 P02	Designer's Risk Management Schedule (for Simple Projects)	
	Project Title Wern Nature Reserve	Oracle Project Code 10048826
Design Stage: Detailed design		

1. Scope of Arcadis commission:

This hazard record is for the construction of a reserve and landscaping bunds alongside the Montgomery Canal between Arddleen and Welshpool (SJ 25665 13049, SY21 9JX). The reserve will provide approximately 0.9ha of waterspace for compensatory habitat and is one of several packages which form part of a wider scheme to restore the Montgomery Canal.

2. Brief description of the works:

Prior to commencement of works, existing water mains on site will be diverted by the Trust.

1. Establish site access, compounds and welfare facilities.
2. Excavate existing ground to form new reserve profile.
3. Excavate topsoil in locations of bunds.
4. Form landscaping bunds using excavated material.
5. Construct RC channel to connect reserve and canal.
6. Allow reserve to fill with water from canal.
7. Install gate in existing fence.

3. Key hazard elimination and risk reduction measures taken during the design process:

1. Principles of good design have been employed, including the ERIC hierarchy of control.
2. Desktop service searches have been undertaken to PAS 128 Type D (desk based) to identify services present on the site.
3. Site visits undertaken to clarify site constraints and determine best position for channel structure that minimises removal of vegetation.
4. Combination of topographic survey data and LiDAR data used to assess gradients of existing ground levels. Reserve positioned to minimise excavation into steeper slopes to reduce the volume of excavated material and the length/height of slope required to grade down to the reserve bed.
5. Ground investigation and trial pits undertaken to determine soil types on site and potential for leakage. Waste Options Appraisal report 10048826-RPT-XX-XXX-P01 describes the existing subsoil as "blueish grey or greyish/orangish brown sandy gravelly clay or clayey gravelly sand". It is therefore assumed that the reserve does not require lining.
6. Liaison with utility owners to determine required clearance for overhead lines and current height.
7. Invert of concrete channel set at level that accommodates operational water level in canal of 65.5mAOD and maintains required draught for weed boat.
8. Positioning of bunds designed to be outside of flood zone to avoid impacting flooding.
9. Reserve offset from central oak tree and slopes reduced to 1:4 around tree to avoid damage to roots.
10. Bunds designed with 1-2m offset from reserve edge to accommodate potential Public Right of Way diversion, maintenance access around entire reserve edge and space for potential accessible service connection chambers.
11. Bund designed to tie in with existing ground level where necessary to prevent ponding on the upstream face.
12. Additional length of bund added at northwest corner of reserve to increase freeboard and prevent reserve overtopping before canal in heavy rain.

4. Significant residual project-specific hazards and risks remaining at design completion:

1. **Presence of underground services.** Several water mains and sub-mains run across the site and will be diverted by the Trust prior to commencement of works. Indicative positions of diverted services are shown on drawing 00101, however exact locations are not known. Contractor to control risk.
2. **Presence of overhead cables.** Overhead cables cross the site to the east and southernmost corner. Contractor to control risk.
3. **Unknown dimensions and locations of existing service chambers.** There is some ambiguity around the exact position of services and chambers as utility plans do not align directly with features picked up in the topographic survey. Contractor to control risk.
4. **Unknown construction and condition of canal bank.** The canal bank is overgrown and its condition and type of construction are unknown. There is therefore potential for the canal to breach during the works. Contractor to control risk.
5. **Damage to oak tree and roots.** Reserve is designed with offset from oak tree, however the exact extent of roots is unknown and there is potential for damage to any part of the tree during construction. Contractor to control risk.
6. **Public safety.** The reserve is generally constructed to match a canal environment, which does not have fencing. As such the client has requested that no fencing be included in the design and will undertake a PSRA (VRA) on completion.



5. Specific construction requirements (e.g. construction sequence):

- Service diversions to be agreed prior to commencing any works.
- Reserve excavated, temporary cofferdam constructed at location of RC channel and canal locally dewatered. RC channel constructed. Stop planks placed to 65.5mAOD. Cofferdam decommissioned, top stop plank removed to allow water to fill reserve.

6. Means by which significant residual hazards and risks conveyed to contractors and others:

Drawings and through discussion with client and contractor.

Date of Review	21/06/2024		
Assessed by:			
Name	Emily Flynn	Signature	Date
-----	-----		21/06/2024
Reviewed by:			
Name	Alex Holt	Signature	Date
-----	-----		21/06/2024

	Designer's Risk Management Schedule (for Simple Projects)			Project Code/Doc No: 10048826-ARC-EWE-R1-TH-CE-00101	
	Project Title: Wern Nature Reserve	Assessor (Name): Emily Flynn	Assessor (Signature): 	Date: 21/06/24	Revision: P02

Ref	Activity & Hazard	Design Input and Designer Actions Taken to Eliminate/Mitigate Hazards	Remaining Significant Risks	Residual Risk Rating: High/ Medium/ Low	Residual Risk to be Shown on Drawings Yes/No
Note: This risk assessment is not intended to identify every common construction site risk. It is assumed that a competent contractor will be undertaking the works and will understand the risks associated with working in a waterside environment, for example working beside water.					
1	Service main and sub-main water supplies Main and sub-main supplies are present within the excavation area of the reserve, with the connection point in the centre of the area. Any excavation could result in damaging the services and would result in the loss of service to the public and damage to third-party property.	Design has been produced in such a way to accommodate potential diverted services, however service diversions will be designed by the utility owner and diversions will be completed prior to commencement of the works so no further design input is available.	Risk remains. Contractor to confirm exact positions of diverted and existing services and avoid damaging them.	Medium	Yes

Ref	Activity & Hazard	Design Input and Designer Actions Taken to Eliminate/Mitigate Hazards	Remaining Significant Risks	Residual Risk Rating: High/ Medium/ Low	Residual Risk to be Shown on Drawings Yes/No
<p>Note: This risk assessment is not intended to identify every common construction site risk. It is assumed that a competent contractor will be undertaking the works and will understand the risks associated with working in a waterside environment, for example working beside water.</p>					
2	<p>Service – Overhead 11kV power line</p> <p>There are 2 wooden masts carrying OH 11kV power lines on the eastern half of the site. Striking the service during construction could lead to electrocution, injury and death. Guidance Note GS6 from the HSE states a minimum clearance of 5.2m from ground to 11kV overhead cables and raising the ground level underneath the cables will reduce the clearance.</p>	<p>This is an inherent risk due to the client’s requirement to distribute excavated material under and around the masts and cables. The bund has been offset from the masts to avoid interaction. The clearance of the cables was measured on site by the utility owner to be 7.0m (minimum) from existing ground level. The bund was designed to reduce in height from 2m to 1.6m underneath the cables, maintaining the required minimum clearance.</p>	<p>Risk remains. Contractor to ensure safe working near overhead cables during construction. Contractor to ensure minimum clearance of 5.2m is maintained.</p>	Medium	Yes
3	<p>Lack of information around existing connection chambers</p> <p>The depth and scale of the existing structures is unknown. This could impact the design and proposed diversions. Utility plans do not align directly with features from the topographic survey, so exact locations are unknown.</p>	<p>No design input available. This is an inherent risk of the site.</p>	<p>Risk remains. Contractor to verify position of all services and chambers before works commence.</p>	Medium	Yes

Ref	Activity & Hazard	Design Input and Designer Actions Taken to Eliminate/Mitigate Hazards	Remaining Significant Risks	Residual Risk Rating: High/ Medium/ Low	Residual Risk to be Shown on Drawings Yes/No
<p>Note: This risk assessment is not intended to identify every common construction site risk. It is assumed that a competent contractor will be undertaking the works and will understand the risks associated with working in a waterside environment, for example working beside water.</p>					
4	<p>Unknown construction and condition of canal bank</p> <p>Excavation will be undertaken close to the existing bank, and RC channel constructed in the bank. The unknown construction and condition leaves possibility for the canal to breach.</p>	<p>The reserve edge is offset from the canal bank to reduce likelihood of breaching.</p>	<p>Risk remains. Contractor to monitor condition of canal bank during works.</p>	Medium	Yes
5	<p>Proposed excavation near a tree in centre of the reserve</p> <p>Any excavation around the tree could damage the root system and either harm or kill the existing oak tree.</p>	<p>A conservative estimate of the tree's canopy diameter using Google Maps (2023) is 18m. A buffer of minimum 2.5m has been provided around the tree's canopy.</p>	<p>Risk remains. Contractor to take care not to damage tree or roots during construction.</p>	Low	Yes
6	<p>Public safety</p> <p>Members of the public could access the reserve or channel structure and get injured or drown.</p>	<p>This is an inherent risk due to the site location and requirement to maintain the Public Right of Way around the reserve. The reserve is generally constructed to match a canal environment, which does not have fencing. As such the client has requested that no fencing be included in the design.</p>	<p>Risk remains. Client will undertake a PSRA (VRA) on completion.</p>	Low	No

Ref	Activity & Hazard	Design Input and Designer Actions Taken to Eliminate/Mitigate Hazards	Remaining Significant Risks	Residual Risk Rating: High/ Medium/ Low	Residual Risk to be Shown on Drawings Yes/No
<p>Note: This risk assessment is not intended to identify every common construction site risk. It is assumed that a competent contractor will be undertaking the works and will understand the risks associated with working in a waterside environment, for example working beside water.</p>					
7	<p>Weed boat access</p> <p>Channel is designed for access by a specific weed boat. If a different boat is used or canal water level drops below operational level, there is a risk that a boat won't be able to access the reserve or will cause damage to the channel structure.</p>	<p>The channel is designed to provide 600mm draught and 2.2m clear width for a weed boat to be driven into the reserve from the canal. These dimensions are based on manufacturer's data and a water level of 65.46mAOD, which is the lowest level on Wern Clay Pit weir from Survey Operations drawing 23L007 produced in January 2024.</p>	<p>No remaining significant risk.</p>	<p>Low</p>	<p>No</p>
8	<p>Ponding behind landscaping bunds</p> <p>The landscaping bunds around the reserve are on a steep slope so could create an area for ponding on their upstream faces.</p>	<p>Bunds designed to tie into existing ground level where necessary to prevent ponding.</p>	<p>No remaining significant risk.</p>	<p>Low</p>	<p>No</p>
9	<p>Overtopping of reserve</p> <p>The existing ground level is close to canal water level near the northwest corner of the reserve, with the ground dropping further the other side of the existing fence. The reserve could overtop in heavy rain events.</p>	<p>Additional bund added at northwest corner to increase freeboard to 500mm above Top Water Level in reserve.</p>	<p>No remaining significant risk.</p>	<p>Low</p>	<p>No</p>