td><td>1.12</td><td>Vegetation Condition Score</td><td>57.49</td><td>Conservation significance score</td><td>1.24</td></tr>
</table>

Unit biodiversity Score	79.84	Area (ha)	0.0053 (MIPS)	Total biodiversity Score	0.42 (MIPS)

Vegetation Association	**Site RC1: *Eucalyptus albopurpurea* mallee disturbed by rubbish dumping and weeds**				
 *Representative photograph of Site RC1, facing NE at 579139, 6153850 (WGS 84 Zone 53).*					
General description	Vegetation association RC1 occurs at the western end of a large expanse of mallee between the proposed desalination plant and Greyhound Rd. The canopy is dominated by *Eucalyptus albopurpurea* over *Rhagodia crassifolia, Melaleuca lanceolata* and a dense cover of *Tetragonia implexicoma*. There are some dense patches of *Austrostipa elegantissima* in more open areas, but the remaining groundlayer is highly disturbed and invaded by exotic annual grasses. Bridal Creeper and African Daisy are also present. The plant association has a moderate diversity of native plant species and good structural diversity but the groundlayer is disturbed by rubbish dumping and weed invasion. **The vegetation community is in moderate condition.**				
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: None Nationally- and State-threatened fauna that are likely to utilise this community: • State Vulnerable: Yellow-tailed Black Cockatoo, Brown Quail • State Rare: Purple-gaped Honeyeater, Elegant Parrot, Rock Parrot, White-winged Chough, Western Gerygone, Shy Heathwren, Peregrine Falcon and Painted Buttonquail. The Nationally Vulnerable Diamond Firetail and State Rare Bush Stone-curlew have been recorded within 5 km of the site but prefer more open habitats and are unlikely to use this plant community. The State Endangered Eastern Osprey and White-bellied Sea Eagle have been recorded nearby but are unlikely to rely on vegetation away from the coast.				
Landscape context score	1.12	Vegetation Condition Score	46.48	Conservation significance score	1.08
Unit biodiversity Score	56.22	Area (ha)	0.1816 (Transfer)	Total biodiversity Score	10.21 (Transfer)

Vegetation Association	**Site RC2: *Eucalyptus conglobata, E. diversifolia* ± *E. oleosa, E. rugosa, E. gracilis* mallee over a shrubby understorey**

Representative photograph of Site RC2, facing NE at 579228, 6153858 (WGS 84 Zone 53).

Acacia alcockii stand growing on the southern side of the existing track

General description	Vegetation association RC2 occurs on the northern side of the rail corridor, within a large expanse of mallee between the proposed desalination plant and Greyhound Rd. The community is characterised by a canopy dominated by *Eucalyptus conglobata ssp. conglobata* and *E. diversifolia ssp. diversifolia* over dense patches of *Melaleuca lanceolata* and more open areas supporting low shrubs such as *Lasiopetalum discolor, Acacia triquetra* (Mallee Wreath Wattle)*, Templetonia retusa, Dodonaea* species and patches of *Gahnia deusta*. Five species of orchid were recorded in the association (*Caladenia capillata, C. campestris, Thelymitra megcalyptra, Microtis sp. and Pterostylis flavovirens*). Apart from very sparsely scattered plants of Bridal Creeper, Sour-sob and Hair's Tail Grass, weed cover is very low. The plant association has a high diversity of native plant species, many of which are regenerating, with good structural diversity and deep leaf litter. **The vegetation community is in excellent condition.**
Threatened species or community	<u>State-listed vegetation community:</u> • State Rare *Eucalyptus conglobata* Low Woodland on fertile loams over limestone <u>State-threatened flora observed:</u> • State Rare Port Lincoln Mallee (*Eucalyptus conglobata*) • State Rare Alcock's Wattle (*Acacia alcockii*) Two stands of Alcock's Wattle were recorded in the community: – ~20 individuals mostly on the south side of the track between Wpts 400 & 401 – ~ 60 plants along the southern edge of the track at Wpt 402. <u>Nationally- and State-threatened fauna that are likely to utilise this community:</u> • Nationally Vulnerable: Diamond Firetail • State Vulnerable: Yellow-tailed Black Cockatoo, Little Eagle, Brown Quail • State Rare: Purple-gaped Honeyeater, Elegant Parrot, Rock Parrot, White-winged Chough, Western Gerygone, Shy Heathwren, Bush Stone-curlew, Peregrine Falcon and Painted Buttonquail. The White-wing chough was observed at the site in October 2023. The State Endangered Eastern Osprey and White-bellied Sea Eagle have been recorded nearby, but are unlikely to rely on vegetation away from the coast.

Landscape context score	1.12	Vegetation Condition Score	62.89	Conservation significance score	1.28
Unit biodiversity Score	90.16	Area (ha)	1.4899 (Transfer)	Total biodiversity Score	134.33 (Transfer)

Vegetation Association	**Site RC3: *Eucalyptus rugosa, E. gracilis, E. oleosa* ± *E. conglobata, E. diversifolia* mallee over a shrubby understorey**

Representative photograph of Site RC3, facing NE at 579435, 6153868 (WGS 84 Zone 53).

Stand of Acacia alcockii along the northern side of the track

General description	Vegetation association RC3 occurs on the northern side of the rail corridor, within a large expanse of mallee between the proposed desalination plant and Greyhound Rd. *Eucalyptus gracilis*, *E. oleosa ssp. ampliata* and *E. rugosa* are the dominant canopy species, generally with a dense understorey of *Melaleuca lanceolata* shrubs, many supporting mistletoe (*Amyema melaleucae). Eucalyptus conglobata* is a minor overstory component in areas that intergrade between communities RC2 and RC3. *Acacia nematophylla*, *Eutaxia microphylla*, *Acacia triquetra* and *Dianella* species are common in the understory. Four orchid species were observed within the proposed clearance area: *Caladenia capillata, C. campestris, Microtis sp.* and *Pterostylis flavovirens*. Apart from very sparsely scattered plants of Bridal Creeper and Sour-sob, weed cover is generally very low. The plant association has a high diversity of native plant species, many of which are regenerating, with good structural diversity and deep leaf litter. **The vegetation community is in excellent condition.**
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: • State Rare Port Lincoln Mallee (*Eucalyptus conglobata*) • State Rare Alcock's Wattle (*Acacia alcockii*) *Acacia alcockii* (Alcock's Watte) occurs in several large stands which include reproductive adult plants and numerous juveniles regenerating through root suckering. The species is abundant in disturbed areas within 5 m of the vehicle track (both sides), becoming sparser further away from the track. – One stand of ~80 plants between waypoints 392 and 394, – Another stand with over 1000 plants between waypoints 398 and 399. Nationally- and State-threatened fauna that are likely to utilise this community: • Nationally Vulnerable: Diamond Firetail • State Vulnerable: Yellow-tailed Black Cockatoo, Little Eagle, Brown Quail • State Rare: Purple-gaped Honeyeater, Elegant Parrot, Rock Parrot, White-winged Chough, Western Gerygone, Shy Heathwren, Bush Stone-curlew, Peregrine Falcon and Painted Buttonquail. The White-wing chough was observed at the site in October 2023. The State Endangered Eastern Osprey and White-bellied Sea Eagle have been recorded nearby, but are unlikely to rely on vegetation away from the coast.

Landscape context score	1.12	Vegetation Condition Score	60.94	Conservation significance score	1.18
Unit biodiversity Score	80.54	Area (ha)	1.4026 (Transfer)	Total biodiversity Score	112.97 (Transfer)

Vegetation Association	**Site RC4: *Eucalyptus diversifolia* with a heathy understorey on limestone**				
 *Representative photograph of RC4, facing SW at 580801, 6154218 (WGS 84 Zone 53).*					
General description	Vegetation association RC4 occurs within a small patch on the northern side of the track, where *Eucalyptus diversifolia* dominates over a dense cover of low and medium shrubs and sedges. *Eucalyptus conglobata* is present as a minor overstory component. *Acrotriche* spp., *Melaleuca lanceolata, Gahnia deusta, Pomaderris obcordata* and *Templetonia retusa* are common understory species. Weed cover is low and includes sparse plants of Bridal Creeper, Aleppo Pine and Western Coastal Wattle. The plant association has a moderate-high diversity of native plant species, with several regenerating species. **The vegetation community is in good condition.**				
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: • State Rare Port Lincoln Mallee (*Eucalyptus conglobata*) Nationally- and State-threatened fauna that are likely to utilise this community: • Nationally Vulnerable: Diamond Firetail • State Vulnerable: Yellow-tailed Black Cockatoo, Little Eagle, Brown Quail • State Rare: Purple-gaped Honeyeater, Elegant Parrot, Rock Parrot, White-winged Chough, Western Gerygone, Shy Heathwren, Bush Stone-curlew, Peregrine Falcon and Painted Buttonquail. The State Endangered Eastern Osprey and White-bellied Sea Eagle have been recorded nearby, but are unlikely to rely on vegetation away from the coast.				
Landscape context score	1.12	Vegetation Condition Score	63.38	Conservation significance score	1.14
Unit biodiversity Score	72.17	Area (ha)	0.0021 (Plant) 0.0381 (Transfer)	Total biodiversity Score	0.15 (Plant) 2.75 (Transfer)

Vegetation Association	**Site RC6: *Eucalyptus diversifolia, E. conglobata, E. gracilis, E. rugosa, Pinus halepensis* regenerating mallee**				
 *Representative photograph of Site RC6, facing East at 579506, 6153858 (WGS 84 Zone 53).*					
General description	Vegetation association RC6 occurs between the track and the rail corridor, where mallee vegetation is recovering well after past disturbances, but still contains open bare areas and has a greater incursion of weeds. *Eucalyptus diversifolia, E. conglobata, E. gracilis and E. rugosa* are the main native canopy species, with several species of *Acacia, Dodonaea* and *Melaleuca* regenerating in the understory. Dominant weed species include Aleppo Pine and Pincushion, with Bridal Creeper, Western Coastal Wattle and *Phalaris* sp. (Canary Grass) present as minor components. The plant association has a moderate-high diversity of native plant species, and very good regeneration, but lower structural diversity compared to adjacent mature mallee communities. **The vegetation community is in moderate condition.**				
Threatened species or community	<u>State-listed vegetation community:</u> • State Rare *Eucalyptus conglobata* Low Woodland on fertile loams over limestone <u>State-threatened flora observed:</u> • State Rare Alcock's Wattle (*Acacia alcockii*) • State Rare Port Lincoln Mallee (*Eucalyptus conglobata*) <u>Nationally- and State-threatened fauna that are likely to utilise this community:</u> • Nationally Vulnerable: Diamond Firetail • State Vulnerable: Yellow-tailed Black Cockatoo, Brown Quail • State Rare: Purple-gaped Honeyeater, Elegant Parrot, Rock Parrot, White-winged Chough, Western Gerygone, Shy Heathwren, Bush Stone-curlew & Peregrine Falcon. The State Endangered Eastern Osprey and White-bellied Sea Eagle occur nearby but are unlikely to rely on vegetation away from the coast. The State Rare Painted Buttonquail prefers dense canopy and ground cover and is unlikely to be supported by this plant community.				
Landscape context score	1.12	Vegetation Condition Score	63.38	Conservation significance score	1.28
Unit biodiversity Score	49.16	Area (ha)	0.1384 (Transfer)	Total biodiversity Score	9.75 (Transfer)

Vegetation Association	**Site RC7: *Olearia axillaris, Leucopogon parviflorus* coastal shrubland**

Representative photograph of Site RC7, facing NW at 579041, 6153877 (WGS 84 Zone 53).

General description	Vegetation association RC7 occurs west of the mallee communities, along either side of Greyhound Rd. It is a coastal shrubland community with an overstorey principally composed of *Acacia nematophylla*, *Leucopogon parviflorus* and *Olearia axillaris. Rhagodia spp.* and *Pomaderris paniculosa* are prevalent in the understorey. Sour-sob is the most dominant weed with Bridal Creeper, Western Coastal Wattle and *Euphorbia terracina* (False Caper) present as minor components. The plant association has a high diversity of native plant species. **The vegetation community is in moderate to good condition.**
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: None Nationally- and State-threatened fauna that may use this community: • State Endangered Eastern Osprey, White-bellied Sea Eagle • State Vulnerable: Yellow-tailed Black Cockatoo, Brown Quail • State Rare: Elegant Parrot, Rock Parrot, Painted Buttonquail, Cape Barren Goose and Peregrine Falcon. The Rock Parrot was recorded in nearby coastal habitat during bird surveys conducted in December 2023. Coastal shrubland is not preferred habitat for the Nationally Vulnerable Diamond Firetail or the State Rare Purple-gaped Honeyeater, Western Gerygone, Shy Heathwren, White-winged Chough and Bush Stone-curlew.

Landscape context score	1.12	Vegetation Condition Score	58.70	Conservation significance score	1.1
Unit biodiversity Score	72.31	Area (ha)	0.7567 (Transfer)	Total biodiversity Score	54.72 (Transfer)

Vegetation Association	**Site RC8: *_Lycium ferocissimum_ open shrubland**				
 *Representative photograph of Site RC8, facing NW at 578971, 6153970 (WGS 84 Zone 53).*					
General description	Plant association RC8 occurs north of Greyhound Rd in highly disturbed areas where introduced Boxthorn (*Lycium ferocissimum*) is prominent and the understorey is dominated by introduced grasses and forbs (Pincushion and False Caper). Regenerating native shrub species such as *Acacia cupularis*, *A. nematophylla, Adriana quadripartita* (Coast Bitter-bush) and *Olearia axillaris* occur as scattered individuals. The plant association has a low diversity of native plant species, with a very high burden of high-threat weeds. **The vegetation community is poor condition.**				
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: None Nationally- and State-threatened fauna that are likely to utilise this community: None. This highly degraded community is unlikely to provide significant habitat for threatened fauna.				
Landscape context score	1.12	Vegetation Condition Score	5.90	Conservation significance score	1.00
Unit biodiversity Score	6.61	Area (ha)	1.1833 (Transfer)	Total biodiversity Score	7.82 (Transfer)

Vegetation Association	**Site RC10: *Olearia axillaris, Acacia nematophylla* disturbed coastal shrubland**				
 *Representative photograph of Site RC10, facing NNW at 578654, 6154278 (WGS 84 Zone 53).*					
General description	This degraded coastal shrubland occurs north of Greyhound Road where there has been past clearance. The overstory is quite sparse and comprised mostly of *Olearia axillaris, Acacia nematophylla* with regenerating *Leucopogon parviflorus, Adriana quadripartita* and various chenopod shrubs. Native plant species diversity is moderate to high. The ground layer is heavily invaded by grassy and herbaceous weeds such as Coastal Galenia, Bridal Creeper and Sour-sob. **The vegetation community is in moderate condition.**				
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: None Nationally- and State-threatened fauna that may use this community: • State Rare: Elegant Parrot, Rock Parrot and Peregrine Falcon. This disturbed coastal shrubland is not preferred habitat for the Nationally Vulnerable Diamond Firetail, State Endangered Eastern Osprey and White-bellied Sea Eagle, State Vulnerable Yellow-tailed Black Cockatoo and Brown Quial, or the State Rare Purple-gaped Honeyeater, White-winged Chough, Western Gerygone, Shy Heathwren, Painted Buttonquail and Bush Stone-curlew.				
Landscape context score	1.12	Vegetation Condition Score	42.83	Conservation significance score	1.04
Unit biodiversity Score	49.89	Area (ha)	0.4364 (Transfer)	Total biodiversity Score	21.77 (Transfer)

Vegetation Association	**Site RC11: *_Acacia saligna, A. paradoxa_ shrubland with emergent _Pinus halepensis_**

Representative photograph of Site RC11, facing NW at 578593, 6154568 (WGS 84 Zone 53).

General description	Plant community RC11 is present along the powerline alignment on the spur heading north from the transfer pipe. It occurs on a very disturbed low dune considered likely to have once been a coastal mallee community. It is now dominated by *Acacia paradoxa* (Kangaroo Thorn), with the introduced *Acacia saligna* (Golden Wreath Wattle) and *Pinus halepensis* also significant in the overstorey. The understorey supports native shrub and sedge lifeforms including several *Acacia* species, *Adriana quadripartita*, *Rhagodia crassifolia* and *Dianella brevicaulis,* but also with a heavy load of grassy and herbaceous weeds. The plant association has a moderate diversity of native plant species, with a high burden of high-threat weeds (e.g. Bridal Creeper, Myrtle-leaf Milkwort, Blowfly Bush, Sour-sob, African Boxthorn and *Asparagus declinatus* (Bridal Veil). **The vegetation community is in poor condition.**
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: None Nationally- and State-threatened fauna that are likely to utilise this community: None. This highly degraded community is unlikely to provide significant habitat for threatened fauna.

Landscape context score	1.12	Vegetation Condition Score	16.08	Conservation significance score	1.0
Unit biodiversity Score	18.01	Area (ha)	0.1977 (Transfer)	Total biodiversity Score	3.56 (Transfer)

Vegetation Association	**Site RC12: Planted **Eucalyptus spp., *Casuarina sp.* over disturbed coastal shrubland**				
 *Representative photograph of Site RC12, facing N at 577990, 6154382 (WGS 84 Zone 53).*					
General description	This plant association occurs to the south-east of the racecourse and near the intersection of Greyhound and Proper Bay roads. It is a degraded version of the coastal shrubland (RC7), where the disturbed remnant community persists beneath overstorey plantings of non-indigenous *Eucalyptus* and *Casuarina* species, and exotic Aleppo Pine and Western Coast Wattle. *Enchylaena tomentosa* and *Rhagodia candolleana* are the most common native shrubs, and there are several regenerating species including *Leucopogon parviflorus, Melaleuca halmaturorum, Acacia nematophylla and A. paradoxa,* Sour-sob is dominant in the groundlayer, and Bridal Creeper is also present. **The vegetation community is in moderate condition.**				
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: None Nationally- and State-threatened fauna that may use this community: • State Vulnerable Yellow-tailed Black Cockatoo • State Rare: Elegant Parrot, Rock Parrot, White-winged Chough, and Peregrine Falcon. This disturbed coastal shrubland is not preferred habitat for the Nationally Vulnerable Diamond Firetail, State Endangered Eastern Osprey and White-bellied Sea Eagle, State Vulnerable Brown Quail or the State Rare Purple-gaped Honeyeater, Western Gerygone, Shy Heathwren, Painted Buttonquail and Bush Stone-curlew.				
Landscape context score	1.12	Vegetation Condition Score	40.13	Conservation significance score	1.06
Unit biodiversity Score	47.64	Area (ha)	0.0746 (Transfer)	Total biodiversity Score	3.55 (Transfer)

Vegetation Association	**Site RC13: *Melaleuca halmaturorum* woodland**				
 *Representative photograph of Site RC13, facing W at 577948, 6154311 (WGS 84 Zone 53).*					
General description	This saline wetland system occurs south of the racecourse on the northern side of Greyhound Road, and along the powerline spur heading north from the transfer pipe. It consists of an overstorey of *Melaleuca halmaturorum* (Swamp Paper-bark) over *Distichlis distichophylla* (Emu-grass) and the small/medium chenopod shrubs *Rhagodia candolleana* and *Threlkeldia diffusa* (Coast Bonefruit), with several highly threatening weeds, including **Juncus acutus* (Spiny Rush), Bridal Creeper, Olive and African Boxthorn. Native species diversity and the community has a medium-high level of structural diversity, with good canopy cover. **The vegetation community is in moderate condition.**				
Threatened species or community	<u>State-listed vegetation community:</u> No <u>State-threatened flora observed:</u> None <u>Nationally- and State-threatened fauna that may use this community:</u> • State Rare: Elegant Parrot, Rock Parrot, and Peregrine Falcon. The wetland community is not preferred habitat for the Nationally Vulnerable Diamond Firetail, the State Vulnerable Yellow-tailed Black Cockatoo and Brown Quail, or the State Rare Purple-gaped Honeyeater, White-winged Chough, Western Gerygone, Shy Heathwren, Painted Buttonquail and Bush Stone-curlew. Given the site's proximity to busy roads, it is highly unlikely to support the State Endangered Eastern Osprey and White-bellied Sea Eagle.				
Landscape context score	1.12	Vegetation Condition Score	45.18	Conservation significance score	1.04
Unit biodiversity Score	52.62	Area (ha)	0.1347 (Transfer)	Total biodiversity Score	7.09 (Transfer)

Vegetation Association	**Site RC14: *Nitraria billardieri* shrubland**				
 *Representative photograph of Site RC14, facing W at 577790, 6154287 (WGS 84 Zone 53).*					
General description	Plant community RC14 occurs as a narrow strip on the southern side of Greyhound Rd, south of the racecourse. The coastal shrubland has a moderate diversity of native species with an overstorey dominated by *Nitraria billardieri* (Nitre Bush) over *Suaeda australis* (Austral Seablite). Three SA Declared weeds Spiny Rush, Bridal Creeper and African Boxthorn occur in the association. **The vegetation community is in moderate condition.**				
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: None Nationally- and State-threatened fauna that may use this community: • State Rare: Elegant Parrot, Rock Parrot, Painted Buttonquail and Peregrine Falcon. Coastal shrubland is not preferred habitat for the Nationally Vulnerable Diamond Firetail, the State Vulnerable Yellow-tailed Black Cockatoo or Brown Quail, or the State Rare Purple-gaped Honeyeater, Western Gerygone, Shy Heathwren, White-winged Chough and Bush Stone-curlew. Given the site's proximity to busy roads, it is highly unlikely to support the State Endangered Eastern Osprey and White-bellied Sea Eagle.				
Landscape context score	1.12	Vegetation Condition Score	36.64	Conservation significance score	1.04
Unit biodiversity Score	42.67	Area (ha)	0.1013 (Transfer)	Total biodiversity Score	4.32 (Transfer)

Vegetation Association	**Site RC15: *Eucalyptus albopurpurea, E. diversifolia* disturbed mallee**				
 *Representative photograph of Site RC15, facing North at 578481, 6155053 (WGS 84 Zone 53).*					
General description	This highly disturbed *Eucalyptus albopurpurea* and *Eucalyptus diversifolia* mallee community occurs at the northernmost end of the powerline alignment on the spur heading north from the transfer pipe. Whilst the overstorey trees are generally in good condition, the understorey is highly degraded and generally dominated by introduced grass, herb and climber weeds. Native species diversity is low and includes some understorey shrubs and groundcovers such as *Rhagodia crassifolia, Pimelea serpyllifolia, Exocarpos aphyllus* and *Tetragonia implexicoma.* The community contains several high threat weeds (Bridal Creeper, Aleppo Pine, African Box Thorn, Sour Sob and Swamp Oak). **The vegetation community is in poor condition.**				
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: None Nationally- and State-threatened fauna that may use this community: • State Vulnerable Yellow-tailed Black Cockatoo • State Rare: Elegant Parrot, Rock Parrot, White-winged Chough, Western Gerygone The degraded understory is unlikely to provide suitable habitat for the Nationally Vulnerable Diamond Firetail, the State Vulnerable Brown Quail, or the State Rare Purple-gaped Honeyeater, Peregrine Falcon, Shy Heathwren, Painted Buttonquail and Bush Stone-curlew.				
Landscape context score	1.12	Vegetation Condition Score	17.00	Conservation significance score	1.06
Unit biodiversity Score	20.18	Area (ha)	0.1465 (Transfer)	Total biodiversity Score	2.96 (Transfer)

Vegetation Association	**Site TR1: *Eucalyptus diversifolia, E. albopurpurea* mallee with emergent *Allocasuarina verticillata***

Representative photograph of Site TR1, facing SSE at 575172, 6154560 (WGS 84 Zone 53).

Threatened flora recorded in TR1: Tate's Grass Tree (left), Spoon-leaved Spyridium (centre) and Snowdrop Spurge (right)

General description	Vegetation Association TR1 is present around the existing Northside Hill tank site at the western end of Blue Fin Rd. *Eucalyptus diversifolia* and *Eucalyptus albopurpurea* are co-dominant canopy species with some emergent *Allocasuarina verticillata*. The understorey is a highly diverse heathy shrub, comprising *Pomaderris obcoradta, Xanthorrhoea seMIPslana, Acrotriche cordata, Acacia myrtoifolia, A. paradoxa, Hibbertia devitata, Lepidospermum viscidum* and *Lasiopetalum* species. Two species of orchids (*Diuris* sp. and *Microtis* sp.) were detected in spring surveys. Weed incursions are minor and include scattered plants of Bridal Creeper, Freesias, Sour-sob, African Daisy and Aleppo Pine. The plant community has very high structural and native plant species diversity, with many regenerating species, and offers good fauna habitat. **The vegetation community is in excellent condition.**				
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: • State Rare Tate's Grass-tree (*Xanthorrhoea seMIPslana ssp. tateana*) • State Rare Spoon-leaved Spyridium (*Spyridium daphnoides*) • State Rare Snowdrop Spurge (*Lysiandra calycina*) *Xanthorrhoea seMIPslana spp. tateana* (SA Rare) occurs interspersed with *X. seMIPslana ssp. seMIPslana*. *Xanthorrhoea seMIPslana* are a dominant component of the understory, however it is not possible to estimate numbers of Tate's Grass-tree plants as the subspecies is only distinguishable when flowering or in mature individuals that have a distinct trunk. Flowering individuals of Tate's Grass-tree were identified along the roadside of Bluefin Road, and at Wpt 408 north-west of the tanks. Note, many *Xanthorrhoea* are showing signs of yellowing, possibly indicating the presence of *Phytophthora cinnamomi* at the site. Numerous individuals of *Spyridium daphnoides* are present along the north-eastern roadside of Blue Fin Rd, and a few to the north-west of the tanks outside the fence (Wpts 406, 408, 409 to 427). Two plants of *Lysiandra calycina* were recorded on the north-eastern side of Blue Fin Rd at waypoints 407 and 420. Nationally- and State-threatened fauna that may use this community: • Nationally Endangered: Mallee Whipbird, EP Southern Emu-wren • Nationally Vulnerable: Diamond Firetail • State Vulnerable: Yellow-tailed Black Cockatoo and Little Eagle • State Rare: Purple-gaped Honeyeater, Western Gerygone, Shy Heathwren, White-winged Chough, Painted Buttonquail and Peregrine Falcon. The Diamond Firetail was recorded during fauna surveys in December 2023 and White-winged choughs were observed at the site in October 2023. Although not recorded within 5km of the site, it is considered likely that the Mallee Whipbird may occur at the site, as the mallee provides suitable habitat and is part of an extensive and continuous tract of mallee to the south and west.				
Landscape context score	1.09	Vegetation Condition Score	69.35	Conservation significance score	1.18
Unit biodiversity Score	89.20	Area (ha)	0.1615 (Transfer)	Total biodiversity Score	14.41 (Transfer)

Vegetation Association	**Site TR2: *Eucalyptus diversifolia, E. albopurpurea* slashed low open mallee**

Representative photograph of Site TR2, facing SE at 575191, 6154581 (WGS 84 Zone 53).

Representative photograph of Site TR2, facing NW at 575463, 6154346 (WGS 84 Zone 53).

General description	Plant Association TR2 occurs to the north-east of Blue Fin Rd, and represents a similar suite of species to that of TR1, except that it is regularly slashed for fire risk mitigation. At the time of the site visit in October 2023, the area had very recently been slashed to a height of approximately 15cm. Weed incursions are minor and include scattered plants of Bridal Creeper, Onion weed and *Centaurea melitensis* (Malta Thistle). Although a highly diverse understorey remains, the plant community is regularly disturbed by slashing and has very low structural diversity. **The vegetation community is in moderate condition.**				
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: • State Rare Spoon-leaved Spyridium (*Spyridium daphnoides*) Given their prevalence in Vegetation Association TR1, it is likely that *Xanthorrhoea seMIPslana spp. tateana* (SA Rare) also occurs in Association TR2, however this was not possible to confirm because the plants had been recently slashed. Two plants of *Spyridium daphnoides* were detected during surveys in October 2023 (waypoints 413), however there are likely to be more along the proposed piepline route. Nationally- and State-threatened fauna that may use this community: • Nationally Vulnerable: Diamond Firetail • State Vulnerable: Little Eagle • State Rare: Purple-gaped Honeyeater, Western Gerygone and Peregrine Falcon. The community is likely to support the Nationally Vulnerable Diamond Firetail which prefers open habitats and high grass cover and was observed nearby. The Little Eagle and Peregrine Falcon may perch in adjacent trees and hunt over open vegetation. Species which prefer dense canopy and/or understory with good leaf litter cover (i.e. EP Southern Emu-wren, White-winged Chough, Shy Heathwren, Painted Buttonquail) are unlikely to occur in this vegetation type.				
Landscape context score	1.09	Vegetation Condition Score	48.78	Conservation significance score	1.12
Unit biodiversity Score	59.55	Area (ha)	0.5117 (Transfer)	Total biodiversity Score	30.47 (Transfer)

Vegetation Association	**Site TR3: *Eucalyptus diversifolia* ± *E. albopurpurea* mallee over dense *Acacia paradoxa***				
 *Representative photograph of Site TR3, facing E at 575404, 6154372 (WGS 84 Zone 53).*					
General description	Association TR3 occurs along the roadsides of Blue Fin Rd, east of the intersection with Kathai Drive. The mallee overstorey becomes more open, but is still principally *Eucalyptus diversifolia* and *E. albopurpurea*. There is a dense mid-shrub layer of *Acacia paradoxa* with a lower diversity and cover of native heath species, likely as a result of previous disturbance, including clearance and fire. Vegetation in close proximity to the road verge is often highly disturbed by grading activities and invaded by weeds such as Rice Millet, Sour-sob and Pincushion. Bridal Creeper, Box Thorn and Myrtle-leaf Milkwort are present in the understory. **The vegetation community is in moderate condition.**				
Threatened species or community	State-listed vegetation community: No State-threatened flora observed: None Nationally- and State-threatened fauna that may use this community: • Nationally Endangered: EP Southern Emu-wren • Nationally Vulnerable: Diamond Firetail • State Vulnerable: Yellow-tailed Black Cockatoo and Little Eagle • State Rare: Purple-gaped Honeyeater, Western Gerygone, Shy Heathwren, White-winged Chough, Painted Buttonquail and Peregrine Falcon. The Shy Heathwren was observed at the site during 2023 fauna surveys.				
Landscape context score	1.09	Vegetation Condition Score	39.09	Conservation significance score	1.14
Unit biodiversity Score	48.58	Area (ha)	0.3617 (Transfer)	Total biodiversity Score	17.57 (Transfer)

Vegetation Association	**Site TR4: *Acacia paradoxa, A. cupularis* very open disturbed shrubland**				
 *Representative photograph of Site TR4, facing E at 575952, 6154031 (WGS 84 Zone 53).*					
General description	Association TR4 represents sections of recovering roadside vegetation along the eastern end of Blue Fin Rd. Native shrub species are regenerating, with a moderate diversity, but generally very low cover. These areas would formerly have been mallee, and so are considered to be highly disturbed. Weeds are dominated by Pincushion, but also include Bridal Creeper, African Daisy, False Caper and Onion Weed. **The vegetation community is in poor condition.**				
Threatened species or community	<u>State-listed vegetation community:</u> No <u>State-threatened flora observed:</u> • State Rare Snowdrop Spurge (*Lysiandra calycina*) One plant of *Lysiandra calycina* was recorded in this plant association during surveys in July 2021. A subsequent survey in October 2023 found no plants within the proposed impact area along the northern side of Blue Fin Rd. <u>Nationally- and State-threatened fauna that may use this community:</u> This highly disturbed community is unlikely to provide significant habitat for threatened fauna.				
Landscape context score	1.09	Vegetation Condition Score	17.22	Conservation significance score	1.04
Unit biodiversity Score	19.52	Area (ha)	0.1658 (Transfer)	Total biodiversity Score	3.24 (Transfer)

Site map showing areas of proposed impact

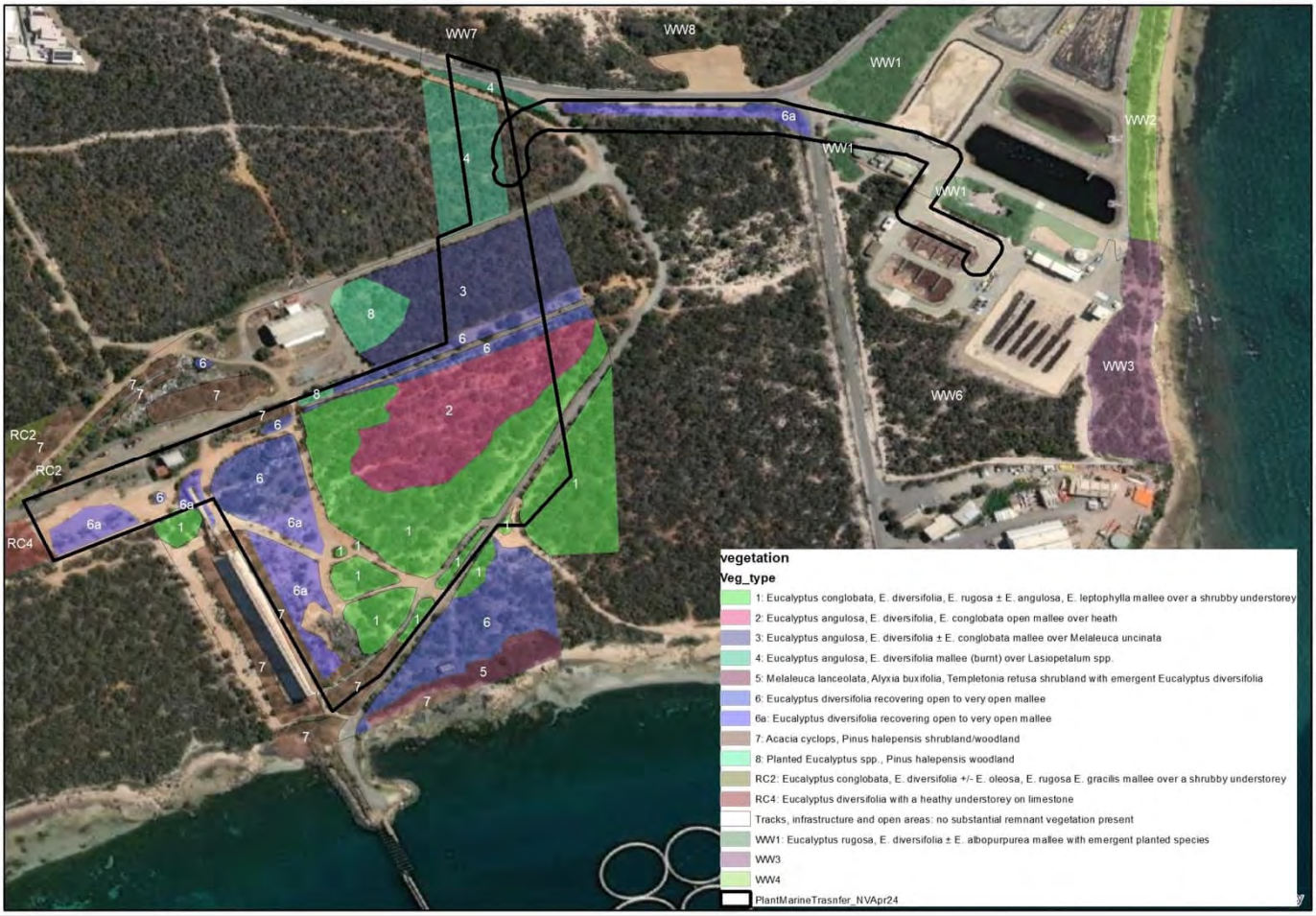


Figure 10. Clearance for Desalination Plant and Saline Waste/Seawater Transfer Pipelines to Wastewater Treatment Plant

*****complete set of maps to be produced when route is finalised***

Photo log

(to be updated when final footprint confirmed)

Photo	Photo Direction	Easting (53H)	Northing	Description
Site 1.1	West	581093	6154216	Vegetation Association 1
Site 1.2	South south-east	581063	6154231	Vegetation Association 1
Site 2.1	South-east	581053	6154259	Vegetation Association 2
Site 2.2	South	581105	6154327	Vegetation Association 2
Site 3.1	South	581091	6154439	Vegetation Association 3
Site 3.2	South-west	581103	6154409	Vegetation Association 3
Site 4.1	South	581105	6154511	Vegetation Association 4
Site 4.2	South	581118	6154577	Vegetation Association 4
Site 5.1	South south-west	581125	6154105	Vegetation Association 5
Site 5.2	South-west	581159	6154113	Vegetation Association 5
Site 6.1	South	581133	6154152	Vegetation Association 6
Site 6.2	South	580979	6154257	Vegetation Association 6
Site 6a	South	580988	6154224	Vegetation Association 6a
Site 7.1	South	581000	6154136	Vegetation Association 7
Site 7.2	South	581059	6154120	Vegetation Association 7
Site 7.3	West	580876	6154275	Vegetation Association 7
Site 8	South-east	581036	6154416	Vegetation Association 8
Site WW1.1	South	581384	6154601	Vegetation Association WW1
Site WW1.2	North-east	581539	6154733	Vegetation Association WW1
Site WW2	North-east	581597	6154700	Vegetation Association WW2

4.2 Threatened Species assessment

4.2.1 Vegetation communities of conservation significance

Nationally-threatened Communities

No nationally (EPBC) listed vegetation communities occur within the areas of impact.

The Nationally Vulnerable "Subtropical and Temperate Coastal Saltmarsh Threatened Ecological Community" occurs along the coastline at Greyhound Rd (within 5 km of the site) but does not extend inland to the site of the proposed desalination plant.

State-threatened Communities

One community is listed as Rare under South Australia's Provisional List of Threatened Ecosystems:

- *Eucalyptus conglobata* Low Woodland on fertile loams over limestone

This community is endemic to the Eyre Peninsula, and listed as Rare in South Australia because it is now confined to southern Eyre Peninsula and adjacent Taylor and Boston Islands. It occurs in vegetation associations: 1, 2, 3, WW2, RC2 and RC6.

4.2.2 Flora of conservation significance

Nationally-threatened flora

No flora species of national conservation significance were detected during field survey work.

Four flora species of national conservation significance were recorded in the BDBSA database or identified as "Known to Occur" by the Protected Matters Search Tool, within a 5 km radius of the impact site.

- Goldsack's Leek-orchid (*Prasophyllum goldsackii*)- Endangered
- Metallic Sun-orchid (*Thelymitra epipactoides*) - Endangered
- Large-club Spider-orchid (*Caladenia macroclavia*) - Endangered
- Trailing Hop-bush (*Dodonaea procumbens*) - Vulnerable

Habitat at the assessment site may be suitable for two of these taxa: the Metallic Sun-orchid and Goldsack's Leek-orchid, which have both been recorded in similar habitat nearby (Appendix 2). These species flower in spring (mid-August to October) and were not detected during the targeted field survey in October.

A fifth species (Inland Green-comb Spider-orchid *Caladenia tensa*) recorded in the BDBSA is unlikely to be the nationally-listed taxon, which is restricted to south-eastern parts of South Australia.

State-listed flora

Five State Rare species were recorded during field surveys.

- Alcock's Wattle (*Acacia alcockii*) – Sites 1, 2, 3, 6, 6a, WW1, RC2, RC3 and RC6
- Port Lincoln Mallee (*Eucalyptus conglobata ssp. conglobata*) - Sites 1, 2, 3, 4, 7, WW2, RC2, RC3, RC4 and RC6
- Snowdrop Spurge (*Lysiandra calycina*) – Sites TR1 and TR4
- Spoon-leaved Spyridium (*Spyridium daphnoides*) – Sites TR1 and TR2
- Tate's Grass-tree (*Xanthorrhoea seMIPslana ssp. tateana*) – Sites TR1

A further 11 State Rare species have been recorded within a 5 km radius since 1995 (Appendix 2). Habitat at the assessment site may be suitable for four of these taxa:

- Green Mintbush (*Prostanthera chlorantha*)
- Port Lincoln Guinea-flower (*Hibbertia cinerea*)
- Twisted Sun-orchid (*Thelymitra flexuosa*)
- Western Daddy-long-legs (*Caladenia bicalliata ssp. bicalliata*)

The two orchid species flower in spring (mid-August to November) and were not detected during the targeted field survey in October.

4.2.3 Fauna of conservation significance

Nationally-threatened fauna

Three EPBC-listed species were recorded during the fauna surveys (**Error! Reference source not found.**, Appendices 1 and 2):

- Diamond Firetail – EPBC Vulnerable
- Common Greenshank - EPBC Endangered
- Fairy Tern – EPBC Vulnerable
- Sharp-tail Sandpiper - EPBC
- Australian Sea Lion - EPBC Endangered

The Australia Sea Lion, Common Greenshank, Sharp-tail Sandpiper and Fairy Tern are marine or shoreline species and are unlikely to be impacted by the vegetation clearance under this application (Table 2).

The desktop assessment identified a further three Nationally-listed terrestrial bird species that are known to occur, or may find suitable habitat, within 5 km of the impact area:

- Mallee Whipbird (eastern subspecies) – EPBC Endangered
- Eyre Peninsula Southern Emu-wren – EPBC Endangered
- Malleefowl - EPBC Vulnerable

Detailed descriptions of the habitat requirements for the Diamond Firetail, Mallee Whipbird and Eyre Peninsula Southern Emu-wren are provided in Section 6.3.5 (SEB Offset).

Diamond Firetail – EPBC Vulnerable

A small group of Diamond Firetails was observed near the Tank Site during the fauna survey. Prior to this, the species was recorded in 2018 in Port Lincoln. It is likely to occur in open mallee vegetation within the assessment site, particularly where native grasses are present in the ground layer.

Mallee Whipbird (eastern subspecies) – EPBC Endangered

The EPBC Protected Matters search states the Mallee Whipbird, or its habitat, is known to occur within 5 km of the assessment site, however the nearest record is in Port Lincoln National Park. The area of mallee vegetation at Murrays Point is unlikely to support whipbirds as it has a more open understorey than the shrubby habitat the species requires and because the vegetation is fragmented by off-road vehicle tracks. The vegetation at Kathai CP is more suitable, however the absence of any local records for a species with a distinctive call in an area easily accessible from Port Lincoln suggests the bird is not present.

Eyre Peninsula Southern Emu-wren – EPBC Endangered

The nearest records for the Southern Emu-wren are near Tulka, ~5 km south of Kathai CP, and given that there is good connectivity to the Northside Tank site, it is feasible that the species would find suitable habitat in the area. There are no post-1995 records within 5 km of the proposed desalination plant at Billy Lights Point and there is no suitable contiguous vegetation that would allow the species to disperse to the area from the south.

Malleefowl - EPBC Vulnerable

The Malleefowl, *Leipoa ocellata,* occurs in semi-arid to arid shrublands and low woodlands, especially those dominated by mallee and/or acacias and associated habitats such as *Melaleuca uncinate* and *Callitris verrucosa*. They require a sandy substrate and abundance of leaf litter for the construction of their mound incubator-nests, and their abundance is usually greater in higher rainfall areas and on more fertile soils where vegetation tends to be denser and more diverse. The birds preferred old growth (i.e. long unburnt) mallee where there is plenty of leaf litter for nest building and thicker understorey cover to provide protection from predators [2]. The EPBC Protected Matters search states that the Malleefowl, or its habitat, is known to occur within 5 km of the assessment site, however there are no recent (post-1995) records within this area. There are numerous records for the species in Port Lincoln National Park. There was no evidence of recent or historic mounds at the assessment site.

Twelve Nationally-listed species of marine or aquatic birds, mammals and reptiles have also been recorded within 5 km of the site but will not be impacted by the works assessed in this application (Table 2).

Nationally-listed Marine and Migratory (Terrestrial) Species

Two raptor species, the White-bellied Sea-eagle (*Haliaeetus leucogaster*) and Eastern Osprey (*Pandion haliaetus cristatus*), are Commonwealth listed marine and/or migratory seabird species and receive national protection as MNES under the *EPBC Act*. Both species are listed as Endangered under the South Australian *NP&W Act*.

The White-bellied Sea-eagle is distributed along the coastline of Australia and extends inland along some of the larger waterways. They breed in solitary and monogamous pairs that mate for life. In southern Australia, the breeding season extends from June to January (sometimes February). Their large nests, made of sticks lined with leaves, grass or seaweed, may be built in tall trees (especially *Eucalyptus* species), bushes, mangroves, cliffs, rocky outcrops, caves, crevices, on the ground or on artificial structures. Pairs usually return to the same breeding territory each year, and often the same nest, although territories may contain one or two additional, less developed nests. Breeding pairs tend to be widely dispersed and are generally separated by distances of several kilometres or more. A breeding pair of White-bellied Sea-eagles has been nesting within 500 m of the proposed project site for the last 3 years.

The Osprey is mostly found in coastal areas but occasionally travels inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging and frequent a variety of wetland habitats including inshore waters, coastal cliffs, beaches, estuaries, mangrove swamps, rivers and large lakes. The Osprey breeds from April to February, constructing a large stick nest usually on exposed cliffs, in low coastal trees or man-made structures. The species is nesting in the vicinity of the Lincoln Cove Marina, around 1 km away from the project site.

The White-bellied Sea-eagle and Eastern Osprey are sensitive to human disturbance, particularly during the breeding season, and may desert nests and young if exposed to human activity. South Australia's Coast Protection Board has established a default spatial buffer for development from the breeding territories of these birds (which includes nests and guard roost), being 2 km for the White-bellied Sea-eagle and 1 km for the Osprey. The Coast Protection Board Policy states that a lesser buffer distance may be accepted where there is specific, independent advice provided by a suitably qualified person.

SA Water staff have been liaising closely with the Coastal Protection Board together with raptor specialist Jason Wiersma (Department of Environment and Natural Resources, Tasmania) to ensure that disturbance impacts to both the White-bellied Sea-eagle and Eastern Osprey are minimised during and following the projects works [3].

The potential electrocution risk posed to the White-bellied Sea-eagle and Eastern Osprey through the installation of new overhead powerlines has not yet been assessed. Mortality due to collisions with transmission lines or nesting on transmission poles has been well documented for raptors such as the Wedge-tailed Eagle and the Osprey[3],[4] and there is the potential to employ mitigation measures to reduce these risks[5], if they are deemed to be significant.

State-threatened fauna

Twenty-nine bird and three reptile species recorded during surveys or database searches are listed as threatened under the NP&W Act. Nineteen of these are present or may find suitable habitat within the vegetation associations under application (**Error! Reference source not found.**)

[3] Washburn B.E. (2014) Human–Osprey Conflicts: Industry, Utilities, Communication, and Transportation. Journal of Raptor Research 48 (4): 387–395.
[4] Bekessy S., et.al., (2009) Modelling human impacts on the Tasmanian wedge-tailed eagle (*Aquila audax fleayi*). Biological Conservation. 142 (11): 2438-2448.
[5] Bernadino J., et.al.(2018) Bird collisions with power lines: State of the art and priority areas for research. Biological Conservation. 222: 1-13.

Table 1: Threatened fauna species recorded during fauna and vegetation surveys in 2023.

Common Name	EPBC Act	NPW Act	Location
Australian Sea Lion	EN	V	East side of Billy Lights Point
Banded Stilt		V	Wetlands between Greyhound Rd and bay
Brown Quail		V	Roadside near Billy Lights Point
Common Greenshank	EN		Tidal flats south of racetrack
Common Sandpiper		R	Billy Lights Point
Diamond Firetail	VU	V	Northside Hill tanks site
Eastern Osprey		E	Wetlands between Greyhound Rd and bay
Fairy Tern	VU	E	Wetlands between Greyhound Rd and bay.
Little Egret		R	Wetlands between Greyhound Rd and bay and shore bird site 3.
Pied Oystercatcher		R	Greyhound Rd shore bird survey sites
Purple-gaped Honeyeater		R	Woodland bird sites (RC2 and 3)
Rock Parrot		R	Greyhound Rd Shore bird site 3, woodland bird site 1, wetlands between Greyhound Rd and bay.
Sharp-tail Sandpiper	VU		Tidal flats south of the racetrack
Shy Heathwren		R	Bluefin Rd (Woodland bird site 7, TR3)
Sooty Oystercatcher		R	3 of 4 shore bird survey sites
White-bellied Sea Eagle		E	Jetty on south side of Billy Lights Point.
White-winged Chough		R	Rail corridor (RC2 and RC3) and Tank site (TR1).

Table 2. Species observed on site, or recorded within 5km of the application area since 1995, or the vegetation is considered to provide suitable habitat.

SPECIES	EPBC Act	NPWS Act	Source	Date of last record[1]	Species known habitat preferences	Likelihood for use for habitat - comments
BIRDS						
Actitis hypoleucos (Common Sandpiper)		R	1,3, 4	2023 (DP,RC)	This species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. Migratory species, breeding in Northern Hemisphere, and flying to the Southern Hemisphere in the southern spring and summer [7].	Known. Unlikely to use mallee associations (Sites 1–8, RC1-6, TR1-4). Observed near Billy Lights Point during 2023 fauna surveys. Highly likely to use coastal shoreline near proposed outfall area. Numerous records around Port Lincoln and Billy Light Peninsula.
Bubulcus ibis coromandus (Eastern Cattle Egret)		R	1,3	2019 (DP,RC,TR)	The Cattle Egret is found in grasslands, grassy woodlands, wetlands and river systems. It also uses pastures and croplands, especially where drainage is poor [8].	Unlikely to use mallee associations (Sites 1–8, RC 1-6, TR 1-4, WWTP 1-4). Highly likely to use coastal shrubland (Greyhound Rd). Previously recorded in samphire areas along Greyhound Rd and mangroves near Port Lincon Marina.
Burhinus grallarius (Bush Stone-curlew)		R	1,2	2006 (DP,RC)	The Bush Stone-curlew is a large ground-dwelling bird found in a variety of habitats including open forest, eucalyptus woodland, rainforest edges, grassy plains, arid scrubland, and along inland watercourses. Key habitat components include fallen dead timber, leaf litter and an open ground layer.	Possible in Sites 1-4 and RC2 - 6 which provide some suitable open habitat. Only one record nearby at Kirton Point, within previous 20 years. Unlikely to use coastal shrubland or degraded mallee areas (Sites 6-8, RC1,7-14). Not recorded within 5km of the proposed Tank Site (TR1-4).
Calidris acuminata (Sharp-tailed Sandpiper)	VU		3, 5	2023 (DP,RC,TR)	A small-medium migratory shorebird breeding in northern Siberia and moving to non-breeding areas south of the Equator. The species is widespread in both inland and coastal locations, occurring in freshwater and saline habitats. They feed along the water's edge of mudflats, wetlands and sewage ponds [9].	Known. Unlikely to use mallee associations (Sites 1–8, RC 1-6, TR 1-4, WWTP 1-4). Highly likely at wastewater treatment plant ponds. Observed during 2023 field surveys. Numerous records across the coastal and wetland areas of the assessment area.
Calidris alba alba (Sanderling)		R	2	2019 (DP,RC)	Small wading bird which breeds in the High Arctic areas and migrates south over winter where it inhabits open sandy beaches, tidal sand flats, mud flats and the shores of lakes and rivers. Occasionally uses rocky shores.	Unlikely to use mallee associations (Sites 1–8, RC1-6, TR1-4). Likely to use coastal shoreline at proposed outfall area. Previously recorded in Murrays Point Reserve and Port Lincoln marina.
Calidris canutus (Red Knot)	VU	E	1,2,3	2020 (DP,RC)	Small to medium shorebird which breeds in the northern hemisphere and migrates south to spend the boreal winter in Australasia. It inhabits intertidal mudflats, sandflats and sandy beaches of sheltered coasts and sometimes on sandy ocean beaches or shallow pools on exposed rock platforms. Occasionally	Unlikely to use mallee associations (Sites 1–8, RC1-6, TR1-4). Highly likely to use wastewater treatment area and coastal shoreline at proposed outfall area. Previously recorded at Billy Lights long beach and at the Pt Lincoln Marina drain.

SPECIES	EPBC Act	NPWS Act	Source	Date of last record[1]	Species known habitat preferences	Likelihood for use for habitat - comments
					seen on saline wetlands near the coast and on sewage ponds and saltworks [10].	
Calidris ferruginea (Curlew Sandpiper)	CR	E	2,5	2023 (DP,RC)	A migratory shorebird which breeds across Arctic Siberia. Non-breeding birds are found in many Australian coastal sites and may also be seen inland in suitable wetland habitats. Feeding habitat includes exposed sandy or soft mud substrates on intertidal flats and beaches. Roosting habitat consists primarily of large intertidal sandflats, spits, and banks [11].	Unlikely to use mallee associations (Sites 1–8, RC1-6, TR1-4). Highly likely to use saltmarsh wetlands along Greyhound Rd.
Calidris melanotos (Pectoral Sandpiper)		R	2,3	2021 (DP,RC)	Small wader which breeds in the northern hemisphere and migrates to south-eastern Australia, arriving mainly in coastal areas and then dispersing inland. Found in coastal lagoons, estuaries, swamps, lakes, creeks, floodplains, and artificial wetlands. It forages for invertebrates on grasslands and mudflats.	Unlikely to use mallee associations (Sites 1–8, RC1-6, TR1-4). Highly likely to use wastewater treatment area and coastal shoreline at proposed outfall area. Recorded at Billy Lights Point.
Cereopsis novaehollandiae novaehollandiae (Cape Barren Goose)		R	1,2,3	2015 (DP) 2019 (RC, TR)	Large ground-dwelling bird found near coastal shorelines and lakes, as well as nearby grasslands and shrublands, including pastureland. They favour grassy areas but can also be seen on beaches and in low heathy scrubs.	Unlikely to use mallee associations (Sites 1-4,6-8, RC1-6, TR1-4). Possible use of coastal shrubland (RC7) and shoreline at proposed outfall area, however this is not preferred habitat. Recorded nearby at Billy Lights Point and shoreline along Greyhound Rd.
Cladorhynchus leucocephalus (Banded Stilt)		V	1,2,3,4	2023 (DP,RC) 2020 (TR)	A nomadic wading bird, found mainly in shallow saline and hypersaline waters of the inland and coast including ephemeral salt lakes, salt works, lagoons, salt- or claypans and intertidal flats. Sometimes found in brackish or fresh water, including farm dams and sewage ponds [12].	Known. Unlikely to use mallee associations. Observed during 2023 fauna surveys in wetlands along Greyhound Rd. Highly likely to use wastewater treatment area and coastal shoreline at proposed outfall area. Previously recorded at Billy Lights Point, wastewater treatment plant, Pt Lincoln Marina and in samphire areas along Greyhound Rd.
Coturnix ypsilophora (Brown / Swamp Quail)		V	4	2023 (DP)	Found in dense vegetation fringing freshwater wetlands, wetter grasslands and shrublands, sedgelands, amongst bracken and occasionally along roadsides. Under favourable conditions the population may irrupt outside of its normal range into semi-arid and arid areas for short periods. Considered to be a vagrant species to Eyre Peninsula [13].	Highly Likely / Known. Observed on roadside near Billy Lights Point during 2023 fauna surveys. In wetter year, suitable habitat may be available at Sites with a dense shrubby or sedge understory (Sites 1 - 4, WW1 - 5, RC1 - 7)
Corcorax melanorhamphos (White-winged Chough)		R	1,2,3,4	2023 (DP, RC, TR)	White-winged Choughs are found in open forests and woodlands. They tend to prefer the wetter areas, with lots of leaf-litter, for feeding, and available mud for nest building [14].	Known. Observed during field surveys in RC2, RC3 and TR1. Highly likely in all other good quality mallee habitats with dense leaf litter. Unlikely to use coastal shrubland (RC8, 10) and degraded mallee areas (Sites 6-8, RC6) which lack leaf litter.

SPECIES	EPBC Act	NPWS Act	Source	Date of last record[1]	Species known habitat preferences	Likelihood for use for habitat - comments
Diomedea exulans (Wandering Albatross)	VU	V	2,5	2017 (DP, RC)	Large seabird which nests on remote islands and forages in open waters of the southern oceans. Juveniles and non-breeding adults circumnavigate Antarctica, often passing close to the Australian mainland [15].	Unlikely. Oceanic species. One record of 2 birds seen off Port Lincoln beachfront.
Egretta garzetta nigripes (Little Egret)		R	1,4	2023 (DP, RC)	The Little Egret frequents tidal mudflats, saltwater and freshwater wetlands, and mangroves [16].	Known. Unlikely to use mallee associations. Observed in wetlands and along shoreline near Greyhound Rd during 2023 fauna surveys. Highly likely to use wastewater treatment area and coastal shoreline at proposed outfall area.
Falco peregrinus macropus (Peregrine Falcon)		R	1	2011 (DP) 2017 (RC, TR)	Found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites and prefers coastal and inland cliffs or open woodlands near water [17].	Highly Likely. Recorded in last 10 years, and suitable prey species present (e.g. may feed on pigeons associated with old sheds at the proposed desalination site).
Gerygone fusca (Western Gerygone)		R	1	2017 (DP, RC) 2018 (TR)	Small bushland bird which occurs in a wide range of wooded habitats varying from open sclerophyll eucalypt forests to sparse mallee and mulga shrublands.	Highly Likely. Recorded in Port Lincoln in the last 6 years, and suitable habitat is present in mallee associations.
Haematopus fuliginosus fuliginosus (Sooty Oystercatcher)		R	1,2,3	2023 (DP,RC,TR)	The Sooty Oystercatcher is strictly coastal, usually within 50 m of the ocean. It prefers rocky shores but will be seen on coral reefs or sandy beaches near mudflats [18].	Highly likely along coast (near outfall, WW1-5). Observed during 2023 fauna surveys on tidal flats along Greyhound Rd. Numerous records in assessment area.Unlikely to use mallee associations (Sites 1–8, RC1-6, TR1-4).
Haematopus longirostris (Pied Oystercatcher)		R	1,4	2023 (DP,RC,TR)	The Pied Oystercatcher prefers mudflats, sandbanks and sandy ocean beaches and is less common along rocky or shingle coastlines. May occasionally be found in estuarine mudflats and short pasture [19].	Unlikely to use mallee or shrubland associations (Sites 1–8, RC1-6, TR1-4). Highly likely along shorelines. Numerous records in assessment area and observed during 2023 fauna surveys on tidal flats along Greyhound Rd.
Haliaeetus leucogaster (White-bellied Sea Eagle)		E	1,4	2023 (DP,RC) 2021 (TR)	White-bellied Sea-Eagles build a large stick nest, which is used for many seasons in succession. The nest can be located in trees up to 30m tall (including low coastal mallees and mangroves), cliff-face ledges or rocky outcrops but may also be placed on the ground where there are no suitable trees. They range around the coast of Eyre Peninsula, fishing over the water [20].	Known. Recorded in Lincoln Cove Marina and samphire areas along Greyhound Rd and known to nest nearby. Observed opportunistically during 2021 and 2023 field surveys. May use moderate to good quality vegetation with emergent trees near the coast (Sites 1-6, 8, RC7, WW1-5). Unlikely to use mallee associations further inland (RC1-6, TR1-4). Unlikely in degraded habitats (Site 7, RC8).

SPECIES	EPBC Act	NPWS Act	Source	Date of last record[1]	Species known habitat preferences	Likelihood for use for habitat - comments
Hieraaetus morphnoides (Little Eagle)		V	2,3	2004 (TR)	A widespread species found in open eucalypt forest or woodland, tree-lined watercourses, mallee and sheoak or acacia woodlands. Nests in mature living trees. Also hunts over open habitats such as grasslands, crops, dunefields, bluebush and saltbush plains, and sedge-covered floodplains. Usually avoid large areas of dense forest.	Possible at Tank Sites (TR1-4). Not recorded within 5km of DP, WWTP or RC sites, but suitable habitat is present in good quality mallee associations.
Hylacola cauta cauta (Shy Heathwren)		R	4	2023 (TR)	Inhabits mallee woodland with a relatively dense shrub and heath understory. Feeds mostly on ground-dwelling insects, although may occasionally eat seeds. The species uses all age classes of vegetation but prefers dense understory often associated with either long unburnt or recently burnt (1-5 years) habitat. Occur in coastal and semi-arid regions.	Known. Observed during 2023 fauna surveys in mallee habitat along Bluefin Rd (TR3). There are no other post-1995 records for the species within 5 km of the proposed route but suitable habitat exists in mallee associations (Site 1-6, WW1-5, RC1-6, TR1 & 3).
Leipoa ocellata (Malleefowl)	VU	V	5	N/A	Found principally in the semi-arid to arid zone in shrublands and low woodlands dominated by mallee and associated habitats [2].	Unlikely. No mounds or birds recorded in the area. Only recorded in Port Lincoln National Park (>5km from project area).
Lichenostomus cratitius occidentalis (Purple-gaped Honeyeater (mainland SA))		R	1,2,3, 4	2023 (DP,RC) 2019 (TR)	Mallee eucalypt associations, preferring mallee heathland, but also often in mallee woodland [21]	Known. Observed at 3 survey points along the rail corridor in 2023 (in RC 2 and 3) and there are numerous recent records in the area. Highly likely in mallee (Sites 1-6, WW1-5, RC1-6, TR1-3).
Macronectes giganteus (Southern Giant-Petrel)	EN	V	1,5	1999 (DP)	Breeds in Antarctica and sub-Antarctic islands. The Australian population has decreased in number by 50% in the last three generations, probably as a result of long-line fishing and possibly introduced predators [15].	Unlikely. Few records on lower EP, all around the Coffin Bay area. One record offshore 5 km east of outfall pipeline.
Macronectes halli (Northern Giant Petrel)	VU			2005 (DP)	Large predatory seabird which breeds on remote islands. They forage at sea and also scavenge on land, feeding mainly on carrion (dead penguins and seals), as well as fish, krill, squid, and other cephalopod [15].	Unlikely. Oceanic species. One record from Port Lincoln.
Neophema elegans elegans (Elegant Parrot)		R	1,2	1999 (DP,RC)	This species can be found in a wide variety of habitats, including grasslands, shrublands, mallee, woodlands and thickets, bluebush plains, heathlands, saltmarsh and farmland. They feed on the seeds of grasses and low growing shrubs [22].	Possible. Most likely in open areas but may also shelter in adjoining mallee areas. Recorded over 20 years ago in Port Lincoln at Kirton Point, and there are historical records in saltmarsh areas along Greyhound Rd. Not recorded near the tank site (TR1-4).
Neophema petrophila zietzi (Rock Parrot)		R	1,2,3,4	2023 (DP,RC) 2019 (TR)	The Rock Parrot is restricted to coastlines and offshore rocky islands, frequenting windswept coastal dunes, mangroves, saline swamps and rocky islets. It is seldom seen more than a few	Known. Observed in 2023 fauna surveys in mallee at the desal plant site and in coastal shrubland along Greyhound Rd.

SPECIES	EPBC Act	NPWS Act	Source	Date of last record[1]	Species known habitat preferences	Likelihood for use for habitat - comments
					hundred metres from the sea [23]. The species feeds on the ground, among rocks, or on tidal flats and beaches often among low plants, such as samphire, pigface, groundsel, Nitre bush, saltbush and Sea Rocket.	Numerous records occur in assessment area near the proposed desal plant, at Billy Lights Point, near the marina and in samphire areas along Greyhound Rd. Highly likely at Sites 1-7, WW1-5, RC7,10-15). Observations at Site 6, suggest the species may also use the mallee associations close to the coast (RC1-6). Unlikely at TR1-4.
Pandion haliaetus cristatus (Eastern Osprey)		E	1,4	2023 (DP,RC) 2016 (TR)	Mostly found in coastal areas but occasionally travel inland along rivers. They range around the coast of Eyre Peninsula and require extensive areas of open fresh, brackish or saline water for foraging. Eastern Ospreys build a large stick bowl usually in the top of a dead or partly dead tree, from isolated trees in open country to open forest, with prominent emergent perches nearby (e.g. dead trees). They can also nest on stacks along rocky shores, and increasingly on man-made structures such as power poles, bridges, and purpose-built nest platforms on poles [24].	Known. Observed over the wetlands along Greyhound Rd during 2023 fauna surveys. Numerous records in the area, including in last 3 years. Known to nest at the entrance to the Lincoln Cove Marina. Mallee associations (Sites 1–4, RC1-3, TR1-4) are unlikely to provide important habitat. Coastal mallee and shrubland with emergent trees may provide suitable roosting sites (Site 5, RC7, WW3-5).
Podiceps cristatus australis (Great Crested Grebe)		R	1	2014 (DP,RC,TR)	Inhabits wetlands, rivers, lakes, estuaries and sheltered bays, but favours large, deep, open bodies of fresh water [25].	Unlikely to use habitat impacted by the project works. One record in samphire areas along Greyhound Rd.
Psophodes leucogaster leucogaster (Mallee Whipbird)	EN	E	2, 5	2014 (DP)	Found in dense mallee scrub on sandy flats, dunes, or limestone, where it forages on the ground and in low shrubs for arthropods. Generally prefers habitat with a dense understory 1.5–2 m tall, below an open mallee eucalypt overstory 2–5 m tall [26].	Possible in good quality mallee associations near the tank site (TR1 and TR3) where an extensive area of mallee is continuous with large patches of mallee to the south and west. Most recent records (2023) are near Tulka almost 7km south of the Northside Hill tanks site. Also recorded in Lincoln NP (2014). The larger area west of Billy Lights Point is highly unlikely to support whipbirds, as it has a more open understorey than the species preferred dense shrubby habitat and is heavily fragmented by vehicle tracks.
Spatula rhynchotis (Australasian Shoveler)		R	1,2	2018 (DP,RC) 2002 (TR)	Occurs in all types of wetlands but prefers large deep freshwater lakes and swamps which are heavily vegetated. It can also be found on open waters and occasionally along the coast.	Unlikely. Habitat near outfall and wastewater treatment plant is not suitable. Recorded near Pt Lincoln and in saltmarsh area along Greyhound Rd.
Stagonopleura guttata (Diamond Firetail)	VU	V	2,4,5	2018 (DP,RC) 2023 (TR)	Occurs in *Eucalyptus, Acacia* or *Allocasuarina* woodlands, open forests, mallee and other lightly timbered habitats, including farmland and grassland with scattered trees. They prefer areas with relatively low tree density, few large logs, and little litter cover but high grass cover, although are occasionally found in	Highly Likely/ Known. Observed near the Kathai Tank site during the 2023 fauna surveys. Recently recorded (2018) in Pt Lincoln. Likely in most sites with open patches of mallee and grasses (e.g. Sites 1–4, RC2-6, WW3-5, TR1 - 3). Unlikely at highly degraded sites, those with very dense

SPECIES	EPBC Act	NPWS Act	Source	Date of last record[1]	Species known habitat preferences	Likelihood for use for habitat - comments
					denser shrub layers. They feed on the ground on seeds and insects [27].	groundcover of shrubs and vines, or coastal shrublands (WW1, RC1, RC 7-15, TR4).
Sternula albifrons sinensis (Little Tern)		E	1,2,3	2010 (DP,RC,TR)	Inhabits sheltered coastal shores and lagoons. Nest in colonies on sandy beaches. Can also be found around sewage works.	Unlikely in mallee or coastal shrubland associations. Possible around shoreline near Greyhound Rd and the proposed intake/outfall site. Recorded on Port Lincoln foreshore.
Sternula nereis nereis (Fairy Tern)	VU	E	1,2,4,5	2023 (DP,RC,TR)	Shorebird, inhabiting a variety of habitats including offshore, estuarine or lacustrine islands, wetlands, beaches and spits. They nest above the high water mark on sites where the substrate is sandy and the vegetation low and sparse [28].	Known. Unlikely to use mallee or coastal shrubland. Observed in the wetlands near Greyhound Rd during the 2021 and 2023 field surveys.
Stipiturus malachurus parimeda (Southern Emu-wren (Eyre Peninsula)	EN	E	5	2023 (TR, RC)	Found only on the southern tip of Eyre Peninsula, in shrubland, mallee and sedgeland, all of which are characterised by one or two low, dense layers of vegetation. The species is more likely to choose habitats based on vegetation structure than floristics. Mallee habitats can be open or closed and are typically dominated by *Eucalyptus diversifolia* and *E. incrassata.* Dense vegetation is important for shelter and because it has higher insect abundance. The species is generally thought to be poor at dispersing - they are not strong flyers and prefer dense cover [29].	Possible. Suitable habitat is available in good quality shrubland and mallee associations with a dense understory (TR1,3). One recent record near Tulka and numerous records around Sleaford Bay and in Lincoln NP. Unlikely elsewhere. There are no post-1995 records within 5km of the proposed desalination plant site and there is no suitable contiguous vegetation that would allow the species to disperse to the area from the south.
Thalassarche steadi (White-capped Albatross)	VU		5	NA	This large seabird breeds only in New Zealand and disperses into southern Australia to forage [15].	Unlikely. Oceanic species. No nearby records.
Thinornis cucullatus cucullatus (Hooded Plover)	VU	V	1,3,5	2018	Inhabits ocean beaches, particularly wide beaches backed by dunes with large amounts of seaweed, creek mouths and inlet entrances. It may also occur on near-coastal saline and freshwater lakes and lagoons, tidal bays and estuaries, on rock platforms, or on rocky or sandy reefs close to shore [30].	Unlikely to use mallee or coastal shrubland. Possible along shoreline near proposed outfall. Recorded in Lincoln NP, but there are no records near Billy Lights Point or the coastline or wetlands along Greyhound Rd or Proper Bay.
Tringa brevipes (Grey-tailed Tattler)		R	2,3	2020 (DP,RC)	A migratory shorebird which spends the boreal winter foraging on muddy and sandy coasts in Asia and Australia. Usually seen in small flocks and prefer sheltered coasts with intertidal mudflats or reefs and rock platforms.	Unlikely to use mallee or coastal shrubland. Highly likely along shoreline near proposed outfall (WW3-5). There are two records for the species on the beach at Billy Lights Point.
Tringa glareola (Wood Sandpiper)		R	1,2,3	2019 (DP,RC) 2008 (TR)	A small wading bird seen in small flocks or singly on inland shallow freshwater wetlands, often with other waders. They prefer ponds and pools with emergent reeds and grass, surrounded by tall plants or dead trees and fallen timber [25]. Breeding in Northern Hemisphere, they migrate to the Southern Hemisphere in the southern spring and summer.	Unlikely to use mallee or coastal shrubland. Highly likely along shoreline near proposed outfall (WW3-5). Recorded in sewage works, at Billy Lights Point and near the breakwater on Greyhound Rd.
Tringa nebularia (Common Greenshank)	EN		2,3,5	2023 (DP,RC,TR)	Breeds across northern Europe and Asia; migrating to Africa, southern Asia and Australia during the boreal winter. The species	Known.

SPECIES	EPBC Act	NPWS Act	Source	Date of last record[1]	Species known habitat preferences	Likelihood for use for habitat - comments
					occurs in all types of wetlands, being recorded in most coastal regions, foraging at the edges of mudflats or shallows. They roost both on the coast and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops [31].	Unlikely to use mallee associations (Sites 1–8, RC 1-6, TR 1-4, WWTP 1-4). Highly likely at wastewater treatment plant ponds. Observed during 2023 field surveys. Numerous records across the coastal and wetland areas of the assessment area.
Turnix varius varius (Painted Buttonquail)		R	1,2,3	2017 (DP) 2018 (RC,TR)	Small ground-dwelling bird found in woodland and forest, shrublands & heathlands and coastal vegetation, usually with a closed canopy and some shrubby understory and deep ground leaf litter [32].	Highly likely in mallee areas with good canopy and understory cover (Sites 1-4,8, RC1-7, TR1,3). Less likely in degraded open sites that lack dense canopy and ground cover. Several records in the area in the last 6 years, including at Murray Point.
Xenus cinereus (Terek Sandpiper)		R	2	2020	Migratory species, breeding in Northern Hemisphere, and flying to the Southern Hemisphere in the southern spring and summer. Usually found on the coast in mangrove swamps, tidal mudflats and the seashore.	Unlikely to use mallee or coastal shrubland. Highly likely along shoreline near proposed outfall (WWTP3-5). Recently recorded near boat ramp at Billy Lights Point.
Zanda funerea whiteae (Yellow-tailed Black Cockatoo)		V	1	2017 (DP,RC) 2008 (TR)	Isolated endangered population occurs on the peninsula. It nests in large eucalypt hollows. Feed on seeds of exotic Aleppo Pines throughout the peninsula, and native hakea species (*H. rugosa, H. cycloptera*). Also insect larvae in flowering spikes of *Xanthorrhoea seMIPslana*, wood borers of Eucalypts and *Acacia* galls.	Highly Likely. Most sites contain food resources for the species, including exotic Aleppo Pines and Acacias. Numerous records in the area, including in last 6 years.
MAMMALS						
Bettongia penicillata ogilbyi (Woylie)	EN	R	2,5	2001	This species has been re-introduced into national parks in the Eyre Peninsula region (including Lincoln National Park), but as yet has not been observed outside of Parks [33].	Unlikely. Not recorded outside reintroduction areas.
Eubalaena australis (Southern Right Whale)	EN	V	2,5	2014	Marine species. A large baleen whale with a circumpolar distribution in the Southern Hemisphere. Breeding aggregations occur over a wide environmental range across the entire southern Australian coast, although preferred habitat generally includes shallow sloping sandy bottom bays that provide protection from prevailing wind and weather. Reproductive areas where females calve and nurse their young appear to be exclusively coastal [34].	Possible along coastline near marine intake/outfall. However, local sightings are of transient animals and the area is not a known aggregation site for the species.
Neophoca cinerea (Australian Sea Lion)	EN	V	1,2,4,5	2023	Marine species which breeds on remote coastlines or on islands, and forages at sea. They use a variety of coastal habitats as haul-out sites, from exposed islands, reefs and	Observed during field surveys to the east side of Billy Lights Point and there have been several sightings at

SPECIES	EPBC Act	NPWS Act	Source	Date of last record[1]	Species known habitat preferences	Likelihood for use for habitat - comments
					rocky terrain to sandy beaches and vegetated fore dunes [35].	Billy Light Point and Port Lincoln foreshore. May use the shoreline near the proposed outfall.
REPTILES						
Caretta caretta (Loggerhead Turtle)	EN	E	5	-	Loggerhead turtles forage in all coastal states and the Northern Territory, but are uncommon in South Australia, Victoria and Tasmania. They feed predominantly on benthic invertebrates in habitats ranging from near shore to shore to depths of 55 m [36].	Unlikely. No records within 5 km of site.
Dermochelys coriacea (Leatherback Turtle)	EN	V	1,5	1989	Marine species. Leatherback turtles are known to forage and migrate throughout Australia. They are an oceanic species, remaining planktivorous throughout their life, feeding on jellyfish and large planktonic ascidians (e.g. sea squirts) in the water column [36].	Unlikely. No records since 1995 within 5 km of site.
Varanus rosenbergi (Heath Goanna)		V	3	2021	Found in sandy heathland, open woodland or sclerophyll forest. Shelters in hollow logs, rock crevices and in burrows. Uses termite mounds as nesting sites and has a varied diet including birds, eggs, reptiles, small mammals and carrion.	Possible. Although the species has not been recorded in vicinity of project footprint (all records are from Lincoln NP), suitable habitat is present along most of the proposed route.
FISH						
Carcharodon carcharias (Great White Shark)	VU		3,5	2003	The species primarily inhabits continental and insular shelf waters but is also known to use the open ocean. It often occurs close inshore near the surf-line and may move into shallow bays. Commonly found in inshore waters in the vicinity of islands, and often near seal colonies [37].	Possible along coastline near marine intake/outfall.

Source; 1- BDBSA, 2 - AoLA, 3 – NatureMaps, 4 – Observed/recorded in the field, 5 - Protected matters search tool, 6 – others
EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable; NP&W Act; E= Endangered, V = Vulnerable, R= Rare
[1]Date of Last Record – within 5km of: DP (Desal Plant); RC (Rail Corridor); TR (Tank Site)

Criteria for the likelihood of occurrence of species within the Study area.

Likelihood	**Criteria**
Highly Likely/Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is present and falls within the known range of the species distribution or; The species was recorded as part of field surveys.
Likely	Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides habitat or feeding resources for the species.
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area provides limited habitat or feeding resources for the species. Recorded within 20 -40 years, survey effort is considered adequate, habitat and feeding resources present, and species of similar habitat needs have been recorded in the area.
Unlikely	Recorded within the previous 20 years, but the area provide no habitat or feeding resources for the species, including perching, roosting or nesting opportunities, corridor for movement or shelter. Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area. No records despite adequate survey effort.

4.3 Cumulative impact

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must consider the potential cumulative impact, both direct and indirect, that is reasonably likely to result from a proposed clearance activity.

4.4 Address the Mitigation Hierarchy

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must have regard to the mitigation hierarchy. The NVC will also consider, with the aim to minimize, impacts on biological diversity, soil, water and other natural resources, threatened species or ecological communities under the EPBC Act or listed species under the NP&W Act.

a) Avoidance – outline measures taken to avoid clearance of native vegetation

Vegetation clearance has been avoided by locating as much of the works as possible within existing cleared areas. The Desalinated Water Transfer pipeline main corridor uses existing cleared vegetation

- along the track north of the former BHP tramline
- in the bed of Greyhound Road
- adjacent to Proper Bay Road
- in the bed of Bluefin Road
- making use of existing clear

The section of the route along Greyhound Road has been designed to avoid impacts to the EPBC Vulnerable Subtropical and Temperate Coastal Saltmarsh

The transfer main avoids clearance at the connection to the Northside Tanks by following the road to the west side of the tanks and entering through the existing cleared gateway.

The desalination plant makes use of existing cleared vegetation at the site including tracks, roads and disused building pads.

The Saline Waste/Seawater Transfer Pipelines works make use of existing cleared vegetation in the Port Lincoln Wastewater Treatment Plant.

Consideration was given to locating the transfer main in the existing cleared corridor of the BHP trainline to further reduce vegetation clearance. This option was not practical because the tramline corridor is too narrow for construction, particularly where it passes through cuttings and because of the high risk of soil contamination associated with the use of herbicides, hydrochemicals and other persistent chemicals during tramline operations.

b) Minimization – if clearance cannot be avoided, outline measures taken to minimize the extent, duration and intensity of impacts of the clearance on biodiversity to the fullest possible extent (whether the impact is direct, indirect or cumulative).

Billy Lights Point was selected as the lowest-impact practical option from a range of alternative sites on southern Eyre Peninsula including Sleaford Bay, Point Boston and Shoal Point at Uley. Vegetation survey and habitat assessments were conducted at five alternative sites. Considerations in the selection of Billy Lights Point were the low risk to matters of national environmental significance, relatively small extent of vegetation clearance and the lower energy requirements for transferring water from a site close to Port Lincoln.

Vegetation clearance has been minimised in the design of the works by adopting the following measures:

- minimising the width of the entry corridor from St Andrews Drive to the desalination plant by co-locating services (vehicle, water, stormwater, sewage) within the access road
- locating the desalination plant in the area of most degraded vegetation at the site
- along the former BHP trainline, co-locating the SAPN access easement alongside with the transfer main easement to reduce clearance extent
- constructing an underground pipeline connection from the marine pump station for a proportion of the necessary pipeline length to avoid disturbance of State protected coastal vegetation, coastal cliffs and *Posidonia* beds offshore of the Billy Lights Wastewater Treatment Plant
- when Design and Construct contractors are finalised and engaged, SA Water will investigate reducing the width of the transfer main corridor when passing through the SA Rare plant community Port Lincoln Mallee *Eucalyptus conglobata ssp. conglobata*
- working under a Raptor Management Plan to minimise disturbance to the previously recorded white-bellied sea-eagle pair and to incorporate impact mitigation in the design of new structures.

Contractors will apply hygiene protocols specified by SA Water to minimise the spread of weeds and plant pathogens during the works.

Contractors will be required to prepare construction plans to:

- minimise clearance of mapped threatened species and plant communities
- recover and translocate threatened species from clearance areas (e.g. Tate's Grass-tree from Blue Fin Road).

c) Rehabilitation or restoration – outline measures taken to rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance that cannot be avoided or further minimized, such as allowing for the re-establishment of the vegetation.

The corridor required to maintain the Desalinated Water Transfer pipeline main and marine pipelines is narrower than the disturbance required for construction. Construction will require a broad area to laydown pipes, store spoil and allow vehicle movement. The disturbance to these areas will be limited to rolling and removal of large debris. The vegetation will be permitted to recover with permanent clearance only required along the pipeline and SAPN towers for inspection, fire control and maintenance.

The ongoing inspection program for SA Water facilities will include assessment for weed invasion in vegetation disturbed by the desalination plant works. Weeds will be controlled as required.

d) Offset – any adverse impact on native vegetation that cannot be avoided or further minimized should be offset by the achievement of a significant environmental benefit that outweighs that impact.

The NVC will only consider an offset once avoidance, minimization and restoration have been documented and fulfilled. The SEB Policy explains the biodiversity offsetting principles that must be met.

The residual impacts of the project will be offset by establishing a new SEB offset area on SA Water land at Uley South, west of Port Lincoln (see Section 6).

4.5 Principles of Clearance (Schedule 1, *Native Vegetation Act 1991*)

The Native Vegetation Council will consider Principles 1(b), 1(c) and 1(d) when assigning a level of Risk under Regulation 16 of the Native Vegetation Regulations. The Native Vegetation Council will consider all the Principles of clearance of the Act as relevant, when considering an application referred under the *Planning, Development and Infrastructure Act 2016*.

Data Reports must provide information on and a recommendation ('Not at variance', 'At variance' or 'Seriously at variance') for principles b, c and d. Complete the following table to provide the relevant information for assessment of the Principle, the outcome of the assessment and possible moderating factors that the NVC can take into consideration.

Noting, consultants can discuss the Moderating factors, but must not change the outcome of the assessment against the principles. This is determination for the NVC only. The Assessment against the principles must be based on the outcomes of the Bushland Assessment, Rangeland Assessment or Scattered tree assessment.

For information on how to make a full assessment of *variance* against the Principles of Clearance, see the Guide for Applications to Clear Native Vegetation.

***Table to be finalised*

Principle of clearance	Relevant information	Assessment against the principles	Moderating factors that may be considered by the NVC
Principle 1b - significance as a habitat for wildlife	Provide details of the threatened species that were recorded or may use the vegetation. Patches; Threatened Fauna Score Unit biodiversity Score Trees; Fauna Habitat Score Biodiversity Score	Seriously at Variance - List vegetation Associations & trees; At Variance – - List vegetation Associations & trees;	
Principle 1c - plants of a rare, vulnerable or endangered species	List threatened species that were recorded for the site or that may be present but undetectable at the time of assessment (e.g. orchids) Threatened Flora Score(s)	Seriously at Variance - List vegetation Associations & trees; At Variance – - List vegetation Associations & trees;	
Principle 1d - the vegetation comprises the whole or part of a plant community that is Rare, Vulnerable or endangered:	Identify any threatened communities under the EPBC Act or threatened ecosystems under the DEW Provisional list of threatened ecosystems present? Threatened Community Score	Seriously at Variance - List vegetation Associations;	

4.6 Risk Assessment

Determine the level of risk associated with the application

Total clearance	No. of trees	0
	Area (ha)	23.39
	Total biodiversity Score	866.91
Seriously at variance with principle 1(b), 1(c) or 1 (d)		**1 (a), 1(b), 1(c) and 1(d)**
Risk assessment outcome		**4**

4.7 NVC Guidelines

Provide any other information that demonstrates that the clearance complies with any relevant NVC guidelines related to the activity.

If applicable

5. Clearance summary

Clearance Area(s) Summary table

Marine intake and outfall pump station (MIPs), Saline Waste/Seawater Transfer Pipelines (Marine)

Bushland assessment

Block	Site	Native species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
A	6a	18	1	0.04	0.08	39.84	0.0034	0.14	1			0.14	$97.43	$5.36
A	WW1	24	1	0.04	0.08	58.59	0.8641	50.63	1			53.16	$36,416.97	$2,002.93
A	WW4	24	1.1	0.04	0.1	79.55	0.0661	5.26	1			5.52	$3,782.32	$208.03
A	WW5	22	1.1	0.04	0.1	79.84	0.0053	0.42	1			0.44	$304.38	$16.74
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
Insert additional rows into the table as required.						**Total**	**0.9389**	**56.444482**				**59.27**		

Totals summary table (MIPS)

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	56.44	59.27	$40,601.10		

Risk level Level 2, 3 or 4	4

Principle	Seriously at variance	Vegetation Assocation	Trees
a - Plant species diversity	Yes	AWW4, AWW5	
b - Wildlife habitat	Yes	AWW1, AWW4,	
c - Rare plant species			
d - Rare plant communities	Yes	AWW4, AWW5	
e - Remnancy			
f - Wetland			

At variance	Vegetation Assocation	Trees
Yes	A6a	
Yes	AWW4, AWW5	
Yes	All	

Economies of Scale Factor	0.5
Rainfall (mm)	459

Reverse Osmosis Desalination Plant (Plant):

Bushland assessment

Block	Site	Native species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
A	1	24	1.1	0.08	0.1	82.22	1.7615	144.83	1			152.07	$104,178.10	$5,729.80
A	2	24	1.1	0.08	0.1	77.95	0.9988	77.86	1			81.75	$56,002.96	$3,080.16
A	3	28	1.1	0.08	0.1	86.45	0.493	42.62	1			44.75	$30,656.90	$1,686.13
A	4	26	1	0.04	0.1	79.72	0.3353	26.73	1			28.07	$19,227.25	$1,057.50
A	6	18	1	0.04	0.08	45.77	0.6391	29.25	1			30.71	$21,040.98	$1,157.25
A	6a	18	1	0.04	0.08	39.84	0.7339	29.24	1			30.70	$21,031.61	$1,156.74
A	7	20	1	0.04	0.08	42.97	0.2508	10.78	1			11.32	$7,751.92	$426.36
A	8	18	1	0.04	0.08	38.26	0.0182	0.70	1			0.73	$500.88	$27.55
								0.00				0.00	$0.00	$0.00
Insert additional rows into the table as required.						**Total**	**5.2306**	**362.00035**				**380.10**		

Block	Site	Native species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
A	RC4	24	1	0.04	0.1	72.17	0.0021	0.15	1			0.16	$109.02	$6.00
A	WW1	24	1	0.04	0.08	58.59	0.0605	3.54	1			3.72	$2,549.74	$140.24
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
Insert additional rows into the table as required.						**Total**	**0.0626**	**3.696252**				**3.88**		

Totals summary table (Plant)

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	365.7	383.98			

Economies of Scale Factor	0.5
Rainfall (mm)	459

Risk level Level 2, 3 or 4	4

Principle	Seriously at variance	Vegetation Assocation	Trees
a - Plant species diversity	Yes	A1, A2, A3, A4	
b - Wildlife habitat	Yes	A4, A6, A6a, A7, A8	
c - Rare plant species			
d - Rare plant communities	Yes	A1, A2, A3	
e - Remnancy			
f - Wetland			

At variance	Vegetation Assocation	Trees
Yes	A6, A6a, A7, A8	
Yes	A4, A6, A6a, A7, A8	
Yes	All	

Principle	Seriously at variance	Vegetation Assocation	Trees
a - Plant species diversity	Yes	ARC4, AWW1	
b - Wildlife habitat	Yes	ARC4, AWW1	
c - Rare plant species			
d - Rare plant communities			
e - Remnancy			
f - Wetland			

At variance	Vegetation Assocation	Trees
Yes	ARC4, AWW1	

Desalinated Water Transfer Pipeline and SAPN Powerline (Transfer)

Bushland assessment

Block	Site	Native species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
A	7	20	1	0.04	0.08	42.97	0.0737	3.17	1			3.33	$2,317.68	$127.47
A	RC1	16	1	0	0.08	56.22	0.1816	10.21	1			10.72	$7,471.83	$410.95
A	RC2	26	1.1	0.08	0.1	90.16	1.4899	134.33	1			141.05	$98,308.61	$5,406.97
A	RC3	24	1	0.08	0.1	80.54	1.4026	112.97	1			118.61	$82,673.43	$4,547.04
A	RC4	24	1	0.04	0.1	72.17	0.0381	2.75	1			2.89	$2,012.34	$110.68
A	RC6	26	1.1	0.08	0.1	70.48	0.1384	9.75	1			10.24	$7,138.76	$392.63
A	RC7	30	1	0	0.1	72.31	0.7567	54.72	1			57.45	$40,044.48	$2,202.45
A	RC8	6	1	0	0	6.61	1.1833	7.82	1			8.21	$5,724.23	$314.83
A	8	18	1	0.04	0.08	38.26	0.003	0.11	1			0.12	$84.00	$4.62
Insert additional rows into the table as required.						**Total**	**5.2673**	**335.82871**				**352.62**		

Block	Site	Native species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
								0.00				0.00	$0.00	$0.00
A	RC10	22	1	0	0.04	49.89	0.4364	21.77	1			22.86	$15,933.78	$876.36
A	RC11	14	1	0	0	18.01	0.1977	3.56	1			3.74	$2,605.80	$143.32
A	RC12	22	1	0	0.06	47.64	0.0746	3.55	1			3.73	$2,600.94	$143.05
A	RC13	20	1	0	0.04	52.62	0.1347	7.09	1			7.44	$5,187.27	$285.30
A	RC14	18	1	0	0.04	42.67	0.1013	4.32	1			4.54	$3,163.39	$173.99
A	RC15	8	1	0	0.06	20.18	0.1465	2.96	1			3.10	$2,163.61	$119.00
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
Insert additional rows into the table as required.						**Total**	**1.0912**	**43.253272**				**45.42**		

Block	Site	Native species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
B	TR1	30	1	0.08	0.1	89.2	0.1615	14.41	1			15.13	$12,664.96	$696.57
B	TR2	30	1	0.04	0.08	59.55	0.5117	30.47	1			32.00	$26,789.44	$1,473.42
B	TR3	16	1	0.04	0.1	48.58	0.3617	17.57	1			18.45	$15,448.01	$849.64
B	TR4	14	1	0.04	0	19.52	0.1658	3.24	1			3.40	$2,845.32	$156.49
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
								0.00				0.00	$0.00	$0.00
Insert additional rows into the table as required.						**Total**	**1.2007**	**65.685337**				**68.97**		

Totals summary table Potable pipelines to Northside Hill Tanks Including SAPN Connection (Transfer)

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	444.77	467.01			

Risk level Level 2, 3 or 4	4

Principle	Seriously at variance	Vegetation Assocation	Trees
a - Plant species diversity	Yes	ARC3, ARC4,	
b - Wildlife habitat	Yes	ARC2, ARC3,	
c - Rare plant species			
d - Rare plant communities	Yes	ARC2, ARC6	
e - Remnancy			
f - Wetland			

At variance	Vegetation Assocation	Trees
Yes	A7, ARC1, A8	
Yes	ARC3, ARC4, ARC6, A8	
Yes	All	

Principle	Seriously at variance	Vegetation Assocation	Trees
a - Plant species diversity	Yes	ARC10, ARC12	
b - Wildlife habitat	Yes	ARC13, ARC15	
c - Rare plant species			
d - Rare plant communities			
e - Remnancy			
f - Wetland			

At variance	Vegetation Assocation	Trees
Yes	ARC11, ARC13, ARC14	
Yes	ARC10, ARC14	
Yes	All	

Principle	Seriously at variance	Vegetation Assocation	Trees
a - Plant species diversity	Yes	BTR1, BTR2	
b - Wildlife habitat	Yes	BTR1, BTR2, BTR3	
c - Rare plant species			
d - Rare plant communities			
e - Remnancy			
f - Wetland			

At variance	Vegetation Assocation	Trees
Yes	BTR3, BTR4	
Yes	BTR1, BTR2, BTR3, BTR4	
Yes	All	

Totals summary table (Entire Application)

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	866.91	910.26			

6. Significant Environmental Benefit

A Significant Environmental Benefit (SEB) is required for approval to clear under Division 5 of the *Native Vegetation Regulations 2017*. The NVC must be satisfied that as a result of the loss of vegetation from the clearance that an SEB will result in a positive impact on the environment that is over and above the negative impact of the clearance.

ACHIEVING AN SEB

Indicate how the SEB will be achieved by ticking the appropriate box and providing the associated information:

✓ Establish a new SEB Area on land owned by the proponent.

***SA Water are proposing to complete an on ground offset within the Uley South Basin Reserve. The proposed SEB offset area has very good connectivity with high quality and protected vegetation. Coffin Bay National Park (NP) and two Heritage Agreements lie on the boundary of the Uley South Basin Reserve, approximately 6.5-7.5 km to the north of the site. Rehabilitation and expansion of the Drooping Sheoak woodland community within the proposed offset area will connect good quality coastal mallee vegetation to the south-west with the Gahnia trifida sedgelands in the north-east, creating a corridor for the movement of threatened fauna such as the Eyre Peninsula Southern Emu-wren.*

ON-GROUND SEB

Application Details

Applicant:	SA Water		
Key contact:	Darren Longbottom, Tiani Zollo Semmler		
Landowner:	SA Water		
Site Address:	Charlotte Waterhole Track, Uley South Basin Reserve		
Local Government Area:	DC of Lower Eyre Peninsula	Hundred:	Uley 511200
Title ID:	CT/6028/666	Parcel ID	H511200 S35

6.1 Background

General description of the vegetation, the site and matters of significance

The site is located in the Talia subregion of the Mungerowie IBRA Association.

The Uley South Basin Reserve is one of four Basin Reserves on the lower Eyre Peninsula which form protection zones for a series of underground aquifer basins. The Uley South Basin is located about 27 km west of Port Lincoln, and can be accessed via an unsealed council road off the Flinders Highway or via a tramline corridor or main pipeline road through the Lincoln Underground Basin Reserve. The reserve is approximately 18,595 ha in area. The proposed SEB offset area is located to the south of the Charlotte Waterhole Track in the south-western part of Uley South Basin Reserve (Figure 11). The Basin comprises a large low-lying depression, encompassing Paradise, Charlotte and Caroona Waterholes, and is encircled by undulating rises and hills.

The proposed offset area lies to the south-west of Charlotte Waterhole and extends to the western flank of Caroona Waterhole (Figure 12). Topography within the SEB area rises gently from less than 10m above sea level (a.s.l.) in the saline depressions up to 70 m a.s.l. to the south-west. Soils on these north-east facing slopes consist of shallow highly calcareous sandy loams with limestone rubble over calcrete. There is significant cover of exposed limestone sheets and rocks, with shallow sandy loam in the intervening spaces. Beyond the proposed offset area, the slopes continue to rise to an elevation of 140 m a.s.l. before culminating in a steep south-west facing coastal cliff.

The lowest lying areas (Charlotte Waterhole and Caroona Waterhole) support *Gahnia trifida* sedgelands (State Endangered) and *Melaleuca halmaturorum* shrubland. Vegetation on the lower slopes of the SEB offset area ranges from very open derived herblands/grasslands to open *Leucopogon parviflorus* shrublands. There are some small patches of *Eucalyptus diversifolia* mallee. The area has been historically cleared and there is very little regeneration due to overgrazing, initially by livestock and more recently by kangaroos and the persistence of low numbers of rabbits [1]. Remnant stumps and fallen *A. verticillata* trees are evident throughout and the vegetation is considered to be derived from the Nationally-listed Drooping Sheoak Grassy Woodland community [2]. The shrubby understory on the mid-slopes becomes much denser and more diverse, under a canopy of sparsely scattered *A. verticillata* and some dense patches of introduced *Acacia cyclops*. The steeper north-east facing slopes above the offset area support high quality *E. diversifolia* coastal mallee grading into low coastal shrublands and heathlands on the hind dunes and clifftop.

The area receives an annual average rainfall of 510 mm (1976 to 2005, NatureMaps).

The proposed SEB offset area has very good connectivity with high quality and protected vegetation. Coffin Bay National Park (NP) and two Heritage Agreements (HA870 and HA994) lie on the boundary of the Uley South Basin Reserve, approximately 6.5-7.5 km to the north of the site. Heritage Agreement 1291 is just over 1.1 km south of the site, which together with the adjoining property (HA1493), covers over 3500 ha (Figure 12). The north-eastern section of the Uley South Reserve includes Mungerowie Scrub, a large, uncleared remnant patch of principally mallee scrub which provides faunal linkages from the north to the coastal eco-tones in the south-west (T & M Ecologists, 2019).

Rehabilitation and expansion of the Drooping Sheoak woodland community within the proposed offset area would connect good quality coastal mallee vegetation to the south-west with the *Gahnia trifida* sedgelands in the north-east, creating a corridor for the movement of threatened fauna such as the Eyre Peninsula Southern Emu-wren.

Threatened Ecological Communities

Drooping Sheoak Grassy Woodland on calcrete of the Eyre Yorke Block Bioregion – EPBC Critically Endangered

The *Drooping sheoak grassy woodland on calcrete of the Eyre Yorke Block Bioregion* is listed as a Critically Endangered ecological community under the EPBC Act. The community has declined by approximately 97%, compared with its original pre-European distribution and now occurs mainly within the Talia and Southern Yorke subregions, in the Eyre Yorke Block Bioregion. An indicative distribution of the community is provided in the Appendices. In 2020, approximately 20% of the remaining ecological community occurred in protected reserves or heritage agreement [3].

The ecological community varies from a low to mid height open woodland to open forest structure and is dominated by *Allocasuarina verticillata* (Drooping sheoak). The understorey is typically dominated by grasses and sedges with sparsely scattered shrubs, but can vary from predominantly grassy to predominantly sedges to densely shrubby [4]. Variation in the structure and composition of the woodland occurs in response to local soil properties, rainfall, fire regimes, disturbance and management history [3].

The Conservation Advice for the ecological community [3] lists the following key diagnostic characteristics:

- Distribution limited to the Eyre Yorke Block Bioregion
- Occurs on calcrete substrates (at various depths) or limestone outcrops overlain by calcareous loam and/or sandy loam soils.
- Vegetation structure is typically a sparse woodland to open forest with at least 10% solid crown cover and of low height (4–10m).
- Canopy is dominated by *Allocasuarina verticillata* with other tree species such as *Callitris gracilis* (Southern Cypress-pine), *Eucalyptus diversifolia* (Coastal White Mallee), *E. porosa* (Mallee Box) or *Melaleuca lanceolata* (Dryland Tea-tree) potentially present but not dominant across a patch.
- The understorey typically varies from absent to sparse and scattered. A denser understorey may occur, for instance representing a transient state after disturbance and transitioning to a more typical open understorey over time.
    - The ground layer ranges from a sparse to thick layer of perennial native grasses, other graminoids, sedges, ferns, geophytes, other forbs and shrubs and is typically dominated by one or more of the graminoid genera: *Austrostipa* (Spear-grasses), *Chorizandra* (Bristle rushes), *Gahnia* (Saw-sedges), *Lepidosperma* (Sword Sedges), *Lomandra* (Mat Rushes), *Rytidosperma* (Wallaby Grasses) and *Themeda* (Kangaroo Grass).
    - There can be a range of low shrubs present such as: *Acacia spinescens* (Spiny Wattle), *A. triquetra* (Gold Dust Wattle), *Correa pulchella* (Salmon Correa), *Dodonaea hexandra* (Horned Hop-bush), *Olearia ramulosa* (Twiggy Daisy-bush), *Prostanthera calycina* (West Coast Mintbush) and *Scaevola albida* (White Fan-flower). Chenopods such as *Enchylaena tomentosa* (Ruby Saltbush), *Rhagodia candolleana* (Sea-berry Saltbush) and *Rhagodia crassifolia* (Fleshy Saltbush) can also occur in some patches.
    - On the Eyre Peninsula, taller shrubs can include: *Acacia anceps* (West Coast Wattle), *A. brachybotrya* (Grey mulga), *A. cupularis* (Coastal Umbrella Bush), *Dodonaea baueri* (Crinkled Hop Bush), *D. viscosa* subsp. *spatulata* (Sticky Hop-bush), *Eremophila alternifolia* (Narrow-leaf Emubush), *Leucopogon parviflorus* (Coastal beard-heath) and *Olearia axillaris* (Coast Daisy-bush). The conservation advice provides a more comprehensive list of flora species that characterise the ecological community.
- The ecological community is not present if the substrate is dominated by buckshot soils, or comprises a dense understorey of coastal shrubs (e.g. *Leucopogon parviflorus*, *Olearia axillaris*) with coastal understorey species (e.g. *Lepidosperma gladiatum*) where the substrate is dominated by sand.

A key threatening process highlighted in the Conservation Advice is the removal of native grasses and herbs over many decades of heavy grazing, resulting in the loss of shallow topsoils and leaving large areas of exposed limestone. The Conservation Advice also states that derived native grasslands, or areas lacking canopy cover and/or tree regrowth are not considered part of this ecological community, unless they represent a small gap in, or are on the edge of a larger patch of the woodland. Restored (including reconstructed) sites or areas of regrowth are part of the listed ecological community as long as the patch meets the key diagnostic characteristics [3].

The site visit identified patches of *A. verticillata* woodland to the north of the proposed SEB offset area, which meet the criteria listed above and may be considered as Benchmark or Reference communities to guide and inform restoration programs. These woodlands are characterised by a canopy dominated by *A. verticillata* with occasional *E. diversifolia* and *M. lanceolata* over a sparse to moderately dense shrub layer comprising species typically found in the nationally-listed ecological community (e.g. *Lasiopetalum discolor, Leucopogon parviflorus, Pimelea serpyllifolia, Acacia cupularis, Acrotriche patula,, Olearia axillaris, Pomaderris paniculosa, Exocarpos aphyllus, Dianella brevicaulis, Bursaria spinosa, Pittosporum angustifolium* and *Beyeria lechenaultii*. Native grasses such as *Austrostipa spp.* and *Rytidosperma spp*. are present but are not a dominant component of the groundlayer.

<u>*Gahnia trifida* Sedgeland in drainage lines and depressions (Endangered in South Australia)</u>

The *Gahnia trifida* sedgelands found in Charlotte Waterhole and Caroona Waterhole are listed as Endangered in South Australia's Provisional List of Threatened Ecosystems [5]. The sedgelands occur in the lowest parts of the Uley South Basin, tolerating periods of inundation to shallow depths and often relying on the presence of shallow groundwater. This threatened ecological community abuts the proposed SEB offset area to the north-east and east.

The sedgelands are highly dependent on maintenance of good hydrology. Changing rainfall patterns have lowered the groundwater table over the last three decades leaving significant areas of the community more susceptible to the detrimental impacts of weed invasion, overgrazing and the encroachment of terrestrial native species [2]. These changes have reduced the cover of native sedges and changed the structure of the sedgelands [6].

Information relating to the relevant land

Uley South basin is a critical water resource, contributing approximately 70 percent of public water supply for our customers on Eyre Peninsula. Uley South will continue to play an important role in supplying water to customers even after the EP desalination plant is commissioned.

With this in mind, SA Water's, water security team have assessed the SEB offset proposal and are supportive of an SEB offset at Uley South, noting that:

- topography rises towards the coast such that depth to groundwater drops rapidly with proximity to the coastline. Depth to groundwater is expected to be >10 m in the revegetation area.
- it is understood that Sheoaks are relatively shallow rooted and unlikely to intercept significant volumes of surface water/groundwater
- revegetation with native Sheoak woodland will help displace Aleppo pines (which may be linked to reduced recharge rates)
- the area identified for the SEB offset is downgradient of all of SA Water's current production bores
- the area is unlikely to be targeted for future production bores.

As a precaution, SA Water will ensure the eastern boundary of the SEB offset zone be moved away from existing water supply and bore infrastructure (TWS 26), with a buffer of 500m from existing bores and pipeline infrastructure. This will allow sufficient area for future bore drilling activities should bores need to be replaced in the future. The SEB offset area could instead be extended further inland at the western boundary as indicated in the figures below (8-9).

General location map

The proposed offset area is located within the Uley South Basin on the west coast of Lower Eyre Peninsula, 28 km south-west of Port Lincoln and 18 km south of Coffin Bay (Figure 11).

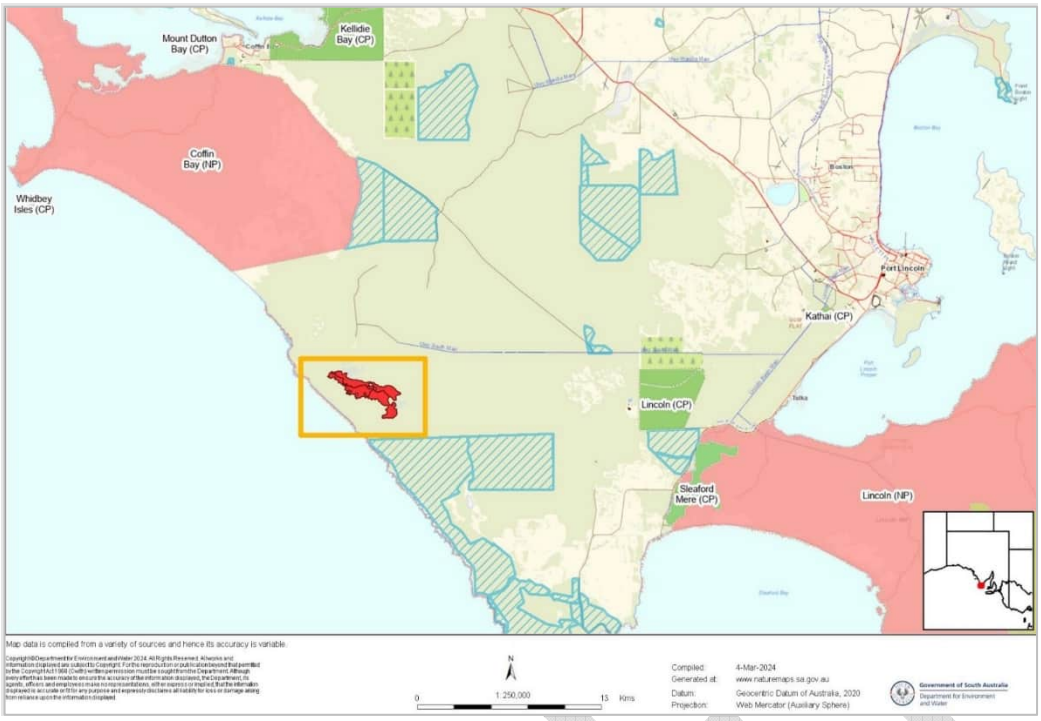


Figure 11. Indicative Site Location (in red).

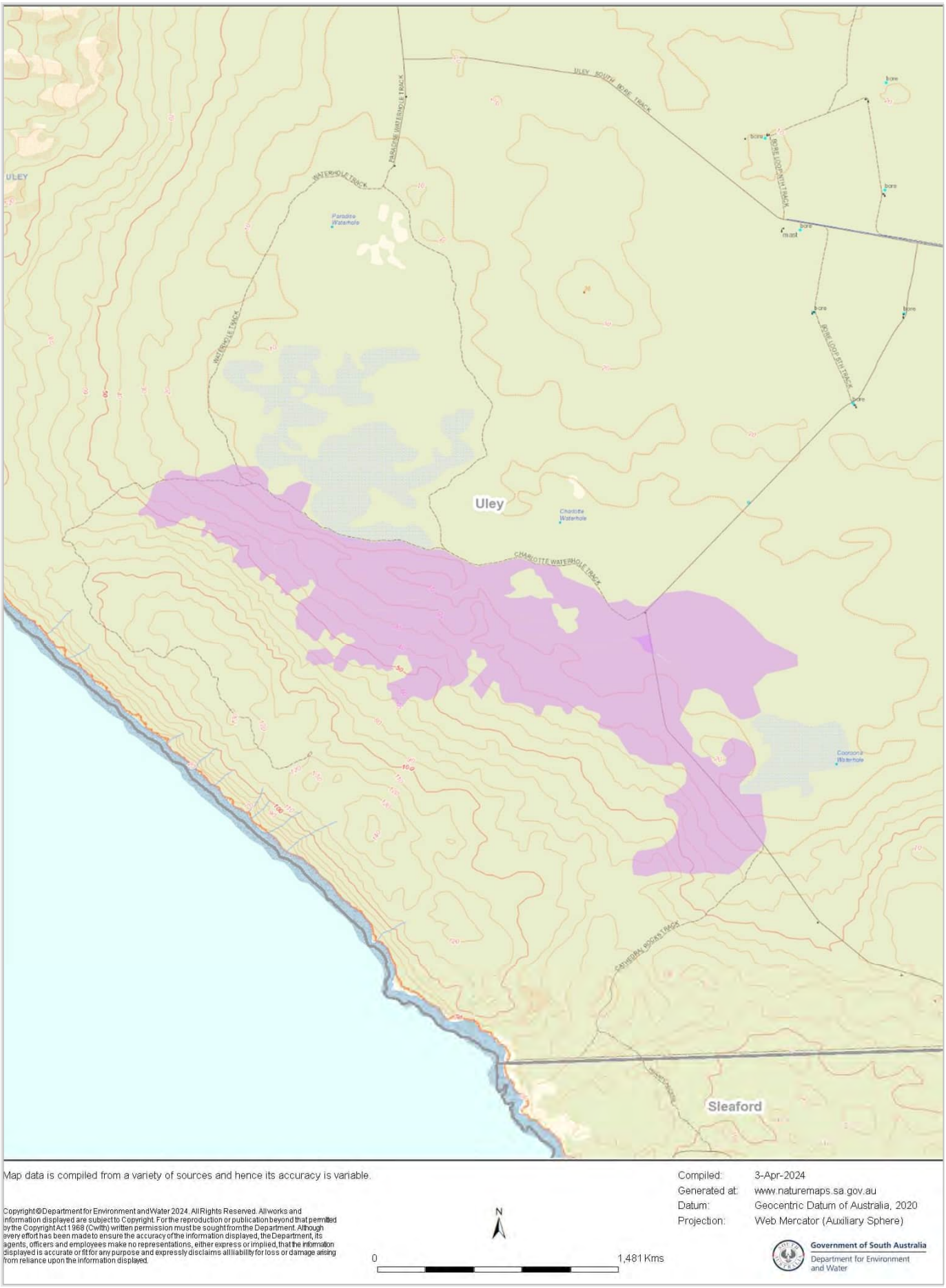


Figure 12. Topographical setting of proposed SEB offset area (in pink)

6.2 Method

Database Searches for Flora and Fauna

A preliminary desk-top review of databases was conducted to identify threatened species and ecological communities prior to the field survey. Records were reviewed for a 5 km search radius centred on the site using NatureMaps, Atlas of Living Australia and the EPBC protected matters search tool (16th November 2023 and 6th March 2024). Records prior to 1995 were excluded. For EPBC Protected Matters, species were only included if they are known to occur, or their habitat is known to occur in the search area. In addition to the database searches detailed above, previous reports prepared for SA Water were examined for records of threatened flora and fauna in proximity to the area of interest.

National Conservation Ratings are in accordance with the most recent *EPBC Act* Listing Status available in the Species Profile and Threats Database. State Conservation Ratings are in accordance with the *National Parks and Wildlife Act 1972*.

Regional conservation ratings were sourced from Gillam, S. and Urban, R. (2009) Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments, West Region. Department for Environment and Heritage, South Australia.

Flora assessment

SEB Offset opportunities were assessed by Ecological Associates and Darren Longbottom of SA Water from the 20th to 22nd November 2023. Sites were investigated in the Uley Wanilla, Uley South and Lincon Basin Reserves.

The investigation focused on state and nationally threatened communities to meet the 'like for like, or better' offset requirement. The Nationally Critically Endangered "Drooping Sheoak Grassy Woodland on calcrete of the Eyre Yorke Block Bioregion" was of most interest because this community was once widespread across the Uley Basin. The community was preferentially cleared from 1850-1960 and has been heavily grazed by livestock and rabbits and, more recently, kangaroos.

The site visit identified a potential SEB offsite area within an extensive tract of derived grassland/herbland and shrubland, located between high quality coastal mallee along the south-western coastline and the *Gahnia trifida* sedgelands to the north-east. Benchmark communities that provide a high-quality reference condition for rehabilitation works were also identified.

The offset area was assessed following the vegetation survey methods set out by the Native Vegetation Council (NVC). Plant associations were mapped and classified according to composition and condition. Bushland Assessments were completed for each plant association as prescribed by the Guide for Calculating a Significant Environmental Benefit [7] and the NVC Bushland Assessment Manual [5]. This included recording the plant species present, the vegetation structure, and habitat values offered by the plant community.

Fauna assessment

The suitability of vegetation associations for rare and threatened fauna was assessed based on the known distribution and occurrence of species and their habitat requirements. In addition to the database searches detailed above, reports and management plans prepared for SA Water and various government and non-government organisations were interrogated for records of threatened fauna in proximity to the area of interest. SA Water staff also provided anecdotal observations of threatened fauna observed near the site.

6.3 Assessment Outcomes

6.3.1 Description of the vegetation

The site visit identified several potential offset sites within the Uley South, Uley Wanilla and Lincoln Basins.

Of these, the area in the south-west of Uley South Basin, is considered to provide the greatest offset potential given that:

- rehabilitation would seek to re-establish a Nationally Critically Endangered ecological community, as well as improve the condition of adjacent remnant patches;
- the rehabilitated community would connect high quality coastal vegetation to the west, with a State Endangered sedgeland community to the east;
- the rehabilitated community would provide habitat for threatened fauna such as the EPBC-listed EP Southern Emu-wren, Western Whipbird and Diamond Firetail (detailed below);
- the availability of large areas suitable for the restoration of one ecological community in one general location, offers practical and cost advantages for the implementation of weed control, revegetation works and herbivore management; and,
- expert advice is available from successful Drooping Sheoak Grassy Woodland restoration projects in Coffin Bay NP (EP Landscapes SA Sheoak Grassy Woodland Restoration Programme [8, 9] and on the West Coast of Eyre Peninsula (Wild Eyre Programme) [4].

The proposed offset area comprises four vegetation associations in varying conditions:

US-A2: Derived herbland/grassland, in poor-moderate condition.

US-A3: Derived *Leucopogon parviflorus* very open shrubland on rises and lower slopes, in poor-moderate condition.

US-A4: *Allocasuarina verticillata* very open woodland over *Lasiopetalum discolor, Acrotriche patula* and *Hibbertia devitata* low shrubland, in good condition.

Vegetation associations A1, A2 and A3 all contain fallen and/or dead *A. verticillata* trees and a suite of understory species that are characteristic of the Drooping Sheoak Grassy Woodland threatened ecological community. These derived grasslands/herblands or shrublands are too degraded to meet the criteria of the EPBC-listed community.

Vegetation association A4 supports a highly diverse understory indicative of the Drooping Sheoak Grassy Woodland ecological community but has a very sparse *A. verticillata* canopy with parts that are heavily invaded by **Acacia cyclops*, and no longer meets the criteria of the EPBC-listed Drooping Sheoak Grassy Woodland ecological community.

Several potential benchmark sites were identified to the north and north-west of the proposed offset area. These sites demonstrate a canopy density and community composition consistent with the key diagnostic characteristics for the EPBC-listed Drooping Sheoak Grassy Woodland ecological community (Figure 13). These reference sites could help to guide and set targets for rehabilitation in SEB offset areas.

Figure 13. Potential benchmark community for Drooping Sheoak Grassy Woodland. Photo 9288 facing south at Wpt 433.

6.3.2 Description of the vegetation

Vegetation Association	A2: Very open derived *Vittadenia* spp. and *Asteridea athrixioides* herbland/ *Rytidosperma* spp. grassland

Photo 9304 facing east at Wpt 437 (Latitude -34.787035, Longitude 135.532098)

Photo 9308 facing south-west at Wpt 438 (Latitude -34.781966, Longitude 135.523802)

General description	Plant community A2 is a native herbland/grassland dominated by native grasses (*Austrostipa exilis* (Heath Spear-grass), *Austrostipa scabra ssp. falcata* (Rough Spear-grass), *Rytidosperma caespitosum* (Common Wallaby-grass) and daisies (*Asteridea athrixioides* (Wirewort), *Vittadinia megacephala* (Giant New Holland Daisy) and *V. australasica* (Sticky New Holland Daisy)). It supports a medium diversity of native species including *Pimelea serpyllifolia* (Thyme Riceflower), *Wahlenbergia gracilenta* (Annual Bluebell) and *Acaena echinata* (Sheep's Burr), with patches of *Goodenia radicans* (Shiny Swamp Mat), *Schoenus nitens* (Shiny Bog-rush) and mosses in areas that retain moisture. Shrubs such as *Leucopogon parviflorus* (Coast Beard-heath), *Olearia axillaris* (Coast Daisy-bush) and *Exocarpos syrticola* (Coast Cherry) are very sparse and often heavily grazed. An area of approximately 12 ha at Wpt 437 has unusually deep topsoil with little exposed limestone. Small piles of scattered rocks near the edges indicate that the land was cleared of rocks and trees. The previous landholder has confirmed that the area was subject to historical cropping. Exotic grasses and herbs such as *Vulpia* spp. (Fescue), *Rostraria cristata (*Annual Cat's-tail), *Lysimachia arvensis* (Pimpernel), *Trifolium campestre* (Hop Clover), *Bellardia trixago* (Mediterranean Linseed), *Asphodelus fistulosus* (Onion Weed) and *Carthamus lanatus* (Saffron Thistle) are prominent. There is a small stand of *Eucalyptus gomphocephala* (Tuart Gums) planted as shade trees north of wpt 437. The SA Declared weed *Echium plantagineum* (Salvation Jane) is present as a minor component of the association. Significant patches of *Marrubium vulgare* (Horehound) are found in the north-western part of the community around waypoint 438. Grazing pressure is high with large numbers of kangaroos seen nearby, and there are areas of significant soil disturbance caused by rabbits. The introduced White Italian Snail (*Theba pisana*) is abundant and known to inhibit the recruitment of native plants by feeding on germinating seedlings. The plant association is in poor to moderate condition with a medium diversity of native species, no canopy cover, very high grazing pressure and moderate levels of weed invasion.				
Threatened species or community	<u>Threatened Ecological Communities</u> This derived herbland/grassland does not meet the criteria of the nationally-listed *Drooping Sheoak Grassy Woodland on calcrete of the Eyre Yorke Block Bioregion.* <u>Threatened Flora</u> No threatened flora were recorded in the vegetation association. <u>Threatened Fauna</u> The plant community may provide resources for three threatened fauna species: - Diamond Firetail (EPBC Vulnerable) - Heath Goanna (SA Vulnerable) - Peregrine Falcon (SA Rare)				
Landscape context score	1.03	Vegetation Condition Score	27.23	Conservation significance score	1.08
Gain Score	5.92	Area (ha)		SEB Points of Gain	

Vegetation Association	A3: Derived *Leucopogon parviflorus* open shrubland on rises and lower slopes

Photo 9323 facing west at Wpt 442 (Latitude -34.786964, Longitude 135.540067)

Photo 9309 facing north at Wpt 438 (Latitude -34.781966, Longitude 135.523802)

General description	Plant community A3 is a regenerating shrubland which occupies the areas between the highly degraded open grassland/herblands and the east facing slopes of coastal woodland vegetation. Is characterised by a very open to mid-open shrubland dominated by ***Leucopogon parviflorus***, *Acacia longifolia* var. *sophorae* and *Exocarpos syrticola* over a herbland of native daisies, native grasses and mosses, with exotic annual grasses and herbs. Sheoak stumps and fallen trunks are widespread, indicating that the community was once an ***Allocasuarina verticillata*** woodland. Exposed limestone outcrops are prominent. Shrub cover varies from quite sparse in the north-western parts to moderately dense in the south-east. The vegetation association has a medium diversity of native species which includes several regenerating shrub species (***Pittosporum angustifolium*** (Native Apricot), ***Olearia axillaris***, ***Melaleuca lanceolata*** (Dryland Tea-tree), ***Pimelea serpyllifolia, Rhagodia candolleana*** (Sea-berry Saltbush), *Acrotriche patula* (Prickly Ground-berry), ***Lasiopetalum discolor*** (Coast Velvet-bush) and ***Dodonaea viscosa subsp. spatulata*** (Sticky Hop-bush). The community also supports a variety of other native lifeforms such as vines (***Clematis microphylla***), lilies (***Bulbine semibarbata*** (Small Leek-lily)), sedges (*Gahnia deusta* (Limestone Saw-sedge), ***Gahnia lanigera*** (Black Grass Saw-sedge), forbs (***Asteridea athrixioides, Vittadinia australasica,*** *Dichondra repens* (Kidney Weed)), grasses (*Austrostipa exilis, Rytidosperma caespitosum*) and mosses. Prominent introduced species include *Lagurus ovatus* (Hair's Tail Grass), Fescue, Onion Weed, Mediterranean Linseed, Hop Clover and *Melilotus indicus* (King Island Melilot). High risk weeds present in parts of the community include **Acacia cyclops* (Western Coast Wattle- recorded as *A. longifolia ssp. longifolia* in scoresheet), Horehound, *Senecio pterophorus* (African Daisy), *Echium plantagineum* (Salvation Jane), *Asparagus asparagoides* (Bridal Creeper) and *Dittrichia graveolens* (Stinkweed). Some of these were outside the survey quadrat and do not appear on the scoresheet. Grazing pressure is high with large numbers of kangaroos observed in the area and there is significant soil disturbance by rabbits. The introduced White Snail is abundant throughout the community. The plant association is in moderate condition with a medium diversity of native species, little tree canopy, very high grazing pressure and moderate levels of weed invasion.				
Threatened species or community	<u>Threatened Ecological Communities</u> This derived shrubland lacks a dominant Drooping Sheoak canopy and does not meet the criteria for the nationally-listed *Drooping Sheoak Grassy Woodland on calcrete of the Eyre Yorke Block Bioregion.* However, several flora species characteristic of the ecological community were recorded (indicated in bold above). This derived herbland/grassland does not meet the criteria of the nationally-listed *Drooping Sheoak Grassy Woodland on calcrete of the Eyre Yorke Block Bioregion.* However, several flora species characteristic of the ecological community were recorded (indicated in bold above). <u>Threatened Flora</u> No threatened flora were recorded in the vegetation association. <u>Threatened Fauna</u> The plant community may provide resources for three threatened fauna species: - Diamond Firetail (EPBC Vulnerable) - Heath Goanna (SA Vulnerable) - Peregrine Falcon (SA Rare)				
Landscape context score	1.03	Vegetation Condition Score	43.44	Conservation significance score	1.08
Gain Score	6.24	Area (ha)		SEB Points of Gain	

Vegetation Association	A4: *Allocasuarina verticillata* very open woodland over *Lasiopetalum discolor, Acrotriche patula* and *Hibbertia devitata* low shrubland

Photo 9333 facing north at Wpt 445 (Latitude -34.789431, Longitude 135.530189)

Photo 9314 facing north at Wpt 439 (Latitude -34.784794, Longitude 135.522079)

General description	Plant community A4 occurs on calcareous soils of the east-facing mid-slopes above the derived shrubland and herbland communities. Varying age classes of ***Allocasuarina verticillata*** occur mostly as sparsely scattered trees, although there are some small stands where the species becomes more dense, particularly in the north-western parts. Large fallen trunks and logs indicate that the canopy layer was once dominated by *Allocasuarina verticillata*. The introduced *Acacia cyclops* (listed as *Acacia longifolia ssp. longifolia* in the BAM scoresheet) now forms the dominant canopy layer in some areas. The low shrub layer comprises ***Lasiopetalum discolor***, ***Olearia axillaris,*** *Hibbertia devitata* (Smooth Guinea-flower), ***Leucopogon parviflorus*** and ***Acrotriche patula*** with dense patches of ***Gahnia lanigera***. Calcrete rocks are present on the soil surface and interspersed with the vegetation. Native species diversity is high and comprises a suite of other species that are characteristic of the EPBC-listed *Drooping Sheoak Grassy Woodland on calcrete of the Eyre Yorke Block Bioregion* community (e.g. ***Pittosporum angustifolium, E. diversifolia, Pimelea serpyllifolia, Acacia cupularis*** (Cup Wattle**), *A. triquetra*** (Mallee Wreath Wattle), ***A. spinescens*** (Spiny Wattle), ***Pomaderris paniculosa*** (Coast Pomaderris), ***Clematis microphylla, Dianella brevicaulis, Asteridea athrixioides, Austrostipa* spp**. and ***Rytidosperma* spp**.). The most dominant weed, *Acacia cyclops* (recorded as *A. longifolia ssp. longifolia* in scoresheet), is the subject of SA Water's ongoing weed management program across the basin. Non-native grasses and herbs are a minor component of the ground layer. Grazing pressure is generally less than on the lower slopes but remains high in more open areas. The vegetation association is generally in good condition with a high diversity of native species, low to moderate cover of canopy and fallen timber and low levels of weed invasion outside of **A. cyclops* patches.
Threatened species or community	<u>Threatened Ecological Communities</u> *To be determined.* The highly diverse understory supports numerous flora species characteristic of the threatened ecological community (indicated in bold above), and the community could be restored through the management of pest plants and grazing pressure. <u>Threatened Flora</u> One threatened flora species was recorded: - *Thysanotus nudicaulis* (a Fringe-lily), (SA Endangered) <u>Threatened Fauna</u> The plant community may provide resources for seven threatened fauna species: - EP Southern Emuwren (EPBC Endangered) - White-bellied Whipbird (EPBC Endangered) - Diamond Firetail (EPBC Vulnerable) - Heath Goanna (SA Vulnerable) - Yellow-tailed Black Cockatoo (SA Vulnerable) - Peregrine Falcon (SA Rare) - Rock Parrot (SA Rare) 

Landscape context score	1.03	Vegetation Condition Score	58.20	Conservation significance score	1.22
Gain Score	5.5	Area (ha)		SEB Points of Gain	

6.3.3 Site map showing areas of the proposed SEB

The site map must ***clearly delineate each vegetation association*** this must be able to be cross referenced with the descriptions provided above.

- Area not finalised.

6.3.4 Photo log

Provide a series of photos of the area of the proposed SEB with location and direction of the photo recorded, marked on a map.

- To be finalised

6.3.5 Fauna and Flora assessment

Threatened Fauna

Three Nationally-listed fauna species have been recorded within 5 km of the site:

- Eyre Peninsula Southern Emu-wren (EPBC Endangered)
- Mallee Whipbird (EPBC Endangered)
- The Diamond Firetail (EPBC Vulnerable)

Eyre Peninsula Southern Emu-wren (EPBC Endangered)

The Eyre Peninsula Southern Emu-wren, *Stipiturus malachurus parimeda,* was listed as Endangered under the EPBC Act in July 2023. The subspecies is found only on the southern tip of Eyre Peninsula, and most recent surveys (2023) indicate that their previous (2002) extent of occupancy has been reduced from eleven to nine isolated subpopulations [6]. The estimated number of mature individuals was 750 (based on 2002 surveys), with an observed and inferred continuing decline [10, 6].

The EP Southern Emu-wren (EPSEW) utilises shrubland, mallee, samphire and sedgeland habitats with one or two layers of dense understorey. Vegetation structure appears to be a more important habitat component than floristic composition, as dense layers of vegetation provide shelter and a higher abundance of insects [10].

Shrubland habitats include wet and dry heathlands, usually dominated by one or two major plant species such as *Melaleuca brevifolia, M. decussata* and *M. lanceolata*. Coastal shrubland species such as *Leucopogon parviflorus, Alyxia buxifolia, Lasiopetalum discolor, Acrotriche patula* and *Beyeria lechenaultii* may also be prominent. Mallee habitats are typically dominated by *E. diversifolia and E. incrassata*, over a dense layer of low heathy shrubs and sedges. Sedgeland habitats occupied by the EPSEW are located around seasonal swamps in coastal regions and are characterised by a dense (>90%) cover of *Gahnia* species, often with dense understorey of sedges and rushes [6, 11].

Southern Emu-wrens are not strong flyers, and when coupled with their need for dense cover, they are considered to be poor dispersers. Habitat loss, degradation and fragmentation are regarded as the main threats to the EPSEW [10]. Even vegetation communities with a continuous canopy layer but degraded (thinned) understory become a barrier for movement. This makes them particularly vulnerable to genetic isolation and catastrophic events such as fire [6].

The subspecies' Conservation Advice lists the following habitats as critical to their survival:

- All known sites where the subspecies occurs;
- Specific habitat types that may be potential habitat for the subspecies; and
- Surrounding matrix of these areas for providing corridors for dispersal between suitable habitat patches.

The proposed SEB offset area lies within one of five subpopulations identified as critical for the long-term survival and recovery of the subspecies. Being one of the largest, this subpopulation (Shoal Point – D'Anville Bay – Whalers Way – Fishery Bay) is likely a major source for regional dispersal in the Sleaford and Uley Basin district [10]. Targeted surveys conducted in 2002 and 2006 found EPSEW in the *Gahnia trifida* sedgeland of Paradise - Charlotte Waterholes and in low *E. diversifolia* coastal mallee west of the proposed offset area [11, 12]. A recent survey (August 2023) recorded emu-wrens in the low coastal mallee site, but did not detect the species in the sedgelands [6]. The species has also been recorded in coastal habitats south of the SA Water Reserve boundary, approximately 1.5 km south of the proposed offset area (Figure 14).

Within the Uley South Basin, both the low *E. diversifolia* coastal mallee south-west of the proposed offset area, and the *Gahnia trifida* sedgelands, provide critical habitat for the EPSEW. It is possible that some areas of Vegetation Association A4 with dense understory could also provide suitable habitat for the Southern Emu-wren. Although the remainder of the proposed offset area is unlikely to support the species in its current state, management actions are expected to improve adjacent critical habitats (through weed management and the reduction of grazing pressure) and would create linkage habitat by incorporating restoration areas with dense understory.

Mallee Whipbird (EPBC Endangered)

The Mallee Whipbird, *Psophodes leucagaster leucogaster,* (also known as the White-bellied Whipbird or Western Whipbird) was uplisted from Vulnerable to Endangered under the EPBC Act in December 2023. The subspecies occurs in four subpopulations: one on each of Yorke and Eyre Peninsulas, one from the Murray mallee in South Australia and one from the Mallee region in Victoria (although the Murray mallee subpopulation may now be locally extinct). On the Eyre Peninsula it is found from Lincoln NP to Coffin Bay NP, including private land throughout Whalers Way. The species' Conservation Advice estimates approximately 1575 mature individuals, with around 80% occurring in the Eyre Peninsula subpopulation [13].

The Mallee Whipbird inhabits mallee scrub on sandy flats, dunes or limestone, with an overstorey of mallee eucalypts including *Eucalyptus incrassata, E. socialis, E. leptophylla* and *E. diversifolia*, and a dense species-rich understory comprising shrubs such as *Melaleuca lanceolata, M. uncinata, Baeckia behrii, Callitris verrucosa, Allocasuarina* spp*., Hakea muelleriana, Leptospermum coriaceum,* and *Triodia* spp. It is also found in *Acacia* thickets. As for the EP Southern Emu-wren, vegetation structure appears to be a more important determinant of habitat selection than floristic composition [13]. The subspecies prefers a dense shrubby understorey 1.5–2 m tall below an open 2–5 m tall mallee eucalypt layer. Although in mallee regions, this is often influenced by post-fire age, the coastline habitat on lower Eyre Peninsula has no recorded fire history suggesting that suitable habitat structure is maintained in the absence of fire in this region [13].

A shy and elusive bird, the Mallee Whipbird dwells mainly on the ground and in low shrubs, feeding on arthropods such as spiders and insects, as well as small skinks. Their nest, comprising of a bowl of twigs, bark and grass, is built approximately 50 cm off the ground in dense shrubs. It is a sedentary bird, with pairs occupying the same home range over many years. Mallee Whipbirds have a restricted dispersal ability, and generally do not travel further than 30 metres over cleared vegetation [13].

There are numerous records of Mallee Whipbird in *E. diversifolia* mallee woodland and in *Leucopogon parviflorus* coastal shrubland approximately 1.5 km south of the proposed offset area, and it is very likely that the species also occupies coastal habitats to the north of the SA Water boundary (Figure 14). A site visit in July 2022 observed and recorded the distinct call of the Mallee Whipbird in coastal shrubland south of Shoal Point, less than a kilometer to the west of the proposed offset area [14]. It is possible that some areas of Vegetation Association A4 with dense understory could also provide suitable habitat for the Mallee Whipbird. The remainder of the proposed offset area is unlikely to support the species in its current state, however management actions are expected to improve adjacent critical habitat and may expand available habitat by incorporating restoration areas with dense understory.

The Diamond Firetail (EPBC Vulnerable)

The Diamond Firetail, *Stagonopleura guttata*, was listed as Vulnerable under the *EPBC Act* in March 2023. The species occurs on mainland Australia from south-east Queensland to Eyre Peninsula and up to 300 km inland. In South Australia there are three isolated subpopulations (Eyre Peninsula, Mt Lofty to Southern Flinders Ranges, and the south-east), with few recent records from a fourth on Yorke Peninsula. The species' Conservation Advice estimates a total population size of 136,000 mature individuals, however the reliability of this estimate is low [15].

The species' Conservation Advice identifies habitat critical to their survival as "Eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats, with low tree density, few large logs, and little litter cover but high grass cover for foraging, roosting and breeding". They are found in open forests and other lightly timbered habitats, including farmland and grassland with scattered trees. The Diamond Firetail is listed as a species that is likely to occur in the Drooping Sheoak Grassy Woodland threatened ecological community [3].

Diamond firetails usually occur in flocks of between 5 to 40, and feed mostly on the ground, on seeds of grasses and herbs, as well as on green leaves and insects. It has been noted that in areas where perennial grasses have been replaced by exotic annuals, the species relies heavily on the seeds of *Allocasuarina verticillata* to provide food during the cooler months [15]. Diamond Firetails often build their nests into the base of large stick-nests made by birds of

prey (e.g. Wedge-tailed Eagle Brown Falcon, Nankeen kestrel and White-bellied Sea-eagle) but may also choose dense or prickly shrubs like hakeas and box thorn.

On lower Eyre Peninsula most records of Diamond Firetails are from Lincoln NP, Coffin Bay NP and Sleaford Mere Conservation Park (CP) with no recent observations along the south-western coast between Whalers Way and Coffin Bay (Atlas of Living Australia). However, SA Water staff reported seeing a group of approximately 8 birds in May 2023, foraging on the SA Water Boundary Track just over 1 km south of the proposed offset area (D. Longbottom, pers. comm.) (Figure 14). Given that suitable (open grassland) habitat is already available across much of the proposed offset area, it is feasible that the species may already use the available habitat to some extent. Management actions that improve these habitats (weed reduction, lowered grazing pressure, restoration of grass, shrub and low-density canopy layers) would all help to increase the availability of food and nesting resources (particularly perennial native grasses and *A. verticillata*) for the Diamond Firetail.

Fauna Species listed under the SA National Parks and Wildlife Act 1972

Six species of conservation concern at the State level have been recorded within 5 km of the proposed offset site, since 1995:

- Eastern Osprey (SA Endangered, listed as Migratory and Marine under the EPBC Act)
- White-bellied Sea Eagle (SA Endangered, listed as Marine under the EPBC Act)
- Yellow-tailed Black Cockatoo (SA Vulnerable)
- Heath Monitor (SA Vulnerable)
- Peregrine Falcon (SA Rare)
- Rock Parrot (SA Rare)

Details of the habitat preferences and likelihood of use for vegetation associations within the SEB offset area are provided in Table 3. Locations of sightings for all but the Heath Monitor) are shown in Figure 14.

The Yellow-tailed Black Cockatoo and Heath Monitor are listed as species that that are likely to occur in the Drooping Sheoak Grassy Woodland threatened ecological community [3]. Improvement and restoration of habitat within the offset area is likely to benefit the Yellow-tailed Black Cockatoo (by increasing food resources, particularly *A. verticillata*), Peregrine Falcon and Heath Monitor.

The Conservation Advice for the Drooping Sheoak Grassy Woodland lists a number of other threatened species that use the ecological community [3]. Several of these have been recorded on lower EP, and may also benefit from restoration of the grassy woodland habitat:

- Blue-winged Parrot (EPBC VU; SA Vulnerable)
- Brown Quail (SA Vulnerable)
- Little Eagle (SA Vulnerable)
- Purple-Gaped Honeyeater (SA Rare)
- Western Three-lined Skink (SA Rare)
- White-Winged Chough (SA Rare)

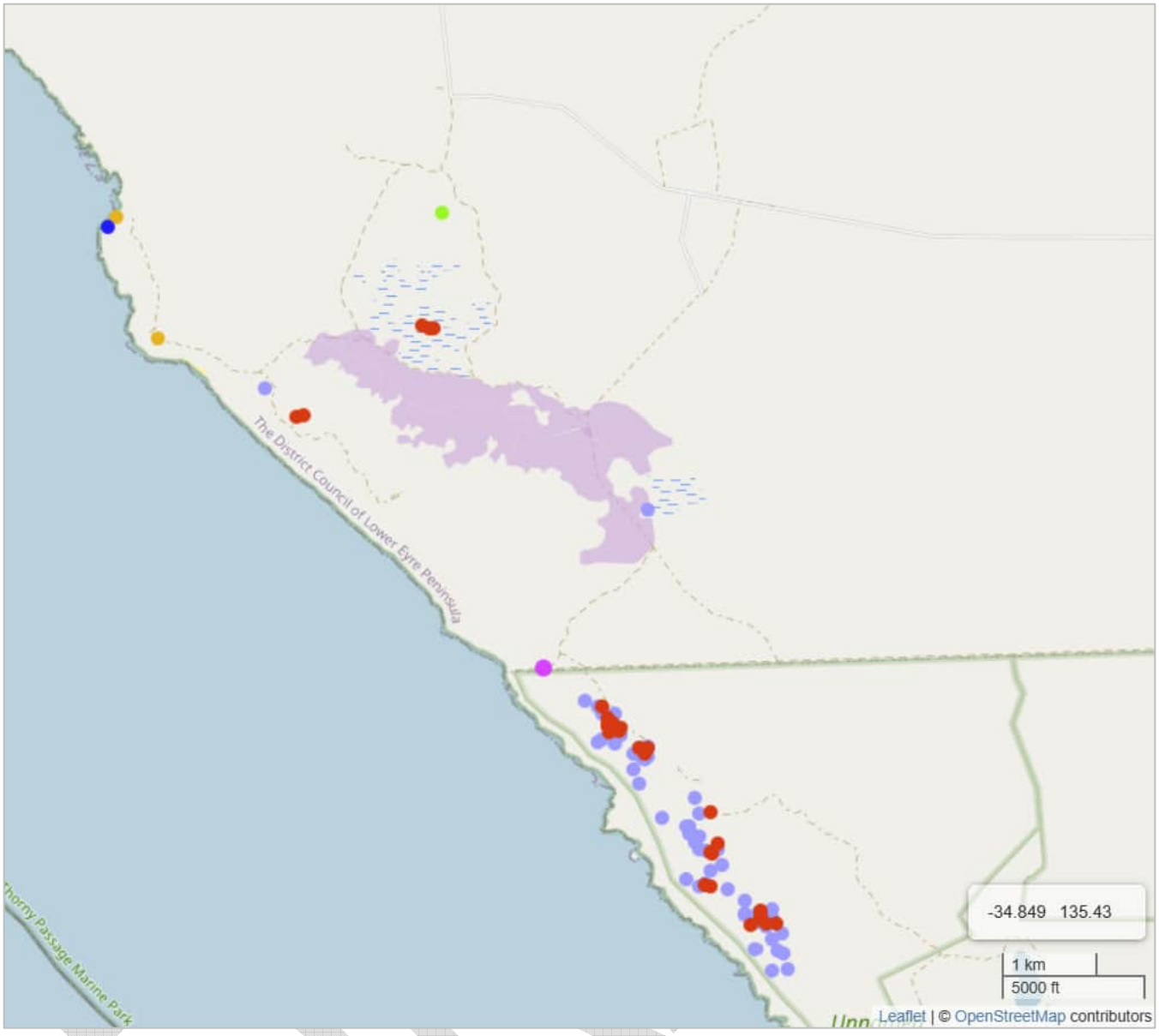


Figure 14. Map of threatened fauna species recorded since 1995 within 5 km of the proposed SEB offset area (shaded in pink). EP Southern Emuwren (red dots), Mallee Whipbird (purple), Diamond Firetail (bright pink), Rock Parrot (orange), Peregrine Falcon (dark blue) and Yellow-tailed Black Cockatoo (green). Note that the higher density of records in private land south of the SA Water Reserve most likely reflects a greater survey effort rather than differences in habitat use.

Threatened Flora

Four State-listed flora species have been recorded within 5 km of the project site since 1995:

- Fringe-lily *Thysanotus nudicaulis* (SA Endangered)
  - Recorded during the site visit in Vegetation Association A4 and in adjacent *E. diversifolia* mallee. Had not been recorded on Lower EP since 1972.
- Port Lincoln Mallee *Eucalyptus conglobata ssp. conglobata* (SA Rare)
  - recorded in 2018 in a stand with *E. diversifolia* ~ 2 km NW of the proposed SEB area [2]
- Snowdrop Spurge *Lysiandra (Phyllanthus) calycina* (SA Rare)
  - Recorded in 2021 on private land ~2.5 km south-east of the proposed offset site, in *E. diversifolia / A. verticillata* mallee over *L. parviflorus* shrubland [16]
- Western Daddy-long-legs *Caladenia bicalliata ssp. bicalliata* (SA Rare)

- found in 2022 in low heathland and in *E. diversifolia* mallee with emergent *A. verticillata*, on private land ~3 km south of the project area [17]

A further two species known to occur in Drooping Sheoak Grassy Woodland, have been recorded on Lower EP:

- Alcock's Wattle *Acacia alcockii* (SA Rare)
  - Restricted to the southern tip of EP, most records are near Pt Lincoln and in Lincoln NP, but there are two observations in coastal vegetation ~7 km south of the proposed offset area. It is often found in shallow soil over limestone and grows in a variety of plant communities, including Sheoak woodland.
- West Coast Mintbush *Prostanthera calycina* (EPBC Vulnerable, SA Vulnerable)
  - Known only from Eyre Peninsula, mostly along the west coast. There is one historic record near Port Lincoln, and one record just south of the Lincoln Basin Reserve. The species is usually found on limestone outcrops in mallee vegetation.

Three of these threatened flora species, *Acacia alcockii*, *Eucalyptus conglobata ssp. conglobata* and *Lysiandra calycina,* are likely to be impacted by the works detailed in the clearance report for the Eyre Peninsula Desalination Plant project.

Depending on habitat suitability, seed availability and propagation requirements, it may be feasible to include some of these threatened flora species as part of the SEB offset revegetation plans.

Table 3. Species observed on site, or recorded within 5km of the application area since 1995, or the vegetation is considered to provide suitable habitat

Species (common name)	EPBC Act	NP&W Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
Stipiturus malachurus parimeda (Eyre Peninsula Southern Emuwren)	EN	E	3,5,6	2023	Found only on the southern tip of Eyre Peninsula, in shrubland, mallee, samphire and sedgeland habitats with a low, dense understorey. They forage on small invertebrates and construct their domed nests in dense vegetation. The species' Conservation Advice [29] lists Shoal Point – D'Anville Bay – Whalers Way as one of five subpopulations critical for the long-term survival and recovery of the subspecies.	Likely. Recorded recently (2023) in low coastal mallee vegetation to the west of the proposed offset area [43]. Also observed using the adjacent *Gahnia trifida* sedgelands in 2006 [48]. Most likely to use Vegetation Association A4, particularly where the understorey is dense. Unlikely to use Associations A1, A2 or A3.
Psophodes leucagaster leucogaster (Mallee Whipbird, White-bellied Whipbird, Western Whipbird)	EN	E	3,5,6	2022	Found in dense mallee scrub on sandy flats, dunes, or limestone, in coastal and inland areas of southern South Australia. The species forages on the ground and in low shrubs for arthropods. As it occupies dense habitat, it is more often heard than seen.	Likely. Recorded recently (July 2022) in coastal shrubland to the west of the proposed offset area. Most likely to use Vegetation Association A4, particularly where the understorey is dense. Unlikely to use Associations A1, A2 or A3.
Zanda funerea whiteae (Yellow-tailed Black Cockatoo)		V	1	2004	Occurs in forests, woodlands, urban areas, particularly eucalypts and pines. Nests in tree hollows. Feed on seeds of native and introduced trees, particularly she-oaks, eucalypts, acacias, banksias, hakeas and pines. They also extract insect larvae from flowering spikes of *Xanthorrhoea* and wood borers in eucalypts and acacias.	Possible. Only one record nearby but suitable foraging habitat is available at the site. Most likely to use Vegetation Association A4. Unlikely to use Associations A1, A2 or A3.
Neophema petrophila (Rock Parrot)		R	1,6	2010	A small grass parrot inhabiting coastal dune areas and rocky islands. Nests in burrows or rocky crevices mostly on offshore islands. Feeds on seeds of grasses, forbs and shrubs. It is seldom seen more than a few hundred metres from the sea.	Unlikely. Recorded along the coastal cliffs near Shoal Point, but the species is unlikely to use mallee and shrubland vegetation further inland.

Species (common name)	EPBC Act	NP&W Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
Falco peregrinus macropus (Peregrine Falcon)		R	1	2009	Found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands and grasslands often near water.	Likely. There is only one record for the species nearby, however suitable nesting habitat is available along the coastal cliffs, and open areas provide foraging opportunities. Likely in all vegetation associations.
Stagonopleura guttata (Diamond Firetail)	VU	V	2,6	2023	Sedentary small finch which inhabits Eucalyptus, Acacia or Allocasuarina woodlands, open forests and other lightly timbered habitats. Prefers areas with relatively low tree density, few large logs, and little litter cover but high grass cover. Feeds on the ground on seeds and insects.	Highly Likely. Recorded near the assessment site by SA Water staff (D. Longbottom pers. comm.). Approximately 8 birds were seen foraging on a fire track in shrubland. Suitable foraging habitat is available in all vegetation associations.
Varanus rosenbergi (Heath Monitor)		V	6	2022	Found in sandy heathland, open woodland or sclerophyll forest. Shelters in hollow logs, rock crevices and in burrows. Uses termite mounds as nesting sites and has a varied diet including birds, eggs, reptiles, small mammals and carrion.	Highly Likely. Recorded by SA Water staff north of the *Gahnia trifida* sedgeland, and south of the offset area along the Eastern Boundary Track. (D. Longbottom pers. comm.). Likely to use all vegetation associations.
Haliaeetus leucogaster (White-bellied Sea Eagle)	Mi/Ma	E	6	2009	White-bellied Sea-Eagles build a large stick nest, which can be located in low coastal trees, cliff-face ledges or rocky. They range around the coast of Eyre Peninsula fishing over the water.	Unlikely. The coastal escarpment is used as a flight path for the species between Coffin Bay and the Lincoln NP [38]. However, the vegetation associations are unlikely to provide important habitat for the species.
Pandion haliaetus cristatus (Eastern Osprey)	Mi/Ma	E	6	2009	This species is mostly found in coastal areas and offshore islands and requires extensive areas of open fresh, brackish or saline water for foraging. As of 2023 there were estimated to be only 50 breeding pairs left in SA, mostly on islands and isolated stretches of coast.	Unlikely. The coastal escarpment is used as a flight path for the species between Coffin Bay and the Lincoln NP [38]. Although a juvenile has been observed perching on a dead *Melaleuca lanceolata* near Charlottes Water Hole, the vegetation associations are unlikely to provide important habitat for the species.

Source; 1- BDBSA, 2 - AoLA, 3 – NatureMaps 4 – Observed/recorded in the field, 5 - Protected matters search tool, 6 – others
NP&W Act; E= Endangered, V = Vulnerable, R= Rare
EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable; Mi/Ma= Migratory/Marine

Criteria for the likelihood of occurrence of species within the Study area.

Likelihood	**Criteria**
Highly Likely/Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is present and falls within the known range of the species distribution or; The species was recorded as part of field surveys.
Likely	Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides habitat or feeding resources for the species.
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area provide limited habitat or feeding resources for the species. Recorded within 20 -40 years, survey effort is considered adequate, habitat and feeding resources present, and species of similar habitat needs have been recorded in the area.
Unlikely	Recorded within the previous 20 years, but the area provide no habitat or feeding resources for the species, including perching, roosting or nesting opportunities, corridor for movement or shelter. Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area. No records despite adequate survey effort.

6.4 Environmental Benefits

Detail the key environmental outcomes and associated benefits that are expected to be provided because of the establishment and management of the SEB area (improved vegetation condition, protecting habitat of threatened species, establishing a population of threatened flora species, etc.).

The NVC will consider this information in association with the SEB Management Plan, when determining if the proposed SEB outweighs the value of retaining the vegetation proposed to be cleared.

6.5 Summary Table

Block	Site	Vegetation Association	UBS	Gain Score	Area (ha)	SEB Point of Gain
				Total		

6.6 SEB Management Plan

The Management Plan for the proposed SEB area is attached in the appendices.

- To be finalised

A Native Vegetation Management Plan is required as part of the Conditions of Consent for clearance.
The Management Plan should be provided at the time of submitting the application to clear vegetation, however it can be lodged during the assessment process if required but must be received before a decision can be made by the Native Vegetation Council in relation to the associated clearance. The Management Plan template is found under Tools for Accredited Consultants.

6.4 References (SEB Offset Section)

[1] Bebbington L, "Flora & Fauna Assessment Site Selection Process Eyre Deslaination Plant, report for South Australian Water Corporation," 2010.

[2] T & M Ecologists, "Uley Wanilla Basin, Uley South Basin, Lincoln Basin and Sleaford Block Land Management Plan. Report prepared for SA Water," 2019.

[3] Department of Agriculture, Water and the Environment, "Conservation Advice for the Drooping sheoak grassy woodland on calcrete of the Eyre Yorke Block Bioregion," 2022.

[4] Berkinshaw, T.D., Durant, M. and Koch, P.J., "WildEyre Conservation Action Planning Report June 2017. Report to the WildEyre Working Group, Greening Australia.," 2017.

[5] Native Vegetation Council, "Bushland Assessment Manual.," Government of South Australia, 2020.

[6] The Nature Conservation Society of South Australia, "Eyre Peninsula Southern Emu-wren Distribution Assessment 2023," South Australia., 2023.

[7] Department for Environment and Water, South Australia, "Guide for Calculating a Significant Environmental Benefit," 2019.

[8] Freeman, A. and Pobke, K, "Macropod management is critical for recovery of Sheoak Grassy Woodlands on Eyre Peninsula, South Australia," Ecological Management and Restoration, 2021.

[9] Peeters P., Gerschwitz T. and Carpenter R., "Restoring Sheoak Grassy Woodlands on Lower Eyre Peninsula. Technical report, Department for Environment and Heritage, Government of South Australia. Unpubl.," 2006.

[10] Department of Climate Change, Energy, the Environment and Water, "Conservation Advice for Stipiturus malachurus parimeda (Eyre Peninsula southern emu-wren). Canberra," 2023.

[11] Pickett, M., "Status Review and Action Plan for the Eyre Peninsula Southern Emu-wren Stipiturus malachurus parimeda. Southern Eyre Birds Inc. and National Parks and Wildlife, South Australia".

[12] Pickett, M., "Habitat Management Guidelines for the Eyre Peninsular Southern Emu-wren. Report prepared for the Department for Environment and Heritage, Port Lincoln.," 2006.

[13] Department of Climate Change, Energy, the Environment and Water, "Conservation Advice for Psophodes leucogaster leucogaster (mallee whipbird). Canberra," 2023.

[14] Ecological Associates, "Ecological assessment of potential Eyre Peninsula desalination plant sites. Ecological Associates report AH058-1-A prepared for SA Water, Adelaide," 2022.

[15] Department of Climate Change, Energy, the Environment and Water, "Conservation Advice for Stagonopleura guttata (diamond firetail)," Canberra, 2023.

[16] Ecological Associates, "Uley South Bore Sites, Native Vegetation Clearance Data Report. Report AH058-1 prepared on behalf of SA Water," 2021.

[17] Ecological Associates , "Uey Bore Sites Native Vegetation Clearance Data Report. Report AH061-1 prepared on behalf of SA Water," 2022.

[18] Native Vegetation Council, "Policy for a Significant Environmental Benefit," Government of South Australia, 2020.

[19] T&M Ecologists, "Eyre Peninsula Desalination Plant Project: Vegetation Survey and Fauna Assessment," T & M Ecologists Report prepared for SA Water, Adelaide, 2021.

7. Appendices

Appendix 1. Fauna Species List (Bird Survey – July 2021)

Appendix 2. Fauna Species List (Fauna survey December 2023)

Appendix 3. Flora of State and National Significance recorded since 1995 within 5 km of the assessment sites.

Appendix 4. Flora Species List

Appendix 5. Bushland Vegetation Assessment Scoresheets associated with the proposed clearance and SEB Area (submitted in Excel format)

Appendix 6. Copies of associated approvals

Appendix 7. Flora Species List (SEB Area)

Appendix 8. SEB Management Plan

Appendix 9. Indicative distribution of the Drooping Sheoak Grassy Woodland ecological community

Appendix 1: Bird Surveys Winter 2021 (T & M Ecologists)

Table A1. Bird species recorded in Fauna Surveys and opportunistically during Field surveys

Species name	Common Name	AUS[6]	SA[7]	EP[8]	Mallee woodlands (Sites 1-4)	Mallee associated with rail corridor (RC2-6)	Saltmarsh (RC9)	Opportune
Pachycephala pectoralis	Australian Golden Whistler			NT		1		
Gymnorhina tibicen	Australian Magpie				1			
Pelecanus conspicillatus	Australian Pelican				FO			1
Corvus coronoides	Australian Raven				1	1		
Barnardius zonarius	Australian Ringneck				1	1		1
Tadorna tadornoides	Australian Shelduck			NT			1	
Cygnus atratus	Black Swan			NT			1	
Elanus axillaris	Black-shouldered Kite			NT				1
Falco berigora	Brown Falcon							FO
Melithreptus brevirostris	Brown-headed Honeyeater				1	1		
Phaps elegans	Brush Bronzewing			RA	1	1		
Hydroprogne caspia	Caspian Tern			RA			FO	
Sternula nereis nereis	Fairy Tern	VU	E	VU			FO	
Cacomantis flabelliformis flabelliformis	Fan-tailed Cuckoo			NT				1
**Columba livia*	Feral Pigeon				1			
Eolophus roseicapilla	Galah				1	1		
Strepera versicolor	Grey Currawong				1	1		
Rhipidura albiscapa	Grey Fantail			NT	1			1
Colluricincla harmonica	Grey Shrikethrush				1	1		
Chalcites basalis	Horsfield's Bronze Cuckoo				1	1		
**Passer domesticus domesticus*	House Sparrow				1			
Grallina cyanoleuca	Magpielark				1			
Falco cenchroides	Nankeen Kestrel				1			1
Phylidonyris novaehollandiae novaehollandiae	New Holland Honeyeater (mainland SA)				1	1		1

6 Australian conservation rating under the *Environment Protection and Biodiversity Conservation Act 1999*

7 South Australian conservation rating under the *National Parks and Wildlife Act 1972*

[8] Gillam, S. and Urban, R. (2009) Regional Species Conservation Assessment Project, Phase 1 Report: Regional Species Status Assessments, West Region. Department for Environment and Heritage, South Australia.

Species name	Common Name	AUS[6]	SA[7]	EP[8]	Mallee woodlands (Sites 1-4)	Mallee associated with rail corridor (RC2-6)	Saltmarsh (RC9)	Opportune
Larus pacificus	Pacific Gull			RA			1	1
Anthochaera carunculata woodwardi	Red Wattlebird (MLR, AP, YP, EP, far west, Yellabinna)				1	1		1
Pachycephala rufiventris rufiventris	Rufous Whistler					1		
Chroicocephalus novaehollandiae novaehollandiae	Silver Gull						1	1
Zosterops lateralis	Silvereye				1	1		1
Gavicalis virescens	Singing Honeyeater				1			
Drymodes brunneopygia	Southern Scrub Robin				1	1		
Acanthagenys rufogularis	Spiny-cheeked Honeyeater				1	1		
Pardalotus punctatus	Spotted Pardalote				1	1		
Pardalotus striatus substriatus	Striated Pardalote				1	1		
Malurus cyaneus leggei	Superb Fairywren (Mainland SA)				1	1		
Circus approximans	Swamp Harrier			RA				FO
Gliciphila melanops	Tawny-crowned Honeyeater				1	1		
Smicrornis brevirostris	Weebill				1	1		
Hirundo neoxena neoxena	Welcome Swallow				FO			
Eopsaltria griseogularis rosinae	Western Yellow Robin				1			
Haliaeetus leucogaster	White-bellied Sea Eagle		E	EN				FO
Pomatostomus superciliosus	White-browed Babbler				1	1		
Sericornis frontalis	White-browed Scrubwren				1	1		
Egretta novaehollandiae	White-faced Heron						1	1
Epthianura albifrons	White-fronted Chat							1
Ardea pacifica	White-necked Heron			NT				1
Rhipidura leucophrys leucophrys	Willie Wagtail				1			
Acanthiza chrysorrhoa	Yellow-rumped Thornbill					1		

Conservation ratings: E = Endangered, VU = Vulnerable, RA = Rare, NT = Near Threatened, LC = Least Concern

1 = noted in vegetation/habitats during field survey, FO = observed as a species flying over the site

Appendix 2: December 2023 Fauna Survey of Port Lincoln Desal Proposed Pipeline Route (David Armstrong)

METHOD

To provide a repeatable systematic approach to monitoring woodland birds along the proposed pipeline route, eight points at approximately 500 metre intervals were selected, five on the old rail line corridor from Billy Lights Point west to the coast on the bay on Greyhound Road, and three along Blue Fin Road on the north eastern side of Kathai Conservation Park.

Each point was visited once on each of four consecutive days (4th -7th December 2023) and all bird species observed or calls were heard over 20-30 minutes, within approximately 100 metres of each point were recorded. Similarly, to monitor the shore birds within the bay south of the racetrack, four locations based on accessibility and observation potential were selected along the shoreline and bird species and numbers present were recorded once on each of the same four days.

Figure A1: locations of systematic survey sites for woodland (WB) and shore birds (SB).

In addition to the systematic site based approach, visits to the sewage works ponds, coast adjacent to Billy Lights Point and the hilltop water tanks site were made and birds and a few other animals present were recorded, as well as "opportunistic" sightings of significant or less commonly encountered species when travelling between fixed survey sites. A night time traverse of the woodland west of Billy Lights Point was undertaken on 6th December, stopping periodically to listen for nocturnal birds, specifically Bush Stone-curlew, owl, frogmouth or nightjar species, but none were heard.

RESULTS

The total number of bird species recorded at sample sites were, 274 records of 33 woodland bird (Appendix 1) and 121 records of 20 shore bird species (Appendix 2). An additional 20 bird, two mammal and one reptile species were recorded opportunistically or at single visits to several specific sites (Appendix 3).

Threat Rated Species

Sixteen conservation rated species were recorded during the survey (Table 1). Many of these were single observations away from designated survey sites. There are existing records in the general area or district for all these species, although they are few in most cases. Of particular interest were four Diamond Firetails which were observed accessing water through a ground level steel grid above a sump a few metres outside the gate to the hilltop water tanks site. There are several past records of Fairy Terns in and around the survey area, including at the bay south of Greyhound Road. However the critical locations for this species are breeding colony sites, which are generally protected at least from terrestrial predators on islands off-shore, in coastal bays or inland saline lakes.

Table A2: Threat rated species recorded during December 2023 survey

Common Name	NPW ACT STATUS	EPBC ACT STATUS	Location
Australian Sea Lion	V	EN	East side of Billy Lights Point
Banded Stilt	V		Pools between Greyhound Rd and bay
Brown Quail	V		Roadside near Billy Lights Point
Common Greenshank		EN	Tidal flats south of the racetrack
Common Sandpiper	R		Billy Lights Point
Diamond Firetail	V	VU	Hilltop tanks site
Eastern Osprey	E		Pools between Greyhound Rd and bay
Fairy Tern	E	VU	Pools between Greyhound Rd and bay
Little Egret	R		Pools between Greyhound Rd and bay & 4 days at shore bird site 3
Pied Oystercatcher	R		3 of 4 shore bird survey sites
Purple-gaped Honeyeater	R		Woodland bird sites 2 (twice), 3 (once) and 4 (twice)
Rock Parrot	R		One bird at shore bird site 3, one at woodland bird site 1, twice (2+1) at Pools between Greyhound Rd and bay
Sharp-tail Sandpiper		VU	Tidal flats south of the racetrack
Shy Heathwren	R		Once at woodland bird site 7
Sooty Oystercatcher	R		3 of 4 shore bird survey sites
White-bellied Sea Eagle	E		Jetty on south side of Billy Lights Point

Waders

Four species of migratory waders were recorded. These were a single Common Sandpiper and a group of seven Red-necked Stints at Billy Lights Point, and a handful of Common Greenshanks and varying numbers of Sharp-tailed Sandpipers on the tidal flats south of the racetrack. Sharp-tailed Sandpipers were present on three of four days, with daily counts varying from 24 to 121. Common Greenshanks were present on all four days with daily counts of six on three days and three on one day. The Common Greenshank and Sharp-tailed Sandpiper were listed as threatened under the EPBC Act in January 2024..

In addition to the two wader species and Australian Sea Lion only recorded at Billy Lights Point, other bird species were only recorded at one of two other locations within the survey area. These included the effluent pond, where small numbers of Pacific Black Duck, Hardhead, Eurasian Coot and Australasian Grebe were seen, as well as over 200 Grey Teal, scarce in the saline bay a few kilometres away where Chestnut Teal dominated. Presumably, all these species prefer the relatively fresh effluent pond water to the nearby sea water or saline bay. The hilltop water tank

site also provided a few species not seen at regular survey sites. These included the Diamond Firetails already mentioned as likely attracted by access to fresh water, Australian Ringneck, Peaceful Dove and Brown-headed Honeyeater, which like the koalas may prefer the taller trees in and around the tank compound.

Hooded Plover: SA Vulnerable, EPBC Vulnerable.

In light of the high threat rating for this species, the series of small beaches on the eastern side of Billy Lights Point were inspected. None of these areas are large enough to support resident Hooded Plovers and all but one of four are regularly inundated at high tide. Whilst mobile none-breeding birds could possibly visit the area, it is not considered core habitat for the species. The high level of visitation by people and dogs to the area would also prevent any birds from becoming established.

White-bellied Whipbird: SA Endangered, EPBC Vulnerable.

No whipbirds were recorded during the survey. Of the two significant areas of native vegetation along the proposed pipeline route, the larger area west of Billy Lights Point is highly unlikely to support whipbirds, as it is has a more open understorey than the species prime dense shrubby habitat and is heavily fragmented by off road vehicle tracks. Kathai Conservation Park is more suitable habitat for this species, however given the proximity of several houses and the town of Port Lincoln to the proposed pipeline corridor it is likely that the distinct song of this species, known to carry up to 800 metres in favourable weather, would have been locally known, particularly as numerous locations for the species are known in the larger, more intact areas of suitable habitat across the southern Eyre Peninsula (BDBSA records). To confirm the absence of the White-bellied Whipbird from this area would require a species specific survey, using song meters or call playback methods during the peak singing period for the species, from July to September, after which there is a gradual decline in intensity from September to December [53]. The time required to undertake such intense work on one species was not available during the recent survey.

Mammals

A single Australian sea Lion was observed swimming close inshore off the eastern side of Billy Lights Point. This is reported to be a common occurrence and is only mentioned due to the conservation rating of the species, of vulnerable under both state and federal legislation. This species is known to have personal feeding areas, so these are possibly sightings of one, or at least a very small number of individuals. Critical habitat areas are offshore island breeding colony sites and regular haul out locations.

Three koalas, an adult male, adult female and dependant juvenile were observed at the hilltop tank site, and another heard a few hundred metres downslope towards the coast between Blue Fin Road and the highway. These are mentioned as they are an introduced or deliberately released population which continues to expand, even in to sub-optimal habitat. Those at the hilltop tank site are likely there due to the larger Eucalypts in the immediate area, which is largely surrounded by more unsuitable shrubby habitat.

Table A3: Woodland birds recorded at fixed survey sites.

Numbers in columns under each site are the number of days out of four on which the species was recorded at the site.

Common Name	AUS	SA	EP	Woodland Birds Site 1	Woodland Birds Site 2	Woodland Birds Site 3	Woodland Birds Site 4	Woodland Birds Site 5	Woodland Birds Site 6	Woodland Birds Site 7	Woodland Birds Site 8	Number of sessions recorded at (max 32)	Number of sites recorded at (max 8)
Australian Golden Whistler			NT	3	3	3	1	4		2	1	**17**	**7**
Australian Raven				2	1							**3**	**3**
Brush Bronzewing			RA	2	1	2	1	4	4	2	4	**20**	**8**
*Common Blackbird				4	2	1	1	3	3	2	4	**20**	**8**
Common Bronzewing				1								**1**	**2**
*Feral Pigeon				4								**4**	**1**
Galah				1								**1**	**1**
Grey Butcherbird							1					**1**	**2**
Grey Currawong				1	2	4	2	1	1			**11**	**7**
Grey Fantail			NT					2	2		3	**7**	**4**
Grey Shrikethrush					1			2				**3**	**3**
*House Sparrow											3	**3**	**2**
Inland Thornbill										1		**1**	**2**
Nankeen Kestrel				1								**1**	**1**
New Holland Honeyeater				4	4	3	2	2	4	4	3	**26**	**8**
Purple-backed Fairywren				1	2			1	2		1	**7**	**5**
Purple-crowned Lorikeet			NT								1	**1**	**1**
Purple-gaped Honeyeater		R	LC		2	1	2					**5**	**3**
Rainbow Lorikeet									1		1	**2**	**2**
Red Wattlebird				2	1	1	1	1	3	1	2	**12**	**8**
Rock Parrot		R	NT	1								**1**	**1**
Shy Heathwren		R	LC							1		**1**	**1**
Silvereye				4	2	1	1	4	4	4	3	**23**	**8**
Southern Scrub Robin				3	3	4	3		3	3	1	**20**	**7**
Spotted Pardalote				1	2	3	2	5			1	**14**	**6**
Striated Pardalote				3		1	1		1			**6**	**4**
Superb Fairywren				1				1	1	2	1	**6**	**5**
Swamp Harrier			RA								1	**1**	**1**
Weebill				4	3	4	2	4	1	1		**19**	**7**
Welcome Swallow				3								**3**	**1**
Western Yellow Robin				1	2	3	3	1	2	1	1	**14**	**8**
White-browed Babbler				3		3	1				1	**8**	**4**
White-browed Scrubwren				2	1	1	1		4	2	1	**12**	**7**
Total Species at Site (Max 33)				**23**	**16**	**15**	**16**	**14**	**15**	**13**	**18**	**274**	

Table A4: Shore birds recorded at fixed survey sites.

Numbers in columns under each site are the number of days out of four on which the species was recorded at the site.

Common Name	AUS	SA	EP	Shore Birds Site 1	Shore Birds Site 2	Shore Birds Site 3	Shore Birds Site 4	Number of sessions recorded at (max 16)	Number of sites recorded at (max 4)
Australian Pelican				1	3			4	2
Banded Stilt		V	RA			3		3	1
Black Swan			NT	2	4	2	2	10	4
Caspian Tern			RA		1			1	1
Chestnut Teal			NT	4	4	3	1	12	4
Common Greenshank			RA		3	4	1	8	3
Great Pied Cormorant			NT	3				3	1
Greater Crested Tern							1	1	1
Grey Teal				1	1			2	2
Little Black Cormorant			NT	1		1	1	3	3
Little Egret		R	NT			4		4	1
Little Pied Cormorant			NT	4	3		3	10	3
Masked Lapwing					4	3	2	9	3
Pacific Gull			RA	3			2	5	2
Pied Oystercatcher		R	RA		4	4	2	10	3
Rock Parrot		R	NT			1		1	1
Sharp-tailed Sandpiper			NT	1	3	2		6	3
Silver Gull				4	4			8	2
Sooty Oystercatcher		R	RA		4	2	2	8	3
White-faced Heron				1	4	4	4	13	4
Total Species at Site (max 20)				11	13	12	11	121	

Table A5: Species recorded opportunistically (not at set survey sites) during December 2023 survey.

CLASS	SPECIES	AUS	SA	EP	LOCATION	RECORDS
Birds	Australasian Grebe			RA	Effluent pond	1
	Australian (Spotted) Crake			RA	Pools between Greyhound Rd and bay	1
	Australian Ringneck				Hilltop tank site	1
	Black-tailed Native Hen				Pools between Greyhound Rd and bay	1
	Brown Goshawk			NT	Murray Point	1
	Brown Quail		V		Roadside near Billy Lights Point	1
	Brown-headed Honeyeater				Hilltop tank site	1
	Buff-banded Rail			RA	Pools between Greyhound Rd and bay	1
	Common Sandpiper		R	VU	Billy Lights Point	1
	Diamond Firetail	VU	V	RA	Hilltop tank site	1
	Eastern Osprey		E	EN	Pools between Greyhound Rd and bay	1
	Eurasian Coot			RA	Effluent pond	1
	Fairy Tern	VU	E	VU	Pools between Greyhound Rd and bay	1
	Hardhead			NT	Effluent pond	1
	Horsfield's Bronze Cuckoo				Pools between Greyhound Rd and bay	1
	Little Grassbird			RA	Pools between Greyhound Rd and bay	1
	Pacific Black Duck				Effluent pond	1
	Peaceful Dove			VU	Hilltop tank site	1
	Red-necked Stint			NT	Billy Lights Point	1
	White-bellied Sea Eagle		E	EN	Jetty on south side of Billy Lights Point	1
Mammals	Australian Sea Lion	EN	V	VU	Off east side of Billy Lights point	1
	Koala				Hilltop tank site and adjacent Blue Fin Rd	2
Reptiles	Sleepy Lizard				Hilltop tank site and around pools along greyhound Rd	3

Appendix 2: Flora of State and National Significance recorded since 1995 within 5 km of the assessment sites.

SPECIES	COMMON NAME	EPBC	NPWS	Source	Date of last record	Species known habitat preferences	Likelihood for use for habitat - comments
Acacia alcockii	Alcock's Wattle		R	1,3,4	2021	Endemic to South Australia and is often found in sand over limestone, more rarely on skeletal soils or sandy soils over granite. It is restricted to the southern tip of Eyre Peninsula. Bushy shrub or small tree to 3 m [54].	Known. Recorded within mallee associations during survey.
Acacia dodonaeifolia	Hop-bush Wattle		R	1,3	2008	Endemic to South Australia and found mainly on southern Eyre Peninsula and southern Mt Lofty Ranges, with minor occurrences on southern Yorke Peninsula, Kangaroo Island and the South-East. Viscid shrubs or small trees to 6 m high. Grows in woodland and open forest vegetation in hard acidic, yellow duplex, red shallow porous loamy, sandy alkaline yellow duplex soils [54].	Unlikely. Soils at assessment sites are not the preferred habitat.
Boronia pilosa ssp. torquata	Hairy Boronia		R	1,3	2013	Confined to edges of freshwater wetland and damp sands. Found only in the lower South-east in South Australia, with an old record from the tip of Eyre Peninsula.	Unlikely. No suitable habitat occurs in the project area.
Caladenia bicalliata ssp. bicalliata	Western Daddy-long-legs		R	1,2,3	2022	Found scattered in the southern part of South Australia growing on calcareous sands or in leaf litter on limestone, chiefly along the coast. Flowers Aug-Sep.	Possible. Two observed nearby in similar mallee. On EP recorded in *Eucalyptus diversifolia* and *Allocasuarina verticillata* mallee and woodland.
Caladenia macroclavia	Large-club Spider-orchid	EN	E	1,5	1960	Grows in *Eucalyptus gracilis*, *E. socialis, or E. incrassata* mallee over *Melaleuca uncinata*, *Alyxia buxifolia*, *Acrotriche patula,*	Unlikely. Habitat does not match mallee communities in assessment area. Last recorded in Lincoln NP in 1985.

						Lepidosperma congestum, Gahnia deusta and *Lomandra effusa*. It prefers sandy loam soils over limestone, usually in lower lying areas [55]. Flowers Aug-Oct.	
Caladenia tensa	Inland Green-comb Spider-orchid	EN		1	2009	Inland Green-comb Spider-orchid occurs in *Callitris spp.* (cypress pine), *Eucalyptus leucoxylon* (yellow gum) woodland and *Melaleuca uncinata* (broombush) mallee on aeolian sandy loams in the Murray-Darling Depression bioregion [56]. Flowers Aug-Oct.	Unlikely. The listed species is confined to the upper south-east and eastern mallee region in South Australia. The taxon was formerly treated as *C. dilatata* and the one record from nearby is more likely to be one of several recently described species within the *C. dilatata* complex awaiting conservation ratings [57].
Dodonaea procumbens	Trailing Hop-bush	VU		5	NA	Widely but patchily distributed across south-eastern Australia, including lower EP. South Australian populations have been recorded in low-lying areas of open *Eucalyptus camaldulensis, E. fasciculosa* and *E. leucoxylon* woodlands and in native grasslands with *Lepidosperma viscida, Themeda triandra, Austrodanthonia spp., Austrostipa spp.* and shrubs including *Acacia acinacea, Dodonaea viscosa and Bursaria spinosa* [58].	Unlikely. No habitat as described in the project area. Last recorded in 1986, 10 km west of Port Lincon.
Eucalyptus conglobata ssp. conglobata	Port Lincoln Mallee		R	1,4	2021	Found on the southern tip of Eyre Peninsula in South Australia, on loam over limestone in mallee shrubland [59].	Known. Widely recorded in assessment area.
Hibbertia cinerea	Port Lincoln Guinea-flower		R	1,3	2005	Grows usually on sandy soil often with limestone outcrops in low mallee vegetation on the southern tip of Eyre Peninsula [60].	Possible, based on habitat description. One record from Murray Point.

Lysiandra calycina (syn. *Phyllanthus calycinus)*	Snowdrop Spurge		R	1,3,4	2023	Found on Eyre Peninsula, tip of Yorke Peninsula, Kangaroo Island and southern Fleurieu Peninsula, growing on sandy soil [54].	Known. Recorded in TR1 and TR4. Highly likely in TR2.
Prasophyllum goldsackii	Goldsack's Leek-orchid	EN	E	1	2008	Goldsack's Leek-orchid occurs in areas of limestone, reddish-brown soils and sands containing lime. On Eyre Peninsula the species is found in two locations (Bascombe Well CP and near Port Lincoln) and associated vegetation includes *Eucalyptus cladocalyx* woodland, as well as *Leptospermum* spp. and *Allocasuarina* spp. shrubland [61]. Flowers Sep-Oct.	Possible although habitats are not a perfect match for the species. One record from coastal *E. rugulosa/E. diversifolia* mallee nearby.
Prostanthera chlorantha	Green Mintbush		R	1,2,3	2008	This species forms small populations of a few scattered plants, on sandy and loamy soils. It is commonly associated with *Banksia, Daviesia* and *Leptospermum* shrubland [62].	Possible, although habitats are not a perfect match for the species. Several records from coastal *E. rugulosa/ E. diversifolia* mallee nearby.
Spyridium daphnoides	Spoon-leaf Spyridium		R	4	2023	Endemic to South Australia on southern Eyre Peninsula, Kangaroo Island, the Mount Lofty region and the south-east of the State [63].	Known. Recorded in TR1 and TR2. Previously recorded in Kathai CP in 1992.
Thelymitra epipactoides	Metallic Sun-orchid	EN	E	1,5	2008	Found primarily in sandy soils in mesic coastal heathlands, grasslands and woodlands, but may also be found in drier inland heathlands, open forests and woodlands [64]. Flowers Aug – Oct.	Possible. Suitable habitat is present. One record from coastal *E. rugulosa/ E. diversifolia* mallee nearby.

Thelymitra flexuosa	Twisted Sun-orchid		R	1,2,3	2008	Found on the lower Eyre Peninsula, Kangaroo Island, southern Mount Lofty Ranges and the South-east in South Australia, growing in heathland, woodland and mallee scrub in higher rainfall districts [54]. Flowers Sep-Nov.	Possible. Suitable habitat is present. One record from coastal *E. rugulosa/ E. diversifolia* mallee nearby.
Thysanotus wangariensis	Eyre Peninsula Fringe-lily		R	1,2,3	2008	Restricted to mallee woodlands on southern and western Eyre Peninsula. Observed near Sleaford in a previous phase of this project.	Possible. Several records from coastal *E. rugulosa/ E. diversifolia* mallee nearby.
Xanthorrhoea seMIPslana ssp. tateana	Tate's Grass-tree		R	1,3,4	2008	Found mainly in the southern Mount Lofty Ranges in South Australia, with scattered occurrences on the Eyre Peninsula and in the South-east, growing in sandy soil in woodland and heathland [54].	Known. Recorded in TR1 and likely in TR2. Several records from coastal *E. rugulosa/ E. diversifolia* mallee nearby.

Source; 1- BDBSA, 2 - AoLA, 3 – NatureMaps, 4 – Observed/recorded in the field, 5 - Protected matters search tool, 6 – others
NP&W Act; E= Endangered, V = Vulnerable, R= Rare; EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable

Appendix 3: Flora species recorded at each site (Desalination Plant, Wastewater Treatment Plant, Tank Site) – will be updated when footprint finalised

Species name	Common name	Conservation Rating		Vegetation Association														
		AUS	SA	WW1	WW3	WW4	WW5	S1	S2	S3	S4	~~S5~~	S6	S7	S8	TR1	TR2	TR3	TR4
Acacia alcockii	Alcock's Wattle		RA	R				1	1	1			1						
Acacia sp. Winged	Angled Wattle			1				R			R		1						
Acacia cupularis	Cup Wattle							1			1		R	R	R		1	R	R
Acacia gillii	Gill's Wattle															1	R	R	
Acacia leiophylla	Coast Golden Wattle								1		1			R	R				
Acacia ligulata	Umbrella Bush			1				1											
Acacia myrtifolia	Myrtle Wattle								1							R	R		
Acacia nematophylla	Coast Wallowa			1				R	1	1	1		R	R	U,R				
Acacia paradoxa	Kangaroo Thorn			1					R	R	R			R	R	R	R	U,R	R
Acacia rupicola	Rock Wattle									R									
Acacia spinescens	Spiny Wattle							1	1	1	1	1	1	R		1	R		
Acacia triquetra	Mallee Wreath Wattle												1	R					
Acaena echinata	Sheep's Burr													1			1		1
Acianthus pusillus	Mosquito Orchid								1	1		1					1		
Acrotriche cordata	Blunt-leaf Ground-berry							1	U	1	1	1	1		1	1	1	1	
Acrotriche patula	Prickly Ground-berry				U			U	1	1	1	1	1	1	1	1	1	1	1
Allocasuarina muelleriana ssp. muelleriana	Common Oak-bush															U,R	R		
Allocasuarina verticillata	Drooping Sheoak			R												E,R	R		
Alyxia buxifolia	Sea Box			1				R		R	1	U,R	U	1					
Amyema melaleucae	Tea-tree Mistletoe			1	1			1			1	1							
Astroloma humifusum / Styphelia humifusa	Cranberry Heath									1							1		
Atriplex paludosa ssp. cordata	Marsh Saltbush			1	1														
Austrostipa acrociliata	Graceful Spear-grass								1	1	1	1	1						
Austrostipa elegantissima	Feather Spear-grass			1					1	1	1			1	1				
Austrostipa sp.	Spear-grass							1	1			1		1		1	1	1	1
Beyeria lechenaultii	Pale Turpentine Bush											1	1	1					
Billardiera sericophora	Silky Apple-berry										1			1	1	1			
Billardiera versicolor	Yellow-flower Apple-berry																	*	

Species name	Common name	Conservation Rating		Vegetation Association															
		AUS	SA	WW 1	WW 3	WW 4	WW 5	S1	S2	S3	S4	~~S5~~	S6	S7	S8	TR1	TR2	TR3	TR4
Bursaria spinosa ssp. spinosa	Sweet Bursaria																		
Caladenia campestris								*	*										
Caladenia capillata	Wispy Spider-orchid							*		*	*								
Caladenia septuosa	Eyre-peninsula Spider-orchid									*	*								
Carpobrotus rossii	Native Pigface			1	1			1	1	R	1	1		1	1				
Cassytha glabella f. dispar	Slender Dodder-laurel							1		1		1				1	1		
Cassytha melantha	Coarse Dodder-laurel			1	1			1		1	1	1	1		1				
Cassytha peninsularis	Peninsula Dodder-laurel									1				*	1	1	1		1
Cassytha pubescens	Downy Dodder-laurel							1		1	1								
Cheiranthera alternifolia	Hand-flower								1	1	1					1			
Choretrum glomeratum	White Sour-bush										1					1	1		
Chrysocephalum apiculatum	Common Everlasting															1	1		
Clematis microphylla	Old Man's Beard			1						1				*	1	1	1		1
Comesperma volubile	Love Creeper			1				1		1	1		1						
Correa backhouseana var. coriacea	Thick-leaf Correa								1	1			1			1	1		
Cyrtostylis robusta	Robust Gnat-orchid						1		1	1									
Dampiera rosmarinifolia	Rosemary Dampiera															1	1		
Daviesia asperula ssp. obliqua	Eyre Peninsula Bitter-pea															1	R		
Dianella revoluta var. revoluta	Black-anther Flax-lily			1	1				1	1	1					1	1		R
Diuris sp.	Donkey Orchid							*			*					1			
Dodonaea hexandra	Horned Hop-bush															1	1		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush			1										1		1			
Drosera macrantha ssp. planchonii	Climbing Sundew								1	1						1	1		
Eucalyptus albopurpurea	Purple-flowered Mallee Box			O												O,R	O,R	1	

Species name	Common name	Conservation Rating		Vegetation Association														
		AUS	SA	WW 1	WW 3	WW 4	WW 5	S1	S2	S3	S4	~~S5~~	S6	S7	S8	TR1	TR2	TR3	TR4
Eucalyptus angulosa	Coast Ridge-fruited Mallee			1	O			1	O	O	O,R			E		1			
Eucalyptus conglobata ssp. conglobata	Port Lincoln Mallee		RA		O			O	O	O	1			*	1				
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee			O	O			O	O	O	O,R	E	O,R	E,R	R	O,R	O	O	
Eucalyptus gracilis	Yorrell			1												1			
Eucalyptus leptophylla	Narrow-leaf Red Mallee							1	1	U									
Eucalyptus oleosa ssp. ampliata	Red Mallee							1			1								
Eucalyptus rugosa	Coastal White Mallee			O	1			O		1			O						
Eutaxia microphylla	Common Eutaxia				1			1	1	1	1	1		1		1	R		
Exocarpos aphyllus	Leafless Cherry			1	1			1											
Exocarpos sparteus	Slender Cherry															1	1		1
Gahnia deusta	Limestone Saw-sedge							1	U	1	1	1				1	1	1	1
Gahnia lanigera	Black Grass Saw-sedge										1					1	1		1
Geijera linearifolia	Sheep Bush			1	1														
Geranium retrorsum	Grassland Geranium																	1	1
Glischrocaryon behrii	Golden Pennants										1								
Gonocarpus mezianus	Broad-leaf Raspwort									U						1	1		
Goodenia geniculata	Bent Goodenia															1			
Goodenia willisiana	Silver Goodenia								1	1	1					1	1		R
Goodia medicaginea	Western Golden-tip																	1	
Grevillea ilicifolia ssp. ilicifolia	Holly-leaf Grevillea															1	1		
Grevillea pauciflora ssp. pauciflora	Few-flower Grevillea															1	1		
Hakea cycloptera	Elm-seed Hakea									1	*					1	1		
Hakea rugosa	Dwarf Hakea																1		
Hakea vittata	Limestone Needlebush															1			
Haloragis acutangula	Smooth Raspwort																		1
Hardenbergia violacea	Native Lilac							1	1								1	1	R
Helichrysum leucopsideum	Satin Everlasting											1							
Hibbertia devitata	Smooth Guinea-flower								1	1	1	1		*	R	1	U,R	*	

Species name	Common name	Conservation Rating		Vegetation Association														
		AUS	SA	WW 1	WW 3	WW 4	WW 5	S1	S2	S3	S4	~~S5~~	S6	S7	S8	TR1	TR2	TR3	TR4
Hydrocotyle callicarpa	Tiny Pennywort											1							
Hysterobaeckea behrii	Silver Broombush															*			
Kennedia prostrata	Scarlet Runner															1	1		1
Lasiopetalum baueri	Slender Velvet-bush							1	1		U,R			1	1	1	1		
Lasiopetalum behrii	Pink Velvet-bush									1	R				1	1	R		
Lasiopetalum discolor	Coast Velvet-bush			1				U	1	1	U,R	1		1	1	1	U	U,R	R
Lasiopetalum schulzenii	Drooping Velvet-bush											1							
Lepidosperma viscidum	Sticky Sword-sedge								1	U		1	1			1	1		
Leucopogon parviflorus	Coast Beard-heath			1				R				1		1	1	R		R	
Lomandra collina	Sand Mat-rush								U	1			1		1	1	1		
Lomandra effusa	Scented Mat-rush							1				1	1			1			
Lomandra micrantha ssp. micrantha	Small-flower Mat-rush															1	1		
Lysiandra (Phyllanthus) calycina	Snowdrop Spurge		RA													*			1
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle										R								
Melaleuca brevifolia	Short-leaf Honey-myrtle			1	1														
Melaleuca decussata	Totem-poles															1	R		
Melaleuca lanceolata	Dryland Tea-tree			U	U			U				O							
Melaleuca uncinata	Broombush								1	U					1				
Microtis sp.	Onion-orchid							1		1	1	1				1			
Microtis frutetorum									*	*									
Muehlenbeckia adpressa	Climbing Lignum																	1	
Myoporum insulare	Common Boobialla			U,R	U,R				R			1	1						
Neurachne alopecuroidea	Fox-tail Mulga-grass									1									
Nitraria billardierei	Nitre-bush													1					
Olearia axillaris	Coast Daisy-bush														1				
Olearia ciliata var. ciliata	Fringed Daisy-bush															1			
Olearia minor	Heath Daisy-bush										1								
Olearia ramulosa	Twiggy Daisy-bush			1	1			1	1					1		R			
Opercularia scabrida	Stalked Stinkweed									1	1								
Opercularia turpis	Twiggy Stinkweed								1		1					1			
Oxalis perennans	Native Sorrel											1		1					

Species name	Common name	Conservation Rating		Vegetation Association														
		AUS	SA	WW 1	WW 3	WW 4	WW 5	S1	S2	S3	S4	~~S5~~	S6	S7	S8	TR1	TR2	TR3	TR4
Pelargonium australe	Austral Stork's-bill																	1	
Pimelea glauca	Smooth Riceflower																R		
Pimelea stricta	Erect Riceflower																R		
Pittosporum angustifolium	Native Apricot			1	1														
Poa poiformis var. poiformis	Coast Tussock-grass											1							
Pomaderris flabellaris	Fan Pomaderris									U		1	1						
Pomaderris obcordata	Wedge-leaf Pomaderris							1	R	1	1	1	1	R		1	1		
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris			1						1								1	
Pterostylis erythroconcha	Red Shell-orchid						1												
Pterostylis longifolia complex									1	1									
Pterostylis flavovirens	Tall Greenhood							*	*	*									
Pterostylis sanguinea	Blood Greenhood							1	1										
Pultenaea acerosa	Bristly Bush-pea							1	1	1	1			*		1	1		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush			1	U														
Rhagodia crassifolia	Fleshy Saltbush			1	1					1	1	1	1			1			
Rytidosperma sp.	Wallaby-grass							1	1	1	1			1	1	1	U	1	1
Schoenus breviculmis	Matted Bog-rush									1									
Spyridium daphnoides	Spoon-leaved Spyridium		RA													*			
Spyridium nitidum	Shining Spyridium															1	1		
Spyridium phylicoides	Narrow-leaf Spyridium							1			1								
Stackhousia aspericocca ssp.	Bushy Candles															1			
Templetonia retusa	Cockies Tongue			1	1			U,R	U,R	R	R	R	U,R	R		R	R		
Tetragonia implexicoma	Bower Spinach			1							1			1					
Thelymitra sp.	Sun-orchid								1	1									
Thelymitra megcalyptra	Scented Sun-orchid							*	*	*	*								
Thelymitra luteocilium	Yellow-tuft Sun Orchid							*	*	*									
Threlkeldia diffusa	Coast Bonefruit			1															
Thryptomene micrantha	Ribbed Thryptomene										R	1			1				
Thysanotus patersonii	Twining Fringe-lily								1	1	1	1	1						

Species name	Common name	Conservation Rating		Vegetation Association														
		AUS	SA	WW 1	WW 3	WW 4	WW 5	S1	S2	S3	S4	~~S5~~	S6	S7	S8	TR1	TR2	TR3	TR4
Vittadinia australasica var. australasica	Sticky New Holland Daisy														1				1
Xanthorrhoea seMIPslana ssp. seMIPslana	Yacca															U	R		
Xanthorrhoea seMIPslana ssp. tateana	Tate's Grass-tree		RA													*			

1= observed during field survey, * = noted in other sections of this vegetation type but not in the assessment area, R=noted to be regenerating in that site, O = overstorey dominant species, U = understory dominant species, E = emergent overstorey species. Key to Conservation Codes: RA=Rare

Appendix 4: Flora species recorded at each site (Rail Corridor) – Will be updated when footprint finalised

Species name	Common name	AUS	SA	RC1	RC2	RC3	RC4	RC5	RC6	RC7	RC8	~~RC9~~	RC10	~~RC11~~	RC12	RC13	RC14	~~RC15~~
Acacia alcockii	Alcock's Wattle		RA		R	R		R	R									
Acacia sp. Winged						1	1	R	R									
Acacia calamifolia/euthycarpa	Wallowa								R									
Acacia cupularis	Cup Wattle			1			1			1	1		1	1	1			
Acacia leiophylla	Coast Golden Wattle				1	1	1							1				
Acacia myrtifolia	Myrtle Wattle						R											
Acacia nematophylla	Coast Wallowa			R	1	R	1	1	R	O	R		O	R	R			
Acacia paradoxa	Kangaroo Thorn													O,R	R			U
Acacia rupicola	Rock Wattle				R	1	1		R									
Acacia spinescens	Spiny Wattle						1	1	1									
Acacia triquetra	Mallee Wreath Wattle			R	R,U	R,U	1	R	R	1			1	R				
Acrotriche cordata	Blunt-leaf Ground-berry				*	1	U	1	U									
Acrotriche patula	Prickly Ground-berry				1	1	U	1	R,U									
Adriana quadripartita	Coast Bitter-bush									R	R		R	R	1			
Alyxia buxifolia	Sea Box					R		R										
Amyema melaleucae	Tea-tree Mistletoe			1	1	1	1	1	1									
Atriplex paludosa ssp. cordata	Marsh Saltbush											1	1					
Austrostipa elegantissima	Feather Spear-grass			1					1					1				1
Austrostipa sp.	Spear-grass				1					1	1							
Austrostipa stipoides	Coast Spear-grass											1						

Species name	Common name	AUS	SA	RC1	RC2	RC3	RC4	RC5	RC6	RC7	RC8	~~RC9~~	RC10	~~RC11~~	RC12	RC13	RC14	~~RC15~~
Beyeria lechenaultii	Pale Turpentine Bush				1		1		1									
Billardiera sericophora	Silky Apple-berry								1									
Billardiera uniflora	One-flower Apple-berry									1								
Caladenia campestris					*	*												
Caladenia capillata	Wispy Spider-orchid				*	*												
Callistemon rugulosus	Scarlet Bottlebrush								1									
Carpobrotus rossii	Native Pigface			1	1	1		1	1	1					1			
Cassytha glabella f. dispar	Slender Dodder-laurel			1	1				1									
Cassytha melantha	Coarse Dodder-laurel			1	1	1	1	1	1	1								
Cassytha peninsularis	Peninsula Dodder-laurel						1	1		1				1				
Clematis microphylla	Old Man's Beard			1		1			1	1				1				
Comesperma volubile	Love Creeper				1													
Correa pulchella	Salmon Correa				1		1											
Daucus glochidiatus	Native Carrot				1	1												
Dianella brevicaulis	Short-stem Flax-lily			1	1	1		1	1	R	1		R	1	1	1	1	1
Dianella revoluta var. revoluta	Black-anther Flax-lily			1	*		1											
Distichlis distichophylla	Emu-grass													1	1	U		
Dodonaea humilis	Dwarf Hop-bush				1				R									
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush				R				R									

Species name	Common name	AUS	SA	RC1	RC2	RC3	RC4	RC5	RC6	RC7	RC8	~~RC9~~	RC10	~~RC11~~	RC12	RC13	RC14	~~RC15~~
Enchylaena tomentosa var. tomentosa	Ruby Saltbush			1						1			1		U	1		
Eucalyptus albopurpurea	Purple-flowered Mallee Box			O														O
Eucalyptus angulosa	Coast Ridge-fruited Mallee						1											
Eucalyptus conglobata ssp. conglobata	Port Lincoln Mallee		RA		O	1	1		R									
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee				O		O			E								O
Eucalyptus gracilis	Yorrell				1	O		O	1									
Eucalyptus leptophylla	Narrow-leaf Red Mallee					1			1									
Eucalyptus oleosa ssp. ampliata	Red Mallee				1	O		O										
Eucalyptus rugosa	Coastal White Mallee				1	O	1	O	R									
Eutaxia microphylla	Common Eutaxia				1	1	1	R	1									
Exocarpos aphyllus	Leafless Cherry			1	1		1	1	1	1				1				1
Exocarpos sparteus	Slender Cherry				1		1	1	1									
Ficinia nodosa	Knobby club-rush								1	1					1			
Gahnia deusta	Limestone Saw-sedge				1		U		1									
Geranium retrorsum	Grassland Geranium									1								
Goodenia varia	Sticky Goodenia				*			1										
Hardenbergia violacea	Native Lilac			1	1	1			1									
Hibbertia devitata	Smooth Guinea-flower				1		1		1	1								

Species name	Common name	AUS	SA	RC1	RC2	RC3	RC4	RC5	RC6	RC7	RC8	~~RC9~~	RC10	~~RC11~~	RC12	RC13	RC14	~~RC15~~
Hibbertia virgata	Twiggy Guinea-flower								1									
Hydrocotyle callicarpa	Tiny Pennywort				1													
Lasiopetalum discolor	Coast Velvet-bush			1	U	1	1		R									
Lasiopetalum schulzenii	Drooping Velvet-bush									1								
Lepidosperma congestum	(blank)						1											
Leucopogon parviflorus	Coast Beard-heath					R		1	1	O			R	R	R			
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle				1													
Melaleuca brevifolia	Short-leaf Honey-myrtle				R	R			R									
Melaleuca decussata	Totem-poles						R											
Melaleuca halmaturorum	Swamp Paper-bark								R			E,R			R	O,R		
Melaleuca lanceolata	Dryland Tea-tree			U,R	U,R	U	U	U,R	R									
Microtis sp.	Onion-orchid				1	*												
Muehlenbeckia adpressa	Climbing Lignum									1								
Muehlenbeckia gunnii	Coastal Climbing Lignum									1			1		1	1	1	
Myoporum brevipes	Warty Boobialla					R												
Myoporum insulare	Common Boobialla									1					1	1		
Nitraria billardierei	Nitre-bush															1	O	
Olearia axillaris	Coast Daisy-bush			1					1	O,R	R		O,R	1				
Olearia minor	Heath Daisy-bush				1	1	1											
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower			1	1	1		1	1	1	1		1	1	1	1		1
Pittosporum angustifolium	Native Apricot				1								1		1	1		1

Species name	Common name	AUS	SA	RC1	RC2	RC3	RC4	RC5	RC6	RC7	RC8	~~RC9~~	RC10	~~RC11~~	RC12	RC13	RC14	~~RC15~~
Poa poiformis var. poiformis	Coast Tussock-grass									1								
Pomaderris obcordata	Wedge-leaf Pomaderris				1	1	U		1									
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris									U								
Pomaderris paniculosa ssp. paralia	Coast Pomaderris			1														
Pterostylis longifolia complex	(blank)				1	1	1											
Pterostylis flavovirens	Tall Greenhood				*	*												
Pultenaea acerosa	Bristly Bush-pea						1		1									
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush									U			1	1	U	U		
Rhagodia crassifolia	Fleshy Saltbush			U	1	R			1	U			1	U				U
Rytidosperma sp.	Wallaby-grass				1		1	1	1									
Salicornia sp.												O						
Senecio pinnatifolius group	Variable Groundsel									1			1					
Stackhousia aspericocca ssp.	Bushy Candles						1											
Suaeda australis	Austral Seablite										1	O	1			1	U	
Templetonia retusa	Cockies Tongue				R	1	U,R	1	R									
Tetragonia implexicoma	Bower Spinach			1	1					1			1	1	1		1	1
Thelymitra megcalyptra	Scented Sun-orchid				*													
Threlkeldia diffusa	Coast Bonefruit			1		1				1	1	1	1	1	1	U	1	
Thysanotus patersonii	Twining Fringe-lily				1													
Westringia eremicola	Slender Westringia						1											

Appendix D Noise Impact Assessment

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Eyre Peninsula Desalination Plant Project

Environmental Noise Emission Assessment

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May 2024

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SA Water

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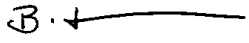
Approved by:	Bronte Nixon	29/05/2024	

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

Table of contents

List of tables

List of figures

List of appendices

Glossary

'A' weighting	The 'A' weighting scale is designed to adjust the noise level to the subjective response of the human ear.
ABL	Assessment Background Level. The 10th percentile of the range of $L_{A90,15min}$ noise levels recorded over any day or night period.
Act	*Planning, Development and Infrastructure Act 2016*
DAA	Development Authorisation Assessment – pursuant to the Planning, Development and Infrastructure Act 2016 (the Act)
dB	Noise level expressed in decibels
dBA	'A' weighted noise level expressed in decibels
HV	High Voltage
INF	Indicative Noise Factors
L_{eq}	The equivalent (continuous) noise level, defined as the steady noise level that would contain the same energy as a time varying signal over the same period
$L_{eq,15min}$	The equivalent (continuous) noise level over a 15-minute period. This noise descriptor is used to assess compliance with the South Australian Environment Protection (Commercial and Industrial Noise) Policy 2023.
L_{90}	The 10th percentile of the measured noise levels, typically used to represent the background noise level.
L_{max}	The highest noise level value in the measurement interval.
LV	Low Voltage
Noise Policy	Environment Protection (Commercial and Industrial Noise) Policy, 2023
Noise Survey	Environmental noise measurements
Policy Guidelines	Environmental Protection (Commercial and Industrial Noise) Policy 2023
Project	The Eyre Peninsula Desalination Plant Project
RO	Reverse osmosis
SA EPA	South Australian Environment Protection Authority
SA PDC	Plan SA Planning and Design Code
Site	The Project site

1 Introduction

1.1 Project description

SA Water has been working to ensure that the Eyre Peninsula's water supply and supporting infrastructure can meet the current and identified future demands of the local community. Approximately 75% of the Eyre Peninsula's water is sourced from the Uley South Basin, with most of the remainder coming from a pipeline from the River Murray. The health of the Uley South Basin is critical to the water security of the Eyre Peninsula as there is no alternate local drinking water supply. In recent years, the basin has been experiencing a long-term recharge decline and drawing water at current rates risks irreversible damage to the basin.

In consultation with businesses, landholders, local Aboriginal communities and Councils, SA Water determined that a new seawater desalination plant near the town of Port Lincoln was the preferred option to ensure a continued drinking water supply for the region. The new plant will reduce reliance on the Uley South Basin, groundwater resources and River Murray and supports both the existing and anticipated future water demand.

The Eyre Peninsula Desalination Plant Project (the Project) will involve the construction and commissioning of a new 5.3 gigalitre GL/annum capacity seawater reverse osmosis (RO) desalination plant and marine infrastructure at Billy Lights Point in Port Lincoln, South Australia.

The Project will also include a seven (7) kilometre long pipeline to transfer the treated desalination water to the existing Northside Hill Tanks in Port Lincoln to supply the town.

1.2 Project area

The proposed Project site (the Site) is approximately 800 m south of the town of Port Lincoln, South Australia. The Site is located approximately 200 m west of the Eyre Peninsula Wastewater Treatment Plant and can be accessed via St Andrews Drive. Land use immediately surrounding the site is currently industrial, as the site was formerly utilised by BHP as a sand mine. The surrounding area is largely vegetated and there is a railway line passing through the proposed site that is no longer in use.

A new access road will be constructed with an entry and exit point from St Andrews Drive.

A transfer pipeline to the Northside Hill tanks will be installed within existing road reserves along Greyhound Road, Property Bay Road and Blue Fin Road.

A general layout of the Project relative to local roads and receivers is included as Figure 1.1 (overleaf).

1.3 Proposed operation

Operation of the Project will be 24 hours per day. Plant and equipment used to run the facility will also be operating on a full-time basis. The noise sources will be spread across the proposed site, with some in buildings or sheds and others in open air. Further details of the facility are provided in Section 3. The closest residential land uses are located within the Site of a new housing development approximately 230 m north of the proposed Site. The nearest existing dwelling to the Site is approximately 270 m away.

Legend

20240116 Site Boundary

Figure 1-1	Author: CJ
Date: 16/05/2024	Approved by: CJ

N

0 90 180 270 m

1:6,000 at A3

To be read in conjunction with WSP document:

Map Source: Metro Maps

New Eyre Peninsula Desalination Project

Project area relative to the surrounding residences and coastal areas

1.4 Scope of report

WSP have been commissioned by SA Water to carry out a preliminary environmental noise assessment of the Project. This report details the assessment of environmental noise emissions from the Project to the surrounding noise sensitive receivers.

Measurements of existing background noise were carried out during September 2023 at six locations throughout the broader Port Lincoln area. This report details the observations from these measurements, as well as the noise source criteria derived for the Project site under the framework of the South Australian *Environment Protection (Commercial and Industrial Noise) Policy, 2023* (the *Noise Policy).*

The assessment has been undertaken in accordance with the requirements of the Noise Policy. The report details the environmental noise impact of the proposed facility and proposes mitigation measures where required.

Noise sources considered as part of this report include the proposed plant and equipment operating within the boundary of the proposed Site, along the supply pipeline and in the existing treatment site to the northeast.

1.5 Exclusions

The following aspects of the Project are excluded from this report. Where they are necessary as part of the Project delivery, they may be included in future studies related to the desalination plant:

- noise from induced traffic along access routes to the site (including public roadways)
- construction noise during the delivery phase of the Project
- assessment of underwater noise impacts on marine fauna or other receptors from Project construction or operation are not within the scope of this assessment
- operational vibration is not within the scope of this assessment.

The following constraints and limitations apply to this assessment:

- Source noise data provided for this assessment has included only indicative overall sound power for each item. Modelling of noise emissions requires application of sound pressure/power spectra to assess noise emission impacts of different sound frequencies. Where spectra are not provided, assumptions have been made based on available technical publications or internal databases of similar measured sources. The conclusions of this report are based on the sources provided and assumptions but may be affected by further information made available as the design progresses.

1.6 References

The following documents have been referenced in the preparation of this report:

- *Environment Protection Act 1993*
- *Planning, Development and Infrastructure Act 2016* (the Act)
- Plan SA Planning and Design Code (SA PDC)
- South Australian EPA Environment Protection (Commercial and Industrial Noise) Policy 2023 (*Noise Policy*)
- Guidelines for the Use of the Environmental Protection (Commercial and Industrial Noise) Policy 2023 (*Policy Guidelines*)
- Australian Standard AS 1055:2018 *Acoustics – Description and Measurement of Environmental Noise*
- Bies and Hansen, Engineering Noise Control – Theory and Practice (2009), Fourth Edition

- Noise and project layout documentation provided by SA Water:
  - **Noise source levels and locations** – Preliminary Operational Noise Source Inventory, dated 27th March 2024
  - **Site layout –** ACA-Interim Submission - DA Critical Items Deliverables -Terrestrial, Dated 8th January 2024
  - **Intake Pumps Station Design** – provided by SA Water, dated 21st December 2023.

1.7 Existing noise environment

Environmental noise measurements (the Noise Survey) have been carried out at a number of locations to characterise the noise environment at areas representative of the nearest noise sensitive receivers. The Noise Survey is detailed in WSP document PS137455-WSP-ACO-REP-001 RevA - Environmental Noise Survey, dated October 2023. This document is included as Appendix A

Measurements were carried out using unattended noise loggers at six locations; the locations were selected as they are considered representative of the nearest noise sensitive receivers around the Project. Additionally, the following factors were also considered in the selection of the noise monitoring locations:

- Measurements were carried out in general accordance with AS 1055:2018 *Acoustics – Description and Measurement of Environmental Noise* and the *Noise Policy*
- The possibility of the measurement location being affected by noise from extraneous noise sources.
- The security of equipment during the period of monitoring. Equipment was positioned on publicly accessible land or on sites controlled by SA Water.

1.7.1 Baseline environmental noise data

Table 1.1 provides a summary of the measurement data during the day (7 am – 10 pm) and night-time (10 pm – 7 am) for each of the measurement locations. Environmental noise measurement locations are shown in Appendix A.

Table 1.1 Background noise monitoring summary

Measurement Location (Zone type)	Daytime Noise Data			Night-time Noise Data		
	L_{eq} dB(A)	L_{max} dB(A)	L_{90} dB(A)	L_{eq} dB(A)	L_{max} dB(A)	L_{90} dB(A)
ML 1 (DU)	39	78	< 20	37	73	< 20
ML 2 (SN)	39	79	< 20	37	68	< 20
ML 3 (WN)	50	81	23	46	75	< 20
ML 5 (SN)	46	81	22	43	75	< 20
ML 6 (DU)	45	89	22	51	96	< 20
ML 8 (Ru)	39	74	22	40	67	22

The average equivalent noise levels (L_{eq} dB(A)) within the areas ML 2, 3 and 5 are higher than those at the other locations. This is most likely due to the impacts of road noise.

Maximum noise levels (L_{max} dB(A)) were highest at ML 6, the Port Lincoln Water treatment plant. At this location there are also higher average noise events during the night than during the day, however this may have been from natural sources close to 7am (for example birds or insects).

2 Noise criteria

2.1 Planning Development and Infrastructure Act (2016)

It is understood that the Proposed Facility is subject to a Development Authorisation Assessment pursuant to the *Planning, Development and Infrastructure Act 2016* (the Act). Under Section 65 of the Act, the Planning and Design Code (SA PDC) is the designated instrument providing guidelines and criteria to which proposed development is required to adhere.

The SA PDC contains the following noise-related Assessment Provisions in the *Interfaces Between Land Uses* section of *Part 4 - General Development Policies*:

Desired outcome

Desired outcome
DO 1: Development is located and designed to mitigate adverse effects on or from neighbouring and proximate land uses

Performance Outcomes and Deemed to Satisfy (DTS) Criteria / Designated Performance Feature

Performance outcome	**Deemed-to-satisfy Criteria Designated Performance feature**
PO 4.1: Development that emits noise (other than music) does not unreasonably impact the amenity of sensitive receivers.	DTS/DPF 4.1: Noise that might affect sensitive receivers achieves the relevant Environment Protection (Noise) Policy criteria.

In accordance with DTS/DPF 4.1, an assessment of noise from the Proposed Facility is required against the South Australian Environment Protection Authority's *Environment Protection (Commercial and Industrial Noise) Policy 2023*.

2.2 Legislative and policy requirements

In South Australia, environmental noise management is legislated under the South Australian *Environment Protection Act 1993*.

Section 25(3) of the *Environment Protection Act 1993* provides the following General Environmental Duty:

> *"A person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm."*

Compliance with the *Environment Protection Act 1993*, and subsequently the General Environmental Duty, is administrated by the South Australian Environment Protection Authority (SA EPA). The assessment of new noise sources as required for contribution to Development Applications is defined under the *Environmental Protection (Commercial and Industrial Noise) Policy (2023)* (*Noise Policy*).

2.3 Environment Protection (Commercial and Industrial Noise) Policy (2023)

The South Australian Environment Protection Authority's *Environment Protection (Commercial and Industrial Noise) Policy 2023* (EPA Noise Policy) is the relevant policy for the assessment of noise from industry operating within South Australia.

When a noise assessment for a Development Authorisation is raised under the Act, Part 5 of the *Noise Policy* guides derivation of the assessment criteria. The Indicative Noise Level for a noise source is determined as the average of the Indicative Noise Factors (INF) applicable at the source and receiver zones. The predicted noise source level for the proposed development (the *Criteria*) should not exceed the relevant Indicative Noise Level Less 5 dB.

The nearest noise sensitive receivers to the Project fall within the following General Neighbourhood Zone and the Waterfront Neighbourhood Zone. Locations of the receivers are included within Figure 2.1.

The details of each representative receivers are summarised in Table 2.1.

Table 2.1 Representative noise sensitive receiver details

Receiver	Address	SA PDC Land use zone
NSR1	10 Sheoak Court, Port Lincoln SA 5606	General Neighbourhood
NSR2	2 Eucalyptus Drive, Port Lincoln SA 5606	General Neighbourhood
NSR3	14 Eucalyptus Drive, Port Lincoln SA 5606	General Neighbourhood
NSR4	4 Romas Way, Port Lincoln SA 5606	General Neighbourhood
NSR5	87 St Andrews Drive, Port Lincoln SA 5606	Waterfront Neighbourhood

The SA PDC Land use zones for the area are shown in Appendix B.

Note that the *Noise Policy* defines separate day and night-time assessment periods. Day period hours are 07:00-22:00, night period hours are 22:00-07:00.

The derived criteria for the representative receivers outlined above and in Figure 2.1 are summarised in Table 2.2.

Table 2.2 Summary of the applicable noise criteria

Receiver	Noise Criteria– dB(A)		
	Day ($L_{eq,15min}$)	Night ($L_{eq,15min}$)	Night ($L_{max,fast}$)
NSR1	51	43	60
NSR2	51	43	60
NSR3	51	43	60
NSR4	51	43	60
NSR5	51	43	60

The operation of the proposed desalination plant will be 24-hours. The criteria for the nearest noise sensitive receivers is most stringent during the night-time period (10pm to 7am). As such, the Night-time noise criteria is the controlling factor for the assessment. The sources are generally expected to be under continuous operation and constant noise. It is not expected that the L_{max} noise will be significantly higher than the continuous noise from the site.

2.3.1 Noise character

In accordance with the *Noise Policy*, the measured or predicted source noise level must be adjusted by the following amounts when comparing to Indicative Noise Levels, if the noise source contains modulation, tonal, impulsive, intermittent or low-frequency characteristics:

- +5 dB(A) if the noise source contains 1 characteristic
- +8 dB(A) if the noise source contains 2 characteristics
- +10 dB(A) if the noise source contains 3 or 4 characteristics.

Legend

- Site Boundary
- Receiver
- Existing Buildings

Figure 2-1	Author: CB	N
Date: 16/05/2024	Approved by: CJ	

0 70 140 210 m

1:5,000 at A3

To be read in conjunction with WSP document:

Map Source: Metro Maps

New Eyre Peninsula Desalination Project

Project area and assessed receiver locations

3 Assessment methodology

Noise emissions from the proposed facility have been modelled using SoundPLAN 8.2 Environmental Noise Modelling Software. The assessment of the Project covers the night operation to account for the most stringent noise emission criteria. Details of the noise model and inputs are provided below. After initial noise modelling of the Project, recommendations are provided related to design options and site operation as it related to noise emissions.

In addition to the above, design options have been provided by SA Water for investigation, including:

- the noise emission impacts of an open-air intake pump station arrangement in comparison to emissions from an enclosed arrangement
- noise mitigation methodologies for evaporative cooling fans at the north façade of the RO Building.

3.1 Modelling

Noise emissions have been modelled using the CONCAWE algorithm under Category 6 meteorological conditions, which is most conducive to noise propagation from the noise source to the noise affected premises, as required by the *Policy Guidelines*.

The noise model has been constructed to represent night-time operation. Noise sources within the project will be expected to operate across intervals (1-20 hours) within a 24-hour period. They have been modelled as all operating at the same time as a worst-case 15-minute operating scenario.

The Project site has been modelled with ground absorption of 0.2. The surrounding area, which separates the Project from nearest receivers is mainly scrubland. It has been modelled with a ground absorption of 0.8. Water occupies some of the region between the Intake pump station and the nearest residential receivers. It has been assumed for conservatism that the absorption of the water surface is negligible (ground absorption = 0.0)

3.1.1 Model inputs

The SoundPLAN model has been developed using site arrangement documentation and drawings as provided by SA Water (as listed in Section 1.6). The documentation includes buildings and source locations as well as proposed earthworks for site leveling and roads. Changes to the existing geography of the Site have been modelled using the elevation contour data provided for the Project.

Proposed buildings as part of the Project include:

- RO Building – A machine shed containing the main process plant for desalination. It comprises walls and roof of profiled sheet steel (0.6 mm thickness) on a steel frame. Roller doors open on the north face of the building for vehicle access; we have been advised that these may be open or closed depending on weather conditions. They have been assumed as open for initial modelling.
- Control Room Building– Control room, Sample test room and lunchroom in a lightweight structure.
- Gas chlorine Building – chemical storage and distribution equipment.
- Low Voltage (LV) and High Voltage (HV) Switch rooms – buildings containing switch gear for site plant and equipment.
- Site office – Lightweight site administration building. This is not considered to be a contributor to noise emissions.
- Intake Pump Station – Two iterations of the intake pump station have been modelled to assess the impacts of open and enclosed plant items. The intake pump station has been modelled as both a building containing the requisite plant but also as a set of external sources. The results of the two modelling scenarios are discussed within Section 4.

Sound power level data (as provided by SA Water) for the noise generating sources at the proposed facility are listed in Appendix C.

Noise source data from the noise model is detailed in Table 3.1. Applicable 1/1/ octave band spectra have been developed for each source from relevant technical publications. The Model takes account of the number of items of each noise source type as listed in the table and as per the specification in Appendix C.

Table 3.1 Sound power data for noise generating plant and equipment onsite

Item Ref.	Noise Source Item	Number of source	Sound Power dB(Lin)								
			Octave Band Centre Frequency, Hz								Overall dB(Lin)
			63	125	250	500	1k	2k	4k	8k	
1	Treated Water Pumps	2	71	72	74	74	77	74	70	64	82
4	UF backwash pump	1	71	72	74	74	77	74	70	64	82
6	SWRO HP Pumps	12	80	81	83	83	86	83	79	73	91
8	Pressure exchanger SWRO	16	74	75	77	77	80	77	73	67	85
9	BWRO Pumps	4	74	75	77	77	80	77	73	67	85
10	RO flushing pumps	1	71	72	74	74	77	74	70	64	82
11	CIP pumps	2	74	75	77	77	80	77	73	67	85
12	Backwash water Recovery pumps	1	71	72	74	74	77	74	70	64	82
13	CO2 dilution pumps	1	71	72	74	74	77	74	70	64	82
14	UF neutralization pumps	1	74	75	77	77	80	77	73	67	85
15	Chlorinated Water Sampling Pumps	1	49	50	52	52	55	52	48	42	60
16	Brine Sample Pumps	1	49	50	52	52	55	52	48	42	60
17	Brine Outfall Pumps	1	71	72	74	74	77	74	70	64	82
18	Wastewater Pump Station Pumps	1	59	60	62	62	65	62	58	52	70
19	Plant Air Compressor	1	52	52	51	54	57	57	55	52	63
20	Service Water Pumps	2	64	65	67	67	70	67	63	57	75
21	HVAC in RO Building	2	94	94	91	88	84	81	78	70	98
23	Overhead cranes & hoists	1	79	80	82	82	85	82	78	72	90
25	Process Lagoon Transfer Pump	2	60	61	63	63	66	63	59	53	71
26	Intake Pumps	4	71	72	74	74	77	74	70	64	82
28	Treated Water Pump VSDs	2	69	70	72	72	75	72	68	62	80
29	Main RO HP VSDs	3	69	70	72	72	75	72	68	62	80
30	HVAC in Intake Pump Station Building	1	94	94	91	88	84	81	78	70	98
31	Permanent Genset	1	76	74	73	75	74	71	65	65	82
32	Temporary Genset	1	76	74	73	75	74	71	65	65	82
33	Chlorine Building Fan	1	72	72	74	73	72	68	64		80

Item Ref.	Noise Source Item	Number of source	Sound Power dB(Lin)								
			Octave Band Centre Frequency, Hz								Overall dB(Lin)
			63	125	250	500	1k	2k	4k	8k	
34	Chlorine Building Monorail	1	79	80	82	82	85	82	78	72	90
35	Chlorine Building Ancillaries	3	54	55	57	57	60	57	53	47	65
36	RO CIP Neutralization Pumps	1	71	72	74	74	77	74	70	64	82
37	Disc Filters backwash Pump	1	74	75	77	77	80	77	73	67	85
38	UF Backwash Waste Pumps	1	71	72	74	74	77	74	70	64	82
40	Limestone Ejector Water pumps	1	71	72	74	74	77	74	70	64	82
41	Limestone Blowers	1	77	72	67	62	57	54	51	44	79
42	Limestone Sludge Water pumps	1	71	72	74	74	77	74	70	64	82
43	Air conditioners in Control Room	3	54	55	57	57	60	57	53	47	65
45	Compressed Air Dryer	1	53	54	56	56	59	56	52	46	64
46	Travelling band screens	2	74	75	77	77	80	77	73	67	85
47	Dosing pumps for marine intake shock dosing	1	79	80	82	82	85	82	78	72	90
48	Chemical Dosing Pumps	24	69	70	72	72	75	72	68	62	80
49	Intake Pump Station Backwash Pumps	1	74	75	77	77	80	77	73	67	85

The proposed installations at the Site include buildings, sheds and covered areas as well as trafficable surfaces for equipment and consumable transport. Noise levels within the proposed buildings and sheds are detailed in Table 3.2.

Table 3.2 Noise sources in buildings

Building	Combined Sound Power of Internal Sound Sources dB(Linear)
RO Building	104
Control Room	65
LV (main) Switch Room	85
HV Switch Room	83

Construction of all site buildings has been modelled as steel profiled sheet for all external cladding. Where significant contribution to noise at the identified receivers is determined to be from such buildings, additional linings may be modelled or recommended for noise mitigation.

3.1.2 Assumptions and constraints

The following considerations have been applied in the preparation of this report:

- noise sensitive receivers were identified based on a review of aerial photography for the site and from inspection during the unattended noise monitor deployment (see Appendix A)
- the modelled site layout was based upon site layout drawings by SA Water, Dated 21st December 2023.

Noise from the proposed desalination facility at each receiver will be from a variety of sources. As such the prevailing character of any individual or set of sources will be determined by its/their contribution at each receiver location. Where results indicate that the controlling sources at the receiver are those for which a Characteristic penalty is applicable, the additional margin will be added to the predicted noise result for that location. This is in accordance with the Noise Policy.

3.2 Results

Noise modelling results for the Project are summarized in Table 3.3. Noise propagation from the Site is shown as contour plots in Figure 3.1.

Listed noise results in Table 3.3 show both the predicted noise levels and the same with potential characteristic penalties applied for Modulating an Intermittent characters. Where the noise levels exceed the environmental noise criteria they have been identified in the table as **bold** font.

Table 3.3 Noise predictions compared to Noise Policy criteria

Receiver	Predicted Night-time Noise Level, dB(A) L_{eq} (including Character Penalty 5 dB)	Criteria dB(A) L_{eq}	Complies with Noise Policy
	RO Building – roller doors closed		
NSR1	39 (**44**)	43	**No**
NSR2	42 (**47**)	43	**No**
NSR3	39 (**44**)	43	**No**
NSR4	35 (40)	43	Yes
NSR5	31 (36)	43	Yes

Noise levels from operation of the Project are highest at the nearest locations within the Port Lincoln Residential Zone. Buildings and sites further to the west are less affected.

WSP note that a 5 dB(A) character penalty has been conservatively applied when the noise at the receiver is dominated by a source which may attract a character penalty.

Figure 3-1	Author: CJ	N
Date: 16/05/2024	Approved by: CJ	

0 90 180 270 m

1:6,000 at A3

To be read in conjunction with WSP document: PS137455-WSP-ACO-REP-002

Map Source: Metro Maps

New Eyre Peninsula Desalination Project

Grid Noise Map - worst case operation (No noise mitigation measures employed)

3.3 Noise mitigation strategy

To mitigate the impacts of the noise emissions from the operational Project at the identifies noise sensitive receivers, the following mitigation strategies have been modelled as potential mitigation measures to satisfy the Nosie Policy criteria.

The above has been undertaken as a sensitivity analysis assessing both the RO Building roller doors and the Intake Pump Station. Since the RO Building evaporative coolers are the controlling noise sources, they have been assessed on completion of the sensitivity analysis.

Sensitivity analysis

- Open vs closed vehicle access roller doors to the RO Building (north facade) (roller doors to be constructed with a continuous, imperforate, profiled metal).
- Intake pump plant within building/enclosure or open-air.

Evaporative cooler mitigation

- Acoustic enclosures for evaporative cooling units (six units total) at the north façade of the RO Building:
  - Acoustic louvres to east and west facades of each enclosure, acoustically equivalent to Fantech Soundbar SB1.
  - Profiled metal sheet to north wall and roof of enclosure.
  - Sound absorbing finish to the internal face of all solid walls and roof of the enclosure, Minimum NRC 0.9, for example. 50 mm minimum thickness with density not less than 32 kg/m^3.

OR

- Alternatively reduce the night-time fan speed of the evaporative cooling units to no more than 74% of the fan speed at 100% capacity.

3.3.1 Model inputs

The inputs to the noise model to implement the above conditions are included below:

- Open Roller doors: Openings (5 off) are included at the north façade of the RO Building each measuring 5 x 4 m (h x w).
- The enclosed intake pump building is of concrete construction with openings for ventilation. No transmission loss has been assumed for the openings.
- The open-air intake pump station design includes no solid fencing or covering structure/roofing. The pump motors and screening plant are located above ground.

Table 3.4 includes the sound power from the proposed open-air intake pump arrangement.

Table 3.4 Sound power data for open-air intake pumps and associated equipment

Noise Source Label	Number of source	Sound Power Level dB(Lin)								
		Octave Band Centre Frequency, Hz								Overall dB(Lin)
		63	125	250	500	1000	2000	4000	8000	
Intake Pump	4	53	64	73	79	85	83	79	65	90
Travelling Band Screen	2	48	59	68	74	80	84	74	60	85
Backwash Pump	2	48	59	68	74	80	84	74	60	85

Each of the above sources are located 2.5-3 m above ground level at the location of the existing SA Water treatment ponds (northeast of the Project main site).

3.4 Results – Noise mitigation design

Noise modelling results associated with the sensitivity analysis are summarized in Table 3.3. It assesses the impact of opening the RO Building doors, and also the noise difference from the indoor and open-air intake pumps. The sensitivity analysis **does not include** the RO Building Evaporative coolers so that the impact of the design options can be compared.

Listed noise results in Table 3.3 show both the predicted noise levels and the same with potential characteristic penalty applied for a potential modulating character.

Table 3.5 Environmental noise predictions compared to Noise criteria

Receiver	Predicted Night-time Noise Level, dB(A) (including Character Penalty 5 dB as relevant)			
	Intake Pumps in Building		Open-air Intake Pumps	
	RO Building – roller doors closed	RO Building – roller doors open	RO Building – roller doors closed	RO Building – roller doors open
NSR1	33 (38)	37 (42)	32 (37)	37 (42)
NSR2	29	37	29	37
NSR3	27	35	27	35
NSR4	22	30	22	30
NSR5	31 (36)	31 (36)	29 (36)	29 (36)

Based on the results shown in Table 3.3, the change in intake pump station design upon noise emissions is negligible. Operation of the Project with the RO Building roller doors open results in higher noise levels at noise sensitive receivers.

Based on this result it is recommended that the roller doors to the RO Building are closed during night operation.

Evaporative cooler mitigation

Continuing on the assumption it is feasible that night operation can occur with the roller doors closed and that the proposed evaporative cooler mitigation can be implemented, results of the modelling for evaporative coolers mitigation options are listed in Table 3.6.

The mitigation provided by the Evaporative cooling is more effective in reducing noise levels at most of the nearest receivers, however, it is noted that the enclosures will increase the footprint of the plant.

Table 3.6 Predicted noise results based on evaporative cooler mitigation options

Receiver	Predicted Night-time Noise Level, dB(A) (including Character Penalty 5 dB as relevant)		Criteria dB(A) L_{eq}	Complies with Noise Policy
	Intake Pumps in Building			
	Evaporative cooler enclosure	Lowered fan speed		
NSR1	33	33	43	Yes
NSR2	32	35 (40)	43	Yes
NSR3	30	33 (38)	43	Yes
NSR4	25	28 (33)	43	Yes
NSR5	29 (34)	29 (34)	43	Yes

Both methods of noise mitigation are shown in the above table to meet the Noise Policy criteria. Contribution to the overall noise level is higher for the lowered fan speed option and thus accrues a characteristic penalty for modulation in some locations.

Predicted noise propagation from the Site following the implementation of either of the two assessed mitigation measures is provided as contour plots in Figure 3.2 and Figure 3.3.

NSR5
NSR1
NSR4
NSR3
NSR2
Desalination Plant Site Boundary

Legend

- Site Boundary
- Receiver
- Point source
- Industrial building; Room
- Existing Buildings

Grid Noise Map - Evaporative Cooler Enclosure

- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55

Figure 3-2	Author: CJ	N
Date: 16/05/2024	Approved by: CJ	

To be read in conjunction with WSP document: PS137455-WSP-ACO-REP-002

Map Source: Metro Maps

0 90 180 270 m

1:6,000 at A3

New Eyre Peninsula Desalination Project

Grid Noise Map - Mitigation measures: RO building evaporative coolers enclosed, RO building roller doors closed

NSR5
NSR1
NSR4
NSR3
NSR2
Desalination Plant Site Boundary

Legend

- Site Boundary
- Receiver
- Point source
- Industrial building; Room
- Existing Buildings

Grid Noise Map - Fan Speed Reduction

- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55

Figure 3-3	Author: CJ	N
Date: 16/05/2024	Approved by: CJ	

To be read in conjunction with WSP document: PS137455-WSP-ACO-REP-002

Map Source: Metro Maps

0 90 180 270 m

1:6,000 at A3

New Eyre Peninsula Desalination Project

Grid Noise Map - Mitigation measures: RO building evaporative cooler fan speed lowered, RO building roller doors closed

4 Discussion

Based on the provided noise source data and assumed spectra, modelling has been undertaken of noise emissions from the Project. Without any noise mitigation measures, it is predicted that the Project will exceed the night-time Noise Policy criteria. The critical items that are predicted to contribute to the exceedance are:

- RO Building Evaporative coolers
- Open roller doors to the RO Building.

Both items are located at the north façade of the RO Building. Since there is no capacity to move the cooling equipment or roller doors to other areas the proposed methods of mitigation are to enclose the coolers, reduce fan speed and to operate with the Roller doors generally closed.

The results of modelling the evaporative cooler enclosures and the reduced fan speed yield the following conclusions:

- Both methods are predicted to reduce noise emission from the coolers such that the Project can meet the Noise Policy criteria.
- The enclosure is more effective in reducing noise emissions. As such the enclosed cooler is less likely to be controlling and less likely to attract the 5 dB(A) characteristic noise penalty.

The background noise L_{90} dB(A), measured in the areas around Port Lincoln is particularly low. As a result, even though the desalination plant is predicted as compliant (if proposed mitigation is undertaken) with the applicable environmental noise criteria, it is likely that the Project will be audible outdoors during quiet periods (particularly at night) at the nearest noise sensitive receivers.

The predicted noise levels suggest that the Project will be audible above background for many of the nearest noise sensitive receivers during low ambient noise periods.

Comparison of the designs for the intake pump station conclude that the noise emission difference at the most affected receiver is negligible.

Since detailed noise data and final plant unit selections have not been provided for this assessment the accuracy of the applying the characteristic penalties is unknown. Detailed acoustic design and assessment should be undertaken during later design stages of the Project to address final design selections and the following potential noise paths:

- penetrations through the building envelope for natural and mechanical services ventilation
- additional doors and access paths.

5 Conclusion

WSP has undertaken an environmental noise assessment to characterise noise emission from the proposed desalination facility. Assessment has included information provided by SA Water about the location and arrangement of noise sources, buildings and additional off-site facilities (Intake Pump Station).

Monitoring of noise at and around Port Lincoln has previously been undertaken to characterise the existing acoustic environment of the area. These works have been completed in accordance with the scope of works agreed with SA Water. Background noise was noted to be relatively low, particularly during night hours.

Without mitigation, the predicted results of the assessment indicate that the noise from the new Eyre Peninsula Desalination Facility during the period of most stringent noise criteria (night-time, 10pm-7am) is likely to exceed the environmental noise criteria defined within the *Environmental Protection (Commercial and Industrial Noise) Policy 2023*.

Noise mitigation recommendations are provided which are predicted to satisfy the Noise Policy.

These mitigation measures include the following:

Roller doors

- RO Building (north facade) roller doors are to be kept closed during night-time operation and are to be constructed with a continuous, imperforate, profiled metal.

Evaporative cooler mitigation

- Acoustic enclosures installed around evaporative cooling units (six units total) at the north façade of the RO Building:
  - Acoustic louvres to east and west facades of each enclosure, acoustically equivalent to Fantech Soundbar SB1.
  - Profiled metal sheet to north wall and roof of enclosure, BMT 0.6 mm minimum.
  - Acoustically absorptive lining to the internal face of all solid walls and roof of the enclosure, minimum NRC 0.9. For example, 50 mm minimum thickness with density not less than 32 kg/m^3.

OR

- Limit the night-time fan speed of the evaporative cooling units to no more than 74% of the fan speed at 100% capacity.

Further design and equipment noise interrogation is recommended as the Project progresses and more information becomes available. However, this assessment concludes that the operation of the proposed New Eyre Peninsula Desalination with the proposed noise mitigation measures can achieve compliance with the *Environmental Protection (Commercial and Industrial Noise) Policy 2023*.

6 Limitations

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Appendix A

Environmental Noise Survey Report
PS137455-WSP-ACO-REP-001 RevA

Design
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Eyre Peninsula Desalination Plant Project

Environmental Noise Survey

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October 2023

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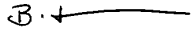
Approved by:	Bronte Nixon	24/10/2023	

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

Table of contents

List of appendices

1 Introduction

1.1 Project description

SA Water has been working to ensure that the Eyre Peninsula's water supply and supporting infrastructure can meet the current and identified future demands of the local community. Approximately 75% of the Eyre Peninsula's water is sourced from the Uley South Basin, with most of the remainder coming from a pipeline from the River Murray. The health of the Uley South Basin is critical to the water security of the Eyre Peninsula as there is no alternate local drinking water supply. In recent years, the basin has been experiencing a long-term recharge decline and drawing water at current rates risks irreversible damage to the basin.

In consultation with businesses, landholders, local Aboriginal communities and Councils, SA Water determined that a new seawater desalination plant near the town of Port Lincoln was the preferred option to ensure a continued drinking water supply for the region. The new plant will reduce reliance on the Uley South Basin, groundwater resources and River Murray and supports both the existing and anticipated future water demand.

The Eyre Peninsula Desalination Plant Project (the Project) will involve the construction and commissioning of a new 5.3 gigalitre (GL)/annum (a) capacity seawater reverse osmosis (RO) desalination plant and marine infrastructure at Billy Lights Point in Port Lincoln, South Australia.

The Project will also include a seven (7) kilometre (km) long pipeline to transfer the treated desalination water to the existing Northside Hill Tanks in Port Lincoln to supply the town.

1.2 Project area

The proposed Project site (the Site) is approximately 800 m south of the town of Port Lincoln, South Australia. The Site is located approximately 200 m west of the Eyre Peninsula Wastewater Treatment Plant and can be accessed via St Andrews Drive. Land use immediately surrounding the site is currently industrial, as the site was formerly utilised by BHP as a sand mine. The surrounding area is largely vegetated and there is a railway line that is no longer in use.

A new access road will be constructed with an entry and exit point from St Andrews Drive.

This transfer pipeline to the Northside Hill tanks will be installed within existing road reserves along Greyhound Road, Property Bay Road and Blue Fin Road.

The closest residential properties are located within a new housing development approximately 230 m north of the proposed Site. Currently, the nearest existing dwelling to the Site is approximately 320 m away, while a number of additional dwellings in this housing development are currently under application and are proposed approximately 230 m from the Site.

1.3 Scope of report

Measurements of existing background noise around Port Lincoln were conducted during September 2023 at six measurement locations. This report details noise source criteria for the site under the framework of the South Australian *Environment Protection (Commercial and Industrial Noise) Policy (2023)* (*Noise Policy*), the observations from the measurement locations and the results of background noise monitoring at the project site and in surrounding areas of Port Lincoln.

2 Noise criteria

2.1 Legislative and Policy requirements

In South Australia, environmental noise management is legislated under the South Australian *Environment Protection Act 1993*.

Section 25(3) of the *Environment Protection Act 1993* provides the following General Environmental Duty:

> *"A person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm."*

Compliance with the *Environment Protection Act 1993*, and subsequently the General Environmental Duty, is administrated by the South Australian Environment Protection Authority (SA EPA). For the assessment of background noise, measurement requirements are provided under the *Environmental Protection (Noise) Policy (2007)*. However, this Policy will be replaced at the 31 October 2023. The incoming policy will be the *Environmental Protection (Commercial and Industrial Noise) Policy (2023)* (*Noise Policy*).

The specific requirements relating to this project within the 2007 and 2023 *Noise Policy* documents do not contain any contradictions. As such the requirements of the 2023 *Noise Policy* have been used for convenience, as it is likely that relevant dates for the project will fall after 31 October 2023.

2.2 Environment Protection (Noise) Policy (2023)

The *Noise Policy* forms the basis of assessment of background noise from the Site, both against the General Environmental Duty and for compliance with EPA License conditions.

The *Noise Policy* provides Noise Goals for noise sources to achieve the General Environmental Duty. Part 4, Clause 17 of the *Noise Policy* provides the noise goals, as shown in Figure 1.

17—Compliance with noise goals satisfies general environmental duty

(1) The general environmental duty under section 25 of the Act is satisfied in relation to noise from a noise source, insofar as the noise affects particular noise-affected premises, if the noise complies with the noise goals.

(2) The noise from a noise source complies with the noise goals if measurements taken in relation to the noise source and the noise-affected premises show that—

(a) the source noise level (continuous) does not exceed the background noise level plus 5 dB(A); or

(b) the source noise level (continuous) does not exceed the indicative noise level for the noise source.

Figure 1 Excerpt from the Noise Policy defining Noise Goals

2.2.1 Development and Planning Zones

The Indicative Noise Level (INL) is determined based on the Zones applied within the South Australian Planning and Design Code. A detailed zoning map for the relevant areas is included within Appendix A. The measurement locations for this scope of works fall within the following Zones:

- Waterfront Neighbourhood
- Suburban Neighbourhood
- Deferred Urban

— Rural

2.2.2 Noise criteria

Under the *Noise Policy*, Development Applications must demonstrate that proposed noise sources adhere to criteria derived based on the INLs. INLs are determined based on the land uses principally promoted for each zone in the South Australian Planning and Design Code. Criteria are set as the Indicative Noise Levels less 5 dBA.

Indicative Noise Levels applicable for nearest each of the measurement locations (refer to Figure 2) are included in Table 1.

Measurement location	**Daytime Indicative Noise Level, dB(A) $L_{eq,t}$**	**Night-time Indicative Noise Level, dB(A) $L_{eq,t}$**
ML 1 (Deferred urban)	47	40
ML 2 (Suburban neighbourhood)	52	45
ML 3 (Waterfront neighbourhood)	52	45
ML 5 (Suburban neighbourhood)	52	45
ML 6 (Deferred urban)	47	40
ML 8 (Rural)	47	40

Table 1 Indicative Noise Levels at measurement locations

2.2.3 Noise character

In accordance with the *Noise Policy*, the measured source noise level must be adjusted by the following amounts when comparing to Indicative Noise Levels, if the noise source contains modulation, tonal, impulsive, or low-frequency characteristics:

— +5 dB(A) if the noise source contains 1 characteristic.

— +8 dB(A) if the noise source contains 2 characteristics.

— +10 dB(A) if the noise source contains 3 or 4 characteristics.

These adjustments are not applicable if assessing against the background +5 dBA Noise Goal.

2.3 Background Noise

The background noise level is defined as the ambient noise level measured over a period when noise from a specific noise source (the proposed desalination plant) is absent from the measurement place. Procedures for the determination of the background noise levels are provided in Clause 14 of the *Noise Policy*. While not applicable as criteria during Development Application, the background noise provides context for future assessment.

3 Assessment Methodology

3.1 Overview

WSP has undertaken noise measurement of the existing environment at Port Lincoln in accordance with the requirements of the *Noise Policy*.

Six unattended noise loggers were installed at and around the proposed site. The locations were selected to provide a range of background noise levels at areas potentially affected by the Site and in consideration of the following factors:

- Noise logging was conducted on site for a period of one week.
- In accordance with the location stipulations of the *Noise Policy*
- Positioned on publicly accessible land or on sites controlled by SA Water.
- Minimal impact from extraneous noise sources to be present throughout the measurement period.

3.2 Noise Policy requirements

Clauses 12 and 14 of the *Noise Policy* provide a framework for the measurement of background or ambient noise levels.

- The microphone of the noise monitoring device must be located 1.5 m or more from the ground.
- The noise monitoring device should be in a measurement location at least 3.5 m from a vertical reflecting surface such as a fence, building or other structure.
- Wind velocity at the time of measurement should not exceed 5 metres per second, to limit the interference of wind generated noise on the microphone itself and extraneous noises which generally increase with increasing wind speeds.
- The measurement is to be made using a fast time weighting, and during a period adequately representative of the nature of the background noise environment.

Clause 14 of the *Noise Policy* defines the required sound measurement and further detail is provided in the *Guidelines for the use of the Environmental Noise Policy (Commercial and Industrial) Noise Policy 2023* (the Guideline). Based on the *Noise policy* and the Guideline the following measurement data have been recorded.

- $L_{Aeq,15min}$: the energy averaged A-weighted noise level containing the same acoustic energy as the actual fluctuating noise level over the 15-minute period.
- $L_{A90,15min}$: the 15-minute period average A-weighted noise level that is exceeded for 90% of the period. L_{A90} is commonly referred to as the background noise level.
- $L_{Amax,15min}$: the maximum A-weighted noise level measured in the period.

3.3 Measurement locations

Figure 2 (next page) displays each of the noise monitoring locations (MLs) with respect to Port Lincoln and the rural surroundings. The proposed Site is also noted in yellow.

Map: MetroMap	Author: KM
Date: 20/10/2023	Approved by: CJ

Map Source: MetroMaps

0 250 500 750 1,000 m

1:16,300 at A3

New Eyre Peninsula Desalination Plant Project

Figure 1 Noise Monitoring Locations (ML)

Considerations for unattended noise monitoring locations in and around the project site considered the following factors:

- The possibility of the measurement location being affected by noise from extraneous noise sources.
- The location is representative of broader areas of the region which may be affected by the Site.
- The location is not impacted by any shielding which would reduce the capacity to collect useful noise data.
- The equipment is likely to be safe during the period of monitoring.

Based on the considerations above, noise monitoring locations were selected. SA Water have hosted 3 of the loggers on sites that are secure or are infrequently accessed.

The north most measurement locations were in suburban parts of Port Lincoln, near Adelphi Tarrace and Wingard Terrace. All other locations are at or beyond the fringes of residential areas and it is assumed that less extraneous noise may be present.

3.4 Noise logging equipment

A fleet of 6 noise loggers were used to conduct the measurement campaign. Table 2 lists the relevant details for the equipment installed.

Measurement Location	Equipment Type	Model	Serial number	Calibration date	Calibration Due
ML 1	Noise Logging	Rion NL-42	709623	16/12/2022	16/12/2024
ML 2	Noise Logging	Rion NL-42	609434	16/08/2022	16/08/2024
ML 3	Noise Logging	Rion NL-42	785237	14/06/2023	14/06/2025
ML 5	Noise Logging	Rion NL-42	709627	29/11/2022	29/11/2024
ML 6	Noise Logging	Rion NL-42	923781	05/04/2023	05/04/2025
ML 8	Noise Logging	Rion NL-42	510453	01/11/2021	01/11/2023
ML 6	Weather logging	Davis Instruments Vantage Vue	MR190108059	-	-
ML 8	Weather logging	Davis Instruments Vantage Vue	MT220503021	-	-
All	Acoustic Calibratior	Pulsar Model 105	67861	21/08/2023	21/08/2024

Table 2 Project Equipment Register

The Rion NL-42 Sound level meter is a Class 1 instrument, suitable for laboratory and field measurement of noise.

All noise measurement equipment was within calibration during the full extent of the noise logging period. Field calibration was also conducted at the commencement and completion of logging with none of the loggers showing significant drift. All noise measurement equipment has been calibrated by a NATA accredited laboratory. Calibration certificates are available for all relevant equipment upon request.

3.5 Weather analysis and impact

Unattended noise monitoring was conducted at six locations around the Site with two weather stations installed for the same period. They were installed at ML 6 and ML 8. Noise and weather data during the measurement period have been correlated in accordance with Australian Standard 1055:2018 *Acoustics-Description and measurement of environmental noise (AS 1055)*. Adherence to the requirements of *AS 1055* ensures that noise data for each site represents the existing noise generating sources at the site.

Noise from wind and rain results in potential extraneous noise due to the following factors:

- Direct wind induced noise at the microphone,
- Noise from wind causing movement of trees, plants, unsecured objects,
- Direct rain impact noise,
- Increased traffic noise levels from wet roads.
- Additional noise sources that may result from flowing water, such as gutters, culverts, dripping, etc.

In accordance with *AS 1055*, the inclusion of measured noise during wind and rain events would not be representative of typically occurring and/or lowest ambient sound pressure levels. As such, periods where rain is present or where wind speed is above 5 m/s have been excluded from reported data.

In addition to the above, the background noise (L_{90} dB(A)) is the noise level that was exceeded for 90% of the measurement time or is representative of the lowest noise level for 10% of the measurement period.

Unattended noise monitoring has been conducted for 8 days. This is in line with Section 6.1 of *AS 1055* as it provides at least 5 days of weekday measurement and at least 2 days of weekend measurement. In some cases, inclement weather results in exclusion of all the daytime noise data (7am-10pm), night-time data (10pm-7am) or the whole day, where this occurs no conclusion can be drawn for that period and no data will be shown. We note that on the 25th of September inclement weather occurred for the entirety of the day and no data has been accepted. The remaining days are considered sufficient to provide reasonable assessment of the background noise at all sites.

In summary, excluding noise during inclement weather from background noise analysis eliminates atypical influence that may increase the apparent background noise at the subject site. The lowest 10 % of each measurement period is considered representative of the background noise at the measurement site. Data remaining after the weather exclusion covers sufficient time to give an acceptable sample of site noise.

4 Results of noise monitoring

The Site is located on the coast to the south of Port Lincoln and mainly comprises scrub land with existing industrial buildings (no longer operational). Further afield, there are residential buildings and associated roads which are part of the southern areas of Port Lincoln. Measurement locations within this study were within both unoccupied areas of scrub and within suburban areas. The background noise in the area has been measured using 6 unattended noise loggers. The results of the noise measurement campaign are shown below.

4.1 Baseline environmental data

Unattended environmental noise measurements were conducted from Thursday 21 September to Friday 29 September 2023. Table 3 provides a summary of the measurement data during the daytime period (7 am – 10 pm) for each of the measurement locations and detailed charts of the monitoring results are provided in Appendix B.

Measurement Location (Zone type)	Daytime Noise Data			Night-time Noise Data		
	L_{eq} dB(A)	L_{max} dB(A)	L_{90} dB(A)	L_{eq} dB(A)	L_{max} dB(A)	L_{90} dB(A)
ML 1 (DU)	39	78	< 20	37	73	< 20
ML 2 (SN)	39	79	< 20	37	68	< 20
ML 3 (WN)	50	81	23	46	75	< 20
ML 5 (SN)	46	81	22	43	75	< 20
ML 6 (DU)	45	89	22	51	96	< 20
ML 8 (Ru)	39	74	22	40	67	22

Table 3 Background noise monitoring summary

The average equivalent noise levels (L_{eq} dB(A)) within the occupied areas (ML 2, 3 and 5) are higher than those at the other monitors. This is most likely due to the impacts of road noise.

Maximum noise levels (L_{max} dB(A)) were highest at ML 6, the Port Lincoln Water treatment plant. At this location there are also higher average noise events during the night than during the day, however this may have been from natural sources close to 7am (for example birds or insects).

4.2 Discussion of results

While at the site, the main contributing noise sources were noted in addition to any factors potentially affecting the measurements. The land use at each monitoring location is also described.

4.2.1 ML 1

This measurement location was on the Site proposed for the desalination plant. The noise logger was installed 35 m to the west of the sand shed onsite which has been out of operation for some time. The measurement location was approximately 200 m from the water and there was dense vegetation southwest of the logger with generally open area to the east. Noise generation in the area was generally limited to birds, insects and wind induced noise from tree and plant foliage. However, the SA Water representative onsite identified that locals may sometimes move about the site on foot or in vehicles. Additional noise from the ocean would be contributary at the logger location during strong wind.

4.2.2 ML 2

The existing site is part of a property approved for further residential developments. The noise monitoring equipment was located southeast of the existing residential properties (the closest being 10 Sheoak Court). The logger was surrounded by native vegetation and was approximately 120 m from St Andrews Drive. As such, noise from the road is audible. Other noise sources are mostly limited to birds, insects, and wind induced noise from tree and plant foliage.

4.2.3 ML 3

The noise logger was setup within a green area on the north side of Wingard Terrace, directly across the road from 13 Laguna Drive. The south side of Wingard Terrace comprises residential properties, while the area north of the logger (between Wingard Terrace and Ravendale Road) is a commercial/light industrial precinct. At the north of the measurement location there was an existing concrete wall which surrounds the SA Power Networks site. Due to the proximity to the road and the regularity of traffic in the area, the controlling noise source at the site is generally cars along Wingard Terrace. Additional vehicle noise is contributed by commercial/light industrial uses along Raven dale Road.

4.2.4 ML 5

The measurement location was within parkland bounded by St Andrews Terrace, Lipson Place and Adelphi Terrace. Beyond the bounding roads the areas are all residential properties. Primary conditions on the land are native vegetation with walking tracks through the site. Traffic along the adjacent roads, birds, insects, and wind induced noise from tree and plant foliage comprise the primary noise sources. It was noted that residents were walking dogs in the area, this may impact noise measurements during some periods, in particular recorded L_{max} levels. At the south end of the site (100 m from the measurement location) there was a water tank and an SA Water pump station. Neither of these sources are expected to contribute significantly to the measured noise levels.

4.2.5 ML 6

The existing SA Water Port Lincoln Wastewater Treatment Plant (WWTP) is located Near Billy Light's Point. The logger was located at the northeast end of the WWTP. The WWTP is surrounded by native coastal vegetation to the north and west of the logger location, however the ocean is approximately 30 m to the east of the site. Additionally, St Andrews Road and a carpark for the nearby boat ramp are each within 100 m of the logger. The existing noise contributors are the site include ocean noise, tree movement, birds, insects. Vehicle movements within the WWTP and from use of St Andrews Road and the boat ramp car park also contributed to the recorded data.

4.2.6 ML 8

The final noise logger within the Kathai Conservation Park was at an SA Water location with two large volume water tanks. The location is surrounded by vegetation, with a small number of unsealed roads nearby. The nearest residence is approximately 580 m to the north. Some additional residences are located 650 m to 700 m to the east. The City of Port Lincoln Waste Landfill is located 1.2 km to the east of the site. The existing noise contributions within the area arise from birds, insects, infrequent local road use and wind induced noise from tree and plant foliage.

5 Conclusion

WSP has undertaken monitoring of noise at Port Lincoln for the purposes of characterising the existing acoustic environment of the area. These works have been completed in accordance with the scope of works agreed with SA Water.

The monitoring was found that noise levels in the vicinity of the site are generally low, particularly during night-time hours. The primary influences on the background noise levels are natural noise sources and traffic on the local road network.

6 Limitations

This Report is provided by WSP Australia Pty Limited (*WSP*) for South Australian Water Corporation (*Client*) in response to specific instructions from the Client and in accordance with WSP's proposal dated 9 March 2023 and agreement with the Client dated 29 March 2023 (*Agreement*).

6.1 Permitted purpose

This Report is provided by WSP for the purpose described in the Agreement and no responsibility is accepted by WSP for the use of the Report in whole or in part, for any other purpose (*Permitted Purpose*).

6.2 Qualifications and assumptions

The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report or otherwise communicated to the Client.

Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and / or recommendations in the Report (*Conclusions*) are based in whole or in part on information provided by the Client and other parties identified in the report (*Information)*, those Conclusions are based on assumptions by WSP of the reliability, adequacy, accuracy and completeness of the Information and have not been verified. WSP accepts no responsibility for the Information.

WSP has prepared the Report without regard to any special interest of any person other than the Client when undertaking the services described in the Agreement or in preparing the Report.

6.3 Use and reliance

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WSP is not (and will not be) obliged to provide an update of this Report to include any event, circumstance, revised Information or any matter coming to WSP's attention after the date of this Report. Data reported and Conclusions drawn are based solely on information made available to WSP at the time of preparing the Report. The passage of time; unexpected variations in ground conditions; manifestations of latent conditions; or the impact of future events (including (without limitation) changes in policy, legislation, guidelines, scientific knowledge; and changes in interpretation of policy by statutory authorities); may require further investigation or subsequent re-evaluation of the Conclusions.

This Report can only be relied upon for the Permitted Purpose and may not be relied upon for any other purpose. The Report does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise. It is the responsibility of the Client to accept (if the Client so chooses) any Conclusions contained within the Report and implement them in an appropriate, suitable and timely manner.

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6.4 Disclaimer

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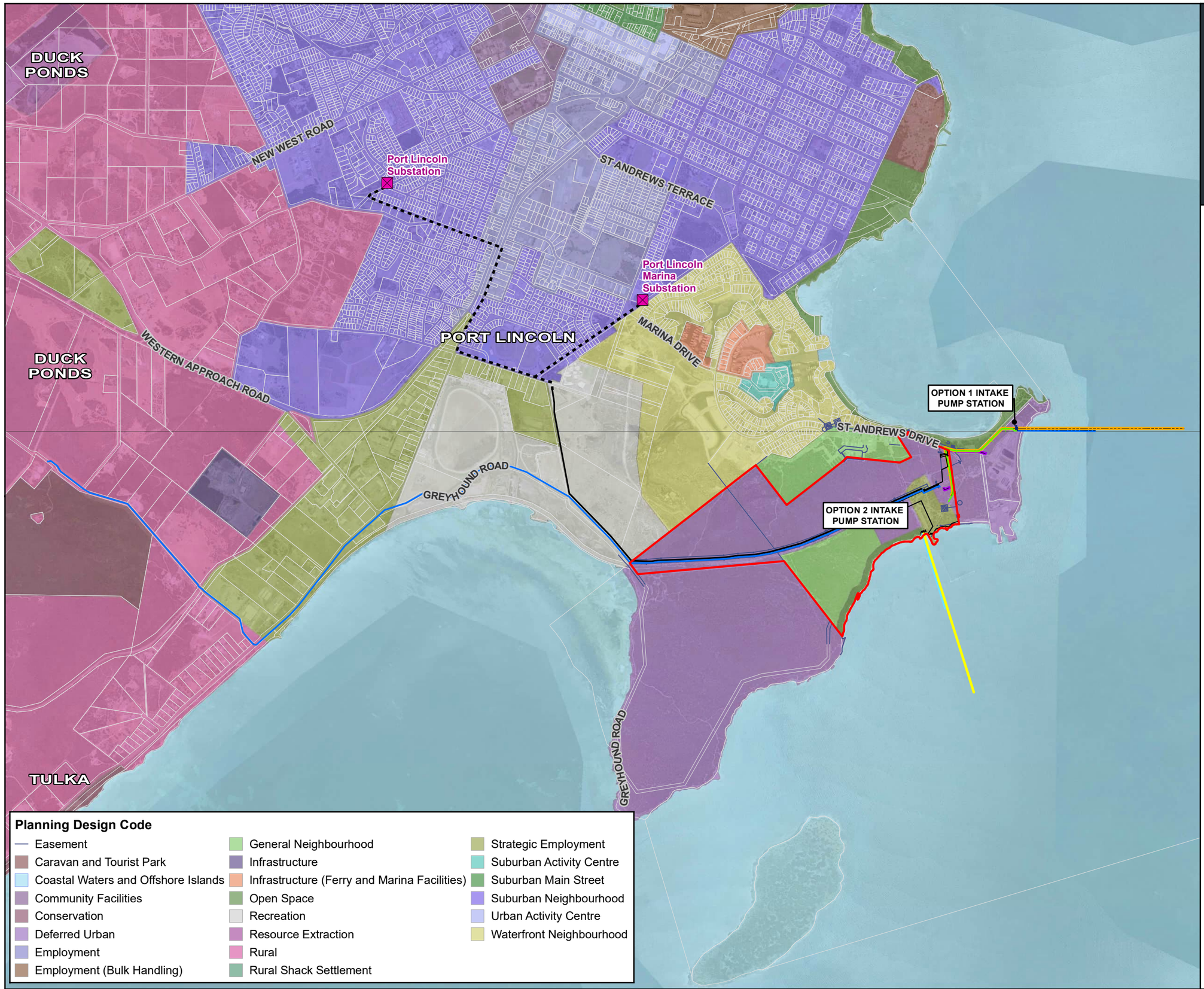
Appendix A

Zoning Map (SAPPA)



Planning Design Code

- Easement
- Caravan and Tourist Park
- Coastal Waters and Offshore Islands
- Community Facilities
- Conservation
- Deferred Urban
- Employment
- Employment (Bulk Handling)
- General Neighbourhood
- Infrastructure
- Infrastructure (Ferry and Marina Facilities)
- Open Space
- Recreation
- Resource Extraction
- Rural
- Rural Shack Settlement
- Strategic Employment
- Suburban Activity Centre
- Suburban Main Street
- Suburban Neighbourhood
- Urban Activity Centre
- Waterfront Neighbourhood

C:\Users\AUMR505149\WSP O365\AU-WKG - Geospatial - AIS - Projects\PS137455_New_Eyre_Peninsul\Mxd\01_ReferenceFigures\PS137455_F003_PlanningandDesign_r1v1.mxd | Author: F.LAST | QA: -

wsp

Eyre Peninsula Desalination Plant Project

Figure 3
Planning and Design Code Zones

Legend

- Site Boundary
- Cadastre
- Desalination Plant
- Overhead Transmission Line
- Underground Transmission Line
- Transfer Pipeline
- Easement
- Substation

Marine Infrastructure Option 1

- Marine Outfall
- Raw Seawater Intake
- Sewer Rising Main
- Transfer Pipeline

Marine Infrastructure Option 2

- Marine Outfall
- Raw Seawater Intake

PRELIMINARY

0 580 1,160
Meters

Coordinate system: GDA2020 MGA Zone 53

Scale ratio correct when printed at A3

1:24,000 Date: 19/07/2023

GDA 2020

Data sources: DELWP, Geoscience Australia, DataSA, Metromap

Appendix B

Daily Noise Graphing

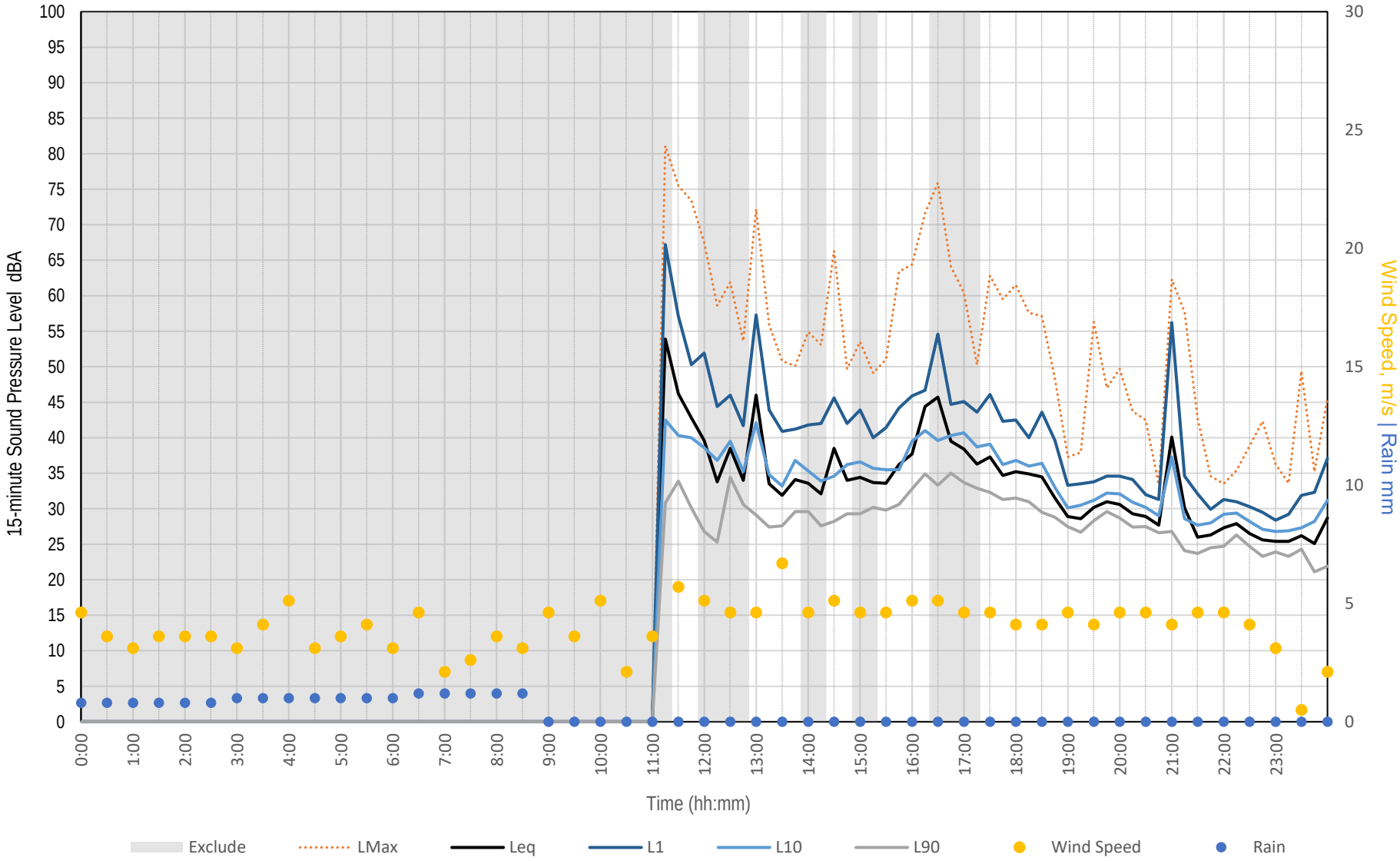
APPENDIX B-1
ML 1

Daily Summary								
Start Date: Thursday 21 September 2023								
End Date: Friday 29 September 2023								
Date	21/09	22/09	23/09	24/09	25/09[1]	26/09	27/09	28/09
$L_{eq, Day}$ dBA	38	35	41	42	-	37	37	40
$L_{eq, Night}$ dBA	35	32	34	40	-	39	32	39
$L_{max\ Day}$ dBA	76	69	85	69	-	68	69	79
$L_{max\ Night}$ dBA	49	76	56	68	-	80	66	64
$L_{90\ Day}$ dBA	24	28	18	24	-	26	16	24
$L_{90\ Night}$ dBA	21	22	18	19	-	26	16	18

[1] Inclement weather occurred for the entirety of the day and no data has been accepted.

Measured Noise Levels - MP 1

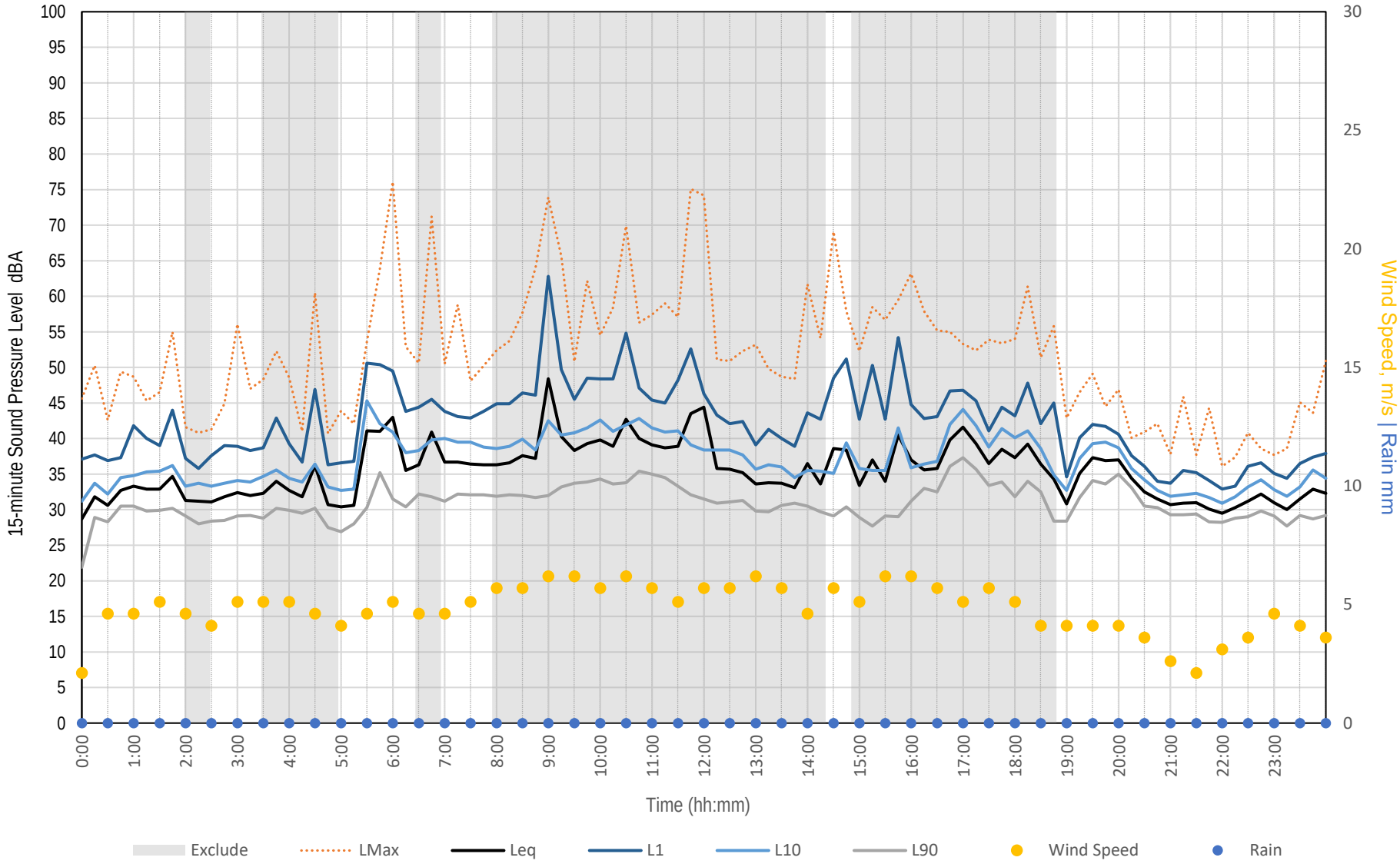
Thursday, 21 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

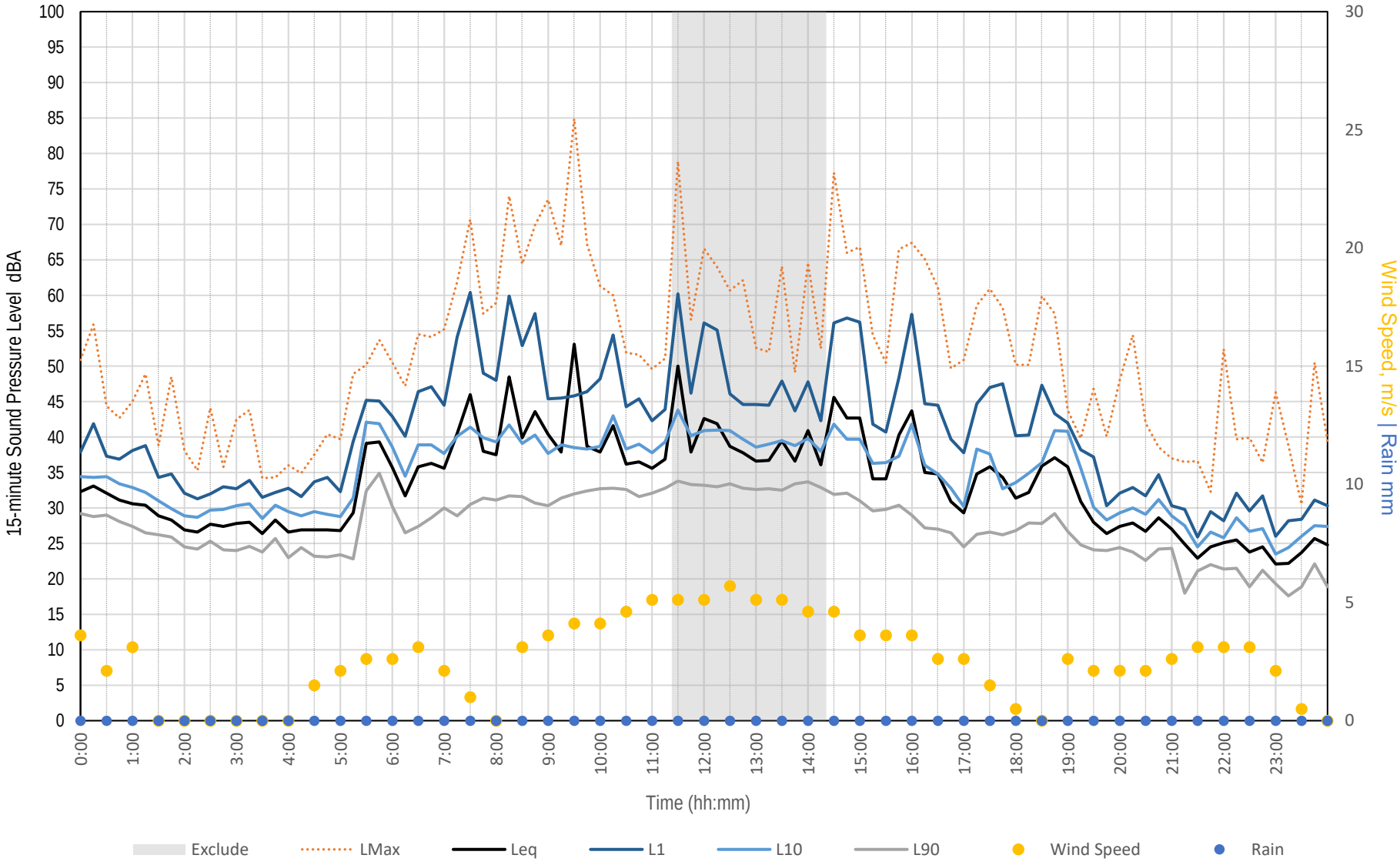
Friday, 22 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

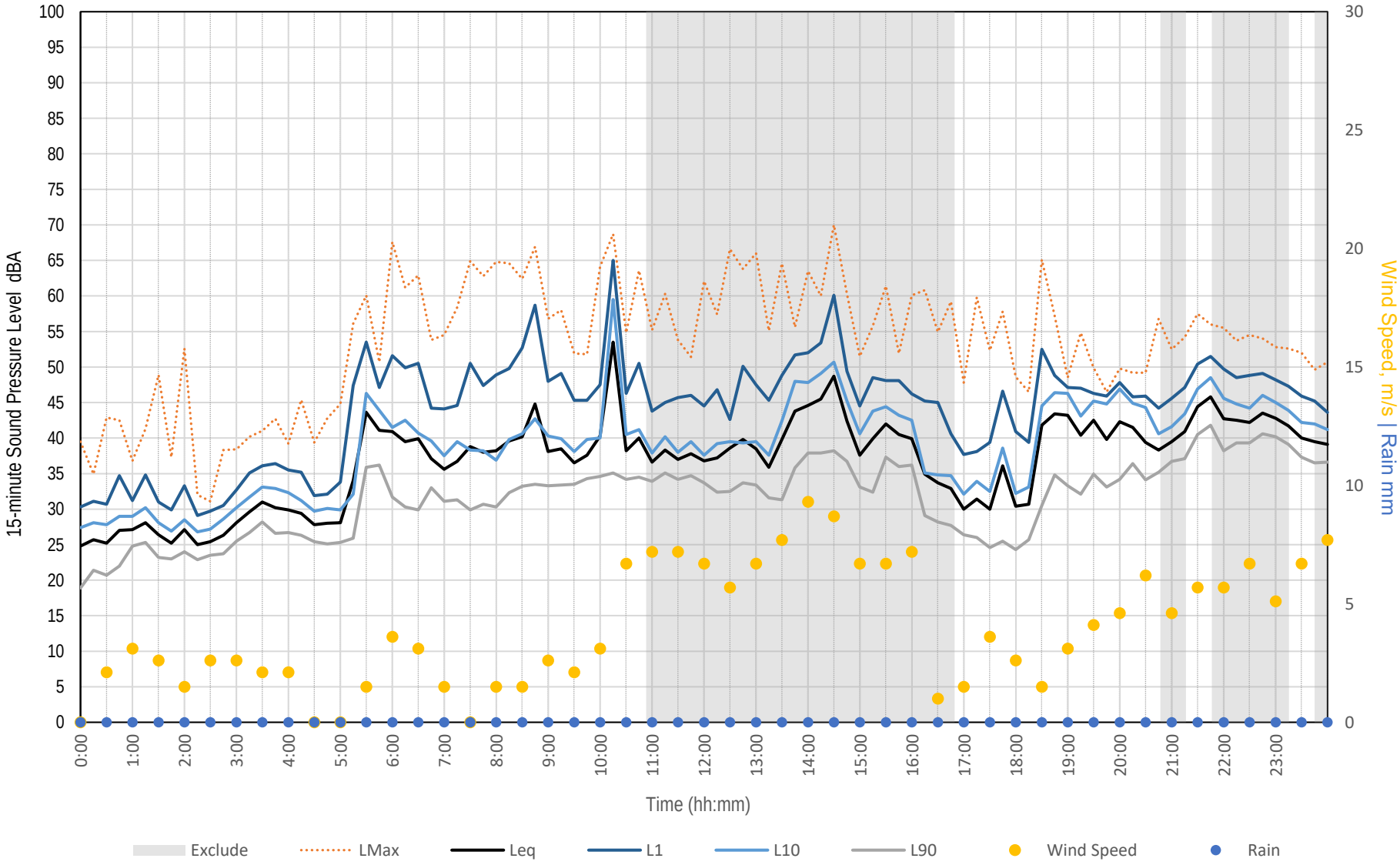
Saturday, 23 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

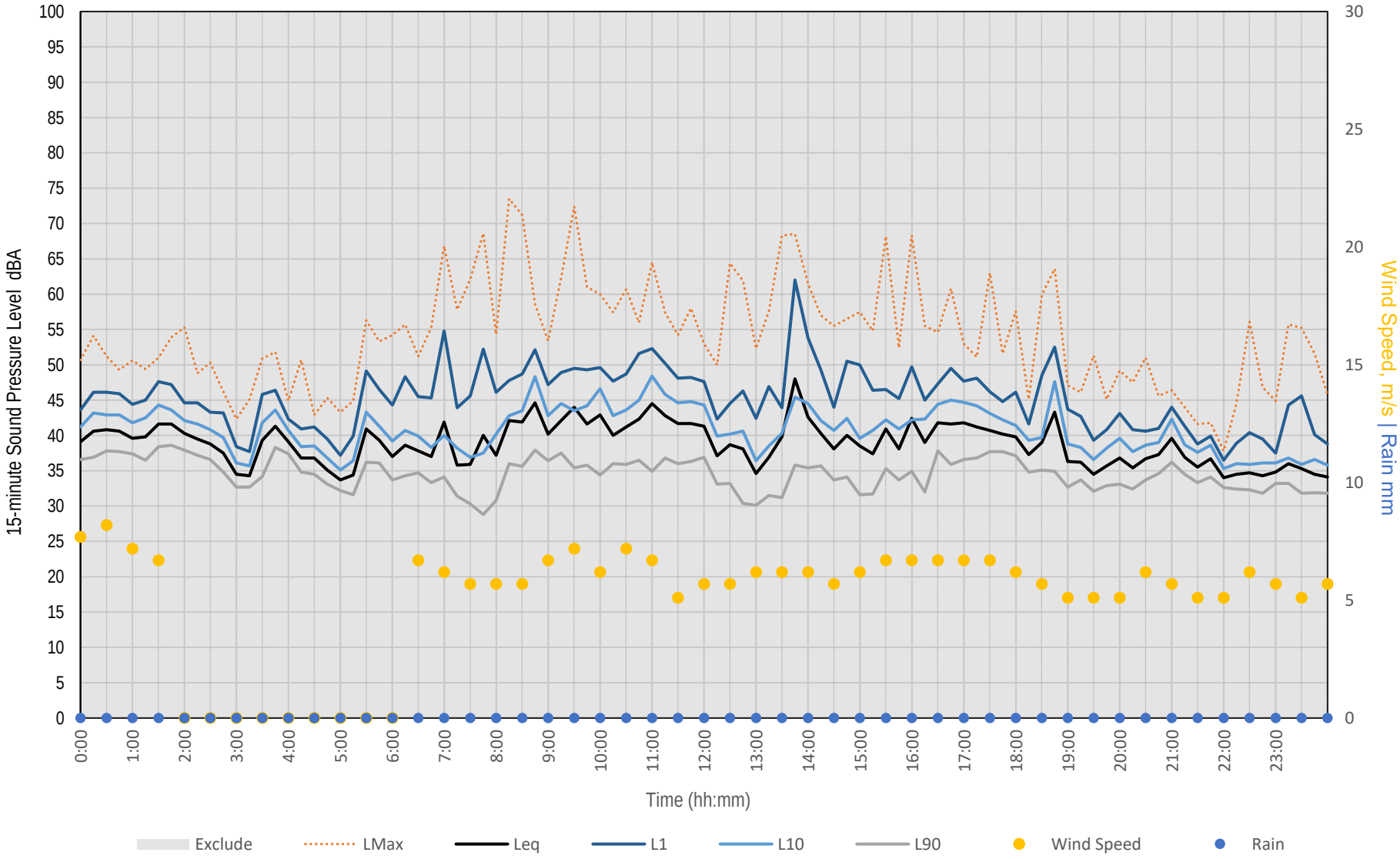
Sunday, 24 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

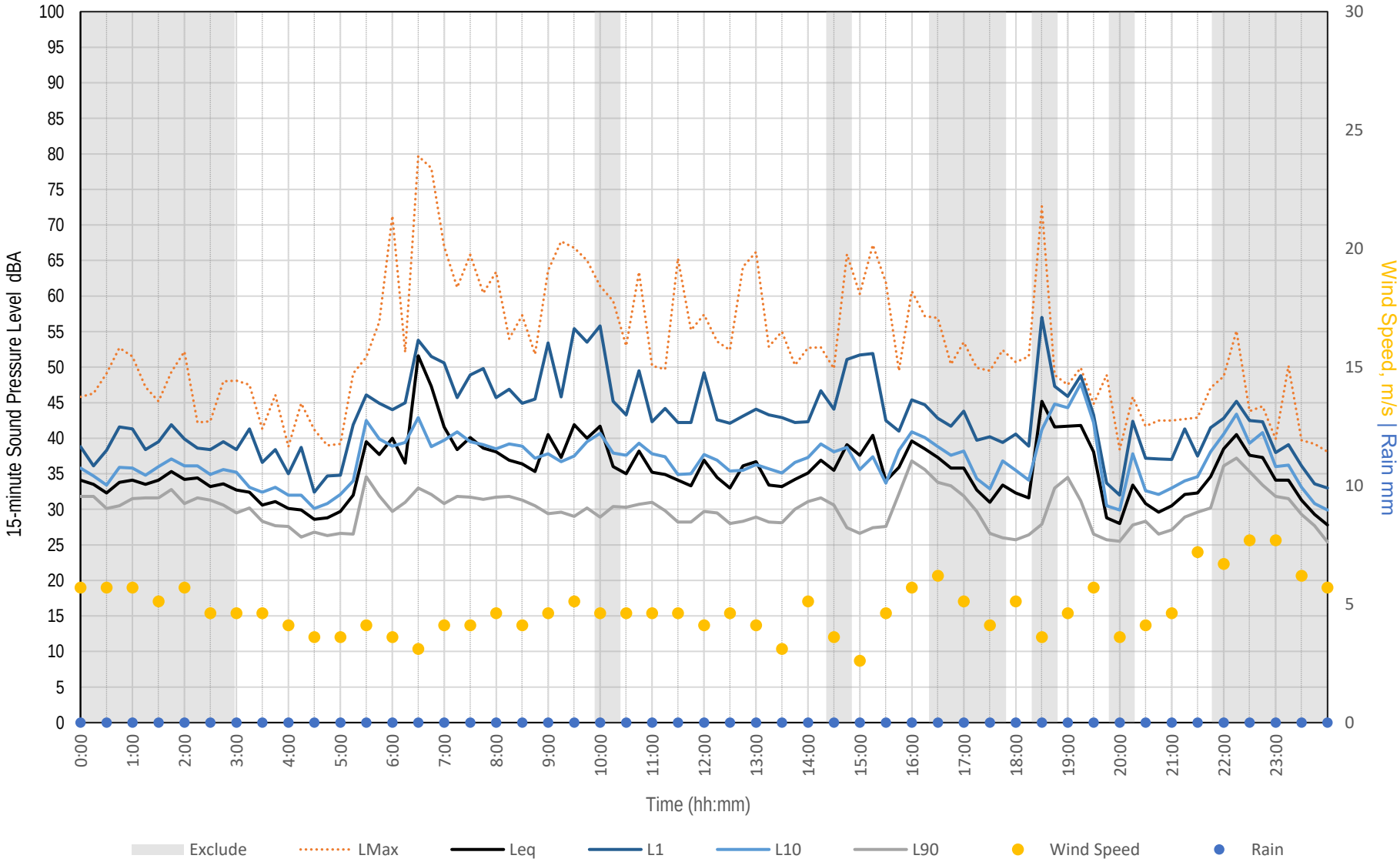
Monday, 25 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

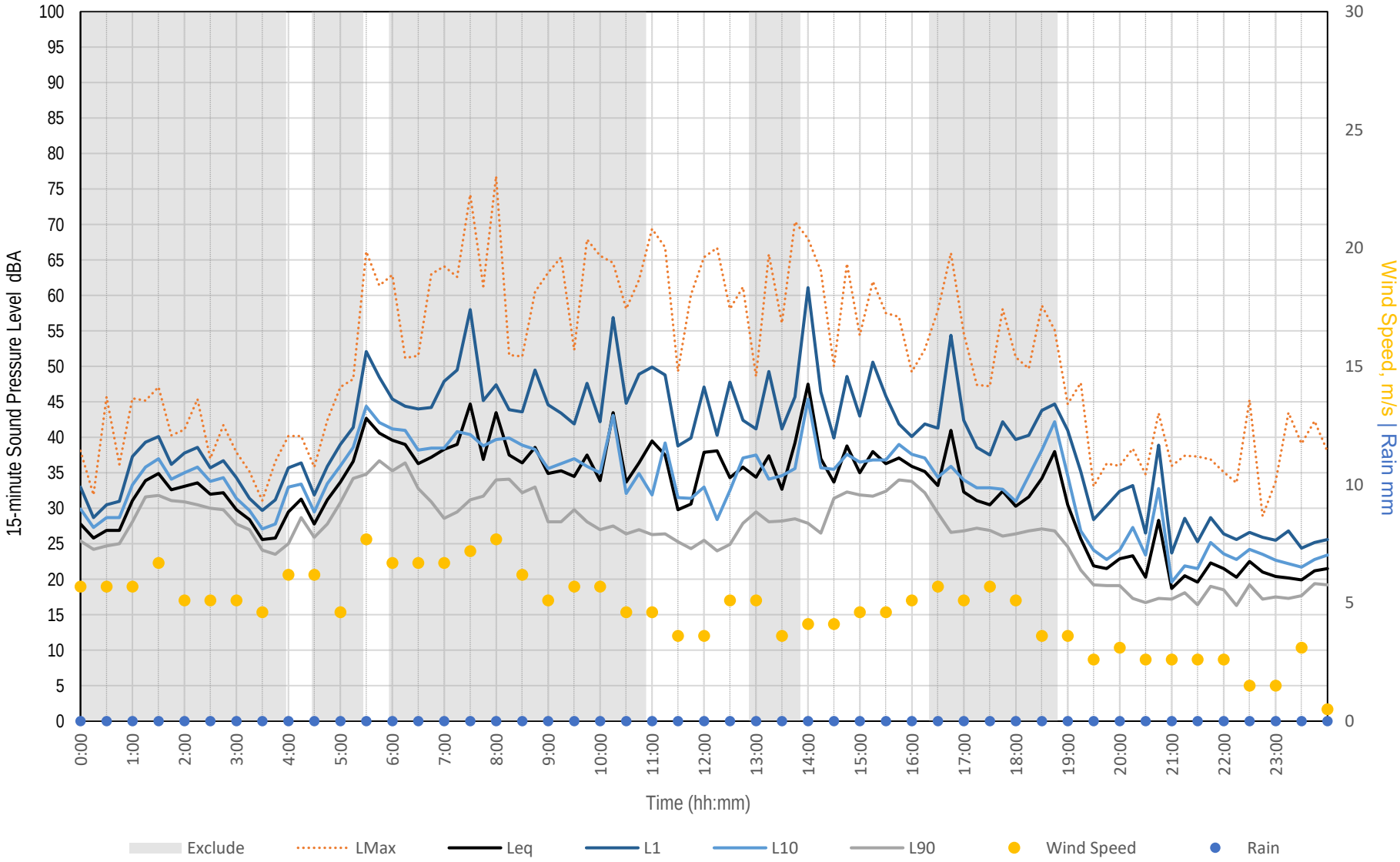
Tuesday, 26 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

Wednesday, 27 September 2023



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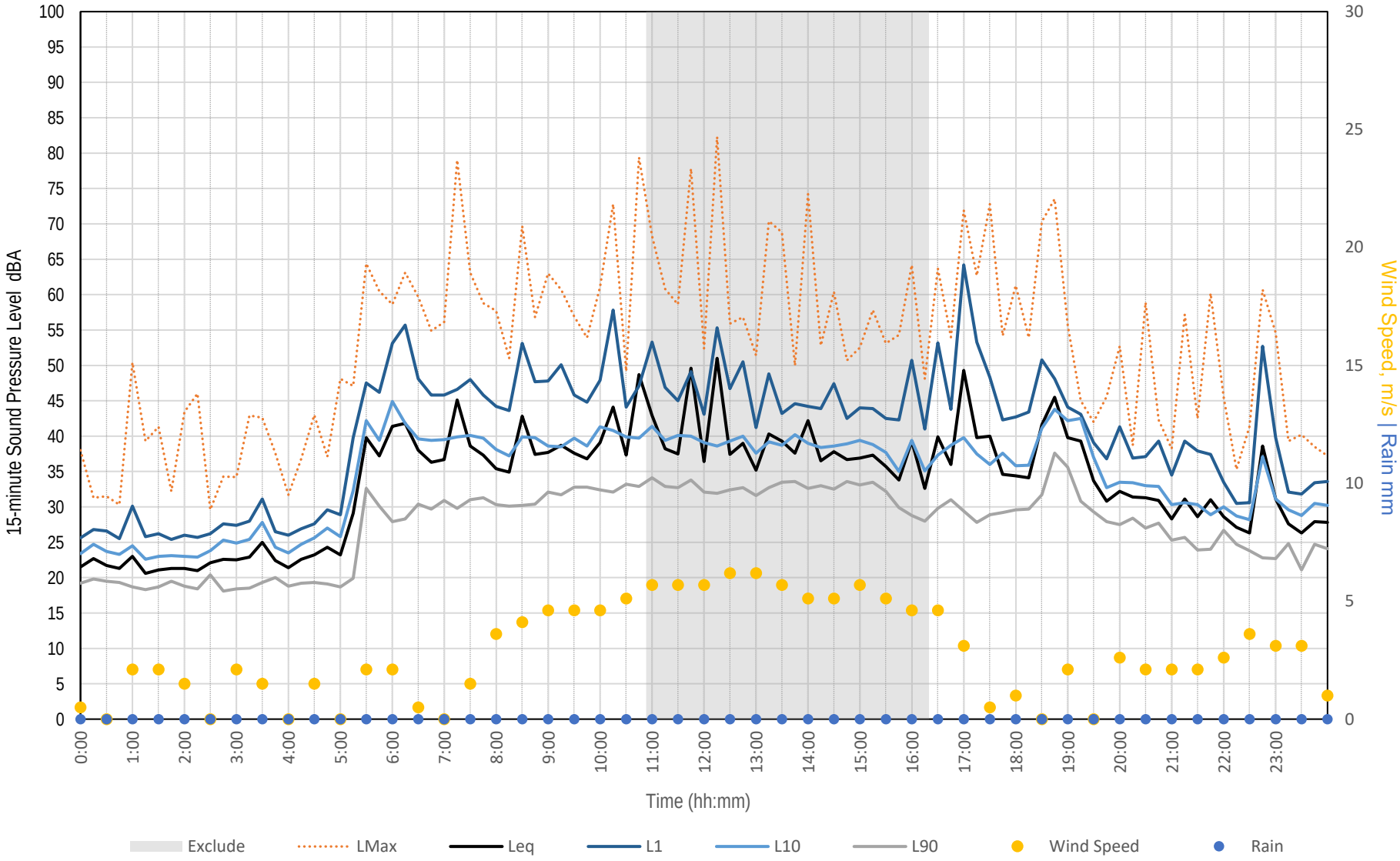
Measured Noise Levels - MP 1

Thursday, 28 September 2023



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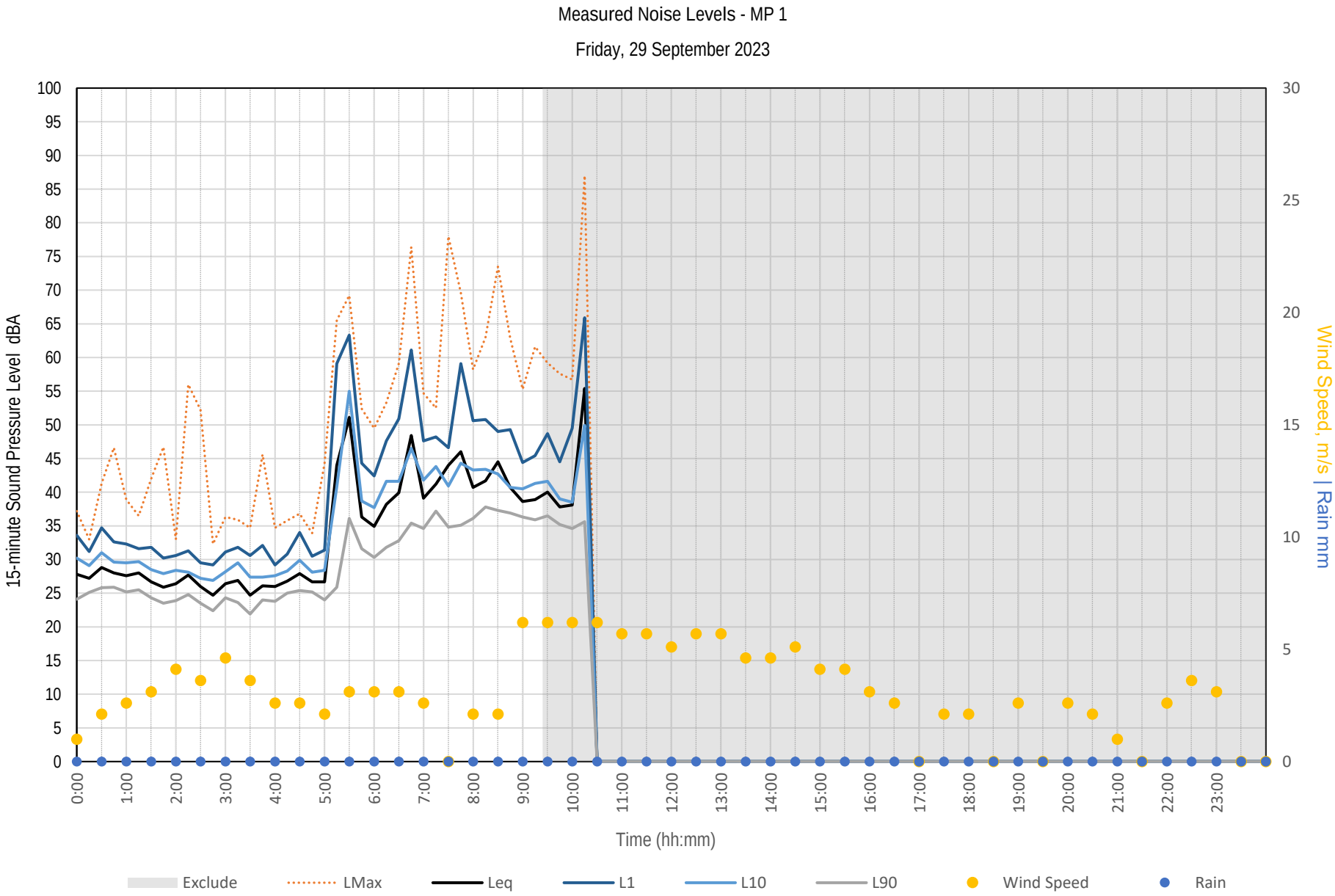


Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

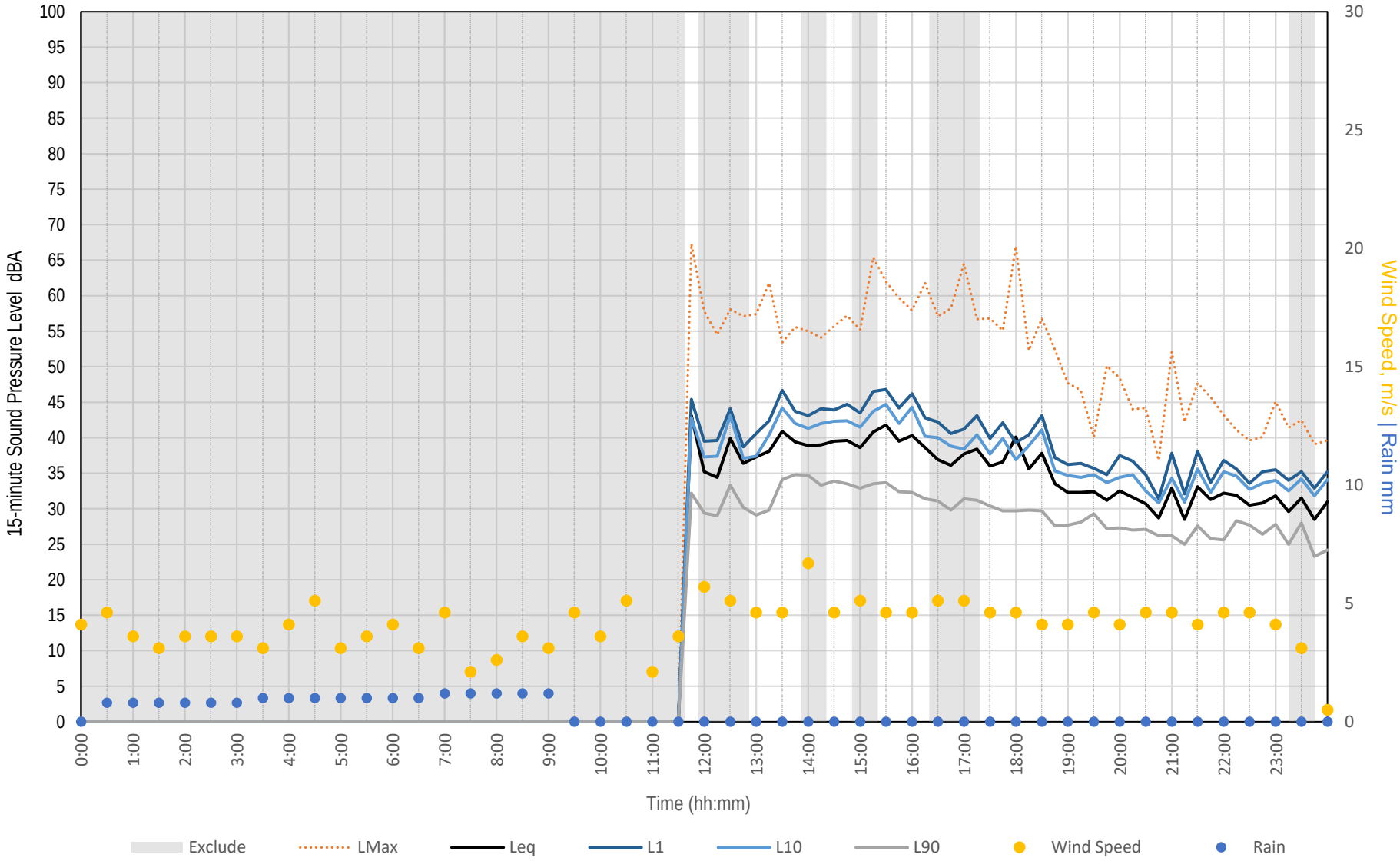
APPENDIX B-2
ML 2

Daily Summary								
Start Date: Thursday 21 September 2023								
End Date: Friday 29 September 2023								
Date	21/09	22/09	23/09	24/09	25/09[2]	26/09	27/09	28/09
$L_{eq, Day}$ dBA	37	39	41	38	-	38	35	40
$L_{eq, Night}$ dBA	38	35	35	39	-	39	33	38
$L_{max\ Day}$ dBA	67	68	87	67	-	65	69	64
$L_{max\ Night}$ dBA	45	68	69	68	-	62	73	74
$L_{90\ Day}$ dBA	25	28	18	24	-	24	19	23
$L_{90\ Night}$ dBA	25	24	17	18	-	29	18	16

[2] Inclement weather occurred for the entirety of the day and no data has been accepted.

Measured Noise Levels - MP 2

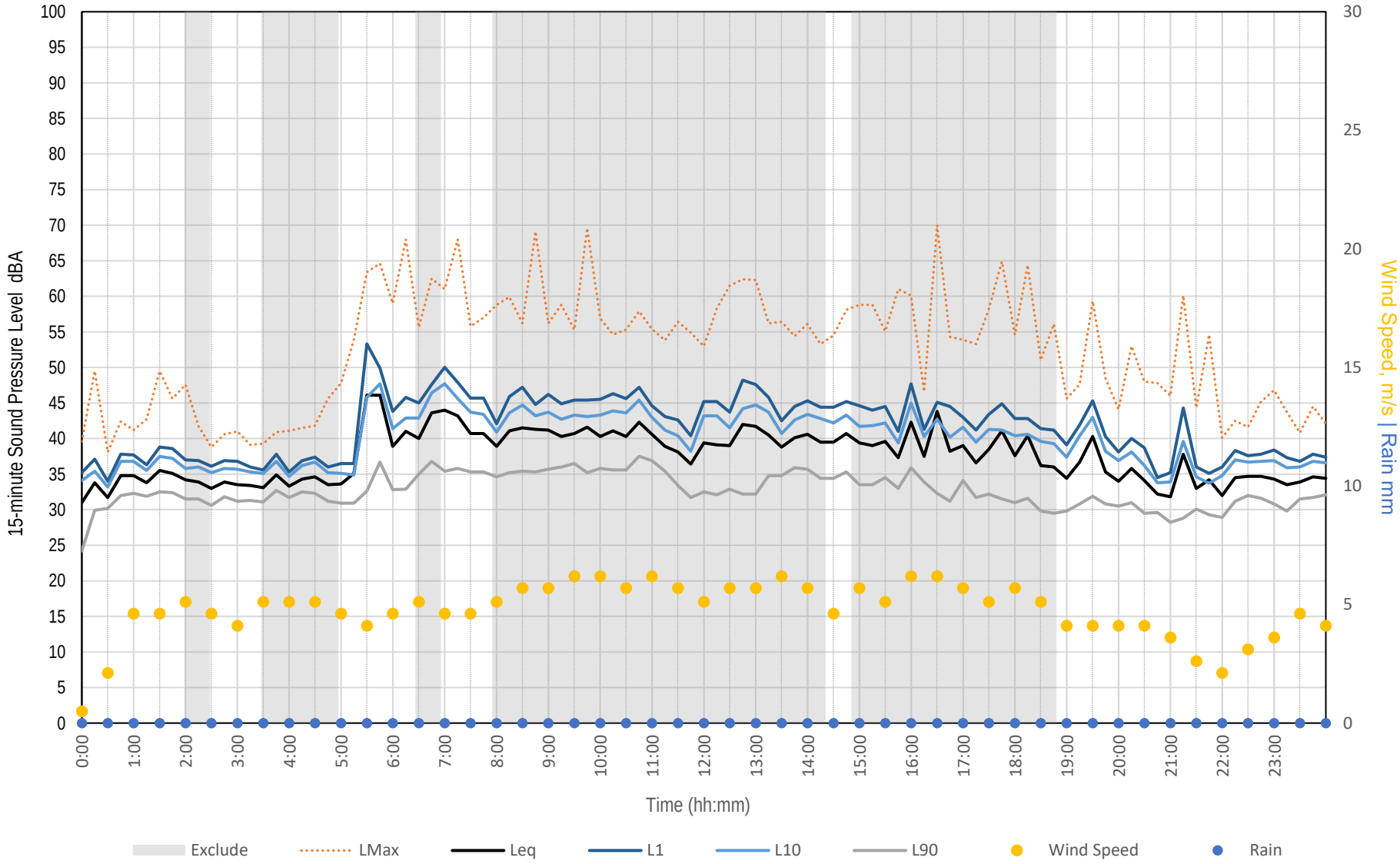
Thursday, 21 September 2023



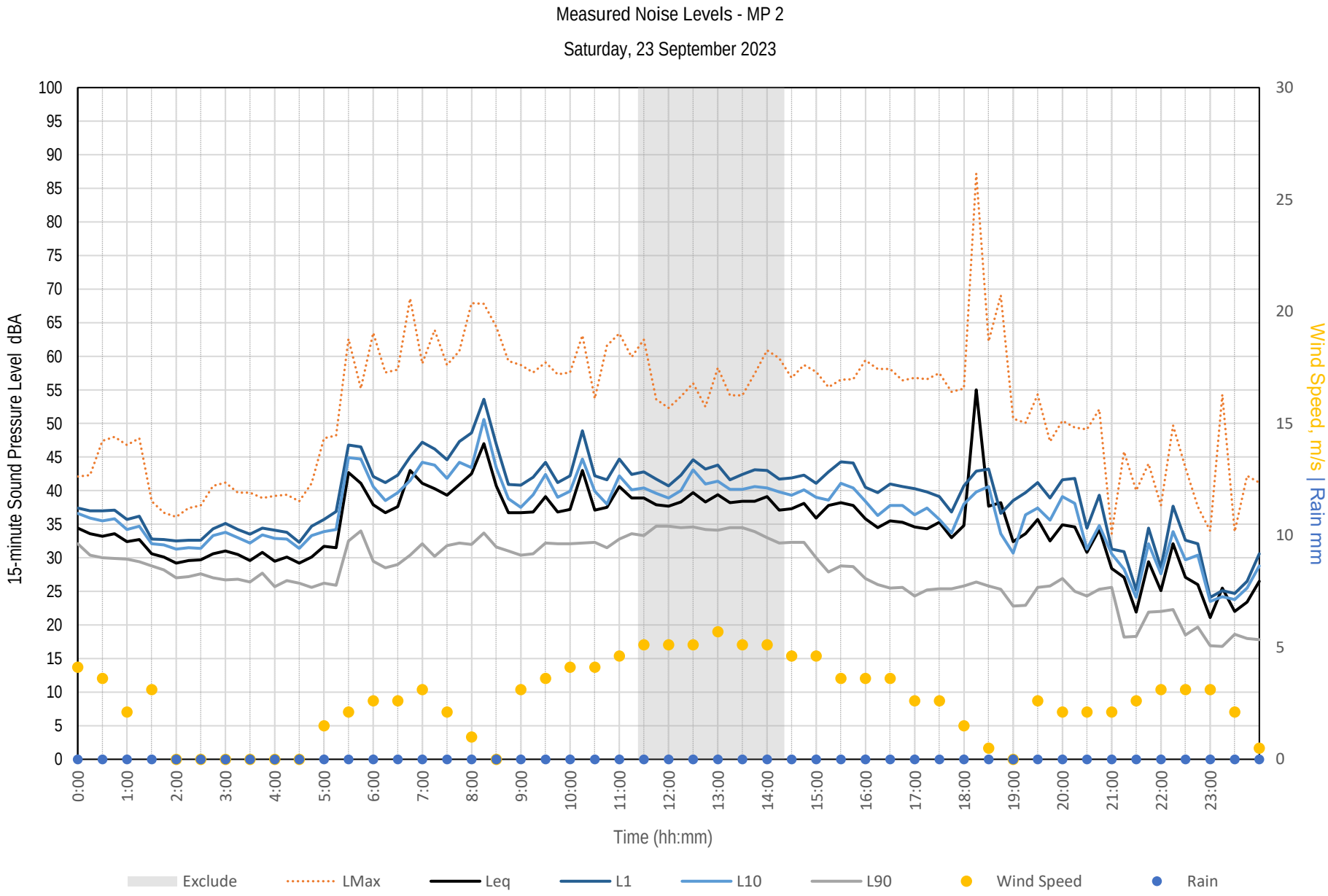
Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 2

Friday, 22 September 2023



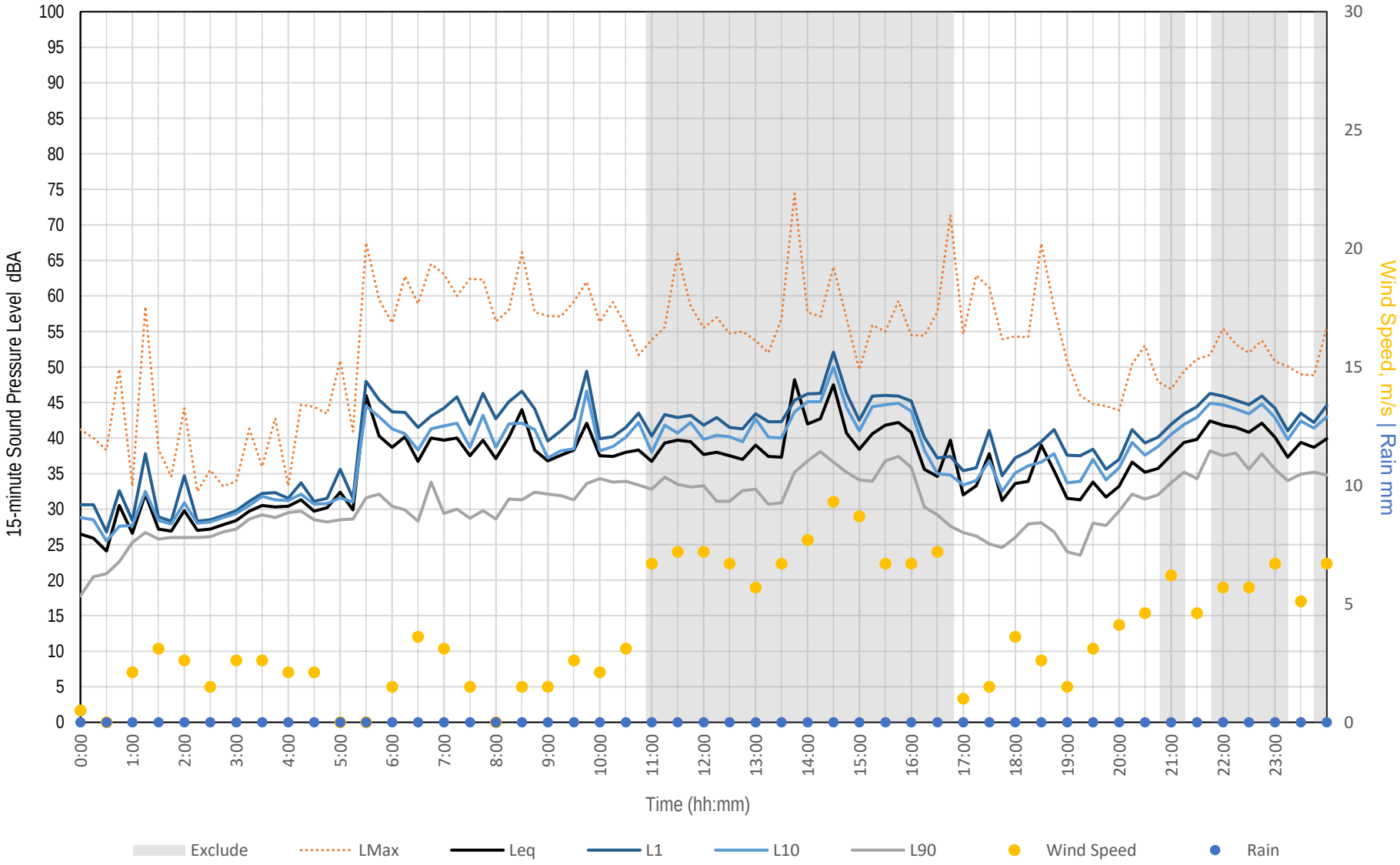
Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 2

Sunday, 24 September 2023



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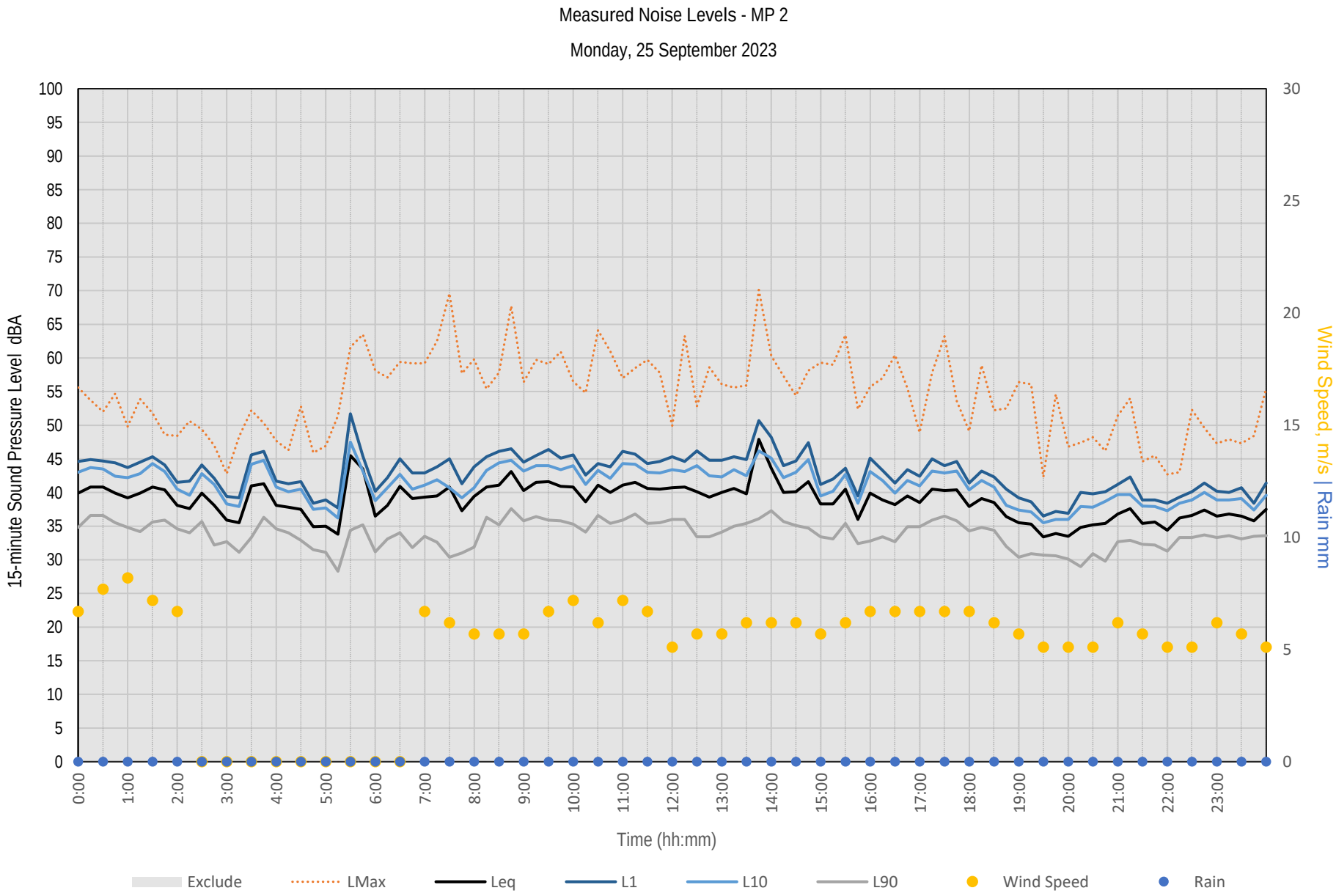
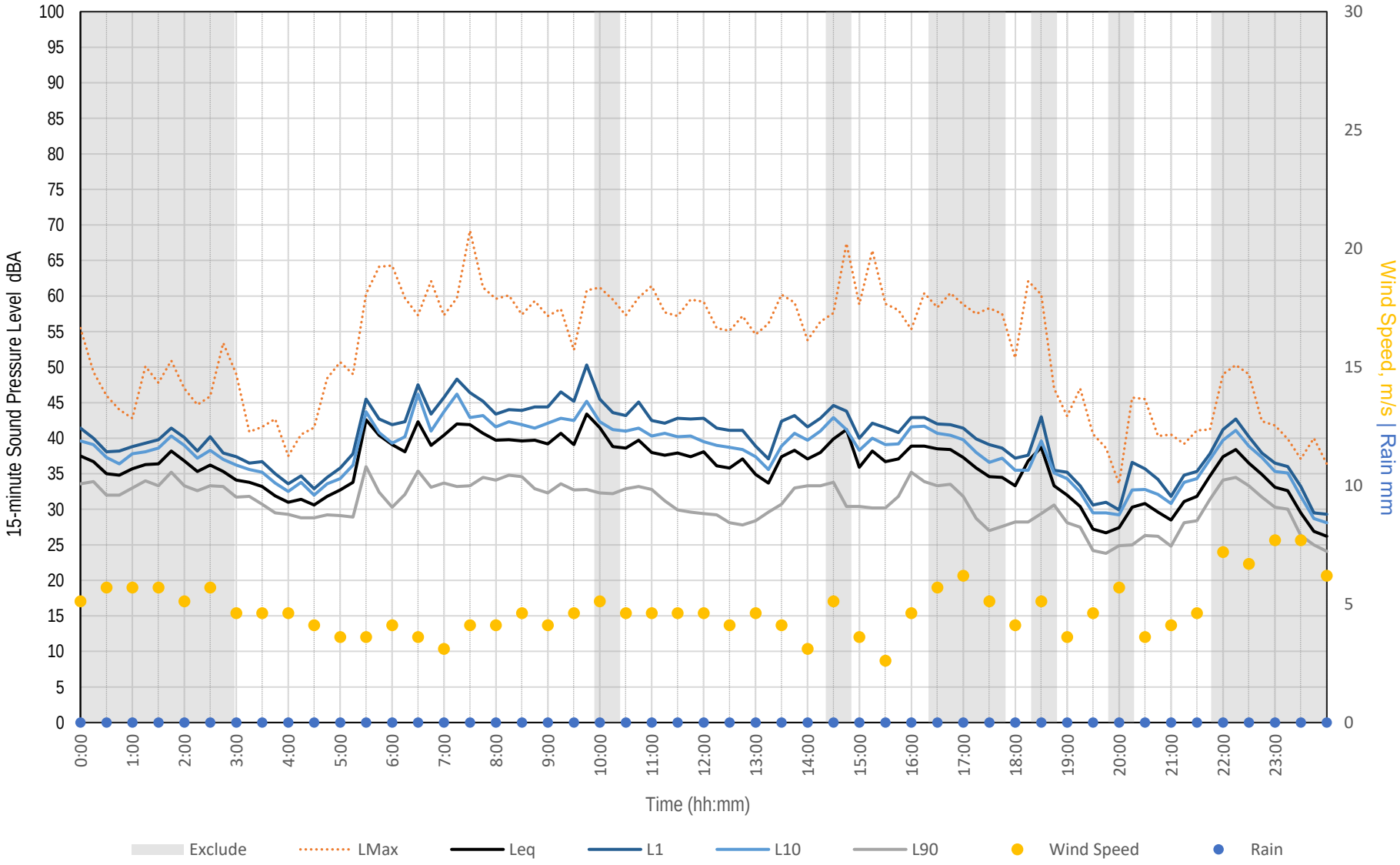


Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 2

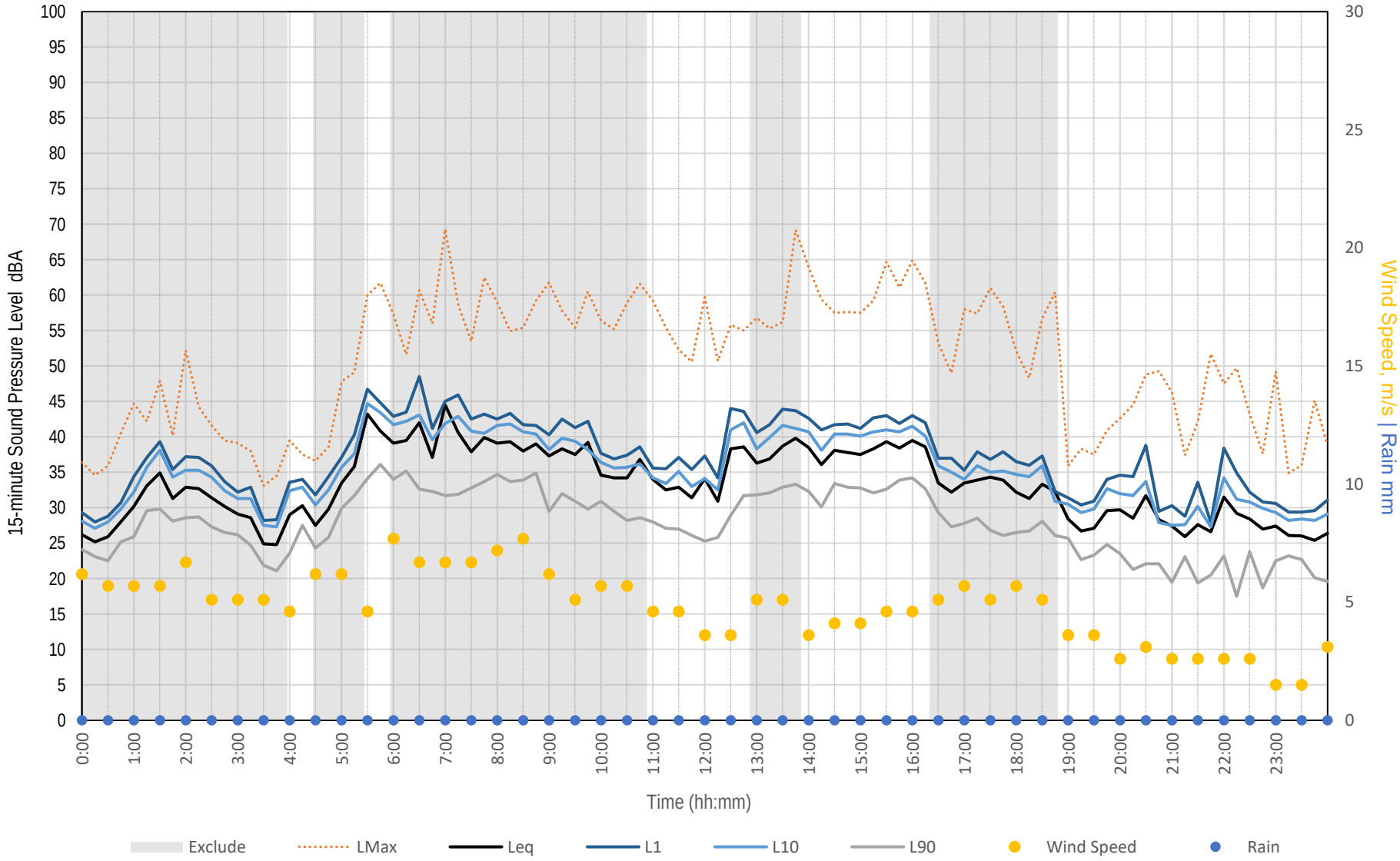
Tuesday, 26 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 2

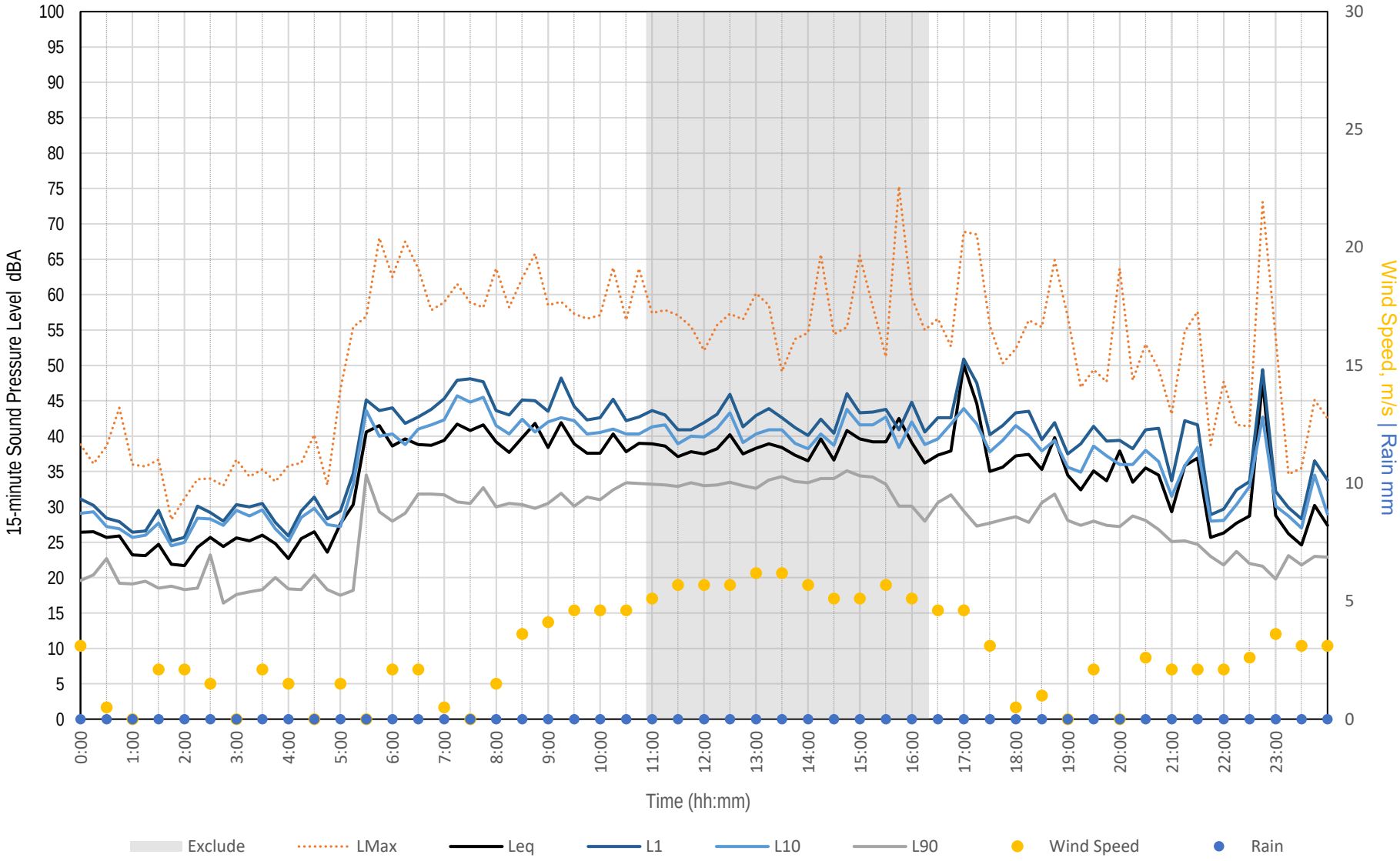
Wednesday, 27 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 2

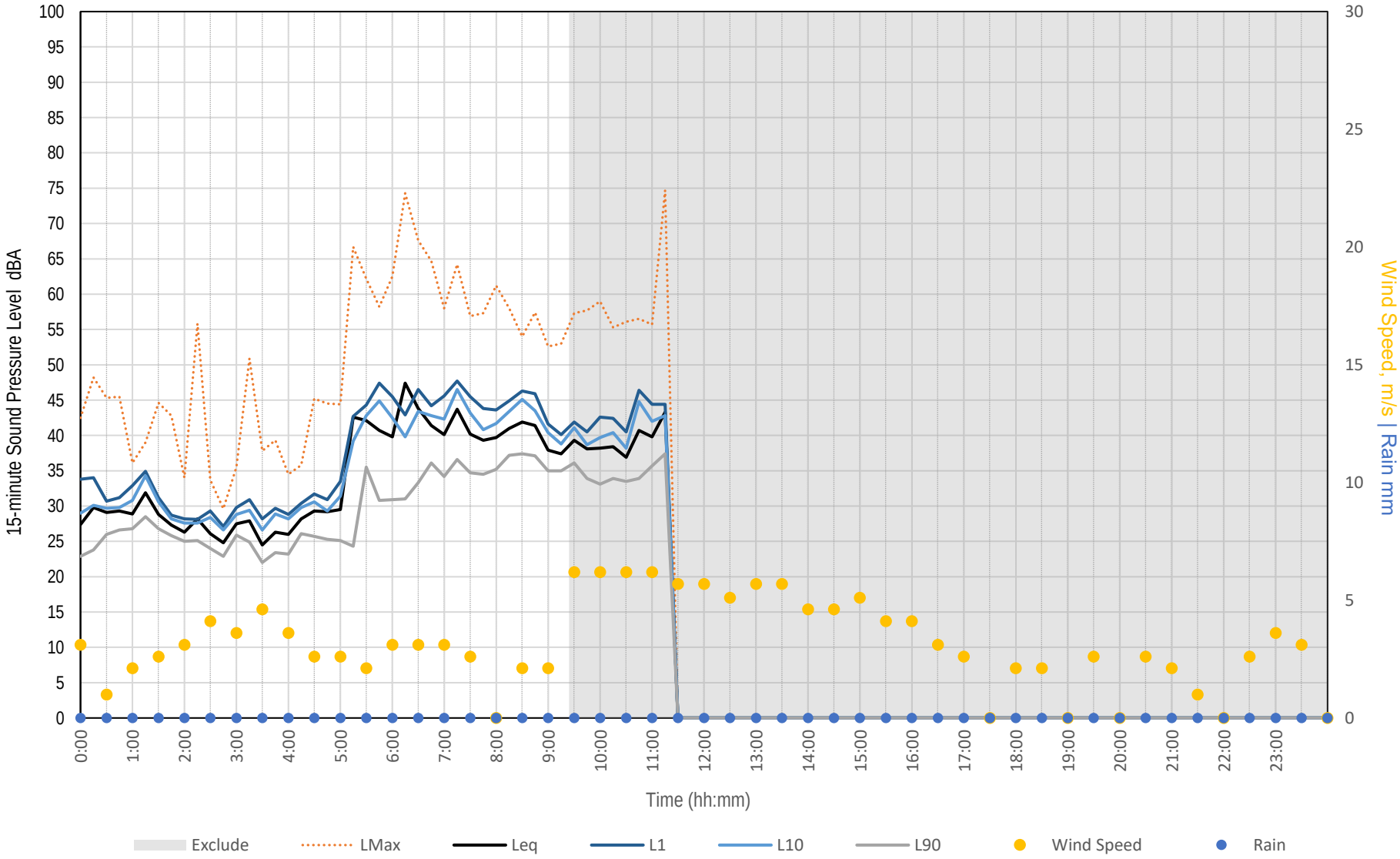
Thursday, 28 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 2

Friday, 29 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

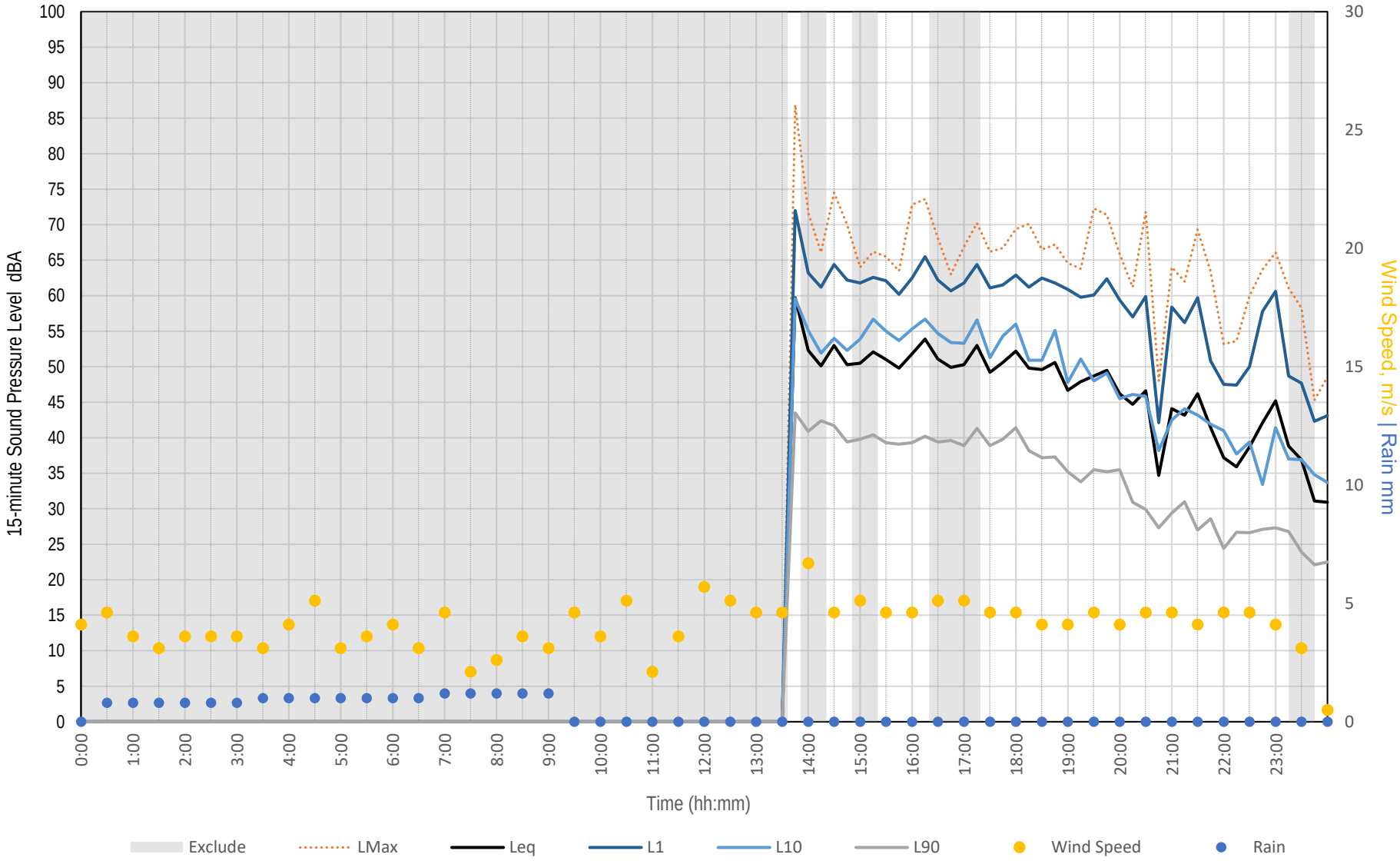
APPENDIX B-3
ML 3

Daily Summary								
Start Date: Thursday 21 September 2023								
End Date: Friday 29 September 2023								
Date	21/09	22/09	23/09	24/09	25/09[3]	26/09	27/09	28/09
$L_{eq,\ Day}$ dBA	51	47	49	47	-	51	50	50
$L_{eq,\ Night}$ dBA	45	47	44	40	-	49	48	47
$L_{max\ Day}$ dBA	87	76	83	77	-	80	76	78
$L_{max\ Night}$ dBA	66	68	81	74	-	76	67	72
$L_{90\ Day}$ dBA	27	28	26	29	-	27	23	24
$L_{90\ Night}$ dBA	24	23	20	19	-	24	21	19

[3] Inclement weather occurred for the entirety of the day and no data has been accepted.

Measured Noise Levels - MP 3

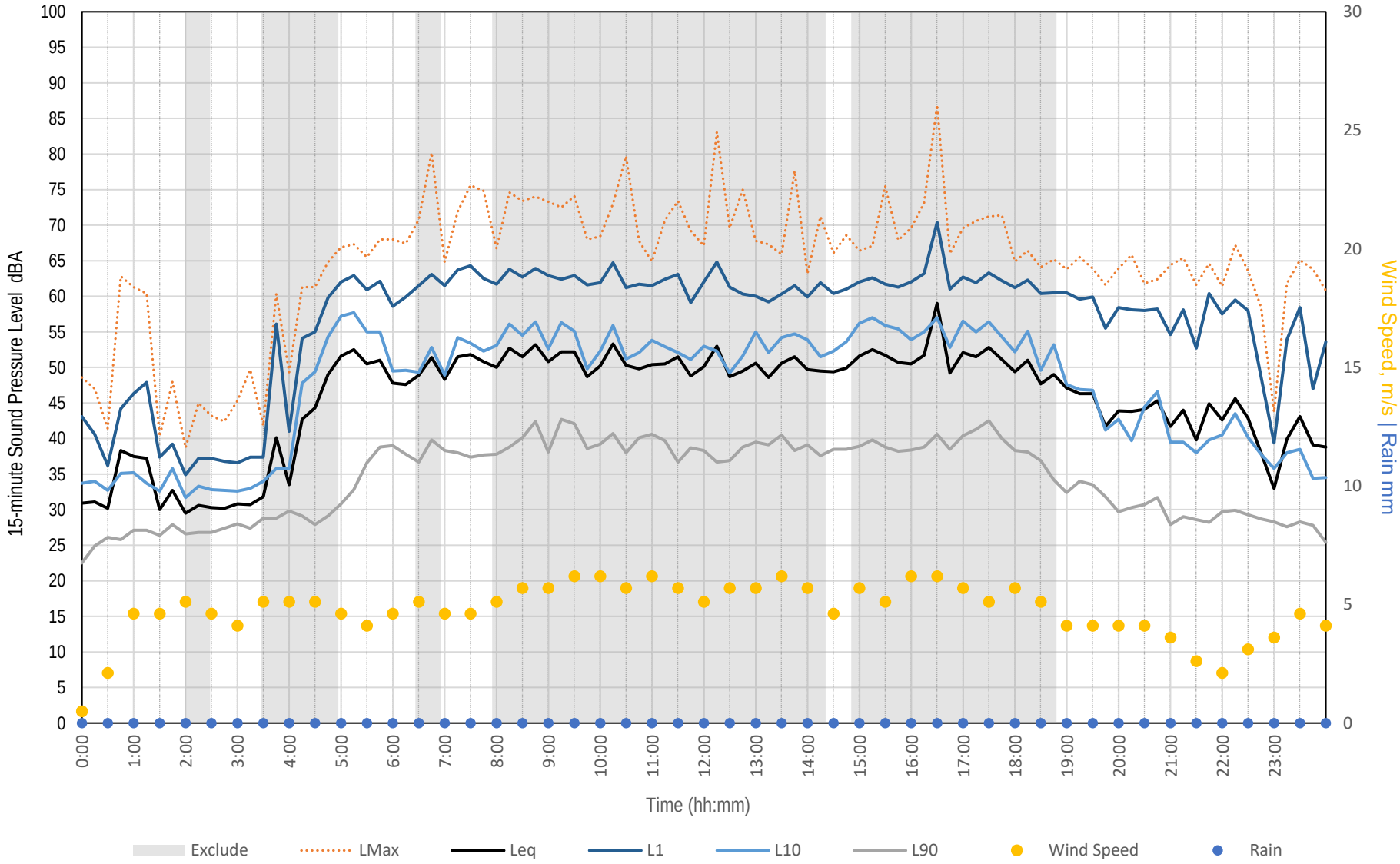
Thursday, 21 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 3

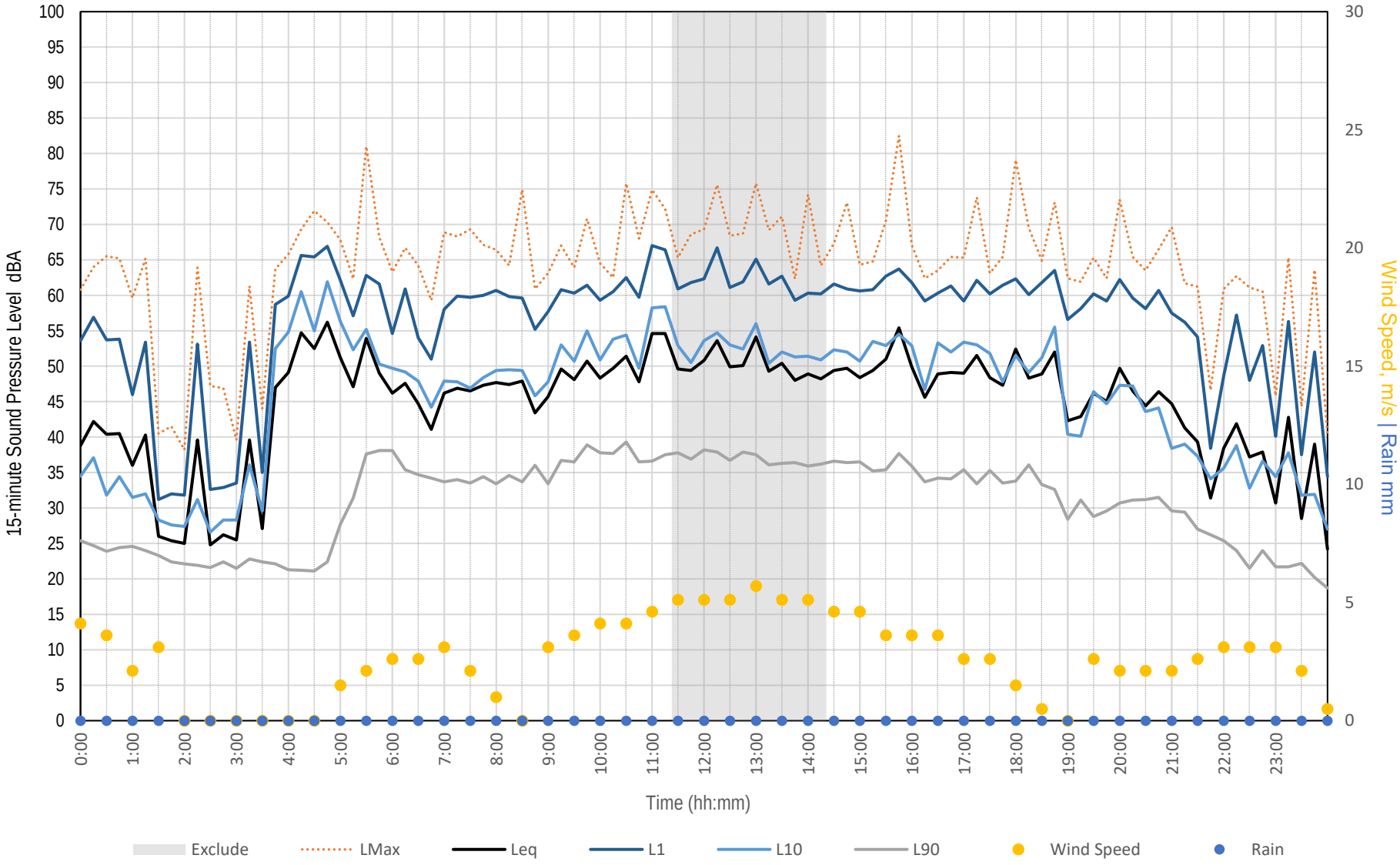
Friday, 22 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 3

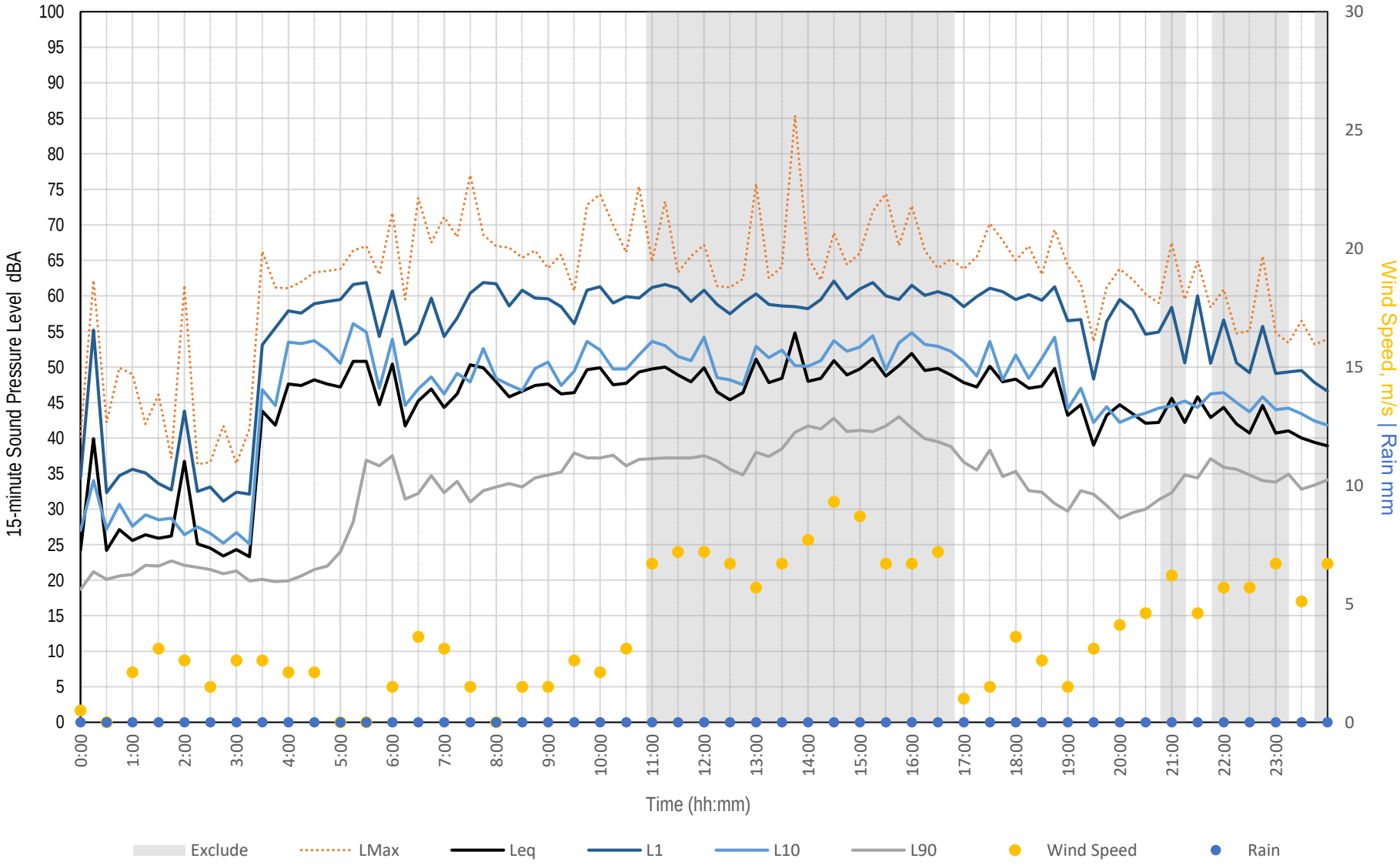
Saturday, 23 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 3

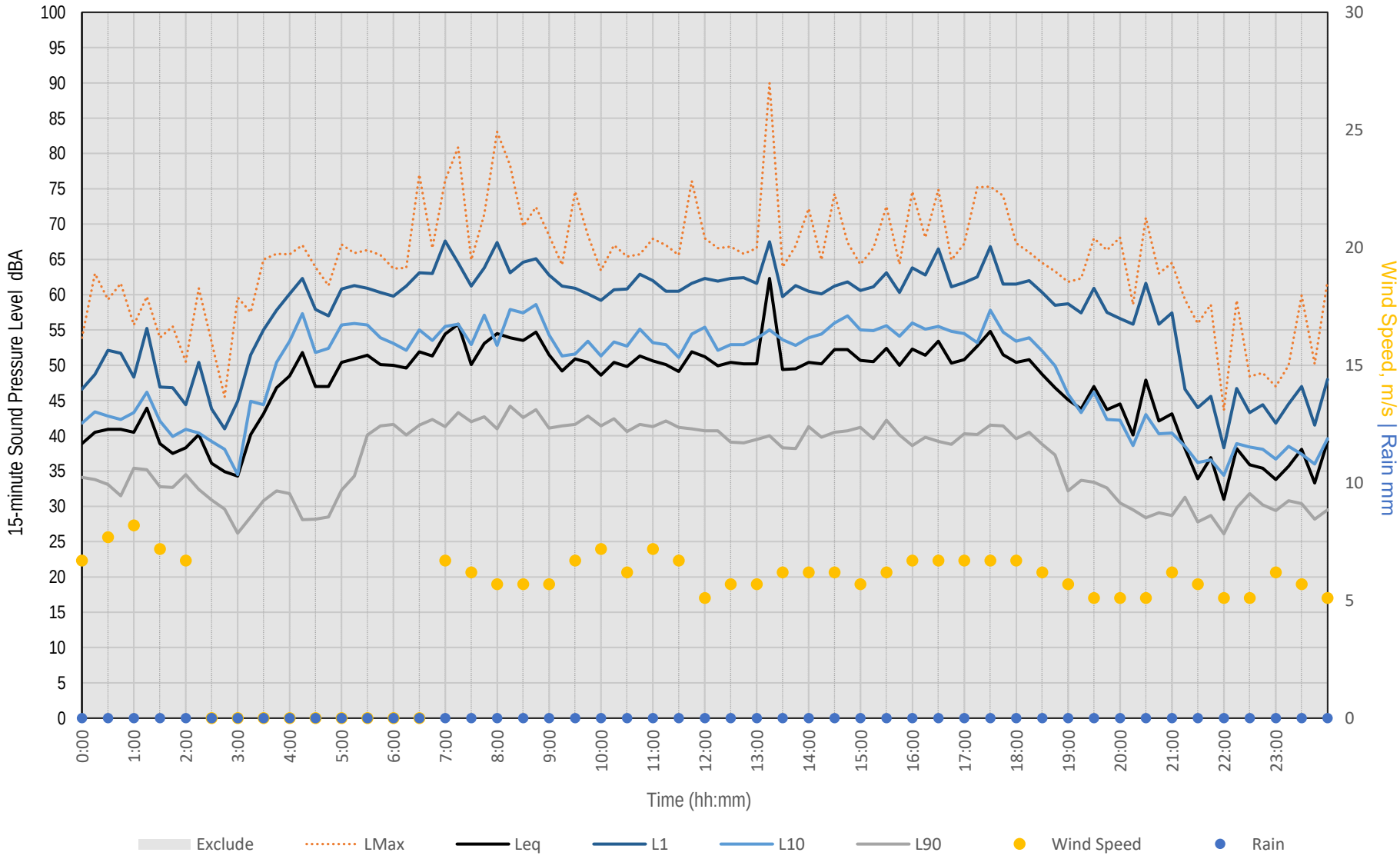
Sunday, 24 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 3

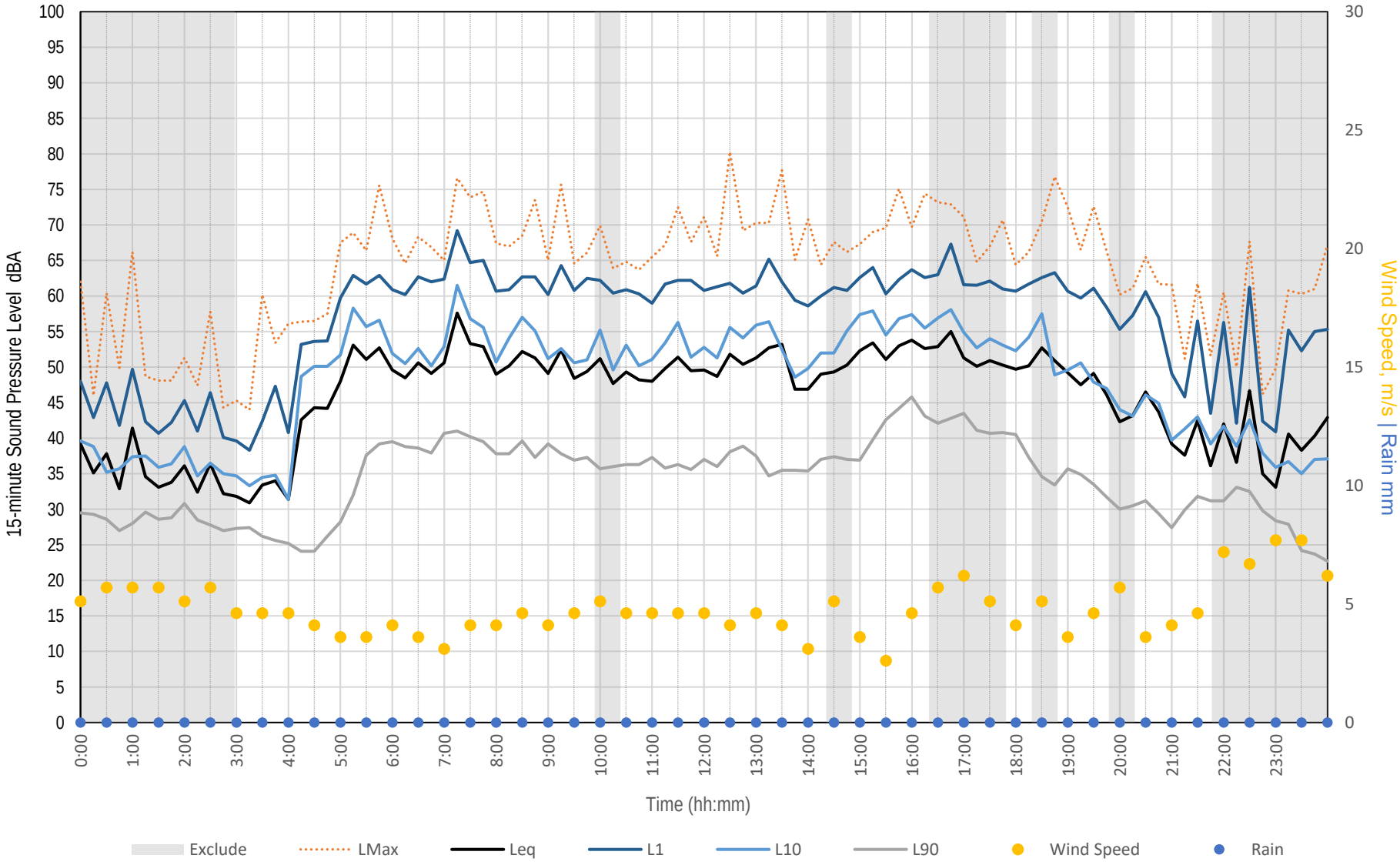
Monday, 25 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 3

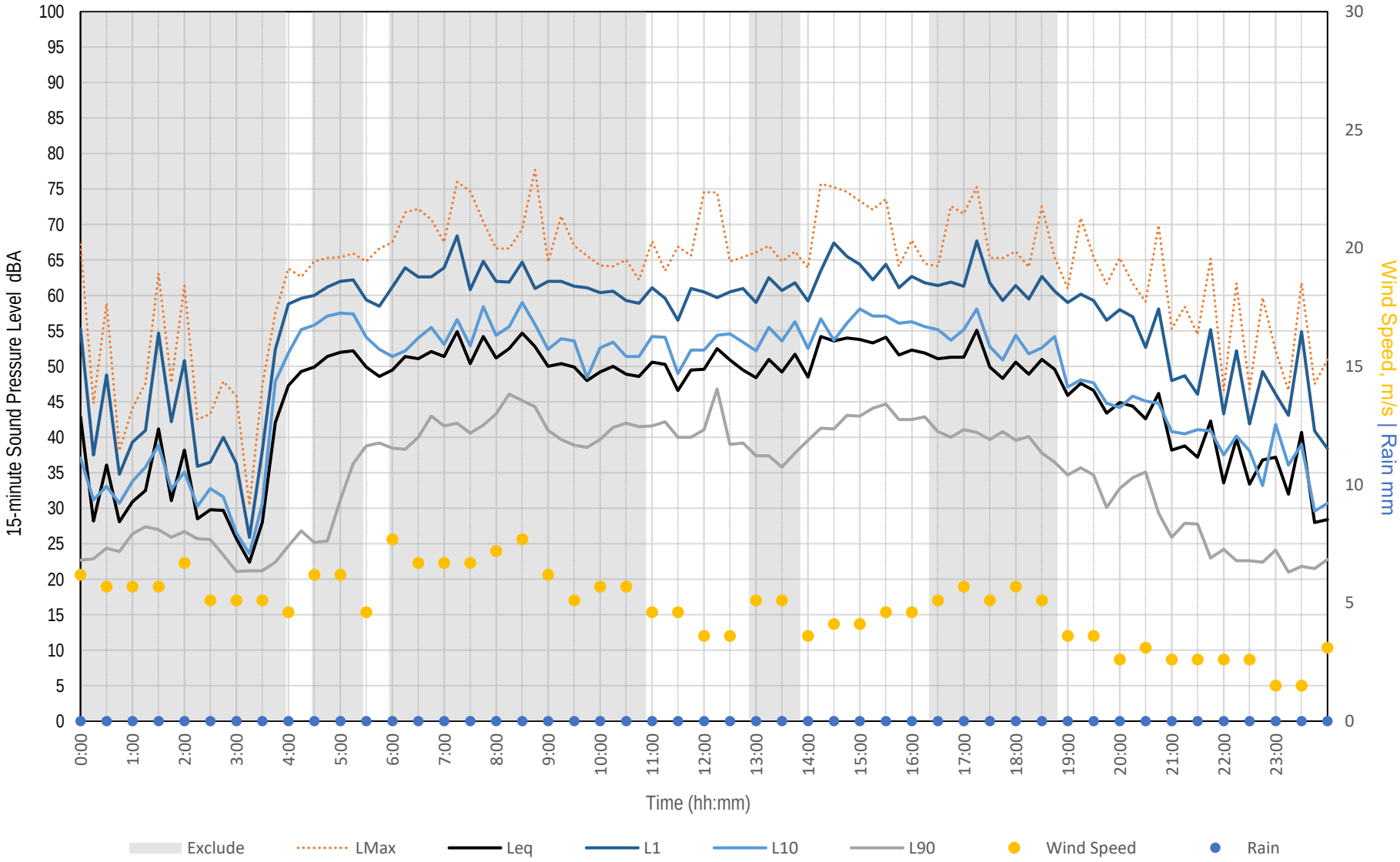
Tuesday, 26 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 3

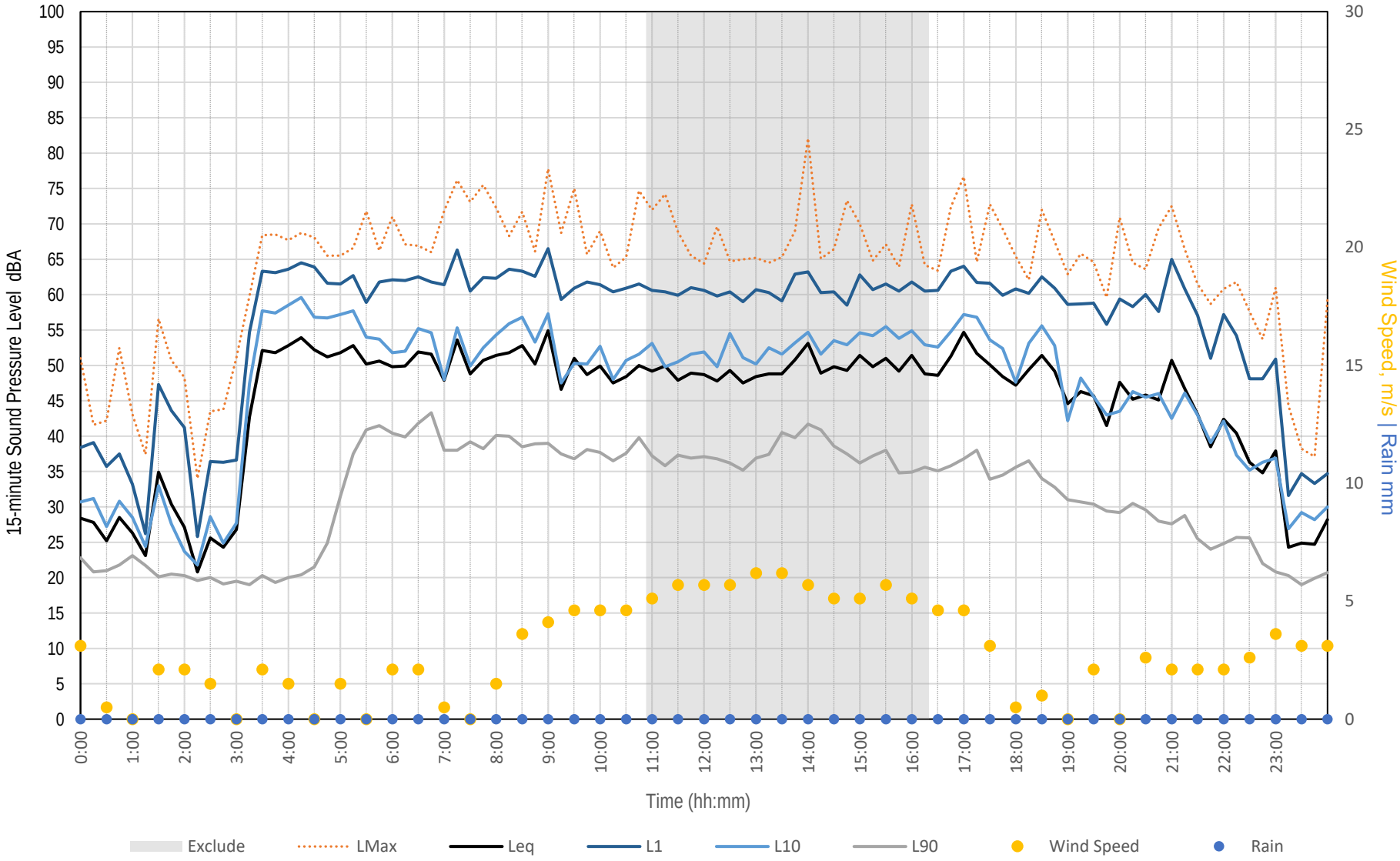
Wednesday, 27 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 3

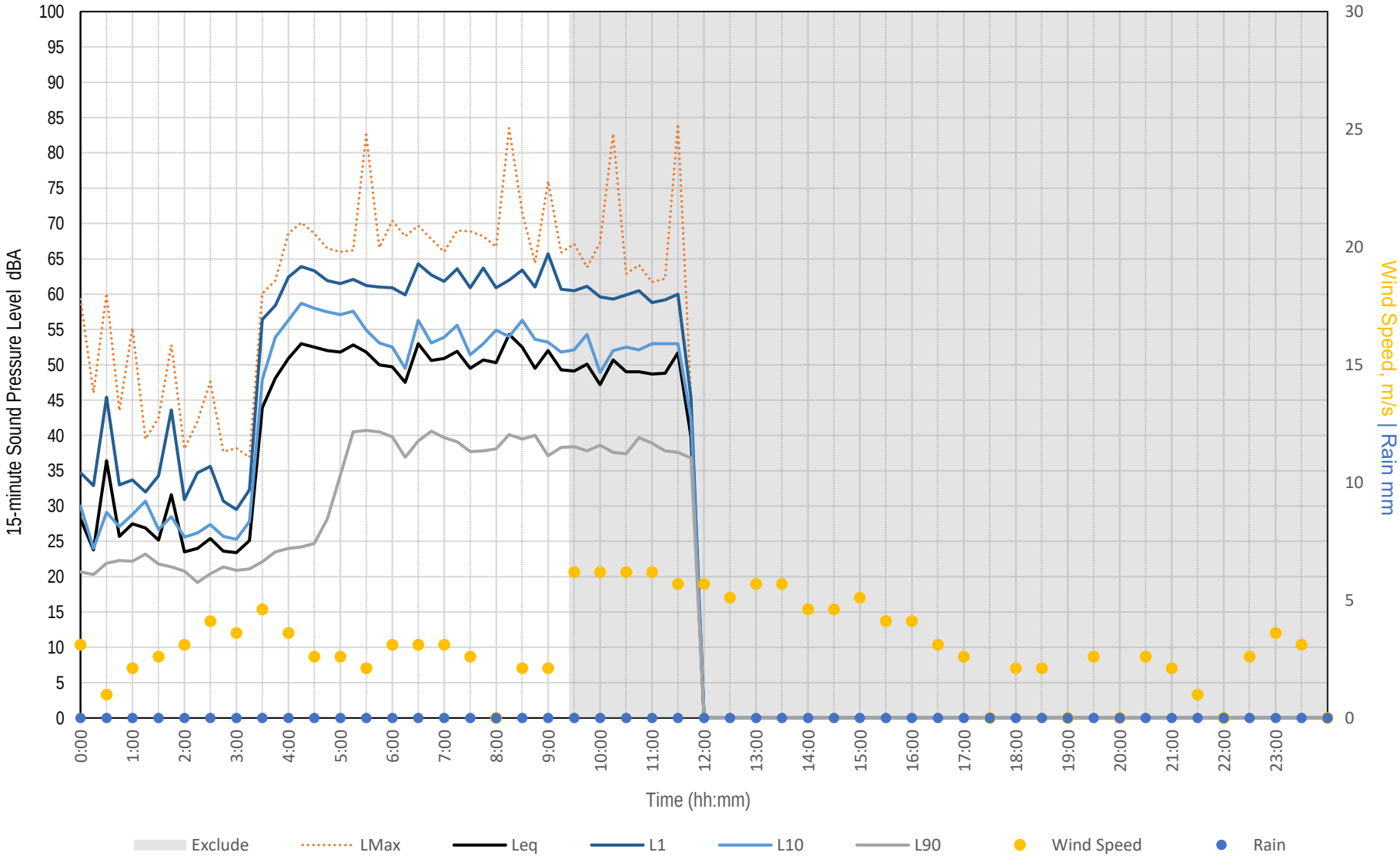
Thursday, 28 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 3

Friday, 29 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

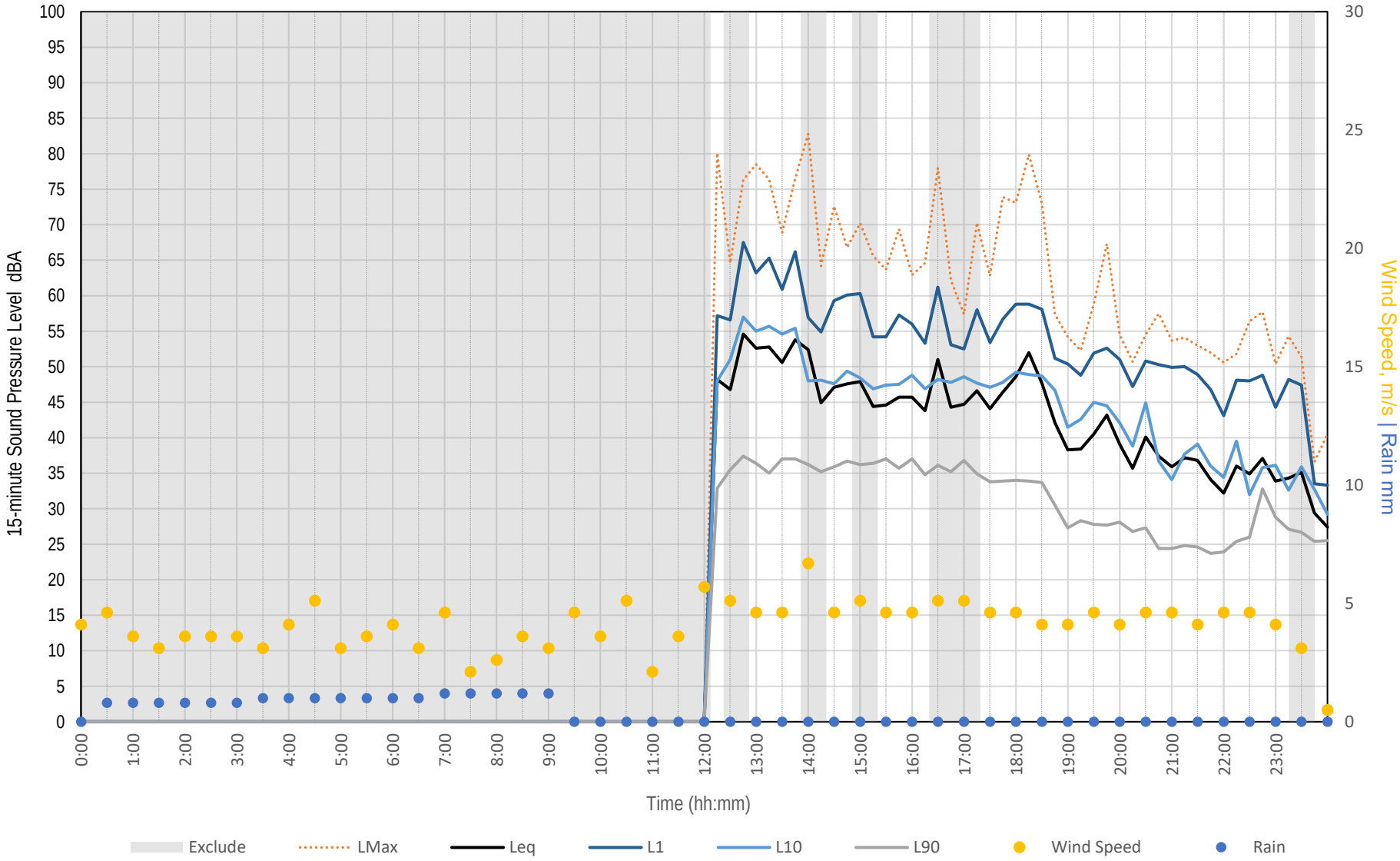
APPENDIX B-4
ML 5

Daily Summary								
Start Date: Thursday 21 September 2023								
End Date: Friday 29 September 2023								
Date	21/09	22/09	23/09	24/09	25/09[4]	26/09	27/09	28/09
$L_{eq,\ Day}$ dBA	47	45	47	44	-	47	44	48
$L_{eq,\ Night}$ dBA	41	40	42	36	-	47	44	43
$L_{max\ Day}$ dBA	80	81	81	76	-	80	83	83
$L_{max\ Night}$ dBA	58	72	70	75	-	79	71	79
$L_{90\ Day}$ dBA	24	26	22	27	-	25	22	23
$L_{90\ Night}$ dBA	24	26	19	18	-	28	20	18

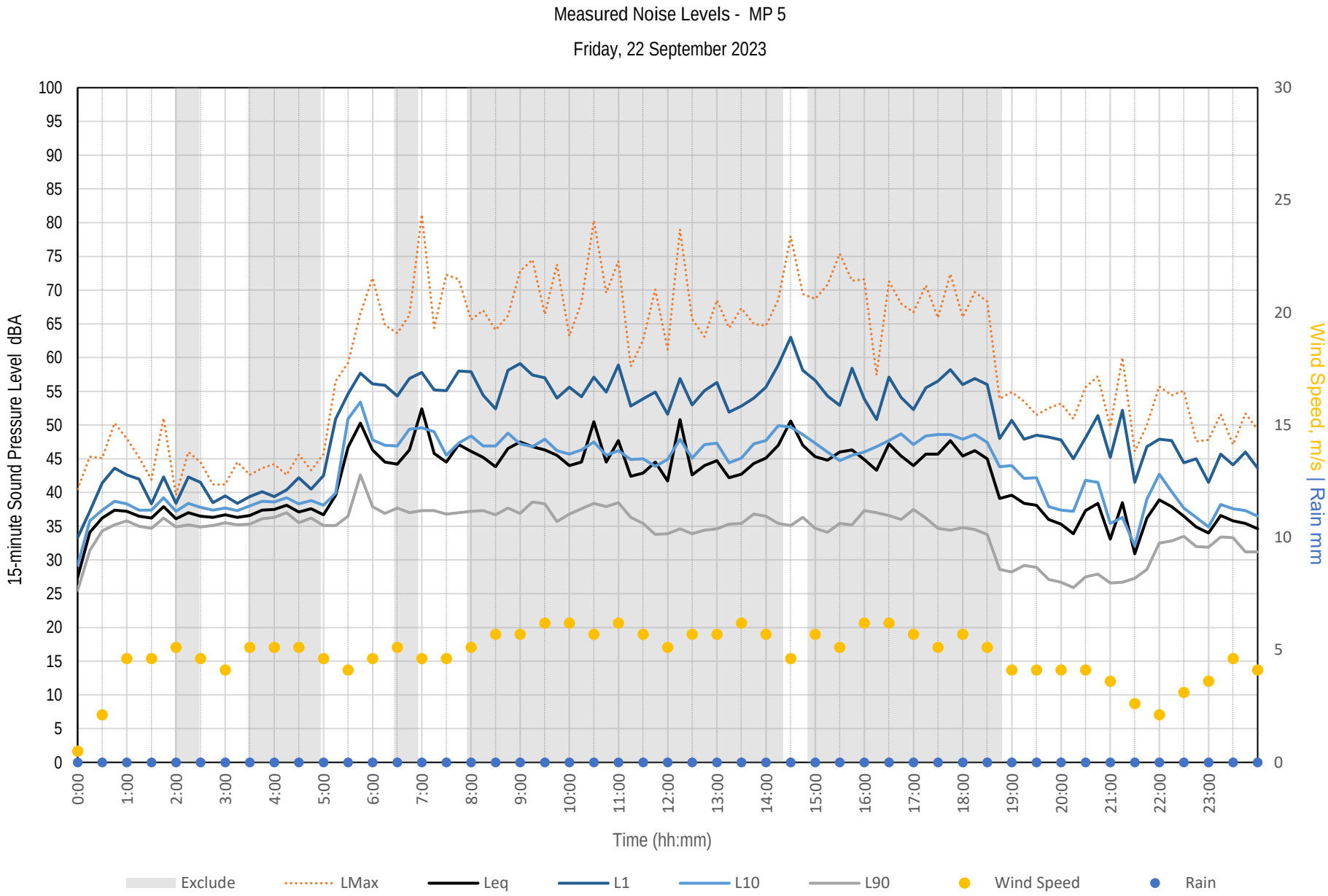
[4] Inclement weather occurred for the entirety of the day and no data has been accepted.

Measured Noise Levels - MP 5

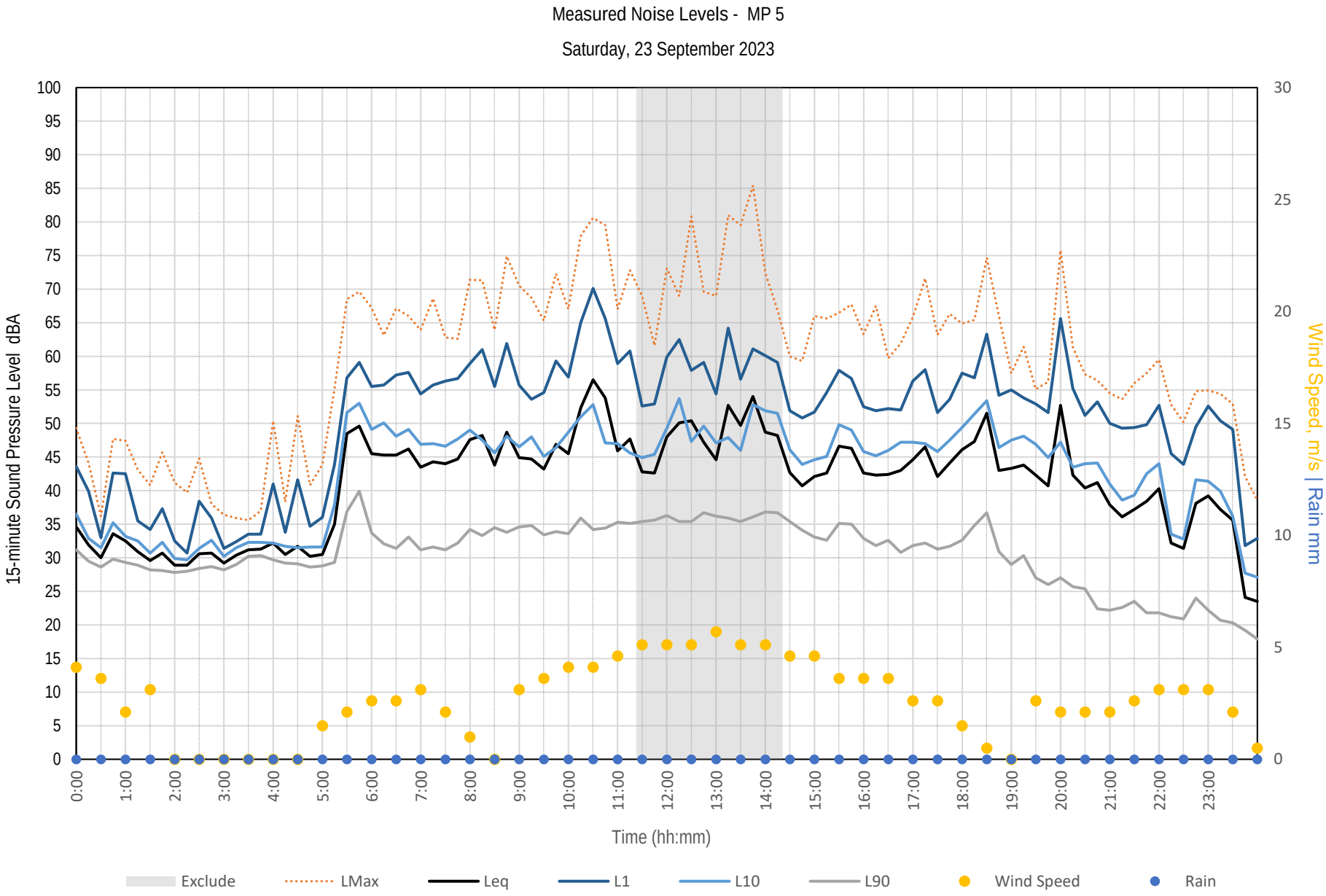
Thursday, 21 September 2023



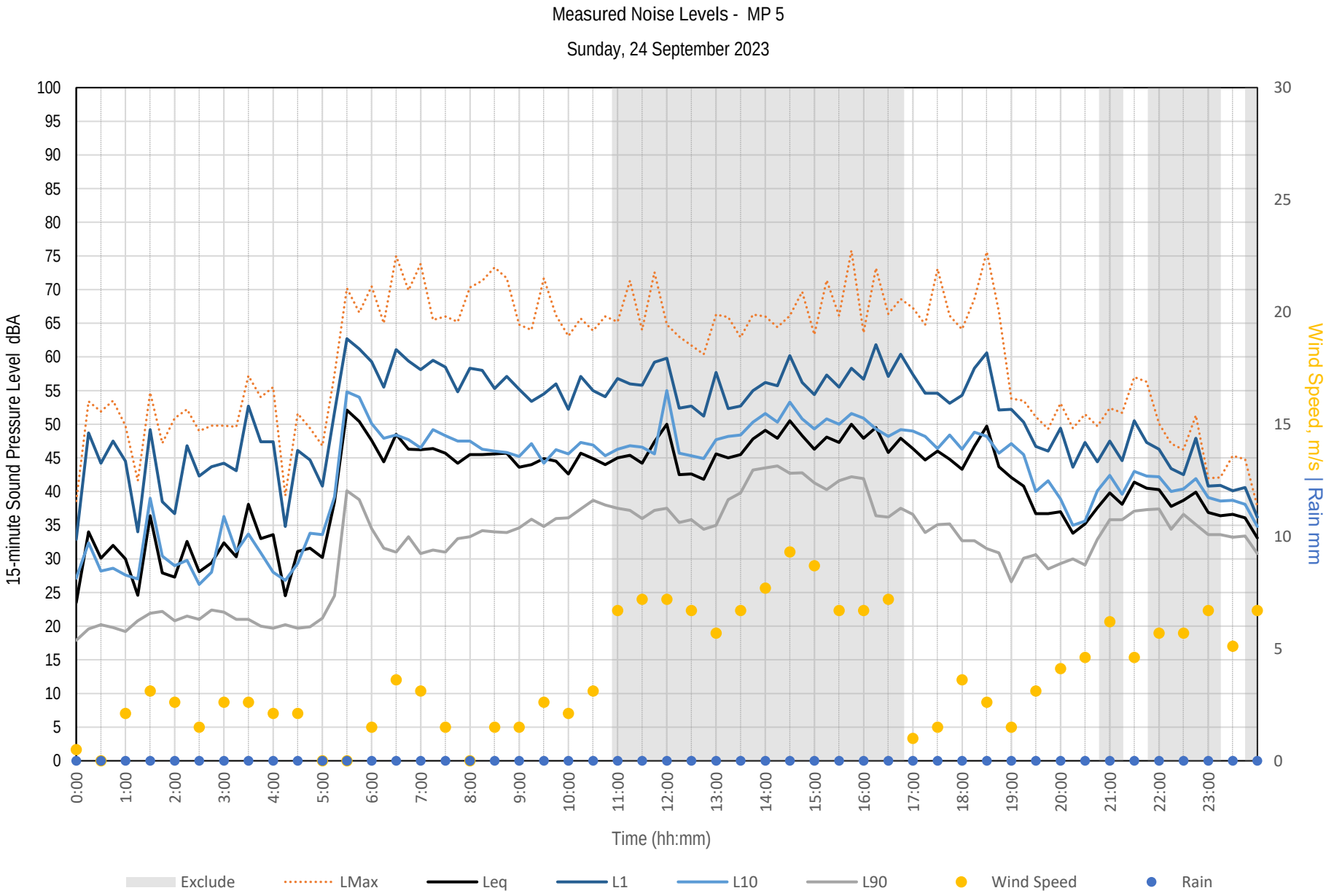
Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).



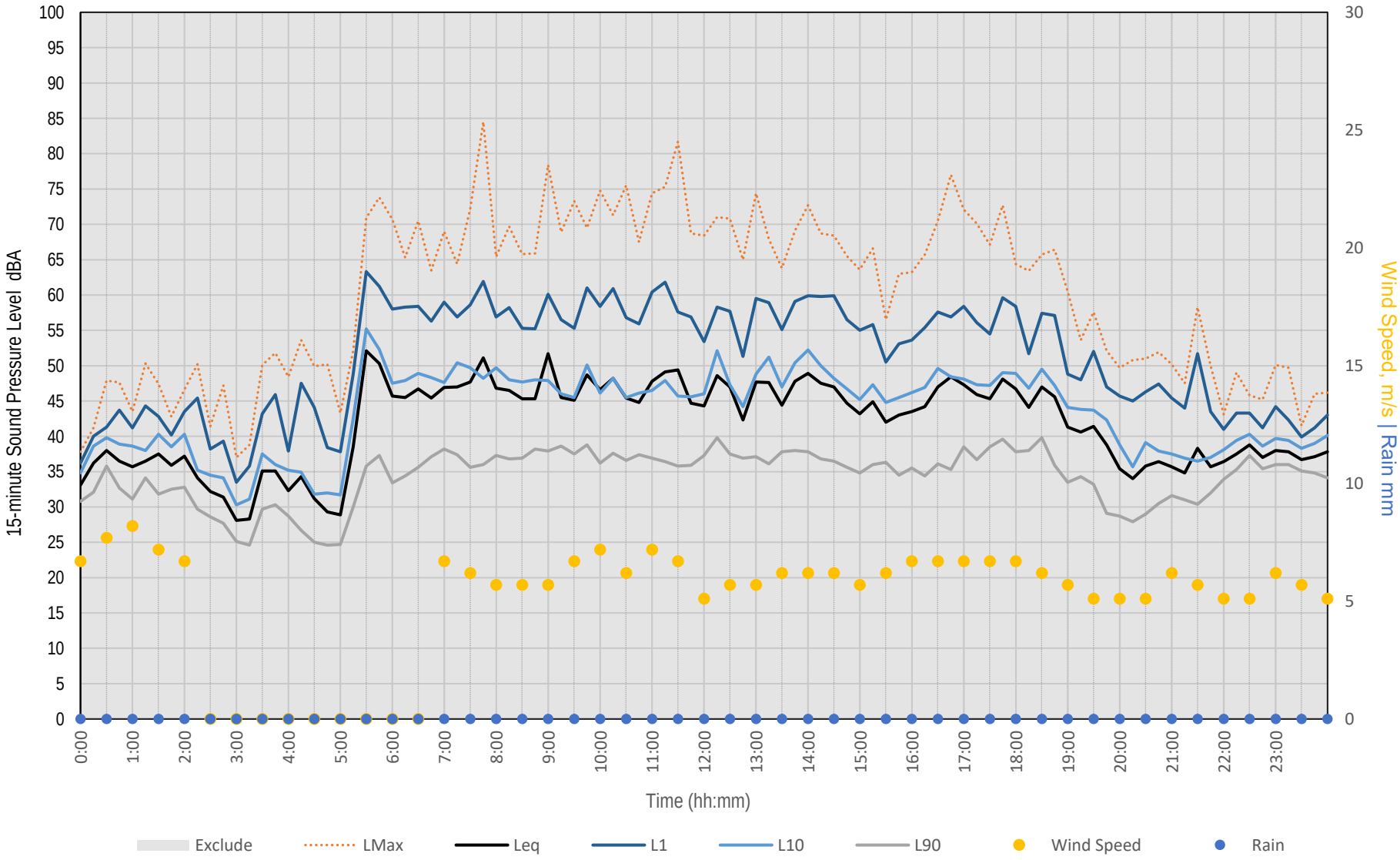
Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).



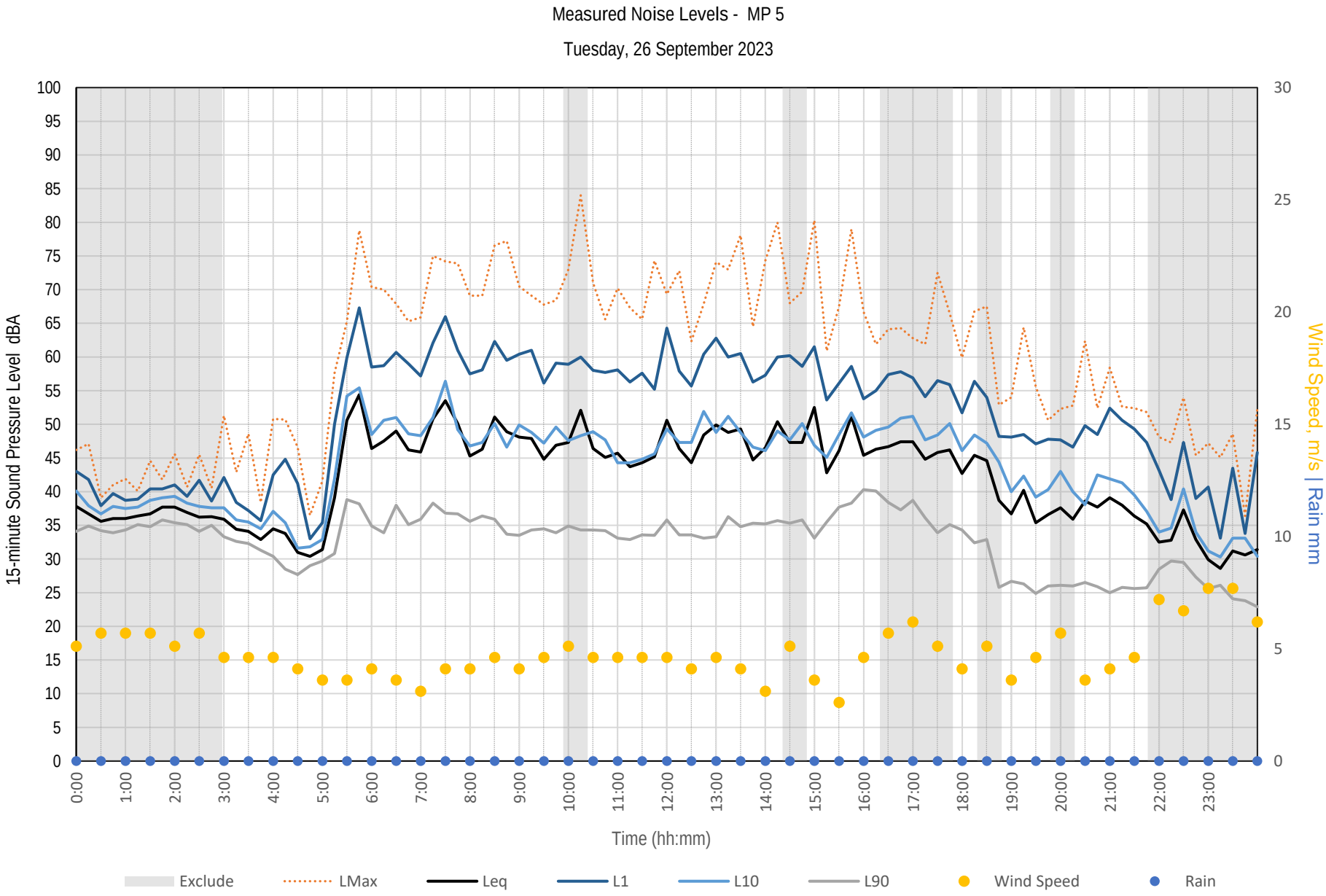
Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 5

Monday, 25 September 2023



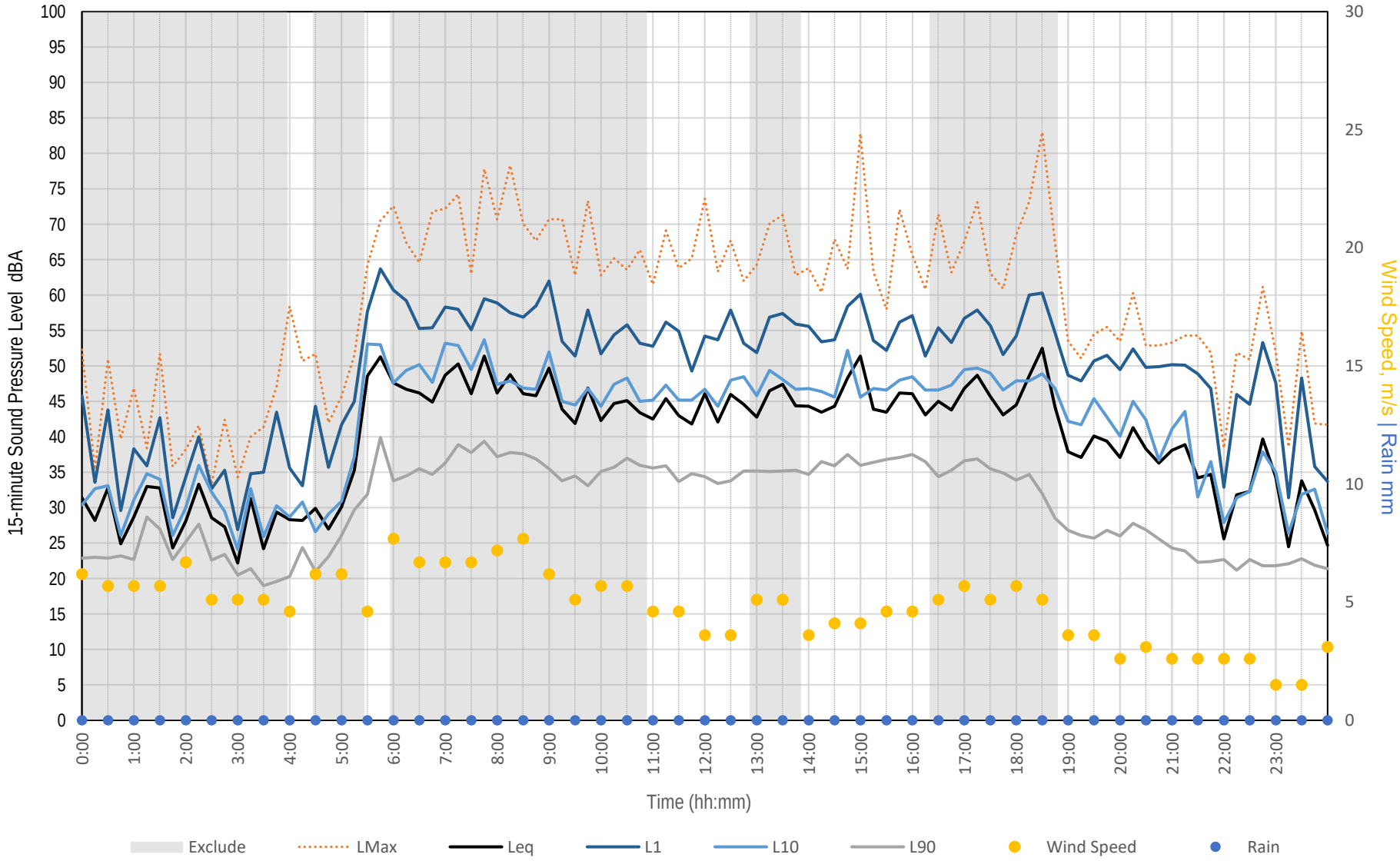
Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 5

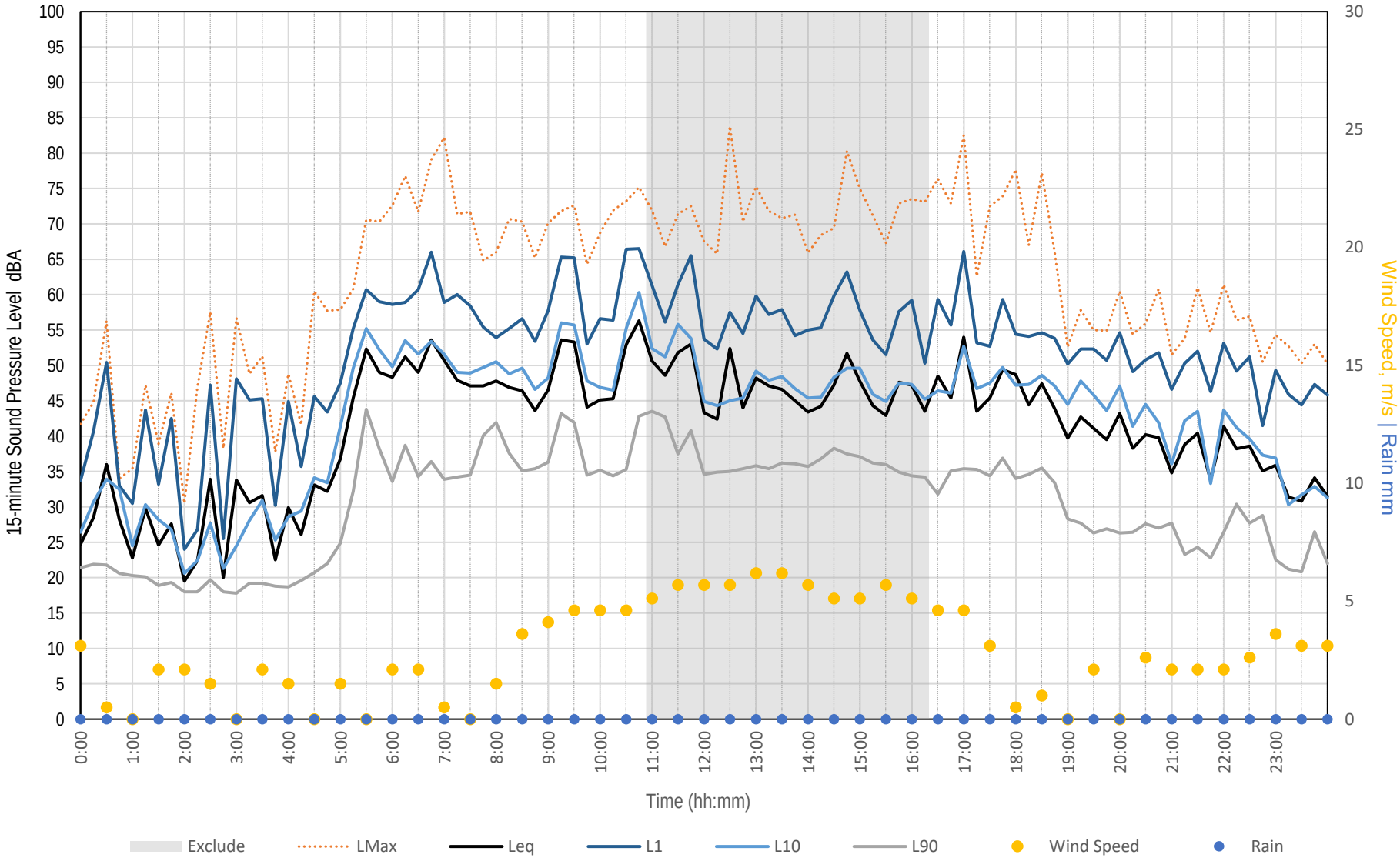
Wednesday, 27 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 5

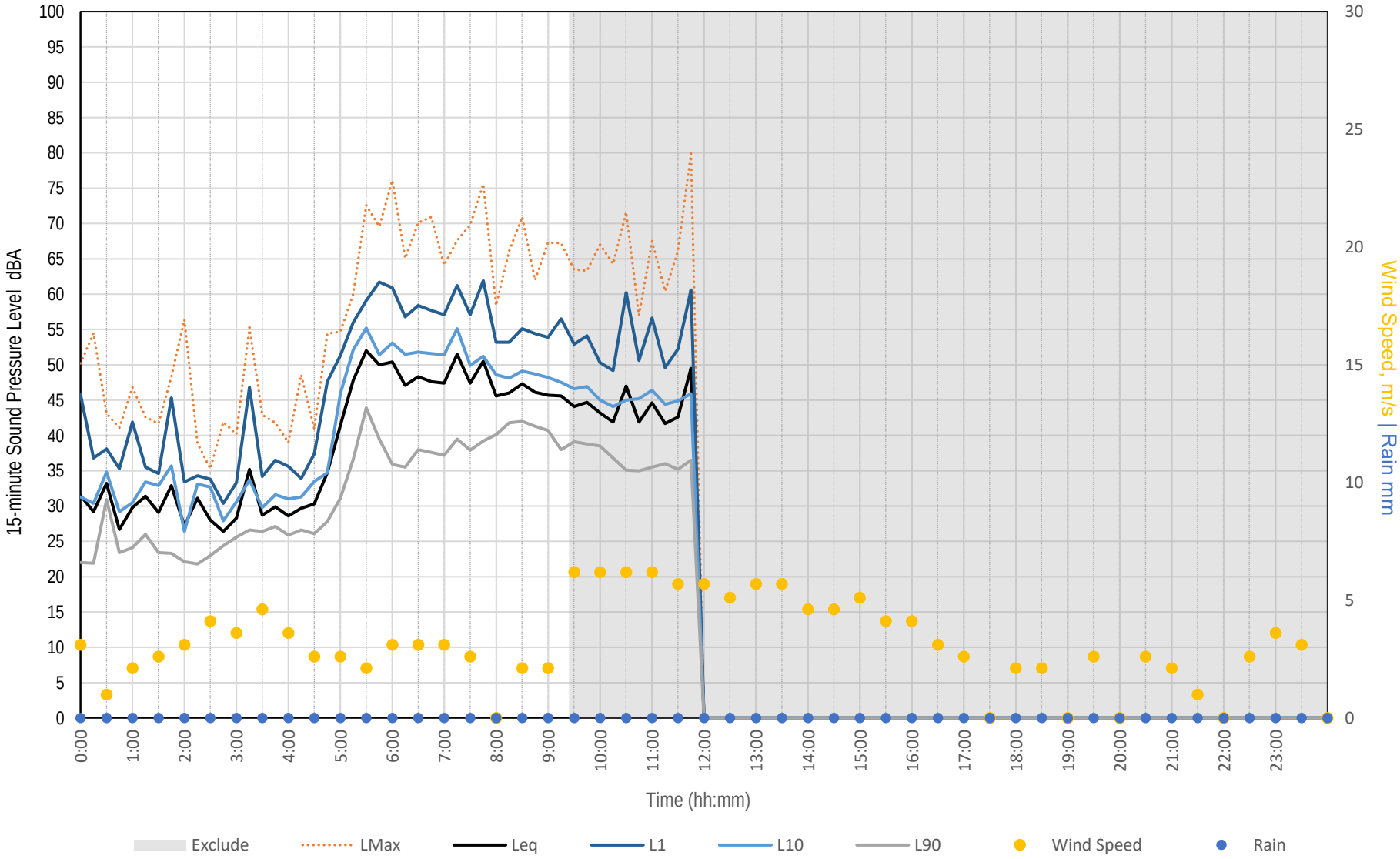
Thursday, 28 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 5

Friday, 29 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

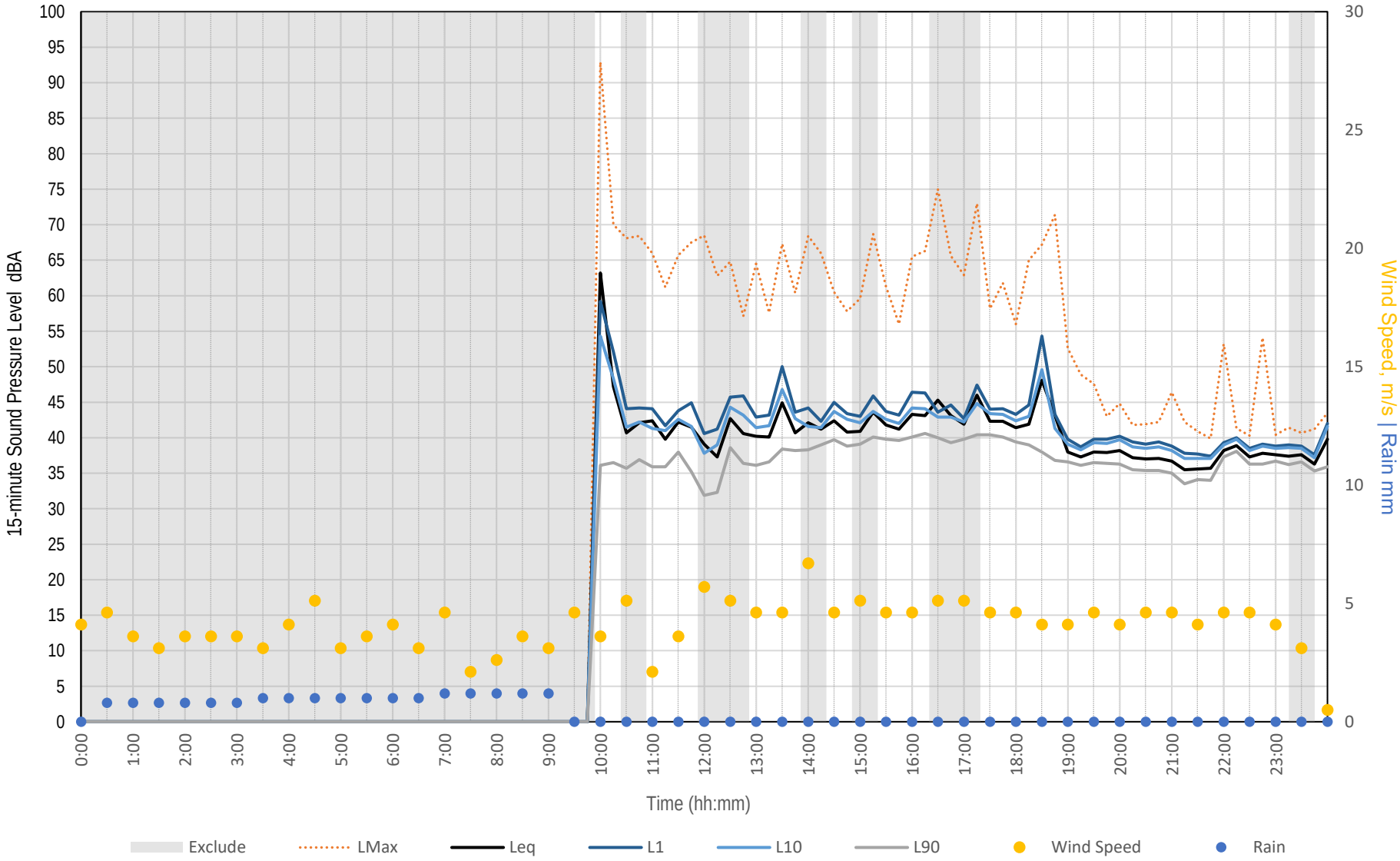
APPENDIX B-5
ML 6

Daily Summary								
Start Date: Thursday 21 September 2023								
End Date: Friday 29 September 2023								
Date	21/09	22/09	23/09	24/09	25/09[5]	26/09	27/09	28/09
$L_{eq,\ Day}$ dBA	49	42	44	48		45	40	41
$L_{eq,\ Night}$ dBA	50	51	41	41		46	58	41
$L_{max\ Day}$ dBA	93	75	87	91		74	73	71
$L_{max\ Night}$ dBA	54	80	98	84		67	103	87
$L_{90\ Day}$ dBA	34	34	19	29		30	26	25
$L_{90\ Night}$ dBA	36	36	18	19		38	23	23

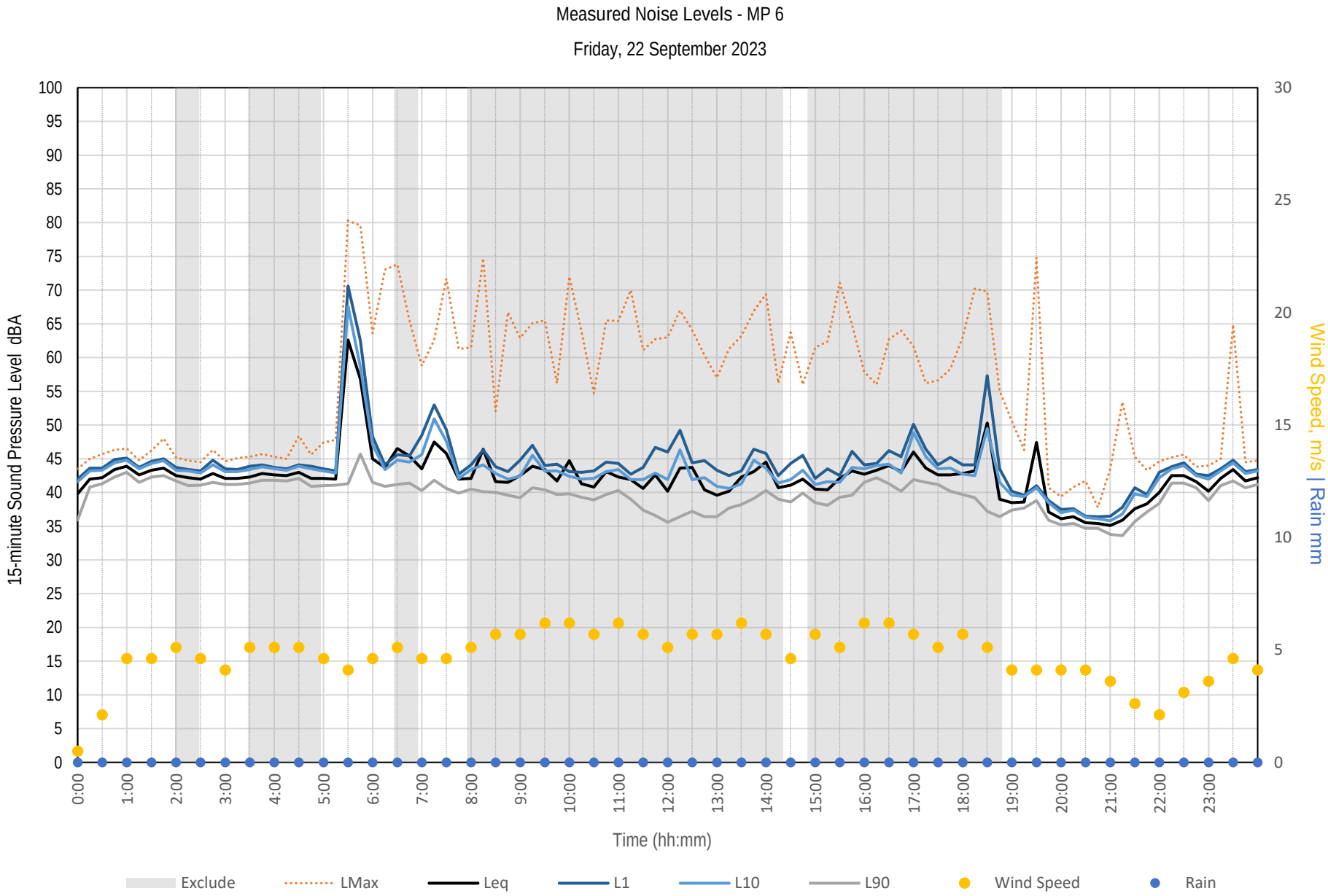
[5] Inclement weather occurred for the entirety of the day and no data has been accepted.

Measured Noise Levels - MP 6

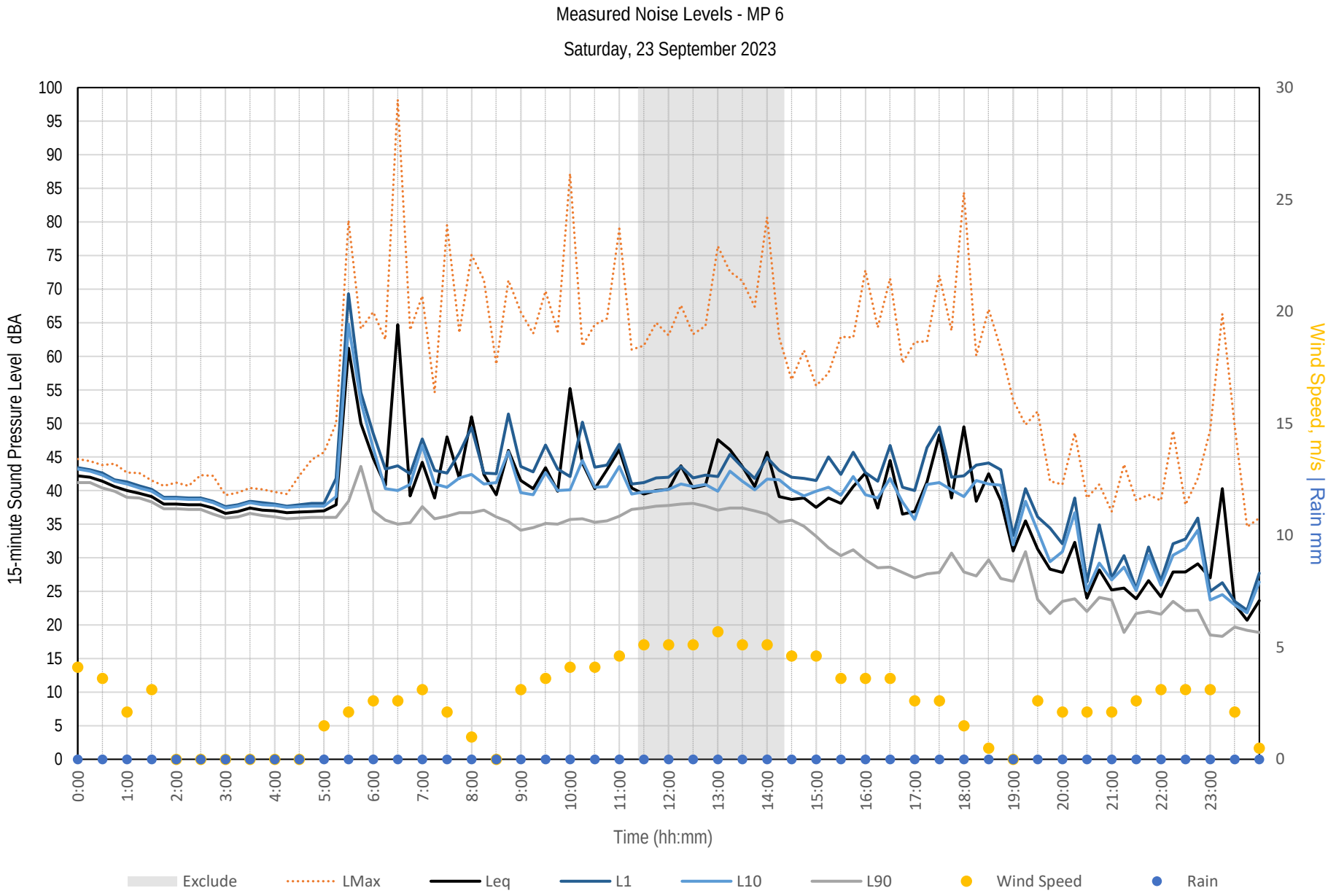
Thursday, 21 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).



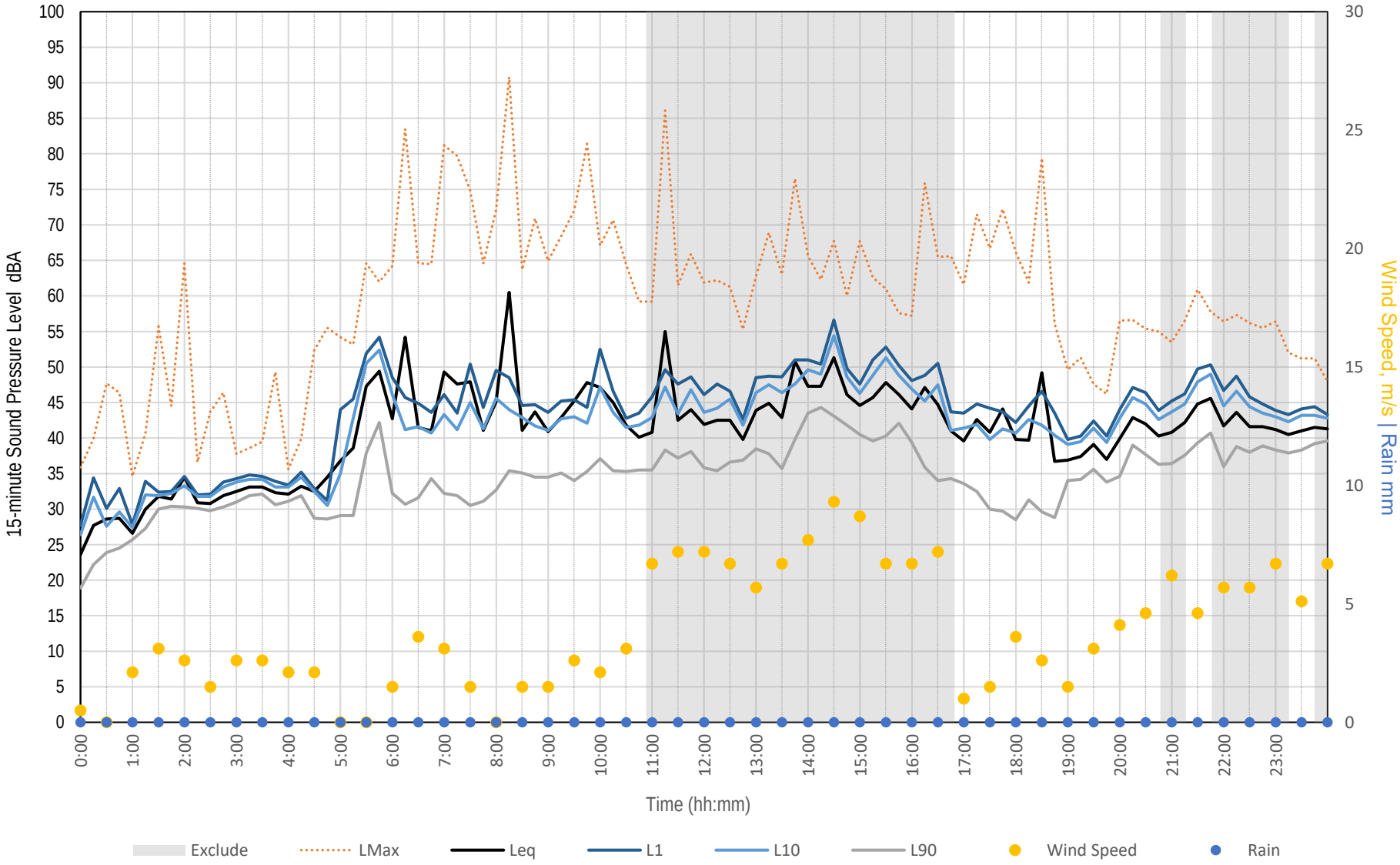
Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 6

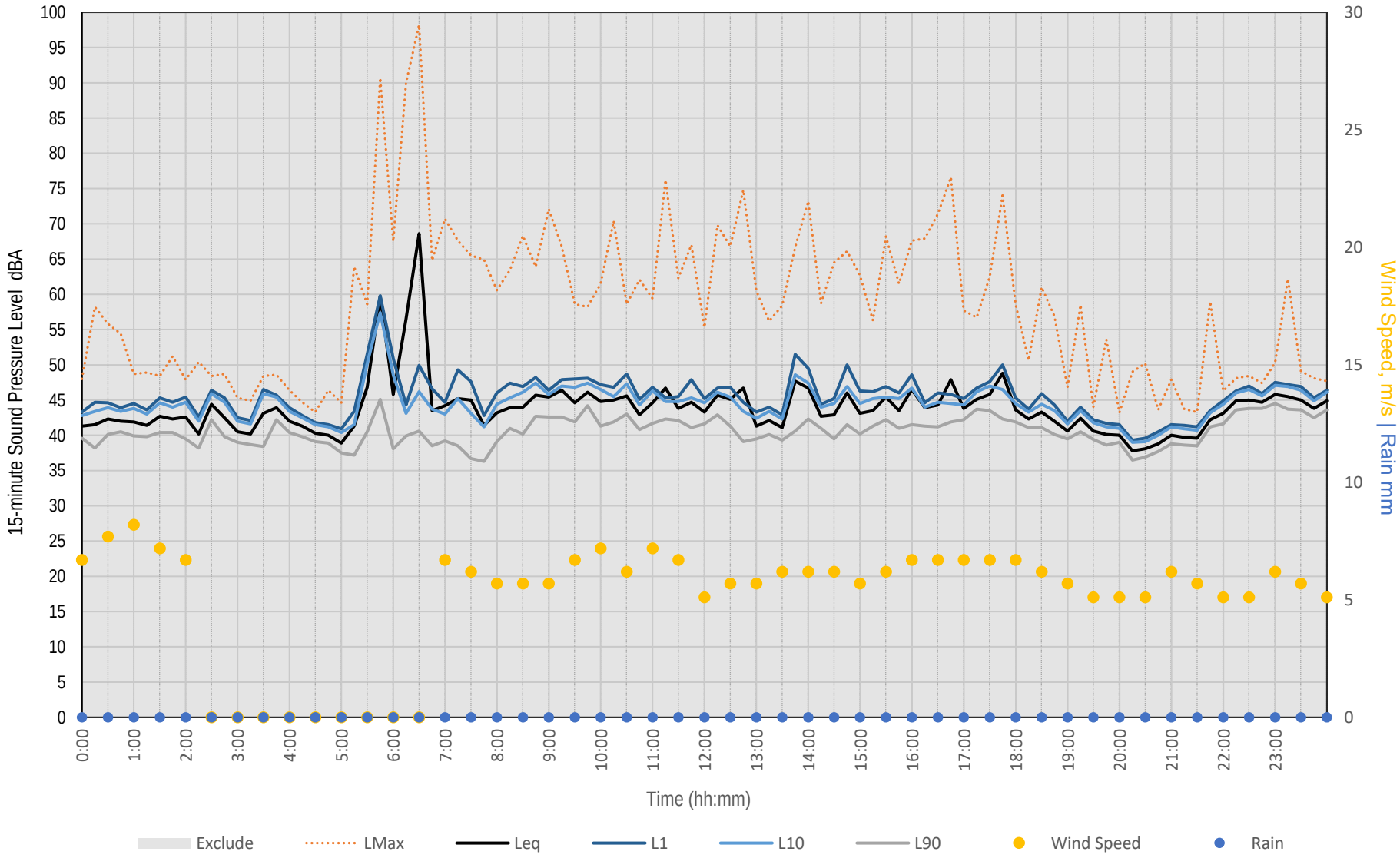
Sunday, 24 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 6

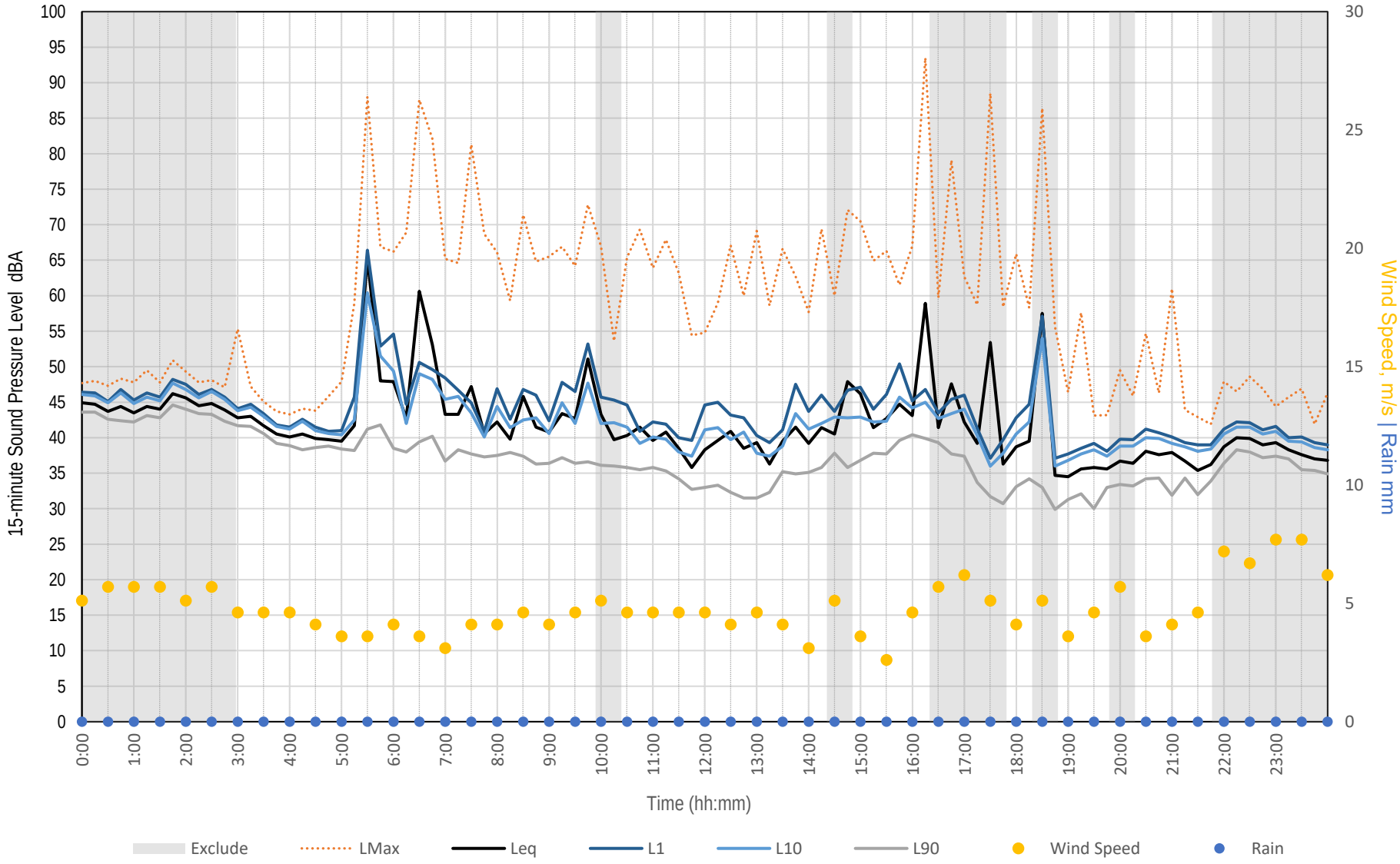
Monday, 25 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 6

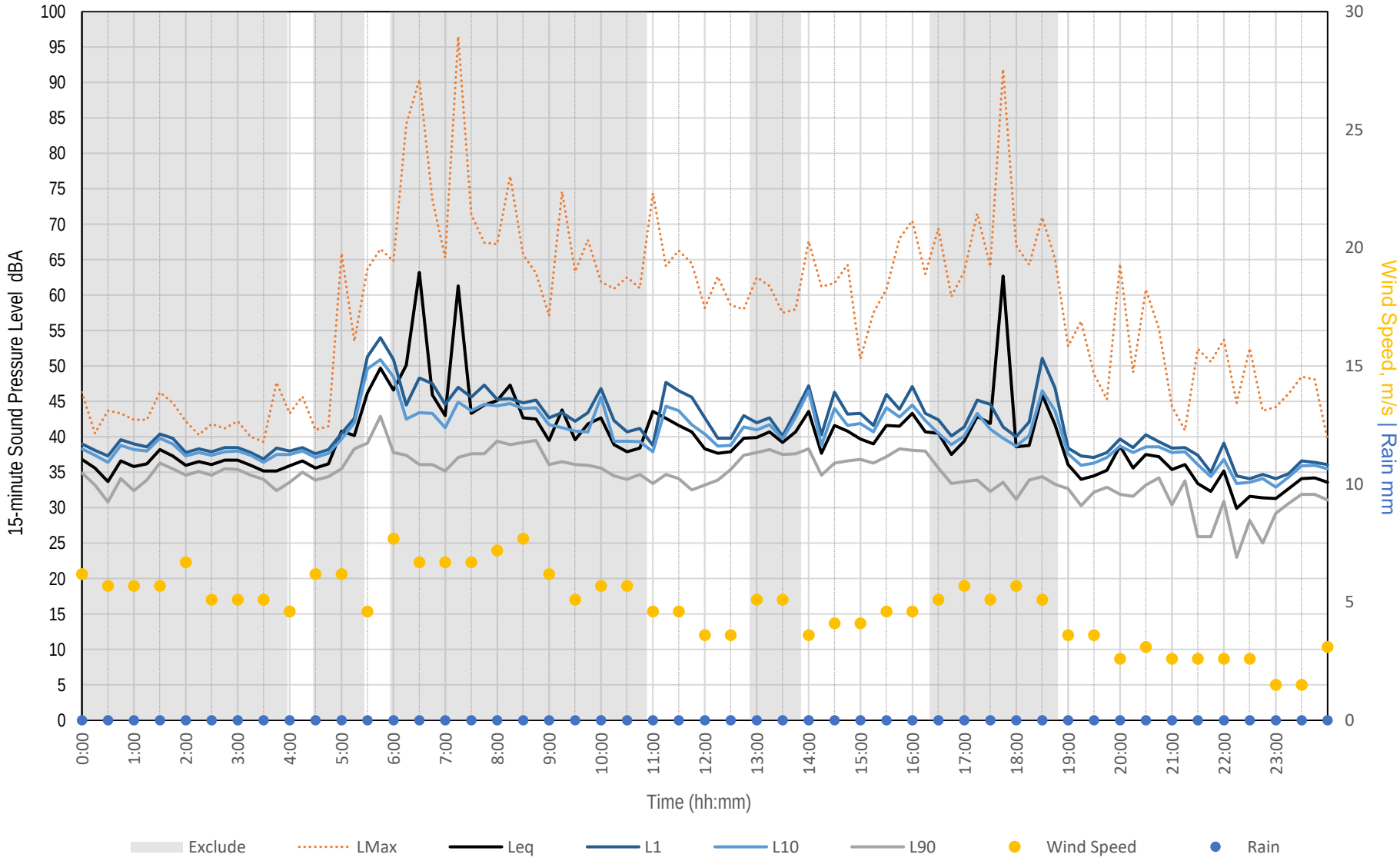
Tuesday, 26 September 2023



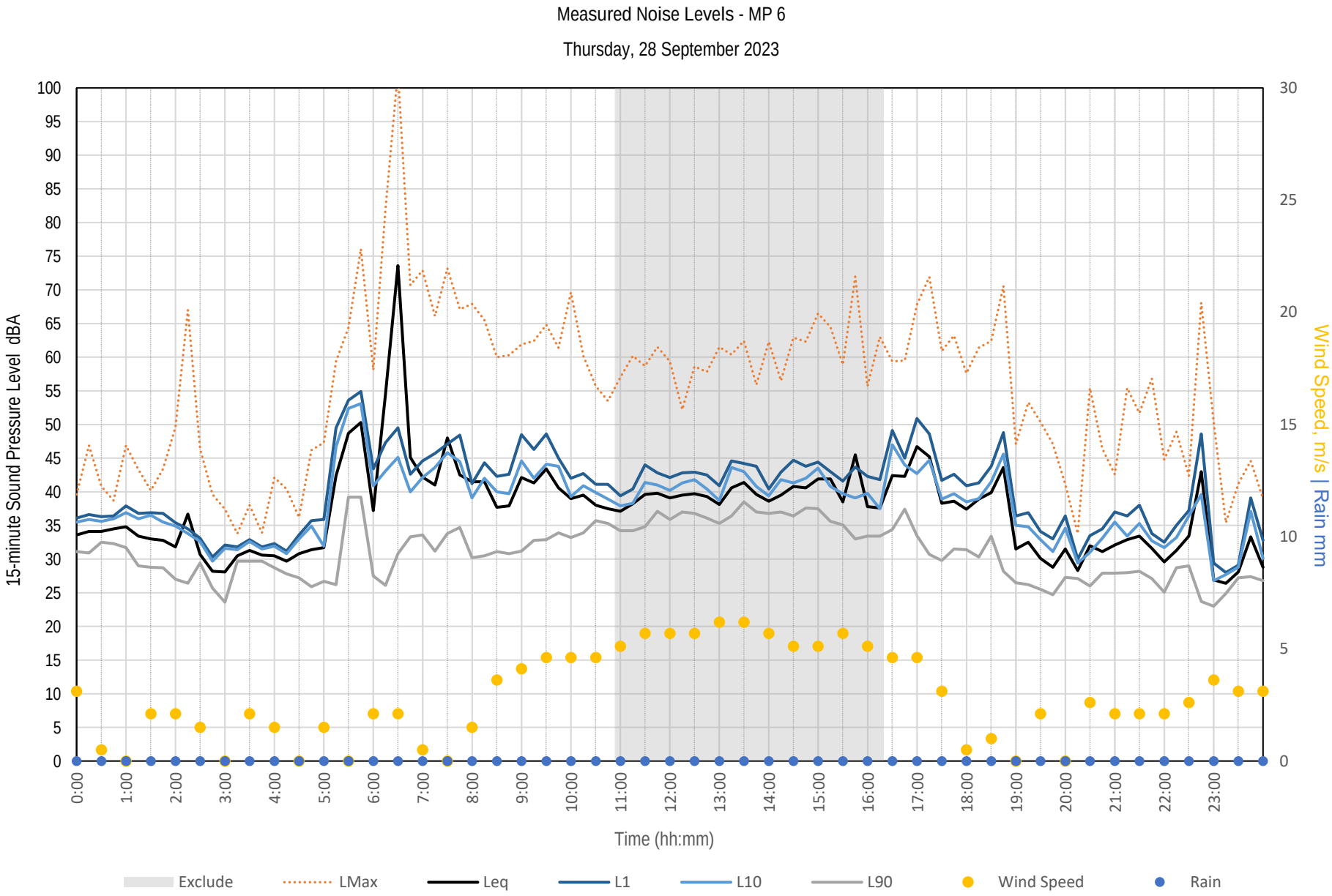
Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 6

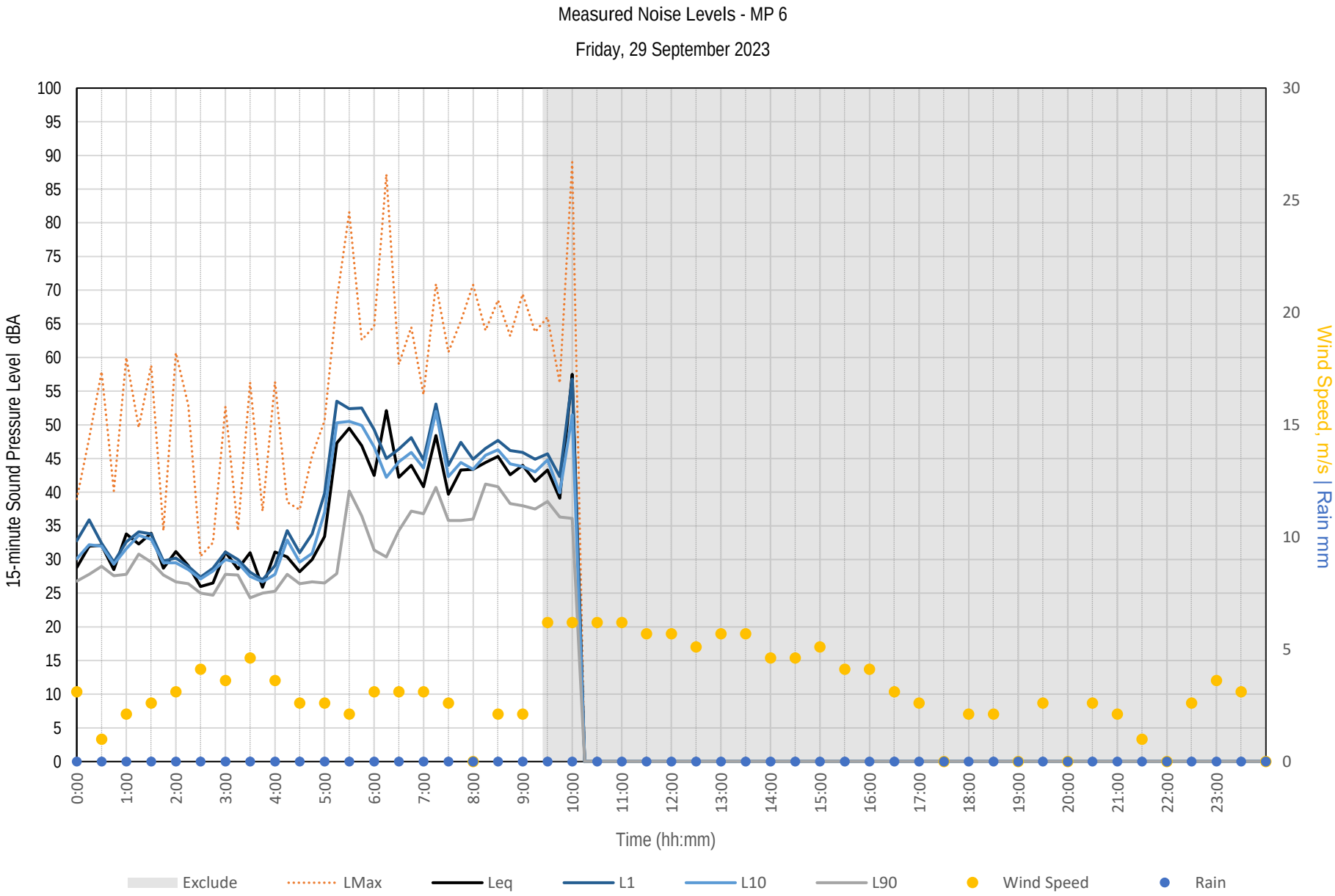
Wednesday, 27 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

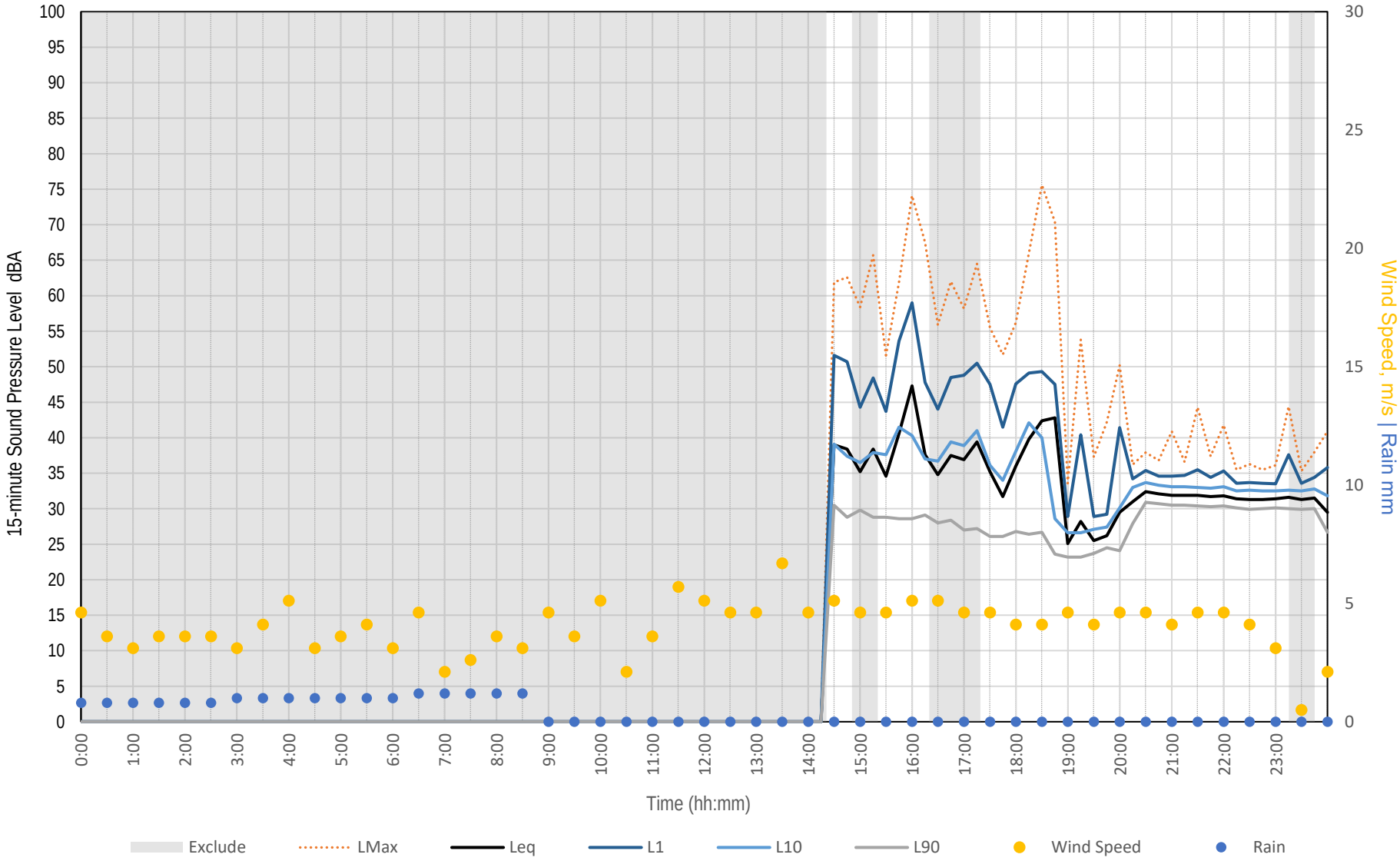
APPENDIX B-6
ML 8

Daily Summary								
Start Date: Thursday 21 September 2023								
End Date: Friday 29 September 2023								
Date	21/09	22/09	23/09	24/09	25/09[6]	26/09	27/09	28/09
$L_{eq,\ Day}$ dBA	49	42	44	48		45	40	41
$L_{eq,\ Night}$ dBA	50	51	41	41		46	58	41
$L_{max\ Day}$ dBA	93	75	87	91		74	73	71
$L_{max\ Night}$ dBA	54	80	98	84		67	103	87
$L_{90\ Day}$ dBA	34	34	19	29		30	26	25
$L_{90\ Night}$ dBA	36	36	18	19		38	23	23

[6] Inclement weather occurred for the entirety of the day and no data has been accepted.

Measured Noise Levels - MP 1

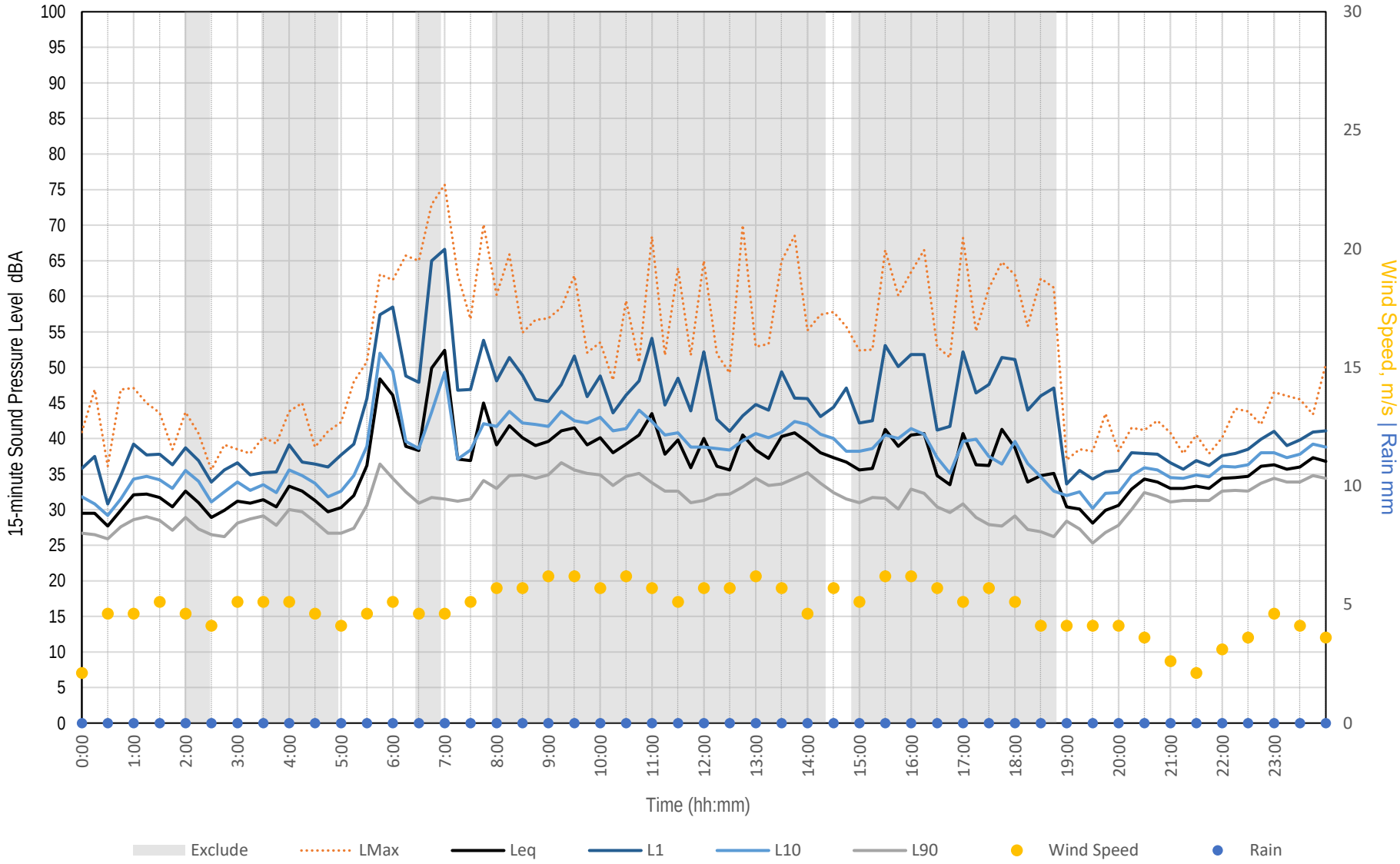
Thursday, 21 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

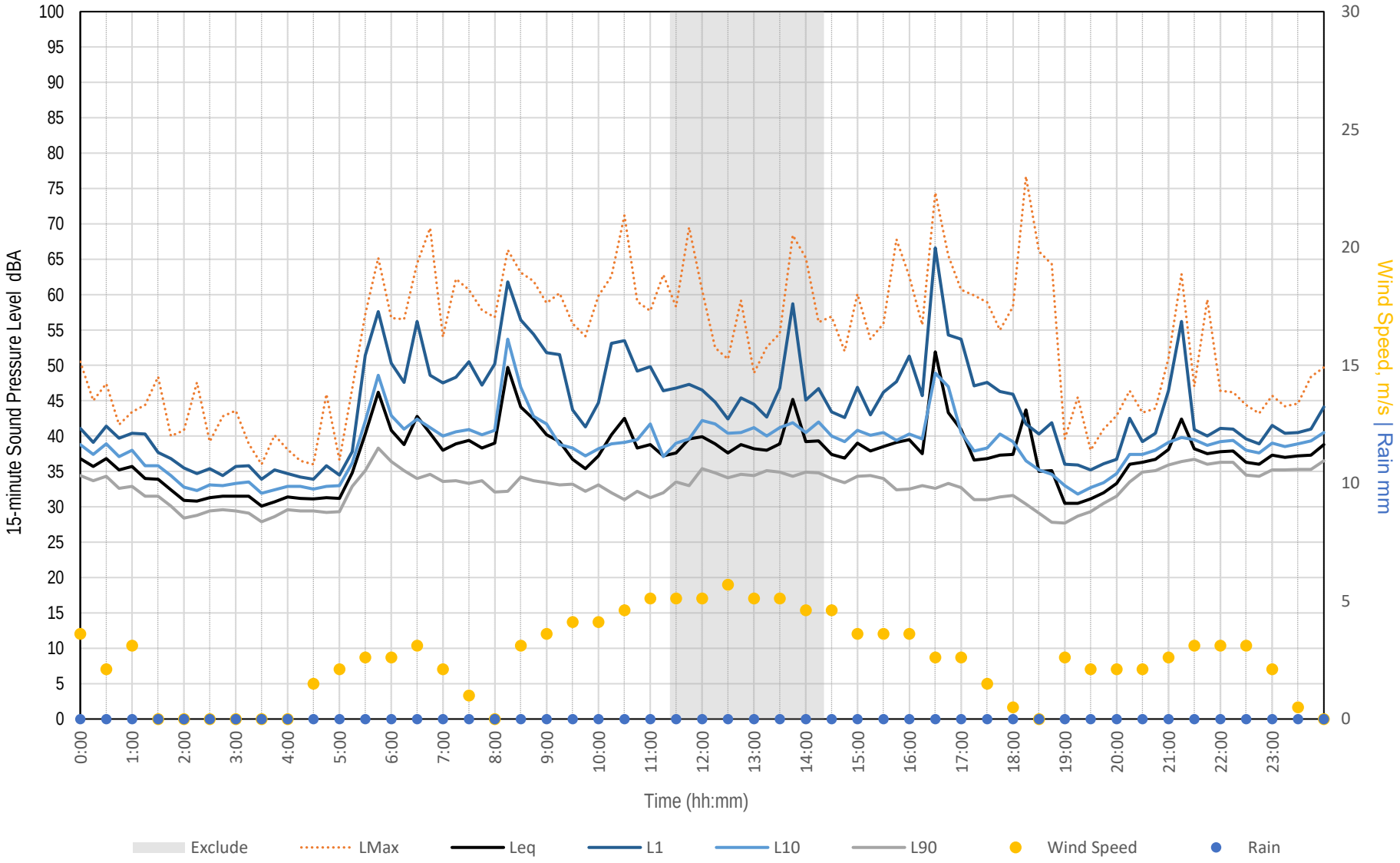
Friday, 22 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

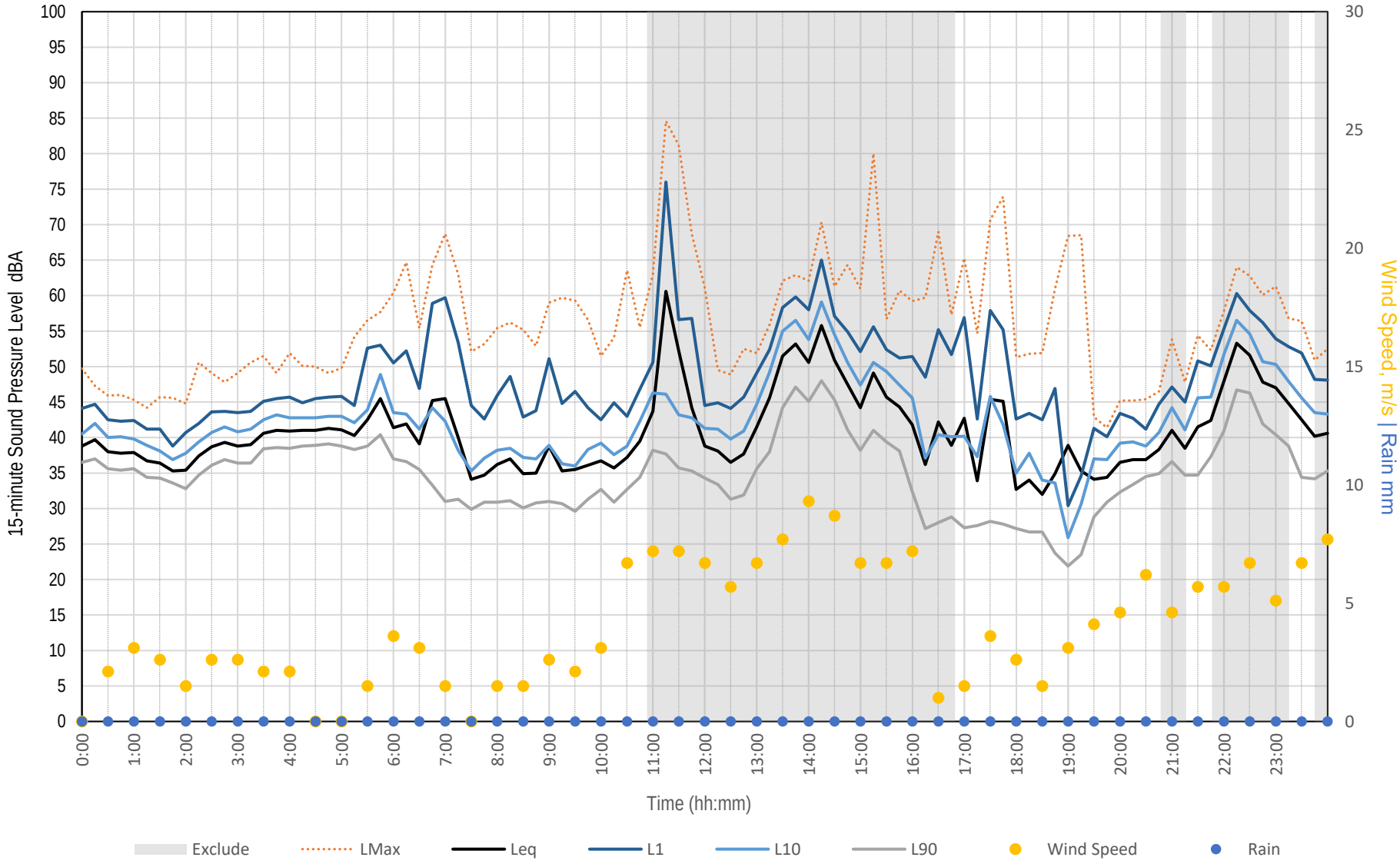
Saturday, 23 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

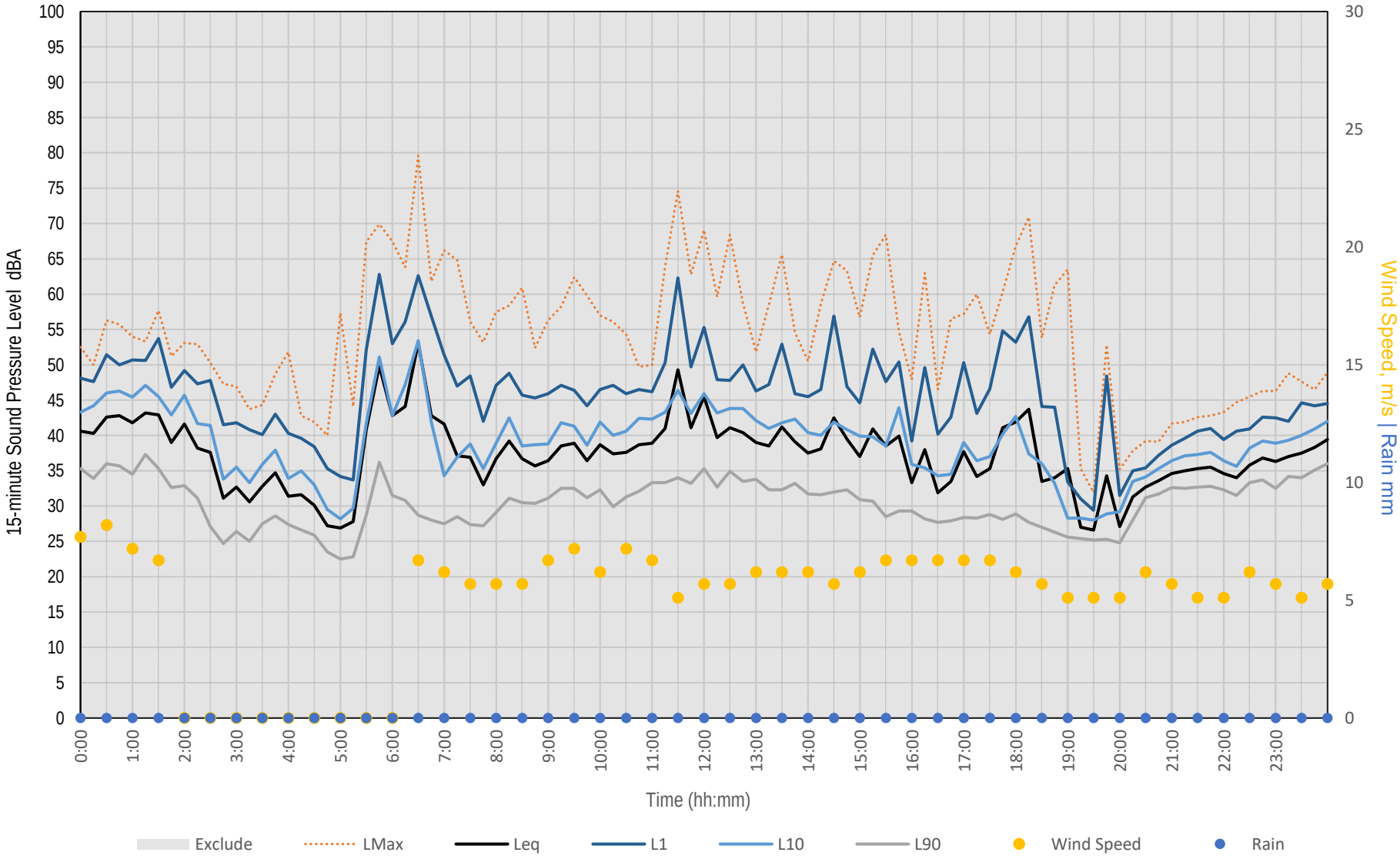
Sunday, 24 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

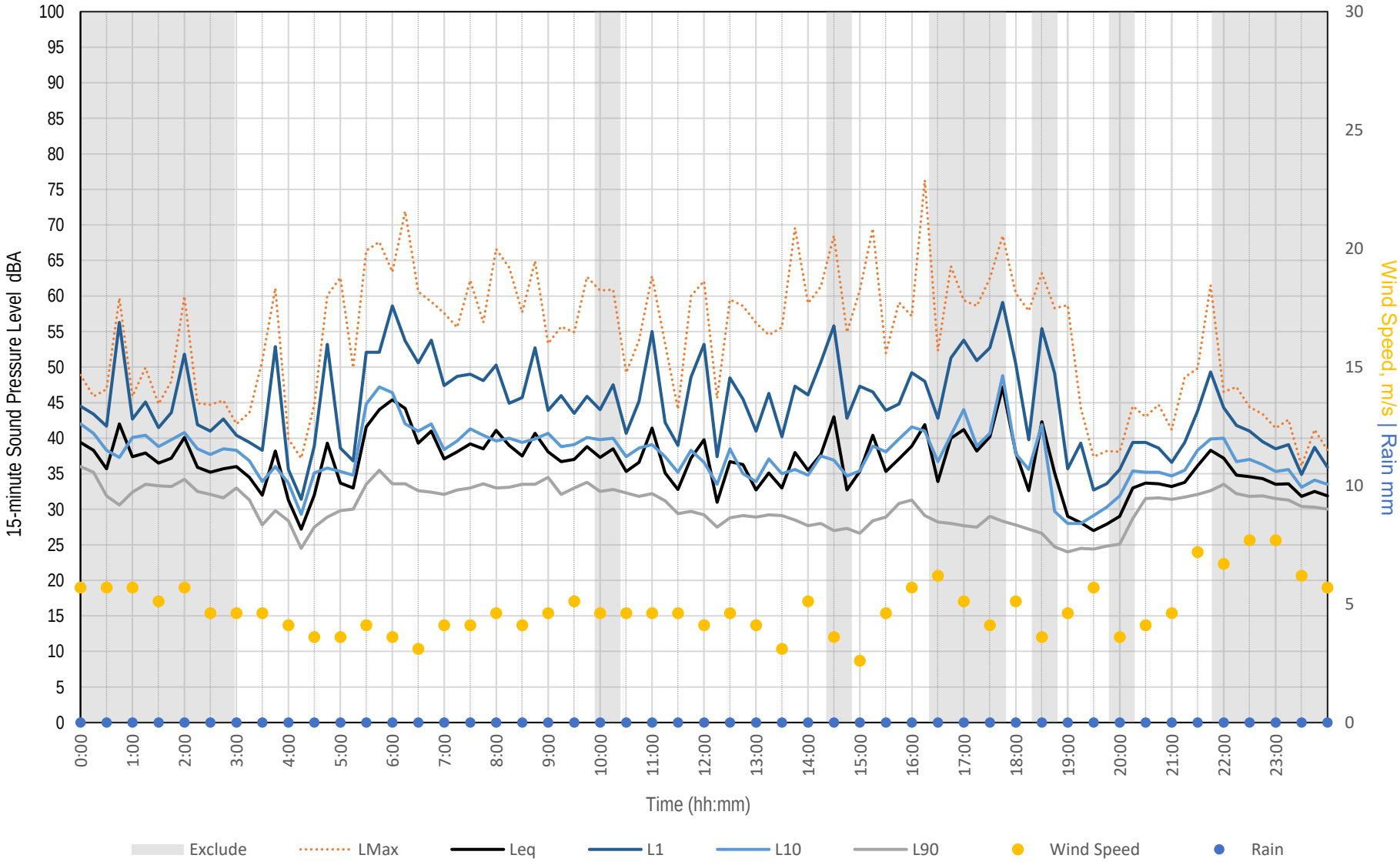
Monday, 25 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

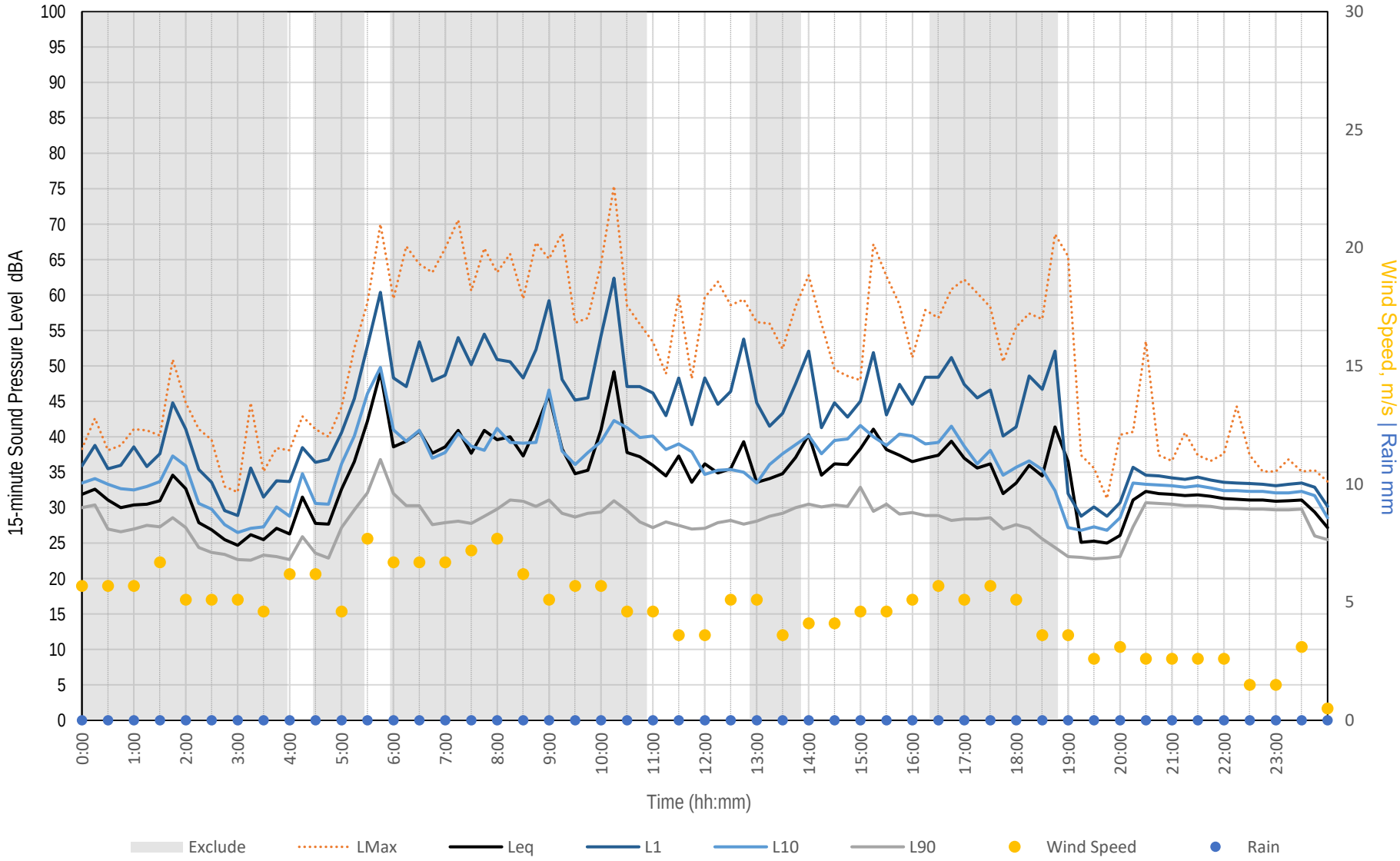
Tuesday, 26 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

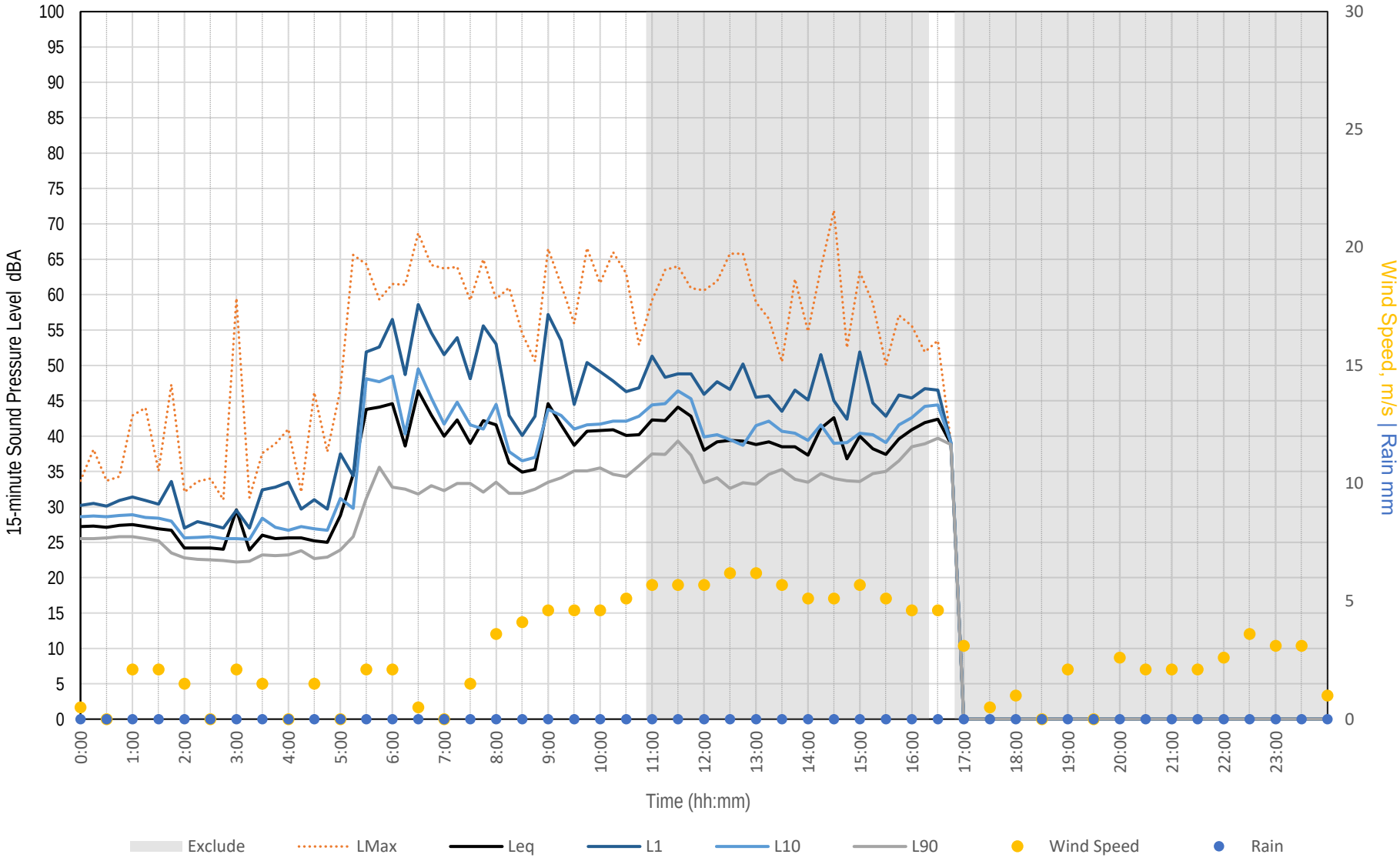
Wednesday, 27 September 2023



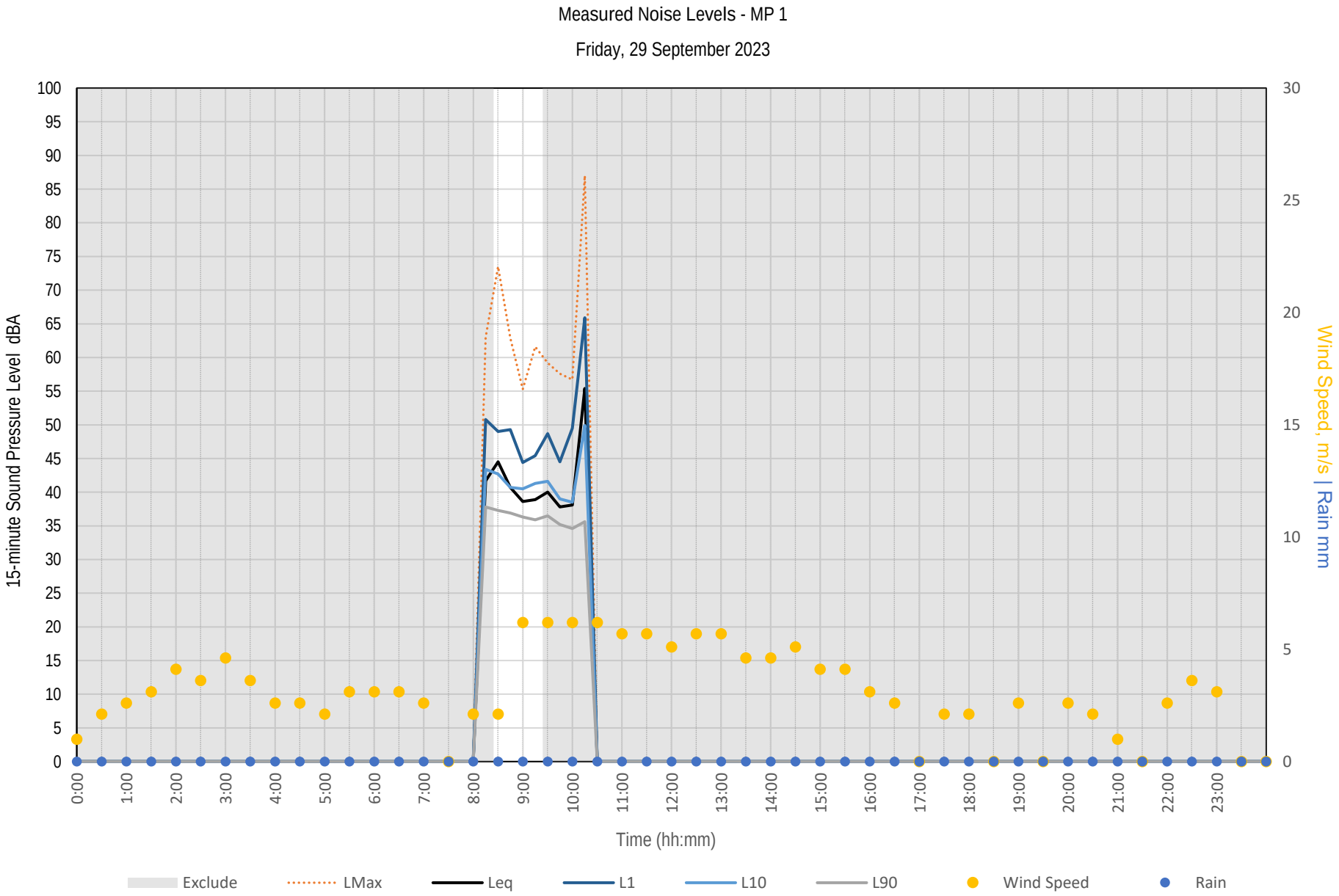
Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Measured Noise Levels - MP 1

Thursday, 28 September 2023



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).



Excluded data is due to inclement weather (where rain is present or where wind exceeds 5 m/s).

Appendix B

SAPPA Zoning map

NSR5
NSR1
NSR2
NSR3
NSR4
Desalination Plant Site Boundary

Legend

- Site Boundary
- Receiver

SA PDC Land Use Zones

- Coastal Waters and Offshore Islands
- Deferred Urban
- General Neighbourhood
- Infrastructure (Ferry and Marina Facilities)
- Open Space
- Recreation
- Strategic Employment
- Suburban Activity Centre
- Waterfront Neighbourhood

Appendix B	Author: CJ
Date: 16/05/2024	Approved by: CJ

N

0 90 180 270 m

1:6,000 at A3

To be read in conjunction with WSP document: PS137455-WSP-ACO-REP-002

Map Source: Metro Maps

New Eyre Peninsula Desalination Project

SA PDC Land use Zone Overlay

Appendix C

Plant and equipment sound power

EYRE PENINSULA DESALINATION PLANT (ECI PHASE)

Desalination Plant Preliminary Operational Noise Sources Inventc

acciona

SA Water Doc No.	A0012-25-GEN-REP-0001-0.2
ACA Doc No.	TBA Draft Only
Date:	Tuesday, 14 May 2024
Revision:	DR (Draft)

Site Layout Item Reference	Area Description	Equipment Description	Equipment Type	Max. Duty Units In Operation	Designer	Sound Power Level (dB)	Frequency Spectra (dB)								Motor Rating (kW)	Indoors or Outdoors	Above Ground or Below Ground	Height of Source (mAHD) Note 3	Daily Operation (Hours)	Noise Attenuation (Yes/No)	Details of Noise Attenuation	Comments
							63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz								
1	Treated Water Storage Tanks and Pump Station	Treated Water Pumps	Pump	2	SMEC	82									450	Outdoors	Above	7.0	20	No	N/A	Two (2) duty pumps required for Stage 1 operation. A third pump is required to accommodate the Stage 2 sprint flows (120%).
~~2~~	~~Desalination Plant~~	~~UF feed pumps~~	~~Pump~~	~~4~~	~~Agua~~	~~85~~									~~75~~	~~Outdoors~~	~~Above~~	~~8.0~~	~~20~~	~~No~~	~~N/A~~	~~Vertical turbine pump, impeller submerged with motor located above ground considered as per 30%~~
~~3~~	~~Inlet Screening Tank~~	~~Washing pumps screening system~~	~~Pump~~	~~1~~	~~Agua~~	~~82~~									~~10~~	~~Outdoors~~	~~Above~~	~~8.0~~	~~20~~	~~No~~	~~N/A~~	~~If screenings are installed in intake Chamber, they will be removed from plant and current layout. In this instance they have been included in plant as the most conservative case.~~
4	Desalination Plant	UF backwash pump	Pump	1	Agua	82									55	Outdoors	Above	8.0	8	No	N/A	If Memcor is considered, this pumps are not required. But if another supplier is selected, they will be required. Shall we mantain them?
~~5~~	~~Desalination Plant~~	~~Service Air compressor~~	~~Blower~~	~~1~~	~~SMEC~~										~~37~~	~~Indoors~~	~~Above~~	~~8.0~~	~~20~~	~~Yes~~	~~See comment~~	~~Accoustic Enclosure for blowers included in vendor package~~
6	Desalination Plant	SWRO HP Pumps	Pump	16	Agua	91									250	Indoors	Above	8.0	20	No	See comment	4 pumps/Rack according Danfoss proposal. We will analyse mitigating noise options as design progresses.
~~7~~	~~Desalination Plant~~	~~SWRO ERD Pumps~~	~~Pump~~	~~4~~	~~Agua~~	~~85~~									18.5	Indoors	Above	8.0	20	No	N/A	~~If proceeding with Danfoss, ERD Pumps will not be required. Included here as preliminary in order to provide the most conservative case~~
8	Desalination Plant	Pressure exchanger SWRO	Recovery device	16	Agua	85									18	Indoors	Above	8.0	20	No	N/A	4 recovery/Rack according Danfoss proposal
9	Desalination Plant	BWRO Pumps	Pump	4	Agua	85									130	Indoors	Above	8.0	20	No	N/A	
10	Desalination Plant	RO flushing pumps	Pump	1	Agua	82									75	Outdoors	Above	8.0	16	No	N/A	
11	Desalination Plant	CIP pumps	Pump	2	Agua	85									55	Outdoors	Above	8.0	16	No	N/A	
12	Calcite Contactor	Backwash water Recovery pumps	Pump	1	Agua	82									4.5	Outdoors	Above	8.0	4	No	N/A	
13	Calcite Contactor	CO2 dilution pumps	Pump	1	Agua	82									15	Outdoors	Above	8.0	20	No	N/A	
14	Desalination Plant	UF neutralization pumps	Pump	1	Agua	85									7.5	Outdoors	Above	8.0	16			
15	Treated Water Storage Tanks and Pump Station	Chlorinated Water Sampling Pumps	Pump	1	SMEC	60									0.55	Outdoors	Above	9.0	20	No	N/A	
16	Brine Pump Station	Brine Sample Pumps	Pump	1	SMEC	60									0.55	Outdoors	Above	8.0	8	No	N/A	
17	Brine Pump Station	Brine Outfall Pumps	Pump	1	SMEC	90									110	Outdoors	Above	8.0	20	No	N/A	Vertical turbine pump, impeller submerged with motor located above ground
18	Sitewide	Wastewater Pump Station Pumps	Pump	1	SMEC	70									5	Outdoors	Below	4.0	4	Yes	Submerged in fluid	Located within a below ground wet well pump station
19	Desalination Plant	Plant Air Compressor	Compressor	1	SMEC	85									30	Outdoors	Above	9.0	20	Yes	Sound attenuation to be included in vendor package	Located outside RO Building, adjacent to liquid chemical area
20	Desalination Plant	Service Water Pumps	Pumps	2	SMEC	75									7.5	Outdoors	Above	8.0	20	No	N/A	
21	Desalination Plant	HVAC in RO Building	Evaporative Cooler	5	Lucid	99										Outdoors	Above	9.0	12	No	N/A	Sound power level unit is dBA. Assumed that multiple units with equal intensity are placed side-by-side which will increase radiant noise. Evap coolers to be located at low level (not roof level).
~~22~~	~~Fire Protection Infrastructure~~	~~Firefighting~~	~~Pump~~	~~1~~	~~Lucid~~	~~See 'Comment'~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~-~~	~~41~~	~~Indoors~~	~~Above~~	~~7.0~~	~~1~~	~~No~~	~~N/A~~	~~At 1 metre, 102.2 dBa and at 7 metres away 93.1 dBa. Pumps to be installed inside a pump shed along with diesel genset. Dedicated fire pumps have been assumed as required for the purposes of the noise assessment, however they will likely be replaced by a direct main connection pending design development.~~
23	RO Building	Overhead cranes & hoists	Crane	1	SMEC	90										Indoors	Above	15.0	4	No	N/A	
24	Sitewide	Electrical Boards/VSDs	Switchboard/VSDs	22	ATSYS											Indoors	Above	8.0	24	No		Located within switchrooms
25	Process Lagoon	Process Lagoon Transfer Pump	Pump	1	SMEC	70									11	Outdoors	Below	4.0	8	Yes	Submerged in fluid	Located within a below ground wet well pump station
26	Intake Pump Station and Inland Raw Water Pipeline	Intake Pumps	Pump	3	SMEC	90									355	Outdoors	Above	4.0	20	No	N/A	Vertical turbine pump with submerged impeller
27	Switchrooms	Air Conditioners	Air Conditioner	2	ATSYS	65										Outdoors	Above	9.0	24	No	N/A	Typical rating only
28	Switchrooms	Treated Water Pump VSDs	VSD	2	ATSYS	80									450	Indoors	Above	9.0	20	Yes	Switchroom	
29	Switchrooms	Main RO HP VSDs	VSD	3	ATSYS	80									700	Indoors	Above	9.0	20	Yes	Switchroom	
~~30~~	~~Intake Pump Station and Inland Raw Water Pipeline~~	~~HVAC in Intake Pump Station Building~~	~~Evaporative Cooler~~	~~1~~	~~Lucid~~	~~96~~										~~Outdoors~~	~~Above~~	~~5.2~~	~~12~~	~~No~~	~~N/A~~	~~Sound power level unit is dBA. Evap coolers to be located at low level (not roof level).~~
31	Desalination Plant	Permanent Genset	Genset	1	ATSYS	82									2000kVA	Outdoors	Above	8.0	20	Yes	Acoustic enclosure	Only used in a loss of power supply event
32	Desalination Plant	Temporary Genset	Genset	1	ATSYS	82									2000kVA	Outdoors	Above	8.0	20	Yes	Acoustic enclosure	Only used in a loss of power supply event
33	Chemical Dosing	Chlorine Building Fan	Fan	1	SMEC	80									1.5	Indoors	Above	13.0	24	No	N/A	Inside Chlorine Storage Building
34	Chemical Dosing	Chlorine Building Monorail	Monorail	1	SMEC	90									3	Indoors	Above	13.0	4	No	N/A	Inside Chlorine Storage Building
35	Chemical Dosing	Chlorine Building Ancillaries	Ancillaries	3	SMEC	65									1.1	Indoors	Above	10.0	20	No	N/A	Inside Chlorine Storage Building
36	Desalination Plant	RO CIP Neutralization Pumps	Pump	1	Agua	82									4	Outdoors	Above	8.0	16	No	N/A	
37	Desalination Plant	Disc Filters backwash Pump	Pump	1	Agua	85									132	Outdoors	Above	8.0	16	No	N/A	
38	Desalination Plant	UF CIP Pump	Pump	1	Agua	82									55	Outdoors	Above	8.0	8	No	N/A	As per SID, UF CIP system is placed next to the chemical building (outdoors)
~~39~~	~~Desalination Plant~~	~~Permeate Booster pump~~	~~Pump~~	~~1~~	~~Agua~~	~~85~~									~~30~~	~~Outdoors~~	~~Above~~	~~8.0~~	~~20~~	~~No~~	~~N/A~~	~~Design is ongoing. It is possible that these pumps will be removed from process~~
40	Desalination Plant	Limestone Ejector Water pumps	Pump	1	Agua	82									37	Outdoors	Above	8.0	4	No	N/A	
41	Desalination Plant	Limestone Blowers	Blower	1	Agua	79									55	Outdoors	Above	8.0	4	No	See comment	Accoustic Enclosure for blowers included in vendor package
42	Desalination Plant	Limestone Sludge Water pumps	Pump	1	Agua	82									2.2	Outdoors	Below	6.0	4	No	N/A	Submerged pumps
43	Control Room	Air conditioners in Control Room	Air Conditioner	3	Vendor	65										Outdoors	Above	10.0	10	No	N/A	Assume split system, reverse cycle AC units. Size TBC based on vendor details for modular control room
~~44~~	~~Inlet Screening Tank~~	~~Screening system~~	~~Screens~~	~~2~~	~~Agua~~	~~85~~									~~20~~	~~Outdoors~~	~~Above~~	~~8.0~~	~~20~~	~~No~~	~~N/A~~	~~If screenings are installed in Intake Chamber, they will be removed from plant and current layout. In this instance they have been included in plant as the most conservative case.~~
45	Desalination Plant	Compressed Air Dryer	Dryer	1	SMEC	64									5.5	Outdoors	Above	9.0	20	Yes	Sound attenuation to be included in vendor package	Located outside RO Building, adjacent to liquid chemical area
46	Intake Pump Station and Inland Raw Water Pipeline	Travelling band screens	Fine screen	2	SMEC	85									3	Outdoors	Above	4.0	20	No	N/A	
47	Intake Pump Station and Inland Raw Water Pipeline	Dosing pumps for marine intake shock dosing	Pump	TBC	Agua	TBC									TBC	Outdoors	Above	4.0	2	No	N/A	
48	Desalination Plant	Chemical Dosing Pumps	Pump	24	Agua	80									1.1	Outdoors	Above	9.0	20	No	N/A	

Site Layout Item Reference	Area Description	Equipment Description	Equipment Type	Units In Operation	Designer	Sound Power Level (dB)	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	Motor Rating (kW)	Indoors or Outdoors	Above Ground or Below Ground	(mAHD) Note 3	Daily Operation (Hours)	Noise Attenuation (Yes/No)	Details of Noise Attenuation	Comments
49	Intake Pump Station and Inland Raw Water Pipeline	Intake Pump Station Backwash Pumps	Pump	1	SMEC	85									5.5	Outdoors	Above	4.0	4	No	N/A	

Notes:

1 The information presented in this document is to be treated as preliminary and subject to change. The information is based on assumptions made on the 30% Concept Design which may be subject to change as the design develops.

2 The information presented in this document is based upon conservative (worst case) scenarios as advised by SA Water for the purpose of drafting the Development Application. Please note that Acciona Construction Australia (ACA) and our design partners are actively working towards optimising the design and opportunities to reduce noise levels throughout the remainder of the ECI period.

3 All levels are expressed as metres AHD. Refer to the 30% Concept Design drawings for finished surface levels.

4 The RO Building is proposed to take the form of a large steel framed shed with roller doors positioned to provide vehicle access for operational/maintenance purposes. The building structure is proposed to be clad with aluminium sheeting. This noise inventory has not considered insulation as a mitigating measure at this moment in time.

5 For the purposes of this noise inventory, anticipated noise levels for the RO Building has considered the scenario of the roller doors being open during normal working hours.

6 The information provided within this document relates to anticipated noise levels for Stage 1 operation only.

7 The data provided within this preliminary noise inventory is based on expected sound power level at source.

8 The noise levels for HVAC in the RO building and Marine Intake PS are subject to change and dependent on completion of heat load assessments within these buildings.

9 The noise levels associated with the Marine Intake Pump Station are subject to change, pending confirmation from SA Water with respect to the pump station configuration to be adopted.

10 This preliminary noise inventory is for the operational phase only; not for construction.

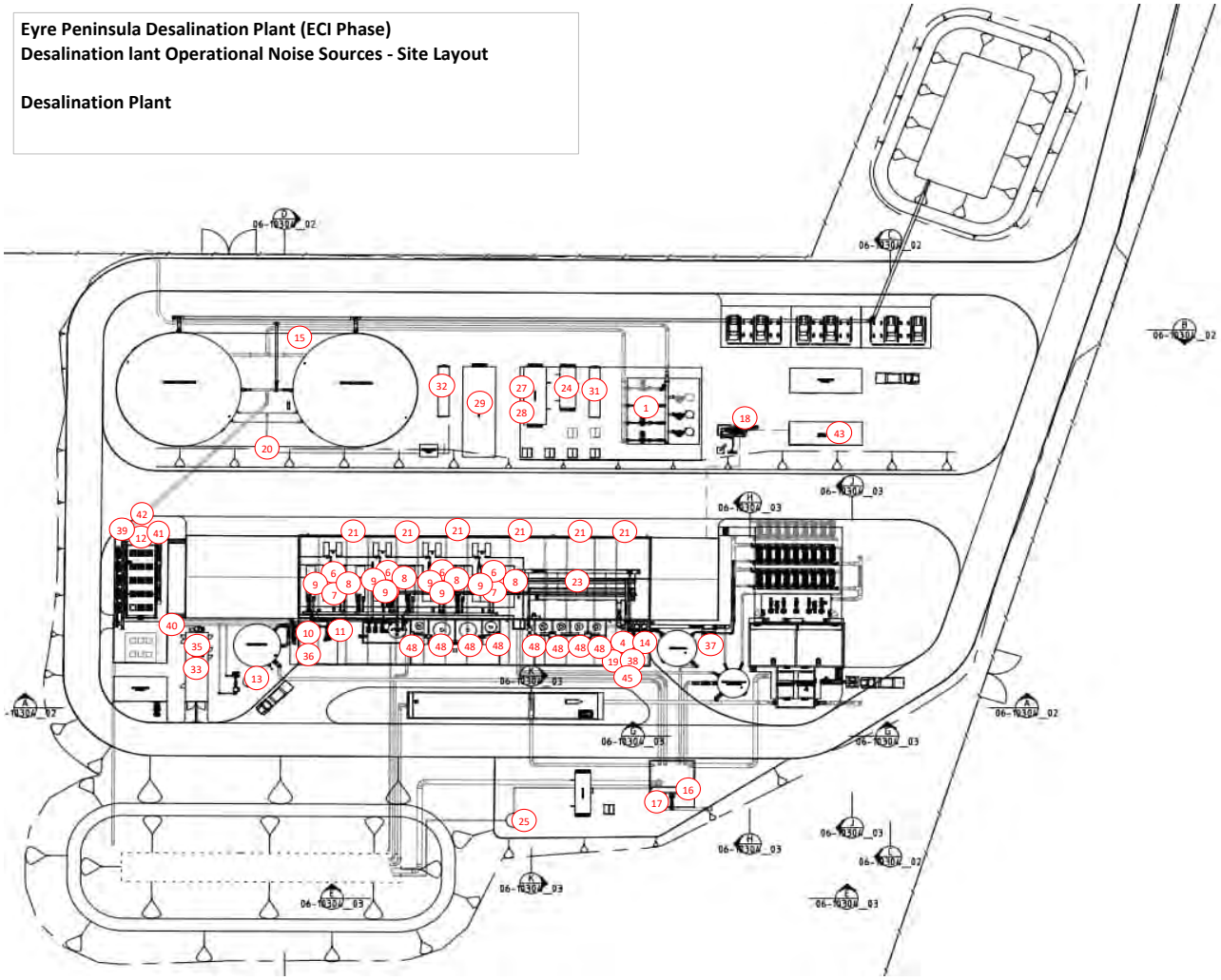
11 Vehicle noise is excluded. Note that chemical deliveries to site are expected to be weekly or less (subject to further development of chemical systems design) and has assumed only two full-time operators on site.

12 The site layout is based on SA Water's 30% design, this may change pending design development, which may have an impact on the noise source locations.

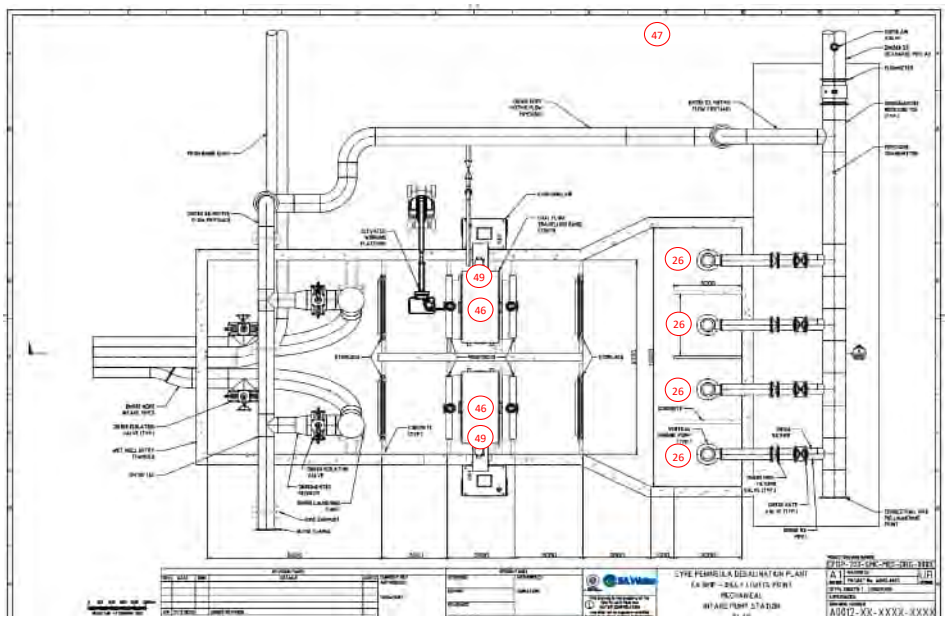
13 This preliminary Operational Noise Sources Inventory only considers noise sources associated with normal/routine plant operation. Noise impacts from abnormal/emergency events (e.g. emergency alarms, fire brigade trucks, etc.) have not been considered.

Eyre Peninsula Desalination Plant (ECI Phase)
Desalination lant Operational Noise Sources - Site Layout

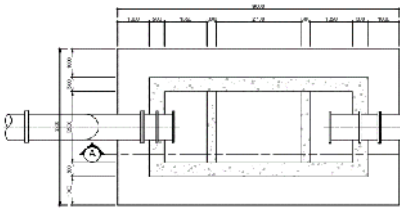
Desalination Plant



Intake Pump Station



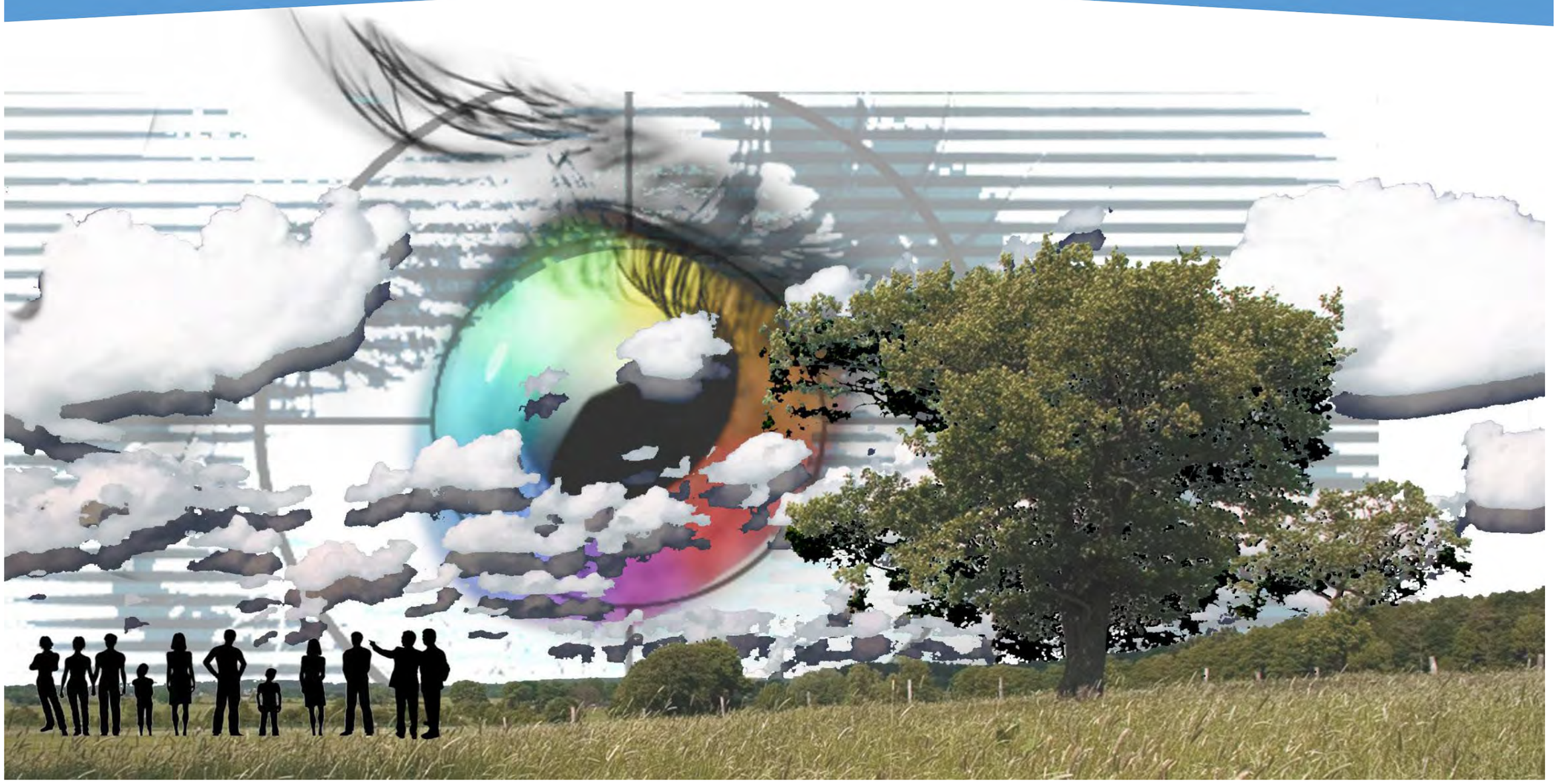
Brine Discharge Structure



Appendix E Landscape Character and Visual Amenity Assessment

Eyre Peninsula's New Seawater Desalination Plant

Landscape Character and Visual Impact Assessment



Hemisphere Design (Aust) Pty Ltd

Contents

About the author

Stuart Heseltine, Registered Landscape Architect, Principal, Hemisphere Design (Aust) Pty Ltd. Stuart is acknowledged as a leading practitioner in the area of landscape character and visual impact assessment. In considering each visual impact assessment exercise Stuart undertakes a qualitative landscape character assessment consistent with best practice as prescribed by the Guidelines for Landscape and Visual Impact Assessment (third edition), the Landscape Institute (UK) and Institute of Environmental Management and Assessment (NSW) 2013.

Stuart has successfully applied this methodology to major projects across South Australia, the Northern Territory, New South Wales and Victoria. With relevance to this project Stuart has prepared assessments for the Adelaide and Kangaroo Island Desalination Plants (SA), the Lincoln Gap (Stage 3) and Barn Hill Wind farm Developments (SA), the Chaff Mill (SA), Tailem Bend (SA) Stage Two, Frasers Solar Farm (Glengarry North, Victoria), Mid Murray and Berri Solar Farm developments (SA), the Clements Gap BESS (SA), Tyabb BESS (Mornington Peninsula, Victoria) and the Torrens Island Gas Power Station Expansion (SA).

Stuart provides regular advice on the likely visual impact of numerous infrastructure developments undertaken by SA Water and visual assessment exercises pertaining to Development Applications lodged in numerous Adelaide metropolitan and regional council areas.

Stuart's particular expertise in undertaking visual assessments is highly sought after for the provision of expert evidence for the Environment, Resources and Development Court (SA).

Note: This document is prepared to be printed and read in A3 format.

Disclaimer: Stuart Heseltine, Principal, Hemisphere Design is the sole author of this report; all changes implemented without the author's consent after the final report has been issued may warrant the intellectual property contained in the report wholly or partially invalid.

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Glossary of terms

Term	Description
CL	Contextual Landscape
EIA	Environmental Impact Assessment
GL/a	Gigalitres per annum
HD	Hemisphere Design
Landscape Assessment	An assessment of the elements that collectively make up the landscape, such as landform, vegetation, land-use and cultural influences
LCVIA	Landscape Character and Visual Impact Assessment
Location(s) / Locality	The position or site of something
PDC	PlanSA. Planning and Design Code
Receptor(s)	A place, route, viewer audience or interest group which may receive an effect and require assessment.
Sensitive Receptor (SR)	A Viewpoint or Viewpoint Locality where the observer is more susceptible to the visual impact of the development
Sensitive Receptor Locality (SRL)	An area where there are a number of collocated sensitive receptors
Viewpoint (VP)	A position providing a view of the proposed development from where an assessment is made to consider landscape character and the likely potential of visual impacts which may result as a consequence of the development
Viewpoint Locality (VPL)	An area where there are a number of collocated viewpoints
Visibility Shadow	Areas within the likely ZTVI where it is predicted that the proposed development will not be visible because there are a combination of ridgelines and depressions, specific blocks of vegetation and built form between the viewer and the proposed site that potentially blocks all views
Visual Exposure	A measure of the degree to which an observer at a location can see or potentially see the area to be affected by the proposed development. The visual exposure is subjectively classified as either none, low, moderate or high
Zone of Theoretical Visual Influence (ZTVI)	The Zone of Theoretical Visual Influence (ZTVI) is the defined area within which modification to the contextual landscape as a result of the proposed development could be discernible to the naked eye. A nominated radius (e.g. 5km, 10km, 15km etc) from the centre of the proposed site is adopted as the likely furthest extent of the likely ZTVI.

Document control and distribution copies

Issue Number	Date Issued	Author	Approved By	Date Approved	Revision Type	Issued to
#01	25/09/2023	Stuart Heseltine	Stuart Heseltine	25/09/2023	N/A	
#02	08/05/2024	Stuart Heseltine	Stuart Heseltine	08/05/2024	Review comments	Tenille Anderson, WSP

Executive summary

This Landscape Character and Visual Impact Assessment (LCVIA) has been prepared as one of several studies to support a Development Application by SA Water for the construction of a Desalination Plant Facility and associated infrastructure at Proper Bay, Port Lincoln, SA. It supersedes a previous LCVIA completed in 2021.

A rigorous on-site analysis undertaken in 2021 and revisited in August 2023 utilising seven pre-determined viewpoints characterised the landscape of the existing locality as being one of **low scenic quality** to **moderate scenic quality**. Through a detailed assessment of four identified Sensitive Receptors and Sensitive Receptor Localities the visual impact that is likely to be experienced within a 2.5km radius Zone of Theoretical Visual Influence by the introduction of the proposed development will be:

Desalination Plant Facility	**No change** at two Sensitive Receptor Localities (SRL 01 and SRL 02)
33 kV powerline supported by monopoles	**Slight adverse impact** to **moderate adverse impact**, diminishing over distance to be inconsequential and **no change** at one Sensitive Receptor (SR 03) **Moderate adverse impact** within an infrequently visited locality, diminishing over distance to be **slight adverse impact** to **no change** at one Sensitive Receptor (SR 04).

The visual impact assessment is supported by ‘before and after’ photomontage imagery and video ‘flythrough’.

Screen planting mitigation is not required at any Sensitive Receptor/Sensitive Receptor Locality. Finishes for the desalination plant roof structure and pump station which are similar in colour to the natural landscape tones and hues are being adopted. The use of non-reflective finishes for power poles is recommended.

Introduction

This Landscape Character and Visual Impact Assessment (LCVIA) has been prepared to support a Development Application for the Eyre Peninsula's New Seawater Desalination Plant, herein referred to as The Project.

This report supersedes a LCVIA report prepared by Hemisphere Design (Aust) Pty Ltd in 2021 for the assessment of a similar facility in broadly the same location. This new report refers to and updates all relevant information, maps and photographs that were presented in the 2021 LCVIA report and, where necessary, considers and assesses additional information presented in the proposed current design.

This LCVIA provides an analysis of:

- the existing landscape character and visual amenity of the contextual landscape and locality;
- the sensitivity of the landscape to change; and
- the likely degree of visual impact as a result of the introduction of The Project.

The degree of likely visual impact is presented in a tabulated form and supported by photomontage imagery and video 'flythrough' imagery. The photomontage imagery provides guidance on the appearance, form, materiality and finishes of the proposed the desalination plant structure and other associated infrastructure.

Project area

The proposed project site is approximately 4km south-east of Port Lincoln township in South Australia. The site is located on land previously owned by BHP and now owned by Lukin Corporation. The Project footprint is approximately 13,853 square metres (1.4 Hectares) in size.

The Project comprises of:

- The construction of a new 5.3 GL/a desalination plant with the ability for a future upgrade to 8 GL/a. The plant will comprise of all associated infrastructure which includes security fencing and nighttime security lighting, access roads, storage tanks, marine and intake pumping infrastructure, waste streams, and stormwater discharge to provide for a functioning desalination plant.
- A Transfer System comprising of a 7km long DN600 pipeline to transfer the treated desalinated water to the existing Northside Hill Tanks in Port Lincoln to supply the town. This pipeline will be installed within existing road reserves and designed to convey the future ultimate capacity of the desalination plant.
- A 33 kV power supply to the proposed desalination plant installing a connection from an existing substation at either Port Lincoln Substation or Port Lincoln Marina Substation to Windsor Avenue. SA Water will erect new poles from Windsor Avenue, traversing the Proper Bay headland to the proposed site via Greyhound Road and the decommissioned tram line route. Works connecting the new SA Water transmission line from Windsor Avenue to the existing substations will be undertaken by SA Power Networks and is not within the scope of this Project.
- Marine structures including sub-surface marine pipelines used to draw in seawater and return brine to the ocean, an intake pump station and may include an outfall pump station depending on final location of outfall pipe.
- Minor vegetation clearance may be required to accommodate the construction of the new desalination plant and installation of kV powerlines and poles. The extent of clearance has yet to be determined however it is envisaged unlikely that the required vegetation clearance will adversely impact views to both the desalination plant, powerlines and poles from locations and Sensitive Receptors (SRs)/ Sensitive Receptor Localities (SRLs) within the contextual landscape.

LCVIA considerations

The following inputs have been considered in the preparation of this assessment:

- Location drawings, construction plans and photographs prepared by WSP and others on behalf of SA Water and issued in February 2024. The current design (as at April 2024) includes minor changes in the disposition of site infrastructure and final building heights. On review it has been determined that these changes will have no notable impact on the likely visual impact of the project and as such updating the LCVIA in response has been deemed to be unnecessary;
- Aerial photography of the site and wider locality;
- On site photography undertaken by Hemisphere Design and Convergen.

Methodology

The methodology employed for the LCVIA involves consideration of best practice guidelines in qualitatively considering the landscape character and the likely visual impact of a proposal. Relevant statutory policies and/or guidelines are also considered and assessed as part of the LCVIA process.

The degree of likely visual impact that will arise from The Project was determined based on a preliminary desktop study which determined the Zone of Theoretical Visual Influence (ZTVI). Within the ZTVI, Viewpoints, being publicly accessible locations, were identified to enable a remote desktop character assessment of the contextual landscape and locality to be prepared.

The assessment of aerial imagery identified seven Viewpoints within the ZTVI which were used to reaffirm the findings of the character assessment on-site.

Four SRs/SRLs were identified as locations where views of the more visually prominent infrastructure elements of The Project are likely to be obtained.

A qualitative assessment of the likely visual impact of The Project was undertaken from the identified SR/SRLs and the subsequent degree of likely visual impact was determined through on-site investigations. This assessment is presented below.

The assessment is supported by photomontage imagery and Linewire/Photo-negative 'x-ray images' are appended for reference which depict the presence of proposed infrastructure in each photomontage without in-situ and contextual rendering. The visual impact assessment is also supported by a video 'flythrough'.

Landscape Character Assessment

Evaluation of the Existing Landscape Character

A qualitative landscape character assessment has been undertaken in a rigorous manner consistent with best practice, as prescribed by *the Guidelines for Landscape and Visual Impact Assessment* (Third Edition)[1].

A desktop evaluation was undertaken using Google Earth aerial photography, and Google Earth 'street view' to identify the likely Zone of Theoretical Visual Influence. The ZTVI is the defined geographical area within which modification to the contextual landscape as a result of The Project could be potentially discernible or visible. Given the nature of the contextual landscape, a 2.5km radius from the centre of the site of the desalination plant was adopted as the likely furthest extent of the likely ZTVI. (Refer: Figure 1 Viewpoints Visited (Dwg No. HD_ Z015_AD01 Sheet No. 1)).

Within the ZTVI a visibility shadow was determined to illustrate areas within the ZTVI where it is predicted that The Project will not be visible/will remain concealed due to the nature of the landform and overlying intermittent vegetative cover. The ZTVI was verified on-site as part of the character assessment. The visibility shadow has been determined to account for over 90% of the area within the ZTVI, i.e., The Project will be wholly or partially visible across an area of less than 10% of the ZTVI.

However, it is acknowledged that the proposed 33 kV powerlines and associated poles to be installed at either 11m or 13m high will have a separate visibility shadow which will be limited within a narrow visual field or corridor from the point of installation at Windsor Avenue running south-east to the proposed site. (Refer: Figure 1 Viewpoints Visited (Dwg No. HD_ Z015_AD01 Sheet No. 1)).

Site visit and photography

Site visits were undertaken in July 2021 and again in September 2023 to obtain new photographs to assist in the presentation of high-quality photomontage images and video flythrough.

Photographs taken in both 2021 and 2023 have been used for the purposes of this assessment. Photographs taken on both occasions at selected viewpoints were taken using a 35mm Single Lens Reflex (SLR) camera with an approximate lens setting of 43mm.

Landscape Assessment

Landscape assessment, in contrast to visual assessment, deals with the fabric, character and quality of the countryside. The landscape fabric consists of the elements that make up the landscape, such as landform, land-use and cultural influences. The way these elements fit together in terms of proportion, pattern, scale, etc., gives rise to a particular landscape character. Changes to the fabric and character of a particular landscape may affect the perceived value of that landscape, giving rise to changes in its quality.

The landscape character assessment has encompassed both the wider contextual landscape and the locality, which is visually more difficult to define and within which the proposed development is located.

This characterisation process establishes a 'baseline' upon which judgments about the potential effects of the proposed development can be made. The following guiding definitions are applied to determine the landscape assessment:

High scenic quality	Areas and localities which exhibit an exceptionally strong positive character with valued features which combine to give an experience of unity, richness and harmony. Within this definition 'exceptional' could apply where an area is also deemed to be worthy of a legislative designation, e.g. a National Park.
Moderate scenic quality	Areas which exhibit a strong positive character with valued features with evidence of a visually acceptable level of alteration/degradation/erosion resulting in a location of more mixed character.
Low scenic quality	Areas with a generally positive character with fewer valued features with evidence of a visually acceptable level of alteration/degradation/erosion resulting in a location of more mixed character.
No scenic quality	Areas with a little or no positive character with few or no valued features with evidence of a visually unacceptable level of alteration/degradation/ erosion resulting in a highly modified location of little character.

[1] Landscape Institute and Institute of Environmental Management and Assessment. Guidelines for landscape and visual impact assessment (3rd ed.). (2013). Routledge. https://doi.org/10.4324/9780203436295

Image 1: Panoramic view at Billy Lights Point and ex-BHP sand storage shed.

The landscape characterisation process also enables an assessment of the landscape 'sensitivity to change', that is the ability of the landscape to accommodate the visual change associated with the proposed infrastructure, for both the wider contextual landscape and the locality.

> *"Landscape sensitivity may be regarded as a measure of the resilience, or robustness, of a landscape to withstand specified change arising from development types or land management practices, without undue negative effects on the landscape and visual baseline and their value."*[2]

For example, a landscape that displays a high 'sensitivity to change' would not be able to absorb a development of the nature proposed by the development without irreparable consequences and impacts on the inherent character and visual amenity.

The following definitions are applied to determine the landscape's sensitivity to change:

High sensitivity to change	Key characteristics and qualities of the landscape are highly sensitive to change from the development type. Development would significantly conflict with several of the assessment criteria with severe adverse impacts likely to arise.
Medium sensitivity to change	Some of the key landscape characteristics or qualities of the landscape are sensitive to change from the development type. There is some ability to accommodate development in some situations without widespread or severe changes to the landscape; the development type relates to some aspects of landscape character.
Low sensitivity to change	Fewer of the key characteristics and qualities of the landscape are sensitive to change from the development type. There are opportunities to accommodate the development type in most locations without widespread or severe effects on the assessment criteria; the development type relates to many aspects of landscape character.
Negligible sensitivity to change	Key characteristics and qualities of the landscape are unlikely to be adversely affected by the introduction of the development type. The development type relates well to the assessment criteria and change may be accommodated without widespread significant adverse impacts on the landscape.

Landscape Character

Contextual landscape

Located to the south of Port Lincoln the Proper Bay peninsula is a monumental landscape where the finer detail of form and function is inconsequential in the sweeping vistas which draw the eye of the observer across Porter Bay and Boston Bay to the north and to the south across Proper Bay, and the more undulating topography of Lincoln National Park where expansive tree canopies silhouette the enveloping skyscape.

Across the mainly planar landscape where the landform raises subtly and imperceptibly above sea level the eye of the observer is orientated through a 360° panorama. The eye is drawn along and through a foreground of dense swathes of native coastal vegetation which envelops the southern and eastern foreshore of Proper Bay and then north and west across a densely vegetated midground towards the Port Lincoln Marina development and the distant and undulating 'ebb and flow' of traditional suburban development on rising land beyond the town centre.

[2] Landscape Institute and Institute of Environmental Management and Assessment. (2013).

The panorama is visually complex, revealing the abrupt convergence of a number of landscape typologies where the quintessential characteristic of the once overarching indigenous landscape endeavours to prevail over an encroaching urbanisation.

Port Lincoln Marina is a visually underwhelming example of the current proliferating trend in 'coastal lifestyle' developments. Comprising of a contemporary built form style and vernacular it is typical of the marina-inspired mix of commercial and residential land use activities commonly found in many northeastern Australian locations. It comprises of single and two storey dwellings within tight knit neighbourhoods with streetscapes lined with palm trees and other exotic tree species and decorative boulevard street light columns. The expansive, multilayered and, in some instances garish, array of coloured facades and roofscapes is sharply juxtaposed against the more welcoming colours and appearance of the expansive seascape and indigenous coastal native landscape.

Beyond the marina and to the west and north of the town centre, the rising suburban hinterland of traditional neighbourhood developments comprises of mainly undulating single storey dwellings punctuated by 'green ribbon' threads of tree canopies which soften and camouflage the built form. The cresting landform of residential development with pockets of massed tree canopies defines the visual horizon.

From a small number of elevated vantage points to the north, a distance of over 2.5km away, and in particular along Hindmarsh Street and at the Port Lincoln Tourist Park, views of the northern and eastern facing roofscape of the ex-BHP sand storage shed and ramped conveyor are obtained. Standing at over 25m high and 134m long and occupying part of the proposed desalination plant site, the roof of the building is an incongruous and dominating visual feature. Whilst the building roof is prominent, the north facing shed elevation and surrounds are concealed by the expanse of native vegetation which surrounds the site and the wider locality.

Immediate setting and locality

From within the emerging residential neighbourhood to the south of St Andrews Drive, views of the sand storage shed and conveyor and the proposed site are concealed by the dense and expansive thickets of mature native coastal vegetation which cover large tracts of the Proper Bay headland. The Port Lincoln Waste Water Treatment Facility and the Australian Fishing Enterprises are inconspicuous land use activities save for the presence of weldmesh security fencing and billboard entry signage along St Andrews Drive.

It is only when arriving at the more elevated eastern-most part of the headland, from the Parnkalla Trailhead and carpark adjacent the popular Billy Lights Point Reserve that intermittent glimpses of the upper portion of the north-eastern part of the storage shed roof are obtained. However, the eye of the observer is more readily drawn beyond the immediate locality to exhilarating views north over the expansive seascape to Boston Island and south to the Lincoln National Park horizon.

The general visual anonymity of the commercial built form and associated land use activities and the monolithic BHP sand storage shed and conveyor allow the more inherent qualities of the indigenous landscape to prevail defining a welcoming and pleasant 'sense of place'.

It is my opinion that the landscape character of the contextual landscape and locality is one of a **low scenic quality** to **moderate scenic quality** and has a **low sensitivity to change** to **moderate sensitivity to change**.

Figure 1: Viewpoints Visited (Dwg No. HD_ Z015_AD01 Sheet No. 1)

Consideration of predetermined viewpoints

Seven predetermined viewpoints within the 2.5km ZTVI were visited, and consideration was given to all likely visual impacts of The Project.

Viewpoint Locality 01 (VPL 01) - Proper Bay Headland
Centred on the Billy Lights Point Reserve car park and Parnkalla Trailhead, views received at this viewpoint confirmed that this location is a Sensitive Receptor Locality and is thus considered further in the assessment below (SRL 01).

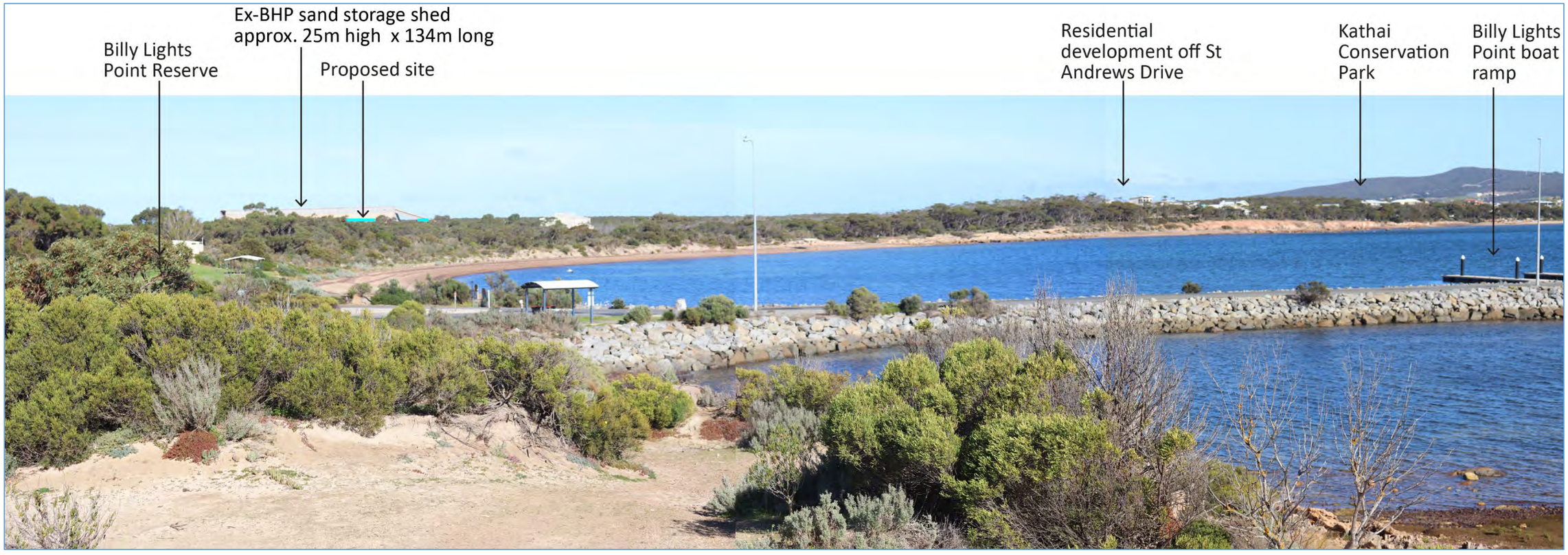

Image 2: VPL 01 – Parnkalla Trailhead at Proper Bay Headland, view southwest

Viewpoint Locality 01 (VPL 01) - Proper Bay Headland

Image 3: VPL 01 – Billy Lights Point boat ramp at Proper Bay Headland, view southwest

Viewpoint Locality 02 (VPL 02) - Residential development off St Andrews Drive
Properties facing southeast along both Romas Way and Cove View Drive. Views of the proposed site and the ex-BHP sand storage shed and conveyor are concealed by dense foreground plantings of coastal native trees and shrubs. Not considered to be a Sensitive Receptor.

Image 4: VPL 02 – Romas Way, south of St Andrews Drive, view southeast

Viewpoint Locality 03 (VPL 03) and Viewpoint Locality 04 (VPL 04) – Port Lincoln Marina
Views south across South Point Reserve, North Point Reserve and south from Mundy's Mooring. The tight knit urban development contains views to within the neighbourhood. The Project site is inconspicuous. Neither viewpoint locality considered to be a Sensitive Receptor.

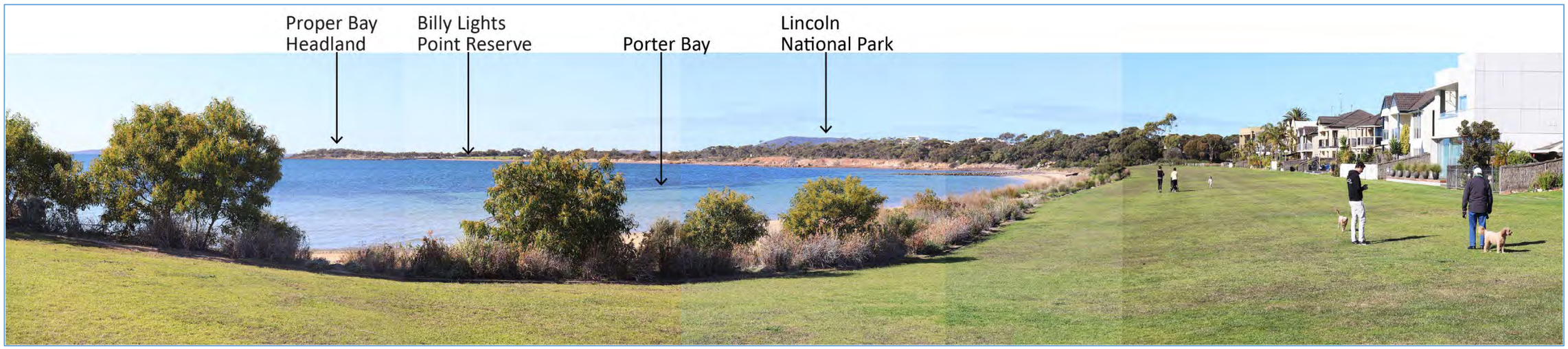

Image 5: VPL 03 – South Point Reserve, view southeast

Viewpoint Locality 05 (VPL 05) – Hindmarsh Street and Port Lincoln Tourist Park

Views south from an elevated vantage point and commercial caravan park over 2.5km north of The Project site. The northeast facing roof of the ex-BHP sand storage shed is a dominant and incongruous visual feature; however, the surrounding dense native coastal vegetation conceals the northeastern shed elevation and surrounding land on which the proposed desalination plant and associated 33 kV powerlines and poles will be constructed.

Given the relative height of the vegetation, at 5m to 8 m above ground level the proposed desalination plant building at 6m high will be largely concealed. This location is a Sensitive Receptor Locality (SRL 02) and is thus considered further in the assessment below.

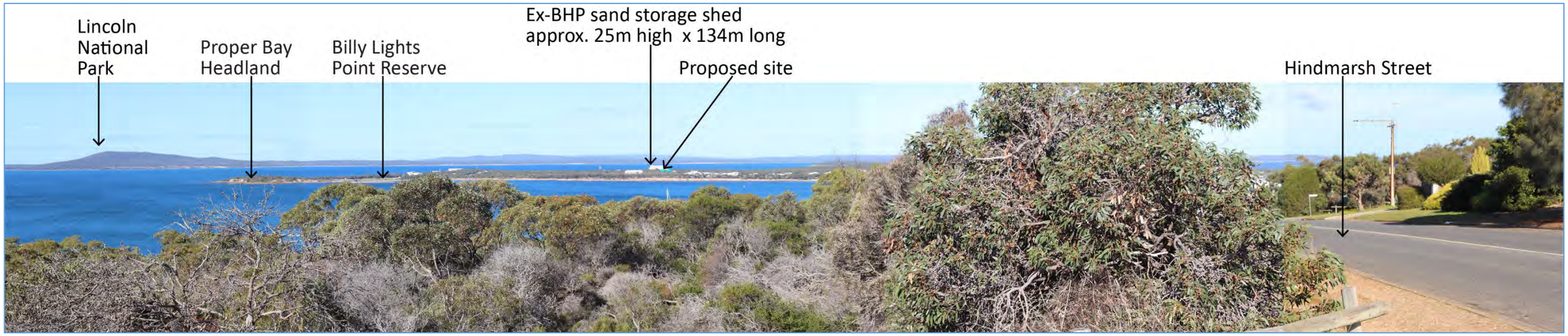

Image 6: VPL 05 – Elevated vantage point at Hindmarsh Street, view south

Image 7: VPL 05 – Port Lincoln Tourist Park, view south

Viewpoint Locality 06 (VPL 06) – Windsor Avenue
Adjacent Navigator College, the proposed 33 kV powerlines and poles that will be erected will be conspicuous features. This location is a Sensitive Receptor (SR 03) and is thus considered further in the assessment below.

Image 8: VPL 06 – Windsor Avenue, view west

Viewpoint Locality 07 (VPL 07) – Greyhound Road

At a point along Greyhound Road looking east along the redundant tram line, views received at this viewpoint confirmed that the proposed 33 kV powerlines and poles that will be erected will be conspicuous. This location is a Sensitive Receptor (SR 04) and is thus considered further in the assessment below.

Image 9: VPL 07 – Greyhound Road, view south

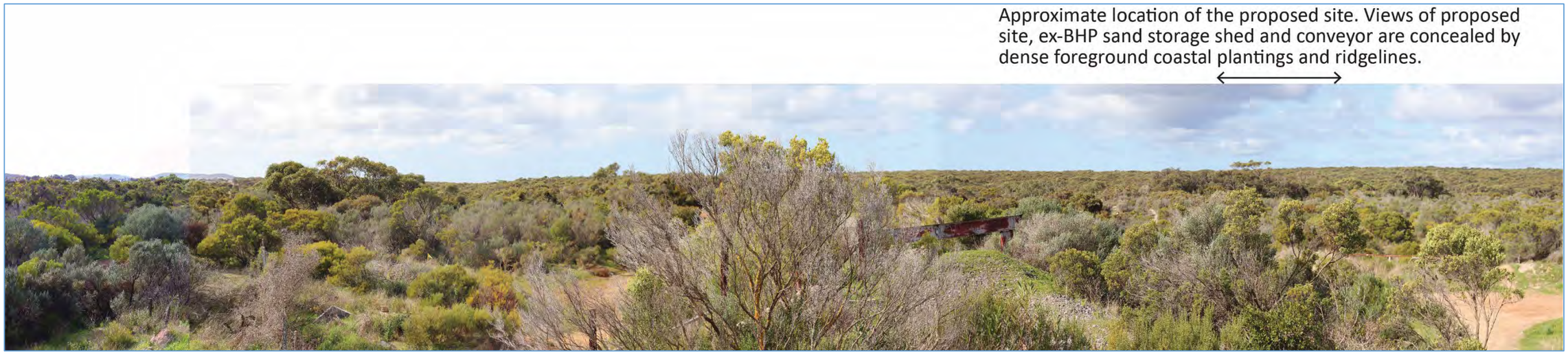

Image 10: VPL 07 – Greyhound Road, view east

Likely Visual Impact Assessment

Determining the likely visual impact of a development proposal in most regional locations presents obvious challenges where properties are often located some distance off major roads on private land away from publicly accessible locations. Where access is not sought to enter private land to obtain a view(s) that will best represent a potential visual impact, assumptions have to be drawn from views obtained from public locations that best typify the view and consequent visual impact that would likely be received from within the curtilage of the dwelling located on such 'remote' properties. The Project has presented such assessment challenges; however, it is the author's opinion this LCVIA assessment is an accurate and fair presentation of the potential likely impacts given these obvious constraints.

Of the seven viewpoints visited the evaluation has identified four locations considered to be SRs or SRLs:

Viewpoint Locality 01 (VPL 01): Proper Bay Headland	Sensitive Receptor Locality 01 (SRL 01)
Viewpoint Locality 05 (VPL 05): Hindmarsh Street and Port Lincoln Tourist Park	Sensitive Receptor Locality 02 (SRL 02)
Viewpoint Locality 06 (VPL 06): Windsor Avenue	Sensitive Receptor 03 (SR 03)
Viewpoint Locality 07 (VPL 07): Greyhound Road	Sensitive Receptor 04 (SR 04)

These SRs/SRLs are identified on Figure 2: Sensitive Receptors and Visibility Shadow Map (Proposed desalination plant and powerlines (Dwg No. HD_Z015_AD01 Sheet No. 2).

The assessment of the likely visual impact of the proposal has been confined to the four identified SRs/SRLs.

For each SR/SRL the likely visual impact of the proposed development is described considering factors which may include:

- The visual qualities of the view and the duration and angle of the view in relation to the main activity of the viewer;
- The distance of the viewpoint from the proposed development;
- The extent of the area over which the changes would be visible and the scale of the change in the view (loss or addition of features, changes in composition, proportion of view affected);
- The degree of contrast in form, scale, mass, line, height, colour and texture introduced into the view by the proposed development;
- The duration and nature of the effect (temporary, permanent, intermittent);
- Access and visitation to and the numbers and types of viewers affected. For example, greater importance/weighting would be afforded to a park or reserve as opposed to an unsurfaced single access lane and infrequently used public road.

Construction phase

During the construction phase temporary changes to visual amenity will occur as a result of earthworks at SR 03 (Windsor Avenue) and SR 04 (at the alignment along Greyhound Road and the disused tram line). Construction works at the site *per se* are not anticipated to affect visual amenity apart from the potential short-term presence of a crane structure. These changes will be due mainly, but not limited to, the presence of construction equipment, earthworks and excavation activities and an overall increase in the number of people and vehicles at each site and at roadside locations.

The changing visual environment and activity during construction will be temporary, therefore is not considered in detail in the visual impact assessment.

Likely visual impact at the identified Sensitive Receptors

The following criteria are applied to describe the likely visual impact of a proposed development at the SRs and SRLs:

Substantial adverse impact	where the scheme would cause a significant deterioration in the existing view
Moderate adverse impact	where the scheme would cause a noticeable deterioration in the existing view
Slight adverse impact	where the scheme would cause a barely perceptible deterioration in the existing view
No change	no discernible deterioration or improvement in the existing view
Slight beneficial impact	where the scheme would cause a barely perceptible improvement in the existing view
Moderate beneficial impact	where the scheme would cause a noticeable improvement in the existing view
Substantial beneficial impact	where the scheme would cause a significant improvement in the existing view

Figure 2: Sensitive Receptors and Visibility Shadow Map (Proposed desalination plant and powerlines) (Dwg No. HD_Z015_AD01 Sheet No. 2)

TITLE	Sensitive Receptors and Visibility Shadow Map (Proposed desalination plant and powerlines)		
PROJECT	Eyre Peninsula's New Seawater Desalination Plant		
DWG NO	SCALE	SHEET NO	REVISION
HD_Z015_AD01	-	2	1
DRAWN	CHECKED	DATE	
SW	SRH	9/23	

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Sensitive Receptor Locality 01 (SRL 01)

Image 11: SRL 01 – Billy Lights Point Reserve at Proper Bay Headland, view southwest

Location	View direction	Distance from Project Site(s)
Proper Bay Headland, centred on the Billy Lights Reserve, the Parnkalla Trailhead and the boat and trailer car park and slipway	South, southwest	Approximately 880m

Landscape and setting	Visual exposure at receptor
From within the receptor locality multiple viewpoints through an intermittent 360° field of vision are available. The views south to The Project location are relatively incidental. The more significant views are received from the elevated Parnkalla Trailhead car park looking north over Porter Bay, Boston Bay and further north to Boston Bay Island and south across Proper Bay to Lincoln National Park. A quintessential South Australian coastal scene epitomised by the expansive views over an extended coastal foreshore where waves of native vegetation lap the ochre sand beaches drawing the eye of the observer up and over to the distant undulating horizon. Gnarly windswept plantings of mature evergreen natives contain the eye to the west, instilling a poignant and evocative reminder of the once dominant pre-settlement coastal landscape, a landscape sharply juxtaposed against the encroaching urban footprint of new residential development and the sprawling Port Lincoln Marina development.	Low. The proposed site is obscured by the dense expanse of mature native trees and shrubs that envelop the site on all sides. Refer Figure 3: Section – Sensitive Receptor Locality 01 (Dwg No. HD_Z015_section)

Sensitive Receptor Locality 01 (SRL 01)	
The monumentality of the view north and eastwards across the expansive sea vista is breathtaking as the coastal horizon overwhelms the foreshore landscape and enveloping urban encroachment. A locality where the commercial undertakings of notable privately owned fishing interests and public works infrastructure are anonymous; however, the legacy of the once regionally significant sand exporting business can be observed by the occasional glimpsed views of the dominant upper roof structure of the vacated sand storage shed and conveyor belt on the site of the proposed new desalination plant.	

Image 12: SRL 01 – Photomontage view of The Project from Billy Lights Point Reserve at Proper Bay Headland, view southwest

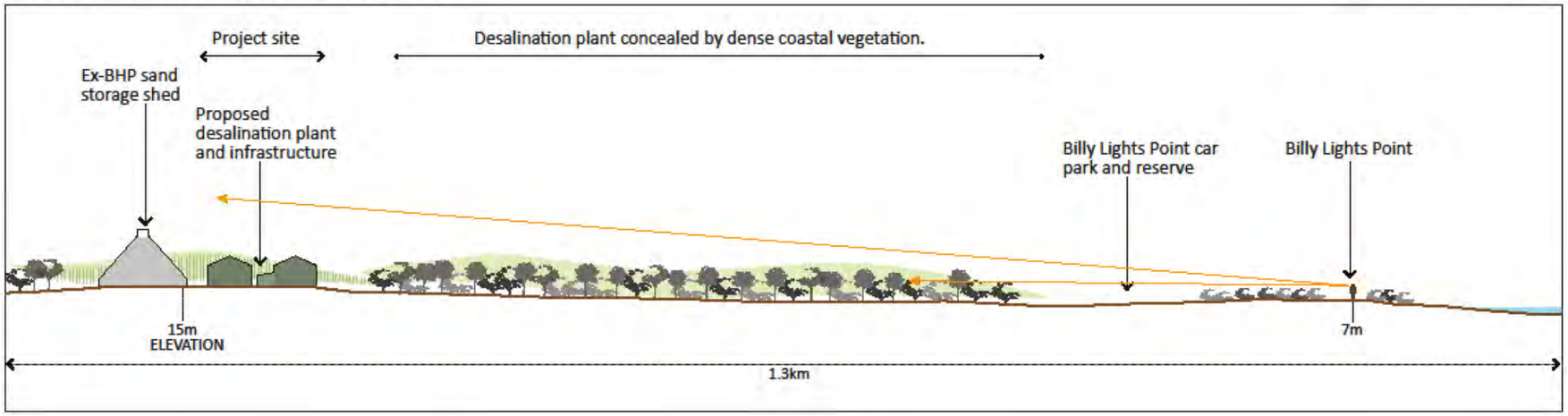
Predicted visual impact	Mitigation
Within a modified contextual landscape of **low scenic quality** to **moderate scenic quality** the likely visual impact will be **no change.** Where the proposed built form will be no higher than 6m above ground it is anticipated that from publicly accessible viewpoints within the receptor locality the desalination plant's built form, associated infrastructure and 33 kV powerlines will be concealed from view. The proposed Option 1 Intake Pump Station is indiscernible and mostly concealed by the existing vegetation. The proposed location of Option 2 Intake Pump Station results in it not being visible from this SRL. The expanse of mature vegetation surrounding the site will	Finishes that complement the tones and hues of the contextual landscape in the selection of materials for the roof structure and pumping station are being adopted to ensure that all potential glimpsed views of part of the roof structure will be inconsequential. It is envisaged that all potential light spill from emergency and security lighting will be managed to eliminate inconvenience to visitors and road users.

Sensitive Receptor Locality 01 (SRL 01)	
camouflage and mask the desalination plant save for a potential glimpsed view of the top of the proposed roof structure above the surrounding vegetation canopies.	

Figure 3: Section – Sensitive Receptor Locality 01 (SRL 01) (Dwg No. HD_Z015_section)

SECTION 1 - Sensitive Receptor Locality 01 (SRL 01)

ILLUSTRATIVE ONLY



TITLE	Section - Sensitive Locality 01 (SRL 01)
PROJECT	Eyre Peninsula's New Seawater Desalination Plant

DWG NO	SCALE	SHEET NO	REVISION 1
HD_Z015_section	-	-	-

DRAWN	CHECKED	DATE
SW	SRH	09/23

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Sensitive Receptor Locality 02 (SRL 02)

Image 13: SRL 02 – View from elevated vantage point at Hindmarsh Street, view south

Location	View direction	Distance from Project Site(s)
Hindmarsh Street and Port Lincoln Tourist Park	180° + across a south, southwest and west vista	Approximately 2.5km

Landscape and setting	Visual exposure at receptor
Numerous vistas south from elevated vantage points along the north-south orientated Hindmarsh Street east of the township and the Port Lincoln Tourist Park located at the northern headland that encloses Porter Bay. This receptor locality is over 2.5km north of the proposed site. The sweeping elevated vistas along Hindmarsh Street draws the eye of the observer over the sprawling and vapid Port Lincoln Marina, beyond the densely vegetated Proper Bay headland to the distant Lincoln National Park which silhouettes and traces the skyline. In a landscape where the contrived 'natural' landscape (as opposed to the resettlement indigenous landscape) prevails, the visual interplay between the distant Lincoln National Park landform and sea scape is sharp and visually exhilarating, across the elongated foreshore plumes of breaking wave cast spray high into the sky creating a foaming mist that shrouds the more rugged	Low to negligible. From over 2.5km the proposed site is indiscernible within the wider contextual landscape and from within the immediate locality.

sections of inaccessible rocky outcrops where the surrounding native vegetation blankets the receding headland.

Within this appealing panorama the northeast facing roof of the vacated sand storage shed is a prominent, an incongruous visual feature of the views over the mid ground, however the surrounding dense native coastal vegetation conceals the northeastern shed elevation and surrounding land on which the proposed desalination plant will be constructed.

Image 14: SRL 02 – Photomontage view of The Project from elevated vantage point at Hindmarsh Street, view south

Predicted visual impact	Mitigation
In a landscape of **low scenic quality** to **moderate scenic quality** the likely visual impact will be **no change.** Given the relative height (between 6m to 8m above ground level) of the mature native vegetation surrounding the site the proposed desalination plant building will, at 6m high be largely concealed save for a glimpsed, intermittent view of the roof top protruding above the adjacent treescape. The 33 kV powerlines and poles will not be discernible over this distance.	Finishes that complement the tones and hues of the contextual landscape in the selection of materials for the roof structure and pumping station are being adopted to ensure that all potential glimpsed views of part of the roof structure will be inconsequential. It is envisaged that all potential light spill from emergency and security lighting will be managed to eliminate inconvenience to residents and road users within this distant sensitive receptor locality.

Sensitive Receptor 03 (SR 03)

Image 15: SR 03 - View from Windsor Avenue, view west

Location	View direction	Distance from Project Site(s)
Windsor Avenue – South	West	2.6km

Landscape and setting	Visual exposure at receptor
A landscape character of **low scenic quality** to **moderate scenic quality**. The township urban fringe juxtaposed against the indigenous landscape of the wider Proper Bay headland. Contained views over a foreground dominated by light industrial land use activities comprising of large sheds, small factories and storage yards enclosed by weldmesh and colour bond fencing. A relatively ordered streetscape where the procession of large stobie poles from Stamford Terrace and towering light columns of Ravensdale Oval dominate the street scene. The recently constructed Navigator College is pleasing to the eye and an inoffensive, subtle built form statement. Travelling south the landscape transitions from urban fringe to coastal native, the departure from a bitumen to unpaved road surface is an obvious visual threshold. The immediate foreground view of shipping containers, building material and other incongruous waste elements within the adjacent large storage yard	High to moderate within the immediate locality.

Sensitive Receptor 03 (SR 03)	
mar the otherwise pleasant unfolding panorama across the windswept Proper Bay and distant Lincoln National Park horizon. A more remote location frequented by locals who are likely to be transiting through to patronise nearby commercial activities or students and staff attending the college. A locality where visitor patronage is likely to be infrequent and low.	

Image 16: SR 03 - Photomontage view of The Project powerlines from Windsor Avenue, view west

Predicted visual impact	Mitigation
In a **low scenic quality** to **moderate scenic quality** landscape and where the assessment in this specific locality is more weighted towards low, the likely visual impact of the 33 kV proposed powerline and poles will be **slight adverse impact** to **moderate adverse impact.** From this receptor the visual impact of the more immediate poles will be notable within the panorama across Proper Bay. However, as the poles recede from view and into the distance they will be largely indiscernible against the skyline.	The use of non-reflective finishes for power poles will ensure the distant poles will be visually inconsequential within the wider contextual landscape.

Sensitive Receptor 03 (SR 03)	
The proposed 33 kV powerline and pole option will be a prominent and obvious addition to the locality and wider contextual landscape as they traverse the planar landform in a southern and easterly direction to reach the proposed desalination plant.	

Sensitive Receptor 04 (SR04)

Image 17: SR 04 – Greyhound Road, view east

Location	View direction	Distance from Project Site(s)
Greyhound Road south at the intersection with the disused BHP tram line	East	2km

Landscape and setting	Visual exposure at receptor
A coastal landscape where native coastal plantings draw the eye through a 180° sweeping vista across Proper Bay to the distant Lincoln National Park. To the north and west the subtly rising landforms blanketed by dense native vegetation silhouettes the horizon. The moving cloudscape projects shadows across the landform creating a kaleidoscope of colours where the tones and hues of the 'canvas' of shrubs and groundcovers sharply contrast with the shimmering blue greys of the tranquil coastal foreshore and enveloping horizon beyond. A locality where remnant tram line infrastructure and ad hoc post and wire fencing detract from the otherwise pleasing visual qualities of this serene setting.	The subtly undulation across a mainly planar foreground devoid of large trees delivers a high degree of visual exposure within this locality. However, the degree of visitation is likely to be low and infrequent.

Sensitive Receptor 04 (SR04)	
The unmetalled ochre access track which continues where Greyhound Road terminates traverses the locality in a haphazard manner without an obvious defined purpose creating some ambiguity as to whether the visitor is invited to continue east beyond the conclusion of the Parnkalla Trail.	

Image 18: SR 04 – Photomontage view of The Project powerlines from Greyhound Road, view east

Predicted visual impact	Mitigation
The installation of 33 kV powerlines and poles at between 11m to 13m above ground level introduces a new foreground feature where existing panoramic views are unfettered by taller vertical elements. The more immediate power poles will be highly conspicuous from the designated route of the Parnkalla Trail, however as the powerlines and poles run further east, the visual intrusion will diminish and the visual impact will be largely inconsequential. Within a modified contextual landscape of **low scenic quality** to **moderate scenic quality** the likely visual impact at an infrequently visited locality will be **moderate adverse impact** in the immediate foreground diminishing to **slight adverse impact** to **no change** within the wider contextual landscape. The proposed desalination plant will be concealed and not a visual impact consideration within the wider contextual landscape.	The use of non-reflect finishes for power poles will ensure the distant poles will be visually inconsequential within the wider contextual landscape.

Consideration of the Planning and Design Code

The following provisions of the SA Government's Planning and Design Code[3], (PDC) which refer to Desired Outcomes (DO) and Performance Outcomes (PO) are considered relevant where they pertain to issues of visual amenity.

Part 4 – General Development Policies: Infrastructure and Renewable Energy Facilities

DO: 1 *(requires the)* Efficient provision of infrastructure networks and services, renewable energy facilities and ancillary development in a manner that minimises hazard, is environmentally and culturally sensitive and manages adverse visual impacts on natural and rural landscapes and residential amenity.

PO: 2.1 The visual impact of above-ground infrastructure networks and services (excluding high voltage transmission lines), renewable energy facilities (excluding wind farms), energy storage facilities and ancillary development is minimised from townships, scenic routes and public roads by:

a) utilising features of the natural landscape to obscure views where practicable
b) siting development below ridgelines where practicable
c) avoiding visually sensitive and significant landscapes
d) using materials and finishes with low-reflectivity and colours that complement the surroundings
e) using existing vegetation to screen buildings
f) incorporating landscaping or landscaped mounding around the perimeter of a site and between adjacent allotments accommodating or zoned to primarily accommodate sensitive receivers.

PO: 2.2 Pumping stations, battery storage facilities, maintenance sheds and other ancillary structures incorporate vegetation buffers to reduce adverse visual impacts on adjacent land.

PO: 2.3 Surfaces exposed by earthworks associated with the installation of storage facilities, pipework, penstock, substations and other ancillary plant are reinstated and revegetated to reduce adverse visual impacts on adjacent land.

PO: 5.1 Electricity infrastructure is located to minimise visual impacts through techniques including:

a) siting utilities and services:
i. on areas already cleared of native vegetation
ii. where there is minimal interference or disturbance to existing native vegetation or biodiversity
b) grouping utility buildings and structures with non-residential development, where practicable.

Part 2 – Zones and Sub Zones: Coastal Waters and Offshore Islands Zone

PO: 2.4 Renewable energy facilities and ancillary development do not impact on the scenic quality of the coast and islands.

In considering the PDC as it applies to visual impact, The Project is not at a variance with the relevant Infrastructure and Renewable Energy Facilities (General) desired and performance outcomes. The Significant Landscape Protection Overlay and Scenic Quality Assessment Provisions do not apply to The Project.

The Project will be delivered to ensure, where practicable, that the siting of the desalination plant and transmission towers will respond to and maximise the potential for the 'natural' landscape to minimise undesirable visual impacts in the contextual landscape.

Summary and Recommendations

It is my opinion that within a locality and landscape of **low scenic quality** to **moderate scenic quality** the visual impact that is likely to be experienced by the introduction of the desalination plant will be:

- Sensitive Receptor Locality SRL 01 – **No change**
- Sensitive Receptor Locality SRL 02 – **No change**

The visual impact that is likely to be experienced by the introduction of 33 kV powerlines and monopoles will be:

- Sensitive Receptor SR 03 – **Slight adverse impact** to **moderate adverse impact,** diminishing over distance to be inconsequential and **no change**
- Sensitive Receptor SR 04 – **Moderate adverse impact** within an infrequently visited locality, diminishing over distance to be inconsequential and **slight adverse impact** to **no change.**

Screen planting mitigation is not required at any Sensitive Receptor; however, the use of material finishes for the desalination plant roof structure and the Intake Pump Station which are similar in colour to the natural landscape tones and hues is being adopted. The selection of non-reflective finishes for power poles is recommended.

[3] PlanSA, Government of South Australia. *Planning and Design Code* Version 2023.13. 31 August 2023.

Image 19: SRL01 - View southwest from Billy Lights Point Reserve – x-ray image indicating The Project's desalination plant and intake pumping station

Image 20: SRL 02 – View from elevated vantage point at Hindmarsh Street, view south - x-ray image indicating The Project's desalination plant and intake pumping station

Image 21: SR 03 - View from Windsor Avenue, view west – x-ray image indicating The Project's powerlines

Image 22: SR 04 – Greyhound Road, view east – x-ray image indicating The Project's powerlines