Ella Bay Integrated Resort Proposal

Supplementary Environmental Impact Statement

Submission Response: 1.5 Energy, Water Supply, Sewage & Waste Management

1.5 Energy, Water Supply, Sewage and Waste Management

1.5.1 Introduction

The Proponent's Energy, Water Supply, Sewage and Waste Management response is set out below. The response takes into account questions raised by submitters and key stakeholders.

Specific submission concerns have been collated into the following key areas for this section:

- *Energy,*
- *Water Supply,*
- *Sewerage, and*
- *Waste Management.*

The Proponent engaged specialist consultants to assist in formulating responses. EnSight (Integrated Energy Services Corporation Pty Ltd) were engaged by the Proponent to help develop various models and alternatives within an Ecological Sustainable Development (ESD) conceptual approach. Ensight provide sustainable environmental system design and specialise in developing best practice energy, water supply, sewage and waste system design. The consultant's report is available in Volume 4, Appendix A.2.9.

Conceptual surface water and groundwater modeling was undertaken by Golder (Volume 4, Appendix A.2.1) and a proposed Water Quality Management Strategy was put forward by specialist consultants THG (Volume 4, Appendix A.2.2). These are discussed in detail in Section 1.1, *Water Resources*.

Key Issues

The Proponent has identified a number of key issues with regard to the impact of Energy, Water Supply, Sewage and Waste Management issues including a need to address the following measures.

Energy

Energy management plans for the proposed development should favour and incorporate:

- strategies to achieve high levels of self-sufficiency for energy use, generation and management reducing greenhouse gas emissions compared to a `business as usual' approach;
- safe, reliable and cost effective electricity supply solutions that have low impact on the environment;
- electricity generation from green resources wherever economically feasible;
- reducing energy demand without compromising user comfort and utility by designing each building to minimise energy use through effective design, and the mandatory use of energy efficient electrical appliances; and

- the provision of electricity through a combination of standalone power supply systems, solar power with a back-up supply provided by a grid connection at Flying Fish Point.

Water Supply

Water supply management plans for the proposed development should favour and incorporate:

- storm-water drainage systems that incorporate elements to manage not only the quantity of storm-water runoff, but also provides quality treatment to ensure that the proposed development has no negative impacts on receiving waters;
- designs that take account of best practice engineering principles for Water Sensitive Urban Design (WSUD);
- efficient use of treated waste water for golf course irrigation, hose wash down, toilet flushing and fire fighting purposes;
- suitable back up water supply resources from Flying Fish Point (by using a trickle feed);
- community-wide design and living principles that establish rainwater tanks, rain harvesting, and recycling systems and procedures that form part of the community's overall water strategy; and
- where possible, strategies to keep and enhance natural drainage paths within Ella Bay.

Sewage

Waste management plans for the proposed development should favour and incorporate:

- a solution that satisfies the authorities and will enable the granting of an Environmental Protection Agency (EPA) licence;
- cost-effective sewage systems that treat sewage on-site and recycle treated wastewater throughout the community through a dual reticulation water supply system;
- water quality that can be safely and reliably managed with minimal or no impact on the environment; and
- effective management of waste through the implementation of good practice, the development of new infrastructure, and the use of existing infrastructure for waste disposal.

1.5.2 Submitter Issue: Energy

1.5.2.1 On-site Electricity Generation.

More information about the generator/s, their location and associated fuel storage should be provided—particularly addressing the possible risk to watercourses and groundwater.

EIS reference: Volume 3. Section 3.5.2.3.2

Submitter reference: 1/52

Wet Tropics Management Authority (50)

Proponent Response

The Proponent recognises that electricity can be provided from several sources. Sources include grid, solar and on-site LP (liquefied petroleum) Gas power generators.

On-site generation capability provides:

- emergency back up; and
- a potential opportunity to establish an economically viable way of Ella Bay generating its own energy supply that minimises greenhouse gases, is cost effective and not reliant on the electricity grid supply network.

Grid connection is being considered as a back up supply. The exact mix of grid to on-site generation will be determined during the detailed design phase.

The Proponent believes that subject to final, detailed modeling and economic analysis, an LP Gas power generation capacity on-site be developed. Its power output and size is likely to be as follows:

- appropriate power output 7 megawatts
- size 15 by 75 metres approximately.

The location of the LPGas Power Station has not yet been finalised but it is likely to be in the SE corner of the Ella Bay site. On-site electricity generation needs to differ during construction and staging as compared to the completed development.

The Proponent believes that LP Gas presents an extremely low to zero risk to watercourses and to groundwater. A significant benefit of using LP Gas for on-site power generation is that is has a lower environmental risk than other forms of fuel sources. Should a spillage occur, LP Gas escapes to air, and, as such, a spillage would not pose a hazard to the local environment or the marine environment. Compared to diesel, LP Gas also emits fewer greenhouse gas emissions, oxides of nitrogen, particles and particulates when burned.

Possible Location of On-Site LP Gas Generators
A possible location site for on-site power generation is shown below.

Figure 1.5.1: Plan showing the indicative location of the power generator (Volume 3.1 Drawing)

Mitigating Risk to the Natural Environment
Both Golder (see Volume 4, Appendix A.2.1) and THG (see Volume 4, Appendix A.2.2) endorse the use of natural gas or LP Gas for fuel purposes as such gas supplies present no risk of contamination to groundwater and/or surface water. Details of LP Gas storage and transport are provided below.

Power Station Design Issues and Noise Reduction
In the scenario that LP Gas fuel is used, power generators would be installed in a purpose built, sound proofed building, To ensure silent operation, the generator exhaust stacks will be fitted with 'super silencers' that use noise canceling technology to allow operation of generators to be used in or near to residential environments.

The building will be designed to extend as each stage of the development progressed and additional generators were required to be installed

Fuel Storage and Handling Issues
LP Gas storage tanks will be designed with physical barriers separating the tanks from any adjacent buildings. The LP Gas tank will be surrounded by fire sprinklers to ensure it remains cool in the event that a fire is present in the tank storage area or in any nearby adjoining buildings. Fire hydrants will also be

installed near the LP Gas tank to meet prescribed fire regulation and the storage of hazardous materials standards.

The estimated volume of power station LP Gas use is estimated on average to be 30 tonnes of LP Gas per week. At full operation, the power station tank would require filling with three 10 tonnes from LPG tanker drops each week from Townsville or Cairns. A 10 or 15 tonne truck is a fixed body truck. Movements of trucks required would be between two to three movements per week on average.

By way of example, the image below is of a LP Gas generator at Couran Cove, an eco-resort community off the Gold Coast power station on South Stradbroke Island. This generator helps supply electricity for 700 dwellings.

Figure 1.5.2: Couran Cove power station (EnSight, 2007)

1.5.2.2 Construction Energy Requirements

The construction period will have a high power demand. How this electricity requirement would be met during the initial construction phase prior to any solar, wind and gas turbine options (that may become available) needs to be explored. This issue has not been identified or addressed.

EIS reference: Volume 3. Section 3.3.3

Submitter reference: 1/52
Wet Tropics Management Authority (50)

Proponent Response

The Proponent will seek to establish a permanent electricity supply from the grid, as quickly as possible once development proceeds. Little Cove has recently commenced and a grid connect is proposed. It is anticipated that the grid connection will be in place prior to proposed Ella Bay project beginning.

In the very early stages of development there may be a temporary need for diesel generators to be on-site whilst feed is being established between Little Cove to Ella Bay.

In any event, a detailed operational power supply plan will be developed to:

- plan for the timely provision of permanent grid, or on-site generators, before the initial construction stages commence;
- phase the supply of on-site generation to meet demand as it develops; and
- install solar PV appropriately to help reduce daylight load as soon as possible.

The level of demand for electricity during the construction phase would not be any higher than comparative developments. The Proponent does not see that there are inherently difficult issues to resolve from an operational perspective.

The Proponent sees no case for using wind turbines as a principle means of providing renewable energy.

1.5.2.3 New Feeder Line

Connection of Ella Bay to the electricity grid would require the establishment of a new feeder line and, possibly, a transformer. No route for this line has been submitted. The establishment of a new power line easement through the Wet Tropics of Queensland World Heritage Area (WTQWHA) would require a permit. This permit would be assessed under the provisions of the Wet Tropics Management Plan 1998. The proposal to run a new feeder line in a trench beside the designated road would also require a permit.

EIS reference: Volume 3. Section 3.5.2.3.1

Submitter reference: 1/52

Wet Tropics Management Authority (50)

Proponent Response

The Proponent believes it is appropriate for an electric power supply service via grid connection to be implemented in Ella Bay. The importance of grid connection is that it provides:

- back up supply,
- cost-effective energy supply,
- opportunity to sell back green energy to the grid, and
- load balancing.

The most effective way to provide this service will be to establish an electric power feeder line along the Proposal's preferred road access option from Flying Fish Point.

The location of a transformer may or may not be necessary, depending on the load and distance calculations. This is being assessed by the Proponent's electrical consultants in conjunction with the energy supplier. In any event, it is the Proponent's position that a transformer will not be located in sensitive areas listed as part of the World Heritage Area.

To minimise environmental impacts where the feeder line goes through World Heritage Listed Areas, it will be buried under the access road, at an appropriate depth and with suitable conduit protection in a trench. Where the feeder line passes through less sensitive areas— this section of the road is relatively short—then the construction of a trench beside the designated road may be more appropriate. Overhead power supply approvals from Flying Fish Point to Ella Bay will not be sought.

A feeder line will be subject to formal application for its approval as part of the road construction.

1.5.2.4 Lighting

Street lighting activated by sensors should be considered. Such lighting would be particularly useful for assisting with energy efficiency and improving the night-time lighting amenity. Street lighting activated by sensors would also decrease the incidence of wildlife concentrating around light sources (i.e. cane toads/bats).

EIS reference: Volume 4. Section 4.1.2.6

Submitter reference: 1/52
Wet Tropics Management Authority (50)

Proponent Response

The Proponent accepts that street lighting activated by sensors should be considered. It anticipates that sensors will be used to improve lighting efficiency and help implement a night-time `dark sky' policy.

One option being considered by the Proponent is to install street lighting that makes use of efficient, high performance, Light Emitting Diode (LED) lighting with daylight sensors.

Under this option street lighting would be directional—generally positioned downwards—to leave the sky dark at night. Mostly bollard/post height lighting would be adopted. Path lighting would be selectively reduced after 23.00 hours, taking into account the need for appropriate security and safety lighting.

A dark sky policy will be incorporated within for Ella Bay Design and Living Principles. The policy will help limit light pollution and also reduce the overall energy demand. It will also help mitigate the effects of artificial light on fauna and habitat, while still providing a safe environment for residents and visitors. LED lighting produces very low levels of heat.

LED lighting requires low voltage components to operate which make it safer and a more economic source of lighting than conventional lighting. LED lighting also has the lowest UV factor of any light source, and does not deteriorate in either quality or efficiency over time. The use of efficient LED lighting also impacts on reducing energy consumption patterns at Ella Bay, which is an important objective.

1.5.3 Submitter Issue: Water Supply

1.5.3.1 Water Usage Rates

Water usage rates stated in the Site Based Management Plan differ markedly from the water usage rates stated in the Infrastructure Requirements and Waste Management. It is the view of Queensland Health that the water consumption rates are more realistic in the Infrastructure Requirements and Waste Management Report.

EIS reference: Volume 3. Section 3.5.3.2

Submitter reference: 1/52

Queensland Health (44)

Proponent Response

The Proponent has checked the figures in the two reports identified above. There is some confusion as to whether or not the figures differ.

The original EIS Report Site Based Management Plan set out preliminary estimates of residential usage calculations in Volume 3, pp 97–98 in tables 3.9–3.11. These are the same figures that are used in the consultant's report from ETS Infrastructure Requirements and Waste Management shown on page 54 (EIS Volume 8, Appendix A.6).

The ETS report (page 60 of EIS EIS Volume 8, Appendix A.6) shows estimated house water demand in categories of 'conservative' (i.e. no demand management), 'with demand management' and 'with demand management and recycled water'. The figures from the report are in the following table.

Scenario	Litres Per Person	Household with three persons
Conservative	316	948
With demand management	226	678
With demand management and recycled water	126	378

Table 1.5.1: Estimated water demand figures

The Proponent proposes to use a system where it uses demand management and recycled water (see yellow highlights in table above).

1.5.3.2 Rainwater Tanks

There is no clear indication as to the size of the rainwater tanks to used in the proposed development. The Rainwater Tank Design and Installation Handbook (HB 230, 2006) states Local Governments and plumbing and building authorities mandate the minimum size of a rainwater storage tank. It is noted that final storage tank sizes will be determined after a detailed rainwater tank modeling has been undertaken. Further information regarding the tank sizes is requested.

EIS reference: Volume 3. Section 3.5.3.4

Submitter reference: 1/52
Queensland Health (44)

Proponent Response

It is proposed that rainwater tanks be widely used throughout the Ella Bay Community. It is a strategic objective to develop self-sufficiency in the supply of potable water throughout Ella Bay and to reduce water demand through the implementation of water efficiency measures.

Clearly, the capacity of rainwater tanks to be used at Ella Bay will vary according to the particular lot or site concerned. The exact sizing of tanks will be assessed during the detailed design phase.

The Rainwater Tank Design and Installation Handbook (HB 230, 2006) developed by the Australian Rainwater Industry Development Association (ARID) to assist Local Councils, plumbers, builders/developers and homeowners. It outlines the minimum standards and performance requirements criteria for development works associated with carrying out rainwater tank installations within private property.

The Proponent will establish a detailed policy for rainwater storage. This policy will form part of the Ella Bay Design and Living Principles.

Taking into account rainfall patterns at Ella Bay, demand reduction and water recycling, Ensight (Volume 4, Appendix A.2.9) suggested that a 30,000 litre rainwater tank would meet potable water demand for one household.

To arrive at this conclusion, Ensight examined yearly rainfall patterns for Ella Bay. It modeled a worst case scenario for a rainfall pattern at Ella Bay 70% lower than the lowest annual rainfall recorded at Innisfail.

For the worst case scenario, Ensight determined that a 30 000 litre water tank would still be one quarter full, even after 12 months, providing that each household has maximised efficiency gains in the use of water—including recycling.

The Design and Living Principles will also determine various rainwater tank capacities that will vary according to the size of the building, its use as either residential or commercial and/or the nature and terrain characteristics of each lot or precinct area.

The Design and Living Principles will set out the policy on a range of issues including:

- sizes, shape and capacity of each water tank,
- materials permitted for each tank,
- design and construction arrangements for the water tank base foundations, first flush cleansing, and acceptable use policies concerning piping infrastructure,
- care and maintenance of tanks, and
- colours permitted under the Building Design Principles.

1.5.3.3 Trickle Feed

Further information on the proposed 'trickle feed' supply of water from Flying Fish Point is required. A water main established from Flying Fish Point to the proposed development would pass through the World Heritage Area (WHA) and would therefore require an evaluation under the provisions of the Wet Tropics Management Plan 1998. No route has been submitted in the Proposal.

EIS reference: Volume 3. Section 3.5.3.4

Submitter reference: 1/52

Johnstone Shire Council (48), Wet Tropics Management Authority (50)

Proponent Response

As discussed in Section 1.5.2.3 *Rainwater Tanks*, Ella Bay espouses a key goal - self-sufficiency - wherever possible. The use of a trickle feed supply from Flying Fish Point will be part of a back-up strategy to be used in, for example, emergency situations. In terms of location of the trickle feed, the option with the least environmental impact is to establish the trickle feed under the preferred road access option. The Proponent anticipates a need for a trickle feed based on a 1 in 100 year emergency situation.

This option would not require the construction of a trench beside the designated road through the WHA, or any additional clearing. A connection to the existing water main at Flying Fish Point would be constructed below the road—subject to permits and approvals. An application would need to be made to Wet Tropics Management Authority in conjunction with Environment North's detailed report (Volume 4, Appendix A..2.6).

If capacity upgrades are required to Flying Fish Point main water supply then discussions with Johnstone Shire Council would need to take place. However, at this stage, the Proponent envisages the pipe diameter would be relatively small.

1.5.3.4 Groundwater Use

Groundwater is proposed for use only in an emergency. What will constitute an emergency has not been defined, and the possible effects on the World Heritage Area (WHA) at Ella Bay have not been assessed.

Any draw down of the water table may have significant effects, particularly during the dry season. The draw on the water table may alter the hydrostatic pressures that prevent saltwater from infiltrating freshwater systems behind the frontal dunes at Ella Bay.

No hydrological data has been submitted to support any groundwater extraction.

EIS reference: Volume 3. Section 3.5.3

Submitter reference: 1/52
Wet Tropics Management Authority (50)

Proponent Response

The Proponent accepts that groundwater is proposed for use only in an emergency—a situation that involves a 1 in 100 year drought event.

The Proponent believes that there will be little or no impact arising as the need to draw water from the water table is a remote possibility. Water will be stored by individual houses in water tanks which will provide a readily available, back-up source of supply in the event of emergency. If that option fails, then trucking in water or making use of the trickle feed from Flying Fish Point remains an option.

EnSight (Volume 4, Appendix A.2.9) also suggested in a report on Ecological Sustainable Development (ESD) issues that consideration should also be given to incorporating an emergency water supply system in the event of a significant drought occurs beyond of the 1 Decile range.

The report from Golder that developed conceptual surface water and groundwater hydrology models identified two significant groundwater supplies (for further details see Section 1.1 *Water Resources* and Volume 4, Appendix A.2.1 *Conceptual Surface Water and Groundwater Hydrology Models* (Golder)). The deep water aquifer can be used with no adverse impact and it is safe to use.

Emergency supplies of groundwater (sourced from deep aquifers identified by Golders) are estimated to be available at a rate of 6 litres per second. According to the Golder report, a draw at this rate is likely to be within the ability of the aquifer to supply, on a sustainable basis. However, as a back-up strategy this use of groundwater would only be accessed for short periods during extended dry periods, which are very rare. Even in the 'driest of the driest' years (calculated by taking the driest month of every year recorded since 1902 with an annual rainfall total of no more than 1.77 m), the groundwater use models developed by

Golders show that with a 30 000 litre tank for each residence there will be sufficient rain to meet household needs.

Should the Proponent decide to make use of groundwater, then such use would be subject to a separate application for an extraction license from the Department of Natural Resources (DNR), Queensland Government.

1.5.3.5 High Rainfall Periods

The velocity and duration of rainfall in this area is often not considered, and a contingency plan to collect and treat the first flush may be the only way to deal with the quantity of water that will fall on the Site in a cyclonic storm event.

EIS reference: Volume 3. Section 3.5.4

Submitter reference: 1/52
Department of the Environment and Water Resources (51)

Proponent Response

The Proponent will carefully assess velocity and duration of rainfall at Ella Bay in shaping its water management strategies at all stages of the staging design and construction process. First flush would be limited mostly to:

- roofs,
- car parks,
- driveways, and
- road surfaces or pathways.

The Proposal discourages the use of petrol or diesel based transport. As a result, there would be minimal pollutants left on roads, car parks and driveways. The roofs and hardstand areas at Ella Bay form a relatively small percentage of the terrain according to Golders.

First flush devices are fitted as standard for water tank storage systems and will be required as part of the Design and Living Principles .

Using modern sewage systems will prevent high volumes of water during storms mixing with any sewage treatment systems.

The impact of storm water run-off can also be mitigated. This can be achieved by designing strategically placed swales, storm channels and reed beds to help re-direct and absorb excess water run-off. A high volume of run-off storm-water is a natural event that will occur from time to time. When this happens, creeks act as major flushing systems for the environment. Golders advise that during high periods of rainfall the creek system becomes open to the sea. Building design codes and planning the layout of infrastructure will take this issue into account.

Additional water solutions have been developed to take into consideration the individual characteristics and climatic conditions at Ella Bay. These include the need to:

- reduce hard surface run-off by using permeable paving and sub-surface water retention in common areas,
- maintain soil-moisture regime which allows infiltration to reduce runoff and erosion,
- install rainwater harvesting tanks at each residential dwelling and at the other centres and resorts (with at least 30 000 litre storage capacity per residential dwelling), and
- use storm-water at each house, in the resort area and community precinct for swimming pool top-up.

In a cyclonic storm any pollutants would be flushed out and heavily diluted due to the large volumes of water.

1.5.3.6 Land Contamination

The Site was a previously used as a cattle station. If the cattle station included a dipping station, it is possible that the land is contaminated. Under the *Environmental Protection Act 1994*, a cattle dip is a notifiable activity and must be listed on the contaminated land register. If the land is not sufficiently remedieated, it may impact on water supply.

EIS reference: Volume 3. Section 3.5.3

Submitter reference: 1/52
Queensland Health (44)

Proponent Response

The Proponent accepts that there is a possibility of land contamination. Ella Bay has been used as a cattle station for a long period of time. Further land contamination analysis is to be conducted as part of the detailed design phase. It is the responsibility of the asset owner, rather than the Proponent, to notify for inclusion on the Contaminated Land Register whether or not a cattle dip is in use at Ella Bay.

Any results indicating contamination will be sufficiently remediated in accordance with the relevant authorities.

1.5.4 Submitter Issue: Sewage

1.5.4.1 Sewage Treatment Level

The information provided did not indicate the treatment level and it is assumed that it will be to a tertiary level.

EIS reference: Volume 3. Section 3.5.5

Submitter reference: 1/52

Department of the Environment and Water Resources (51)

Proponent Response

The Proponent stated in the Original EIS Volume 3, page 132, Section 3.5.5 Sewerage that `treated effluent will have sufficient treatment to allow safe re-use or disposal and will comply with authority standards and requirements'. A detailed review of sewerage related elements for the Proponent's Original EIS Submission was completed by consultants ETS in February 2007.

Sewage water treatment levels will be treated to a tertiary level. A treatment level for effluent was proposed in the Original EIS Submission, Volume 3, page 139. The quality characteristics were set out as follows:

Parameter	Unit	Maximum
Suspended Solids	Mg/L	< 1
Turbidity	NTU	<2.0
Biological Oxygen Demand-5	mg/L	<10
Total Nitrogen	mg/L	<10
Total Phosphorous	mg/L	<1
Faecal Coliform*	org/ml	<10
pH		6.5-8.0
Dissolved Oxygen	mg/l	>2

* Median from 5 samples of final effluent taken at half hourly intervals

In the ETS Consultant's Report that was commissioned by the Proponent, effluent quality was further discussed. This Report is contained in the EIS Appendix A.6.5 Infrastructure Report (ETS and Section 6.4.1 *Effluent*.

The above treatment level is classified as Class A and is suitable for irrigation discharge. To comply with Class A requirements listed in the Queensland Recycled Water Guidelines a maximum limit of 1600 uS/cm for conductivity (EC) should also be attained. Additionally, monitoring for E.Coli will need to be carried out with a median limit of <10 cfu/100mL (as for Faecal Coliforms).

The Proponent suggests an extensive re-cycled water program. For water to be re-cycled safely the Queensland Re-Cycled Water Guidelines propose Class A+ Standard for the following uses:

- watering household gardens;
- wash down water;
- household laundry; and
- fire Fighting.

1.5.4.2 Effluent Wet Weather Storage Treatment Facilities

Concern is raised over the capability of the effluent wet weather storage treatment facilities to cope adequately with prolonged periods of heavy rainfall.

Details of how such a system will operate without adverse consequences should be provided for analysis at this stage of the Proposal, rather than being left for some future time when, if the efficiency of the operation is insufficient, alternate options may be unavailable or inappropriate.

EIS reference: Volume 3. Section 3.5.5.4

Submitter reference: 1/52
Johnstone Shire Council (48), Department of the Environment and Water Resources (51)

Proponent Response

The Proponent will design wet weather storage (WWS) treatment facilities that can cope with periods of heavy rain experienced from time to time at Ella Bay. The Proponent recognises that, periodically in periods of extremely heavy rainfall, discharge of treated water will be necessary. This is a 1 in 10 year event.

It is the Proponent's contention that on site water quality will be better than present circumstances of a pastoral farm where some hundreds of cattle are free to move around the farm without any controls on faecal emissions. It will be better because the Ella Bay environment will become a managed environment in which water discharges must meet higher standards than at present and water treatment of effluent will also be of a higher standard.

Modeling using the MEDLI was conducted during the EIS process by the Proponent's consultant, Simmons and Bristow on the adjoining Little Cove Development. This initial modeling indicates that utilising 4000 kilolitres of WWS capacity, and about 70 hectares of irrigation area at Ella Bay there is likely to be a one (1) overtopping event per 10 year period, with approximately 1000 kilolitres of overtop volume over a five day period. The Proponent also notes that the optimum WWS was 500 kilolitres for Little Cove. The Proponent's consultant, ETS determined that the approximate WWS for Ella Bay will be a volume of 4,000 kilolitres.

It should be noted that this estimated storage volume required may be reduced potentially as the majority of treated waste water will be mostly recycled back to residential units on a closed loop basis. Should environmental discharge of treated waste water be required in periods of severe, prolonged heavy rainfall (i.e. estimated at one in 10 year type rainfall events) then water will be discharged via irrigation to the golf course, and, not directly into the creeks. Calculations performed for Little Cove indicate that the level of dilution would reduce constituent levels well below those required under the GBRMPA Standards.

Wastewater for discharge via irrigation will be treated to a tertiary Class A water quality level and the Proponent will seek a sewerage treatment license from the Queensland EPA. This license will also govern environmental discharges of treated wastewater during exceptional circumstance wet weather incidents.

1.5.4.3 Location of Sewage Treatment Plant

The site plan showing the location of the sewage treatment plant was left blank in the EIS. A site location would be required. The Department's preferred site would be away from the foreshore coastal strip and not within 'endangered' or 'of concern' Regional Ecosystem's.

EIS reference: Volume 3. Section 3.5.5

Submitter reference: 1/52

Department of the Environment and Water Resources (51)

Proponent Response

The Proponent evaluated options concerning the building of appropriate infrastructure to manage the treatment and disposal of sewage waste. Sewage treatment plant/s will be located away from the coastal foreshore, areas of endangered ecosystems as well as other areas of concern including watercourses.

The location of the sewerage treatment plant is currently proposed to be in the south east corner near the village and is shown on the precinct plan (see Volume 3.1).

It may be possible to design multiple plants strategically located around the site as shown in figure 1.5.3. Options to centralise or decentralise the plants will be further evaluated during the projects detailed design phase.

The Ella Bay Master Plan (see figure 1.5.3 below) shows the possible location of up to six decentralised sewage treatment plants.

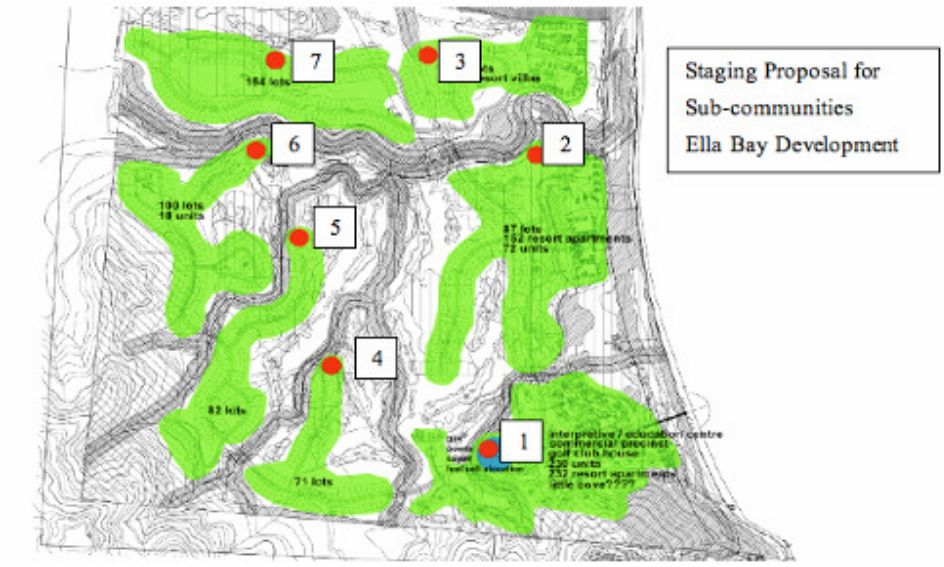

Figure 1.5.3: Location of sewage treatment plants (EnSight, 2007)

1.5.4.4 Irrigation and Discharge Using Treated Effluent

Discharge into creeks and streams is not recommended without extensive assessment, monitoring and modeling. Discharge must meet Australian and New Zealand Environment Conservation Council (ANZECC) guidelines.

Irrigation using treated effluent on the Site is a concern during extended wet periods. Irrigation or discharge of treated effluent during these times would be unacceptable. Storage contingencies should be elaborated upon, including the location and design features of storage mechanisms.

The estimated total load and volume of flow and the tidal flush capability needs to be assessed to ensure that impacts upon the creeks and streams and receiving waters are minimised. Discharge of large volumes may be more suitably discharged to the marine environment (require GBRMPA permit) during periods of extended rainfall and should be explored.

EIS reference: Volume 3. Section 3.5.5

Submitter reference: 1/52
J Dall (6), Department of the Environment and Water Resources (51)

Proponent Response

The Proponent commissioned consultant's THG to develop a water quality management strategy for Ella Bay that included water quality management techniques, tools and technologies for managing wastewater. Their report is contained in Volume 4, Appendix A.2.2.

Preliminary calculations indicate that the level of dilution would reduce constituent levels well below those required in the GBRMPA Standards.

Ella Bay will be a self-sufficient community in terms of water supply and use and, as a result strict controls, on the treatment, monitoring, reuse, distribution and overall management will be required.

Water for irrigation and discharge in exceptional circumstances will be treated to Class A standard. The exceptional circumstance is a 1 in 10 year overtopping event. In this event, the Proponent will still irrigate (over some 70 hectares) and there will be no direct discharge to the creeks. Creeks will overflow in periods of exceptionally high rain and any discharges will be highly diluted as a result due to sheer volume of rainfall in the area. A direct marine discharge is not considered necessary. The main creek at Ella Bay flows to the sea during periods of high rainfall. A 1 in 10 year overtopping event would see the creek flowing into the sea. The sewage consultants, Simmons and Bristow have estimated that 1000 litres overtopping volume over a five day period.

1.5.4.5 Disposal of Sludge

It has been suggested that the disposal of sludge from on-site sewage treatment works would be disposed to landfill. Johnstone Shire Council requires further information relating to this aspect of the Proposal advising how this meets all relevant legislative requirements.

EIS reference: Volume 3. Section 3.5.5.4

Submitter reference: 1/52
Johnstone Shire Council (48)

Proponent Response

The Proponent accepts that sludge from on-site sewage treatment works will be disposed to landfill from time to time. This is normal procedure for such a community of the size envisaged for Ella Bay.

However, the Proponent believes that there are options to reduce the amount of sludge for disposal. A sewage treatment option being considered by the Proponent is to use a Membrane Bio Reactor (MBR) treatment process. This process involves establishing a suspended growth with an activated sludge system utilising micro-porous membranes to separate waste solids and liquids (for further details see the Proponent's consultant Ensight's report in Volume 4, Appendix A.2.9).

In conjunction with the MBR treatment process plant digesters with aerators to assist with aerobic digestion (part of the process which allows the bugs to consume any of their own kind which have died) are also used.

The result of this is sludge reduction in the wastewater tanks by the release of gases in conjunction with a V belt press. This de-waters sludge with bio-solids collected in a 1m3 bin which are then transferred to a larger 10m3 rail bin for removal off site by a contractor. The water can then be returned to the head of the plant.

The bio-solids are taken offsite to a specialist service provider able to compost this and other materials on a commercial scale. However there is a possibility that there may very well be an end use for de-watered sludge combined with composting either on site or in the local community to assist with possible regeneration projects.

An advantage of this process is that it deliver long sludge age outcomes, and, as a result, achieve comparatively low sludge production levels. This is due to the biological treatment of the waste stream. The production of sludge is less significant in comparison to other sewage treatment processes. Small quantities of sludge will, from time to time be taken off-site (The Proponent's consultant, Ensight envisaged this happening approximately every 18 months). It would be disposed of according to Council procedures.

With regard to environmental impact, the Proponent believes that there will be no impact on the environment arising from sludge, providing it is safely removed from Ella Bay periodically, and disposed of according to the relevant procedures and legislation.

1.5.4.6 Great Barrier Reef Marine Park Authority Levels

The documentation indicated that Great Barrier Reef Marine Park Authority (GBRMPA) would require a <l0mg/L. GBRMPA has a requirement for a load based licensing with levels of total nitrogen at <5 and total phosphorous at <1. This can be achieved with a Membrane Bio Reactor plant or equivalent.

EIS reference: Volume 3. Section 3.5.5

Submitter reference: 1/52
Department of the Environment and Water Resources (51)

Proponent Response

The Proponent acknowledges that GBRMPA levels for total nitrogen are <5mg/L and total phosphorus are <1mg/L. The Proponent is proposing to use a Membrane Bio Reactor (MBR) plant for the treatment of waste water.

This waste water treatment process is discussed in detail in Volume 1, Section 1.5.4.6 and in Volume 4, Appendix A.2.9.

For the purpose of explaining the MBR process, the diagrams that follow below show this in diagrammatic format. The diagrams illustrate the treatment process for a Membrane Bio Reactor (MBR) approach to water treatment showing inlet and bioreactor, membrane and permeate, chlorine and dosing and the treatment of sludge.

Attainable water quality results arising from such a system are as follows:

- Total Nitrogen - 5 mg/L at 90%ile
- Total Phosphorus - 0.5 mg/L at 90%ile

The Proponent will not be carrying out direct discharge to the sea using an outfall pipe.

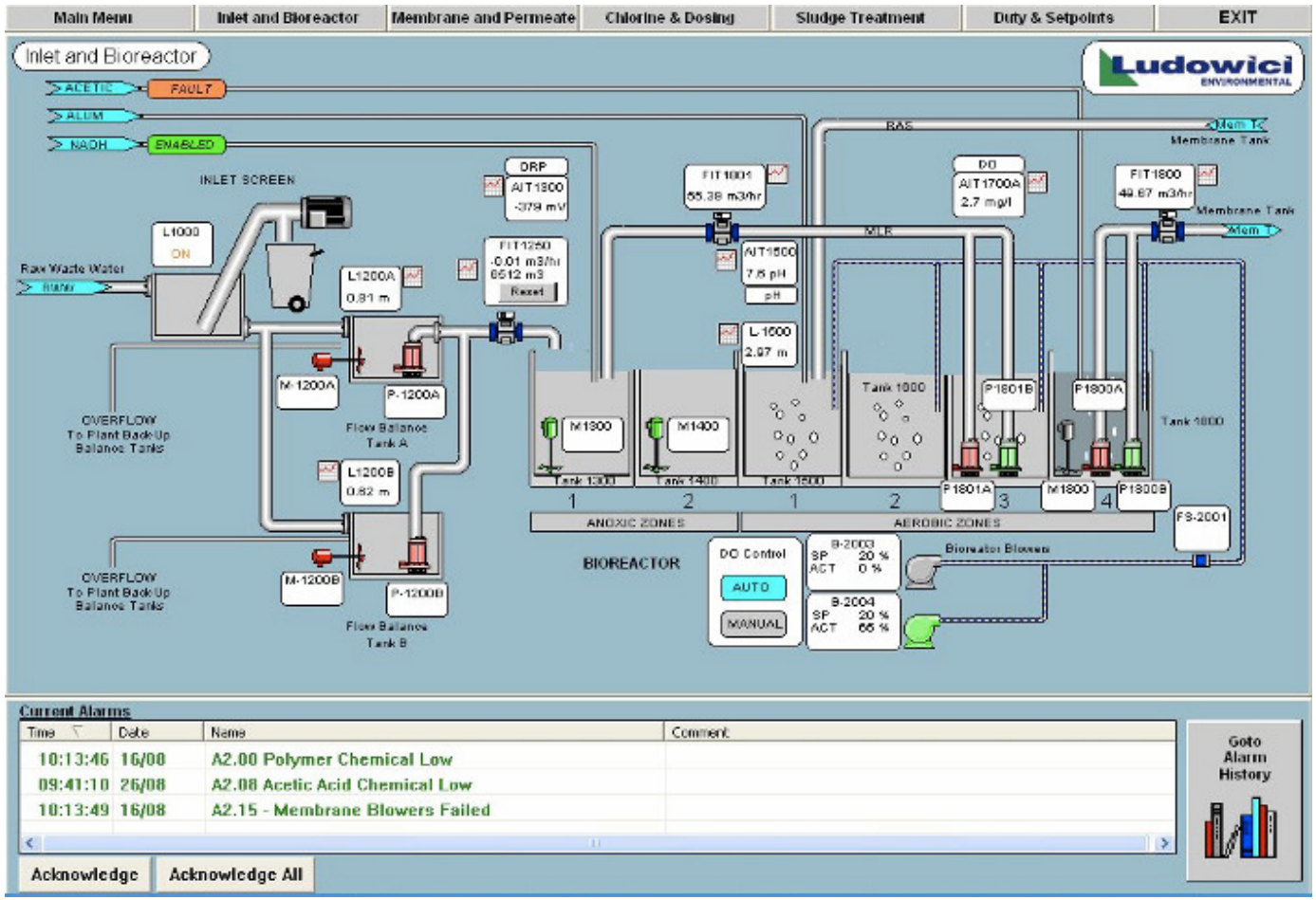

Figure 1.5.4 Inlet and Bioreactor Process

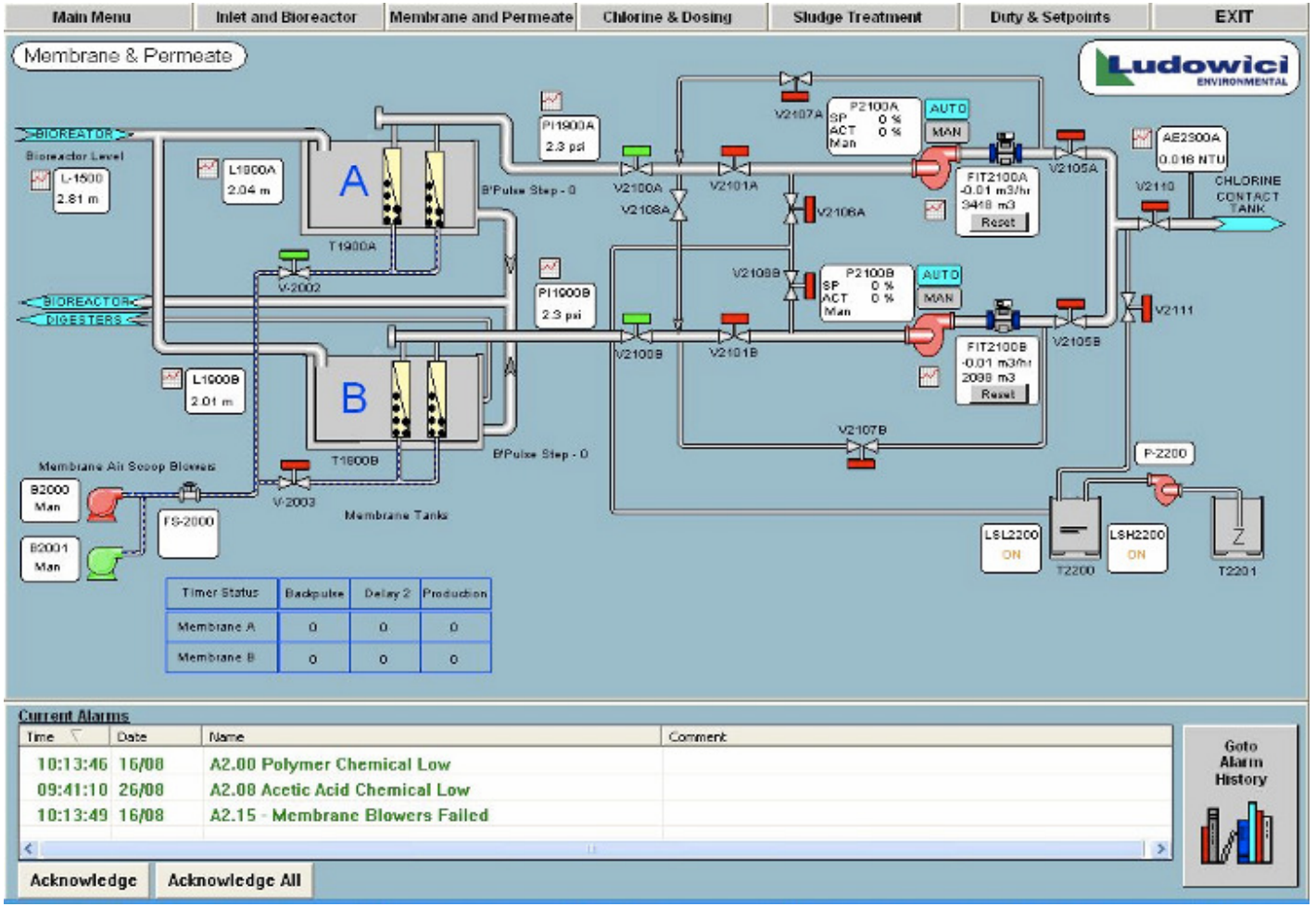

Figure 1.5.5 Membrane and Permeate Process

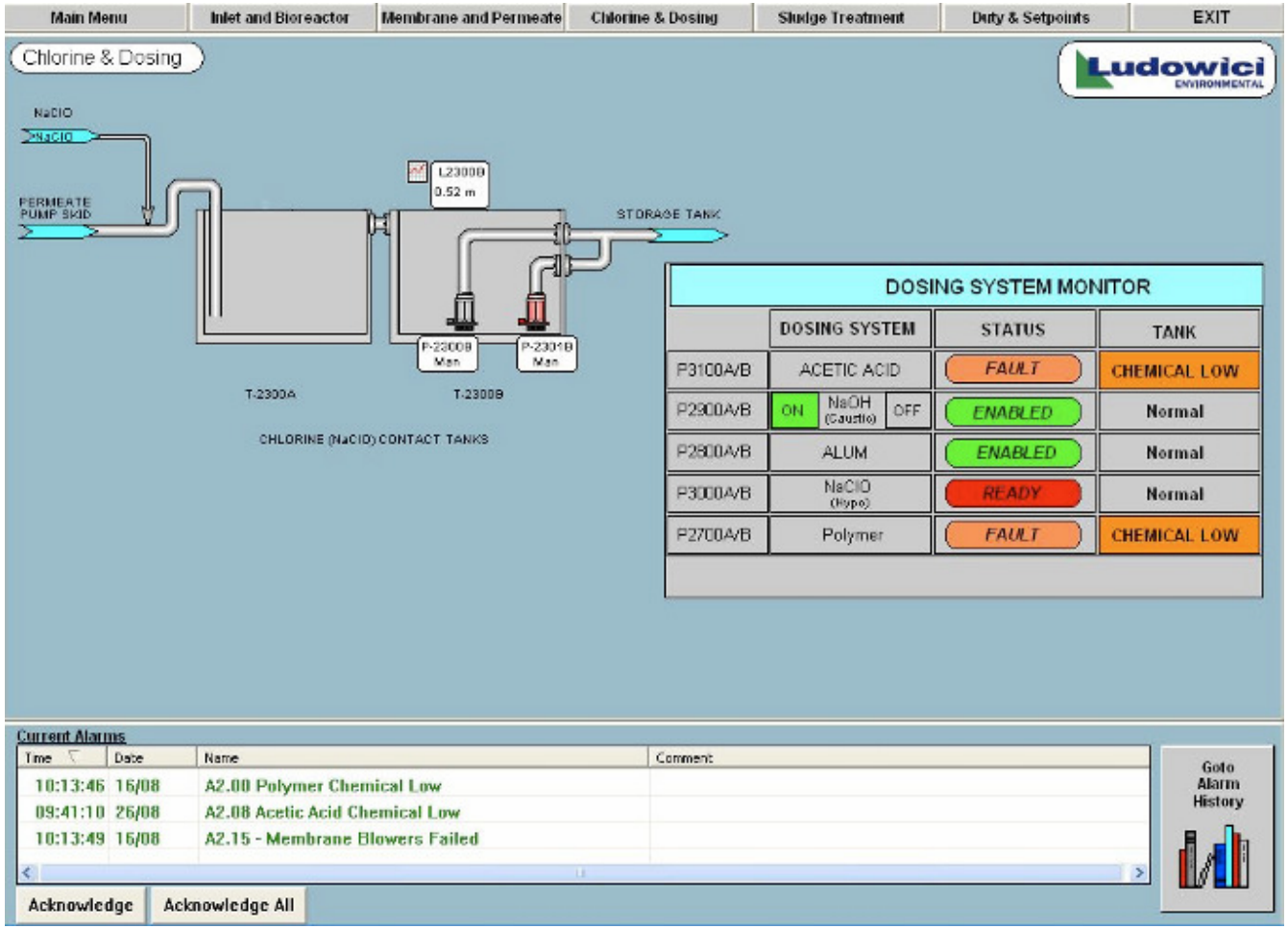

Figure 1.5.6 Chlorine and Dosing Process

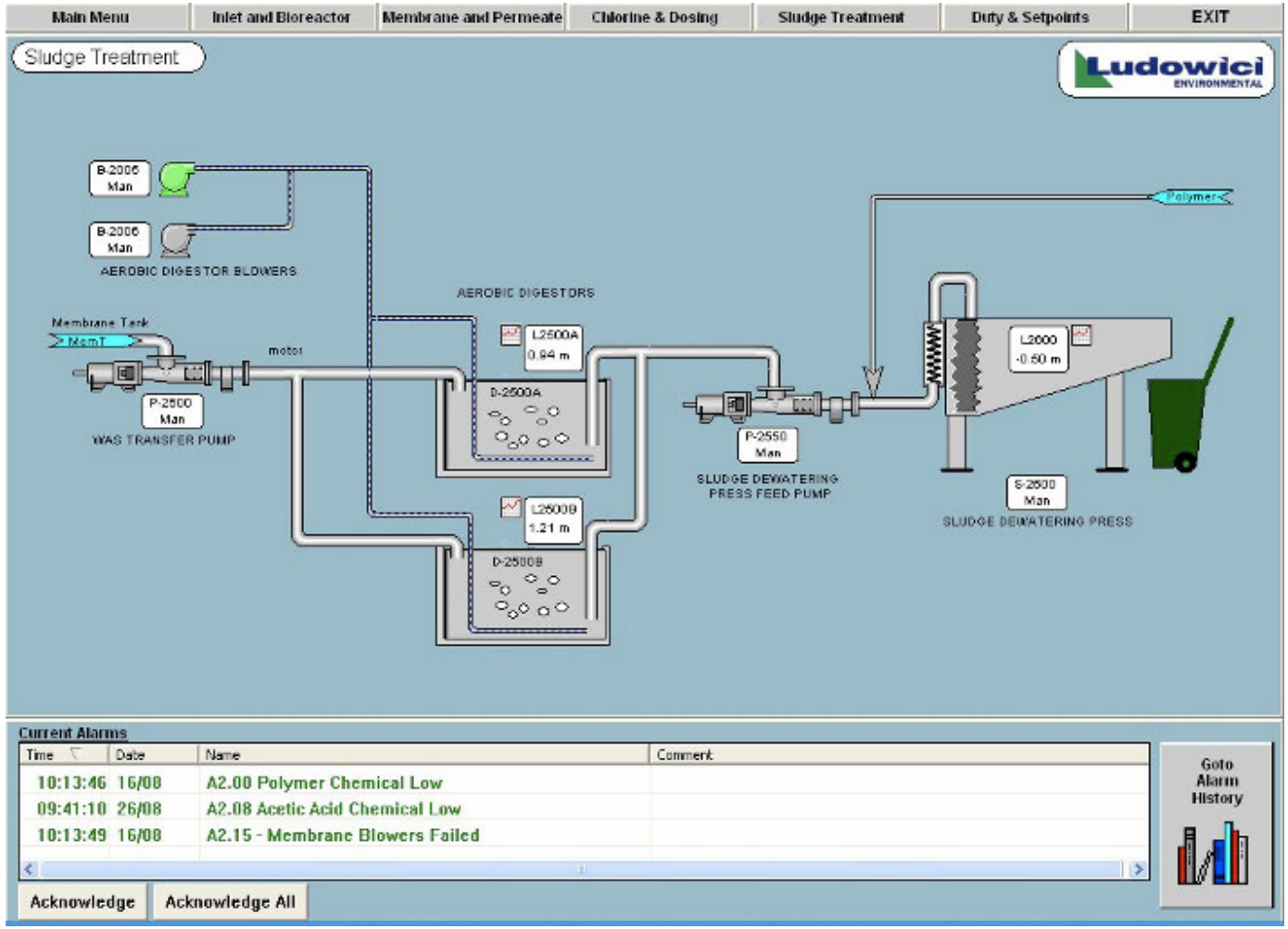

Figure 1.5.7 Sludge Treatment Process

1.5.5 Submitter Issue: Waste management

1.5.5.1 Waste Disposal Units

The internal layout of the development, including cul-de-sacs, is such that it caters for the movement of Council's waste collection vehicles.

EIS reference: Volume 3. Section 3.6.1.2

Submitter reference: 1/52

Johnstone Shire Council (48)

Proponent Response

A detailed Waste Management Strategy has been developed and is included in the *Ecologically Sustainable Development* Report (Volume 4, Appendix A.2.9). The internal layout of the development will allow for adequate access for Council and contractor waste collection vehicles, as required. This includes appropriate internal road widths, traffic calming measures and turning circles within cul-de-sacs. The revised circulation plan is provided below.

Figure 1.5.8: Circulation Plan (Volume 3, Section 3.1)