Wodonga Planning Scheme

Environmental Significance Overlay for Huon Hill Water Treatment Plant

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THIS REPORT HAS BEEN REQUESTED BY RUSSELL KENNEDY ON BEHALF OF NORTH EAST WATER AND ACCORDINGLY IS SUBJECT TO LEGAL PRIVILEGE
1. **BACKGROUND**

North East Water (NEW) provides high quality drinking water to 108,000 persons and 51,100 properties in towns and cities in northern Victoria. The service area extends 60 to 80 km south from the Murray River and includes the centres of Yarrawonga, Benalla, Wangaratta, Rutherglen, Wodonga, Beechworth, Kiewa, Tallangatta, Corryong and many other smaller towns. The service area extends as far south as Whitfield, Harrietville, Mt Beauty and Dartmouth.

NEW operates 20 water treatment plants, including the plant at Huon Hill, that collectively treat 15,000 million litres per year of water that is supplied to residences, commercial premises, industries, for fire fighting and irrigation (schools, sports fields, parks and gardens).

The Huon Hill Water Treatment Plant takes water from Wodonga Creek (an anabranch of the Murray River) and treats it to a high standard. The water treatment processes include coagulation and flocculation (to bind solids and organic material), sedimentation and clarification (to remove solids and organic material), filtration, disinfection and fluoridation. An average of 18 million litres per day (18 ML/d) of treated water is supplied to Wodonga, Baranduda, Kiewa, Tangambalanga, Barnawatha, Chiltern and Springhurst.
Figure 2 shows the Huon Hill water treatment plant in local context. There are two covered tanks (with grey roofs) for storing treated water, and an open lagoon (on the south-east of the site) for storing water prior to treatment. Chemical storage and treatment facilities are located in the rectangular building near the centre of the site. A series of sinuous lagoons to hold and dewater sludge are located on the west of the site. Access for trucks and personnel is from the Murray Valley Highway via the designated road through the site (shown as white line).

Raw water from the Murray River and treated water for distribution to suburban tanks and reservoirs, and towns through the region, enters and leaves the site through a series of buried pipeline in an easement that extends north-west from the site.

**Figure 2. Land Uses Adjacent to Huon Hill Water Treatment Site**

The roundabout southwest of the plant divides the major roads into four. The Bandiana Link Road extends to the north, Murray Valley extends to the east, Victoria Cross Way extends to the south and then west, and Thomas Mitchell Drive extends to the west.

The water treatment plant is at the apex of an area of natural habitat that includes walking tracks and Huon Hill Park. Urban residential areas have been developed to the southeast of the plant and to the west of Bandiana Link Road. There are large commercial sites south of the Murray Valley Highway (Bunnings, a homemaker centre and the Stump Jump Motel).
Figure 3 shows the land use zoning in the Wodonga Planning Scheme in the area of the water treatment plant. The plant is within the site zoned PUZ1 (public use-services and utility). Bordering the PUZ1 to the north, west and south is GRZ1 (general residential).

East of PUZ1 is a large area of RCZ (rural conservation) with a small area of PCRZ (public conservation and resource) to the north-east of the plant. C2Z (commercial) zoning is south of the Murray Valley Highway (shown in purple).

The plant is encircled by residential zoning, which extends around the north, west and south of the site, close to the water treatment and storage facilities.

**Figure 3. Land Use Zoning Near Huon Hill Water Treatment Plant**

Clause 21.11-3 of the Wodonga Planning Scheme states that there is tension between essential services infrastructure (water and wastewater facilities) and proposed development.

A strategy set out in the Planning Scheme is to reduce this tension or land use conflict by providing “a buffer around the Wodonga West and Baranduda Wastewater Treatment Plants and the Wodonga Potable Water Treatment Plant to minimise encroachment by sensitive land uses”.

In subsequent decisions, VCAT Panels have defined an ESO around the Baranduda wastewater treatment plant and the West Wodonga wastewater treatment plant.

The purpose of this report is to define the size and shape of the ESO around the Huon Hill water treatment plant. The instructions received from Russell Kennedy on behalf of NEW are provided in Appendix A.

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*CEE/North East Water/Huon Hill Water Treatment Plant/Recommended ESO/Ver0b*
Figure 4 shows the planning overlays near the Huon Hill water treatment plant. The RCZ to the east of the plant is overlain by ESO2 (environmental significance – Wodonga Hills and Surrounds). The RCZ area is overlain by a DDO (design and development overlay).

**Figure 4. Planning Overlays Near Huon Hill Water Treatment Plant**

Figure 5 shows the site of the Huon Hill water treatment plant and the surrounding area is a designated bushfire prone area. This has significance in terms of maintaining access for CFA fire-fighting vehicles around the perimeter of the site.

**Figure 5. Bushfire Prone Designation at Huon Hill Water Treatment Plant**

This property is in a designated bushfire prone area. Special bushfire construction requirements apply. Planning provisions may apply.
Environmental Significance Overlay

The Huon Hill water treatment plant was originally built in a rural setting. Over time, development has brought residences and other odour-sensitive premises nearer to the plant. Proposed future residential development may extend to the boundary of the water treatment plant, creating a conflict between the continued operation of the plant to serve the whole community (now and in the future) and an elevated risk of amenity nuisance and risk occurring at nearby premises.

To minimise this risk, NEW seeks to apply an Environmental Significance Overlay (ESO) around the water treatment plant to define an appropriate buffer between incompatible land uses (water treatment on the one hand and residential or other odour-sensitive premises on the other hand).

The objective of the Environmental Significance Overlay is to:
- Ensure there is separation between incompatible land uses.
- Provide a planning tool to mitigate any detrimental impact of operations.
- Allow the ongoing operation of the water treatment plant without causing adverse amenity impacts on nearby sensitive land uses, while allowing continued orderly land development in the area.
- Ensure that the planning authority is fully aware of the possible impact of any development or re-zoning proposal on NEW operations.
- Ensure that development proposals within the ESO are referred to NEW, allowing it the opportunity to comment upon any anticipated adverse effect that its operations might have upon the proposed development, and vice versa.
- Ensure that local and regional planning recognizes the future expansion and needs of the water treatment facilities to support regional growth.

The ESO reduces the risk of adverse effects on the efficient operation of the water treatment plant, an important public asset, and allows the urban potable water system to continue to provide a reliable supply of safe potable water, and protect public health.

Sources of Information

Data and information relied on in the preparation of this report includes:
- Information about plant operations and site topography provided by NEW (see Appendix B for a topographic plan),
- Winds measured on the site by NEW (see Appendix C for wind roses),
- Input from the CFA on the width of fire access roads,
- Noise report prepared by Marshall Day Consultants; and
- Assessment of the water storages prepared by SMEC.

Relevant documents are listed in the References.

Site Inspections

The Huon Hill facility was inspected twice in 2018. The inspections included an examination of the process and chemical storages with the operator, an inspection of the surrounding land uses in 2018 and related factors such as topography and wind conditions.
2. DESCRIPTION OF HUON HILL PLANT

Water from the Murray River is pumped to the 32 ML raw water storage on the site. From there it flows by gravity to the treatment processes including coagulation/flocculation, flotation, filtration, pH adjustment, chlorination and fluoridation.

The plant has seven filters each with a design capacity of 10 ML/d. The plant was upgraded in 2009 with dissolved air flotation to provide more effective removal of algae. Powdered activated carbon is added to remove algal taste, odours and toxins. The maximum water production rate, allowing for backwashing cycles, is 68 ML/d. The process flow diagram for the Huon Hill water treatment plant is shown in Figure 6.

Figure 6. Process Flow Diagram for Water Treatment.

Substantial maintenance of treatment units was undertaken in 2015 and 2017 to enhance plant performance. Cracks and leakage between filters 5 and 6 caused by soil and structure movement were investigated in 2007 and repaired in 2008, but re-occurred in 2010. The joints/cracks were successfully repaired in 2010.

The treated water is pumped to two clear water storages on the site. The storages are operated in series to maintain the chlorine contact time (30 min). Chlorine is supplied to the site in 1 tonne gas cylinders and dissolved in water to maintain the chlorine residual required in the potable water reticulation to protect public health.

Sludge is discharged to a series of sludge drying beds on the site, which also are used to dry sludge from repairs in the water reticulation network.
3. DEFINING AN ESO FOR THE SITE

The matters considered in defining the appropriate ESO for the water treatment plant are those that involve a substantial risk to the continued operation of the water treatment plant, or to the amenity and welfare of nearby residents. These matters are as follows:

- Bushfires;
- Noise;
- Chorine Leaks;
- Embankment Failure; and
- Access by Large Trucks.

To prepare this expert opinion, I have reviewed publications and reports by technical experts and then assessed the buffer zone that I consider reasonable and appropriate to reduce, manage or mitigate the risk. The combination of the buffer zones forms the basis for the recommended ESO for the Huon Hill water treatment plant.
4. BUSHFIRE MANAGEMENT ZONE

As shown in Figure 5, the site of the water treatment plant is within an area designated as bushfire prone. The bushfires zone extends in all directions around the site.

Measures to limit bushfire risk at the site were discussed with officers of the CFA in Melbourne. Their advice was to maintain the existing access that extends around the perimeter of the site with a width to enable a 7.7 m fire truck to turn around (Ref: CFA Fire Safety Coordinator email of 5 Dec 2018). The width of the zone must be sufficient to make a 180-degree turn in emergency conditions. Using a tee turn as the design basis, fire trucks require a turning width of 16 m to turn safely (Ref. Preferred Requirements, Water Supplies and Access for Subdivisions in Rural Zones, CFA Nov 2006).

Figure 7 shows a 16 m wide buffer zone for firefighting, defined in accordance with CFA recommendations, extending around the perimeter of the Huon Hill water treatment plant.

Figure 7. Recommended CFA Access Buffer
5. NOISE BUFFER

The Huon Hill water treatment plant operates 24 hours per day, 365 days each year, processing and pumping raw water and sludge, as outlined in Section 3. Raw water flows into the raw water storage pond. From there, the water flows to the filter building which contains blowers, pumps, chlorine plant and fluoride plant. There are several water treatment tanks that are emptied and cleaned (using the blowers) once or twice per day depending on water demand and raw water quality. The activated carbon vibrator operates every hour for approximately 25 seconds. The sludge thickener operates for 2 hours each time a filter tank is emptied.

The treated water enters the storage tank No 1 via a bell mouth at the south east side. Ventilation louvres run the entire north and south sides of the building. Rushing water is audible and dominates the ambient noise environment along the northern site boundary. Water then flows to storage tank No 2 and is pumped from the site. The Baranduda pumps operate day and night, as required to deliver water.

Another significant source of noise is the jetvac truck (vacuum truck) that collects spilled water and soil when a break in a potable water pipe is repaired in the network. The contents of the truck are discharged to the sinuous sludge lagoons on the site. There are typically 2 or 3 truck deliveries for each repair event. Breaks in potable water pipes occur at random times, and thus there are as many jetvac truck operations during the night as during the day.

Marshall Day Acoustics was engaged to undertake an environmental noise assessment of the Huon Hill water treatment plant in accordance with the relevant Victorian EPA legislation, guidelines and accepted industry practice. The noise assessment (Wodonga Water Treatment Plant Environmental Noise Assessment, Rep 01 20181428, Marshall Day Acoustics, Feb 2019) involved:

- Measurement of existing noise conditions at the site;
- Recommended maximum noise levels determined in accordance with EPA SEPP N-1 limits, EPA Publ. 1411-1413 Noise from Industry in Regional Victoria and sleep disturbance criteria from NSW Road Noise Policy 2011;
- 3-D modelling of noise at the site and surrounding environment, accounting for typical worst-case atmospheric conditions for the propagation of noise.

Figure 8 shows background noise levels measured at the site from 19 December 2018 to 1 January 2019 (over the holiday period). The noise level at the measurement site on the northern boundary averaged 36 dB and was over 34 dB on 80 % of the days. The noise level at the measurement site on the southern boundary was higher and averaged 40 dB and was over 39 dB on 80 % of the days. The noise buffer reflects the higher noise level on the southern boundary which includes traffic noise on Bandiana Link Road and the Murray Valley Highway.

The EPA guidelines for noise from commercial premises in regional Victoria are EPA Publications 1411 and 1413 Noise from Industry in Regional Victoria (NIRV) and SEPP N-1 (Control of Noise from Commerce, Industry, and Trade). The designated noise limits are 52 dB for the day, 43 dB for evenings and 40 dB at night. As the water treatment plant and equipment operate 24 hours per day, noise from the site should comply with the SEPP N-1 night-time noise limit of 40 dB.
A 3-D digital noise model of the site and the surrounding environment was developed by Marshall Day Consultants using the noise modelling software SoundPLAN v8.0. The model calculates noise levels in the vicinity of the plant, accounting for site noise sources, terrain and atmospheric conditions. Figure 9 shows the predicted 40 dB noise contour (orange) and 45 dB contour (light green) for normal operations of the Huon Hill water treatment plant.

**Figure 9. Noise Contours Predicted by Marshall Day**
The noise model predicts that the noise in the area surrounding the Huon Hill plant will exceed the EPA limit of 40 dB within 50 m to 150 m from the boundary of the plant, depending on direction.

The recommended noise buffer is based on the 40 dB contour near the north of the plant (where there is a low background noise level) and 45 dB near the west and south of the plant (where noise from Bandiana Link Road and the Murray Valley Highway result in higher background noise). Figure 10 shows a 60 m wide buffer zone for noise to the north of the site (except where the storage tank shields the adjacent land from noise) and a 30 m wide buffer zone to the south of the site. The noise buffer extends for 200 m up the hill to the east of the site.

**Figure 10. Recommended Noise Buffer**
6. **CHLORINE LEAK ZONE**

Chlorine is used throughout the world for effective disinfection of potable water. All NEW water systems in Australia use chlorine for disinfection, including the Huon Hill plant as it is an effective disinfectant at low concentrations. However, chlorine can be a hazard if it escapes into the atmosphere.

Humans can detect low concentrations of chlorine gas. The threshold concentration for detection of chlorine gas ranges from 0.1 to 0.3 ppm. At 1 to 3 ppm, there is mild mucus membrane irritation that can usually be tolerated for about an hour, with conditions being “burdensome” and “irritating”, and “annoying” above 2 ppm. At 5 to 15 ppm, there is moderate mucus membrane irritation. At and above 30 ppm, there is immediate chest pain, shortness of breath, and a cough. At about 50 ppm, adverse health effects can develop and above 400 ppm chlorine is generally fatal.

The EPA 3-minute design limit for chlorine is 0.0033 ppm (for a continuous release). The limit used in this assessment for a single rare event is 0.5 ppm of chlorine over 15 minutes. Chlorine leaks are rare for any particular site (including at water treatment plants). However, the occurrence of these events is not zero, as illustrated in Table 1 which lists 22 chlorine spills at 15 locations in Western Australia from 2011-2017 (Ref: DRP, Dangerous Good Reportable Situations and Incidents).

<table>
<thead>
<tr>
<th></th>
<th>Chlorine Spills in Western Australia – 2011 to 2017</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Chlorine leak from the drum during servicing of a regulator.</td>
</tr>
<tr>
<td>2.</td>
<td>Chlorine released from drum during a plant shutdown.</td>
</tr>
<tr>
<td>3.</td>
<td>Chlorine gas released from a sample point.</td>
</tr>
<tr>
<td>4.</td>
<td>Release of chlorine from an incorrectly installed plug.</td>
</tr>
<tr>
<td>5.</td>
<td>Failure of gas detector after leak resulted in chlorine gas escape</td>
</tr>
<tr>
<td>6.</td>
<td>Release of chlorine gas from water treatment plant</td>
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<tr>
<td>7.</td>
<td>Chlorine gas leak from a cracked regulator</td>
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<tr>
<td>8.</td>
<td>Chlorine gas released from the treatment plant at a leisure centre</td>
</tr>
<tr>
<td>9.</td>
<td>Chlorine leak (after operating hours) at a leisure centre</td>
</tr>
<tr>
<td>10.</td>
<td>Chlorine leaked from the plant room</td>
</tr>
<tr>
<td>11.</td>
<td>Gas was released during the purging and shutting down of a section of plant</td>
</tr>
<tr>
<td>12.</td>
<td>Release of chlorine gas from a cylinder at an aquatic centre.</td>
</tr>
<tr>
<td>13.</td>
<td>Minor chlorine leak from drum at water treatment plant</td>
</tr>
<tr>
<td>14.</td>
<td>Chlorine inadvertently added to a full drum resulting in chlorine gas release.</td>
</tr>
<tr>
<td>15.</td>
<td>About 10 kg of chlorine released from a drum</td>
</tr>
<tr>
<td>17.</td>
<td>Leak during the testing of chlorine gas shut-down system</td>
</tr>
<tr>
<td>18.</td>
<td>Chlorine leak during testing of vacuum regulator at water treatment site</td>
</tr>
<tr>
<td>19.</td>
<td>Chlorine leak from a cylinder regulator</td>
</tr>
<tr>
<td>20.</td>
<td>Chlorine leak from vacuum regulator due to contamination on valve seat</td>
</tr>
<tr>
<td>21.</td>
<td>Chlorine gas leak after-hours</td>
</tr>
<tr>
<td>22.</td>
<td>Contractor accidently dug and severed underground chlorine gas pipe.</td>
</tr>
</tbody>
</table>
A range of events can cause a chlorine leak as shown in Table 1. Based on the use of 1 tonne chlorine gas cylinders, the maximum feasible leak is 1 kg/minute. A more likely high leak volume is 1 kg over 3 minutes.

The AUSTOX model was used to calculate the downwind chlorine concentration, taking into account the rapid lateral spread of the chlorine (as it is a dense gas), the limited vertical dispersion, local topography, local winds and the volatilisation with time. Figure 11 shows the predicted concentrations for three large leak scenarios. Based on the results of the chlorine modelling, the recommended buffer zone to protect residents from chlorine levels exceeding 0.5 ppm is shown in Figure 12.

**Figure 11. Results of Chlorine Leak Modelling**

![Graph showing chlorine concentration vs. distance downwind](image)

**Figure 12. Recommended Chlorine Buffer**

![Map showing recommended chlorine buffer zone](image)
7. EMBANKMENT FAILURE ZONE

The Huon Hill water treatment plant has two treated water storages and a raw water storage. Clear Water Storage No 1 was constructed in 1962 and has a capacity of 14 ML. The storage is rectangular in shape, approximately 60 m by 80 m in area with a 5 m high earthfill embankment that is 150 m long (on two sides). The clayey/sandy soil excavated on the southern and eastern sides was used to construct the embankment on the northern and western sides. The concrete lining consists of reinforced concrete slabs that are 6 m by 6 m in area and 75 mm thick, with the bitumen seal at the joints.

An inspection by GHD in 2017 found that the slabs are in good condition with minor cracking on a few of them. Joints had a horizontal separation of 5 to 10 mm indicating the bitumen joint material had failed. NEW has not noticed any seepage from the embankment, and nearby groundwater levels show no leakage at present.

Clear Water Storage No 2 was constructed in 2006 and has a capacity of 14 ML. The storage is rectangular in shape, approximately 70 m by 100 m in area with an 8 m high earthfill embankment that is 200 m long (on two sides). The clayey/sandy soil excavated on the eastern side was used to construct the embankment on the western side. The embankment is lined with reinforced concrete that is 150 mm thick and cut into 10 m by 14 m rectangles on a 100 mm layer of crushed rock.

An inspection by GHD in 2017 found that the concrete is in good condition. NEW has not noticed any seepage from the embankment, and nearby groundwater levels show no leakage at present.

The raw water storage was constructed in 1976 and has a capacity of 32 ML. The storage is rectangular in shape, approximately 90 m by 90 m in area with a 6 m high earthfill embankment that is 180 m long (on two sides). The clayey/sandy soil excavated on the northern and eastern sides was used to construct the embankment on the southern and western sides. The embankment is lined with reinforced concrete slabs similar to those used in Clear water Storage no 1.

Inspections in recent years have not identified any significant structural issues. NEW has not noticed any seepage from the embankment. Nearby bore levels show the groundwater level is just above the foundation of the embankment.

Risk Assessment by SMEC - 2018

SMEC assessed 15 failure modes for the embankments of which three related to failures after an earthquake (seismic event), two related to overtopping, five related to piping of water through the embankment from various causes and five related to gradual deterioration of the embankment and lining over time. The failure modes were then assessed by considering the sequence of events leading to an embankment failure for each mode, and calculating the probability of each event.

The outcome of the SMEC risk assessment is summarised in Figure 13. The likelihood of failure is, of course very low, being 5 in a million for each of the clear water storages and 30 in a million for the raw water storage.
Figure 13. Summary of SMEC Risk Assessments for Embankment Failure

*Numbers below columns refer to failure modes analysed by SMEC.*

*Vertical scale is annual probability of failure.*
The consequence of failure depends on the number of people downstream of the embankment at the time of failure. The failure is expected to develop as a piping failure over an hour or so, and people living or sleeping in houses immediately downstream of the embankments are most at risk.

The usual way to manage this risk is to continue with regular inspections of the embankments and linings by NEW, and regular monitoring of groundwater levels near the embankments which may provide warning of a slowly developing failure. A seismic event could, however, cause rapid failure, so inspections and monitoring would be of limited use in the case of an earthquake.

In addition to inspections and monitoring, in my view the best way to mitigate this risk is to avoid having residences immediately downstream of the embankments. SMEC advised that, in the event of a piping failure, the flood wave could be 0.3 m deep and have a velocity of 1.6 m/s. This would crash through a house wall.

Based on the results of the SMEC risk assessment, the recommended buffer zone to protect residents from embankment failure is shown in Figure 14.

**Figure 14. Recommended Impact Zone for Embankment Failure**
8. RECOMMENDED ESO FOR HUON HILL WATER PLANT

The recommended ESO for the Huon Hill water treatment plant is determined from the combination of the buffer zones recommended in the following figures:

- CFA Access Buffer (Figure 7);
- Noise Buffer (Figure 10);
- Chlorine Buffer (Figure 12); and
- Impact Zone for Embankment Failure (Figure 14).

These buffers were developed taking into account the specific features of the water treatment plant, local topography (hillside sloping down to the south-west) and hourly measurements made at the site. Figure 15 shows the recommended ESO for the water treatment works on a photographic base.

**Figure 15. Recommended ESO for Huon Hill Plant – Photographic Base**

The ESO extends over the proposed house blocks downstream of the storage embankments and that are also within the noise buffer, the chlorine buffer and (partly) the CFA access buffer. The ESO provides scope for long term maintenance of the embankments.
Figure 16 shows the recommended ESO for the water treatment works on a photographic base. The eastern and part of the southern area of the recommended ESO extends over RCZ (land zoned recreation). A strip of the ESO around the perimeter of the plant, mostly on the downslope boundary (see topographic contours in Appendix B) extends over GRZ1 (general residential), but not yet developed.

**Figure 16. Recommended ESO for Huon Hill WMF – Planning Base**

The recommended ESO extends well into the GRZ (recreation zone) to the east and north of the plant and it is recommended that no picnic or camping or café facilities be constructed within the ESO. Walking and other general recreation such as exercising dogs are compatible activities.

In conclusion, the recommended ESO complies with the Strategy set out in Clause 21.11-3 of the Wodonga Planning Scheme to “Provide a buffer around the Wodonga West and Baranduda Wastewater Treatment Plants and the Wodonga Potable Water Treatment Plant to minimise encroachment by sensitive land uses”.
9. ADDITIONAL CONSIDERATIONS

This section of the report considers additional matters and questions that are listed in the Letter of Instruction in Appendix A.

Standard Separation Distance

The EPA VIC Publication *Recommended Separation Distances for Industrial Residual Air Emissions* does not address the storage of chlorine gas in cylinders.

Victoria Planning Policy Clause 23-10.1 lists as the threshold distance for the production, storage or use of chemical products (such as chlorine) as 300 m. This distance is shown as the “nominal 300 m chlorine buffer” in Figure 12.

AS2927 *The Storage and Handling of Liquefied Chlorine Gas* lists the minimum separation distance between a 1 tonne chlorine cylinder and a dwelling as 25 m.

I consider these generic separation distances are not appropriate for application to this site as it is on a steep slope (see topographic contours in Appendix B). Accordingly I have used a plume dispersion model to establish the zone potentially impacted by a leak of dense chlorine gas as the basis for defining the appropriate chlorine buffer area. The recommended chlorine buffer area extends a short distance uphill and a longer distance downhill from the place for handling chlorine.

Mitigation Measures

I do not consider there are reasonable mitigation measures for the bushfire buffer zone, where an open track is required next to the facility.

It is feasible to mitigate against noise by constructing walls or acoustic enclosures on the site of the water treatment plant, or by providing double glazing and heavier walls (with less ventilation) as part of new nearby dwellings.

Theoretically it is feasible to constrain the spread of chlorine by walls or steep embankments. There are practical limitations to applying this concept, and I do not consider the level of protection which could be achieved to be good as not having residential premises downwind of the site.

It is feasible to limit the spread of water from an embankment failure of a water storage by constructing training walls or armoured embankments. There are practical limitations and consequences and I have not addressed the design of such mitigation measures. Other options are theoretically possible – having houses on stilts, for example. However, I do not consider the level of protection to be as good as not having residential premises downwind of the site.
10. CONCLUSIONS

This report considers the application of an ESO to the Huon Hill water treatment facility. The facility represents a substantial community investment and is connected to most properties in the town by an extensive buried network of potable water pipes. It is critical urban infrastructure.

The water plant must continue operating to serve the existing community and enable future residential, commercial and industrial growth in the Wodonga and other towns in the region, so that the community can survive and prosper. Thus, NEW seeks to protect the water treatment plant from encroachment by sensitive development, and also to protect neighbours from the possible adverse consequences of living too close to the treatment plant, by having an ESO over and around the facility.

The recommended ESO for the Huon Hill WMF is determined from the combination of the buffer zones recommended in the following figures:

- CFA Access Buffer (Figure 7);
- Noise Buffer (Figure 10);
- Chlorine Buffer (Figure 12); and
- Impact Zone for Embankment Failure (Figure 14).

These buffers were developed taking into account the specific features of the water treatment plant, local topography (hillside sloping down to the south-west) and hourly wind measurements made at the site. Figures 14 and 15 show the recommended ESO for the water treatment works on a photographic base and a planning base, respectively.

The ESO extends over the proposed house blocks downstream of the storage embankments and that are also within the noise buffer, the chlorine buffer and (partly) the CFA access buffer. The ESO provides scope for long term maintenance of the embankments.

The recommended ESO recognizes and protects the existing water treatment plant, which is critical community infrastructure. No allowance has been made for the future expansion of the facility at this location, as no information is available on future expansion plans.

From the viewpoint of protecting the community against the risk of noise, chlorine and sudden flooding, and to allow continued protection of the water plant from bushfires, it is recommended that no residential development be permitted within the ESO.

The recommended ESO complies with the Strategy set out in Clause 21.11-3 of the Wodonga Planning Scheme to “Provide a buffer around the Wodonga West and Baranduda Wastewater Treatment Plants and the Wodonga Potable Water Treatment Plant to minimise encroachment by sensitive land uses”.

CEE/North East Water/Huon Hill Water Treatment Plant/Recommended ESO/Ver0b
11. REFERENCES


EPA VIC (2013), Recommended Separation Distances for Industrial Residual Air Emissions, EPA Publ. 1518, March 2013

Marshall Day Acoustics (2019), Wodonga Water Treatment Plant Environmental Noise Assessment, Report 01 20181428 to NEW, Feb 2019

SMEC (2018), Huon Hill Storages Risk Assessment, Report to NEW, Feb 2018

Standards Australia (2001), The Storage and Handling of Liquefied Chlorine Gas Australian/New Zealand Standard No. 2927


Victoria Government (2018), Government Response to the Major Hazard Facilities Advisory Committee, Jan 2018

Victoria Planning Policy, Clause 53.10-1 Threshold Distance (2019-on line)

Wodonga Planning Scheme (2019 – on line)
Appendix A. Instructions from Russell Kennedy

This report has been prepared in response to a request from Russell Kennedy Pty Ltd dated 28 November 2018 with the following scope.

We are instructed to retain your services on behalf of our client to provide an expert opinion assessing the separation distance for the Wodonga Water Treatment Plant also referred to as the Huon Hill Storages (Utility Installation).

NEW in consultation with the Wodonga City Council intend to apply the Environmental Significance Overlay to identify, recognise and protect the Utility Installation from encroachment of incompatible land development and use.

NEW as the proponent and the Wodonga Shire Council (Council) as the planning authority (appointed by the Minister for Planning) will prepare the proposed amendment to the Wodonga Planning Scheme (Scheme).

You are retained to provide an expert opinion in relation to the proposed amendment, which may proceed to a hearing before Planning Panels Victoria (Panel). If a hearing is listed you will need to appear to give expert evidence to the Panel.

As an expert witness you are required to:

- Consider the documents provided to you;
- Undertake or procure such enquiries and investigations as you consider necessary for the formulation of your opinion;
- If necessary, meet with any such other persons or organisations as may be appropriate to obtain supplementary information to assist you in formulating an opinion;
- Provide a expert witness statement for use in evidence before the Panel; and
- Appear to be called as a witness to give your opinion at any hearing.

In the event that the matter proceeds to a hearing, we will advise you of the date your expert witness statement is required to be filed and served. If a hearing is listed you will be required to attend the hearing to give oral evidence.

Please ensure your report addresses:

1. The extent of the separation distance for the Utility Installation addressing:
   - storage failure (flooding);
   - chlorine gas release (hazard);
   - noise (amenity);
   - heavy vehicle access (noise and safety);
2. Plume dispersion modelling for chlorine gas release;
3. The function of a separation distance for the Utility Installation;
4. How the separation distance is determined for the Utility Installation;
5. The layout, design, operation of the Utility Installation;
6 The likely future expansion of the Utility Installation and its proposed layout, design and operation;
7 The population served by the Utility Installation, the projected population growth and available capacity of the Utility Installation;
6 Identification of development controls on encroaching development (not confined to residential), which may mitigate any detrimental impact, including but not limited to building design addressing the frequency, duration time; and capacity of occupation;
7 Building design to isolate internal air environment for occupied rooms (i.e. office) during upset conditions or emergencies;
8 Layout of buildings to maximise the separation distance to the Utility Installation;
9 Building design to ensure apertures (i.e. roller doors) are oriented away from the Utility Installation; and
10 Mitigation structures (i.e. earthen bund) to attenuate noise, divert overland water flow and any chlorine gas release.

Your written expert witness statement should be prepared to be filed as expert evidence in the Panel detail your opinion in respect to the following matters:
1. Your review of the brief of documents and any other documents you consider relevant, and such further investigations and enquiries as are necessary or desirable in the circumstances;
2. To the extent you are unable to express any opinion as to the above matters, your opinion as to what further documentation or information is necessary to enable you to reach such an opinion;
3. Take the form of a narrative;
4. Be expressed in a manner that is unemotional and non-partisan and that reflects the objectivity and independence you have brought to the completion of your tasks pursuant to your retainer as an expert witness; and
5. Address the points specifically raised in this letter and answer any questions put to you.

If you come to the view that it is appropriate for you to address matters in your report in addition to those set out in the list above, please let us know. If appropriate, we will provide you with a supplementary letter of instructions.

Please ensure that your expert witness statement is clearly marked with the following words on the front cover:
“THIS REPORT HAS BEEN REQUESTED BY RUSSELL KENNEDY ON BEHALF OF NEW AND IS SUBJECT TO LEGAL PROFESSIONAL PRIVI
Appendix B. Local Topography

Topographic contours at 0.5 m intervals. Ridge lines shown in yellow dashed lines.
Appendix C. On-Site Wind Patterns

On-site wind data has been used for noise modelling and chlorine modelling.

Average wind speed is 1.3 m/s
Dominant wind directions are south-west and north-east.
Strong winds from west, SSW and ESE.
During day-time hours:
Average wind speed is 1.6 m/s
Dominant wind directions are SSE and north-east.
Strong winds from west, SSW and ESE.
During night-time hours:
Average wind speed is 1.1 m/s
Dominant wind directions are SSW and north-west to west.
Many night winds from south, SSE and southeast.
Appendix D. Qualifications and Experience of author, Dr Ian Wallis

1.1 Name and Address:
Dr Ian Geoffrey Wallis, 150 Chesterville Road, Cheltenham VIC 3192

1.2 Qualifications of Expert
B.E (Hons), M.Eng.Sc., Ph.D (Monash University)

1.3 Experience
30 years experience in air quality studies, odour assessments and strategic planning on infrastructure. Prepared *Plume Calculation Procedure* for the EPA (Schedule C of SEPP for Air Quality Management, 2001). Responsible for odour assessment and recommendation of appropriate buffer zones for many treatment plants in Victoria, ACT, Western Australia and Queensland. Buffer zones developed in these studies are incorporated into statutory planning schemes for several treatment plants. Dr Wallis has conducted many surveys and investigations to assess odour problems, community responses and feasible solutions.

EPA-accredited environmental auditor for 20 years, and has completed environmental audits for governments in Victoria, ACT, Western Australia and Queensland.

1.4 Area of Expertise
Modelling the extent of odour from treatment plants; assessment of the effects of odour and community expectations and responses; assessment of buffer zone or separation distance for industrial facilities and infrastructure, including wastewater and water treatment facilities.

Clause 52.10 – Uses with adverse amenity potential of the Victoria Planning Provisions lists industrial and materials storage uses with the potential to adversely affect the amenity of their neighbourhoods.

The Victorian Government agrees that the threshold distances and how they operate needs to be reviewed to make them clearer, address their interaction with other standards and incorporate the best-available evidence.

*MAJOR HAZARD FACILITIES*

*Government Response*
to the Major Hazard Facilities Advisory Committee

*JANUARY 2018*