Functional Design Package

Report Template

**TEMPLATE FOR CONSULTANTS/WETLAND DESIGNERS – ADDITIONAL PROJECT SPECIFIC INFORMATION CAN BE ADDED AS REQUIRED**

ADDRESS:

PROJECT TITLE & JOB DESCRIPTION:

DEVELOPER:

CONSULTANT:

MUNICIPALITY:

CONSULTANT REF:

MELBOURNE WATER REF (EPMS #, LD #):

Include company disclaimer plus other information as outlined in table below:

|  |
| --- |
| **Revision No.** |
|  |
| **Date:** |
|  |
| **Prepared:** |
| (Consultant’s name) |
| **Reviewed:** |
| (Consultant’s name) |
| **Approved:** |
| (Consultant’s name) |

**CONTENTS**

1. **Deemed to comply statement**
2. **Wetland overview**
3. **Flow estimation**
4. **MUSIC modelling summary**
5. **Sediment pond**
6. **High flow bypass channel**
7. **Macrophyte zone**
8. **Geotechnical investigation**
9. **Landscape concept**
10. **Environmental protection**
11. **Maintenance considerations**
12. **Works cost estimate**
13. **Approval authorities**
14. **Functional design calculation summary**

**Attachment A – Deemed to comply checklist**

**Attachment B - Hydrologic, hydraulic and MUSIC models**

**Attachment C – Functional design drawings**

**Attachment D – Landscape concept plans**

**Attachment E – Wetland maintenance boundaries**

**Attachment F – Maintenance agreements**

**Attachment G – Function design calculation summary table**

**Declaration**

|  |
| --- |
| I declare and acknowledge that I have submitted the attached application in its entirety in accordance with Part B of the Melbourne Water Constructed Wetlands Design Manual. I further acknowledge that if the application is incomplete it will be returned and will not be considered lodged with Melbourne Water.  Signature: Date:  Print name: Position: *Signed by Consultant Principal* |
|  |

**Accepted file formats**

|  |  |
| --- | --- |
| **Item** | **Format** |
| Declaration | Pdf |
| Reports | Pdf |
| Models | MUSIC, Wet spells analysis, IFA, RORB and/or HEC-RAS files |
| Mapping information | Geo-referenced MapInfo layers |
| Sections, schematic drawings | Pdf |
| Plans | Pdf and dwg |
| Specifications | Pdf |

1. **Deemed to comply statement**

Complete Deemed to Comply Checklist (Attachment A).

## 1.1 Statement

*Insert wording: The statement must list any aspects of the package that do not conform with the “Deemed to Comply” requirements outlined in Part A2 of the Melbourne Water Constructed Wetlands Design Manual.*

## 1.2 Justification for any non-compliance

*Insert wording: Justification must be provided for any non-compliant conditions listed in Section 1.1. An explanation must be provided as to how the proposed alternative approach achieves (compared to the deemed to comply approach) equivalent or better:*

* + *pollutant reductions and flow management*
  + *safety outcomes*
  + *maintenance*
  + *sustainability/robustness (i.e. ≥ 25 year life)*

# Wetland overview

*Insert wording: A functional description of the wetland system operation including how gross pollutants, sediments and water quality will be managed.*

## 2.1 Changes to concept design

*Insert wording: If applicable, a summary of any changes to assumptions made during the concept design phase*

# Flow estimation

*Insert wording: Provide a summary of the hydrologic modelling.*

* + *Design flow rates and method and assumptions used to estimate them.*
  + *Peak water levels above sediment pond, macrophyte and in the surrounding reserve for 5, 10 and 100 year ARI events and method and assumptions used to estimate them.*

Copy of hydrologic model (Attachment B).

# MUSIC modelling summary

*Insert text: Description of updated MUSIC model including matching:*

* + 1. *the inlet pond volume in MUSIC to the sediment pond volume shown on plans (excluding the sediment accumulation volume)*
    2. *the permanent pool volume to the proposed bathymetry (using the user defined stage-storage relationship)*
    3. *the high flow bypass configuration to the design*
    4. *the extended detention controlled outlet configuration to the design (using the user defined stage-storage relationship)*
  + *Analysis of water level patterns in macrophyte zone*
  + *90th %ile residence time in the macrophyte zone*
  + *Report from MUSIC auditor tool (if available)*
  + *Report from inundation frequency analysis tool (if appropriate)*

Copy of MUSIC model (Attachment B).

# Sediment pond

*Insert wording: Description of the sediment pond function (cross reference with functional design plans in Attachment C).*

* + *Calculations used to size sediment pond/s*
  + *Calculations used to size connection between sediment pond and macrophyte zone*
  + *Calculations used to size connection between sediment pond and high flow bypass (i.e. sediment pond overflow outlet)*
  + *Maximum flow velocity through sediment pond*

## 5.1 Sediment pond cleanout

*Insert text: Description of how sediment ponds will be dewatered during maintenance (without dewatering macrophyte zone)*

* + *Calculations used to size sediment dewatering area*

# High flow bypass channel

*Insert wording: Description of how the bypass channel will function (cross reference with functional design plans in Attachment C).*

* + *Calculations/hydraulic modelling used to size the high flow bypass channel*

Copy of hydraulic model (Attachment B).

# Macrophyte zone

*Insert wording: Description of the macrophyte zone function (cross reference with functional design plans in Attachment C).*

* + *Calculations used to size macrophyte zone extended detention controlled outlet*
  + *Calculations used to size macrophyte zone overflow outlet*
  + *Maximum flow velocity through macrophyte zone*

*Insert table showing percentage of macrophyte zone (at NWL) that is in the following depth zones:*

* + 1. *100 to 150 mm below NWL*
    2. *150 to 350 mm below NWL*
    3. *Greater than 350 mm below NWL*

## 7.1 Plant selection

*Insert table showing plant species and densities that will be used in each zone.*

1. **Geotechnical investigation**

*Insert text: Summary of findings of geotechnical testing (full geotechnical report to be included as an Attachment to the functional design report). Summary must address:*

* + 1. *Whether maximum groundwater level is within 0.5 m of the wetland base*
    2. *Dispersiveness of soils*
    3. *Whether wetland earthworks involve contaminated material and if so the required soil management approach and costs*
    4. *For wetlands with a permanent pool, suitability of site soils to form an impervious wetland liner*
    5. *For ephemeral wetlands, likely infiltration rate from base of wetland*
    6. *Topsoil suitability (refer Melbourne Water Specificiation)*

1. **Landscape concept**

*Insert text: Provide brief description of landscape concept for the surrounding areas.*

*Insert figures: Landscape concept plans for surrounding areas (Attachment D)*

1. **Environmental protection**

*Insert text: Provide a description of how the surrounding environment will be protected during construction (e.g. protection of significant existing vegetation and preventing contaminated runoff leaving the site)*

1. **Maintenance considerations**

## 11.1 Maintenance delineation

*Insert wording: Provide a description of the wetland maintenance delineation (i.e. which parts Melbourne Water will be responsible for maintaining and which parts will be maintained by others - Council).*

*Insert figure: Plan showing maintenance responsibility boundaries (Attachment E)*

## 11.2 Maintenance agreements

*Provide letters from other parties agreeing to being responsible for maintaining areas of assets adjacent to the wetland (Attachment F)*

1. **Works cost estimate**

*Insert table: Provide works cost estimate with clearly itemised items to be funded by Melbourne Water.*

1. **Approval authorities**

*Insert text: Provide a summary of consultation that has occurred with other approval authorities (e.g. Council, service authorities)*

**Attachment A**

Melbourne Water Deemed to Comply Checklist.

**Attachment B**  
Copies of hydrologic, hydraulic and water quality models.

**Attachment C**

Functional design drawings:

* Scale plan(s) showing proposed surface levels (in m AHD) within and surrounding the wetlands (e.g. produced from earthworks model). The plan(s) must show lines indicating TEDD, NWL, the edge of each planting zone, maintenance access tracks and sediment dewatering areas, any existing or proposed services within the wetland reserve and locations of any edges that do not contain safety benches and will therefore be fenced. Note that presence, alignment and estimate depth of underground services must be based on physical site proving (unobtrusive testing using a detector is acceptable)
* Indicative long section of sediment pond(s) and macrophyte zone(s) showing planting zones, topsoil, liner, peak 5,10 and 100 year ARI water level and the location and depth of any underground services.
* Indicative long section of the high flow bypass.
* Schematic dimensioned drawings with levels to “m AHD” of:

1. Inlet to sediment pond
2. Connection between the sediment pond and macrophyte zone
3. Connection between the sediment pond and high flow bypass
4. Twin chamber outfall pit including side winding penstock and gate valves.
5. Macrophtye zone overflow outlet
6. Connection of wetland outlet(s) to downstream drain/waterway including the peak 1 year ARI water level in the downstream drain/waterway and the maximum high tide level (accounting for anticipated sea level rise)

* Geo-referenced GIS (MapInfo) layers showing catchment boundary for each sediment pond (provide MapInfo tables)

**Attachment D**

* Landscape concept plans for surrounding areas.

**Attachment E**

Draft plan of wetland maintenance boundaries.

**Attachment F**

Maintenance agreement letters.

**Attachment G**

Functional Design Calculation Summary Table

Functional Design

Calculation Summary Table

This template should be refined to be site specific for each functional design submitted to Melbourne Water as part of the Design Acceptance Process for Constructed Wetlands.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Address:** |  | | | **Melways Ref:** |  |
| **Project title & job description:** | | |  | | |
| **Developer:** |  | | | | |
| **Consultant:** |  | | | | |
| **Date:** |  | | | | |
|  | | | | | |
| **MUSIC modelling rainfall station (include name and number):** | | | |  | |
| **MUSIC modelling time step:** | |  | | | |

|  |  |
| --- | --- |
| **Calculation Task** | **Results / Outcome** |
| 1. **Catchment Characteristics** | |
|  | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Subcatchment | AREA (ha) | | | | | Overall % imperviousness |
| Residential | Commercial | Industrial | Other | Total |
| A |  |  |  |  |  |  |
| B |  |  |  |  |  |  |
| C |  |  |  |  |  |  |
| D  E  F  G  H |  |  |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| 1. **Estimate design flow rates** | |  |  |
| Time of concentration |  |  | mins |
| Peak design flows |  |  |  |
| * Station used for IFD data | |  |  |
| Q3 month |  |  | m3/s |
| * If located within a floodplain | |  |  |
| Q100 year |  |  | m3/s |
|  |  |  |  |
| 1. **Wetland characteristics and performance** | |  |  |
|  | |  |  |
| **MUSIC results:** | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | In | Out | Removed | % Reduction |
| Flow (ML/yr) |  |  |  |  |
| Total Suspended Solids (kg/yr) |  |  |  |  |
| Total Phosphorous (kg/yr) |  |  |  |  |
| Total Nitrogen (kg/yr) |  |  |  |  |
| Gross Pollutants (kg/yr) |  |  |  |  |

|  |  |  |
| --- | --- | --- |
| 1. **Sediment Pond** | | |
| Volume of sediment pond at normal water level |  | m3 |
| Normal water level (NWL) |  | m AHD |
| Length to width ratio |  | L:W |
| Extended detention depth (EDD) |  | m |
| Maximum 100 yr ARI velocity through cross section at mid-point |  | m/s |
| Cross section batter slope |  | V:H |
| Sediment pond capture efficiency (of 125µm sediment) |  | % |
| Sediment pond clean out frequency |  | yrs |
| Discharge capacity of connection to macropyhte zone |  | m3/s |
|  |  |  |
| 1. **Macrophyte zone** |  |  |
| Area of macrophyte zone at normal water level |  | m2 |
| Normal water level (NWL) |  | m AHD |
| Average depth below normal water level |  | m |
| Length to width ratio |  | L:W |
| Extended detention depth (EDD) |  | m |
| Cross sectional area between NWL and TED at the narrowest point |  | m2 |
| Maximum 3 mth ARI velocity through narrowest cross section |  | m/s |
| Percentage of macrophyte coverage to normal water level |  | % |
|  |  |  |
| **Plant zones** | **Area (m2)** | **% Coverage** |
| Edge planting |  |  |
| Ephemeral |  |  |
| Shallow marsh |  |  |
| Deep marsh |  |  |
| Submerged marsh |  |  |
|  | | |
| 1. **Macrophyte zone outlet** |  |  |
| Discharge capacity of outlet pipe |  | m3/s |
| 1. **High-flow bypass system** |  |  |
| Pipe |  |  |
| Diameter of pipe |  | mm |
| Channel |  |  |
| Longitudinal slope |  | % |
| Base width |  | M |
| Batter slope |  | H:V |
| Weir length |  | m |
| Weir crest level |  | m |