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Our Ref: 000166

20 July 2016

Fooks Martin Sandow Anson Pty Ltd
Att: Mr Peter Sandow
L2, 182 Chapel Street
North Melbourne VIC 3051

Dear Peter

RE: Preliminary Dwarf Galaxias Survey

Introduction

Aquatica Environmental (the trading name of Aquatica Australia Pty Ltd) was engaged by Fooks Martin Sandow Anson Pty Ltd (FMSA) on behalf of the Plumbing Industry Climate Action Centre (PICAC) to undertake a Dwarf Galaxias *Galaxiella pusilla* survey at the location of a proposed land development in Narre Warren, Victoria (the site, see Appendix A).

The site is an approximately 2.7 hectare parcel of undeveloped land and located on the southeast corner of the intersection of Centre Road and Fullard Road Narre Warren.

The primary aims of the Dwarf Galaxias survey (the survey) were to:

1. Conduct a field survey to confirm the existing understanding that Dwarf Galaxias were present in the roadside drains abutting the site;
2. Provide advice on the implications of Dwarf Galaxias presence for the project; and
3. Provide advise on the ranger of possible management and mitigation measures that could be implemented to protect Dwarf Galaxias habitat abutting the site during the construction and operation phase of the site's development.

Species Description – Dwarf Galaxias

Dwarf Galaxias are a small freshwater fish endemic to southeastern Australia occurring only in Victoria, South Australia and Tasmania. Typical maximum lengths are 40 millimetres (mm) for males and 34 mm for females with records up to 48 mm (Allen *et. al.* 2003) (Plate 1).

Although they are still widely distributed across southeastern Australia, populations are fragmented and patchy across the landscape (Saddlier *et. al.* 2010). A decline in their abundance has been attributed to habitat loss due to wetland drainage, alterations to flow regimes, climate change,

habitat damage (i.e. grazing and agriculture) and competition and predation by introduced fish species such as the Eastern Gambusia *Gambusia holbrooki* (Department of Environment 2015).

Dwarf Galaxias are a mid-water freshwater fish that spend their entire life cycle in freshwater environments. Their diet consists primarily of small aquatic macroinvertebrates. Spawning occurs in late winter to spring (May through to October) when females lay from 65 to 250 eggs on the underside of aquatic or submerged vegetation or on hard surfaces (Saddlier *et. al.* 2010). They are a short-lived fish with only one year's age-class having been observed and adults dying after spawning, indicating they are an annual species (Humphries 1986 in Department of the Environment 2015).

Plate 1 Dwarf Galaxias (Photo by A. Jenkin)

Habitat requirements

Dwarf Galaxias have a wide range of habitat requirements but typically occur in slow flowing and still, shallow, permanent and temporary, freshwater waterways including swamps, the backwaters of streams and creeks, drains and ditches, usually with dense aquatic, emergent or flooded vegetation (Allen *et. al.* 2003 and Saddlier *et. al.* 2010).

The National Recovery Plan for Dwarf Galaxias (Saddlier *et. al.* 2010) notes that Dwarf Galaxias have different habitat requirements depending on life stage and season including:

- **Transient habitat**: ephemeral habitat that retains water for less than one month following inundation and is mostly used for Dwarf Galaxias dispersal.
- **Spawning habitat**: ephemeral habitat with abundant aquatic or submerged vegetation that retain water for 1-3 months following inundation and during the May to October breeding season.
- **Short-term refuge habitat**: ephemeral water bodies that retain water for more than three months but do not have the attributes to support a permanent population.
- **Long-term refuge habitat**: permanent water bodies that provide permanent refuge for Dwarf Galaxias populations and where source stock can disperse and repopulate transient, spawning and short-term refuge habitats (i.e. those listed above).

Status

Legislative status

Dwarf Galaxias are listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) and Department of Environment, Land, Water and Planning (DELWP) Advisory List of Threatened Vertebrate Fauna (DEPI 2013) and *Flora and Fauna Guarantee Act 1988* (the FFG Act) listed. They are also designated as Vulnerable on the International Union for Conservation of Nature (IUCN) Red List of Threatened Animals (Wager 1996) and on the Australian Society for Fish Biology threatened species list (ASFB 2010).

Regional status

Dwarf Galaxias were likely once more widespread through the region. However, wetland modification and land uses such as wetland draining, farming and urban development have lead to a decline in much of their key habitat area (Department of Environment 2015a).

Plate 2 shows the Victorian Biodiversity Atlas (VBA) recorded locations where Dwarf Galaxias have been previously recorded near the site (DEPI 2014). It should be noted that there is some spatial errors on the placement of these VBA records. Despite many looking rather scattered, the vast majority are associated with table drains associated with Centre Road.

Major threats to the Eastern Dwarf Galaxias in the region include:

- Wetland drainage;
- Alteration to the flow regime of waterways (i.e. changes to the natural flooding and drying cycles);
- Degradation and loss of habitat due to and land development and lack of regeneration; and
- Introduced feral fish competitors and predators (Department of Environment 2015).

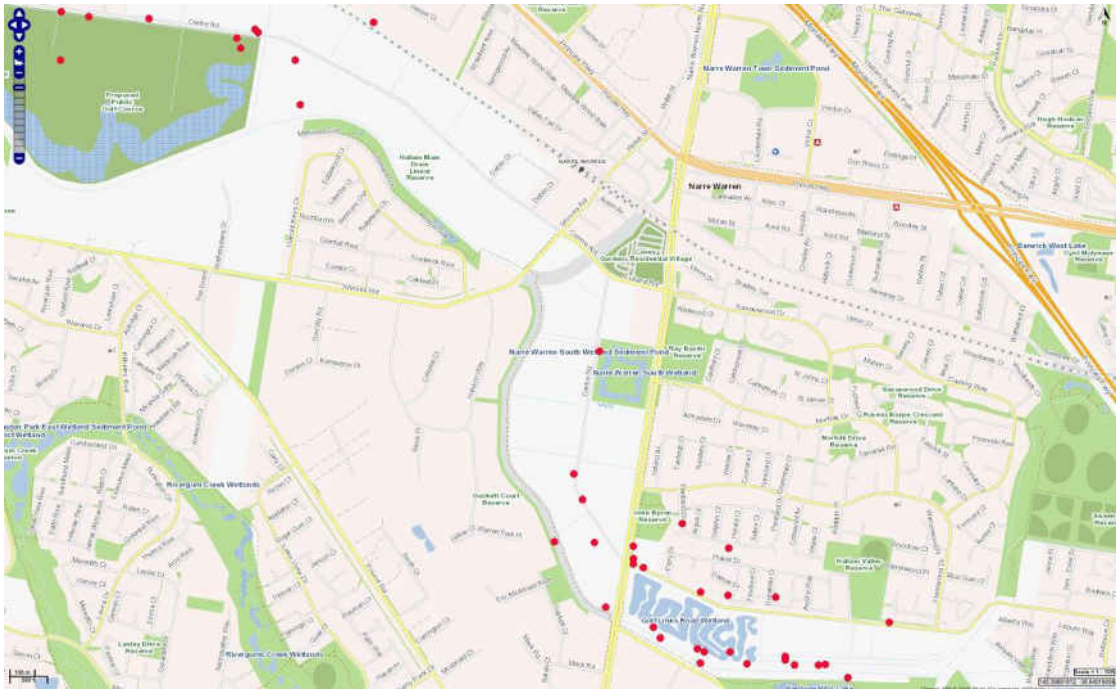

Plate 2 Existing Dwarf Galaxias (•) near the site (Source: DEPI 2014)

Site Description

The site consist an open grassy area with a shallow drain along the northern boundary at Fullard Road and a more significant vegetated table drain on the eastern site of Centre Road (see Appendix A).

To the east of the site are garden/landscaping supply and industrial machinery businesses. To the south of the site is Narre Warren South Sediment Pond and Wetland. The northern boundary is at Fullard Road and the western at Centre Road. On the opposite side of Centre Road is open pasture (part of the Hallam Valley Floodplain) and a property leased for flying remote control aircraft.

Methodology

Desktop Review

Aquatica Environmental conducted a brief desktop review of publically available biodiversity databases and other sources of information to identify existing records of Dwarf Galaxias and/or their habitat in the study area or its immediate vicinity.

Sources of information included:

- Department of Environments EPBC Act Protected Matters Search Tool;
- DELWP's Victorian Biodiversity Atlas (VBA) for historical and/or recent records of Eastern Dwarf Galaxias; and
- A brief internet resources search for reports or other sources of information relating to Dwarf Galaxias in the study area.

Dwarf Galaxias Habitat Assessment and Preliminary Survey

Aquatica Environmental undertook a Dwarf Galaxias survey in the roadside table drain abutting the western boundary site, focusing primarily on the Centre Road east drain (between Centre Road and the site).

Where potentially suitable Dwarf Galaxias habitat was identified, a survey of that habitat was undertaken. Sampling for adult Dwarf Galaxias was undertaken using hand-held dip-nets, sampling in and around areas of suitable habitat. Sampling for larval Dwarf Galaxias was undertaken by colleting a sample of water (approximately 10 litres) and placing it in a shallow white tray, where any larva would have been visible

Active searching using dip-nets is a standard method for sampling Dwarf Galaxias and is one of the suite of suitable methods outlined in the Survey Guidelines for Australia's Threatened Fish (DSEWPaC 2004) and Biodiversity Precinct Structure Planning Kit (DSE 2010).

Results

Desktop Review

There are a large number of Dwarf Galaxias in the vicinity of the site, with the majority being associated with table drains and other associated inundation-prone areas along Centre Road. There is an existing record in the section of Centre Road drain that abuts the site (see Plate 2), supporting the understanding that the species was previously present.

Dwarf Galaxias Survey

The survey was undertaken on the morning of 4 July 2016. Weather on the day was cool and fine to cloudy will light breezes.

The drain was found to have standing water and suitable Dwarf Galaxias along the full length that abutted the site (Plates 3a and 3b). Three adult Dwarf Galaxias were recorded at approximately 40 m south (one recorded) and 80 m south (two recorded) of the intersection with Fullard Road (Appendix A and Plate 4).

In addition to confirming the presence of Dwarf Galaxias in the drains, the drain was found to be biologically active and diverse. A wide range of aquatic fauna was recorded during the survey including (but not necessarily limited to):

- Yabby, individuals and burrows (*Cherax destructor*)(Plate 5);
- Ewing's Tree Frog (*Litoria ewingii*)(Plate 6a);
- Tadpoles (likely *L. ewingii* and/or *Crinia* sp.)(Plate 6b); and
- A wide range of macroinvertebrates including dragonfly and damselfly larvae, water beetles (larvae and adults), leaches, etc.

Eastern Gambusia (*Gambusia* holbrooki), which is one of the greatest threat species to Dwarf Galaxias, was also recorded in the drain (Plate 7).

Supporting the suitability of the drain for supporting Dwarf Galaxias there was a wide range of aquatic and emergent flora present including (but not necessarily limited to):

- Sedge (*Cyperus sp.*);

- Rush (*Juncas sp.*);
- Slender Knotweeed (*Persicaria decipiens*); and
- Arrow-grass (likely *Triglochin striatum*).

There was also a range of riparian/wetland flora including grasses (likely a mix of native and exotic), dense stands of Melaleuca and a number of Eucalypts.

Water in the drain was continuous from near the intersection of Fullard Road to the southern end of the site. Along this reach of the drain, it is likely the range of habitat types and attributes required to support a Dwarf Galaxias population, are present. In particular, dense aquatic/emergent vegetation, cover and protection afforded by the Melaleuca overstory and the presence of yabby burrows are key elements for a habitat to support the species.

a b

Plate 3 Examples of Dwarf Galaxias habitat areas in the Centre Road drain abutting the site

Plate 4 Female Dwarf Galaxias with full belly indicating about to commence breeding

Plate 5 Yabby

a b

Plate 6 Ewing's Tree Frog (a) and tadpole (b)

Plate 7 Dwarf Galaxias (top) and Eastern Gambusia (bottom)

Potential Impacts

The proposed development of the site has the potential to impact upon Dwarf Galaxias both in the abutting drain and its downstream receiving waters. Potential impacts include those that may be direct to Dwarf Galaxias on the site (e.g. due to project construction, development or operational

activities) or cumulative affecting Dwarf Galaxias populations in the wider region (e.g. contributing to further loss of the species in the wider catchment).

Potential impacts may include:

- Reduction/loss of habitat;
- Injury and/or mortality during construction;
- Changes to the drain's hydrology and flow regime;
- Habitat fragmentation and reduced dispersal ability (e.g. due to culverts or drain filling); and
- Reduced water quality.

Legislative Implications

Local Planning Policy Frameworks

Under Local Planning Policy Framework (LPPF) 21.10, council and Melbourne Water (as the referring authority) may require that the drain and Dwarf Galaxias habitat be protected and maintained/enhanced for the benefit of the species.

EPBC Act

Due to the Centre Road drain supporting a Dwarf Galaxias population and the potential for the project to impact on the population or its habitat, a referral under the EPBC Act will likely be required.

Management and Mitigation Measures

The National Recovery Plan for the Dwarf Galaxias (Saddlier et al., 2010) summarises a range of management strategies to avoid threatening processes to Dwarf Galaxias and their habitat including:

- No direct loss of habitat through wetland drainage on either public or private land;
- No physical alteration to Dwarf Galaxias habitat as a consequence of land adjoining dwarf galaxias habitat;
- No further damage to riparian vegetation;
- Damaged or depleted riparian vegetation is protected and (if necessary) supplemented by active revegetation works; and
- Plans to clear vegetation lying adjacent to Dwarf Galaxias habitat will not impact upon water quality (no increase in sedimentation, nutrient levels, pesticides, herbicides, etc.).

To achieve these strategies at the PICAC site the key goal will be avoiding direct impacts to Dwarf Galaxias and their habitat (i.e. the drain) during both the construction an operational phase of the development of the site.

In order to protect the local Dwarf Galaxias population and their habitat the following mitigation and management measures are suggested:

- For accessing the site, off Centre Road, consider using a crossing design that does not require in-drain works. For example, rather than using a box culvert, use a single span design where only 'top of bank' works will be

required. The key concern is that any works that will require excavating directly in the drain and/or the Dwarf Galaxias habitat, will likely present great challenged in terms of obtaining permits and approvals.

- Incorporate Water Sensitive Urban Design (SWUD) in all aspects of designed and developing the site. In particular it will be key the ensure that development of the site does not impact the water quality and/or the hydrological regime of the drain, which is supporting the species. It may be necessary to engage with a hydrologist to ensure this is achieved.
- WSUD should include measures to manage stormwater and had stand runoff to the drain. Any water that is discharged into the drain should meet relevant guidelines such as the State Environmental Protection Policy Water of Victoria (SEPP WoV) and/or the specific requirements outlined by Melbourne Water. Measures may include bio filters, wetlands, retention basins, etc.
- Maintain a vegetation buffer between development areas and the drain in order to protect Dwarf Galaxies habitat. It will be key to ensure that the vegetation buffer incorporates retention of the existing native vegetation, removal of weed species and ensuring any additional planting/landscaping replicated the range of native flora already present on the site.
- WSUD could consider the design and creation of additional wetland/s on the site to provide both stormwater filtration and additional habitat for Dwarf Galaxias.

Next Steps

Next steps should include:

- Engage with Melbourne Water to get their input and ideas about protecting the drain and its resident Dwarf Galaxias population and design of the site including hydrology, stormwater
- Once more detail is ascertained about the actual design of the site and the proposed Dwarf Galaxias mitigation and management measures, a Dwarf Galaxias Management Plan (DGMP) should be developed. The DGMP should outline how the existing habitat will be protected during the construction and operational phases of the project, the details of any habitat enhancement, permits and approvals requirements, responsibilities, and any monitoring requirements.
- Develop and submit a referral under the EPBC Act to the federal minister for the environment. The referral should be able to demonstrate that consultation with local authorities has occurred and their input has been factored into the project (i.e. Melbourne Water and Council) and that the action is guided and supported by the DGMP.

If you have any questions or would like to discuss this assessment, report or any other matter further, please do not hesitate to call me on 0413 935 497.

Kind Regards,

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Appendix A: The site, the surveyed drain (pale blue), existing records (green) and the location of records form this most recent survey (red)